PROCEEDINGS

OF THE

BOSTON SOCIETY OF NATURAL HISTORY.

TAKEN FROM THE SOCIETY'S RECORDS.

January 2, 1861.

The President in the Chair.

The following papers were presented:

ON THE SUPPOSED IDENTITY OF THE PARADOXIDES HARLANI, GREEN, WITH THE PARADOXIDES SPINOSUS, BOECK. BY ALBERT ORDWAY.

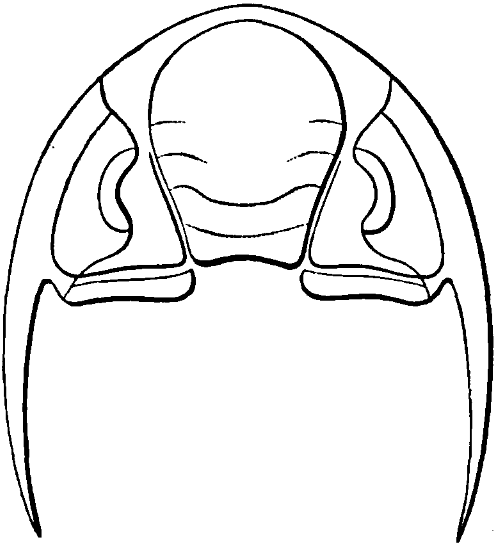
In an interesting communication, made by M. Barrande, to the Geological Society of France, at their meeting on the 7th of May, 1860 (see Bull. de la Soc. Geol. de France, vol. xvii.), he gave it as his opinion that the *Paradoxides Harlani*, Green, is identical with the *Paradoxides spinosus*, Boeck. An opinion coming from one who is so eminent in science, and whose work on the "Système Silurien du Centre de la Bohême" stands as an everlasting monument to his learning and untiring zeal, is certainly worthy of being carefully weighed before venturing to doubt it. But when we remember the imperfect means of comparison which M. Barrande had at his command, wanting some of the most characteristic portions of the animal, we can easily imagine that with all his scientific acumen, and accurate knowledge of Trilobites, he should fail to establish the difference between the two species under discussion.

This being a point of some local interest, as well as having a bearing on the question of the distribution of species in the Primordial fauna, I have thought it not unworthy of attention. Having had access to all the collections in our vicinity, and having frequently visited the quarry at Braintree, and made a large collection of its interesting treasures, I have thought the materials at my disposal sufficiently large to enable me to make an accurate comparison of them with the *Paradoxides spinosus*. Nor have I been limited in this comparison to the excellent figures and description given by M. Barrande of the *spinosus*, but have been enabled to make the comparison directly from the excellent specimens of that species which are in the Museum of Comparative Zoölogy. After a long and careful comparison, I think I can venture to say that the *Paradoxides Harlani* is certainly a distinct species from the *Paradoxides spinosus*. I will now lay before you the principal differences which have led me to this opinion, and you can judge of its worth for yourselves.

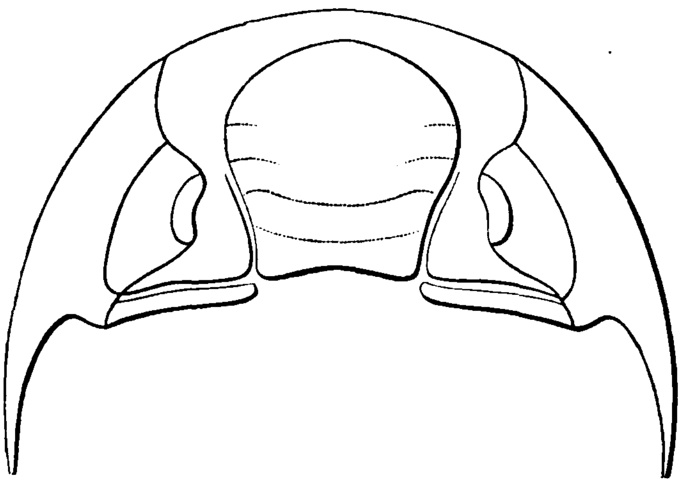
One of the first things that strikes us in examining the Paradoxides from Braintree is its great size. Most of the specimens measure ten and twelve inches in length, and some of them, as indicated without doubt by fragments which I have found, must have measured at least eighteen or twenty inches. In the " Systême Silurien du Centre de la Bohême," M. Barrande gives ten inches as the length of the largest specimens of the *Paradoxides spinosus*, but in his more recent publications he says that he has found specimens in which the head is over nine inches and a half in width. While this is the very largest specimen of the *spinosus* known, we have specimens from Braintree in which the head measures about thirteen inches in width.

The glabella of the *Harlani* is much wider in proportion to its length than it is in the *spinosus*. What makes this especially apparent is the difference which it produces in the anterior outline, making it less oval, and giving the glabella a square appearance. The lateral lobes of the glabella appear to have the same *general* shape as in the *spinosus*, but I have not been able to determine their outline very accurately. In no specimen, however, have I found the anterior furrow of the glabella distinctly marked; in fact, I have not been able to satisfy myself of its presence. We can determine, however, from the position of the other furrows, that if the anterior one was present, its position must have been different from what it is in the *spinosus*, and that, in connection with the squareness of the glabella, would produce a material difference in the shape of the frontal lobe, making it much narrower than it is in that species.

It is perhaps in the cephalic limb that we find the most characteristic differences. It is at least twice as broad, comparatively, in the *Harlani* as it is in the *spinosus*. This great width of the limb alters the exterior contour of the head to a great extent, causing it to present the appearance of part of a very broad oval, instead of the more narrow oval of the exterior contour of the head of the *spinosus*. It also alters the direction of the facial suture, necessitates the changing of the



Paradoxides spinosus, Boeck.



Paradoxides Harlani, Green.

position of the palpebral lobe, and shortens the movable cheek. Not only is the cephalic limb of the *Harlani* much wider than that of the *spinosus*, but it presents other and very characteristic differences. Instead of its lateral portion reaching to about the seventh pleura, and almost touching their tips, it only reaches to the fourth pleura, and is quite a distance from the body.

I have already spoken of the position of the palpebral lobe and the shortness of the cheek in the *Harlani.* The palpebral lobe is also shorter and much less convex than in the *spinosus.* We also observe a slight difference in the posterior lobe of the cheek, which is broad at its tip and narrows gradually towards the dorsal furrow.

The axis of the body narrows much more towards the pygidium in *Harlani*, than it does in the *spinosus.* The pleuræ also present marked differences, which I think M. Barrande would not have failed to notice if he had possessed other means of comparison than photographs. The external, or curved portion of the pleuræ, is much longer in comparison to the internal portion in the *Harlani* than in the *spinosus*, the curve being so long that they do not present that somewhat angulated appearance which we often notice in that species. In fact, they much more resemble the pleuræ of *Paradoxides imperialis*, and would be more easily mistaken for them than for those of *P. spinosus.* This comparison of the pleuræ holds through all of them. In the middle segments of the body the curved portion of the pleuræ is fully equal to the horizontal portion, and as we descend towards the pygidium the difference becomes much more marked, the pleuræ assuming a long sweeping curve almost from the point of their attachment to the axis. So that the posterior pleuræ, especially, are very different from what they are either in the long or wide form of the *spinosus*, for according to the figures of M. Barrande they appear to differ in the two forms. Another very interesting feature of the pleuræ is, that in the *smallest* specimen of the Harlani which I have seen, the last pleura extends to a very marked distance beyond the pygidium. According to the description of M. Barrande this only occurs in the largest specimens of the *spinosus.*

The pygidium I have not found sufficiently well preserved to make an accurate comparison of the two species.

I have found several specimens of the hypostome well preserved, and these add to the evidence of their belonging to a species distinct from the *spinosus.* They have the anterior portion much wider than in the *spinosus*, so that that part presents a much longer oval.

I have now reviewed some of the principal points of difference which I have noticed in comparing the specimens from Braintree with the *Paradoxides spinosus*, and after carefully weighing their value I am fully convinced that the *Paradoxides Harlani* is really a distinct species, so related to the former that without doubt it was a representative of that species in the Primordial fauna of America.

To place the matter in as clear a light as possible, I will briefly recapitulate the characters by which we may distinguish the *Harlani* from the *spinosus*. 1. By its greater size. 2. The greater width of the glabella, and the form of its frontal lobe. 3. The great width of the cephalic limb, the shortness of its lateral portion, and the distance to which it is removed from the thorax. 4. The shortness of the movable cheek, and the shape of its posterior lobe. 5. The different position of the palpebral lobe, and its less convexity. 6. The greater length of the curve of the pleuræ, and the probable extension of the last one beyond the pygidium. 7. The width of the hypostome, and the long oval form of its anterior portion.

After citing these differences it gives me pleasure to quote the following paragraph from the communication of M. Barrande, both because it strengthens my own conclusion, and shows the knowledge and forethought of the learned author. After speaking of the points in which *P. Harlani* seems to agree with *P. spinosus*, he says: "Pour compléter ce parallèle, il nous manque encore l' hypostome du *Paradoxides* américain. C'est seulement dans cette pièce, dans les contours extèrieurs de la tête et dans les pointes génales, qu'il pourrait se trouver quelques différences inattendues et contraires a l' indentité apparente dans toute les autres parties du corps." Now it is precisely in these points, which with his characteristic foresight M. Barrande pointed out, that we find the most marked differences of *P. Harlani*, though I think that I have also shown differences in some other parts.

My conclusion does not in the least weaken the arguments which have been brought forward to prove the existence of the Primordial fauna in America, but rather indicates the diversity of life in those early ages, and perhaps the distribution of animals into geographical faunæ, as in later years.

On the Occurrence of other Fossil Forms at Braintree, Mass. By Albert Ordway.

At one of the past meetings of the Society, there was exhibited the cast of a fragment of rock from Newfoundland, on which were a number of specimens of Trilobites, which were referred to the genus *Conocephalutes*, and of which Mr. Marcou spoke in his interesting paper "On the Primordial Fauna," under that name. (See Proc. Bost. Soc. Nat. Hist. vol. vii. p. 369.) From a comparison of this cast, with specimens from Bohemia, I am inclined to refer the specimens to the genus *Ellipsocephalus*, as they have not the narrowing of the glabella in its anterior part, which is characteristic of *Conocephalites*, nor do there appear to be any furrows on the glabella. The specimens are, however, somewhat imperfect, and having only seen a cast, I would not pretend to speak with much certainly on this point. Which ever genus they may hereafter be found to belong to, it does not alter the evidence of the existence of the Primordial Fauna in Newfoundland, for both genera are characteristic of it. The important point is this. From the occurrence of these fossils in the same beds as the *Paradoxides Bennetii*, Salter, we should naturally look for something representing them in the slates at Braintree. And I have the pleasure of stating that during the last summer I found a fragment at Braintree, which I find to belong to the same genus as the new specimens from Newfoundland.

I have also found at Braintree a distinct fucoidal impression which shows three branches, each about four inches long, but not sufficiently well marked to afford any evidence with regard to its nature.

These two discoveries, although slight, show us the existence of a variety of organic remains in the Braintree slates, and incite us to further investigations. And I hope that the next summer will not pass without further developing their riches, and affording us some new facts with regard to the Primordial fauna of the eastern portion of America.

On the genus Raphidophora, Serville; with descriptions of four species from the Caves of Kentucky, and from the Pacific Coast. By Samuel H. Scudder.

In 1839, Serville, in his Histoire naturelle des Orthoptères, characerized, among the Locustariæ, the genus *Raphidophora*, from a single species from Java, *R. picea*. Burmeister in the previous year, had described the same insect, in his Handbuch der Entomologie, under the specific name *loricata*, and placed it in the genus *Phalangopsis* of Serville, together with other species of either genus, separating them from one another as different sections of the same genus; he, however, discovered his mistake before the completion of his work, and in the appended corrections, notices "that the species of the first section appear to belong to the following family," (Gryllodea;) and subsequently (Germar's Zeitschrift für Entomologie, II. 72), he asserts that his second section, in which occurs his *P. loricata*, is identical with Serville's genus *Raphidophora*.

Misled by Burmeister's error, in the body of his work — where he describes one species "*P. lapidicola*" from the United States, without much doubt, identical with the well-known *R. maculata* of Harris,— and overlooking the correction made by Burmeister himself in his appendix and in Germar's Zeitschrift, and probably also noticing the strong general resemblance of *P. longipes*, of Central America, as figured in Serville's work, to our "wingless crickets," all the species found with us have been referred by American entomologists to the genus *Phalangopsis*. A careful examination will prove that they all belong to the genus *Raphidophora*, no species of *Phalangopsis* having been yet described from the United States.

The following table exhibits the synonymy of the hitherto described species of *Raphidophora*, so far as known to me: —

1. *Raphidophora loricata*, Burm. Germar, Zeitschrift f. Ent. II. p. 72.
   Phalangopsis loricata, d. Haan, Burm. Handbuch der Ent. II. p. 722.
   Raphidophora picea, Serv. Hist. nat. p. 391 (Java).
2. *Raphidophora palpata*, Charpentier, Orth. descr. et depict. pl. 44.
   " " " Germ. Zeitsch. III. p. 319.
   " " Fischer, Orth. Eur. p. 200.
   Locusta palpata, Sulzer, Abgek. Gesch. d. Ins. p. 83.
   Raphidophora araneiformis, Charp. Germ. Zeitsch. III. p. 319.
   Phalangopsis araneiformis, Germ. Burm. Handb. II. pp. 722, 1014.
   Phalangopsis araneiformis, Herr-Schaeffer Nomencl. II. pp. 15, 26 (Europe).
3. *Raphidophora cavicola*, Fischer, Orth. Eur. p. 301.
   Locusta cavicola, Koller, Beiträge zur Landesk. III. Wien, 1833, p. 80.
   Phalangopsis latebrarum, Herr-Schaeffer Nomencl. II. p. 15.
   Phalangopsis latebricola, Herr-Schaeffer Nomencl. II. p. 26 (caves in Europe).
4. *Raphidophora lapidicola*, Burm. Germ. Zeitsch. III. p. 319.
   Phalangopsis lapidicola, Burm. Handb. p. 723.
   ? *Raphidophora maculata*, Harris, Ins. injurious to Veg. Ed. 1841, p. 126.
   ? *Ephippigera maculata*, Harris, Cat. Ins. Mass. p. 56.
   ? *Phalangopsis* " " Ins. injurious to Veg. Ed. 1852, p. 137.
   (The posterior tibiæ of the male of this species are not waved at the base, as asserted by Haldeman, Proc. Am. Ass. Adv. Sc. II. p. 336) (United States).
5. *Raphidophora gracilipes*.
   Phalangopsis gracilipes, Hald. Proc. Am. Ass. Adv. Sc. II. p. 336 (Pennsylvania).
6. *Raphidophora scabripes*.
   Phalangopsis scabripes, Hald. Proc. Ac. Nat. Sc. Phil. VI. p. 364 (Alabama).

It was first mentioned in 1844, by Telkampf,* in connection with descriptions of the blind fish of the Mammoth Cave, that a species of

* Telkampf: Müller's Archiv für Anat. und Phys. 1844, p. 318.
Wiegmann's Archiv für Nat. 1844, p. 384.
Thompson: Annals and Magazine of Nat. Hist. 1844, p. 111.
Agassiz: Silliman's Am. Journ. of Science, 1851, p. 127.
Schiödte: Kongl. Danske Vid. Selsk. Skrift, 1849, p. 5.
Fischer: Orthoptera Europæa, 1853, p. 200.

Phalangopsis-like Orthopteron was also an inhabitant of the cave; and though subsequent mention, in similar connections, has been made by Thompson, Agassiz, Schiödte, and Fischer, no further account has been given of it than that it resembled the *P. longipes* of Serville.

Having been lately favored with specimens of two species, collected in different Kentucky caves, by Mr. Alpheus Hyatt, and of one of them by my brother in the Mammoth Cave, and having also had the opportunity given me of examining numerous specimens of both in the Museum of Comparative Zoölogy in Cambridge, I take this opportunity to give a more exact account of them than has hitherto been done. I am indebted to my brother and to Mr. Hyatt for the information I have given respecting their habits.

Raphidophora subterranea, nov. sp.

Fuscous *, under surface of body, the head except vertex, both pair of palpi except extremities, coxæ, under side of femora, terminal third of tibiæ, and the tarsi except the under edge and extremities, paler; some faint reddish-brown spots on upper surface of thoracic segments. A much depressed, scarcely perceptible carina along the dorsum. All the appendages densely covered with short, fine, microscopic hairs.

Antennæ dark brown at base, becoming paler toward the tip; first joint stout, somewhat flattened anteriorly, obliquely truncated interiorly at the base; second joint half as long and as broad as first, compressed anteriorly; third cylindrical, as long as first, at base of the same breadth as second, but narrowing rapidly, though but slightly; remainder of unequal length, but averaging, at first, half the length of the third joint, slowly diminishing in size, so that the whole tapers very gradually to the very delicate extremity. Tip of the last joint of the maxillary palpus with a slight excavation interiorly. Eyes black, subovate, subglobose.

Four anterior coxæ carinated externally, the carina of the two anterior being produced into a central spine. A double row of distant, alternate, short spines on under side of the four anterior tibiæ, with two upon either side at the extremity, of which the lower is largest, embracing the base of the tarsi; posterior tibiæ with a double row of minute sharp spines, extending nearly the whole length of the hinder portion, raised at a very small angle, interrupted by longer, distant, and alternate ones, elevated to a higher angle; upon the anterior lower third are two approximate rows of distant spines; three spines at the extremity upon either side, embracing the first joint of the tarsi, the first and third of a nearly equal size and appearance to the larger tibial spines, while the second is three times

* The colors of both species are described from specimens dried after a long immersion in alcohol.

as long, and thickly covered with short, fine hairs; all the longer spines are movable and tipped with reddish-brown, approaching to black; terminal half of claws black.

Ovipositor rufo-testaceous, swollen at the base, flattened in the terminal two thirds, nearly straight, slightly curved upwards and ensiform at the tip, produced to a sharp point with five or six serrations on the lower edge of extremity of inner valves, but hidden by the outer ones; anal cerci tapering to a fine point, furnished, besides the short hairs common to all the appendages, with exceedingly fine long ones, shortening toward the apex.*

MEASUREMENTS. THE AVERAGE OF MANY SPECIMENS. Anterior femora, .54-inch; ant. tibiæ, .59-inch; middle femora, .49-inch; middle tibiæ, .59-inch; posterior femora, .84-inch; posterior tibiæ, 1.08-inch; antennæ (longest), 4-inch; maxillary palpi, .50-inch; ovipositor, .52-inch; cerci, .26-inch; whole body (as curved), .66-inch.

This species is the one inhabiting the Mammoth Cave of Kentucky, and the adjoining White's Cave; they were found throughout the cave to the remotest parts (seven miles or thereabouts), though not near the entrance, especially in damp, moist situations, where they abound; they were found in especial plenty about "Martha's Vineyard," and in the neighborhood of "Richardson's Spring," where they were discovered, jumping about with the greatest alacrity upon the walls, where only they are found, and even when disturbed, clinging to the ceiling, upon which they walked easily; they would leap away from approaching footsteps, but stop at a cessation of the noise, turning about and swaying their long antennæ in a most ludicrous manner, in the direction whence the disturbance had proceeded; the least noise would increase their tremulousness, while they were unconcerned at distant motions, unaccompanied by sound, even though producing a sensible current of air; neither did the light of the lamp appear to disturb them; their eyes and those of the succeeding species are perfectly formed throughout, and they could apparently see with ease, for they jump away from the slowly approaching hand, so as to necessitate rapidity of motion in seizing them. Late in October, females were obtained enormously distended with eggs.

Raphidophora stygia, nov. sp.

Body pale brown, with the segments bordered posteriorly with dark brown or black, becoming gradually paler toward the hinder part of the body, and dotted with pale spots. Head pale brown, a black spot beneath each eye, and another midway between these. Eyes black, subpyriform, subglobose. Appendages of the mouth dirty pale. Antennæ yellowish brown, paler toward tip, obscurely and distantly

* A more detailed account of the abdominal appendages cannot be given till the homologies of these parts are carefully studied and their nomenclature rectified.

annulated with narrow pale bands; first joint with a central faint brown annulation, shaped as in *subterranea*, but less flattened and truncated; second joint very small, with lateral constrictions; third joint as long as first, cylindrical; fourth joint half as long as third; remainder unequal but very short, and continuing of the same average length, while they become more slender toward the extremity. Last joint of maxillary palpus split interiorly almost its entire length.

Lateral edges of thoracic segments minutely marginate; the pronotum is bordered in front as well as behind with brown, and is irregularly mottled with black and dirty yellow. Legs pale-yellowish, femora and tibiæ and joints of tarsi beneath, especially at extremities, more or less clouded with brown. Coxæ as in *subterranea;* there are three or four distant spines on the upper part of the inner edge of anterior femora, and upon the upper part of both posterior edges of middle femora; the internal terminal lobes of the middle femora also gives rise to a short spine; spines on under side of four anterior tibiæ, same as in *subterranea*, except that the spines of the parallel rows are opposite or nearly so. Posterior femora barred and cross-barred with dark brown bands; beneath, two rows of serrations or rudimentary spines; tibiæ as in *subterranea;* spines and claws tipped with reddish brown.

Ovipositor brown; thickened at base, flattened posteriorly, nearly straight, very slightly curved at the end, the tip with a dull point; inner valves at their extremity waved beneath into three or four dull points, hidden by the outer valves. Anal cerci brown, beset with long delicate hairs, as in *subterranea.*

Measurements. Average of many Specimens. Anterior femora, .34-inch; ant. tibiæ, .36-inch; middle femora, .31-inch; middle tibiæ, .35-inch; posterior femora, .71-inch; post. tibiæ, .76-inch; antennæ (longest), 3.44-inch; maxillary palpi, .33-inch; ovipositor, .51-inch; cerci, 25-inch; body (as curved), .80-inch.

Nearly opposite Hickman's Landing, upon the Kentucky River, there is a large cave, a mile or more in extent, which has received no name; quite near it, farther up the river, is a much smaller one, a few hundred feet only in extent; in this latter place the *stygia* is found,— for convenience' sake we may call it "Hickman's Cave;" though search was made in the larger cave, no *Rhaphidophoræ* were found, but in the remotest corner of Hickman's Cave, in a sort of hollow in the rock, not particularly moist, but having only a sort of cave-dampness, the *stygia* was found plentifully; these were also found exclusively upon the walls. Even the remotest part of the cave is not so gloomy but that some sunlight penetrates it.

The relations of these cave-insects to other *Raphidophoræ* are very interesting. *R. stygia* inhabits a cave only a few hundred feet from the sunlight; *R. subterranea* deep caves, scarcely ever within a mile of the opening; *R. maculata* of Harris lives beneath logs and stones. By a comparison of the minutiæ of the structure of these three species, it will be seen that *R. stygia* holds middle ground between *R. maculata* and *R. subterranea* in the length and slenderness, as well as the shape of the joints of the antennæ, in the form of the dorsal portion of the thoracic segments, in the spines of the edges of the femora and of the terminal lobe of middle femora, in the stoutness of all the legs, in the form of the ovipositor and the teeth of its inner valves, in the abdominal appendages, of which I have not made mention, in the general contour, and even in the coloration of the body; there seems to be but one exception where *stygia* is more nearly allied to *maculata* than to *subterranea*, and that is in the structure of that part of the terminal joint of the maxillary palpus, which Burmeister considers as the organ of touch; further on, I shall mention their relation to those of the Pacific coast.

Raphidophora Agassizii, nov. sp.

Body dirty yellowish brown,* with the segments bordered posteriorly — and the pronotum anteriorly — with black. Head yellowish brown, slightly marked above with darker wavy lines, palpi pale yellow, antennæ yellowish brown becoming paler toward the tip; first joint large, flattened, rounded interiorly, joints immediately succeeding cylindrical, of nearly equal diameter, but the whole antenna tapering toward the tip; second joint as long as its diameter; third, twice as long; fourth, one half longer than its diameter; fifth and succeeding joints subequal, half as long as fourth. Eyes black, subpyriform, subglobose.

Thoracic segments much mottled with yellowish brown; there is a faint pale dorsal line which extends over the head, and through the tubercle of the vertex, interrupting a brown band between the eyes. Coxæ, upper part of femora, the lower part of the tibiæ sometimes, and tarsi, yellowish brown; posterior part of the femora and tibiæ darker; basal portion of posterior femora brownish yellow, barred and obliquely cross-barred with dark brown. All the appendages and posterior half of abdominal segments covered with short fine hairs. Under edges of the anterior femora serrated, with a single spine or two upon the inner edge near the extremity; middle femora with both edges distantly spined; internal terminal lobe of middle femora armed with a spine, and sometimes the external lobe has a very slight one; a double row of alternate spines on the upper side of middle tibiæ, and a double row of opposite spines on under side of both anterior and middle tibiæ, the terminal ones of all the rows being longest. Posterior femora with two rows of minute black spines on the posterior portion interrupted by larger, distant, nearly opposite

*Described from alcoholic specimens.

spines; terminal spines as in *stygia*, but smaller, the longest with scarcely perceptible hairs. Longer spines movable; tips of spines and claws, reddish black.

Ovipositor reddish brown, darker at base, a little curved and slightly turned upwards at the tip, which is produced to a fine point; the inner valves are as in *stygia*, with the dull points produced to delicate spines, the terminal ones slightly recurved and none concealed by the upper valves; anal cerci brown with long fine hairs, longer in the male than in the female.

MEASUREMENTS. AVERAGE OF MANY SPECIMENS. Anterior femora, .24-inch; ant. tibiæ, .26-inch; middle femora, .24-inch; middle tibiæ, .26-inch; posterior femora, .55-inch; post. tibiæ, .58-inch; antennæ (longest), 1.86-inches; maxillary palpi, .25-inch; ovipositor, .34-inch; cerci, ♂ .19-inch; ♀ .12-inch; whole body .80-inch.

Obtained on islands in the Gulf of Georgia, under stones, by Mr. A. E. R. Agassiz, after whom I take pleasure in naming it. The specimens are in the Museum of Comparative Zoölogy, at Cambridge.

Raphidophora xanthostoma, *nov. sp.*

Body brown, pro- and mesonotum faintly mottled with yellowish brown. Head (except the parts of the mouth) dark brown, mottled with pale yellowish; labrum, mandibles, maxillæ, labium, and labial palpi bright straw yellow, with some reddish spots; maxillary palpi, brown and dirty yellow; tubercle of the vertex ridged with dirty yellow, and upon either side a yellow spot; antennæ reddish brown, first two joints darkest; first joint flattened at the base, slightly excavated exteriorly, obliquely truncated interiorly on the basal half, truncated obliquely at the extremity; second joint, cylindrical, half as broad, and one third as long as first; third, twice as long as second, as broad as it is at its junction, narrowing slightly, remainder subequal, a little shorter than second. Eyes subovate, globose.

Sides of thoracic segments emarginate, edged with yellow becoming paler on the metanotum, and reddish on the anterior of pronotum. Legs reddish brown, darkest at the extremities of femora and bases of tibiæ; both sides of posterior tibiæ faintly spotted with equidistant yellowish spots; four anterior tarsi yellowish, with very faint brown bands across the sides; posterior tarsi brown with the joints tipped with yellowish, and having a faint dirty yellow line beneath. Outer posterior edge of anterior femora not covered, as the others, with fine spines; both under edges of middle femora spiny at their terminal half; inner lobe of the extremity of two posterior pair with a small spine; both upper edges of posterior femora supplied with fine spines as far as basal half of the swollen portion; three pair of dark brown spines at the extremity of posterior tibiæ, of which the middle is largest, fully twice as long as the others, with a few very fine short distant hairs upon it, the other spines reddish brown, except the bases of those near the extremity of the tibiæ, which are yellowish; claws, reddish brown, darkest toward tip. Anal cerci stout, yellowish brown, dotted with dirty white, each dot at the base of a delicate hair.

MEASUREMENTS. Anterior femora, .62-inch; ant. tibiæ, .68-inch; middle femora, .60-inch; middle tibiæ, .73-inch; posterior femora, 1.10 inches; post. tibiæ, 1.30 inches; antennæ (broken), 2.00 inches; maxillary palpi, .35-inch; cerci, .18-inch; whole body, .70-inch.

This species is one from a rich collection brought home by Mr. Agassiz from the Pacific coast; it was taken at Crescent City, California, under a large stone; only one specimen was obtained. In the Mus. Comp. Zoöl., Cambridge.

Raphidophora xanthostoma does not belong to the genus in which I have placed it, but is the representative of one closely allied, though perfectly distinct. I do not now characterize it, because I have only a single male specimen to examine, insufficient to give with accuracy and fulness the characteristics of the genus in which it must eventually be placed; it will be sufficient here to say, that it will be found to differ from *Rhaphidophora* in the more rounded front of pronotum, in the more distant and globose eyes, in the very prominent and deeply cleft tubercle of the vertex; there is a marked difference, in that all the femora and tibiæ are rectangular, and the edges minutely spined, except the swollen portion of the posterior femora, which also partakes of this character in its posterior half; the two anterior pair of tibiæ are noticeably longer than the femora, while they are equal in *Raphidophora* proper; the anal cerci are blunt at the extremity and channelled interiorly; all three pair of coxæ are carinated externally, and the epimera of the thoracic segments are produced to emarginate lamellæ which almost overlap the base of the coxæ; the sides of meso- and metanotum are not prolonged downward below the pronotum, and the lower edges of all the coxæ are produced on the inner side to a small dull spine.

On placing these *Rhaphidophoræ* of the Pacific coast side by side with those from the other side of the Rocky Mountains, one cannot but be struck with the peculiar correspondences of structure seen. On certain theories of the origin of species, one would instantly prejudge them to be most closely allied to *R. maculata*, Harris; on the contrary, by examining those parts of their structure which I have mentioned in my previous comparison of *maculata*, *stygia*, and *subterranea*, it will be seen that *Agassizii* recalls most vividly *stygia*, while *xanthostoma* is most closely allied to *subterranea*, they being in short, representative species of distinct faunæ. *R. Agassizii* will be found closely related to *R. stygia* in the shape of the basal joints of the antennæ, the terminal opening of the last joint of the maxillary palpus, in the shape of the legs, in the spines of the four anterior femora, in the form of the ovipositor and the spines of the inner valves, in the abdominal appendages of the male, and in the general markings of the whole body; and as this species from the Gulf of Georgia is found to be most closely allied to the *Raphidophora* of the shallow cave, so that from California, in the minutiæ of its structural peculiarities, reminds us of that from the deeper cave; this will be seen in the shape and comparative size of the basal joints of the antennæ, in the compressed terminal joint of the maxillary palpus, as well as in its interior split, and in the length and slenderness of the legs; whilst in the tubercle of the vertex, in the shortening of the meso- and metanotum, and in the proportional length of the four anterior femora to the tibiæ, *R. subterranea* even approaches the genus to which *xanthostoma* belongs.

The Javanese species, *R. loricata*, Burm. (according to Serville's description), differs from all our species, in the form and comparative size of the terminal joint of the maxillary palpi, in the coxæ of mesothorax, in the terminal spines of the four anterior femora (from which characteristic Serville derives the generic name), in the character of the terminal spines of posterior tibiæ, in the non-compressed form of tarsi, and the presence of spines upon their first joint, and (in most) in the comparative length of the cerci.

From the European species, *R. palpata*, Charp., *and R. cavicola*, Fisch., ours differ mostly in the form and comparative size of the ovipositor, and I might add also in the general structure of the abdominal appendages, were it not certain that Fischer's description of these parts was taken from dried specimens, which could not exhibit their true character.

NOTE. In my comparisons I have made frequent mention of *R. maculata*, Harris, which is mentioned in the synonymical table as the same as *R. lapidicola*, Burm. I have not used the latter name, because I am sure that the insects before me were the *R. maculata*, Harr., while I am not equally confident that they were the *R. lapidicola*, Burm.

DESCRIPTIONS OF SHELLS COLLECTED BY THE NORTH PACIFIC EXPLORING EXPEDITION. BY DR. A. A. GOULD, *(continued.)*

TECTARIUS LUTEUS. T. parva, biconica, lutea, epidermide calcareâ incrustata, lineis incrementi tenuibus et lineis volventibus minutissimis antrorsum crescentibus reticulata; anfr. 7, conicis, acutè carinatis, ad suturam imbricantibus et subnodulosis: apertura rhomboidea; labro acuto; columellâ callo erecto indutâ. Axis, 6 +; diam. 4 millim. Inhabits China Seas. W. S.

A curious little shell which I was at a loss at first where to place; but, on the whole, do not hesitate to place it under this genus.

SIGARETUS LUCIDUS. T. parvula, depressa, candida, tenuis, lineis incrementi et striis volventibus reticulata; anfr. 3 +, apice e margine remoto, regione umbilicali concavo, calloso, minutè perforato;

apertura e tribus duas partes faciei ventralis amplectente. Long. 10; lat. 7; alt. 2 millim. Taken with the animal in the North China Seas. W. S.

MARGARITA IANTHINA. T. globoso-conica, tenuis, dilutè ianthina, striis crebris volventibus cincta, satis umbilicata, ad peripheriam subangulata; anfr. 6 + ventricosis; suturâ profundâ: apertura rotundata, anticè subangulata; columellâ rectâ, acutâ: fauce margaritaceâ. Axis, 8; diam. 20 millim. Inhabits Arctic Ocean.

Similar in form and size to *L. Schantarica*, Midd., but thinner, more angular, differently colored, and with a much larger umbilicus.

MARGARITA MUSIVA. T. pyramidalis, margaritacea, crustâ cinereâ fusco tessellatâ induta; anfr. 6, ultimo tricarinato (ceteris bicarinatis); basi convexiusculo polito; umbilico amplo, conico, carinâ plicatâ marginato: apertura circularis; columellâ vix reflexâ, ad carinam umbilicalem terminante. Operculum corneum, lineis incrementi concinnè granulatis. Axis, 6; diam. 5 millim. Inhabits Hong Kong Harbor, in 10 fath., shelly gravel. W. S.

Allied to *M. carinata*, *biangulosa*, &c.

MARGARITA ARTICULATA. T. parva, globoso-conica, livescens; anfr. 6, rotundatis, ultimo filis circ. 5 (ceteris 3) cinctis, juxtà suturam excavatis; filis coloribus pallidis et obscurioribus alternantibus articulatis, interspatiis concinnè clathratis; basi nitido concentricè striato; umbilico amplo eleganter plicato: apertura circularis; labro tenui. Axis, 5; diam. 6 millim. Inhabits Simon's Bay, Cape Good Hope. W. S.

Much like *M. dilecta* A. Ad.

MARGARITA ALBULA. T. parva, tenuis, ovato-turbinata, pallidè grisea, striis volventibus tenuibus insculpta; anfr. 4 citò crescentibus, rotundatis, ad peripheriam obtusis; basi convexo, arctè perforato: apertura subcircularis; peritremate acuto, ferè continuo. Axis, 5; diam. 8 millim. Inhabits Arctic Seas. W. S.

Much like an overgrown *M. arctica*, but it is covered with an opaque calcareous crust; the suture is less impressed; the umbilicus smaller, and it is everywhere spirally striated.

MARGARITA MUSTELINA. T. minuta, tenuis, globoso-conica, infra concentricè striata, livida albo propè suturam parcè strigata; anfr. 4 ventricosis; peripheriâ obtusè angulatâ; basi rotundato latè perforato: apertura ovata; columellâ tenui, arcuatâ. Diam. 4; axis, 3 + millim. Inhabits Hakodadi Bay, at low water. W. S.

MARGARITA LENTICULA. T. minuta, depressa, lenticularis, concavo-convexa, lactea, striis tenuissimis ordinatis cincta; anfr. 4 declivibus, propè suturam excavatis; areâ umbilicali lirâ in labro desinente cinctâ: obliquè et arctè perforata: apertura rotundata quodammodo transversa; columellâ cylindricâ umbilico obviâ. Axis, 3; diam. 5 millim. Sea shore, Loo Choo. W. S.

This pretty, depressed species may very likely belong to a distinct genus; but I find no other one which will better receive it.

MARGARITA PINTADO. T. parva, ovato-globosa, depressa, tenuis, cinerea; anfr. 5 ventricosis juxta suturam planulatis, liris 5 volventibus fusco et albo articulatis cinctis; basi rotundato, latè perforato, concentricè sulcato et articulato: apertura rotundato-ovata; labro tenui; columellâ incrassatâ, nacreâ, anticè cuspidatâ. Axis, 4; diam. 5 millim. Inhabits Simon's Bay, Cape Good Hope, 12 fathoms, sandy. W. S.

Characters in many respects like those of Monilea, rather than of Margarita.

GEN. MONILEA. Ommatophori externi, liberi; tubus analis ex angulo postico aperturæ protrusus; lobi cervicales valdè fimbriati; solea elongata, lanceolata, anguli anteriores valdè protracti; cirrhi laterales utrimque quinque quorum postici multò breviores.

These characters are drawn from *M. nucleses* Phil. and have not before been given, the genus having been established upon the shell alone.

MONILEA APICINA. T. parva, ovato-conica, tenuis, filis numerosis subequalibus cincta; apice et flammulis sparsis radiantibus rosaceis; anfr. 5 convexiusculis ad peripheriam obtusis; suturâ profundâ; basi convexo, lineis incrementi nonnihil granulatis; umbilico minuto, costâ callosâ marginali et alterâ interiori cincto: apertura ferè circularis. Axis, 5; diam. 6 millim. Inhabits Port Jackson. W. S.

MONILEA VERNICOSA. T. parva, tenuis, depressa, orbicularis, nitida, minutissime reticulata, virescens strigis saturatioribus ad suturam et ad peripheriam quadratim dilatatis et supernè cingulis 4 albo articulatis picta; anfr. 5 convexis ad peripheriam subacutis; suturâ profundâ; basi convexo; umbilico profundo pallido intus excavato et plicato: apertura ampla; columellâ expansâ, anticè angulatâ, extus dentatâ. Axis, 4; diam. 6 millim. Inhabits Ousima. W. S.

MONILEA NANA. T. minuta, solida, ovato-globosa, albida; anfr. 4 ad suturam plicatis, ultimis liris granulosis 2–3 cinctis; apice obtuso levigato; basi convexo, concinnè striato; umbilico satis magno, plicato-crenulato: apertura circularis; labro crasso; columellâ tenui, anticè dilatatâ. Diam. 2+ millim. Inhabits China Coral Seas. W. S.

MONILEA INEPTA. T. minuta, solida, ovato-conica, filis (quorum singulo eminentiore) articulatis rosaceis vel argillaceis cincta, intervallis pallidioribus, regione suturali tessellato; anfr. 4+ convexis; apice obtuso; basi convexo; umbilico modico, plicato, albido cincto:

apertura circularis; labro simplici, crasso; columellâ æquabili. Diam. 3 millim. Inhabits Kagosima Bay. W. S.

MONILEA GLAREOSA. T. parva, solida, ovato-globosa, cinerea flammulis radiantibus fuscescentibus variegata; anfr. 5 ventricosis, apicalibus plicato-granulosis, ceteris liris frequentibus, quorum 3–4 majoribus interdum subdivisis cinctis; basi rotundato; umbilico modico, ad marginem plicato-crenato: apertura circularis; labro incrassato, simplici. Diam. 5 millim. Inhabits Loo Choo, Ousima and Kikaia; under surf-washed stones. W. S.

MONILEA SPURIA. T. parva, rudis, crassa, depressa, orbicularis, albida; anfr. 4, supernis simplicibus, alteris liris 4 elevatis et lineis incrementi decussatis, ultimo ad peripheriam obtuso; basi convexo; umbilico amplo, profundo, scalariformi: apertura circularis; columellâ tenui; labro anticè dilatato. Diam. 5; axis, 4 millim. Inhabits Simon's Bay; low-water mark, under stones. W. S.

ETHALIA RUFULA. T. parvula, lenticularis, polita, nitida, maculis subquadratis ad peripheriam et propè suturam, et lineis angulatis rufis ornata; anfr. 6 convexiusculis, ubique sulcis angularibus remotis cinctis; suturâ profundâ; basi ferrugineo reticulato; umbilico lato, scalariformi, margine decoloratâ: apertura angulata; callo columellari tenui, umbilicum haud longe ambiente. Axis, 4; diam. 6 millim. Inhabits Ousima. W. S.

ETHALIA CAPILLATA. T. parva, lenticularis, levis, nitida, viridans vel fulvescens lineis tenuibus angulatis gregatim intersecantibus et strigis radiantibus ornata; anfr. 6 planulatis ad peripheriam acutis; suturâ vix impressâ; basi convexo radiatim plicato; umbilico parvo, callo pallido deinde fossâ ferrugineâ cincto: apertura parva, rhomboidea; labro acuto; columellâ callo linguiformi umbilicum subtegente instructâ. Axis, 4 +; diam. 8 millim. Coast of China, 23° 30′ N. in 25 fathoms, sandy. W. S.

ROTELLA SUPERBA. T. magna, solida, depresso-conica, nitida, fusco-viridis; anfr. 7, apicalibus integris, ceteris 4-sulcatis, interspatiis lineis albidis tessellatis; basi convexo, albido vittâ viridi articulatâ ornato, callo copioso impleto nunc rubino nunc pudorino tincto: apertura rotundato-ovata; columellâ incrassatâ. Axis, 15; diam. 20 millim. Found dead on the shore, Kagosima Bay. W. S.

CLANCULUS JUCUNDUS. T. parvula, depressa, ovato-conica, ochracea vel rufescens; anfr. 5 convexis propè suturam tessellatis interdum omninò strigatis, liris inequalibus cinctis ad anfr. majores gemmatis; suturâ canaliculatâ; basi rotundato; umbilico crenulato; dente columellari eminente, acuto; labro intus sulcato. Axis and diam. 5 millim. Inhabits Sydney, N. S. W.

About the size of *C. minor*.

Diloma nana. T. minuta, fusca, ovato-globosa; anfr. 4 convexis benè discretis, apicali simplici, alteris liris et sulcis angustioribus cinctis, liris ordinatim quasi plicatis; basi rotundato, pallidiori, vix perforato; columellâ acutâ, denticulatâ; labro acuto intus undulato; fauce lividâ. Diam. 5 millim. Inhabits Loo Choo. W. S.

Diloma verruca. T. parvula, ovato-conica, dilutè rosacea; anfr. 4 convexis suturâ canaliculatâ sejunctis, liris binis elevatis cinctis, tribus minoribus anticè, duobus posticè additis, lamellis incrementi decussantibus, ad decussationes dilatatis; basi convexo arctè perforato; dente columellari parvo; labro crenulato, intus sulcato. Axis, 4; diam. 3 millim. Inhabits Coral Seas, China. W. S.

Elenchus ocellatus. T. parva, elevata, ovato-conica, polita, posticè ex rufo virescens, anticè rubescens, lineis volventibus pallidis rufomarginatis circ. 4 et lineis flexuosis obliquis ornata; anfr. 7 vix convexis, punctis albis circ. 6 cinctis, ultimo ad peripheriam obtusè angulato; basi convexo: apertura ovata intus virescens; columellâ pallidâ, dente obsoleto albido instructâ. Axis, 12; diam. 7 millim. Inhabits Sydney, N. S. W. W. S.

Allied to *E. minor.*

Elenchus exiguus. T. minuta, levis, ovato-conica, acuta, flavida rosacea vel fulvida plus minusve lineis flexuosis saturatioribus vel vittis articulatis ornata; anfr. 5 ventricosis: apertura rotundato-ovata; columellâ planatâ, decoloratâ, dente acuto deflecto munitâ. Axis, 2; diam. 1.5 millim. Inhabits Port Jackson.

Cantharidus lineolaris. T. elevato-conica, perforata, aureo-viridis lineis angulatis luteis propè suturam dilatatis ibi nigro maculatis, striis incrementi et striis volventibus subtilissimis reticulata; anfr. 7 planulatis, ultimo angulato: apertura parva, subtriangularis. Axis, 7; diam. 4 millim. Found at Sydney, N. S. W. W. S.

Eutropia modesta. T. parva, ovato-conica, glabra, lutescens fasciis obscuris articulatis et maculis fuscis ad suturas et ad basim ornata; anfr. 6 ventricosis: apertura rotundato-ovata; columellâ pallidâ vix incrassatâ. Axis, 10; diam. 6 millim. Inhabits Loo Choo. W. S.

Bankivia lugubris. T. parva, ovato-turrita, glabra, rubida, lineis inequalibus saturatioribus cincta; apice pallido; anfr. 8 ventricosis: apertura subcircularis, trientem longitudinis testæ adequans; columellâ tenui, albâ, arctissimè perforatâ; labro acuto pallido, intus rufo submarginato. Axis, 12; diam. 6 millim. Inhabits Sydney, N. S. W. W. S.

Most nearly allied to *B. major.*

Ziziphinus rubidus. T. acutè conica, solida, nitida, aurantiaca flammulis saturatioribus flexuosis radiantibus variegata; anfr. 7 imbricantibus, sulcis tribus reclivantibus aratis; peripheriâ obtusâ; basi planulato, imperforato, striis concentricis insculpto: apertura subquadrata; columellâ brevi, porcellanâ, anticè attenuatâ; fauce argillaceâ, levi. Axis, 15; diam. 12 millim. Habitat ——?

Ziziphinus infuscatus. T. parva, conica, albida maculis fuscis subquadratis picta; anfr. 8, seriebus 7 granularum (minoribus sæpè additis) quarum suturali et peripहericâ subquadratis et plerumque tessellatis; basi convexo, filis 8 concentricis, radiatim clathratis insculpto; regione umbilicali excavato, imperforato: apertura subquadrata ad columellam angulata; columellâ posticè rotundatâ, anticè obsoletè dentatâ; fauce margaritaceâ. Axis, 10; diam. 9 millim. Inhabits Kagosima Bay. W. S.

Possibly may be the young of *Z. pyramis*; also like *Z. millegranus*.

Ziziphinus acutus. T. minuta, acutè conica, prasina rosaceo et albo variegata, striis tenuibus volventibus impressa, interspatiis concinnè clathratis; anfr. 8 subconcavis anticè dilatatione interdum duplici etiam noduloso munitis; basi convexiusculo, regione umbilicali rosaceo, vix perforato: apertura subquadrata. Axis, 4; diam. 3 millim. Inhabits Eastern Coral Seas. W. S.

Ziziphinus urbanus. T. parva, ovato-conica, cinerea, ad suturam et ad peripheriam maculis quadratis pallidis et fuscis seriatim articulatis ornata, liris ordinatis simplicibus ad 6 (interdum nonnullis tenuioribus) cincta, interspatiis exiliter clathratis; anfr. 7 convexis; peripheriâ obtusâ; basi concavo; umbilico modico, costâ marginato: apertura subcircularis; columellâ arcuatâ, margine erecto. Axis, 6; diam. 5 millim. Inhabits Kagosima Bay. W. S.

Polydonta (Infundibulum) lacertinum. T. depresso-conica, cinerea olivaceo variegata; anfr. 10 sub-concavis supernis seriatim granulosis et ad suturam inconspicuam subcrenulatis, ultimo imprimis granulis compressis obliquis seriatim cincto, tunc serie minori, deinde duobus remotioribus medianis, postea serie minori, denique ad peripheriam duobus majoribus; basi vix convexo, liris granulosis fusco maculatis insculpto; umbilico lato, polito, nacreo; columellâ lobatâ, flexuosâ; fauce margaritaceâ: apertura dolabriformis; labro acuto. Diam. et axis, 25 millim. Inhabits Hong Kong Harbor. W. S.

Resembles *P. Hanleyanus Rv.* but has fewer series of granules, and is granular beneath.

Polydonta (Infundibulum) gloriosum. T. depresso-conica, solida, straminea flammulis rosaceis alternantibus picta; anfr. 8, posticè seriebus tribus granularum et anticè nodulis elongatis compressis circ. 16 ornatis; basi complanato, stellato, liris 6 granulatis fusco articulatis insculpto; infundibulo albo polito costis duabus cincto; columellâ edentatâ; fauce margaritaceâ, tricostatâ. Axis et diam 30 millim. Inhabits Japan. W. S.

Chlorostoma rugatum. T. solida, depressa, ovato-conica, fusco-nigra, striis incrementi lamellosis; anfr. 6 admodum convexis, posticis transversim striatis, anticis plicis ad suturam tuberculosis in undulas obliquas divaricantes desinentibus ornatis; basi convexo, spiraliter striato, regione umbilicali impresso, imperforato, albido; dente columellari acuto: apertura magna, rotundata; fauce argentatâ. Diameters about one inch. Inhabits Hakodadi Bay and Simoda. W. S.

Closely allied to *C. nigerrima.*

Chlorostoma achates. T. pyramidalis ad peripheriam acutè angulata, levis vel striis incrementi solum insculpta, ex olivaceo cinerascens; anfr. 5 supernis undulatis, ultimo expanso, concavo; basi concavo, polito, olivaceo lineis albidis radiato, latè et profundè perforato: apertura magna; labro acuto secundum peripheriam valdè prolongato; columellâ subdentatâ. Diam. 1.75, poll.; axis, 1.50 poll. Inhabits Simoda. W. S.

The peculiar agate-striped base is quite characteristic.

Chlorostoma undatella. T. parva, depressa, ovato-conica, nitidula, nigra, striis tenuibus volventibus et plicis acutis obliquis divaricantibus ornata; anfr. 6 convexiusculis ad peripheriam angulatis; basi convexiusculo, latè perforato (interdum ferè clauso); columellâ dentatâ, albâ; labro acuto, nigro cretaceo submarginato; fauce iridescente. Diam. 15; axis, 10 millim. Inhabits Ousima, Kagosima, and Taneogosima, on surf-washed rocks at low-water mark. W. S.

Monodonta glabratum. T. globoso-conica, crassa, polita, fusco-viridis, interdum ad verticem nigrescens et ad peripheriam pallidior, ubique sulcis 4–5 cincta, interspatiis tessellatim sulcatis; anfr. 7 convexis: apertura ampla, rotundato-ovata, alba; labro intus sulcato; dente columellari acuto, sulcato. Axis, 15; diam. 13 millim. China Seas. W. S.

Has a general resemblance to, and may be a variety of, *M. tuberculata;* but its rubbed look, tessellated rather than papillated surface, and shorter axis distinguish it.

Gibbula fucata. T. parva, orbicularis, depressa, supra levis, infra concentricè striata, livido-cinerea strigis rubris vel fuscis saturatiori marginatis ad peripheriam angulatis et subtus interdum tessellatis variegata, sub crustâ calcareâ iridescens; anfr. 5 declivibus; suturâ conspicuâ; basi arctissimè perforato: apertura ampla, ovata; columellâ arcuatâ, subreflexâ. Diam. 7; axis, 5 millim. Inhabits —— ?

Gibbula redimita. T. parva, ovato-conica, ventricosa, tenuis, sub crustâ calcareâ argentata, liris remotis planulatis (ad spiram 5) cincta, pallidè incarnata, liris rufo et albo articulatis; anfr. 7 ventricosis, tabulatis; basi rotundato, vix fissurato: apertura rotundato-ovata; columellâ tenui, erectâ, posticè dilatatâ, anticè planulatâ. Axis, 7; diam. 6 millim. Inhabits Hakodadi Bay. W. S.

Like *G. nivosa* A. Ad., but that species is not granulate.

Gibbula musiva. T. parva, ovato-globosa, tenuis, liris transversis ubique cincta, lutea nigro ordinatim tessellata; anfr. 5 convexis; basi imperforato (junioribus exceptis): apertura rotundato-ovata; columellâ incrassatâ anticè subdentatâ; fauce nacreâ, sulcatâ. Diam. 6 millim. Inhabits Simon's Bay. W. S.

The animal has a bilobed head, the lateral mantle without lobes behind the slight emargination which forms the anterior lobe.

Gibbula loculosa. T. parva, globoso-conica, depressa, subtenuis, rosaceo, fusco etc. et strigis radiantibus flavidis variegata; anfr. 5 ventricosis, liris 5 et filis minoribus 1–3 ad interspatia exiliter clathrata cinctis; liris levibus, coloribus articulatis; suturâ profundâ; basi rotundato concentricè arato; regione umbilicali pallido arctè perforato: apertura rotundato-ovata; fauce margaritaceâ, sulcatâ. Axis, 6; diam. 7 millim. Inhabits False Bay, Cape Good Hope. W. S.

Animal with the lateral lobes smooth-edged; four pairs of lateral cirrhi not very long, the third pair very short.

Gibbula gaudiosa. T. parva, ovato-globosa, sub crustâ cretaceâ margaritacea, supernè rosacea alibi strigis radiantibus rubris, rufis et flavidis ornata; anfr. 5 filis circ. 5, minoribus interpositis, cinctis; basi rosaceo sæpè flavido tessellato, concentricè striato, regione umbilicali calloso plerumque imperforato: apertura rotundato-ovata; labro tenui versus columellam ampliato; fauce nacreâ, sulcatâ. Diam. 6 millim. Inhabits False Bay. W. S.

One specimen is beautifully tessellated on the ridges with brown, roseate, blue, golden-yellow, white, and cream color.

Gibbula lepida. T. parva, globoso-lenticularis, levis, murina, vittâ peripherali et vittâ suturali nigris albo tessellatis picta; anfr. 5; suturâ vix impressâ; basi convexo, striis concentricis et maculis albidis ornato; regione umbilicali excavato, callo induto: apertura parva, obliqua; columellâ acutâ, anticè dentatâ; labro acuto; fauce margaritaceâ, sulcatâ. Diam. 5; axis, 4 millim. Inhabits New Ireland. W. S.

Somewhat like *G. spilota*.

Gibbula fulgens. T. parva, globoso-conica, subtenuis, sub epidermide tenui fuscescente vividè iridescens; anfr. 5, costis 4–5 fusco et rosaceo articulatis cinctis; suturâ obviâ; basi convexo, costulis benè dispositis sculpto, arctè perforato; columellâ arcuatâ, expansâ, erectâ; fauce deauratâ vividè iridescente. Operculum corneum multispirale. Diam. 7 millim.

Collonia lenticula. T. minuta, solida, alba, globoso-lenticularis, ubique striis confertis tenuissimis cincta; anfr. 4 depresso-convexis citò crescentibus; basi convexo, imperforato, callo copioso munito: apertura parva, circularis. Diam. 4; axis, 2 millim. Inhabits China Coral Seas. W. S.

Collonia quantilla. T. minuta, solida, depresso-orbicularis, rosacea sulcis pallidioribus circ. 4 cincta; anfr. 4 vix convexis, peripheriâ obtusâ; basi convexo, pallidiore, arctè perforato: apertura circularis; labro crasso; columellâ robustâ declivi. Diam. 3; axis, 2 + millim. Inhabits Simon's Bay. W. S.

Turbo amussitatus. T. globoso-conica, crassa, rufa; anfr. 6 ventricosis, costis inequalibus irregularibus 6–8 et intermedianis exilibus 4–5 cinctis, costis obliquè striatis; basi concinnè reticulato, perforato tandem callo occluso: apertura subcircularis; columellâ expansâ duplici; fauce margaritaceâ. Operculum osseum, paucispirale. Axes, 12 millim. Inhabits —— ?

Turbo nocturnus. T. parvula, globoso-conica, solida, rufofuscescente et rosaceo alternatim strigata; apice albo; anfr. 5 convexis, sulcis equalibus aratis; suturâ impressâ; basi convexo, imperforato, concentricè striato: apertura subcircularis; columellâ expansâ, argentatâ, granulatâ, extus erectâ. Operculum osseum, paucispirale, apice excentrico, extus granulato. Axes, 7 millim. Inhabits Simoda. W. S.

Chæna lagenula. T. elongata, arcuata, tenuis, lactea, posticè quadrangularis, anticè declivis et in rostram protracta; umbonibus ventricosis ad quadrantem anticalem positis; margine dorsali posticâ rectâ; marg. ventrali incurvatâ; angulis posticis rotundatis; facie dorsali latè ovato-cuneatâ, posticè citò angustatâ; facie ventrali ovatâ omnino hiante. Long. 12; lat. 6; alt. 3 millim. Inhabits Hong Kong harbor, 10 fathoms, shelly sand. W. S.

Animal like that of Gastrochæna; but the mantle envelopes all the anterior portion of the shell, and also the anterior half of the ventral margin.

This shell belonging to the builder of the old *Fistulana lagenula* of Lamarck, has not heretofore been described, though the curious flask-shaped enclosure has been familiar. The shell has the general characters of that of *Fistulana clava* Lk, Chæna mumia Gray. Still the ovate, curved form and the sculpture of the shell, and the peculiar, artichoke-like or bulbous structure of the enclosing capsule, made up of successive calcareous cups involving bits of shell and sand, together with the proportions of the animal will, I think, authorize a generic distinction. I would propose, in that case, the name Cucurbitula, which at once expresses the cup-like elements and general gourd-like form.

THRACIA PUSILLA. T. minuta, rotundato-ovata, flavescens, anticè latè rotundata, posticè truncata (angulo dorsali recto) concentricè exiliter undulata; umbonibus vix postmedianis; declivitate umbonali angulatâ. Long. 8; alt. 5; lat. 4 millim. Inhabits Simoda. W. S.

A little like *T. myopsis*, Beck, which seems to be the same as *Anat. papyracea* Say.

THRACIA CULTRATA. T. parva, alba, tenuissima, ovato-rhomboidea, ventricosa, intus argentata, anticè semi-elliptica latè rotundata; umbonibus postmedianis acutis; margine dorsali posteriori declivi, extremitate truncatâ, angulo superiori acuto; declivitate umbonali acutâ; margine ventrali vix arcuatâ; apophysi cardinali triangulari (valvâ sinistrâ ignotâ). Long. 8; alt. 6; lat. 4 millim. Inhabits Port Jackson, sandy mud, 8–15 fathoms. W. S.

THRACIA CONCINNA. T. parva, alba, transversa, anticè rotundata, posticè truncata, convexiuscula, minutissimè punctata; umbonibus postmedianis, declivitate umbonali angulatâ, valvis magnitudine et convexitate satis discrepantibus: cardo debilis; fissurâ apicali perviâ. Long. 17; alt. 11; lat. 8 millim. Inhabits Kagosima Bay. W. S.

Much like *T. villosiuscula* in outline, but more convex.

MYODORA FLUCTUOSA. T. parva, tenuis, albida, umbonibus ferè medianis: valv. dextra convexa, posticè triangularis, apice truncatâ, undulis concentricis, circ. 20 ad margines haud protractis ornata; (valvâ sinistrâ ignotâ): cardo debilis; dentibus elongatis. Long. 8; alt. 7; lat. 3 millim. Inhabits Kagosima Bay. W. S.

Allied to *M. brevis*, which is larger and more finely ribbed. There is one in the Cuming Coll. much like it.

LYONSIA VENTRICOSA. T. ovato-falcata, tenuis, fragilis, lucida, straminea, ventricosa, concentricè exiliter striata et rugis hispidis radiata; umbonibus satis antemedianis; extrem. anticâ rotundatâ; extrem. posticâ angustante ad apicem truncatâ; margine ventrali lentè arcuatâ; cardine valdè debili. Long. 17; alt. 9; lat. 8 millim. Inhabits Hakodadi Bay, 2–6 fathoms, sandy mud. W. S.

Its shorter and less slender form, and its color, distinguish it from *L. Norvegica* and *hyalina*.

LYONSIA (Pandorina) FLABELLATA. T. oblongo-ovata, nasica, ventricosa, tenuis, opalina, straminea, exilissimè striata; umbonibus ad trientem anteriorem sitis; extremitate anticâ arctè rotundatâ; margine dorsali posticâ rectâ; margine ventrali unà cum extrem. posticâ continuò arcuatâ usque ad angulum superiorem: cardo debilis; sulco ligamentali angusto; paginâ interiori opalinâ. Long. 17; alt. 10; lat. 6 millim. Inhabits Arctic Ocean. W. S.

Very close upon *P. arenosa* Möll., but the striæ are more numerous and delicate.

Neæra adunca. T. minuta, alba, globosa, ovato-triangularis, concentricè lirata; umbonibus ferè medianis, elevatis, tumidis; extremitate anticâ globosâ; extrem. posticâ subitò augustatâ, triangulari acutâ, deflectâ; margine ventrali concavè arcuatâ. Long. 5; lat. et alt. 4 millim. Inhabits Kagosima Bay, sandy mud, 12–15 fathoms. W. S.

Theora lubrica. T. parva, fragilis, pellucida, nitida, straminea, ovato-crescentica, ventricosa, posticè compressa; umbonibus nonnihil antemedianis; extremitate anticâ acutè rotundatâ: extrem. posticâ acutâ; margine ventrali benè arcuatâ; costâ internâ ex umbonibus obliquè antrorsum productâ. Long. 11; alt. 7; lat. 3 millim. Inhabits Hakodadi Bay, very common in mud, 6 fathoms. W. S.

Theora nitida. T. tenuis, fragilis, nitida, lucida, alba, elongato-ovata, subfalcata, epidermide stramineâ induta; umbonibus antemedianis; extremitate anticâ rotundatâ; extrem. posticâ acutâ, compressâ, subadscendente; margine dorsali posticâ declivi; margine ventrali arcuatâ: cavositas porcellana, rosaceo tincta, radiatim tenuiter striata. Long. 14; alt. 8; lat. 5 millim. Inhabits Hong Kong harbor.

Possibly *T. fragilis* Hinds, but seems smaller and more slender.

Theora obtusa. T. parvula, ovalis, tenuissima, hyalina, equilateralis, utroque extremitate rotundata, tenuissimè radiatim striata; costâ internâ gracili, elongatâ, lacteâ. Long. 10; alt. 6; lat. 3 millim.

Only one valve was obtained, evidently more equilateral, thin, and obtuse posteriorly than any described species.

Saxicava flaccida. T. tenuis, subnacrea, multiformis plerumque subquadrata variè distorta, concentricè undulata, epidermide tenui ochraceâ rugosâ induta; umbonibus terminalibus, tumidis; declivitate post-umbonali carinatâ interdum spinulosâ: cavositas subnacrea; cardinis dente valido elongato, uncinato. Long. 20; alt. 13; lat. 10 millim. Inhabits Hong Kong and Simon's Bay. W. S.

The strong cardinal tooth and the semi-pearly structure are altogether unusual for this genus. It would come under Hiatella or Rhomboides, which are now regarded as variations of Saxicava. I cannot distinctly make out a pallial impression. The animal has a byssus. Perhaps these shells have been confounded with Sax. *rugosa*, which is said to come from Cape of Good Hope, China, &c. I am by no means certain that the shells from the two localities which I have had under inspection are the same. Those from the latter locality are certainly much the smallest.

Cryptomya truncata. T. tenuis, alba, rotundato-ovata, posticè obliquè truncata; umbonibus submedianis, parvis; valvâ (dextrâ) tumidâ, fastigio acuto ab umbone ad angulum postero-ventralem tendente divisâ; areâ anticâ striis concentricis et posticè striis radiantibus ornatâ; areâ postero-dorsali triangulari eburneâ, sulco radiante partitâ, et striis lamellosis concentricis insculptâ. Long. 18; alt. 13; lat. 10 millim. Inhabits the China Sea, lat. 24° N. W. S.

The cartilage pit is oblong, narrow, somewhat oblique, and nearly appressed against the margin; behind it is a protrusion of the margin almost like a lateral tooth. Only one valve having been examined, the generic place is not fully settled.

PANOPÆA FRAGILIS. T. elliptica, tenuis, fragilis, livido-albida, concentricè undulata; umbonibus submedianis; extremitate anticâ obtusè rotundatâ; extrem. posticâ subtruncatâ; cardine debili; apophysi ligamentali brevi; dente elongato; margine dorsali ad basin dentis fissuratâ. Long. 2; alt. 1, 5; lat. 1 inch. Inhabits Hakodadi Bay. W. S.

Remarkable for its fragile structure and waved surface, like some of the Thraciæ, or Mactraceæ, or still more like Pholadomya.

PANOPÆA GENEROSA. Several specimens were obtained at Awatska Bay, Kamtschatka, which are probably this species; but the beaks are much more anterior, the posterior truncation is much more oblique and in a different direction, and the gape is much less than in the specimen originally described. They have also a double structure, — an inner porcellanous layer, and a more earthy, somewhat crystalline coat, which extends beyond the first at the margin. This latter crystalline or tessellated structure is very clearly exhibited, and probably obtains in all the species. The variation in outline from the original type was so great that I had named these specimens *P. sagrinata.*

CORBULA VENUSTA. T. parva, solida, albida (vel rosacea) ovato-triangularis, admodum compressa, subæquivalvis, concentricè arata, liris intercurrentibus rotundatis; umbonibus medianis anticè excavatis; extremitate anticâ rotundatâ; extrem. posticâ altiori et latiori, vix truncatâ; margine dorsali arcuata; declivitate umbonali carinatâ. Long. 10; alt. 7; lat. 4 millim. Inhabits Hakodadi Bay, in shelly sand, 5–8 fathoms. W. S.

Some smaller specimens are proportionally shorter, and have the grooves much more distant, and if seen alone, would be considered a different species.

CORBULA (Azara) RUSTICA. T. parva, ovato-trigonalis, solida, lævis, epidermide tenui rufescente induta; umbonibus submedianis inconspicuis, erosis; valvæ majoris marginibus dorsalibus arcuatis, declivibus; extremitate anticâ rotundatâ; extrem. posticâ obtusè truncatâ; valvâ alterâ graciliori, penitus inclusâ; declivitate umbonali obtusè angulatâ; cardine debili; cavositate cretaceâ. Long. 15; alt. 9; lat. 5 millim. Inhabits Whampoa. W. S.

Some of the specimens are much more triangular than others.

Solecurtus abbreviatus. T. tenuis, elongato-rhomboidea compressa, striis incrementi insculpta, sulco radiante obliquo albido-marginato excepto; umbonibus minimis medianis: margine dorsali anticâ rectâ, declivi; extremitate anticâ obliquè retrorsum truncatâ; angulo dorsali postico declivi; angulo postico ventrali rotundato; margine ventrali incurvatâ. Long. 45; lat. 10; alt. 20 millim. Inhabits Hong Kong. W. S.

Solecurtus strigosus. T. tenuis, compressa, transversè oblonga, concentricè striata; epidermide flavo-viridi, posticè verticaliter rugosâ; umbonibus minimis ad quadrantem anteriorem sitis; margine dorsali anticâ declivi; extrem. anticâ obliquè retrorsum truncatâ; angulo superiori acuto; extremitate posticâ acutè rotundatâ; margine ventrali incurvatâ; declivitate umbonali obtusè angulatâ. Long. 50; alt. 7; lat. 7 millim. Inhabits Whampoa. W. S.

Solecurtus debilis. T. parva, tenuis, lucida, alba, oblongo-ovalis, compressa, concentricè striolata, striis in medio obliquis, epidermide flavescente tenuissimâ hic illic induta; umbonibus propè trientem longitudinis sitis, posticè excavatis; extrem. anticâ rotundatâ; extrem. posticâ acutiori; margine dorsali posticâ demum declivi; margine ventrali quantulum concavâ. Long. 25; lat. 5; alt. 7 millim. Inhabits Port Lloyd, and Loo Choo Island. *Capt. Rodgers.*

Solen strictus. T. valdè elongata, marginibus ferè parallelis; marg. dorsali lentè declivi; extremitate anticâ obliquè truncatâ; extrem. posticâ quadratâ, angulis rotundatis; epidermide nitidâ, flavido-corneâ, lineâ diagonali inconspicuâ; dente terminali; cavositate incarnatâ. Long. 4.5; alt. 0.7; lat. 0.5 poll. Inhabits Hakodadi Bay. W. S.

General features like *S. corneus* Lk, but much larger, and proportionally more slender.

Solen gracilis. T. tenuis, gracilis, valdè elongata, subcylindrica, vix arcuata, epidermide flavo-virescente nitidâ induta; marginibus parallelis; extrem. anticali obliquè truncatâ, sulco subterminali ferè obsoleto; extrem. posticali obliquè antrorsum truncatâ, angulis rotundatis; dente cardinali terminali, in utraque valvâ singulo. Long. 4.5; alt. 0.6; lat. 0.4 poll. Inhabits Hakodadi, on sandy beaches. W. S.

The nearly straight, proportionally slender form, and very oblique anterior truncation afford obvious characters.

Machæra sodalis. T. fragilis, compressa, elongato-ovata, purpurascens, epidermide tenui fusco-corneâ induta; umbonibus ad quadrantem anteriorem sitis, conspicuis, acutis; extremitate anticâ latè rotundatâ, retrorsum sensim angustatâ; paginâ interiori purpurascente; costâ cardinali albâ antrorsum inclinatâ et inflecta. Long. 32; lat. 7; alt. 22 millim. Inhabits Hakodadi Bay. W. S.

Greatly resembles *M. costata* Say. It has a more purplish hue, a more shining epidermis; but the principal difference is in the posterior acumination, and the gentle sweep as well as inclination forwards of the internal rib.

SOLEMYA PUSILLA. T. fragilis, oblongo-ovalis, vix retrorsum dilatata, epidermide tenui pallidâ sub lente striis confertis radiantibus insculptâ, et radiis fuscis remotis pictâ; extremitatibus rotundatis; margine dorsali rectâ; margine ventrali leniter arcuatâ; umbonibus ad quadrantem anteriorem positis. Long. 12; alt. 5 millim. Inhabits Hakodadi Bay in 5 fathoms, muddy bottom. W. S.

Described from a single, perhaps immature specimen. It is near to *S. velum* Say, though the dorsal margin appears more straight; and if the radiating striæ are constant, it would be a good distinctive character.

PSAMMOBIA SPATULATA. T. tenuis, compressa, oblongo-ovata retrorsum angustata et ad extremitatem truncata, anticè rotundata; margine dorsali rectâ; marg. ventrali arcuatâ; umbonibus ad trientem posteriorem locatis, minutis; callo ligamentali elevato, intus suffulto; disco striis concentricis exilibus et striis radiantibus tenuioribus insculpto: color rufescens, lineis saturatioribus radiata, intus hepatica: cardo debilissimus. Long. 28; alt. 15; lat. 4 millim. Taken off the coast of China, 23° 30′ N. in sand, 25 fathoms. W. S.

PSAMMOBIA TENELLA. T. tenuis, fragilis, alba, pellucida, glabra, elongato-elliptica, vel potius posticè angustior et subtruncata; umbonibus vix postmedianis, acutis; margine dorsali posticâ cristatâ, juxtà umbonibus emarginatâ; declivitate umbonali conspicuo; extremitate anticâ rotundatâ; margine ventrali lentè arcuatâ. Long. 12; alt. 6; lat. 3 millim. Inhabits Hong Kong Harbor, in 8 fathoms. W. S.

SEMELE DUPLICATA. T. ovato-reniformis, tenuis, compressa, straminea, laminis erectis plerumque geminatis erectis propè apicem desideratis ornata; umbonibus postmedianis, elevatis; margine dorsali anticâ incurvatâ; marg. posticâ sensim arcuatâ; portione posticâ altiori, acutiori; plicâ submarginali obsoletâ: cardo debilis; dentibus lateralibus approximatis. Long. 20; alt. 16; lat. 6 millim. Inhabits Kagosima Bay, in 6 fathoms, sandy bottom. W. S.

Almost identical in form with *Tellina lyra*, which has a smooth fold and more remote ridges. *S. scabra* Hanley, is similar, but has radiating lines between the ridges. It probably grows larger.

SEMELE ALVEATA. T. subcircularis admodum convexa, ferè equilateralis, flavida, concentricè laminato-striata; interspatiis radiatim clathratis, radiis laminas haud equitantibus; plicâ submarginali conspicuâ; margine dorsali excavatâ; extremitate posticâ subtruncatâ. Cavositas versus umbones flavida. Long. 90; alt. 28; lat. 15 millim. Inhabits Loo Choo. W. S.

Some specimens in the Cuming Coll. are rather more solid.

Ervilia bisculpta. T. crassa, elongata, ovato-trigonalis, alba vel purpurascens, concentricè sulcata exceptâ areâ postero-dorsali radiatim aratâ; umbonibus purpureis vix antemedianis; extremitate anticâ rotundatâ; extrem. posticâ obliquè truncatâ, angulo postero-ventrali acuto; margine ventrali arcuatâ: cavositas nitida; sinu siphonali angusto, linguiformi. Long. 6; alt. 4; lat. 3 millim. Inhabits Kagosima, in sand, 5 fath. W. S.

The coloration and sculpture is quite pretty and peculiar.

Ervilia livida. T. minuta, tenuis, elongata, ovato-triangularis, anticè rotundata, posticè acuta, rufescens vel rubido obsoletè radiata (intus ejusmodi picta) concentricè striatula; umbonibus vix antemedianis: cardo debilis. Long. 7; alt. 4; lat. 3 millim. Inhabits Kagosima Bay, in sand, 5 fathoms. W. S.

Scrobicularia caduca. T. parvula, tenuis, lucida, fragilis, submargaritacea, albida, ovata posticè obliquè truncata, subglobosa, equilateralis, striis concentricis exilibus, quibusdam utroque laminosis notata; declivitate umbonali posticâ angulatâ: cavositas nitida, lineis lacteis concentricis exhibens. Long. 10; alt. 8; lat. 6 millim. Inhabits Loo Choo. W. S.

The hinge has one large and two small approximated cardinal teeth, with a triangular pit between.

Scrobicularia (Capsa) adunca. T. ovato-triangularis, tumida, straminea, striis tenuibus concentricis lamellosis ordinatim insculpta; umbonibus paulum antemedianis, acutis; extremitate anticâ semicirculari; extrem. posticâ triangulari, rostratâ; margine ventrali incurvatâ; margine dorsali excavatâ, levi: cavositas intra lineam pallialem flavescens, extra pallidior: cardo validus. Long. 22; alt. 15; lat. 10 millim. Inhabits Loo Choo. W. S.

Quite remarkable for its sharp, hooked, beak-like posterior extremity. It is closely allied to Neæra, and looks much like *Gastrana fragilis.*

Tellina lubrica. T. cuneata, salmonacea, lævis; umbonibus ferè terminalibus, acutis; extremitate anticâ elongato-ovali; extrem. posticâ latè truncatâ; plicâ submarginali inconspicuâ; dente antico laterali remoto, obsoleto; postico brevi, valido. Long. 14; alt. 9; lat. 4 millim. Inhabits Hakodadi Bay, in sandy mud, 6 fath. W. S.

Comes nearest to *T. felix*, which has an acute posterior angle. It also closely resembles *T. fabagella.*

Tellina euglypta. T. solida, elongata, ovalis, ex albido flavescens, costis concentricis elevatis remotis ornata, intervallis et paginâ superiori costarum sulcis radiantibus recurvantibus posticè profundis aratis; umbonibus medianis eminentibus; extremitatibus subacutis, posticâ subtruncatâ; margine ventrali posticè flexuosâ. Cavositas polita, nitida. Long. 8; alt. 5; lat. 3 millim. Inhabits —— ?

A singular little shell, the generic place of which is somewhat doubtful. Its hinge of two cardinal and two lateral teeth, and its flexuous posterior margin and the deep pallial sinus bring it among the Tellinidæ; while its sculpture, solidity, and symmetry suggest *Corbis*, with which the hinge is not absolutely inconsistent.

Macoma lunella. T. parvula, alba, lævis, ovato-triangularis, ventricosa; umbonibus postmedianis, acutis; extremitate posticâ semicirculari; margine postero-dorsali citò declivi, extremitate truncatâ; areâ postero-dorsali crassè striatâ; margine postero-ventrali contractâ: cavositas levis, opalina; sinu profundo, rotundato, vix conspicuo; cardinis dentibus pusillis. Long. 10; alt. 8; lat. 6 millim. Inhabits China Seas, lat. 24° N. in 25 fathoms. W. S.

The shell most nearly approaching it is *T. mera* of the American Atlantic shore.

Tellina (subg. Arcopagia) saccularia. T. parvula, lucida, subglobosa, lactea, concentricè tenuissimè striata; umbonibus postmedianis, rufescentibus eburneo lineatis; extremitate posticâ leviter truncatâ demum subsinuatâ; declivitate umbonali obtuso: cardo satis validus; dentibus lateralibus duobus. Long. 10; alt. 9; lat. 6 millim. Inhabits Loo Choo. W. S.

Very like *T. perula* Gd, and possibly the same. It is less pouched, and destitute of concentric lamellar striæ and the two peculiar white umbonal rays, though there are vermicular opaque markings.

Tellina (Arcopagia) cratitia. T. tenuis, livida, compressa, ovato-triangularis, costis acutis reclivantibus ad 30 (minoribus posticè interpositis) radiata, et laminis crebris concentricis reflexis costas equitantibus cancellata; umbonibus medianis; marginibus dorsalibus declivibus, subrectis; extremitate posticâ acutè rotundatâ, et plicâ inconspicuâ, umbonali instructâ; margine ventrali arcuatâ, pectinatâ; cavositas nitida, sulculata. Long. 15; alt. 11; lat. 5 millim. Inhabits Loo Choo, sandy bottom, 8 fathoms. W. S.

Analogous to *T. scobinata*, but no species has been described with similar sculpture, which is much like that of *Venus marica*.

Lutraria lucida. T. tenuis, alba, oblongo-ovata, subfalcata, concentricè undulata; umbonibus ad trientem anteriorem positis, acutis, eminentibus; extremitate anticâ acutè rotundatâ, margine dorsali declivi; marg. posticâ concavâ, compressâ, extremitate truncatâ; declivitate umbonali obtusâ; cavositate porcellanâ; cardine debili. Long. 40; alt. 20; lat. 8 millim. Inhabits Kagosima. W. S.

Remarkable for its thin, lucid, fragile structure. A specimen in Mr. Cuming's Coll. is larger than those collected by the Expedition.

Saxidomus aratus. T. crassa, exalbida, ovato-quadrata, epidermide tenui rufâ induta, liris profundis recliventibus concentricis arata; umbonibus ad trientem anteriorem positis; extremitate posticâ subquadratâ, obliquè truncatâ, angulis rotundatis, modicè hiante; delivitate umbonali obtuso; extrem. anticâ minus elevatâ, rotundatâ, absque lunulâ: cavositas alba, margine simplici: cardo validus, dentibus in utrâque valvâ 4, in v. dextrâ posteriori, in v. sinistrâ anteriori multo majori. Long. 4.5; alt. 3; lat. 2 inches. Inhabits San Francisco.

Smaller than *S. Nuttalli*, the posterior dorsal portion more elevated, the valve more regularly convex, the beaks less prominent, which with the furrows and epidermis give it very distinct characters. *Venus maxima* Phil. cannot be very different from it.

Tapes vernicosa. T. solida, oblongo-ovata, ventricosa, nitida, supernè levis alibi concentricè sulcato-plicata, fulva flavido maculata et radiis hepaticis interruptis 4 ornata; umbonibus vix antemedianis; lunulâ lanceolatâ; facie dorsali anticâ excavatâ; extremitate anticâ acutè rotundatâ; margine dorsali posticâ subrectâ, extremitate latè rotundatâ, subtruncatâ; marg. ventrali lentè arcuatâ; margine internâ simplici. Long. 3; alt. 2; lat. 1.5 poll. Inhabits Kagosima Bay and off Hakodadi Cape, in coarse sand, 20 fathoms. W. S.

One of the most beautiful of the group, allied to *T. sulcata*, with which it agrees in form and size; it is more brilliantly colored, and the sulci are less general. *T. laterisulca* is differently colored, and the sulci end more abruptly. It is more brilliantly varnished than any other species. The young are nearly destitute of sulci.

Venus (Mercenaria) Stimpsoni. T. solida, cinerea, ovato-cordata, satis convexa, laminis erectis concentricis confertis dispositè ornata; umbonibus antemedianis eminentibus, acutis, approximatis; facie dorsali antico concavo; lunulâ profundâ; extremitate anticâ compressâ, rotundatâ; facie dorsali posticâ arcuatâ, declivi, impressâ, nihil nisi striatâ; extremitate posticâ satis acutâ: cardo validus; cavositas et apophysis ligamentalis aurantiaci; sinu siphonali minimè profundo; margine internâ simplici. Long. 3.7; alt. 3.3; lat. 1.7 poll. Inhabits Hakodadi, 6 fathoms. W. S.

A fine species analogous to American Atlantic forms. Resembles *V. mercenaria* and *V. Mortoni*, but is less solid and less ventricose than either, having the white interior and closely laminated exterior of the latter.

Venus puellula. T. parvula, subcircularis, ovato-triangularis, solida, straminea rufo bi-vel tri-radiata; umbonibus medianis, eminentibus, purpureis; extremitate anticâ rotundatâ; margine dorsali posticâ angulatâ, rapidè declivi, apice truncato; margine ventrali semicirculari; disco radiis numerosis elevatis et costis compressis alveolato, costis marginem posticam haud attigentibus. Cavositas rufo-purpurea; margine stramineâ, crenulatâ; margine cardinali purpureo-maculatâ. Long. 6; alt. 5; lat. 4 millim. Inhabits Ousima. W. S.

Looks like a miniature specimen of the variety of *V. marica*; figured in Sowerby's Thesaurus f. 110, yet seems in all respects adult.

CHIONE ROSCIDA. T. parva, elongato-ovata, compressa, glabra, nitida, anticè sulcis concentricis arata; umbonibus vix antemedianis; extremitate anticâ satis acutâ; extrem. posticâ magis rotundatâ; margine ventrali lentè arcuatâ; lunulâ lanceolatâ, depressâ, lineâ impressâ circumscriptâ: color lividus, radiis 2–3 et zonis concentricis incarnatis variegatus; intus ad limbum flavescens; disco incarnato. Long. 13; alt. 9; lat. 5 millim. Inhabits Harbors of Ousima, in sand, 15 fathoms. W. S.

A small, pretty shell, of the same type as *C. lilacina*.

CALLISTA GLANDULA. T. tenuis, albida, ovato-cordiformis, ventricosa, liris confertis concentricis tenuibus insculpta; umbonibus vix antemedianis tumidis; facie dorsali utroque concavo; lunulâ magnâ, malè impressâ; extremitate posticâ altiori, truncatâ; margine ventrali arcuatâ. Long. 25; alt. 21; lat. 19 millim. Inhabits Hong Kong. W. S.

A small inflated species, concentrically striated like Dosinia, resembling in form *D. varians* and *limatula*, but quite destitute of coloring.

CARDILIA GEMMULATA. T. minuta, solida, alba, quoad altitudinem ovato-triangularis, sub-obliqua, striis concentricis et radiantibus decussantibus elevatis insculpta, intersectionibus nodosis; umbonibus acutis, uncinatis; margine anticâ ferè verticali; marg. posticâ primò rectâ, deindè arcuatâ et in marginem ventralem semicircularem desinente; valvis satis convexis ferè tectiformibus; margine internâ undulato-dentatâ; tabellâ ligamentali ferè obsoletâ. Long. 2; alt. 2.5; lat. 2 millim. Inhabits China Seas. W. S.

This is the third species known, and well distinguished by its sculpture. Only one valve was obtained.

NUCULINA PRETIOSA. T. minuta, obliquè ovato-crescentica, polita, nitida, fusco-viridis; apice acuto, curvato; margine dorsali primò rectâ, dein valdè arcuatâ; margine ventrali incurvatâ; extremitate rotundatâ; paginâ interiori virescente; tabellâ cardinali latâ sensim retrorsum angustatâ; denticulis binis subapicalibus, duobus anticalibus, tribus post-apicalibus, laterali elongato, elevato, falcato, albo. Long. 4; lat. 3; alt. 3 millim. Inhabits Simon's Bay, Cape Good Hope. W. S.

This curious shell greatly resembles an apple-seed, and seems to be the only recent species yet obtained. One or more fossils have been found in the Eocene, on which the genus was founded by Deshayes.

The lateral tooth is so large, and bridges over the umbonal cavity so peculiarly that a single valve might be taken for a specimen of Latia, were it not for the cardinal range of denticles which are like tenon and mortise articulations, and not comblike, as in Nucula proper.

LORIPES ROTATA. T. solidula, flavescens, orbicularis, subglobosa, striis concentricis irregularibus utrinque plus minusve coalescentibus insculpta; umbonibus medianis parvis; lunulâ profundâ, striis impressis haud remotis inclusâ; margine internâ concinnè crenulatâ; cicatricibus profundis; sulco cardinali elongato; dente cardinali valido; dente laterali postico parvo; antico obsoleto. Diameter 59; lat. 5 millim. Inhabits Loo Choo. W. S.

GOULDIA DILECTA. T. minuta, obliqua, rotundato-cordata, subglobosa, alba, polita, anticè admodum concentricè undulata; umbonibus submedianis; margine internâ simplici; sinu palliali obvio. Long. et alt. 4; lat. 2 millim. Inhabits Kagosima. W. S.

The generic characters are well marked, and this is the only species yet known from the Eastern Seas.

MYSIA (Felania) USTA. T. obliquè rotundato-ovata, lenticularis, crassa, concentricè undulata, epidermide piceâ durâ induta; umbonibus vix antemedianis, acutis; lunulâ parvâ, lanceolatâ; extremitate anticâ subcirculari; extrem. posticâ acutiori, obliquâ; ligamento conspicuo: cavositas ex albo viridans, costâ ab umbone usque ad cicatricem anteriorem munita; margine interiori simplici; dente laterali antico minimo vel obsoleto. Long. 30; alt. 27; lat. 15 millim. Inhabits Hakodadi Bay, in sandy mud, 8 fath. W. S.

It has the general aspect of Astarte, with its thick, dark epidermis, but has the hinge of Mysia, subgen. Felania.

MYSIA DOLABRATA. T. parva, compressa, symmetrica, rotundato-quadrata, flavescens, glabra; umbonibus medianis, parvis, acutis; costâ internâ intra-umbonali exili, posticè submarginali. Long. 10; alt. 10; lat. 4 millim. Inhabits Simon's Bay, Cape Good Hope. W. S.

Generally resembles *Felania Senegalensis*.

MYSIA FIGLINA. T. obliquè rotundata, lenticularis, nitida, concentricè striolata, pallidè argillacea; umbonibus acutis vix antemedianis; disco intus calcareo; dentibus cardinalibus validis; costâ intra-umbonali obliquâ, satis conspicuâ. Long. 18; alt. 16; lat. 6 millim. Dredged off the east coast of Japan, lat. 37°, in coarse, black sand, 20 fathoms. W. S.

Has a peculiar argillaceous look which may serve to distinguish it from other species. *M. dolabrata* scarcely differs except in polish, size, and obliquity of beaks.

MYSIA ABBREVIATA. T. tenuis, fragilis, straminea, glabra, subglobosa, posticè valdè truncata, supernè compressa; declivitate umbonali angulatâ; anticè rotundatâ; umbonibus medianis, tumidis, acutis; lineis incrementi conspicuis: cavositas cretacea, citrina. Long. 20; alt. 17; lat. 12 millim. Inhabits Hong Kong harbor. W. S.

Mysia obliqua. T. parvula, obliquè rotundato-ovata, lenticularis, flavescens, zonis incrementi raris ornata; umbonibus antemedianis; regione posticâ latiori, rotundatâ; margine ventrali obliquè arcuatâ; costâ internâ umbonali tenuissimâ; cardine debilissimo. Long. 8; alt. 7; lat. 3.5 millim. Inhabits Loo Choo. W. S.

Has no very marked characters, but in general is like a small *M. globularis* Lk. It is more globose than *M. figlina*. It is possibly a very small specimen of *Diplodonta Koreensis* Ad. and Rv.

Lepton firmatum. T. subtrigona, planata, lactea, subdiaphana, glabra; umbonibus medianis, haud eminentibus; margine ventrali ferè rectâ; paginâ interiore subrugosâ; cicatricibus subrotundis; dentibus curtis, validis. Long. 5+; lat. 2+; alt. 4 millim. Inhabits sand at low water, Simon's Bay. W. S.

In shape like *L. squamosum*, but distinguished by its short, stout teeth. The rugosities are probably caused by a perforating parasite.

Lepton concentricum. T. ovato-triangularis, subplana, concentricè concinnè lirata (liris acutis), epidermide subrugosâ marginem implicante induta; umbonibus postmedianis, acutis; cicatricibus subelongatis; lineâ pallii è margine remotâ; dentibus minimis, lateralibus utrâque valvâ remotis, ferè obsoletis; valvæ dextræ dente cardinali unico; v. sinistræ dentibus duobus minimis margini contiguis. Long. 10; lat. 4—; alt. 7+ millim. Inhabits Sydney harbor. W. S.

This beautiful species is easily known by its minute teeth, concentric sculpture and abundant epidermis. Its shape is unusually unsymmetrical. It not unlikely belongs to a genus not yet established.

Lepton lucidum. T. parva, tenuis, nitida, alba, ovato-quadrata, posticè dilatata, concentricè striolata et obsoletè radiata; umbonibus medianis acutis tumidis; margine dorsali rectâ; extremitatibus obliquis, angulis ventralibus acutis rotundatis; margine ventrali vix arcuatâ. Long. 9; alt. 6; lat. 3 millim. Inhabits Hong Kong harbor. W. S.

Kellia crenulata. T. tenuis, flavescens, trapezoidea, marginibus plerumque rotundatis; margine ventrali rectâ et compressâ; umbonibus ferè medianis, prominentibus; lineis incrementi conspicuis; totâ paginâ interiori rugulosâ, cardinem versus marginibus crenulatis; dente cardinali conspicuo, conico, altero celato fossam ligamenti metiente; dente laterali singulo, curto, haud obvio. Long. 9.5; alt. 6.5; lat. 4+ millim. Inhabits Hong Kong harbor. W. S.

Readily known by its crenulated hinge margin. It has the aspect of Scintilla, from which it differs in its teeth and ligament. Only one valve was found.

☞ This and the five following species plainly belong to the family Kelliadæ; but their precise generic place is less easily decided, and indeed cannot be, without further knowledge of the animals. I have placed them under the old genus Kellia, stating in what respects they verge toward later genera. Mr. P. P. Carpenter has for the most part worked out for me these minute bivalves.

KELLIA BALAUSTINA. T. minuta, nitida, rotundato-ovata, rubiginosa, subdiaphana, lineis concentricis creberrimis insculpta; umbonibus submedianis, eminentibus; margine ventrali valdè arcuatâ: marginibus cardinalibus rubidis; valvæ alteræ dentibus card. duobus parvis, dentibus lateralibus brevissimis, postico ferè obsoleto; valvæ alteræ dentibus lateralibus curtis, antico obsoleto, dente cardinali unico, valido. Long. 2.5; alt. 2 millim. Inhabits Sydney harbor. W. S

Three fresh specimens were obtained, resembling *Astarte triangularis*. The lateral teeth are very short, and but from analogy might be described as cardinal.

KELLIA BULLA. T. tenuissima, diaphana, ventricosa, elliptica, posticè truncata, lineis incrementi vix conspicuis; umbonibus parum exstantibus: valvæ alteræ dente cardinali debili, subelongato, torto; dente laterali curto parum elevato; valvæ alteræ —? Long. 8 +; lat. 6; alt. 6 + millim. Inhabits Loo Choo. W. S.

Distinguished by the swollen, slightly prominent umbos; teeth short and delicate.

KELLIA UNDULATA. T. minuta, tenuis, ovato-quadrata, tumida, concentricè undulato-striata, flavido-rosaceo tincta; umbonibus vix ante-medianis, elevatis; extremitate anticâ acutè rotundatâ; extrem. posticâ latiori, subtruncatâ; margine ventrali lentè arcuatâ, dimidio postico cavositatis vividè miniato. Long. 2; lat. et alt. 1.5 millim. Inhabits Kagosima. W. S.

KELLIA COMPACTA. T. equilateralis, subquadrata, epidermide extra marginem productâ benè induta, striis concentricis lamellosis ornata; umbonibus haud eminentibus; marginibus dorsalibus rectis, declivibus; marg. ventrali rectâ: extremitatibus rotundatis; cicatricibus ovalibus; lineâ pallii simplici; valvulæ alteræ dentibus duobus magnis, divergentibus, equalibus; alteræ marginibus dentibus simulantibus, elongatis; fossâ ligamentali amplâ. Long. 6 +; lat. 3 +; alt. 5 millim. Inhabits ——?

Resembles in form *Bornia corbuloides* Phil. The prolonged infolded epidermis brings it in alliance with Lepton; but its hinge is like that of *Pythina* Hinds. A knowledge of the animal can alone remove it definitively from the old genus Kellia.

KELLIA CONVEXA. T. parva, trigono-elliptica, plus minusve inflata, facie variabilis, striis concentricis confertis notata et epidermide rugosâ inflectâ induta; umbonibus ferè medianis, tumentibus, plus minusve prominentibus; margine ventrali rectâ vel incurvatâ; extremitatibus rotundatis; cicatricibus inconspicuis; ligamento interno ossiculâ firmato. Long. 4+; lat. 1; alt. 3+ millim. Inhabits Simon's Bay, in sand, 12 fathoms. W. S.

The hinge is as in *K. compacta*, but the ossicle at the hinge seems to bring it under *Montacuta*. In young specimens there is a punctate appearance by transmitted light. Its true place must be decided by the animal. It is very variable in outline.

Montacuta divaricata. T. minuta, tenuis, albida, obliquè ovato-trigonalis, cuneata, convexiuscula, liris tenuibus interdum bifurcatis radiata; umbonibus acutis terminalibus; extrem. posticâ latè truncatâ; portione anticâ semiovali, acutè rotundatâ. Ossiculum anticè quadratum, posticè triangulare truncatum. Inhabits Hakodadi, on the spines of a Spatangus. W. S.

This interesting little species is readily distinguished by its very oblique, cuneate form, and radiated surface.

Cryptodon subradiatus. T. rotundato-elliptica, planata, marginibus rotundatis; umbonibus angustis prominentibus, medianis; extus lirulis radiantibus subimpressis margines versus conspicuis disco obsoletis; lineis incrementi conspicuis remotis fluctuosis; intus cicatricibus elongatis; lineâ palliali interruptâ, punctatâ; valvæ alteræ dente cardinali subulato, lateralibus subobsoletis; valvæ alteræ —— ? Long. 3.75; alt. 3; lat. 2 millim. Inhabits St. Simon's Bay. W. S.

Only one valve was found. The bands of growth are alternately opaque and diaphanous, and the pallial line is broken into dots as in Lucina proper.

Cryptodon polygonius. T. parvula, tenuis, fragilis, lucida, alba, globoso-quadrata, striis incrementi leniter insculpta; umbonibus medianis eminentibus, tumidis; extremitate anticâ acutâ; extrem. posticâ latiori, obliquè truncatâ, angulo postero-ventrali acuto; margine ventrali et margine anticâ continuatim arcuatâ; portione postico angulis binis radiato. Long. 4; alt. 3.5; lat. 3 millim. Inhabits Simon's Bay. Cape Good Hope. W. S.

It is larger, more equal in its diameters, thinner and more angular in front than *C. flexuosus*.

Scintilla thoracica. T. parva, tenuis, lucida, nitida, elongata, tumida, subovalis, minutissimè radiatim striata et fasciis concentricis etiam punctis lacteis ornata; umbonibus antemedianis, minutis; extremitate anticâ rotundatâ; extrem. posticâ altiori, obliquè subtruncatâ; limbo tenuissimo; cicatricibus benè impressis. Long. 13; alt. 8; lat. 4 millim. Inhabits Ousima. W. S.

LUCINA (Myrtea) SEMINULA. T. minuta, crassa, albida, globoso-triangularis, sulcis et laminis elevatis undulatis subcrenulatis ad extremitatibus ferè spinosis insculpta; umbonibus vix post-medianis; lunulâ cordatâ, profundâ, et posticè foveâ ligamentali lanceolatâ instructis; junctione dorsali antico angulato; ab umbone ad junctionem antero-ventralem striata; extremitate posticâ biangulatâ, sulco ab umbone aream minus insculptam secernente: cardo validus; margine interiori crassâ penitus crenulatâ. Diam. 3 millim. Inhabits Hong Kong harbor. Common in 5–10 fathoms, shell sand. W. S.

Remarkable for its great solidity and the depths of its sculpture.

LUCINA (Codakia) PARVULA. T. obliquè ovato-cordiformis, tenuis, flavescens, tumida, concentricè laminato-lirata et radiatim striata, striis utrinque excurvatis et interdum divaricantibus, intersectionibus indentatis; umbonibus elevatis, post-medianis; lunulâ excavatâ; margine internâ exiguè crenulatâ; dente laterali antico obsoleto. Long. 7; alt. 6; lat. 4 millim. Inhabits Port Lloyd, Bonin Island; Loo Choo; Hakodadi, in sand, 6 to 20 fathoms. W. S., and *Captain Rodgers.*

The characters are much the same in *C. obliqua* Rv., a much larger shell. Specimens from Hakodadi are less deeply sculptured, and perhaps more orbicular; but on the whole the differences are not enough to warrant a separate description.

YOLDIA OBTUSA. T. tenuis, glabra, dilutè flavo-virens, transversim ovalis vel potius subcrescentica, tumida; umbonibus parvis ad trientem sitis; extremitate anticâ acutâ; margine dorsali posticâ rectâ demum declivi; extrem. posticâ rotundatâ; margine ventrali valdè arcuatâ; areâ dorsali angustâ haud circumscriptâ; cardine debili, denticulis anticis 20, posticis 24 instructo. Long. 16; alt. 9; lat. 6 millim. Inhabits Hong Kong harbor, in mud, 6–10 fathoms. W. S.

Generally resembles *Y. sapotilla* G. but is less attenuated than any species I have seen.

NUCULA PARVULA. T. minuta, flavescens, ovato-cuneata; disco glabro, limbo striis exilibus confertis radiato; umbonibus tumidis, post-medianis; extremitate anticâ acutâ admodum nasutâ; extrem. posticâ rectangulari; margine internâ crenulatâ. Long. 2; lat. 1.5; alt. 1.5 millim. Hong Kong harbor, in 8 fathoms, muddy bottom. W. S.

Allied to *N. nana* Hinds.

NUCULA (Acila) INSIGNIS. T. magna, solida, obliquè ovato-triangularis, ventricosa, sulcis e lineâ medianâ divaricantibus interdum propè marginem bifurcatis arata, epidermide olivaceâ induta; umbonibus posticis, ferè terminalibus, conspicuis; extremitate posteriori verticali, angulo ventrali obtuso, areâ dorsali depressâ, cristatâ, vallibus acutis circumscriptâ; portione antico ovato: cavositas salmonacea, argentata; denticulis anticis circiter 20; posticis 10. Long. 15; alt. 12; lat. 8 millim. Dredged off the east coast of Japan, lat. 37°, and at Hakodadi. W. S.

The description of *N. mirabilis* Hinds would apply in general to this shell; but in the figure, the postero-ventral junction is more acute angled, and there are angular markings represented at the extremities. In one of our specimens there is a double series of zigzags down the disk.

LEDA CUSPIDATA. T. parva, olivacea, concentricè sulcata, pyriformis, anticè subglobosa, posticè subitò contracta, rostrata; umbonibus paulum antemedianis; areâ dorsali posticâ amplâ, cristatâ, carinis submarginalibus circumscriptâ; dentibus cardinalibus anticis 12, posticis 14. Long. 7; alt. 4; lat. 3 millim. Inhabits Hong Kong harbor, in mud, 8 fathoms. W. S.

Approaches nearest to *Leda retusa*.

MODIOLARIA CUPREA. T. trapezoidea, ventricosa, tenuis; epidermide ochraceâ; umbonibus obtusis; extremitate anticâ insolitè obtusâ, ferè verticali; margine dorsali lentè arcuatâ, quoad marginem ventralem ferè rectam parallelâ; extrem. posticâ obtusâ; valvis absque angulis; areis lateralibus tenuiter et inconspicuè radiatis; areâ medianâ glabrâ: cavositas margaritacea, limbo cupreo; margine internâ crenulatâ. Long. 7; lat. 4; alt. 4.5 millim. Inhabits Kagosima Bay. W. S.

An unusually short, quadrate species, and quite distinct in characters, so far as a single, not very fresh specimen can be relied on.

MODIOLARIA EXPLETA. T. parvula, elongata, ovato-trapezoidalis, dilutè virens fusco marmorata; umbonibus subterminalibus, acutis; extremitate anticâ acutâ; margine dorsali et marg. ventrali lentè arcuatis vix divergentibus; extrem. posticâ obtusâ; valvis tumidis ubique striis punctatis radiatis, ad aream medianam minus impressis; pagina interior margaritacea, marmorata; margine internâ utrinque crenulatâ. Long. 6; alt. 4; lat. 2 millim. Inhabits Hong Kong harbor. W. S.

The striation of the median area is peculiar to this species, so far as I know, bringing it near to *M. pectinula* G.

MODIOLARIA VARICOSA. T. tenuis, compressa, ovato-trapezoidalis, dilutè viridis, lineis fuscis angulatis ornata; umbonibus terminalibus; extremitate anticâ acutâ, marginibus arcuatis divergentibus; extrem. posticâ rotundatâ; areis lateralibus striis frequentibus radiantibus impressis; areâ medianâ striis concentricis vel etiam striis radiantibus solum insculptâ: pagina interior nacrea lineis angulatis rufis perlucentibus. Long. 9; alt. 6; lat. 2.5 millim. Inhabits Sydney, New South Wales. W. S.

Generally resembling *M. expleta* in form and coloration, but differing in size and the want of striæ in the middle area. It is marked like *M. strigata* Hanley, a larger and less dilated shell.

MODIOLARIA CUNEATA. T. obliquè ovato-cuneata, ventricosa, tenuis; epidermide pallidè virente; umbonibus terminalibus exstantibus decurvis; margine dorsali cristatâ, arcuatâ; facie dorsali latâ, declivi; angulo antico-ventrali latè rotundato; margine ventrali aliquid pendente; extrem. posticâ angustè rotundatâ; areis terminalibus radiatim sulcatis, sulcis quadratis punctatis, anticis 16, posticis 30; areâ intermediâ concentricè striatâ: pagina interior vinaceo tincta vel marmorata; margine crenulatâ. Long. 12; alt. et lat. 7 millim. Inhabits False Bay, Cape Good Hope, at low-water mark, imbedded in the test of a large Ascidian, sometimes a dozen in an individual; also among rocks, 20 fathoms. W. S.

Very similar to *M. marmorata*, differing chiefly in being of a brownish or rosy color instead of pale green; the umbonal slope is more angular, and the point more acute; the striæ are rather more numerous and more deeply impressed.

M. ARCUATA. T. parvula, gracilis, arcuata; margine ventrali incurvatâ; fastigio antero-dorsali elevato; umbonibus ad quadrantem anteriorem ventricosis; areis terminalibus concinnè radiato-striatis; areâ medianâ inornatâ. Long. 5; alt. 2 millim. Inhabits Kagosima. W. S.

M. QUADRULA. T. subquadrata, marginibus parallelis, ventrali vix incurvatâ; extremitate anticâ rotundatâ; extrem. posticâ obliquè truncatâ; apicibus ferè terminalibus; declivitate postero-dorsali modicè exposito; areis terminalibus radiato-striatis; areâ medianâ inornatâ. Long. 10; alt. 5 millim. Inhabits Kagosima. W. S.

The two latter descriptions are taken from two single valves, quite unusual in form; perhaps accidentally distorted.

MYTILUS CORUSCUS. T. pyriformis, margine ligamentali vix arcuatâ; marg. postero-ventrali angulatâ, latè truncatâ; regione byssali lentè incurvatâ; facie anticâ latâ angulo submarginali limitatâ; epidermide crassâ piceâ anticè castaneâ; margine interiori nigrâ: cavositas ad cicatrices ex viridi iricolor argillaceo versus apicem mutata. Long. 65; alt. 38; lat. 25 millim. Inhabits Hakodadi Bay, common on rocks between tide marks. W. S.

A very symmetrical species, quite remarkable for the brilliancy of its interior.

MYTILUS MUTABILIS. T. elongata, margine byssali ferè rectâ; marg. dorsali lentè omnino arcuatâ in marginem ventralem continuâ; umbonibus pallidis, acutis, plerumque erosis; valvis versus apicem radiatim sulcatis, sulcis sensim evanescentibus, alibi glabris, epidermide castaneâ nitidâ indutis; facie ventrali concinnè striatâ: cavositas hepaticâ. Long. 30; alt. 16; lat. 12 millim. Inhabits Kagosima Bay. W. S.

Like *M. trossulus* or small specimens of *M. edulis* in form, but much more elongated. The diverging furrows are quite coarse and obvious in some specimens, and in others obsolete; the fine striation in the neighborhood of the byssus may always be seen.

SEPTIFER FURCILLATA. T. parvula, pyriformis; margine ligamentali angulatâ, compressâ; declivitate umbonali elevatâ; facie ligamentali latâ, margine rectâ; sulcis quadratis divergentibus concinnè clathratis insculpta, sulco mediano et sulco subventrali majoribus, ex quibus sulci versus marginem recurvati exoriuntur. Long. 8; lat. et alt. 4 millim. Inhabits China Seas. W. S.

A somewhat worn valve furnishes the above description, which I venture to give because the sculpture is so peculiar. It has the form of *S. Cumingii*, but a much coarser sculpture.

PECTEN LÆTUS. T. rotundato-ovata, convexiuscula, vividè rufa; auriculâ parvâ ferè rectangulari; a. alterâ duplo longiori, acutangulari, extremitate arcuatâ; sinu byssali magno; valvæ integræ costis 10–12 majoribus laminas remotas erectas fornicatas gerentibus, 3–4 minoribus plus minusve muriculatis interpositis; v. alteræ costis frequentioribus minoribus squamigeris, costulis muriculatis interpositis; auriculis (nisi areâ ad sinum tendente) radiis numerosis spinulosis munitis; cavositas valvæ integræ rubricata; v. alteræ pallidior, ferè alba. Long. 3.5; alt. 3.75; lat. 1.5 poll. Inhabits Hakodadi Bay, in shelly mud, 10 fath. W. S.

Resembles generally *P. senatorius*, but is more elongated, the small ear longer, and the ribs much less regularly disposed. It is still more like *P. caurinus* G. in which the ribs are angular and more regularly disposed. In old and heavy specimens the scales are worn off; and in some young specimens, too, they are inconspicuous.

OSTREA RIVULARIS. T. discoidea, subcircularis, tenuis; valva inferior crassior, purpurascens, costis radiantibus remotis, interruptis, subtubulosis munita; v. superior simplex, rivulis ramosissimis purpurascentibus venosa: cavositas minimè profunda, ovata, alba cinereo latè marginata; cardine debili. Diam. 60; lat. 10 millim. Inhabits the China Seas, as indicated by shells adhering to it.

The rays of little tubes below, and the veins above, are unusually clear, distinctive characters.

PLICATULA SIMPLEX. T. parva, solida, cinerea vel rubida, flabelliformis, symmetrica, quadrantem haud æquans; marginibus rectis, planulatis; costis præcipuis 6 et costulis numerosis lateralibus, etiam laminis concentricis numerosis munita. Long. 15; lat. 8 millim. Common at Kagosima Bay and Simoda, 5–20 fath. W. S.

. PLACUNANOMIA UMBONATA. T. discoidea, talcosa, fragilis, admodum levigata, straminea: valva superior obsoletè radiata, et umbonem submarginalem monstrans; fossâ cardinali, minimè profundâ: v. inferioris perforatione acuto-ovato; claviculâ vix dilatatâ, quasi costâ secundum marginem perforationis prolongatâ. Diam. 25; lat. 4 millim. Inhabits Kagosima Bay. W. S.

It most resembles *P. claviculata* from Mazatlan.

Observations on the genus Cottus, and descriptions of two new species (abridged from the forthcoming Report of Capt. J. H. Simpson), by Theodore Gill.

The genus *Cottus*, as restricted by Doctor Charles Girard, embraces species with and without palatine teeth, but in all other respects similar. If the arrangement of the teeth is in all cases of generic importance, the species of *Cotti* must then be distributed among two genera. Such genera would bear nearly the same relation to each other as the *Brytti* of Cuvier do to *Pomotis;* as the true *Scorpænæ* do to the genus *Scorpænopsis* of Heckel, and as many genera of *Clupeinæ* bear to each other. For our present purposes we may, however, regard the *Cotti* as forming a single natural genus, all of whose species are very similar in form and structure, but, on account of the difference in dentition, are divisible into subgenera. As the type of the genus *Cottus* has no palatine teeth, that name must be restricted to species so distinguished; the *Cotti* with palatine teeth may then be designated by the name of *Potamocottus*. In the forthcoming report of Captain Simpson, the characteristics and nomenclature of the genus will be more fully discussed. It will be sufficient to state here that Dr. Girard's assertion, that, when young, some species of *Cottus* "exhibit teeth like asperities on the palatines," does not appear to apply to the typical *Cotti*, which seem always to have the palatine bones edentulous. The *Potamocotti*, on the contrary, of all sizes and ages, have teeth on those bones. Even if some of the typical *Cotti* have, in their youth, teeth which they lose with age, the fact would scarcely militate against assigning a certain value to a plan of dentition which is constant through life.

The species of *Potamocottus* now known are the *Cottus Richardsonii* of Agassiz, *Cottus meridionalis* of Girard, *Cottus Wilsonii* of Girard, and *Cottus Bairdii* of Girard.

The two new species of which diagnoses are now given, will be fully described and illustrated in the forthcoming Report by Captain J. H. Simpson, of his Explorations across the Continent in the years 1858 and 1859.

Potamocottus punctulatus Gill.

This species has a form similar to those which are placed by Dr. Girard in the first division of the first section of his systematic distribution of the *Cotti*. The head is much depressed, and rhomboidal ovate above; it forms, from the snout to the membranous margin of the operculum, a third of the entire length. The snout is broadly rounded before. The mouth is large, the distance between the extremities of the maxillaries equalling the length of the caudal fin. The eyes are nearly central and of the usual size; the width of the frontal bones between them equals one of their diameters. The lateral line from the scapular bones to the end of the second dorsal fin is well marked; it is thence deflected and very obscure.

D. 8–17; A. 13; P. 15; V. 1–4.

The color before is grayish, and behind brownish; there are numerous black spots, which on the head and anterior portion of the body are very small and abundant, but behind are larger, confluent, and much fewer. The rays of the dorsal, caudal, and pectoral fins are quite thickly spotted; the rays of the anal have also some spots, but the ventrals are nearly immaculate.

This species is one of the most easily distinguished of the American *Cotti;* one specimen was obtained by Dr. George Suckley, in the summer of 1859, between Bridger's Pass and Fort Bridger; it is four inches in length.

POTAMOCOTTUS CAROLINÆ Gill.

This species is most nearly allied to the *Cottus* or *Potamocottus Richardsonii.* The head forms twenty-eight hundredths (28-100) of the total length above; it is oval and depressed, and its breadth is about a sixth less than the length. The mouth is large, and the distance between the ends of the maxillary bones exceeds a sixth of the total length, and nearly equals the length of the caudal fin. The eyes are moderate; the longitudinal diameter of the orbit equalling a sixth of the head's greatest length. The distance between the centre of the pupil and the snout equals a tenth of the entire length. The interorbital space scarcely equals the diameter of the orbit. The caudal fin forms eighteen hundredths (18-100) of the total length. The lateral line is continued in an almost straight direction to the base of the caudal fin, the deflection under the posterior part of the dorsal fin being slight; the cutaneous keel, in which the pores open, is most developed behind.

D. 8–17; A. 12½; P. 16; V. 1–4.

The color differs little from that of the allied species. There are four rather darker transverse dorsal bands; one under the first dorsal fin, one under the anterior and another under the posterior parts of the second dorsal, and a fourth at the base of the caudal fin. The spinous dorsal is punctulated with darker, especially between the anterior rays. The other fins are hyaline. The head is darkest above.

The *Potamocottus Carolinæ* is one of the largest species of the genus, and even exceeds the *Potamocottus punctulatus* in size. It is most nearly allied to the *Potamocottus Richardsonii* Gill or *Cottus Richardsonii* Agassiz, but differs from it in the proportions of its parts, and the character of the lateral line.

Several specimens were obtained by Prof. S. F. Baird, assistant Secretary of the Smithsonian Institution, at Maysville, Kentucky, in the year 1852. They are now in the Museum of the Institution, and are numbered in the catalogue of fishes~~, 2,859.~~ The largest is nearly six inches long.

I have given myself the pleasure of dedicating this fine species to my estimable young friend, Miss Caroline Henry.

Description of a new species of the genus Tigoma of Girard (abridged from the forthcoming Report of Capt. J. H. Simpson), by Theodore Gill.

The full description and figures of this species will be published in Captain J. H. Simpson's Report of his Explorations across the Continent in 1858 and 1859. The revised characters and synonymy of the genus will be also given.

Tigoma squamata Gill.

The greatest height of the body equals three tenths of the total length, and is about twice as great as the width. The head forms more than a quarter (28-100) of the total length, and the distance from the snout to the nape exceeds a fifth; its width behind equals 15-100 of the total length, and before, from cheek to cheek, one tenth, or scarcely more than the interorbital area. The eyes are moderate, the diameter exceeding a sixth (5-28) of the head's length; the centre of the pupil is distant two diameters from the snout. The dorsal fin commences midway between the snout and the end of the central caudal rays. The ventrals are inserted nearly under the first branched ray of the dorsal. The number and character of the rays are indicated by the following formula:—

D. 4, $7\frac{1}{1}$; A. 4, $6\frac{1}{1}$; C. 9, 1, 9, 8, 1, 8; P. 1, 14; V. 1, 9.

There are about fifty scales along the lateral line.

The color is a dark purple or purplish blue, with each scale margined with darker. The fins are of the same color as the body.

Specimens of this species were obtained by Mr. C. S. McCarthy, the collector of Captain Simpson's Expedition in the Salt Lake Basin. They are entered in the Catalogue of Fishes in the Smithsonian Museum, under the number 2,607.

Descriptions of new species of Pimelodinæ (abridged from the forthcoming Report of Captain J. H. Simpson), by Theodore Gill.

The three species that are now noticed will be fully described and illustrated in the forthcoming Report of Captain J. H. Simpson, of his Explorations across the Continent in 1858 and 1859.

The genera to which they are referred are characterized in the synopsis of the sub-family of Pimelodinæ.

Genus ICTALURUS (Raf.) Gill.

All of the following species are members of this genus; they are arranged provisionally, nearly in the order of time in which they were described by their nomenclators.

Ictalurus cœrulescens = Silurus punctatus *Raf.* = Silurus pallidus *Raf.* = Silurus cœrulescens *Raf.* = Pimelodus maculatus *Raf.* = Pimelodus cœrulescens (*Raf.*) *Kirtland.*

Ictalurus furcatus = Pimelodus cauda-furcatus *Lesueur* = Pimelodus furcatus *auct.*

Ictalurus furcifer = Pimelodus furcifer *Val.*

Ictalurus gracilis = Pimelodus gracilis *Hough* = Pimelodus Houghii *Girard.*

Ictalurus Beadlei = Synechoglanis Beadlei *Gill.*

Ictalurus olivaceus = Pimelodus olivaceus *Girard.*

Ictalurus affinis = Pimelodus affinis *Baird* and *Girard* (1854).

Ictalurus vulpes = Pimelodus vulpes *Girard.*

Ictalurus megalops = Pimelodus megalops *Girard.*

The following species perhaps belong also to this genus, but the insufficient descriptions given of them, leave it doubtful whether they are *Ictaluri* or *Amiuri.*

Pimelodus lupus *Girard.*

Pimelodus graciosus *Girard.*

A species of this genus is described in Griffith's edition of the "Regne Animal" of Cuvier as the *Pimelodus Cranchii.* As the figure is itself very poor, and as there is no description nor any mention of the habitat of the species, it is irrecognizable, and cannot be retained as a valid species of the genus.

ICTALURUS SIMPSONII Gill.

Head from the snout to the margin of operculum, forming twenty-two hundredths (22-100) of the length from snout to end of median caudal rays. Eyes large and oval, the longest diameter between a fifth and sixth of the head's length. Maxillary barbels extending beyond the opercular bones; the nasal slender and scarcely longer than the eye's diameter; the external inframaxillary exceed half the length of the maxillary, and are twice as long as the internal ones. Eight branchiostegal rays. Dorsal fin commencing at the anterior third of the length from the snout to the concave margin of the caudal; its spine is slender and three fourths as long as the longest ray; it is nearly edentulous behind. The process of the coracoid bone of Owen projects beyond the base of the pectoral spine for a distance equal to the interval between the snout and orbit. The caudal fin is deeply forked, the longest ray being at least twice as long as the central ones; the latter form a ninth of the total length.

D. 1–5½; A. 24; P. 1–9; V. 1–7.

The color of the shrunk alcoholic specimens is purplish brown above, and silvery bronze on the sides. The free half of the anal fin is darker.

This species is very nearly allied to *Ictalurus cœrulescens* (*Pimelodus cœrulescens* Raf. not Lac.), *Ictalurus affinis* (*Pimelodus affinis* Girard), *Ictalurus olivaceus* (*Pimelodus olivaceus* Girard), and *Ictalurus vulpes* (*Pimelodus vulpes* Girard). From the first two it is distinguished by the fewer rays of the anal fin, and apparently from the latter by the length of the head and of the barbels.

Two specimens were obtained by Dr. Suckley in the "Big Sandy River" of Kansas.

GENUS AMIURUS (Raf.) Gill.

The genus *Amiurus* contains all the cat-fishes with wide and depressed heads covered with a thick skin, and has as its type the *Pimelodus catus* of most authors. The following species belong to this genus:—

Amiurus catus = Silurus catus *Linn.* = Pimelodus catus *auct.*

Amiurus cupreus = Silurus cupreus *Raf.* = Pimelodus cupreus *Raf. Kirtland.*

Amiurus xanthocephalus = Silurus xanthocephalus *Raf.* = Pimelodus xanthocephalus (*Raf.*) *Kirtland.*

Amiurus albidus = Pimelodus albidus *Les.*

Amiurus nebulosus = Pimelodus nebulosus *Les.*

Amiurus nigricans = Pimelodus nigricans *Les* = Pimelodus nigrescens *Richardson.*

Amiurus natalis = Pimelodus natalis *Les.*

Amiurus cœnosus = Pimelodus cœnosus *Richardson.*

Amiurus borealis = Pimelodus borealis *Rich.*

Amiurus pullus = Pimelodus pullus *Dekay.*

Amiurus atrarius = Pimelodus atrarius *Dekay.*

Amiurus felis = Pimelodus felis *Agassiz* (not *Lac.*)

Amiurus catulus = Pimelodus catulus *Girard.*

Amiurus felinus = Pimelodus felinus *Girard.*

Amiurus antoniensis = Pimelodus antoniensis *Girard.*

Amiurus ailurus = Pimelodus ailurus *Girard.*

Amiurus Hoyi = Pimelodus Hoyi *Girard.*

Amiurus confinis = Pimelodus confinis *Girard.*

Amiurus cupreoides = Pimelodus cupreoides *Girard.*

Amiurus Dekayi = Pimelodus Dekayi *Girard.*

Amiurus lynx = Pimelodus lynx *Girard.*

Amiurus puma = Pimelodus puma *Girard.*

Amiurus vulpeculus = Pimelodus vulpeculus *Girard.*

Amiurus platycephalus = Pimelodus platycephalus *Girard.*

Amiurus obesus Gill.

The head forms a quarter *of the total length*, and its greatest width equals a fifth. Eyes small, the diameter only equal to about an eighth of the head's length. Maxillary barbels extending little beyond the bases of the pectorals; the nasal extend beyond the posterior borders of the eyes; the external inframaxillary are little longer than the internal, and equal in length the interorbital space. There are nine branchiostegal rays, enveloped in a thick membrane. The dorsal fin commences slightly behind the beginning of the second third of the total length. The length of the anal fin equals a seventh of the total. The spiniform process of the coracoid bone, from the base of the pectoral spine to its tip, equals seven ninths of the spine's length. The truncated caudal fin forms fifteen hundredths (15-100) of the total length.

D. 1–4½; A. 17½ (4.13½); C. 7, 1.15, 1.9; P. 1–8; V. 1.–7.

The color is olivaceous above, and whitish on the abdomen; bases of the anal and caudal fins reddish. The teeth are of a dark purplish color.

Two specimens were collected by Mr. McCarthy, on Captain Simpson's Expedition. They are supposed to have been obtained in Nebraska.

Genus Noturus Raf.

Representatives of this genus have been described from three quite different sections of the United States, and appear to belong to three different species. The following is a list of them: —

Noturus flavus *Raf.*—Noturus luteus *Raf.*—Pimelodus flavus (young), *Dekay*, *Bleeker*—Noturus flavus *Kirtland*, *Storer*.

Noturus gyrinus *Raf.*—Silurus gyrinus *Mitchill*—Schilbeodes gyrinus *Bleeker*.

Noturus lemniscatus *Girard*—Pimelodus lemniscatus *Les.*, *Dekay*, *Val.*, *Storer*.

Noturus occidentalis Gill.

The head enters less than four times (23-100) into the total length; its greatest breadth equals a fifth of the total length. The eyes are small, a diameter not exceeding a seventh of the head's length; the interocular area equals a tenth of the entire length. Maxillary barbels scarcely reaching to the bases of the pectoral fins; nasal extending slightly behind the eyes; the external inframaxillary equal a tenth of the total length, and the internal are about six or seven tenths as long as the external. Nine branchiostegal rays are concealed in the thick membrane. The dorsal commences with the third tenth of the total length. Adipose fin arising nearly over the sixth or seventh ray of the anal fin, and in the specimen described separated from accessory rays by a naked interval. Anal fin nearly equal in length to a sixth of the total. The coracoid spine is short, stout, and oblique.

D. 1, 6½; A. 15½ (4.11½); C. 23, 7.12. 11; P. 1.10; V. 1.8.

The color above is olivaceous brown, and beneath light. The fins are not margined with darker.

One specimen was caught by Dr. Suckley in the Platte River.

Synopsis of the genera of the sub-family of Pimelodinæ.

By Theodore Gill.

The following synopsis of the genera of the sub-family of *Pimelodinæ* was drawn up to assist in the better appreciation of their characters, and their relation to each other, when engaged in the preparation of the Report on the Ichthyology of the route pursued by Captain J. H. Simpson. In the forthcoming Report of that gentleman, the nomenclature of the North American genera, and the reasons that have induced us to change the application of the ancient name of *Pimelodus*, are fully discussed.

Sub-family Pimelodinæ Gill.

Body stout or moderately elongated. Head short or oblong, depressed or sub-compressed, covered by a more or less thick skin, and without a casque. Eyes subcentral, various in size according to genus.

Barbels six or eight; two supramaxillary and four inframaxillary; when eight are present, there is a pair of nasal barbels.

Teeth on both jaws, villiform or acute, and pluriserial, arranged in entire or bipartite bands; none on the vomer or palate.

Dorsal fin subquadrate, anterior almost always with a short or moderate spinous or cartilaginous ray. Adipose fin distinct, rarely united with the recurrent rays of the caudal fin.* Pectoral fins, with the first ray spinous and comparatively short.

Ventral fins inserted behind the vertical of the dorsal fin.

Lateral line straight and simple, or undivided.

The sub-family of Pimelodinæ, as thus restricted, is quite a natural group, which is peculiar to the continents of North and South America, the southern and eastern parts of Asia, and the islands of the Sunda-Moluccan Archipelago. All of its species are confined to the fresh water of those countries.

The difference between this and the other sub-families of Siluroids relates chiefly to the form and the position of the dorsal fins. It resembles most of the allied sub-families in this respect, but from all of them it differs by characters, which, although not in themselves very important, are of considerable value from their permanency, and the difference of habit with which they are coincident.

The nearest allies are the Hemipimelodinæ, of which at present only one genus is certainly known. The fishes of that sub-family are distinguished from those of the present one by a well-defined granu-

* The genus *Noturus* of Rafinesque is the only one so distinguished.

lar casque, and perhaps by the forked posterior extremity of the lateral line. We have not been able to examine any representatives of the group, and cannot say in what other respects it may differ. Bleeker alludes to the resemblance of the single genus to the restricted genus *Arius*.

Group PIMELODI Gill.

Supramaxillary and two pairs of inframaxillary barbels only present. Anal fin short, commencing some distance behind the anus.

§ 1. Body slender.

Head subconical in profile, above gradually narrowed to the little rounded or subtruncated muzzle; skin tense and very thin, not concealing the sculpture of the cranium.

Eyes generally large and suboval. Adipose fin elongated, thin, and compressed, vertically striated, posteriorly truncated.

Caudal fin forked, with the inferior lobe generally longest.

Genus PIMELODUS (Lac.) Gill.

SYNONYMY.

Pimelodus (sp.) *Lacepede*, Hist. Nat. des Poissons, vol. v. pp. 94, 107.

Rhamdia (sp.) *Bleeker*, Ichthyologiæ Archipelagi Indici Prodromus, vol. I. Siluri.

Supraoccipital bone, continued backward as a stout process, the apex of which is emarginated, and receives the subacute anterior portion of the head of the second interspinal. Anterior dorsal fin armed with a well-developed spine.

The genus *Pimelodus*, as now restricted, only includes certainly the *Pimelodus maculatus* of Lacepede. Two or three doubtful species may possibly be also referred to the genus, when they are better known.

Type Pimelodus maculatus *Lacepede.*

This species is found in the La Plata, Parana, and Uruguay rivers, and as far south as the 26th degree of latitude in South America.

Genus RHAMDIA Bleeker.

SYNONYMY.

Mystus (sp.) *Gronovius*, Museum Gronovianum, vol. I.

Heterobranchus (sp.) *Spix.*

Pimelodus (sp.) *Cuv. et Val.* Hist. Nat. des Poissons, vol. XIV.

Pteronotus *Swainson*, Nat. Hist. of Fishes, &c., vol. II.

Rhamdia *Bleeker*, Ichthyologiæ Archipelagi Indici Prodromus, vol. I. Siluri, pp. 197, 204. August, 1858.

Pimelenotus *Gill*, Synopsis of fresh-water fishes of Trinidad, p. ; *ib.* in Annals of the Lyceum of Nat. Hist. of New York, Sept. 1858.

This genus was first naturally characterized by Dr. Bleeker and the present author, at nearly the same time. Dr. Bleeker's name appears to have been published a short time before ours. His name is therefore now adopted. The names of *Mystus* and *Pteronotus* cannot be retained, as both had been previously used for valid genera; *Pteronotus* was also given from a misconception of the characters of its type, Swainson having established the genus for the *Heterobranchus sextentaculatus* of Spix, on account of its second dorsal being supposed to be furnished with true rays.

Head obliquely compressed, gradually narrowed to the snout. Supraoccipital bone posteriorly acuminate, but free. Dorsal fin with a more or less slender spine.

Type Rhamdia Sebæ *Bleeker.*

Syn. Pimelodus Sebæ *Cuv. et Val.*

§ 2. Body comparatively short and robust.

Head large, depressed, covered with the generally thick skin, and with the muzzle horizontally convex or rounded.

Mouth large. Supraoccipital bone posteriorly free.

Eyes small. Adipose fin thick and short. Caudal fin not forked.

Genus Pseudopimelodus Bleeker.

SYNONYMY.

Pseudopimelodus *Bleeker*, Ichthyologiæ Archipelagi Indici Prodromus, vol. I. Siluri, pp. 169, 204. August, (?) 1858.

Batrachoglanis *Gill*, Synopsis of fresh-water fishes of Trinidad, p. 29; *ib.* in Annals of Lyceum Nat. Hist. of New York, vol. VI. Sept. 1858.

Branchiostegal membrane with nine or ten rays on each side. Ventral fins with one simple and five branched rays. Dorsal and pectoral spine quite strong or moderate.

This genus may be considered as representing, in South America, the *Amiuri* of the Northern Continent. But it is perhaps entitled to this distinction only on account of its form. The number of known species is only six, and most of them appear to be quite rare.

As in the case of the nearly synchronous names of *Rhamdia* and *Pimelenotus*, we have adopted Bleeker's name of *Pseudopimelodus* in preference to our *Batrachoglanis*. The first species, and consequently the type, of Bleeker's genus is *Pimelodus bufonius* of Valenciennes; that of *Batrachoglanis* was expressly stated to be the *Pimelodus raninus* of the same naturalist.

Type Pseudopimelodus bufonius *Bleeker.*

Syn. Pimelodus bufonius *Val.*

Genus ZUNGARO Bleeker.

SYNONYMY.

Zungaro *Bleeker*, Ichthyologiæ Archipelagi Indici Prodromus, vol. I. Siluri, p. 169, 204.

Branchiostegal membrane with only four rays on each side. Ventral fins with one simple and nine branched rays. Dorsal and pectoral spines slender, concealed in the membrane.

This genus was founded on the *Pimelodus zungaro* of Humboldt. It is possible that the great physicist has overlooked one or two branchiostegal rays. He has asserted that none of the fins have spines; but, as Valenciennes has suggested, they are probably present in the dorsal and pectoral fins as usual, but enveloped in a thick membrane. We have not been able to examine Humboldt's original memoir, but as the species is described by Valenciennes as recalling the form of the *Pimelodus bufonius* (or *Pseudopimelodus bufonius*), and to differ only in the characters above enumerated, there is little doubt that the diagnosis of the section in which it is placed is equally applicable to it and *Pseudopimelodus*. One species is known.

Type Zungaro Humboldtii *Bleeker*.

Syn. Pimelodus zungaro *Humboldt*.

It is an inhabitant of the upper Marañon in the Province of Jaën de Bracamoros, where the cold streams descending from the Cordilleras enter that river.

Group ICTALURI Gill.

Supramaxillary, nasal, and two pair of inframaxillary barbels always present. Anal fin longer than high, commencing near the anus.

Genus ICTALURUS (Raf.) Gill.

SYNONYMY.

Silurus sp. *Raf.*

Pimelodus sp. *Raf.* Ichthyologia Ohiensis.

Ictalurus sp. *Raf.* Ichthyologia Ohiensis.

Elliops sp. *Raf.* Ichthyologia Ohiensis, p. 62.

Pimelodus sp. *Kirtland, auct.*

Synechoglanis *Gill*, Annals of Lyceum of Natural History of New York.

Type Ictalurus cœrulescens *Gill.*

Syn. Pimelodus cœrulescens *Raf.*

Body slender and anteriorly subcylindrical. Head obliquely compressed, small, covered with a thin skin. Supraoccipital bone posteriorly cleft and receiving the acuminate anterior end of the head of the second interspinal. Mouth moderate or rather small; seven to nine branchiostegal rays on each side. Anterior dorsal fin with a stout spine. Adipose fin subpedunculated and thick. Caudal fin forked, and inserted on the equally convex extremity of the caudal peduncle. Ventral fins with eight rays.

Genus AMIURUS (Raf.) Gill.

SYNONYMY.

Silurus sp. *Linn, auct.*
Pimelodus sp. *Raf.* Ichthyologia Ohiensis.
Ictalurus sp. *Raf.* Ichthyologia Ohiensis.
Amiurus *Raf.* Ichthyologia Ohiensis, p. 65.
Pimelodus sp. *auct.*
Type Amiurus catus *Gill.*
Syn. Pimelodus catus *Lac.*

Body rather stout and robust. Head depressed, oval, and with the periphery of the snout rounded, covered with a thick skin. Supraoccipital bone posteriorly free. Branchiostegal membrane with seven to nine rays. Mouth wide. Anterior dorsal fin with a stout serrated spine. Adipose fin subpedunculated and thick. Caudal fin not forked; the end of the caudal peduncle equally convex. Ventral fins with eight rays (1.7).

Genus NOTURUS Raf.

SYNONYMY.

Silurus sp. *Mitchill.*
Noturus *Raf.* American Monthly Magazine and Critical Review, vol. III. p. 41. Nov. 1818.
Noturus *Raf.* Prodrome de soixante-dix nouveaux genres d'Animaux découvertes dans l'interieur des Etats Unis en 1818; *ib.* in Journal de Physique, vol. LXXXVIII. 1, p. 421. June, 1819.
Noturus *Raf.* Ichthyologia Ohiensis, p. 67.
Noturus *Raf. Kirtland, Storer, Baird.*
Pimelodus sp. *Cuv. et Val. Storer, Bleeker.*
Schilbeoides *Bleeker*, Acta Societatis Scientiarum Indo-Nederlandicæ, vol. IV. 258. 1858.

Body rather stout and robust. Head depressed, oval, covered with a thick skin, with a median longitudinal and transverse nuchal groove. Supraoccipital bone posteriorly free. Mouth wide. Branchiostegal membrane with seven to nine rays on each side. Anterior dorsal fin with a short, smooth, and acuminated spine. Adipose fin, cariniform, elongated, and compressed, generally united with the procurrent rays of the obliquely truncated caudal fin. Caudal peduncle with the extremity obliquely subrotundate, truncated downwards and forwards. Ventral fins with nine rays (1.8).

Type Noturus flavus *Raf.*

Genus HOPLADELUS (Raf.) Gill.

SYNONYMY.

Silurus sp. *Raf.* American Monthly Magazine and Critical Review, vol. III. p. 355.
Glanis sp. *Raf.* Mass. Monthly Magazine and Critical Review, vol. III. p. 447, vol. IV. p. 107.
Pimelodus sp. *Raf.* Ichthyologia Ohiensis.
Ictalurus sp. *Raf.* Ichthyologia Ohiensis.
Leptops *Raf.* Ichthyologia Ohiensis, p. 64.
Opladelus *Raf.* Ichthyologia Ohiensis, p. 64.
Ilictis *Raf.* Ichthyologia Ohiensis, p. 66.
Pylodictis *Raf.* Ichthyologia Ohiensis, p. 67.
Pimelodus sp. *Lesueur*, *Kirtland*, *Val*, &c.

Body elongated and anteriorly depressed. Head depressed and oblong, covered with a thick skin. Supraoccipital bone, posteriorly free. Mouth wide. Lower jaw longest. Branchiostegal membrane with twelve rays on each side. Anterior dorsal fin with its spine enveloped in the skin. Adipose fin short and thick. Caudal fin slightly emarginated. Caudal peduncle posteriorly, equally convex. Ventral fins with nine rays (1.8).

Type Hopladelus olivaris *Gill.*
Syn. Silurus olivaris *Raf.*

Genus OLYRA McClelland.

SYNONYMY.

Olyra *McClelland*, Calcutta Journal of Natural History, vol. II. p. 576.

Body elongated and subcylindrical. Head depressed, especially at the snout, and moderately elongated, covered with a thick skin. The supraoccipital bone apparently free posteriorly. Mouth moderately wide; jaws of equal length. Branchiostegal membrane with about six rays on each side. Anterior dorsal with no stout spine. Anal fin long, with more than twenty rays. Caudal fin lanceolated, inserted on the symmetrical termination of its peduncle. Ventral fins with five rays.

The genus *Olyra* as here restricted, includes only the first species of M'Clelland's genus which he has called *Olyra longicaudatus*. The small number of branchiostegal and ventral rays is one of the most distinguishing characters of that genus. Dr. M'Clelland may have erred in the exact number, as he was often inaccurate, but the true number must be very near that given. The small simple ray of the ventral fin may possibly have been omitted, but for the present, we are compelled to rely on the accuracy of the describer of the specie

Type Olyra longicaudata *McClelland.*

This species was observed by the author to indicate a union between the shad-fishes and the loaches (Cobites).

Genus Branchiosteus Gill.

SYNONYMY.

Olyra sp. *McClelland*, Calcutta Journal of Natural History, vol. II.

Body elongated and subcylindrical. Head oblong and depressed, especially at the snout. The supraoccipital is undoubtedly free posteriorly. Mouth quite wide; lower jaw prominent and protruding beyond the upper. Branchiostegal membrane with about thirteen rays. Anterior dorsal fin without a large spine. Anal fin of moderate length, with about fifteen rays, increasing in length posteriorly. Caudal fin not lanceolated. Ventral fin with about seven rays.

This genus appears to have some affinity with the North American *Hopladeli*. It has the same large number of branchiostegal rays, nearly the same form of head, the prominent lower jaw, and the comparatively short anal fin. One of the distinguishing characteristics of the Asiatic genus is the smaller number of ventral rays. Even if Dr. M'Clelland has overlooked the first simple one, there is one less than in the genus *Hopladelus*, and the same number as in the *Amiuri* and *Ictaluri*.

A single species has been discovered in the Kasyah Mountains.

Type Branchiosteus laticeps *Gill.*

Syn. Olyra laticeps *McClelland.*

In addition to the preceding genera, Dr. Bleeker has named a group *Gagata*, and has referred to it a number of East India species, chiefly described by Hamilton Buchanan, which he was unable to refer to any other genus. No generic characters are given, and the group is stated to be formed for species with eight barbels, which cannot be placed elsewhere. It would be to some doubtful whether a name of a group, which has been formed of such elements and on such principles should be retained for any natural genus. This must be decided hereafter when the affinities and characters of the species referred to are known.

Besides the genera that have been admitted as members of the group, it may perhaps be found that several others, such as *Hemipimelodus* and *Rama*, are natural associates of the genera here grouped, but we are too imperfectly acquainted with them and have not the requisite data to decide now.

Group Akyses Gill.

Head covered by the skin; nostrils distant; the posterior cirrated, the anterior subtubular. Skin of the body glandular or verrucose. Teeth pluriserial, small and acute, arranged in a single or bipartite band on the jaws. Ventral fin with one simple and five branched rays. Natatory bladder absent. Anal fin of moderate length.

Genus ACROCHORDONICHTHYS Bleeker.

SYNONYMY.

Acrochordonichthys *Bleeker*, Ichthyologiæ Archipelagi Indici Prodromus, vol. I. Siluri, p. 209, 221.

Internal and external inframaxillary barbels distant from each other; the former situated near the front of the jaw; the latter far behind the angle of the mouth. Branchial apertures inferior; branchiostegal membrane moderately emarginated; branchiostegal rays seven. Caudal fin entire. Skin of the body covered with longitudinal rows of warts. Supramaxillary barbels, membranaceous at their bases.

Five species of this genus have been described by Bleeker, all of which are peculiar to the rivers of Sumatra and Java.

Type Acrochordonichthys platycephalus *Bleeker*.

Genus AKYSIS Bleeker.

SYNONYMY.

Akysis *Bleeker*, Ichthyologiæ Archipelagi Indici Prodromus, vol. I. Siluri, pp. 209, 234.

All the inframaxillary barbels approximated to the front of the mouth. Branchial apertures posterior, produced beyond or behind the apex of the opercula; branchiostegal membrane scarcely or not at all emarginated. Branchiostegal rays six. Caudal fin bilobed. Skin of the body granular.

If the *Pimelodus cana* of Hamilton Buchanan really belongs to this genus, two species are known, one of which is found in the rivers of Java, and the other in Bengal.

Type Akysis variegatus *Bleeker*.

Group GLYPTOSTERNI Gill.

Head covered by the skin. Nostrils contiguous and patulous, neither tubular nor valvular. Teeth small, acute, and pluriserial, in a single or transversely divided band on each jaw. Branchial apertures posterior, extending as far as the apex of the opercula; branchiostegal membrane very deeply emarginated. Branchiostegal rays eight or nine.

Skin of the body smooth. Thoraco-postgular region with transverse, concentric, or posteriorly converging suctorial laminæ.

Anal fin of moderate length, with ten to fourteen rays. Dorsal pectoral spines cartilaginous or osseous, enveloped in the skin. Caudal fin bilobed. Ventral fin with one simple and five branched rays.

Natatory bladder absent.

Genus GLYPTOSTERNUM McClelland.

SYNONYMY.

Glyptosternon *McClelland*, Calcutta Journal of Natural History, vol. II.

Glyptosternon *Bleeker*, Ichthyologiæ Archipelagi Indici Prodromus, vol. I. Siluri, pp. 190, 204, 214.

Eight species of this genus are known, all of which are natives of the rivers of and the islands of Java and Sumatra.

The genera *Ictalurus*, *Amiurus*, *Noturus*, and *Hopladelus* were confounded by Dr. Bleeker under the name of *Pimelodus*. The group so framed was characterized by the presence of eight or nine rays in the ventral fins; the branchiostegal membrane, furnished with from eight to twelve rays, and the presence of a natatory bladder.

He has referred to it all the North American *Ictaluri*, and also the *Pimelodus Cranchii* of Griffith's English edition and translation of the "Regne Animal" of Cuvier; the *Pimelodus cantonensis* of Valenciennes, and *Pimelodus guttatus* of Lacepède. The *Pimelodus Cranchii* is probably a true *Ictalurus*, but as no description is given, and the figure is of no value for specific details, and as the habitat is also unknown, the species is uncertain. As the specimen is said to be preserved in the British Museum, Dr. Gunther will probably describe it in a recognizable manner.

The *Pimelodus cantonensis* and *Pimelodus guttatus* do not appear to belong to any of the North American genera, but as they have only been established on Chinese figures, they also must be considered as doubtful for the present.

Subfamily HEPTAPTERINÆ Gill.

Body very slender and elongated, subfusiform, with the skin smooth.

Head oblong, much depressed, oval above and laterally elongate, conical, or cuneiform; covered by a soft and smooth skin.

Eyes moderate, subcentral or subanterior.

Barbels, six; two supramaxillary and four inframaxillary.

Nostrils distant, valvular.

Teeth on the jaws, acute and pluriserial; none on the vomer or palate.

Branchiostegal membrane emarginated, with nine rays on each side.

Dorsal fin subquadrate, distant from the head.

Anal fin oblong, commencing under the adipose fin, and far behind the anus.

Adipose fin commencing some distance behind the dorsal, very long, low, and compressed, and united with the procurrent rudimentary rays of the entire caudal.

Pectoral fins rounded, with the first ray spinous.

Ventrals under the anterior or middle part of the dorsal, sustained by six rays.

The single species of this section which is yet known, differs too much in form and in the position of the dorsal fin from the other Siluroids, to be referred to any of the restricted subfamilies. We have therefore placed it in a distinct one, which we believe is truly founded.

The characters of the subfamily have been given here, because *Noturus*, one of the North American genera of *Ictaluri* has a similar union of the adipose fin and the procurrent rays of the caudal fin. But in every other respect, *Noturus* is a true member of the group of *Ictaluri*, and nearly allied to the common catfishes or *Amiuri*.

Genus HEPTAPTERUS Bleeker.

SYNONYMY.

Pimelodus § 3 sp. *Cuv. et Val.* Hist. Nat. des Poissons, vol. XV.

Heptapterus *Bleeker*, Ichthyologiæ Archipelagi Indici Prodromus, vol. I. Siluri, p. 197.

The only known species is an inhabitant of the Parana River and its tributaries.

Type Heptapterus mustelinus *Bleeker*.

Syn. Pimelodus mustelinus *Cuv. et Val.*

CATALOGUE OF THE MINERALOGICAL SPECIES ALLANITE. BY WM. SHARSWOOD.

In anticipation of prefixing a monograph of the Cerium minerals to my researches on the element Cerium and its congeners, I have prepared a reference list of the present known minerals of the species ALLANITE, accompanied with such notes as may not be altogether without interest to science. An additional object has also been had in view, — that of gaining suggestions and other assistance from those persons who may be able to offer them.

Philadelphia.

ALLANITE.

Allanite. Alluk, Greenland. Thomson, Trans. R. S. Edinburgh, VI. 371. (It was on this mineral that the variety Allanite was founded.)

——— Schmiedefeld near Luhl, Thuringia. Credener.

——— Hindostan. (Thomson alludes to his having seen a specimen of this mineral in the Museum of the Honorable East India Company, but failed to learn its exact locality. Dufrenoy gives an analysis of a specimen from the same country, by Stromeyer.)

——— Jotum, Fjeld. Scheerer.

——— Myssore. Wollaston.

——— Snarum. Scheerer.

——— Krux, in Thuringia. Credener, Ann. Chem. u. Phys. LXXIX. 144.

Allanite. Iglorsoit, Greenland. Stromeyer, Göttingische gelehrte Anzeigen, 1834, St. 75.

——— Hitteröe, Norway.

——— Dresden, near. Zschau, Leon. Jahrb. Min. 1852, p. 652.

——— West Point, N. Y. — Bergemann, Ann. Ch. u. Ph. LXXXIV. p. 485.

——— Monroe, Orange Co., N. Y. Beck, Natural History of New York. Mineralogy, p. 441; Genth, Am. Journ. Sci. and Arts, 2d Ser. XIX. p. 20.

——— Eckhardt's Furnace, Berks Co., Pennsylvania. Genth, Am. Journ. Sci. and Arts, 2d Ser. XIX. p. 20. (As a point in the history of this mineral, it has been communicated to me that about two tons of the mineral had been taken to a furnace near Reading, under the impression of its being iron ore.)

——— South Mountain, near Bethlehem, Pa. Genth, Am. Journ. Sci. and Arts, 2d Ser. XIX. p. 20. (Among the material thrown out of a shaft, sunk through a vein, composed chiefly of partially decomposed Feldspar, the mineral occurs in crystals, decomposed on the surface, with Zirconite in small quantity, quite well defined crystals of Arsenical Iron, and Sphene in large decomposing crystals.)

——— Haddam, Ct.

——— Bolton Quarry, Mass. (It was first discovered in America, in the limestone of this place, accompanying Petalite, by Dr. Charles T. Jackson.)

——— South Royalston, Mass. Hitchcock, Final Report on the Geol. of Massachusetts, II. p. 638.

(A large number of crystals were found in a boulder of gneiss on the road to Templeton. The crystals which have been described as being "prisms, often two inches long, appear to be right oblique-angled prisms, truncated upon the acute edges, so as in fact to become six-sided prisms. Their diameter is rarely a quarter of an inch; but usually much smaller. The fracture is eminently resinous, and all the external characters correspond to the Allanite from Greenland. Indeed specimens are frequently found that cannot be distinguished from the Orthite and Pyrorthite of Sweden, which are probably the same mineral." Hitchcock, *loc. cit.*)

——— Athol, Mass. Hitchcock, Final Rept. Geol. Mass. II. p. 638. (Occurs in the same variety of gneiss as the above.)

——— Athol, on the road from Westminster, Mass. Hitchcock, *loc. cit.* (Found in blasted rocks.)

——— Manchester, N. H. Jackson, Proc. Bost. Soc. Nat. Hist. V. p. 189. (Found in gneiss in a vein of granite. I have an examination of this mineral in progress.)

——— Moriah, Sanford Magnetic Iron Ore Bed, Essex Co. N. Y.

——— St. Paul, C. W.

——— Bay St. Paul, C. E.

Allanite. Franklin, New Jersey. (In the Feldspar of an old Magnetic Iron Mine, this mineral abounds in small, flat prisms of considerable length. The mineral was found at this locality by Dr. Charles T. Jackson. I must here take the liberty of offering my sincere thanks and grateful acknowledgments to the author of the following investigation, T. Sterry Hunt, Chemist to the Geological Survey of Canada, who has given its publication to my charge.)

Specific gravity 3.84. Partially decomposed by heated hydrochloric acid, with separation of flocculent silica. Gave on analysis: —

Silica	30.20
Alumina	13.05
Iron Sesquioxide	18.25
Ceric Oxide	16.60
Lanthanum Protoxide	6.90
Lime	11.76
Magnesia	1.70
Manganese	traces
Volatile Matter	1.30

The oxyd of Lanthanum, removed by very dilute nitric acid from the calcined cerium oxyd, probably contained some Didymium. The iron, in part at least, exists as protoxyd in the mineral.*

T. S. H.

——— Easton, Northampton Co., Pa. (Edward Swift, M. D., has informed me of his having found a specimen of this mineral on the surface of a field near Easton.)

Cerine. Riddarhyttan, Mines of St. Görans. Hisinger, Afh. i Fys. och. Kemi, IV. 327.

——— Bastnäs. Hisinger.

Orthite. Iglorsoit.

——— Finbo, near Fahlun, Sweden. Berzelius.

——— Skeppsholm.

——— Lindenäs, Norway.

——— Miask in the Ural. Rammelsberg.

——— Fille-Fjeld. Scheerer.

——— Wesciö, Sweden. Blomstrand, Öfv. Akad. Handl, 1854, p. 296; J. pour. Chem. LXVI. p. 156.

——— Arendal. Zettel, Ann. Ch. u. Pharm. CXII. p. 85.

——— Suontaka, Finland. Mendeljef, Jahresbericht Forts. pharm. u. tech. Chemie, Physik, Min. u. Geol. 1858; p. 703.

——— Weinheim. near Stifft, Leonh. u. Bronn, Jahrb. Min. 1856, p. 895.

* It will be made a point of inquiry, during the course of these investigations, to determine the state of oxidation in which the iron exists in these minerals. W. S

Allanite. East Bradford, Chester Co. Pa. Rammelsberg, Ann. Ch. u. Ph. LXXX. p. 85; Kenngott, Uebersicht Min. Forsch. 1850–1851, p. 131; Sharswood, Tr. Acad. Sci. St. Louis I. p. 685. (This mineral has been classed as Orthite by Rammelsberg. It has been arranged under the variety Allanite, by Professor Dana, in his Manual of Mineralogy.)

——— Thuringerwald.

——— Hitteröe. Scheerer.

——— Werchoturie. Hermann.

——— Gottliebsgang. Berzelius.

——— Stockholm, Park at. Berlin.

——— Kullberg, near Stockholm. Berlin.

——— Eriksberg in Stockholm. Bahr.

——— *Pyrorthite.* Kararfvet near Fahlun. Berzelius, Afh. i. Fys. och. Kemi. v. 49.

——— Ytterby. Berlin.

Dr. C. T. Jackson exhibited a small trilobite from Braintree, which proved to be the *Paradoxides Harlani*, and observed that this fossil seems to be identical in Braintree and Newfoundland. The *P. Bennetti* from St. Mary's Bay, according to Barrande, is nearly related to but not identical with the *P. spinosus* of Bohemia.

Mr. Marcou remarked that Massachusetts and Newfoundland bore about the same geographical relation to each other as Bohemia and Scandinavia; in both cases the trilobites of the primordial fauna being nearly related but distinct species. Indeed, it is the opinion of Mr. Barrande that there was a greater diversity in the ancient than in the modern crustaceans of these regions.

Professor Agassiz observed, as to the difference between ancient and modern species, that there were representative species in all geological periods, as well as at the present time. That there may be synchronism of deposit without identity of fossils must be evident, if we glance at the present distribution of animals; if at the present epoch the fauna of America and of Australia should become fossilized, there would not be the slightest resemblance between the representative species of the two continents. The paleontologist must be ready to admit that very different fossil faunæ may be contemporaneous, and that their difference does not necessarily imply a distinct zoölogical age.

Mr. Marcou stated that Mr. Hitchcock's section in Vermont, exhibited at the last meeting, was not made with reference to the idea that the fossils were primordial, and therefore that we cannot draw from it the conclusions which only a section made with this special object in view could justify. He drew a section of Bald Mountain, Washington

County, N. Y., sent him by Mr. Emmons, in which the Chazy is found resting on slate, conglomerate, and sandstone, referred to the Taconic system. On Mr. Safford's geological map of Tennessee, he showed the position of primordial trilobites in strata many thousand feet thick, below the lower Silurian.

He presented to the Society a pamphlet on the "*Neocomien dans le Jura*," in which, about two years since, he had attempted to show that the Neocomian strata of the Jura are the geological marine equivalents of the Wealden of the southeast of England, and that the Purbeck beds belong to the upper oölite.

Professor Agassiz said that, years before, in his work on fossil fishes, he had come to the conclusion, from the examination of fossil fragments of fish, that the Purbeck beds should be classed with the Jurassic. He objected to the use of the expression "primordial fauna," as it implies that there was only one fauna during the period in question; as there is no single fauna of the present epoch, neither was there of the distant geological ages, and as there are now several contemporary faunæ, so were there several in past ages. In order to avoid confusion of a combination of animals or a fauna within a definite space of the earth with the time of a geological epoch, he advocated dropping the term primordial fauna, and adopting one signifying a period of time. It might do to say the primordial fauna of Bohemia, of America, of Scandinavia, &c., but not primordial fauna simply as a combination of animals without regard to extent of geographical distribution.

Mr. Marcou replied that at the time the name primordial fauna was given by Barrande, that of Bohemia was supposed to be the only one. It has been found in other countries since, and the name has been retained as a convenient expression not likely, in his opinion, to mislead any one in the way alluded to by Prof. Agassiz, and not understood as implying the existence of only one fauna at this ancient epoch. He thought, however, a better name could be given, and should be, whenever the so-called Taconic system should be definitely settled in science.

Dr. Bacon, in reference to the cocoanut pearl, of which he had made the first chemical analysis, read a passage from the chemist Fourcroy, written seventy years since, in which these concretions are noted as occurring in the cocoanut. How the carbonic acid and lime originated in the cocoanut, which does not normally contain either, is still a puzzle to the chemist and the botanist.

Dr. Winslow remarked that the milk of the young cocoanut, as he had many times experienced, has a pungent, acid, and refreshing taste, similar to that resulting from carbonic acid; whether this was present or not he was unable to say.

Mr. Marcou stated that he had seen an account, in an English journal, of a living bright red starfish drawn up from a depth of nearly two miles, on a sounding-line, and he argued from this that the generally accepted views as to the depth at which oceanic animals live might require some modifications.

Professor Agassiz and Dr. Gould doubted that this animal had been taken from the depth stated, and suggested that it might have attached itself to the line at a depth much less than this.

Professor Agassiz made some remarks on the circumscription of animals in the ocean, where valleys are as truly limited as the basins of inland lakes; on account of the varying pressure species living at great depths could not as a general rule ascend the sides of a valley and enter a contiguous one; the difference of temperature would also prevent this change. Some fishes and invertebrates have the power of adapting themselves to great changes of ocean pressure; such fish as have an extensive series of water pores on the lateral line or on the head, like the cod, possess this power to the greatest perfection, enabling them at will to introduce into or eject water from the circulation; there is also a great difference in this respect in echinoderms.

Dr. White presented, in the name of Mr. Henry Morse, two specimens of the siluroid genus *Callichthys*, a fish from Surinam, which is said to climb trees. Professor Agassiz and Dr. Pickering mentioned the genera *Periophthalmus*, *Anabas*, and *Gobiesox*, which have the property of existing a considerable time out of water, and might ascend the trunks of trees inclining into the water. Dr. Pickering observed that he had found *Gobiesox* in Peru forty feet above the water on shore, and had seen *Periophthalmus* hopping about over the mud in the manner of frogs.

Professor W. B. Rogers presented, in the name of R. B. Forbes, Esq., a magnificent and very large specimen of amethystine quartz crystals, the half of a geode from Salto, Uruguay. The thanks of the Society were voted for this donation.

Dr. H. A. Warrener of Antioch College was elected a corresponding member, and Messrs. Samuel N. Wigglesworth, Arthur Codman, and Dr. Hall Curtis, of Boston; and Charles W. Folsom, of Cambridge, resident members.

January 16, 1861.

T. T. Bouvé, Esq., in the Chair.

The following communications were read:

Catalogue of the Marine Shells of Nova Scotia. By T. R. Willis, of Halifax.

Palliobranchiata.

Rhynchonella psittacea, *Gm.*
Waldheimia cranium, *Müll.*
Terebratulina septentrionalis, *Couth.*

Lamellibranchiata.

Anomia ephippium, *Lin.*
Anomia aculeata, *Gm.*
Ostrea virginiana, *Lister.*
Ostrea borealis, *Lam.*
Lima sulculus, *Leach.*
Pecten tenuicostatus, *Migh.*
Pecten islandicus, *Ch.*
Pecten irradians, *Lam.*
Nucula tenuis, *Mont.*
Nucula delphinodonta, *Migh.*
Nucula proxima, *Say.*
Yoldia pygmaea, *Muenst.*
Yoldia thraciformis, *Storer.*
Yoldia sapotilla, *Gould.*
Yoldia limatula, *Say.*
Yoldia myalis, *Couth.*
Leda tenuisulcata, *Couth.*
Leda minuta, *Müll.*
Modiolaria substriata, *Gray.*
Modiolaria nigra, *Gray.*
Modiolaria discors, *Lin.*
Modiolaria corrugata, *Stm.*
Modiola plicatula, *Lam.*
Modiola vulgaris, *Fleming.*
Mytilus edulis, *Lin.*
Cellularia fastigiata, *Blum.*
Cellularia turrita, *Desor.*
Serripes groenlandicus, *Ch.*
Cryptodon Gouldii, *Phil.*
Cyprina islandica, *Lin.*
Astarte striata, *Leach.*
Astarte semisulcata, *Leach.*
Astarte crebricostata, *Forbes.*
Astarte lactea, *Br. & Sow.*
Astarte castanea, *Say.*
Cardita borealis, *Con.*
Mercenaria violacea, *Schum.*
Gemma Tottenii, *Stm.*
Callista convexa, *Say.*
Tapes fluctuosa, *Gould.*
Petricola pholadiformis, *Lam.*
Mactra polynyma, *Stm.*
Mactra solidissima, *Chemn.*
Ceronia arctata, *Con.*
Ceronia deaurata, *Turt.*
Macoma sabulosa, *Spengl.*
Macoma fragilis, *O. Fabr.*
Solen ensis, *Lin.*
Machaera squama, *Blainv.*
Solenomya velum, *Say.*
Solenomya borealis, *Tott.*
Mya truncata, *Lin.*
Mya arenaria, *Lin.*
Crytodaria siliqua, *Spengl.*
Saxicava arctica, *Lin.*
Cochlodesma Leana, *Con.*
Thracia truncata, *Migh.*
Thracia myopsis, *Möll.*
Lyonsia arenosa, *Möll.*
Pandora trilineata, *Say.*
Pholas crispata, *Lin.*
Teredo dilatata, *Stm.*

Gasteropoda.

Opisthobranchiata.

Philine quadrata, *Wood.*
Philine lineolata, *Couth.*
Scaphander puncto-striata, *M.*
Diaphana debilis, *Gould.*
Utriculus pertenuis, *Migh.*
Cylichna alba, *Brown.*

Prosobranchiata.

Chiton marmoreus, *O. Fabr.*
Chiton lævis, *Penn.*
Chiton albus, *Lin.*
Tectura testudinalis, *Müll.*
Lepeta caeca, *Müll.*
Pilidium rubellum, *O. Fabr.*
Crepidula unguiformis, *Lam.*
Crepidula fornicata, *Lin.*
Crepidula convexa, *Say.*
Cemoria noachina, *Lin.*
Margarita helicina, *O. Fabr.*
Margarita argentata, *Gould.*
Margarita obscura, *Couth.*
Margarita varicosa, *Migh.*
Margarita cinerea, *Couth.*
Margarita groenlandica, *Ch.*
Skenea planorbis, *Fabr.*
Rissoa minuta, *Tott.*
Lacuna vincta, *Mont.*
Littorina litorea, *Lin.*
Littorina palliata, *Say.*
Littorina rudis, *Mont.*
Scalaria groenlandica, *Perry.*
Turritella erosa, *Couth.*
Turritella reticulata, *Migh.*
Aporrhais occidentalis, *Beck.*
Bittium nigrum, *Tott.*
Menestho albula, *Möll.*
Velutina zonata, *Gould.*
Velutina haliotoides, *Müll.*
Marsenina groenlandica, *M.*
Natica clausa, *Sow.*
Lunatia heros, *Say.*
Lunatia triseriata, *Say.*
Lunatia groenlandica, *Möll.*
Mamma ? immaculata, *Tott.*
Bulbus flavus, *Gould.*
Amauropsis helicoides, *Johnst.*
Bela turricula, *Mont.*
Bela harpularia, *Couth.*
Bela violacea, *Migh.*
Bela decussata, *Couth.*
Bela pleurotomaria, *Couth.*
Columbella rosacea, *Gould.*
Purpura lapillus, *Lin.*
Nassa obsoleta, *Say.*
Nassa trivittata, *Say.*
Buccinum undatum, *Lin.*
Buccinum ciliatum, *O. Fabr.*
Fusus pygmaeus, *Gould.*
Fusus islandicus, *Chemn.*
Fusus decemcostatus, *Say.*
Trophon craticulatus, *O. Fabr.*
Trophon clathratus, *Lin.*
Trophon scalariformis, *Gould.*
Trichotropis borealis, *B. & S.*
Admete viridula, *O. Fabr.*
Fasciolaria ligata, *Migh.*

On the occurrence of Massive Datholite in the mines of Lake Superior. By Augustus A. Hayes, m.d.

A few weeks since Dr. N. C. Keep, of this city, called my attention to a white, compact mineral, closely resembling an artificial product, which he had found to be very fusible, and to afford a green-colored, transparent globule, before the blowpipe flame.

On testing this body, I found that its easy fusibility was due to the considerable proportion of the *borate of lime* contained in it, and that it was composed essentially of silicate and borate of lime, without any crystalline form. Mr. James A. Dupee supplied me with a larger specimen, and with information respecting its common occurrence in the mines before I had communicated the fact of its composition to this Society.

Dr. Kneeland recognized the mineral, as a rock called "Tabular spar" at the Portage Lake mines, and Professor Bacon found specimens in the collection made by Dr. Kneeland, now in the Society's cabinet, when the subject was before the Society; thus establishing the identity as well as various localities of the specimens.

From additional information received recently, it appears that the rock abounds at several of the mines, and forms part of the gangue rock including copper; but no formation, or bed of it, has yet been found.

The Quincy, Marquette, Minnesota, and "Ash-bed" mines contain it, and the Portage Lake and Keweenaw Point rocks include it, in other rocks.

This mineral is a white compact mass, resembling the coarser kinds of Wedgewood ware.

Its fracture, approaching conchoidal, leaves sharp edges and splinters. Hardness 5.5, or just below feldspar. The masses include trappean silicates in regular crystals, and these often contain oxides of iron and copper. Sp. Gr. 2.911.

When heated in the closed tube, it gives off water; at a higher heat a sublimate of boric acid appears. The powder becomes flesh-colored and organic matter is destroyed.

In the Oxidizing Flame alone, it melts quietly to a transparent globule; the Reducing Flame expels any bubbles, and the globules are colored by oxides of copper and iron. Soda in the Oxidizing Flame effervesces and gives a transparent globule, and phosphoric salt develops a silica skeleton. The powder in warm dilute sulphuric or oxalic acid is decomposed, and the addition of alcohol affords a solution, which burns with a green flame.

Two analyses, embracing the extremes of several, gave:—

	I.	II.
Water	3.984	3.96
Silica	38.320	37.92
Boric Acid	22.640	22.16
Quartz	.800	2.08*
Lime	32.816	33.64
Alumina and Ox. Iron	1.040	
Ox. Copper	.080	
	99.680	99.76

* A silicate of alumina, iron, and copper.

Several analyses have been made, taking fragments from different localities, and a close agreement was found in the results; proving an equality of composition quite unusual in uncrystallized compound minerals.

In these analyses, the boric acid was weighed in combination with magnesia, by the following method: —

1. A trial gave the proportion of bases present.

2. 25 grains of very fine powder of the mineral were dropped into a flask containing 500 grains of pure water, boiling hot; 30 grains of crystals of pure oxalic acid were added, and the boiling continued until the oxalates would rapidly fall to the bottom of the flask, as a heavy granular powder.

The clear solution contained nearly all the silicic and boric acids. Without removing it from the flask, it was cooled and agitated while a slight excess of pure ammonia was added; the whole again warmed and finally cooled, when the silica, combined with lime and mixed with oxalate of lime, was a granular powder which could be easily and accurately washed. A trace of copper oxide and the whole boric acid, with some excess of oxalic acid and ammonia, were in the filtrate; sulphydric acid removed copper, and the filtrate mixed with a weighed quantity of recently calcined and cool magnesia, the water evaporated by steam bath, and the residue calcined, the increase of weight in the magnesia was pure boric acid. The other constituents were determined as usual, using the oxalates.

It will be seen that this mineral is less hydrous than crystallized Datholite. The fine powder of the masses loses at 300° F. 0.36 per cent. moisture. Slowly heated to redness the loss increases to about 3.96 per cent., but a sudden elevation of temperature causes a loss of acid, apparently due to the action of silicic acid of the silicates in expelling it. A slight loss of acid in this way has occurred in these experiments, and a closer determination would show the existence of little less water. It is possible, too, that the water in crystallized Datholite has been overrated in consequence of an error arising from the volatility of hydrous boric acid in presence of silica.

Apart from any scientific interest belonging to this mineral, it has important economical relations. It may be used in the manufacture of borax, as it contains nearly one half as much pure boric acid as is found in commercial boric acid.

Some experiments made by my friend, Dr. Keep, and repeated by myself, prove that it may replace borax in many most important applications, without any chemical change previously; the careful selection of fragments only being required.

Remarks on some of the Birds that breed in the Gulf of St. Lawrence. By Henry Bryant, M.D.

The trip to Labrador, made by me the past summer, for the purpose of procuring specimens of the eggs of those sea-birds that breed there, and also to ascertain what changes, if any, had taken place in their economy since Audubon's visit, was unfortunately delayed till the 21st of June, so that the results were much less satisfactory than I hoped to have obtained. Instead of visiting Anticosti and the whole of the North shore, I was compelled to sail directly to the Bird Rocks, thence to Romaine, the nearest point on the North shore, and from thence, following the shore line, to Chateau Beau at the outlet of the Straits of Belle Isle, the farthest point reached.

The season was remarkably stormy and cold, and I was informed by every one that such an inclement one had not been known for years. This also delayed my progress and added much to the difficulty of making researches, as many of the breeding-places of this class of birds are accessible only in pleasant weather.

We sailed from Gaspé on the 21st, and arrived at the Bird Rocks on the morning of the 23d; these are two in number, called the Great Bird or Gannet Rock, and the Little or North Bird; they are about three quarters of a mile apart, the water between them very shoal, showing that, at no very distant epoch, they formed a single island. They are composed entirely of a soft, reddish-brown sandstone, the strata of which are very regular and nearly horizontal, dipping very slightly to the S. W. The North Bird is much the smallest, and though the base is more accessible, the summit cannot, I believe, be reached, at least, I was unable to do so; it is the most irregular in its outline, presenting many enormous detached fragments, and is divided in one place into two separate islands at high water; the northerly one several times higher than broad, so as to present the appearance of a huge rocky pillar. Gannet Rock is a quarter of a mile in its longest diameter from S. W. to N. E. The highest point of the rock is at the northerly end, where, according to the chart, it is 140 feet high, and from which it gradually slopes to the southerly end, where it is from 80 to 100.

The sides are nearly vertical, the summit in many places overhanging. There are two beaches at its base on the southerly and westerly sides, the most westerly one comparatively smooth and composed of rounded stones. The easterly one, on the contrary, is very rough and covered by irregular blocks, many of large size and still angular, showing that they have but recently fallen from the cliffs above. This beach is very difficult to land on, but the other presents no great difficulty in ordinary weather; the top of the rock cannot, however, be reached from either of them. The only spot from which at present the ascent can be made, is the rocky point between the two beaches; this has probably, from the yielding nature of the rock, altered materially since Audubon's visit; at present, it would be impossible to haul a boat up from want of space. The landing is very difficult at all times, as it is necessary to jump from a boat, thrown about by the surf, on to the inclined surface of the ledge, rendered slippery by the fuci which cover it, and bounded towards the rock by a nearly vertical face. The landing once effected, the first part of the ascent is comparatively easy, being over large fragments and broad ledges, but the upper part is both difficult and dangerous, as in some places the face of the rock is vertical for eight or ten feet and the projecting ledges very narrow, and the rock itself so soft that it cannot be trusted to, and in addition rendered slippery by the constant trickling from above and the excrements of the birds that cover it in every direction.

Since Audubon's time the fishery, which was carried on extensively in the neighborhood of Bryon Island, has failed, or at least is less productive than on the North shore, and I am inclined to think that at present the birds are but little disturbed, and that consequently their number, particularly of the Guillemots, has much increased. There was no appearance of any recent visit on the top of the rock, and though after making the ascent it was obvious that others had preceded us, still the traces were so faint that it was several hours before we succeeded in finding the landing-place. The birds breeding there, at the time of our visit, were Gannets, Puffins, three species of Guillemots, Razor-billed Auks, and Kittiwakes. These birds are all mentioned by Audubon, with the exception of Brünnich's Guillemot, and the Bridled Guillemot confounded by him with the common species. No other breeding-place on our shore is so remarkable at once for the number and variety of the species occupying it.

Of the seven species mentioned, I am not aware that three, namely, the Kittiwake and the Bridled and Brünnich's Guillemot, are known to breed at any other place south of the Straits of Belle Isle; of the remaining four, two, the Foolish Guillemot and Razor-billed Auk, are found at many other places and in large numbers; the Puffin in much greater abundance on the North shore, particularly at the Perroquet Islands, near Mingan and Bras D'Or; the Gannet at only two other points in the Gulf, at Percé Rock near Gaspé, which is perhaps even more remarkable than Gannet Rock, but is at present inaccessible; and at Gannet Rock near Mingan, which will soon be deserted by those birds in consequence of the depredations of the fishermen.

The following list of birds is not intended to comprise all those observed by me, — all the land birds are omitted, as well as those water birds to our present knowledge of which I could add nothing.

Before leaving home I had flattered myself that I should have an opportunity of seeing some of the rarer Rapacious birds, or the Iceland or Greenland Falcon, Duck Hawk, &c. Strange as it may seem, during the whole of my visit to the North Shore, I saw only a single bird of this class — a fine Golden Eagle at Bras D'Or. I mention this, not as proof that those birds are unknown, for I frequently found on the shores unmistakable evidence of their visits, but to show with how much caution the results of any individual's experience should be received as positive evidence in Natural History.

As Audubon has generally given the average dimension only of the eggs of the birds described by him, which affords but a very incorrect idea of the variation in size and shape, I have made careful measurement of the extremes in length, breadth, and size of the eggs of all the varieties procured by me, not, however, including those which were evidently abnormal. In this class, I found eggs of the common Cormorant and Herring Gull; they were not more than one quarter of the average size, without exception contained nothing but albumen, and the shell was remarkably thick and strong. One egg of the Cormorant was not symmetrical in its longitudinal axis, and had the appearance of having been deposited in a soft state on a convex surface; in other respects it presented nothing remarkable. I have been led to make these remarks because Naumann, in his description of the eggs of *Uria troille*, states that eggs of very small size are found, caused by the birds laying more than their normal number. I do not think that this is the cause, as the eggs found by me were in nests with other eggs that presented no deviation from the ordinary shape or size.

Somateria mollissima Linn. This bird, though constantly harassed by the fishermen and inhabitants, still breeds in great abundance along the whole extent of the North Shore, and, as it is not gregarious during the breeding season, and ranges over such an immense extent of island and shore, it will probably continue to do so, even if unprotected, for many years. I found but few of their nests, placed under the shelter of the dwarf firs and junipers; their favorite breeding-places seemed to me to be the small grassy islands found in bays, and particularly those where small spots of turf were protected by a rock from the prevailing wind. On many of the islands a species of umbelliferous plant grows abundantly, the thick foliage of which forms an admirable shelter that they gladly avail themselves of. It is not often that many nests are found on one island; from one to a dozen is the ordinary number, though on Greenlet Island, in the Straits of Belle Isle, I found over sixty, probably not more than a quarter of the whole number, as two other persons besides myself were searching for them at the same time, and it is not probable that all the nests would be discovered; indeed, I found nearly as many returning as on first going over the ground. This island is, however, peculiarly adapted to their wants, being covered with a thick growth of the plant above mentioned, hardly elevated above the water, and at a sufficient distance from the main land to prevent it being often visited by the inhabitants. I found on this island a nest in a small stone hut, made for the purpose of concealing the hunters in the spring, at which time they shoot immense numbers of the Eider or Sea Ducks, as they call them.

I found many nests in which the down was quite clean, and am inclined to believe that it is always so if the bird is undisturbed; but after having been frequently robbed, the supply not being sufficiently great, it is forced to eke it out with the most convenient substitute, and late in the season it is not at all uncommon to find nests without any down. I found some containing fresh eggs, and others that had just been finished; after the middle of July, and as many birds had already hatched their brood by the first, it is probable that others had made at least three nests that season. Audubon states that the eggs are deposited on the grass, &c., of which the nest is principally composed. I did not see an instance, where there was any down, that this was the case. Nearly every day, during the first week or two, I found nests containing one, two, three, or more freshly laid eggs lying on a bed of down so exquisitely soft and warm that, in that almost painfully barren and frigid region, it was the ideal of comfort, almost of beauty. When the bird leaves her nest without being suddenly disturbed, I believe the eggs are generally covered with down, always so after the full complement has been laid. The largest number of eggs found by me in a nest was six, and this in so many instances that I am inclined to think it the normal number; in color they present two varieties, one of a pale greenish-olive or oil green, and the other a brownish or true olive; the former are frequently marked with large spots or splashes of the same color of much greater intensity; the latter are invariably unspotted. After the eggs have been incubated for some time, they are always more or less scratched and marked, probably by the claws of the bird while setting on them or rolling them over. In shape they present little variety, being always nearly oval; the diameter is considerable. In size, the difference is perhaps less than in the majority of birds.

Four selected eggs measured as follows: 75 x 47 mill. — 83 x 55 — 71 x 53 — 75 x 47. Of these the first was the most elongated; the 2d, the largest; the 3d, the most broadly oval, and the last the smallest.

Sula bassana, Linn. The northerly or highest half of the summit of Gannet Rock, and all the ledges on its sides of sufficient width, the whole upper part of the pillar-like portion of the Little Bird, and the greater part of the remaining portion of this rock, were covered with the nests of the Gannet at the time of my visit. On the ledges the nests were arranged in single lines, nearly or quite touching one another; on the summit, at regular distances one from the other of about three feet. Those on the ledges were built entirely of sea-weed and other floating substances; on the summit of the rock they were raised on cones, formed of earth or small stones, about ten inches in height and eighteen in diameter when first constructed, presenting, at a short distance, the appearance of a well-hilled potato field. I saw no nests built of zostera, or grass, or sods; the materials were almost entirely fuci, though anything available was probably used; in one case the whole nest was composed of straw, and in another, the greater part of manila rope-yarn.

The nests on the summit of the Great Bird were never scattered, but ended abruptly in as regular a line as a military encampment. Through the midst of the nests were several open spaces, like lanes, made quite smooth by the continued trampling of the birds, which seemed to be used for play-grounds; these generally extended to the brink of the precipice, and reminded me very much of the sliding places of otters.

The birds were feeding principally on herring, but also on capelin filled with spawn, some fine-looking mackerel, a few squids, and, in one instance, a codfish weighing at least two pounds. The surface was swarming with a species of staphylinus that subsisted on the fish dropped by the birds. Occasionally, a nest could be seen in which the single egg had not been deposited, and perhaps one, in two or three hundred, with a newly laid one; on all the rest the Gannets were already sitting, and though none of the eggs were as yet hatched, many of them contained fully formed chicks. On being approached the birds manifested but slight symptoms of fear, and could hardly be driven from their nests; occasionally one more bold would actually attack us. Their number on the summit could be very easily and accurately determined by measuring the surface occupied by them; by a rough computation I made it to be about fifty thousand pairs, and probably half as many more breed upon the remaining portion of the rock and on the Little Bird.

All the birds I saw were in adult plumage, differing in this respect from those breeding in the Bay of Fundy, where many were young birds. The egg of the American bird has not, I think, been described. Audubon was unable, on account of the weather, to ascend the rock, and I think his description was without doubt taken from a European specimen.

In shape and general appearance the egg is more like that of the brown Pelican than of any other North American bird, and it is sometimes stained with blood, as that commonly is. The cretaceous or calcareous coating is thicker than it is on the egg of any other bird that I am acquainted with, and it is very generally marked with scratches and furrows, as if deposited in a soft state; in one specimen this coating is two millimetres in thickness, nearly one twelfth of an inch; so that the egg, though emptied of its contents, feels nearly as heavy as an ordinary one that has not been blown. In shape there is a greater tendency to elongation or flattening of the ellipse than in the Pelicans. The color when first laid is a chalky white, which soon becomes a dirty drab.

Four eggs selected from many hundreds gave the following measurements: 89 x 45½ mill.—84 x 52—66 x 48—67½ x 42.

Phalacrocorax carbo, Linn. On the 26th of June I had the pleasure of visiting, for the first time, a breeding-place of this species. It was situated on the south side of the rocky wall that bounds the gulf at Wapitaguan, and is probably much the same as it was twenty-seven years ago at the time of Audubon's visit; it extends for nearly half a mile along the face of the cliff, which is there from a hundred to a hundred and fifty feet in height, not perfectly vertical, but falling back slightly towards the land as it rises. Although not by any means easy of access, it is yet much less dangerous than Gannet Rock, as the smallest projection can be depended on, and the rough surface of the granite enables one to crawl over it without fear of slipping. As the eggs are not considered worth collecting, and it requires a good deal of time and patience to ascend the precipice, the birds had not, I think, been disturbed before my visit. The nests were built precisely as described by Audubon, and placed wherever there was any room for them. Some of them contained half-grown young, and others were but just finished, but by far the larger number either young or eggs that were nearly hatched. I did not see a single bird that had more than the merest trace of the long white feathers of the neck and thighs. The full number of eggs is four, and, excepting when first laid, they are filthy in the extreme. In shape they are more regular than in the Florida Cormorants, but less so than in the double-crested, the only species of this genus with whose eggs I am sufficiently acquainted to properly compare them. The calcareous coating of this egg, as also of that of the *dilophus*, is much softer than that of the *Floridanus*, and can readily be rubbed off with the fingers; in some specimens it is quite thick, and is frequently deposited in irregular sheets, or even lumps. The birds were very tame, and, though they flew off on our approach, returned to their nests the moment we moved to another spot. On alighting on the sides of the precipice they cling to it with their tail and claws, much like swifts or woodpeckers, and before alighting almost always swooped down nearly to the surface of the water and then rose in a curved line to the surface of the cliff, without moving their wings, and almost with the regularity of a pendulum. Though these birds breed at many other points on the coast, I did not find them in as large numbers anywhere else. The number at Wapitaguan was from 4,000 to 5,000.

Four eggs measured as follows: 71 x 40 mill. — 64 x 40 — 63 x 43 — 67½ x 43½.

Phalacrocorax dilophus, Swains. This species, so closely resembling the Florida Cormorant, I found breeding only at one place, Wapitaguan; it was not so abundant as the *P. carbo*, being in the proportion of about one of the present to four of the other. The northerly part of the breeding-place was occupied exclusively by the present species, the central part by both, and the southerly by the common species only. Though so early in the season, there was hardly a trace of the crest remaining on any of the birds. Their nests were apparently as bulky as those of the common species, and as they are certainly occupied for more than one year, I am inclined to think it not uncommon for the nest built by one species to be occupied by the other the next season. As a general rule, they preferred the lowest ledges, where the two species were breeding in common; but the highest nest of all was one of the present species. Where the ledge was long enough to admit of several nests, they were generally all occupied by the same species; where there were only two or three, much more frequently by the two. In one or two places near the summit, where the rock was broken in such a way as to present a series of little niches, they seemed to alternate, as if by design. The two species were evidently on terms of perfect friendship, and when not sufficiently near to be distinguished by color or size, no difference could be detected in their habits or motions. The nests contained the same variety of eggs and young as those of the preceding species; if anything, the number of newly laid eggs was proportionably less. The eggs, four in number, were of a more regular oval, but otherwise similar in appearance, and the difference in size by no means proportioned to that of the birds themselves. At the time of Audubon's visit none of the present species were seen at Wapitaguan, and he says that he never found them breeding on precipices, but always on flat rocks. I was unable to visit the breeding-place mentioned by him, near Cumberland Harbor, though I passed near, both going and returning, and even remained two days at *Tête de Baleine*, in hopes that the sea might go down sufficiently to make it possible to land on the rock.

Four eggs gave the following measurements: 60½ x 36½ mill. — 57 x 40½ — 56 x 38 — 59 x 39.

Thallassidroma Leachii, Bon. These birds were frequently seen, but do not breed in numbers or in many places on the North shore. I found them but at two places, on Gull Island, at Romaine, and on a small island between Mecattina and Bras D'Or. As the opposite shore of Newfoundland is lower, and the islands less rocky, it probably breeds there. On the Atlantic shore it is found breeding everywhere that a suitable island exists, from Mount Desert, in Maine, to the

Straits of Belle Isle. At Romaine the eggs were but just laid on the 26th of June.

Puffinus —— ? Shearwaters were very numerous in the Straits, and as at that time they must have been feeding their young, their breeding-places were probably at no very great distance. Owing to the stormy weather I was unable to procure a specimen so as to identify the species, and did not succeed in finding their breeding-place. None of the inhabitants, questioned by me, had ever found the egg or knew anything about their breeding-places.

Lestris arcticus. Also very abundant in the Straits, but not found breeding.

Larus marinus, Linn. This beautiful and powerful Gull we found breeding on almost all the grassy islands North of Romaine, in greater abundance as we approached the Straits. I saw nothing in its habits not already well known. I am sure, however, that it has been represented as much more rapacious and tyrannical than it deserves to be. On Greenlet Island, which I have already mentioned as the abode of great numbers of Eider Ducks, I found twenty-two nests of this bird, among the number one not a foot from the nest of an Eider, both containing eggs. I did not see a single egg-shell or any appearance of any eggs having been destroyed by the Gulls. On all the islands where the Herring Gulls breed, this species is found in greater or less numbers, apparently on as good terms with them as with its own species. I saw no peculiarity in its flight, and have often watched one for some time to ascertain what species it belonged to, before a good look of his black back betrayed it.

The nest is much oftener placed on the bare rock than that of the following species, and is not unfrequently found singly on some small rocky island, which the other never is. The eggs are three in number, and are generally easily distinguished from those of the Herring Gull by the color as well as size. The spots are generally fewer in number and much larger, and this is almost a specific character.

The dimensions of four were as follows: 81 x 50 mill. — 69 x 51½ — 70 x 57 — 69½ x 57.

Larus argentatus, Brünn. This bird was not found by Audubon breeding anywhere on the coast of Labrador. I can hardly attempt to account for this. It is difficult to believe that a bird, now one of the most abundant on the coast, breeding on nearly all the grassy islands, and which the inhabitants state to have always been abundant, could have been overlooked by Audubon; still, this is the most probable supposition, and he mentions, as a fact, something that would seem to favor this view, namely, that the Black-backed Gulls change their plumage so as to resemble large Herring Gulls.* I visited probably

* "The most remarkable circumstance relative to these birds is that they either associate with another species, giving rise to a hybrid brood, or that when very old they lose the dark color of the back, which is then of the same tint as that of the *Larus argentatus*, or even lighter." *Aud. Birds of America*, 8vo. vol. 7, p. 178.

thirty breeding-places of this bird, between Romaine and Chateau Beau, at all of which there were Black-backed Gulls in greater or less abundance, but in the whole of this distance found but one spot on which the Black-backed Gulls were breeding by themselves in a greater number than one, or, at most, two pairs.

As the islands on which these birds breed are all known by the inhabitants, and the eggs and young are both favorite articles of food, they are much harassed by them. At Flat Rock, for instance, where many of these birds breed, on the 26th of July there were from fifty to sixty young birds, the greater number of which, as well as all the eggs, were carried off, and many of the old birds shot by a party of eight whalers, who landed on the island at the same time with ourselves. Nothing remarkable was observed in their method of building their nests. The eggs are subject to a larger amount of variation in form and color than those of most of the genus; the large spots found in the Saddle-back are seldom seen.

Four of them measured as follows: 73 x 44 mill. — 67 x 49 — 55 x 48 — 78 x 52.

Alca torda, Linn. This species, though abundant, is probably less numerous than the Foolish Guillemot; it is, however, much more generally distributed, and breeds on almost all the rocky islands in greater or less numbers, even on those at some distance from the open waters of the Gulf, which the *U. troille* I believe never does.

The eggs can generally be easily distinguished from those of the Guillemots, though some of the latter are so similar that I think they could not be determined with positive certainty. Naumann says that they can be distinguished by the spots being always shaded on their edges with reddish-brown. This is not strictly true, and I have seen eggs of the Guillemots in which the spots were similarly shaded. The number of eggs is stated by Audubon to be two; though I have seen hundreds of them, I never found more than one laid by the same bird, and in no instance anything like a nest. The greatest number found breeding at any one place, was on an island called Tête de Baleine, near the Fox Islands. From the eggs being generally deposited in cracks and fissures, or under projecting masses of rock, they are more difficult to be obtained, and consequently the birds are not so much disturbed as the Guillemots. In the ninth volume of the Pacific R. R. Survey, it is stated that the white line from the nostril to the eye is never absent in this bird in any state of plumage. Naumann says, on the contrary, that in the first plumage it is nearly impossible to distinguish it from the young *U. arra*. I have a fine adult specimen in winter plumage, and also a young bird of the year, without a trace of the white line.

Four eggs measured as follows: 71 x 43½ mill. — 75½ x 49 — 83½ x 47½ — 80½ x 49.

Uria grylle, Linn. Breeding everywhere in abundance. One specimen had the posterior edges of the upper mandible and the lower edges of the rami of the under mandible deep red. I never found more than two eggs laid by the same bird. On July 3d, on a small island where there was no appearance of the birds having been disturbed, the greater number had but just commenced incubating, and none of the eggs were hatched.

Four eggs measured: 57 x 36 mill. — 55 x 38 — 51 x 37 — 58 x 39.

Uria troille, Linn. The most common bird on the Labrador coast, — breeding at various points, from the southern extremity of Nova Scotia to the entrance to Hudson's Bay. From the number in which they assemble at their chosen breeding-places, the eggers and fishermen are enabled to collect their eggs with great ease; the extent to which these birds are persecuted may be imagined from the fact that, though on the 23d of June young birds were common at Gannet Rock, where they are but little if at all disturbed, up to July 20th I saw but one young bird on the Labrador coast. At the Murre Rock, so famous at the time of Audubon's visit for the number of Guillemots breeding there, on the 2d of July not more than a hundred eggs could be collected, and apparently not over a thousand birds were breeding on it, probably not a hundredth part of their former numbers. On account of the violence of the sea, I was unfortunately unable to visit the Foxes, as they are called, a short distance north of the Murre Rocks, and at present said to be their favorite breeding-place. Naumann in his description of the eggs of this bird states that he has never seen an unspotted specimen. I have several in my possession, and it would be strange if in a bird, whose eggs are so extremely varied in their coloration, they should not occasionally be found of a uniform color.

Four eggs measured as follows: 84 x 47 mill. — 74 x 51 — 84 x 51 — 78 x 45.

Uria ringvia, Brünn. As this bird was unfortunately confounded by Audubon with the preceding species, it is at present impossible to ascertain what were its limits or numbers at the time of his visit. There can be little doubt, however, that it was not at all rare on the Labrador shore. None were seen by me at any place, except Gannet Rock, though I think it must breed at other points on the coast. The eggs are said by Naumann to be larger than those of the Foolish Guillemot, and the shell to be smooth, and the spots to be seldom large, &c. The largest Guillemot egg found by me was one of the present species, but in respect to the coloration I notice no particular mark by which they could be distinguished. When at Gannet Rock I unfortunately supposed that I should find this and the succeeding species equally common on the North Shore, and neglected to procure many specimens. The largest and handsomest egg procured is one of the green variety, and marked over the whole surface with lines that present very much the appearance of Chinese characters; it resembles, however, specimens of the eggs of *Uria troille*, and I see no character by which it could be distinguished from them.

Naumann gives, as one of the distinguishing features of the eggs of this bird, a peculiarly fine spotting or dotting, which gives the whole egg, at a short distance, the appearance of being uniformly dark colored. I saw no eggs at Gannet Rock that presented this peculiarity, but in the collection of the Smithsonian Institution there are eggs from California of another species, which are so marked. The species to which these eggs belong is as yet doubtful. Among the thousands of eggs of *U. troille* seen by me at Labrador, not one presented this peculiarity.

Four eggs measured: 79 x 47 mill. — 75 x 48 — 70 x 46 — 80 x 50.

Uria lomvia,* Linn. Every available spot on the sides of Gannet Rock, not already occupied by the Gannets or Kittiwakes, had been taken possession of by the three last-mentioned species of Guillemots and the Razor-billed Auks; their comparative numbers were about three of *U. troille* to two of *U. lomvia* and one of *U. ringvia*, and about one Auk to fifty Guillemots. I noticed nothing in the habits of these birds not already well known.

According to Naumann, the eggs of *U. lomvia* resemble a turkey's in form; though their shape is generally more ovate than that of the two preceding species, and the spots are frequently larger and less numerous, I have not been able to find any character by which they can certainly be distinguished. I have eggs, particularly of *U. ringvia*, that present these peculiarities as strikingly as any of the present species.

Four specimens measured as follows: 79 x 47 mill. — 75 x 48 — 70 x 48 — 70 x 45.

Mr. Theodore Lyman presented the following: —

Descriptions of new Ophiuridæ.

† Ophioplocus, Lyman. (Nov. Gen.)

Disc closely and finely scaled, above and below. Genital scales hidden. Teeth. No tooth-papillæ. Mouth-papillæ. Side mouth-shields wide, and nearly, or quite, meeting within. Arm-spines arranged along the outer edge of the side arm-plates. Upper arm-

* This is the specific name given by Linnæus to Brünnich's Guillemot in the "Systema Naturæ," edit. x. 1758, and consequently has priority over *arra* of Pallas.

† Ὄφις, snake; πλόκος, a twisted rope.

plates divided, on the middle line, into halves, which, at the base of the arm, are placed at the outer lower corner of the joint, on each side, being separated by a number of supplementary pieces. At the tip of the arm the plate is simple; then it divides in two, and the halves are gradually forced apart by the intrusion of supplementary pieces. Two short genital slits, extending only half-way to the margin of the disc, and beginning outside the mouth-shields.*

OPHIOPLOCUS TESSELLATUS, Lyman.

Special marks. Color gray, with obscure cross-bands on the arms. Length of arms, in adults, four to five and a half times the diameter of the disc.

Description of a specimen. Diameter of disc 17 millim. Width of arm, without spines, 3.5 millim. Length of arm 70 millim. Mouth-papillæ five on each side, and one odd one, placed just under the teeth; the side papillæ squarish, flat, and crowded; the odd one resembling the teeth. Teeth five, thick, short, stout, broader than long, with a curved cutting edge. Mouth-shields broad heart-shape, with a curve without and an angle within; length to breadth, 1 : 1.5. Side mouth-shields large and of even width, 5 millim. wide. Under arm-plates squarish, very regular and clear in outline, slightly separated, thick; outer side curved, lateral sides a little re-enteringly curved; length to breadth (10th plate) 1 : 1.3. The halves of the upper arm-plates are rounded triangular, very much like the supplementary pieces in *Ophionereis;* at the base of the arm they lie very low down, so that the side arm-plates are much reduced in size; they are separated from each other by six supplementary pieces, of which one lies on the middle line of the arm, and the other five make a sort of semicircle round it; at the base of the arm the central piece of this semicircle becomes very small indeed, and is often divided in two; between the supplementary pieces there are sometimes single large grains. The halves of the upper arm-plates and the supplementary pieces are thick and swelled, and often of about the same size. Side arm-plates small and almost covered up by the arm-spines. Scales of the disc a little larger above than below, mostly overlapping, but with here and there a round scale; varying somewhat in size, the largest 8 millim. long. Radial shields very small, about 1 millim. long, sunken in the scaling of the disc. Genital slits only 2 millim. long, starting 1 millim. outside the mouth-shield. Arm-spines three, stout, round, blunt; the lowest much the largest; lengths, to that of under arm-plate, .8, 1, 1.3; 1. Tentacle-scales two, longer than broad, flat, nearly oval. Color, in alcohol, gray, with

* *Ophiolepis imbricata* doubtless belongs to this genus, and may be considered the type.

very obscure cross-bars of darker on the arms. According to a colored sketch by Mr. Garrett, the tints of the living animal are about the same.

Variations. The characters of fifteen specimens which I have examined were very uniform; only the young have shorter arms. The proportions of the disc to the arms in specimens of different sizes were 9.5 : 30; 16 : 68; and 19 : 93. The radial shields vary a little in size and distinctness.

This species seems, from descriptions, to be very near *Ophiolepis imbricata;* it, however, has the arms a good deal longer, to which may be added the different pattern of color. *O. imbricata* has arms only three times the diameter of the disc.

Ophiolepis Garretti, Lyman.

Special marks. Arms six times the diameter of the disc; not tapering till just at the end. Mouth-shields as broad as long.

Description of a specimen. Diameter of disc 9 millim. Width of arm, without spines, 2 millim. Length of arm 55 millim. Mouth-papillæ five on each side, and one under the teeth, those on the sides flat, stout, squarish, crowded; the outer one sends a slender prolongation above and beside the next papillæ. Teeth regular, broader than long, with a rounded cutting edge. Mouth-shields neatly rounded without, and with an acute angle within, length to breadth .9 : 1; their outer edge is bordered by a line of little, crowded, angular pieces, one of which is inserted between the mouth-shield and side mouth-shield, at each corner. Side mouth-shields large, of equal width along their length; within separated by one or two supplementary pieces. Under arm-plates longer than broad, broader without than within; outer side curved, lateral sides re-enteringly curved; length to breadth, (7th plate) .9 : .7. Side arm-plates thick and swelled. Upper arm-plates broader than long, broader without than within; swelled, length to breadth (19th plate) .5 : 1.3. The supplementary pieces are small and crowded, the one at each outer corner being largest; they are at the base of the arm, from 7 to 10. The scaling of the disc is very regular, the scales being a little smaller below than above; diameter of the largest nearly 1 millim.; each has its free edge bordered by a line of crowded and regular pieces, which are commonly about seven in number. Radial shields irregular oval, separated by two large scales one outside the other, and two smaller ones lying side by side. Arm-spines 4; very small and slender, confined to the middle of the edge of the side arm-plate; lowest one longest, 5 millim. long. Tentacle scales two, rarely three, stout, thick, forming together an oval figure, which stands obliquely to the length of the arm. Color, in alcohol, disc pale reddish-yellow, with bands of darker on the arms, below grayish. The living animal has a brick-red disc with paler bands on the arms; the lower surface much paler (Garrett).

This species is distinguished from *O. cincta* by shorter mouth-shields and much longer arms.

OPHIOCOMA TARTAREA, Lyman.

Ophiocoma erinaceus (pars?) Ltk. Addit. ad Hist. Oph. 164.

Special marks. Black. Arms about five and a half times as long as diameter of disc. Upper spines slender and much longer than the rest; sometimes four and a half times as long as an under arm-plate. Two tentacle scales. Interbrachial spaces below not granulated.

Description of a specimen. Diameter of disc 25 millim. Breadth of arm without spines 4 millim. Length of arm 132 millim. Tooth-papillæ fourteen to eighteen, sometimes in transverse rows of three; sometimes irregularly placed. Teeth stout, thickened, four in number. Mouth-shields longer than broad, broader without than within, corners all rounded; outer side curved, or made up of three lines; lateral sides re-enteringly curved; length to breadth 3.3 : 2.8. Side mouth-shields triangular, small, broad, lying entirely on the sides of the mouth-shields. Under arm-plates considerably broader than long; a little way from the disc, regularly hexagonal; length to breadth (14th plate) 1.9 : 2.5. Upper arm-plates broader than long, somewhat affected in shape by the number of arm-spines; most are either hexagonal or oval hexagonal, with very sharp lateral corners; length to breadth (13th plate) 1.9 : 4.2. Disc very regularly and finely granulated above, about 14 to a square millim.; below interbrachial spaces naked, showing the fine scales. Arm-spines near base of arm alternating five and four, rarely six; further out four and three; at the tip of the arm only three; upper spine very long, slender, cylindrical, slightly tapering, sometimes a little curved; other spines smaller; within the disc the lowest spine is often much flattened and widened at its end; lengths to that of under arm-plate 9, 6.8, 5.5, 5.5, 3.5, 3.5 : 1.9. Tentacle scales two, nearly to the tip of the arm; outside one oval, inside one more or less irregular. Color, in alcohol, black; the under surface of the arms having a brownish shade.

Variations. This species presents some differences in the lengths of the arm-spines, but very little in their *character.* The range of variation is very much as in *O. Busei.* The specimen above described had spines of the maximum length. Another large specimen, with a disc of 27 millim. and arms of 150 millim., had the spines as follows: 6, 5.5, 4, 3.3, 2.7. The spines of another were, 5.8, 4.5, 3.5, 2.8, 2.5; the disc being 22 millim. A partly grown specimen from Kingsmill Island belonged apparently to this species; the disc was 20 millim. in diameter, and the spines were 5, 3, 2.6, 2.6, 2.6.

This seems to be the species described by Dr. Lütken as identical with *O. erinaceus*. I have seen, however, a number of large specimens of *O. erinaceus*, from Zanzibar, and have compared them with the present species; and they seem to be distinct, differing as "representative species" usually do. The upper arm-spines of *O. erinaceus* are more regular, stouter, and more swelled at the base; also they are shorter; the upper arm-plates are narrower and more crowded; and the arms shorter. A specimen with a disc of 30 millim. had four arm-spines, as follows: 4.6, 4, 3.5, 3.5. Sandwich Islands.

OPHIOCOMA MOLARIS, Lyman.

Special marks. Arms five and a half to eight times the diameter of the disc. Spines ringed with darker and lighter; upper one slender, little tapering, longest, from three to three and a half times as long as an under arm-plate.

Description of a specimen. Diameter of disc, 24 millim. Width of arm without spines, 4 millim. Length of arm, 137 millim. Mouth-papillæ, 11 or 12, the innermost two much the smallest. Tooth-papillæ, 7 or 8, rather large. Teeth, four, upper one narrowest and sharpest. Mouth-shields longer than broad, much narrower within than without, pretty regular; bounded without by a curve, within and on the sides by straight lines; length to breadth, 2.6 : 2. Side mouth-shields small, triangular, lying on the sides of the mouth-shields. Under arm-plates rather broader than long, hexagonal, the outer side and outer laterals being more conspicuous than the corresponding sides within; length to breadth (10th plate), 1.5 : 2. Upper arm-plates broader than long, quite irregular, varying in breadth according to the encroachment of the upper arm-spines, oval, with pointed lateral corners; length to breadth (7th plate), 1.5 : 3.4. Disc regularly, but rather loosely granulated, 20 to a square millim.; below, interbrachial spaces granulated, except a band along each genital slit. Arm-spines near base of arm, alternating four and three, slender, elegant, little tapering, somewhat flattened; upper one longest and largest, but never *swelled;* lengths to that of under arm-plate, 5.5, 3.5, 2.5, 2 : 1.5. Tentacle scales two, on base of arm, but, a little way out, only one. Color, in alcohol; above, umber brown; below, interbrachial spaces the same, the other parts lighter; some of the arm-spines ringed with lighter.

Variations. The arms are always slender, long, and finely tapering; but their proportions vary from five and a half to eight times the diameter of the disc. The tooth-papillæ are commonly about nine; rarely 12. The color varies in depth; the lightest specimens are pale bluish-gray, varied with specks and marblings of white; below, nearly white, with brown lines round the under arm-plates. The lighter the color, the more conspicuous are the dark rings round the spines. The number of joints furnished with two tentacle scales varies somewhat, often differing on the different arms of the same individual. A specimen with a disc of 23 millim. had arms of 161 millim.; length of arm-spines to under arm-plate, 4.5, 4, 3, 2.5: 1.4. A small specimen had the disc 14 millim.; arms, 110; arm-spines to under arm-plate, 4, 2.5, 2, 1.6 : 1.1.

This is the representative species of *O. scolopendrina*, from which, however, it is distinguished by longer arms and longer and more slender arm-spines. The tooth-papillæ, also, are usually fewer. Kingsmill Islands.

Ophiocoma insularia, Lyman.

Special marks. Lower spines longer than the upper. Arms flat, about four times as long as diameter of disc. Under arm-plates regular, and about as long as broad. Interbrachial spaces below closely granulated.

Description of a specimen. Diameter of disc 30 millim. Width of arm, without spines, 4.5 millim. Length of arm, 125 millim. Mouth-papillæ, six on each side; under the teeth there cannot be said to be any mouth-papillæ, because the tooth-papillæ, which sometimes are as many as twenty, extend downwards and outwards, growing smaller and smaller, till they nearly reach the inner end of the mouth-shield. Teeth four, flat and squarish; upper one smallest. Mouth-shields about as long as broad, much rounded, without straight lines; length to breadth, 2.8 : 2.5. Side mouth-shields small, triangular, lying entirely on the sides of the mouth-shields. Under arm-plates about as broad as long, bounded without by a curve, and within by a short inner side and two inner laterals; length to breadth (15th plate), 2.2. Upper arm-plates even and regular, much broader than long, bounded without by a clean curve, and within by an inner side and two inner laterals; length to breadth, 2 : 4. Granulation of the disc extremely close and fine above and below; and extending even to the outer corner of the side mouth-shields; about 45 to a square millim. Arm-spines rather short, little tapering, blunt, a good deal compressed; on the first few joints, beyond the disc, four, very rarely indeed five, further out three; they do not alternate three and four, as is seen in many other species; lengths, to that of under arm-plate, 3, 3.1, 3.6, 3.5 : 2. Tentacle scales, two, large and regular, much longer than broad. Color, in alcohol, above, deep umber, almost black; below, interbrachial spaces the same; arms a little lighter.

Variations. A young specimen, with a disc of 9.5 millim. had arms 35 millim. long; the mouth-shields were narrower than in the adult, the color was paler, and the tips of the arms were cross-barred with white. A very large specimen with a disc 33 millim. in diameter, had arms 155 millim. long; the proportion of the arm-spines to the under arm-plate was 3.5, 3.5, 3.7, 3.7 : 2; the upper spines were greatly flattened, and were cut square off at the end. Some well-grown individuals have cross-bars of light brown towards the end of the arm. Sandwich Islands, Kingsmill Islands.

Ophiocoma Sannio, Lyman.

Special marks. Arms to disc as four to one; they are banded with yellowish. Six arm-spines, slender, and elegant; upper ones longest, and as long as three and a half to four and a half under arm-plates.

Description of a specimen. Diameter of disc 27 millim. Width of arm, without spines, 4 millim. Length of arm about 90 millim. Mouth-papillæ, six, three on each side. Tooth-papillæ irregularly placed, extending nearly to the inner end of the mouth-shield, the lowest one smallest; about twenty-one in number. Teeth five, lowest one very small and nearly surrounded by papillæ; upper one small and somewhat pointed. Mouth-shields oval, longer than broad; length to breadth 2.5 : 2. Under arm-plates broader than long, regular, bounded without and within by a curve, on the sides by re-entering curves; length to breadth (10th plate) 1.4 : 2. Upper arm-plates very regular, bounded without by a clean curve, nearly oval, but flattened a little within; length to breadth (10th plate), 1.4 : 2.4. Disc, above and on the sides, finely and closely granulated, about 45 grains to a square millim., brachial spaces below naked; showing unusually large scales, having a diameter of 5 millim. Arm-spines six, remarkably slender, tapering, and regular; lengths to that of under arm-plate, 5.2, 6, 5, 4.2, 3.8, 3.2 : 1.4. Tentacle-scales two, rather large and pointed. Color, in alcohol, above, very dark purplish brown; the disc ornamented with numerous fine radiating lines of yellowish; two yellowish specks at the base of each arm; about every other upper arm-plate is cross-barred with yellowish, the base of the upper spine having the same color; below, interbrachial spaces dark brown, varied with yellowish; yellowish spots between the under arm-plates.

Variations. The arrangement of colors on the disc varies; sometime the disc is wholly dark, or, again, only spotted with light yellowish; but the arms are always more or less banded with light. A light mark on each side of the mouth-shield is very characteristic. A young specimen with a disc of 9 millim. had arms 34 millim. long; there were five arm-spines. Another had four, and close to the disc, five arm-spines, the disc was to the arms as 6 : 21. In younger specimens the tooth-papillæ are, of course, fewer.

This species stands very near *O. lineolata*, from Isle de France, but differs in having unequal and longer spines. Sandwich Islands, Kingsmill Islands.

OPHIOTHRIX VIRGATA, Lyman.

Special marks. Disc beset with slender spines. Arms twelve times as long as the diameter of the disc; along their upper side, a clear white line, bordered by a narrow blue one on each side.

Description of a specimen. Diameter of disc, 6 millim. Width of arm, without spines, 1 millim. Length of arm, 75 millim. Tooth-papillæ 13, in horizontal rows of two or three; lowest ones the smallest. Teeth four, very thick and stout, standing close together. Mouth-shields heart-shaped, with a pretty distinct point inward, broader than long; length to breadth, .8 : 1. Side mouth-shields meeting nearly, or quite, within. Under arm-plates four-sided, with cleanly rounded corners; length to breadth (12th plate), .6 : .7. Upper arm-plates, wider without than within, outer side cleanly curved, lateral sides a little re-enteringly curved and sloping towards the centre of the arm; length to breadth (8th plate), .7 : 1. Disc above and below pretty closely covered with short, tapering, thorny spines, the longest 1 millim. in length, which nearly obscure the scaling of the disc, which may be distinguished through the skin. Radial shields nearly naked, separated by a single line of spiny scales; length to breadth, 1.8 : 1.2. Arm-spines six, slender, not swelled at the point, upper one commonly longest; lengths to that of under arm-plate, 1.7, 1.7, 1.4, .9, .6, .5 : .6. Tentacle-scales very distinct, round. Color, in alcohol, above, pale blue on the disc; the radial shields with a speck of white at their outer ends; arms obscurely banded with paler and darker blue; along the middle of the arm a clear line of white bounded by a narrow blue line on each side; below, interbrachial spaces pale blue; the rest nearly white.

Ophiothrix spongicola must be quite near this species, but its arms are much shorter, and the pattern of color different. Kingsmill Islands.

OPHIOTHRIX DEMESSA, Lyman.

Special marks. Upper surface of disc, with radial shields closely covered with minute spines, bearing a crown of thorns. Arms about nine times as long as the diameter of the disc. Little thorny spines on the upper arm-plates.

Description of a specimen. Diameter of disc, 10.5 millim. Width of arm, without spines, 1.9 millim. Length of arm, 97 millim. Tooth-papillæ fifteen, unusually stout, standing on a level with each other, arranged in horizontal rows of from two to four, according to size; upper ones stoutest. Teeth four, thick, stout, standing well apart. Mouth-shields much broader than long, oval, with a faint point inward; length to breadth, .7 : 1.1. Side mouth-shields very small and narrow; not meeting within. Under arm-plates small, squarish, with rounded corners, rather broader without than within;

length to breadth, .6 : .6. Upper arm-plates regular and well marked, much wider than long, wider without than within, lateral corners unusually sharp; outer side cleanly curved; length to breadth, .6 : 1.2: their surface is closely covered with minute thorny spines, like those of the disc, but smaller. Disc closely beset with short minute spines, which are smooth on the sides, but have a crown of four to six thorns; the radial shields also are covered so as to look like the rest of the disc; below, the spines are smaller, more scattered, and more pointed. Arm-spines very slender and elegant, tapering, pointed, uppermost and lowest ones shortest; on the basal joints, commonly eleven; lengths to that of under arm-plate, .6, 1, 1.4, 1.6, 1.6, 1.6, 1.6, 1.2, .9, .6, .3 : .6. Tentacle-scale small and rounded. Color, in alcohol, above, faint purplish-blue, arms banded with darker and a broken stripe of the same running along the middle line; interbrachial spaces below, same as above, the rest lighter.

Variations. In specimens that have the disc spines less closely set, the disc is seen to be covered with thin, small, rounded scales; the outlines of the radial shields, also, may be seen. The upper arm-plates are hexagonal, having the outer side in three lines. The arms in some specimens attain a length twelve times that of the disc diameter.

Ophiothrix demessa has a very soft puffed disc, which commonly wrinkles in alcohol; it somewhat resembles *O. longipeda* and *O. parasita*, but has little thorny spines on the upper arm-plates, and is otherwise distinguished. Sandwich Islands, Kingsmill Islands.

Ophiothrix propinqua, Lyman.

Special marks. Disc sparsely granulated and covered above with narrow scales, which form five to seven radiating rows in the interbrachial spaces. Radial shields naked.

Description of a specimen. Diameter of disc 11 millim. Width of arm, without spines, 1.6 millim. Length of arm, 125 millim. Tooth-papillæ standing nearly on a level with each other; thirteen to fifteen, in horizontal rows of two, or more commonly three; the lowest one smallest. Teeth four, very thick and stout, the highest one smallest. Mouth-shields small, irregular oval, or oval heart-shaped, broader than long; length to breadth .7 : 1.2. Side mouth-shields short and wide, not meeting within. Under arm-plates oval, broader than long, the outer side a little re-enteringly curved; length to breadth (12th plate) .6 : .8. Upper arm-plates pointed oval; much broader than long; length to breadth, .6 : 1.5. Disc covered above with narrow, elongated, rather indistinct scales; arranged in parallel, radiating rows; from five to seven such rows in each interbrachial space; and a single row, of three or four scales between each pair of radial shields; these scales bear a few rough grains; outside each radial shield, a row of roundish scales; interbrachial spaces below covered with very short spines. Radial shields smaller than usual; regular triangular, quite naked; length to breadth, 2.8 : 1.6. Arm-spines, near base of arm, from five to seven; the two or three lowest very small; the larger ones swelled at the tip; lengths to that of under arm-plate, 2.2, 2.5, 2.2, 1.1, .6 : .6. Tentacle-scale very small, somewhat pointed. Color, in alcohol, above, disc bright Prussian blue, varied with whitish; outer tips of radial shields white; arms obscurely banded with paler and darker blue; a longitudinal stripe of dark-blue along the middle, and a small white spot between each pair of upper arm-plates; below, interbrachial spaces dark-blue; mouth parts and under arm-plates nearly white.

Variations. Another specimen had the disc of a more intense blue, and the white spots on the arms were nearly wanting.

This species approaches *O. nereidina*, but has more rows of scales on the back of the disc; the arms, also, are proportionately shorter. Kingsmill Islands.

OPHIOTHRIX CHENEYI, Lyman.

Special marks. Radial shields closely granulated; disc beset with thorny stumps. Length of arms about eight times the diameter of disc.

Description of a specimen. Diameter of disc 21 millim. Width of arm, without spines, 3.6 millim. Length of arm, 170 millim. Tooth-papillæ very close set; they form, as usual, a vertical oval, bordered by a projecting margin of about twenty-six papillæ, the centre being filled in with smaller and lower papillæ. Teeth, two. Mouth-shields nearly as long as broad, heart-shaped with a pretty acute point inward; length to breadth, 2.3 : 2.5. Side mouth-shields somewhat variable, more or less closely soldered to the mouth-shields. Under arm-plates partly separated by transverse furrows; rectangular, broader than long, re-enteringly curved outside; length to breadth (10th plate), 1 : 1.3. Upper arm-plates much broader than long, oval, well-marked, with a distinct longitudinal rib, sometimes a dent in the outer side; length to breadth (12th plate), 1.1 : 2.8. Disc above, closely beset with little stumps, thorny on their tops and sides; the longest of them 5 millim. long. Below, interbrachial spaces with scattered stumps, which near the mouth-shields are more pointed and fewer. Radial shields indistinct, from being covered with large, rough grains, about 35 to a square millim. Arm-spines 9; the 3d, 4th, and 5th, longest, pretty stout, somewhat thickened at the point; the three under ones very small, as also the upper one, which is not always found; lengths to that of under arm-plate, .5, 2.9, 3, 3.1, 3.1, 2, 1.5, 1.2, .5 : 1.2. Tentacle-scales, oval; small but distinct. Color, in alcohol, above, disc rich Prussian blue, speckled with white; a light spot on each radial shield; arms indistinctly banded with darker and lighter blue; along the middle a fine white line, bordered on each side with a band of blue; below, disc pale blue, arms mottled and speckled with dark and light blue; arm-spines transparent, nearly white; the points of the larger ones brownish.

Ophiothrix Cheneyi stands near *O. longipeda*, but has arms only about half as long. It is distinguished by its large size and its broad flat arms, bearing regular and well-marked upper arm-plates. Zanzibar.

ASTROPHYTON CLAVATUM, Lyman.

Special marks. Radial ribs closely beset with minute, thorny stumps, or spines.

Description of a specimen. Diameter of disc 30 millim. Width of arm at first fork, 12 millim. Length of arm, 231 millim.

1st joint (within the disc)	to 2d	8	millim.
2d joint	to 3d	12	"
3d joint	to 4th	8	"
4th joint	to 5th	9	"
5th joint	to 6th	11	"
6th joint	to 7th	11	"
7th joint	to 8th	9	"
8th joint	to 9th	10	"
9th joint	to 10th	12	"
10th joint	to 11th	10	"
11th joint	to 12th	11	"
12th joint	to 13th	11	"
13th joint	to 14th	11	"
14th joint	to 15th	7	"
15th joint	to 16th	9	"
16th joint	to 17th	9	"
17th joint	to 18th	9	"
18th joint	to 19th	8	"
19th joint	to 20th	8	"
20th joint	to 21st	8	"
21st joint	to 22d	6	"
22d joint	to 23d	9	"
23d joint	to 24th	5	"
24th joint	to 25th	8	"
25th joint	to 26th	5	"
26th joint	to 27th	5	"
27th joint	to 28th	5	"
28th joint	to end	5	"

Tooth-papillæ and teeth about thirteen, regular, cylindrical, tapering, sharp, the upper ones largest; the longest 1.5 millim. Mouth-papillæ about four on each side, very small, somewhat irregular. Madreporic shield lying at the corner of the interbrachial space; broader than long, plainly made up of irregular, short, thickened tubes, soldered side by side. The space occupied by the tentacle pores and the covered under arm-plates is sunken, forming a shallow trench, the joints being indicated by obscure cross lines. Beyond the disc, the joints are marked by depressions between them; their outer and inner ends are thickened on the sides, making a series of very distinct double ridges along the sides of the arm. The under side of the arm, within and near the disc, is covered by a close pavement of flattened grains; it is very distinct from the sides and upper surface, which are beset with fine, rounded grains, and are separated from the lower surface by a sunken line. Along the upper surface of the arm runs a distinct median furrow. Radial ribs running quite to the centre of the disc, prominent, their outer ends cut abruptly off, making a concave scar, length to breadth, 17 : 4; they are closely beset with microscopic, thorny stumps or grains, some of which end in three or four distinct thorns. The same thorny grains are found, but smaller and more scattered, on the interbrachial spaces below; and a few also on the depressed parts of the upper surface of the disc. At the tips of the arms and on the smaller twigs there are, as usual, double vertical rows of grains, bearing hooks. Tentacle-scales, one or two, small and difficult to see, extending inward as far only as the fourth fork of the arm. Color, in alcohol, above, dark purplish-brown, varied with black; below, interbrachial spaces the same; under surface of arms much lighter. Zanzibar.

Notes on the Cretaceous and Carboniferous Rocks of Texas. By Jules Marcou.

A short time after my last return to Boston, June, 1860, I received two memoirs by Dr. B. F. Shumard, *On the Geology of Texas*, in which that eminent paleontologist has expressed opinions differing from those published by me several times from the year 1854 to 1859. From the nature of Dr. Shumard's memoirs, which contain only short notices, without descriptions or figures of the contested species of fossils, without geological maps, and without real sections of the rocks identified, I did not intend to give my views on the subject, especially after having repeatedly explained the stratigraphical relations of the rocks west of the Mississippi.

In the mean time I wrote a letter, in September, to Dr. Shumard, telling him that although his memoir *On the Cretaceous Strata of Texas* was very interesting, I could not agree with him as to the succession given by him in his theoretical section, but that I hoped one day we might meet, perhaps at Fort Washita, or even at Pyramid Mount, and then settle amicably together our different views. Dr. Shumard did not answer my letter, and I supposed, from his silence, that he was content to leave the matter as it was, until further researches were made; but Mr. Meek having called the attention of the readers of *Silliman's Journal*, vol. XXXI. Jan. 1861, p. 127, to the views of Dr. Shumard in opposition to mine, and taken special care to indorse his own previous opinions and those of his friends and collaborators, Messrs. James Hall, Dr. Hayden, and Drs. Shumard and Newberry, on the disputed geological age and order of succession of the strata in the West, I must once more try to disentangle the thread that my learned adversaries endeavor to keep in a constant imbroglio, and state again what I candidly suppose to be the truth, taking for a basis my own observations.

In the *First Report of the Progress of the Geological and Agricultural Survey of Texas*, December 1, 1859, Dr. B. Shumard says: "Mr. Marcou, in his *Carte Géologique des Etats Unis*, has attempted to define the limits of our coal measures. But the boundaries laid down by him are incorrect, and liable to lead to serious error. The coal measures do not extend into Grayson, Fannin, Collin, and Dallas counties, as represented in that map."

If Dr. Shumard will reduce a map of Texas, containing the county boundaries, to the very small scale of my *Carte Géologique des Etats Unis*, he will see that I have not placed any coal measures in Grayson and Fannin counties, and it is doubtful if I have put any into Collin and Dallas counties, for one or two lines will easily take out a county on such a reduced scale. On such a map, colors can only give a general idea of the distribution of the principal groups of the sedimentary and crystalline rocks. Geological landmarks must be looked for there, and not the geological details of the counties. In my first geological map of the United States, published in Boston, 1853, I showed the union of the coal fields of Missouri and Iowa with that of Arkansas, which Mr. James Hall said, in the *Silliman's Journal* of March, 1854, was "without authority," p. 205, vol. XVII. It is true that Mr. Hall himself united these coal fields in 1857, in his *Geological Map of the Country west of the Mississippi*, and Mr. H. D. Rogers did the same in 1856, both of them copying me, and I suppose sustained by good authority.

During my exploration of Arkansas and the Choctaw and Chickasaw countries in 1853, I perceived that the coal measures must extend into Texas; and from the collections of Capt. Pope, submitted to me at Boston in 1854, on his line of exploration from Preston to El Paso, by Fort Belknap, I concluded that the coal field did not stop in Arkansas, but extended into Texas as far as the Clear Fork of the Rio Brazos west of Fort Belknap. Aided by the observations of Dr. Roemer on the Rio San Saba, published by that learned geologist in

1849, I extended the coal field from Iowa to the vicinity of the Rio San Saba, expressing that opinion which I continue to think a true one, by a general outline, without any claim to the exact correctness of the boundary line, except near the thirty-fifth parallel of latitude, where I have seen the exact limits. From the collections submitted to me, I judged that the cretaceous rocks overlie and even conceal from view the carboniferous rocks on both sides of the Red River, near Preston, as shown on my map; and if my limit is too far south by one line or a fraction of a line, bringing the carboniferous into Collins and Dallas counties, I am much obliged to Dr. Shumard for correcting my mistake, but cannot see that my approximative limit is *liable to lead to serious errors*, as he thinks, on this account. A glance at the *Geognostische Karte von Texas*, published in 1849, — the only one then in existence, — in comparison with my map, will show the difficulties to be surmounted, in the modification and enlargement, made by me, especially as I had only been in the northern corner of the State, near the River Canadian, a hundred miles distant from Red River, and was obliged to make out the Triassic and Jurassic age of rocks, then and at this time considered as cretaceous by Messrs. Shumard, Meek, and Hall.

The second memoir of Dr. B. F. Shumard, alluded to at the commencement of this note, is entitled *Observations upon the Cretaceous Strata of Texas*. (See *Trans. of the Acad. of Science of St. Louis*, vol. I. p. 582. 1860.)

In this memoir Dr. Shumard describes a theoretical section, showing the order of succession of the different subdivisions of the Texan Cretaceous System, so far as his observations go, and correct in the main, he believes, although he admits that "further researches may render some slight modifications necessary." The various groups of strata, in regard to their statigraphical relations and fossils, were "investigated very carefully," he says, and adds, "We have devoted special attention to the *inferior division* of the system." Yet in the description of the *lower cretaceous*, he admits that he is indebted to his brother, Dr. G. G. Shumard, for a knowledge of it, and in the description of its different subdivisions, he seldom gives the strata which overlie or underlie them.

The tabular view of the strata given by Dr. Shumard is here given: —

Section of the Cretaceous Strata in Texas. By Dr. B. F. Shumard.

		Feet.	Characteristic Fossils.
Upper Cretaceous.	Caprina Limestone,	60	Caprina, Cytherea, and Ammonites.
	Comanche Peak group.	300 to 400	Exogyra Texana, Gryphœa Pitcheri, Janira occidentalis, Cardium multistriatum, C. Texanum, Pholadomya Sancti-Sabæ, Lima Wacoensis, Ammonites acuticarinatus, A. Pedernalis, Scolaria Texana, Phasianella tumida, Nerinea acus, Toxaster Texanus, Holectypus planatus, Cyphosoma Texana, and Diadema Texana.
	Austin Limestone. (Fish-bed.)	100 to 120	Gryphœa vesicularis, Exogyra costata, Ostrea anomiæformis, Radiolites Austinensis, Nautilus DeKayi ?, Baculites anceps, Hemiaster perastatus. Lamna Texana, Corax heterodon (falcatus), Mosasaurus.
	Indurated blue Marl, or Exogyra arietina Marl.	60	Exogyra arietina, Gryphœa Pitcheri, Janira Texana, Dentalia.
	Washita Limestone.	100 to 120	Gryphœa Pitcheri (*common var. and var. G. Tucumcarii*) G. sinuata, Marcou (*not Sowerby*), Ostrea subovata (*O. Marshii, Marcou*), O. carinata, Janira Texana, Inoceramus problematicus, Ammonites Texanus, A. Brazoensis, Hamites Fremonti, Nautilus Texanus, Holaster simplex, Toxaster elegans.
	Blue Marl.	50	Inoceramus problematicus, Ostrea, Plicatula, scales and teeth of fishes.
	Caprotina Limestone.	55	Orbitolina Texana, Panopœa Newberryi, Cardium Brazoense, Arca Proutana, Phasaniella perovata, Nerinea, and Caprotina Texana.
Lower Cretaceous.	Arenaceous group. .... (Fish-bed.)	80	Ostrea congesta, O. bellarugosa, Lucina, Plicatula. Lamna Texana, L. compressa, Ptychodus mammilaris, Galeocerdo pristodontus.
	Marly clay, or Red River group.	150	Ammonites Swallovii, A. Meekianus, Ancyloceras annulatus, Scaphites vermiculus, Baculites gracilis, Cytherea Lamarensis, Nucula Haydeni, Corbula Graysonensis, Inoceramus capulus.

I hope Dr. Shumard will pardon me for disagreeing with his views; and I recognize with pleasure, with Mr. Meek, that his exploration in Texas makes his memoir an important one, "entitled to great weight." He gives freely his opinion on my Pyramid Mount section, and I trust he will allow me the same liberty with regard to his theoretical section.

The *Caprina limestone* is intimately united to the *Comanche Peak group*, forming generally the highest elevation on the table-land of Texas. Directly below, is what Dr. Shumard calls the *Comanche Peak group*. Comanche Peak is a celebrated landmark in Johnston County, and as the author has given this name to a special group of rocks, it would have been desirable to have a section of it, but Dr. Shumard gives a section of Shovel Mountain, in Burnet County, fifty miles distant. The Shovel Mountain section is divided into seventeen numbers, comprising three slopes, that is to say, three portions of the mountain where the strata are concealed from view. The *Exogyra Texana* is found near the summit, and the *Gryphæa Pitcheri* near the base; the whole thickness of the section is 355 feet. The list of fossils is given without regard to the subdivisions of the strata, and no one of these fossils indicates the upper portion of the Upper Cretaceous, either in America or Europe. Some of them, such as *Gryphæa Pitcheri*, *Ammonites Peruvianus* (*acuto carinatus*), *Am. Pedernalis*, *Nerinea acus*, and *Toxaster Texanus*, are forms indicating the Neocomian group of Europe, and I should not be surprised if these forms were all found together at Shovel Mountain in the same subdivision at the base of the section, and not near the summit. The other fossils, *Exogyra Texana* (*flabellata*), *Pholadomya Sancti-Sabæ*, *Lima Wacoensis*, *Arcopagia Texana*, *Triginonia crenulata*, *Avellana Texana*, *Cerithium Bosquense*, *Holectypus planatus*, indicate forms of the upper green sand of England, and are found, I suppose, near the summit of Shovel Mountain.

Dr. Shumard gives no reason, stratigraphical or paleontological, for putting the *Caprina limestone* and the *Comanche Peak group* at the summit of the series of cretaceous rocks of Texas, except that he says, the *Caprina limestone* always caps the highest elevations of the table-lands of Texas. This greater elevation does not make it, as a matter of course, a more recent formation, and the contrary is often the case all over the world. Roemer, who considers the cretaceous strata of Texas table-lands as an equivalent of the Upper Chalk of Europe, admits that the strata of the plateaux are *older* than those of the Texas plains, such as the *Austin limestone*.

From the imperfect section of Shovel Mountain, and the list of fossils given by Dr. Shumard of *Comanche Peak group*, I consider that group as of the age of the Green sand, and to be placed below the *Austin limestone*, and the cretaceous rocks of New Jersey; and more, I think it is not rigorously limited, including in the middle and at the base strata, which are probably equivalents of what Dr. Shumard calls *Indurated blue marl*, and the upper portion or even perhaps the whole of his *Washita limestone*.

The *Austin limestone* contains fossils such as *Gryphæa vesicularis*, *Radiolites Austinensis*, *Nautilus DeKayi?*, *Baculites anceps*, *Hemiaster perastatus*, *Corax heterodon*, *Lamna Texana*, which indicate a fauna of the chalk group as well in Europe as America. I regard that subdivision of Dr. Shumard as the youngest of all the cretaceous strata of Texas as yet described; and of the age of the white chalk or *Sénonien* of France.

The *indurated blue marl* or *Exogyra arietina marl*, which comes next in Dr. Shumard's theoretical section, contains the *Exogyra arietina* in profusion, and also the *Gryphæa Pitcheri*. The author says "that it is well exposed towards the base of Mount Bonnell, near Austin." Mount Bonnell is also cited as a typical locality for his *Comanche Peak group;* by giving a section of that mountain, Dr. Shumard would have shown the *Austin limestone* placed according to his views, but none is given. Dr. George G. Shumard found this *indurated blue marl* resting upon the *Washita limestone* in the State of Arkansas, and as the *Washita limestone* is another of the subdivisions not defined with sufficient exactness to serve as a term of comparison, I am inclined to consider the *indurated blue marl* as a subdivision in the middle of the *Comanche Peak group*, and above or even included perhaps in what Dr. Shumard terms the *Washita limestone.*

The *Washita limestone* constitutes according to the author, an important member of the Texan cretaceous system; its name is taken from Fort Washita, where Dr. George G. Shumard found it finely developed. The first *desiderata* are, a good description, bed by bed, of all the cretaceous strata of Fort Washita, with the distribution of the fossils contained in them. This want is not supplied by the memoir of Dr. Shumard; the fossils are given in bulk, although it is more than probable that in those 120 feet thickness of strata, there is a regularity and order in the distribution and relative position of the fossils; they cannot all range from the bottom to the top. It is clear, from the list of fossils, that the greater part of the *Washita limestone* belongs to the lower cretaceous rocks of America, and is on a parallel with the *Néocomien* of the Jura. Without a good drawing of the *Inoceramus problematicus*, and even without a description of the fossil, so called by Dr. Shumard, I may be permitted to doubt its existence; and, if it is found at Fort Washita, it must be in the upper part of the strata, and not in the same bed with *Gryphæa Pitcheri.*

The *blue marl* with *Inoceramus problematicus* was examined by Dr. G. G. Shumard, in Grayson County, and it is given in the theoretical section without saying what strata overlie or underlie it. From the presence of the *Inoc. problematicus* in it, and of fish scales and teeth, I regard it as younger than the *Washita limestone* and place it below the *Austin limestone*.

The *Caprotina limestone* is the lowest member of the cretaceous strata of Texas. I have seen it on the False Washita, near the Canadian, resting unconformably on the Trias, and passing by almost insensible gradations to the *Gryphæa Pitcheri limestone.* The list of fossils given by Dr. Shumard indicates a Néocomien fauna. As Dr. Shumard cites the foot of Mount Bonnell as one of the typical localities for the *Caprotina limestone*, it is to be regretted, once more, that he did not give an exact real section of that mountain.

Without giving a single locality where the *Caprotina limestone* may be seen clearly and unquestionably overlying the *Arenaceous group*, Dr. Shumard makes a great division which he calls *Lower Cretaceous*, and which, according to his brother, contains, in its upper part, *Ostrea congesta*, *Ptychodus mammilaris*, *Lamna compressa*, *Lamna Texana*, and *Galeocerdo cristodontus*. I found the *Ostrea congesta* at Galisteó (New Mexico), in company with *Inoceceramus problematicus*, *Ptychodus Whipplei*, and a large Ammonite, and I have referred those strata to the Chalk group of Europe. From the fossil fishes determined by Dr. Leidy, I consider the *Arenaceous group* of Dr. Shumard younger than the *Washita and Comanche Peak group*, and of the same age with the fish-bed at the base of the *Austin limestone* and the *Blue marl* of Grayson County. The *Lamna Texana* is, according to Dr. Shumard himself, common to the *Arenaceous group* and the fish-bed of the *Austin limestone;* and the *Ptychodus mammilaris* is a very characteristic fossil of the chalk of France, England, Belgium, Italy, and Germany; so I see no reason, paleontologic or stratigraphic, for placing that division in the Lower Cretaceous rocks.

Marly clay or Red River group. This group is an interesting addition to our knowledge of Texan cretaceous rocks. From its position below the *Arenaceous group*, and from the fauna contained in it, such as *Ammonites*, *Ancyloceras*, *Scaphites*, *Baculites*, &c., all new species related to the Marly Chalk species of Europe or America, I regard it as a part of the Upper Cretaceous, below the *Austin limestone* and the *blue marl with Inoc. problematicus*, but above the *Caprina limestone*. I think it fills up the gap between the deposit of the cretaceous strata of the table-lands and those of the plains of Texas.

Now, if I arrange, in a tabular form, the groups of Dr. Shumard, as I am led to consider them, we shall have the following table: —

Upper Cretaceous or Sénonien.	Austin Limestone. Fish-bed in sandstone (*L. Texana*). Blue Marl with *Inoceramus problematicus*.	 Arenaceous group with *Ostrea congesta*. Fish-bed, *Lamna Texana*, &c.
Middle Cretaceous or Green Sand and Turonian.	Marly clay, or Red River group. Caprina limestone. Comanche Peak group (superior part with *Exogyra Texana*). *Exogyra arietina* Marl.	
Lower Cretaceous or Aptien and Néocomien.	Washita limestone (comprising the inferior part of the Comanche Peak group, with *Gryphaea Pitcheri*). Caprotina limestone.	
	Trias or Carboniferous.	

Dr. Benjamin Shumard in this memoir not only synchronizes all the strata of my real section of Pyramid Mount, near the Llano Estacado, with his theoretical section of Texas, and that with such a degree of certainty that he thinks it "scarcely admits of a doubt," but he also regards my *Gryphœa Tucumcarii* as identical with his *Gryphœa Pitcheri*, and my *Ostrea Marshii* with his *O. subovata* of Fort Washita. I have the greatest respect for the labors of Dr. B. Shumard, who is one of the pioneers of the geology of the Mississippi valley, and I do not doubt that he candidly believes he has given a right interpretation to my observations at Pyramid Mount. But however great may be the weight due to the opinion of such an eminent observer, especially when it concurs with that of all other explorers, collectors, and Messrs. Meek, Hall, and Newberry, I continue to believe, very candidly also, that there is not a single stratum nor a single fossil of Cretaceous age at Pyramid Mount. Dr. Shumard thinks that a closer observation than mine at Pyramid Mount, would result in the discovery of the cretaceous fossils of Grayson County, and that my *Ostrea Marshii* and *G. Tucumcarii*, identical or not with his *O. subovata* and *G. Pitcheri*, "hold a position more than two hundred feet above strata that contain well-marked cretaceous types." I can only express the wish that when Dr. Shumard goes to Pyramid Mount, he may find more fossils than I did, and if any of them are cretaceous, and *below* the *Gryphœa Tucumcarii* bed, I am ready to yield to such a proof.

The *Gryphœa Tucumcarii* is a Jurassic fossil closely allied to *G.*

diletata, *G. cymbium*, and *G. calceolata* of Europe, which have nothing whatever in common with the *Gryphœa Pitcheri* or any other cretaceous species; a clearer Paleontological case can seldom be seen; but Messrs. James Hall, W. P. Blake, and J. M. Meek have contrived to make the matter difficult and dark, in the *Reports on the Pacific Railroad and the Mexican Boundary Commission*. I have always considered their determination of fossils as valueless, and a few words of explanation will show the degree of confidence that is to be placed in them as accurate and reliable authorities.

In vol. III. *of the Pacific Railroad Explorations*, Mr. James Hall has described and figured both fossils as varieties, the one of the other. The descriptions and figures of Mr. Hall certainly do not indicate a single species with varieties, but two distinct species, as broadly distinct as two species of the same genus can be; besides, he refers all the specimens of Pyramid Mount to what he calls the typical form of a *small individual* of Dr. Morton's *Gryphœa Pitcheri*, while his *G. Pitcheri*, var. *navia*, are all from the False Washita, both varieties not being found in the same locality, but at two hundred miles distance from each other. This simple fact of stratigraphical position and distribution is a strong objection to the identification of the two fossils. Plate I, fig. 1–6, represents the *Gryphœa Pitcheri* of Hall (not Morton or Roemer). Compared with the text the figures do not give half the characters, and all the principal ones are wanting; such as being "distinctly lobed," "beak strongly incurved," "umbo large and prominent," "postero-ventral margin sinuate and elevated in a line corresponding to the depression in the opposite valve," "impressed radiating lines near the centre;" in fact, I do not recognize a single one of the figures, drawn by Mr. Meek, as representing any specimens picked up by me at Pyramid Mount, and if any of them came from there they are rolled and worn-out specimens, probably picked up on the banks of Tucumcari Creek by some other members of our expedition. Figures 7, 8, 9, and 10, on the same plate, are intended to represent the *Gryphœa Pitcheri*, var. *navia*. Mr. Hall says in the description, "upper valve unknown," when figure 8 gives a complete specimen with upper and lower valves; figure 9, is also an upper valve of another specimen well preserved. So the text is in complete disagreement with the figures. Further, those figures 7, 8, 9, and 10, have been copied from my plate published in May, 1855, in the *Bulletin de la Soc. Géol. de France*, vol. XII. pl. XXI., and the copy was so carelessly made by Messrs. Hall, Blake, and Meek, that they have put the figure 10 as the side view of the upper valve of figure 9, when in fact it is the side view of the upper valve of *Gryphœa Tucumcarii*, figured under the number 1 *a* and 1 *b* on my plate, a specimen which has nothing to do whatever with the False Washita specimens, even taking for granted the opinion of

Mr. Hall, that it is *G. Pitcheri*, var. *navia*. These examples will suffice to show the accuracy of the *Paleontology* of vol. III. of the *Pacific Railroad Exploration*.

We will now pass to the first volume of the *United States and Mexican Boundary Survey*. In the chapter by T. A. Conrad, *Descriptions of Cretaceous and Tertiary Fossils*, page 141, this learned paleontologist describes, at page 155, the *Gryphœa Pitcheri*, plate VII., figure 3, and plate X, figure 2. In the synonymy, he gives *Gryphœa Pitcheri*, Morton, which is right, for it is the species which he figures under the number 3 *a*, 3 *b*, representing, as Morton does, a young individual of the species.* Conrad gives also as synonym my *Gryphœa dilatata* var. *Tucumcarii* such as is represented in figure 3, or elongated variety, in the *Bulletin de la Soc. Géol. de France*. This is a mistake, and he corrects it in a letter, which I will give a few lines further on. I agree entirely with Mr. Conrad, in his description of specimens figured. Plate VII., figure 3 *a*, 3 *b*, represents a young individual, and figure 3 *c*, 3 *d*, is a full-grown but broken specimen, representing the common form of the *Gryphœa Pitcheri*; figures 3 *g* and 3 *f*, represents the smaller valve of the *Gryphœa Pitcheri*. Plate X, figure 2 *a*, 2 *b*, represents an upper valve of the *Gryphœa Tucumcarii*, so far as I can judge of the drawings without a description, for there is none given.

It seems needless to make a var. *navia* for the young individual, merely to express a difference in age.

Mr. Dana, in his *Review of Marcou's Geology of North America*, having quoted Conrad's opinion against me, I was led to inquire more closely into the matter, as I have a great respect for that Paleontologist, and wished to discover, if possible, the reasons why such an observer should hold so different an opinion of those two *Gryphœæ* from that of Deshayes, D'Orbigny, Agassiz, Pictet, and D'Archiac.

* I have never seen Morton's original specimen. If the figure in his *Synopsis of the Cretaceous Group of the United States*, plate XV., figure 9, is correct, it differs in its general outline and in the details of both valves, from the young specimen of *G. Tucumcarii*, published in my *Geology of North America*, plate IV., fig. 2; and as it differs even more from the young specimen of *G. Pitcheri*, figure 6, on the same plate, I am led to believe that I did not meet with the true *G. Pitcheri* of Morton, in my explorations with Captain Whipple's party. Mr. Ferdinand Roemer having the opportunity of seeing in the company of the late Dr. Morton himself, the original specimen at Philadelphia, I naturally followed his identification of *G. Pitcheri*; and if Roemer has made a mistake, I was misled by his description in *Die Kreidebildungen von Texas*. Thus we shall have three species of *Gryphœa*; 1, the *G. Tucumcarii* of the Jurassic rocks of Pyramid Mount (New Mexico); 2, the false *G. Pitcheri*, of Roemer and Marcou, or the false *G. Pitcheri* var. *navia* of Conrad and Hall, of the cretaceous rocks of the false Washita River (Texas), which may be called *G. Roemeri*, in honor of its first discoverer, Mr. F. Roemer; and 3, the true *G. Pitcheri* Morton, which I have never seen, and, consequently, on which I cannot give any information as to its stratigraphical position and association with other fossils.

On looking more closely at the plates of the *Mexican Boundary Report*, I found on the last plate, No. XXI., figure 3 *a*, 3 *b*, 3 *c*, a specimen of *Gryphœa Tucumcarii* under the false name of *Gryphœa Pitcheri*. Mr. Conrad, in his description of *Gryphœa Pitcheri*, p. 155, makes no reference whatever to that plate, nor to the figures 3 *a*, 3 *b*, 3 *c;* and in the *Explanation of Plates of Prof. Hall's Report*, p. 174, nothing is said of the locality or the stratigraphical position of this fossil. The plate was drawn by Mr. F. B. Meek, who has put it under the head of *Cretaceous*. The mysterious appearance of this beautiful fossil is rendered still more suspicious from the fact that, at p. 144, reference is made to plate XXI., in order to bring in the supposed *Gryphœa Pitcheri*, figured upon it, as a proof of the cretaceous age of the formation; and Mr. Agassiz is made (in a foot-note) to sustain this opinion, although it is well known that he has considered these two fossils as distinct, from the beginning.

For any reader not deeply interested in the matter, that page 144 of the *Description of Cretaceous and Tertiary fossils* by Conrad, will seem to be written by Conrad himself; when in fact Mr. Conrad had nothing to do with it, and in order to find the writer we must look at the foot of page 103 of *Geology and Paleontology*, by Mr. J. Hall, where, in a foot-note, he says that he has described the "Echinodermata at the request of Mr. Conrad, putting them in their proper place," without saying if it is also at the request of Mr. Conrad that, in describing his Echinodermata, he figured in plate XXI. a *Gryphœa Tucumcarii* under the false name of *G. Pitcheri*. Desirous to know the opinion of Mr. Conrad himself on these incomprehensible and doubtful proceedings, I wrote to him, and give below his answer: —

PHILADELPHIA, *January* 25, 1861.

JULES MARCOU, ESQ.:

Dear Sir: — . . . . . When I drew up the Report in Emory's Survey, I was shown by Professor Hall a series of *Gryphœa*, some of which were undoubtedly your *G. Tucumcarii*, as figured on plate XXI. Professor Hall thought they graduated into *G. Pitcheri*, and I thought so at the time. The name of your species ought not to have been placed as a synonym to plate VII., figure 8, for it is undoubtedly *G. Pitcheri*.

But the figures on plate XXI. represents a species and specimen, the locality of which is *unknown* to me, and were engraved *after* I had sent in my report and descriptions. So that I can now say, that I do not know whether *G. Pitcheri* is identical with your species or not.

The localities of the *G. Pitcheri* (page 155, Lèon Spring, Texas; plains of Kiamesha, Arkansas; New Braunfels, Texas; Fort Washita and Cross Timbers, Texas), are correctly given, from MSS. accompanying the specimens.

. . . . . sincerely yours, T. A. CONRAD.

That the *G. Tucumcarii* is found at Lèon Spring, is a fact first made known in my Report of 1854, from a specimen picked up there by Dr. Kennerly, and it is also certain that cretaceous fossils have also been found there by Col. Emory; but it is not necessary to place the *G. Tucumcarii* in the same bed with the cretaceous fossils, for the Jurassic and cretaceous rocks may well exist together in that locality. I have always believed that the cretaceous strata would be found *overlying* the Jurassic rocks on the plateau between Rio Pecos and the Rio Grande, on the road to El Paso, and I have no doubt that a practical geologist will one day give a detailed section, showing such an arrangement of the strata in the vicinity of Léon Spring.

I have taken pains to have a very good plate of the *G. Tucumcarii*, *G. Pitcheri*, and *O. Marshii*, drawn in Paris by the best artist there for fossils, M. Humbert; that plate is not only in the *Bulletin de la Soc. Géol. de France*, vol. XII., but also in my *Geology of North America*, with descriptions of the three species. I have placed specimens in a good state of preservation in the following collections: Muséum des Naturalistes de Moscow; Museum at Berlin by Humboldt himself and Mr. Mulhausen; at the Museum of the Universities of Munich, Basle; at the Royal Museum at Stuttgart; at the École Polytechnique of Zurich; at Pictet's collection at Geneva; D'Archiac's collection; at the Jardin des Plantes, and the École des Mines, at Paris; at the Geological Society of London (where are the specimens figured on the plate); and finally, at the Museum of Comparative Zoölogy at Cambridge, Mass. So it will be always easy to see what I mean by *G. Tucumcarii* and *G. Pitcheri*, notwithstanding the Hall, Blake, and Meek imbroglio.

In conclusion, if Dr. B. Shumard continues to hold the opinion that he finds my *G. Tucumcarii* and *Ostrea Marshii* at Fort Washita, with cretaceous fossils, I hope he will be induced to give a good drawing of them, with detailed descriptions, and a real section of the strata at Fort Washita, like my detailed section of Pyramid Mount, in order to allow geologists to judge for themselves *avec connaissance de cause;* but as long as he contents himself with simple affirmation, and theoretical sections, his views will have no more weight than a mere contradiction of mine, without proofs to sustain them.

Mr. Marcou remarked that in a recently published letter of Sir Wm. E. Logan to M. Barrande, the former admits a primordial fauna in Canada. In a list of one hundred and thirty-seven species of fossils in the beds near Quebec, not one was found common to them and the Anticosti group, where there is a gradual passage from the fauna of the Hudson River formation to that of the Clinton, and not one of any formation higher than the Chazy. The Quebec group is in long and narrow synclinal forms, separated on the main anticlinals by dark gray and even black shales and limestones, which he had formerly considered as belonging to the Hudson River group; now that he finds them separating the synclinals of the Quebec group, he must regard them as older. They must be subordinate to the Potsdam, and will represent the true primordial zone in Canada. The strata at Georgia he considers a constituent part of the primordial zone. He thought that the Huronian system of Mr. Logan was not a good one; it contains no fossils, and it is impossible to define its commencement or its end.

Prof. B. Silliman, Jr. observed that the geologists who differed from Mr. Marcou in regard to the cretaceous rocks of Texas were accomplished and conscientious observers, who had sent to Washington a large collection of fossils, which would probably throw light upon the disputed points. The March number of Silliman's Journal would contain a section of the district made with great care by Dr. Shumard. He observed that the Canadian geologists still adhere to their original account of the rocks at Montmorenci.

Dr. Gould remonstrated against the recent misrepresentations of some English naturalists in regard to the specific distinctness of faunæ far removed from each other; they pretended that he and other American naturalists set down everything found at a distance as *prima facie* a distinct species. He was not aware that any naturalist maintained such a proposition, but he would say that species far removed from each other, without any plausible means of connection, are probably distinct. There are some species of animals, as certain *helices*, which are more or less cosmopolite; but these are few, and the tendency of recent examinations in all departments of the animal kingdom is to show that most supposed identical species in faunæ far removed from each other are really distinct, and that the supposed different species which are really the same are very few.

Dr. White exhibited a mouse whose head was almost entirely covered by large masses of the parasite fungus *Achorion Schoenlinii.*

The growths formed dry, yellowish crusts resembling in shape kernels of popped-corn. Nothing of the head was visible with the exception of the ears and mouth. This animal was one of twenty or thirty caught during the past three months in the seed-store of Curtis & Cobb, in this city, nearly all of which have had more or less of the same appearance. Even the young have exhibited it, when they belonged to mothers similarly affected. They were all killed by a cat. As is well known, this parasitic plant is the cause of the disease upon the human scalp known as *Favus*, which is characterized by the appearance of crusts exactly similar to those seen upon the mouse, and by the loss of hair. These crusts consist of minute sporules and sporangia, that is, the reproductive portion of the fungus, together with a slight growth of the mycelium. These spores coming in contact with the scalp of a child, whose head is not well cared for, attach themselves to the epithelium, or find a lurking-place in the hair follicles. There they rapidly reproduce themselves, distend the hair sacs, press upon the roots of the hair, and finally, entering into its substance, produce a discoloration and brittleness, which causes it to break off at a short distance above the surface of the scalp. This process repeats itself indefinitely if unchecked, causing general baldness, and large unsightly formations of a bad odor. The plant may also grow upon the skin of other parts of the body; but there, failing to find a lodging-place so secure as the hair follicles of the head, is easily removed, and never forms crusts of any considerable size. When seated on the scalp, it can only be cured by pulling out all the affected hairs. Its infectious nature may be proved by transplanting it from one person to another. It is, fortunately, a disease of rare occurrence, less frequently seen than the other vegeto-parasitic diseases of the scalp. Whether the disease belongs naturally to the mouse or to man, we have no means of determining; he believed it had never been observed upon any other animals than the mouse and cat.

Prof. Silliman inquired if any of the members had heard of the arrival in Boston of a large quantity of the magnesian mineral Rhodizite, a cargo of which is said to have been shipped from Africa. It is a rare substance, heretofore found only in Siberia, and if occurring in abundance, as is alleged, in Africa, will be of considerable commercial importance from the boracic acid it contains.

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

From the *Académie des Sciences de Lyon*, June 11, 1860, sending its *Memoires;* from the *Académie des Sciences de Russie*, June 27, acknowledging the receipt of the Society's proceedings; from the *Verein für vaterländische Naturkunde in Württemberg*, Stuttgart, Sept. 1, acknowledging the receipt of the Society's publications and sending their own; from the Royal Institution, London, Sept. 28, acknowledging the receipt of the Proceedings; from the *K. Akademie der Wissenschaften*, Wien, Oct. 10, sending their Proceedings and asking for wanting numbers of the Proceedings of this Society; from the Microscopical Society, London, Nov. 15, acknowledging the receipt of the Society's publications and a box of slides of microscopic objects; from Mr. H. Davis, of McGregor, Iowa, Dec. 8, asking for an exchange of Mississippi River for marine shells.

Dr. S. Weir Mitchell, of Philadelphia, was chosen Corresponding Member.

February 6, 1861.

The President in the Chair.

Dr. B. J. Jeffries made the following report on a specimen of Ichthin, submitted to him at the last meeting: —

The fluid was of a pale-yellowish color, consisting, as he understood, of Ichthin in a mixture of alcohol and water. From this fluid there was deposited in the bottom of the phial a thin sediment of a light yellowish color. This sediment, examined under the microscope, with a diameter about 250 to 300, proved to consist mostly of little white tables or plates, chiefly of quadrangular forms. The sediment when dried was treated with *water*, which appeared to have no effect on the granules, simply giving them opportunity to move about as regards each other. *Alcohol* appeared to bring the granules out more distinctly, and they exhibited a tendency to aggregate somewhat like blood-corpuscles. It had no other effect as far as could be noticed. *Ether*, pure, did not affect them. *Liquor potassæ* appeared to break portions of some of them down, and render others more pellucid. *Nitric Acid* had the same effect to a greater degree. *Acetic Acid* rendered them more pellucid, and, after they had been treated with it and dried, they appeared to shrink. The action of *Hydrochloric Acid* was nearly the same. They did not disappear under its effect. *Sulphuric Acid* rendered them most pellucid, and after a time quite indistinct, so that a dim light was required to bring them out. Some of them were burnt for twenty minutes on a glass, which was kept at a red heat, and had not then disappeared, although most of them were broken down. After they had been subjected to this heat for an hour, they had entirely vanished.

This ichthin, for so this examination seems to show it to be, was taken from the egg of a ray found at San Francisco. Perhaps the *Raia oculata*, Girard. It may be possible, from what MM. Valenciennes and Frémy have observed, to distinguish the species of ray from this substance found in the egg.

Prof. Agassiz made some observations on the rate of increase and other characters of fresh-water shells, Unios.

To determine their rate of growth he had collected large numbers during every month in the year; he always found many series of shells of different sizes, all of a size in each series, the whole suite of specimens representing all the intermediate sizes, and, as he believed, the rate of growth and annual increase. Though different species breed at different seasons, none breed more than once a year, as is proved by examination of the gills in which the eggs are deposited. The small shells, less than an inch long, have generally been regarded as of only a year's growth and as immature; he found them filled with eggs at this small size, and considered them as from seven to nine years old instead of one, and as mature.

The *Naiades* have until recently been studied chiefly by amateurs, and not by naturalists, and from the shells alone. Rafinesque made a good beginning with the Kentucky species, separating *Unio alatus* as the type of his genus *Metaptera;* Mr. Lea separated the same as *Symphynota*, uniting under it, however, species entirely dissimilar. In *Metaptera* (Raf.) the inner gill is united at the upper margin with the side of the foot, there being no communication between the foot and gill cavities, as occurs in *U. complanatus*, so that the eggs must pass back of the gill and by a very circuitous course; the hind part of the gill only is filled with eggs, in a kind of pouch, and the edge of the mantle opposite is ciliated, evidently for the physiological purpose of securing an ample supply of water, in itself a good generic character. The species are the *M. alata*, the same from the Alabama and the rivers flowing into the Mississippi, though described under various specific names in different localities, as *U. Alabamensis* and *Poulsoni; M. Ohioensis* or *U. lævissimus* of Lea, from rivers emptying into the Ohio and upper Mississippi and Missouri; and *M. gracilis*, also from the Northern States. In their early coming to maturity this family is similar to fishes; the pickerel of the Swiss lakes, which attains a length of three or four feet, and a weight of twenty to thirty lbs., spawns under a foot in length and a pound in weight; alligators also lay eggs when quite small.

Dr. Gould remarked that this method of examining shells must be very fruitful in results. At first the animals of shells were not studied at all; Mr. Lea finds now 400 species of this family in America alone, whereas not many years ago only about twenty were known all over the world. He stated that there was a great confounding of species and even of genera among Unios. He inquired if the striæ correspond to a year's increase, if a species cannot breed at the age of one year, and what proof there was that these small shells were seven to nine years old? He had found shells which certainly grew to this size in a single year in favorable localities, and specimens attain the dimensions which Prof. Agassiz attributed to a life of thirty or forty years, in three or four years.

Prof. Agassiz replied that the finding of definite sizes at different months without any intermediate degrees in each series had satisfied him that the layers of increase were annual. Some species grow rapidly for the first few years and then slowly, and others in a uniform manner; they also grow more rapidly in some waters than in others, so that the dimensions observed in one river are no guide for those in another. All of the large shells found in waters which had flowed for only three or four years might not have grown from eggs deposited there; mature shells may have crept into such waters. The Unios lay thousands of eggs, in some species very mature, in others less so.

In answer to an inquiry from Dr. Jackson whether, from the ascertained growth of shells in this manner, it would be possible to deduce the approximative period during which geological strata composed principally of shells had been deposited, Prof. Agassiz replied that he was satisfied that nothing could be obtained from such data; the elements of the problem were not in them.

Capt. James Anderson, of the steamer Canada, was elected a corresponding member.

February 20, 1861.

The President in the Chair.

Dr. C. T. Jackson presented, in the name of Mr. Addison Gott of Rockport, Mass., several specimens of rock perforated by boring animals, from the bottom of the sea, off the Coffin Islands, in twenty fathoms of water. These are part of the Magdalen Islands, in the Bay of St. Lawrence. The thanks of the Society were voted for the donation.

Prof. Agassiz remarked that the round perforations in this rock were made by the *Saxicava rugosa*, a bivalve shell. He had found these shells in the perforations, though they have generally been found at the foot of the Devil's apron and other algæ. As to the point whether the holes were made by the animals found in them, he thought they were, as they are of the size and shape of the shell; he did not think they could be produced by any acid secretion; the hardest rocks and lavas are perforated by sea urchins. He believed they were made by mechanical agency, and probably by the incessant movement of the brushes of vibratile cilia along the edges of the mantle of shells and ambulacral tubes of echinoderms.

Prof. Wyman did not think that the rasps of the *Natica* are sufficient to make their perforations in other shells; they are mere developments of epithelial cells, and do not appear different from the cell walls; the effect looked to him more like that of chemical than mechanical action, the solvent being the most concentrated where it is used, that is, on the stone, and not necessarily acting on the shell, where it would be greatly reduced.

Mr. F. H. Storer did not think it difficult to admit the secretion of an acid which should act on the rock and not on the shell, in the same manner as the gastric juice acts upon animal matters and not on the coats of the stomach.

Dr. Kneeland read a communication on the respiration of the fishes of the blenny family and genus *pholis*, called shauny in Europe, and of which a few specimens have been taken in Boston Harbor.

The shauny has the habit of creeping out of water by means of the ventral fins as the tide recedes, hiding in crevices of the rocks, and there remaining until the tide again rises; they have been known to live thirty hours in a dry box. In this fish there is no air-bladder; the gill openings are very large, and would seem to permit the gills to become dry very soon, and produce death as soon as in the mackerel and other fish with large gill openings; there does not appear to be any special apparatus for separating the leaflets of the gills for admitting and retaining air, and thus delaying the period of asphyxia; there is no labyrinthic arrangement as in the climbing perch (*Anabas*), nor the small branchial openings of the eels.

It seems most likely that the skin is the principal medium through which respiration is effected in this fish while in the air, especially as the body is soft and scaleless. We know that this cutaneous respiration is sufficient to purify the blood in some fishes, as the *Synbranchus* of Guiana, which is found buried in the earth at a considerable distance from water; and also in frogs and salamanders, both adult and young.

Professor Agassiz observed that although the gill openings in this fish are very large, the cheeks, as in blennioids generally, are much swollen, and the gill-covers fit very closely, and, the branchial rays being soft, may serve to retain the water in the gills for a considerable time.

The President gave an account of a monstrosity which he had recently examined, — a partially double pig.

In this specimen there were two sets of lower extremities, the bodies partly fused, two pairs of upper extremities, a single head, two lateral ears, and a median one, and three nostrils on the snout. It presented symmetrical organs on the median line made up of organs naturally not on the median line and unsymmetrical; this may take place in any double organs, as the eyes, ears, legs, arms, lungs, kidneys, &c.; he illustrated it by a comparison with the single terminal leaf in plants, which is composed of the upper halves of two leaves. In this pig, the doubling took place also in the brain. On separating the two sides of the cerebral hemispheres, which were made up of the right hemisphere of one brain and the left hemisphere of another, was seen a third hemisphere, with a single optic thalamus and striated body, and below these organs double; to each of the lateral hemispheres was appended a distinct cerebellum and spinal marrow. It is a question of considerable physiological interest, whether here there was a single or two organisms. C. F. Wolff maintains that there may be two primitive stripes on one germinal membrane, or one bifurcating at the top or at the bottom, thus making double monsters single organisms.

Prof. Agassiz said that he thought that the study of corals would show that the general idea of individuality is not correct. *Astræa* grows by single tubes, growing in length but not enlarging in diameter, and the buds arise from the interstices between the tubes by the vital power of individuals; in other corals the buds grow from the sides, and may form independent and disconnected individuals; in others the tubes become wider with the increase of length, and finally form two tubes, with two mouths and two stomachs, and yet the two branches have proceeded from a single organism; two individuals have been developed from one base.

Prof. Agassiz announced that Capt. Anderson had left with him, for presentation to the Society, a pamphlet on the deep sea soundings of Capt. McClintock in the surveys made in connection with the North Atlantic telegraph, and also embracing Dr. Wallich's observations on living star-fishes taken from the great depth of 1260 fathoms; from the details of the experiments he was satisfied that these animals had lived at that depth. In order to withstand the pressure to which these animals must be subjected, without being crushed, he maintained that water must penetrate their tissues very freely. The fluid penetrates in fishes through minute pores communicating with the venous sinuses near the heart; these are to be seen by the naked eye on the sides of the head of the herring and shad, and enable these fishes to make the change from deep water in the winter to shoal water in the spring, when they approach the shore to spawn. In mollusks they are limited chiefly to the foot; in echinoderms they vary in different families, being sometimes in slits, and at others admitting water into the aquiferous system through the madreporic body.

Considerable discussion followed as to the necessity of any such arrangement for resisting pressure at great depths.

A letter was read from Capt. Anderson, accepting corresponding membership of the Society.

Messrs. Horace Mann, of Concord, and Elbridge Gerry Dudley, of Boston, were elected resident members.

March 6, 1861.

The President in the chair.

Dr. Gould, in regard to the holes in the stone exhibited at the last meeting, and said by Prof. Agassiz to have been excavated by *Saxicava rugosa*, observed that the finding of this shell in the holes and fitting them accurately, did not prove that they were the excavators. This shell may enter a hole of any shape, and adapt itself exactly to it; and, from the habit of thus moulding its shell to the cavity in which it lives, is often called *Saxicava distorta*. *Crepidula* has often been found distorted so as to fit similar excavations, but that is no evidence that it made the holes. *Petricola* in like manner frequently occurs in holes made by *pholas* and *lithodomus*. The fitting of the shell to the cavity is rather an evidence of the power of adaptation in form, than of ability to perforate.

Mr. L. W. Bailey read the following communication on Micro-Photography, or the photographic delineations of microscopic objects, and presented, in the name of the author, Mr. A. M. Eaton, of Providence, several ambrotypes of diatoms.

MICRO-PHOTOGRAPHY, OR THE PHOTOGRAPHIC DELINEATION OF MICROSCOPIC OBJECTS.

Thinking that some details of the method by which I obtained these ambrotypes, might not prove uninteresting to you, I propose to lay before you a brief account of my experiments, and of the method which I have found to be the most successful.

As to the general arrangement of the microscope and of the camera, I adopt the following plan, which is one quite generally used. I remove the ordinary lenses of the camera, and substitute in their place a sliding piece of wood, having a hole in the centre, so arranged, that when lined with black velvet, the tube of the microscope (with the eye-piece removed) when placed in a horizontal position shall just slide in it.

At first, I tried to obtain negatives by lamp-light, from which negatives I might obtain positives or common photographs in the usual way. For this purpose, I placed the lamp directly in front of the microscope, using no means to condense the light. This succeeded quite well with low powers. In order to obtain a better illumination, I then placed two large bull's eye condensers between the light and the microscope, according to the method given in the Quarterly Journal of Microscopical Science. I thus obtained a much better illumination, but soon became satisfied that I should need sunlight in order to succeed with the high powers.

I accordingly directed my attention towards working with direct sunlight and, after trying various methods of illumination, I adopted the following with high powers, such as the $\frac{1}{8}$, $\frac{1}{12}$, and $\frac{1}{16}$ inch objectives.

I placed the microscope as before in relation to the camera, and then set the whole perpendicularly with the sun, the camera being nearest the sun. Then I placed a mirror (which I find should be without many blemishes, since otherwise colored rings, &c. are apt to appear on the focussing plate) in front of the microscope, and arranged it at such a height and angle that the sunlight was thrown directly through the microscope upon the focussing slide of the camera. I condensed the light upon the object on the stage of the microscope by means of an achromatic condenser, and still further by means of a large bull's eye condenser, placed between the mirror, before spoken of, and the achromatic condenser, and so arranged that the light was brought to a focus upon or near the open end of the achromatic condenser. This was ascertained by simply holding a piece of glass over the open end and bringing the light to a focus upon it, care being taken that this condensed light was made to pass in a direct line through the achromatic condenser upon the object, thence through the objective used, and thence directly upon the focussing slide. Then by rotating the screw of the achromatic condenser, more or less light could be thrown upon the object, according to the objective used.

For low powers of course no such condensation of the light is necessary. We may dispense with the achromatic and bull's-eye condensers and the mirror, and condense the direct sunlight upon the object by the small mirror attached to the microscope.

Being soon satisfied that there must be some loss in the details, by going through the two processes of obtaining a negative, and then printing from it, I then turned my attention to direct positives on glass or ambrôtypes, such as are now before you. These ambrotypes require only one half the time of exposure in the camera that photographs do, which is also an advantage when working with high powers, when the focussing slide is sometimes placed at a distance of five feet from the objective, by which means the light becomes diffused over a large surface, attended with an equivalent loss of intensity.

I have, on some occasions, when I wished to bring out, with sharpness of definition, some of the indistinct lines or dots on Diatoms, placed a diaphragm, having a very small aperture immediately behind the objective in the tube of the microscope. By so doing, of course, much light is lost, but here again, the extreme sensitiveness of the ambrotype process renders it much superior to the common photograph.

It is generally stated, in all articles on micro-photography, that the correction of the objectives for perfect vision is not the best for photographic purposes. Accordingly, with all powers lower than the $\frac{1}{4}$-inch, after focussing by the eye on the ground-glass slide, the objective is usually withdrawn a little by means of the fine adjustment. I have found no difficulty of this kind, even when working with the inch objective.

The ground glass upon which objects are usually focussed, is not delicate enough to show the lines on diatoms, &c. I have, therefore, taken out this glass and substituted for it a piece of plate glass, coated with skimmed milk (just as we coat a glass plate with collodion), and allowed to dry. Thus, while taking an ambrotype of the dots on *Pleurosigma angulatum*, I found that I could not bring out these dots on the common glass slide. But when I substituted the glass, coated with milk, they immediately became visible.

I used the common ambrotype methed, which is too well known to require any description. By changing the number and proportion of the salts used in the collodion, I obtained a collodion which requires an exposure only of fifteen seconds, when using the $\frac{1}{16}$ inch objective, and when the sensitive plate is placed at a distance of five feet from the objective. I hope that I may be able to obtain a collodion sensitive enough to give an ambrotype of the circulation of the blood in a frog's foot with a $\frac{1}{4}$ or $\frac{1}{8}$ inch objective.

My instruments and objectives were made by the Grunows of New Haven. The $\frac{1}{16}$ inch objective, which I have used in obtaining ambrotypes, showing the lines and dots on *Pleurosigma angulatum* and *P. attenuatum*, &c., is one of large angular aperture, which belonged formerly to Prof. Bailey, of West Point.

AMASA M. EATON.

Providence, R. I., March 5, 1861.

Dr. Bryant read the following paper: —

REMARKS ON THE VARIATIONS OF PLUMAGE IN BUTEO BOREALIS, AUCT., AND BUTEO HARLANI, AUD.? By HENRY BRYANT, M.D.

The variations of plumage in the individuals of the species of the genus Buteo, common in the Atlantic States, are so slight that it is not to be wondered at, that the first specimens from other parts of the country, presenting, as they did, such extraordinary variations of color, should have been described as distinct species. At present, however, the number of specimens known is so large, that on careful examination it seems to me necessary to adopt one of two conclusions, namely, either to increase the species indefinitely, or to reduce them to a much smaller number than are at present supposed to exist. As the European buzzard, *B. vulgaris*, is well known to present the greatest* variety of color, it seems to me more reasonable to adopt the last conclusion.

On carefully examining a large series of specimens, principally in the collections of the Smithsonian Institution at Washington, and of the Academy of Natural Sciences at Philadelphia, I find that all of them belonging to Harlani ?, insignatus, Swainsonii, Bairdii, oxypterus, borealis, montanus, calurus, and perhaps Cooperi, can be easily reduced to two very distinct groups, each of which is distinguishable by definite external characters, and in which the variations of plumage, though apparently so great, if the extremes only are taken into consideration, can, it seems to me, be arranged in a series, in which the connection of the different members may be readily traced. Of these two groups or rather species, one, which should be called *B. borealis*, as the first described, consists of that species, montanus, calurus, † Harlani ? and probably Cooperi, and is characterized by a very muscular body, stronger and larger bill, longer and more powerful tarsi, and a more rounded wing, the fourth quill generally the longest, the fifth little, if any, shorter than the third, and the first always shorter than the eighth. The other species, to which Harlani ?, insignatus, Swainsonii, Bairdii, and oxypterus belong, is distinguished by a more slender body, shorter and weaker tarsi, and a more pointed wing, the third quill generally the longest, the fifth considerably shorter than the third, and the first always longer than the eighth. It is a matter of some doubt what name should be assigned to this species. I have seen specimens which agree very exactly with Audubon's plate of *B. Harlani*, and if they are really specimens of his bird, that name would have priority. Though his type specimen in the British Museum is said, by some of the English ornithologists, to belong to the other species, I am inclined to doubt this, as there is a specimen of *B. fuliginosus* in the collection of the Academy, marked *B. Harlani*, by Audubon himself, and it is almost impossible for him to have mistaken this bird for a red-tailed hawk. I shall, therefore, at present consider this species to be *B. Harlani*. If the type in the British Museum should prove to be a different bird, *Swainsonii*, as next in date, would take its place.

On making the examinations which led to the conclusions above stated, I was struck by the small number of specimens in which all the feathers were equally developed; and when they were so, the

* "In the coloring of the feathers of this bird there prevails a most extraordinary difference, and one which is not often seen in other birds of prey. From the darkest, uniform, blackish-brown to the purest white, we find all the shades, and also both colors mixed and spotted, in such various ways, that the countless transitions cannot be described; this difference is independent of age and sex." *Naumann's Nat. Hist. of the Birds of Germany*, vol. i. p. 347.

† There is a specimen marked Harlani in the collection of the Academy, which I consider to belong to this group.

variations in the proportions of the primaries and of the wings and tail, in specimens of the same variety, was much greater than I had expected to find; in *B. borealis*, for instance, the fourth quill is generally the longest; but sometimes the fourth and fifth in *B. montanus*, generally the fourth in Nos. 5,836 and 19,925; the fifth in No. 4,545, the third, fourth, and fifth, and in one, not in the table, the fourth and fifth; in calurus, in two specimens, the fourth, and in No. 16,026, the fourth and fifth; in *Harlani*, generally the third, but in No. 10, the fourth; in *insignatus* generally the third, but in No. 6,955, the fourth; in *Swainsonii*, generally the third, but in No. 8,539, the fourth, and in No 8,540, the third and fourth; in *Bairdii* generally the third, but in Nos. 10,761 and 19,121, the third and fourth are the longest. The same range of difference will be seen to exist in the proportions of the other primaries. The variation in number and shape of the tarsal scales is considerable, as is usual in birds of this order. The development of the festoon of the lower edge of the upper mandible, one of the principal generic characters, varies particularly in *B. montanus*, the series of which is the largest, from a sharp, almost tooth-like process to an entire absence of it.

In order that the resemblance in form of the different varieties may be most readily seen, I have placed all the measurements in the same table, instead of giving those of each variety, with the description of its plumage. The specimens in the collection of the Smithsonian Institution are designated by the number of their labels; those from the Academy by the letter A, and a few from my own collection by the letter B. Though the sex, length, and extent are copied from the labels when mentioned, much value should not be attached to them as they are obviously wrong in some instances; in no case is the measurement of the length of the prepared skin given, as I do not consider that there is any certainty of its approximating very nearly to the real length. Apparently the length of the red-tailed Hawks varies from 600 to 700 millimetres, and of the other species from 550 to 650 millimetres.

Buteo borealis, adult. Above, dark brown, with purple reflections; base of the feathers of occiput, hind-neck and forehead, white; feathers of the back, scapulars, and wing-coverts generally with their margins lighter, as if faded, and sometimes ferruginous; feathers of hind-neck very dark, with their margins ferruginous; sides of neck and temporal regions the same, frequently appearing rufous, streaked with brown. Top of head slaty brown, margins of the feathers rufous; lores white, the bristly ends of the feathers only being black. Closed wing brown, with the ends of primaries dark brownish-black, narrowly margined at the ends with whitish; secondaries, tertiaries, and centre of primaries obscurely barred with darker brown; upper tail coverts varying from white to rufous, and barred more or less distinctly, sometimes not at all, with brown of a lighter or deeper shade. In some specimens the rufous margin of the feathers, above described, is faded into white, on the outer edge, which color occasionally takes the place of the rufous entirely; in these specimens all the colors are much lighter than described, and a good deal of white is seen on the scapulars and tertiaries, the whole bird having the appearance of being faded. Tail bright rufous, narrowly tipped with white, and with a distinct subterminal black band and a few black spots, most distinct near the shaft and on the inner web and generally towards the base of the tail, as if the remains of former bands; these are sometimes nearly obsolete.

Below, with the throat and upper part of fore-neck varying from nearly white, with the tips of the feathers scarcely black, to deep blackish-brown, the base of the feathers only being white; a very distinct dark beard-stripe from the middle of the ramus of the lower mandible, runs down till it is lost in a patch on each side of the lower part of the neck and upper part of the breast, which is sometimes continued nearly across, forming an interrupted gorget; the color of this patch varies from a deep blackish-brown, more or less margined with rufous, to a dull slaty ferruginous; rest of the breast and upper part of abdomen varying from white to rusty, shafts of the feathers sometimes dark, and with a central linear ferruginous spot, becoming broader towards the dark patch already mentioned, and into which they gradually run. A broad band of dark spots varying much in intensity of color and number, crosses the upper part of abdomen, the central spots of which are generally of an elongated tear-like form, but vary much in shape; on the sides more frequently forming bands, sometimes covering the whole feather, with the exception of a slight edging, more or less irregularly waved, of whitish; lower part of abdomen and crissum white, more or less rusty; feathers of tibiæ and thighs varying from white to pale-rusty, sometimes unicolor and sometimes more or less distinctly barred with rufous brown, the bars generally not extending to the margins of the feathers. Under surface of wing nearly white at the base of the feathers, mottled or barred with brown, and shaded suddenly into deep slaty-brown, nearly on a line with the sinuation of the outer primaries. Under surface of tail hoary or silvery rufous, the black showing less distinctly than on the upper surface.

Young. Above very similar to the adult, but with much more white. Tail ashy-brown, narrowly tipped with white, with about eight dark-brown bars. Entire under surface white, with numerous large ovate spots of brownish-black on the sides of the upper part of the breast, and a wide irregular band, formed of spots of the same color, crossing the upper part of abdomen. Crissum and tibiæ with irregular transverse bands and sagittate spots of dark-brown.

Buteo montanus, adult. Above, wings and tail almost precisely similar to *borealis*, the upper tail coverts generally more rufous, and the back seldom so unicolor.

Below, with the throat and fore-neck similar to the darkest specimens of *borealis*, upper part of breast sometimes exactly like individuals of the eastern variety, but generally with the feathers barred more or less distinctly with pale fulvous. The band crossing the upper part of abdomen differs in being barred, the colors varying from pale fulvous, in the centre of the abdomen, to more or less distinct brown on the flanks, and with elongated, lanceolate-shaped spots of blackish-brown at the tips of the feathers, varying much in number and size; the whole band varies much in size and conspicuousness, sometimes occupying nearly the whole breast, and at other times confined entirely to the abdomen; tibiæ distinctly barred with rusty; crissum with a few faint bars.

Young. Similar to young of *borealis*, but somewhat more spotted below, and occasionally slightly soiled with rusty.

Specimens of *B. montanus*, from Cape St. Lucas, have hardly a trace of black on the tail; upper tail coverts pale rufous, without bars; the whole upper part of the breast deep brown, with the edges of the feathers rufous; rest of under parts pale-rusty, darker on thighs and crissum, without any trace of bars except a few almost obsolete ones on the upper part of abdomen; a few very elongated brown spots running down the shafts on the upper part of abdomen, and the feathers on the flanks barred, and with a central stripe of the same color.

A second specimen differs in the absence of the brown color on the upper part of the breast, the feathers being mostly with a large central spot of dark rufous and a brown line or spot running down the shaft, which expands towards the side of the neck so as gradually to occupy nearly the whole feather. One of the young birds, from the same locality, resembles almost precisely the young *Buteo borealis*, another has a much larger amount of light rufous and white on the upper part, and the whole breast streaked longitudinally with dark brown, the feathers of the abdomen margined and spotted on each side of the shaft with white; tibiæ with very broad brown bars, narrowly edged with rufous; other young birds vary between these two extremes.

A specimen from Fort Steilacoom, No. 5,836, is very dark, almost blackish-brown on the interscapular region, rather lighter towards the head, with the feathers of the occiput, hind-neck and rump margined with rufous. Tail dull-red, obscurely banded or mottled with dark-red throughout the whole length, in other respects as described above. Below, the throat white, each feather with a dark stripe down the centre; fore-neck and breast white, with large lanceolate spots of rufous, becoming browner on the sides of the neck till it gradually assumes the color of the hind-neck; lower part of breast and abdomen spotted with ferruginous-white and brown; flanks brown, spotted with white, narrowly margined with pale-rufous; lower part of abdomen pale ferruginous-white, barred with ferruginous-brown; crissum the same, but with the bars less distinct; tibiæ pale rufous, beautifully barred with a deeper shade of the same color.

Buteo calurus ♂, No. 5,481. Above, purplish-brown, lightest on the head, and with the margins of most of the feathers as if faded, and the shafts black; the scapulars and tertiaries more or less marked with grayish white; ends of primaries dark purplish-brown, the rest banded on both webs, at first very obscurely, but gradually more distinctly, with two shades of brown; tail bright rufous, tipped with white, with about eight irregular black bands, all, excepting the last, very narrow. Below, with the throat fuliginous, breast and abdomen brown, much darker on the flanks and centre of abdomen, where there is a distinct purplish gloss. Tibiæ and lower part of abdomen dull brown, with the feathers margined with pale dull rufous. Crissum pale dull rufous, barred with dusky. A specimen from Fort Tejon differs from the above in having the feathers of head and hind-neck pretty broadly margined with rufous; upper tail coverts bright rufous, barred with dusky. Below, throat blackish-brown, hardly showing any white; breast and abdomen dull rufous, with the brown of the throat, as it were, gradually shaded in, the shafts only of the lower feathers being dark, then with a narrow stripe, growing broader towards the throat, so that on the upper part of the breast there is only a narrow margin of rufous; centre of abdomen and flanks of the same color as the throat, the margins of the feathers pale rufous or hoary; tibiæ and lower part of abdomen pale rufous, barred with dusky, the ends of the feathers on the abdomen of a dirty white; crissum pale rufous, barred with darker towards the tail, the bars gradually becoming brown next the abdomen.

No. 16,026 differs from the last in having the rufous edging of the feathers continued to the interscapular region,—in the breast being of a much brighter ferruginous,—in the dark spots, which are tear-shaped instead of acuminated as in the last, being continued to the upper part of abdomen,—in the centre of abdomen being of a very dark purplish-brown, the feathers margined with rufous,—and in the tibiæ and crissum being much less distinctly but more broadly barred with brown, the two colors being much darker.

No. 10,571 from Tejon, has the feathers of the throat narrowly edged with rusty, the ferruginous of the breast and lower parts replaced by pale rufous, the black band across the abdomen consisting of a few elongated blackish-brown spots. Tibiæ and crissum without bars, upper parts similar to the last. A specimen from Fort Crook, No. 10,569, resembles the last in the upper parts, but with more white on the throat, and the rufous nearly washed out on the breast, — in the feathers of the upper part of the abdomen being barred with dusky, — and in the dark spots being broader, and in the tibiæ and crissum being barred with white, and pale fulvous.

Buteo Harlani of the Academy, described by Mr. Cassin, in the ninth volume of the P. R. R. Report, page 24, resembles very closely the dark variety of *calurus*, with the exception of its tail, which resembles that of an immature *montanus;* as its proportions, as will be seen by referring to the table, are those of *calurus* or *montanus*, I have considered it as such.

Buteo Cooperi. Above, the feathers of the head and hind-neck white, with a central terminal brown spot, becoming larger as it descends, until, near the back, it occupies the terminal half of the feather; the back, interscapulars, and wing coverts margined with rufous and whitish, and with concealed spots of whitish on the coverts. The ends of the wings are hoary as if faded; the tail rufous, mottled with blackish and cinereous, forming irregular longitudinal stripes, and with an obscure terminal black band. Under parts white, much as in *B. borealis;* the inner surface of the tibiæ pale rufous, mottled with brown; outer surface white, barred almost obsoletely with rufous. There is nothing in the coloration of this bird that would make the supposition of its being a variety of *montanus* improbable. The tail, which shows the greatest dissimilarity, has very much the appearance it would have in a semi-adult of this species, if the color were partially washed out. The proportions are similar; the tarsus, which appears very long, is no longer than in *B. montanus*, No. 4,372; its scutellation presents, however, a peculiarity not seen in any of the specimens of *montanus*, the outer lateral surface having on its posterior edge a row of large hexagonal scales, next to which are two rows of small scales, while in *montanus* there are three or four rows of small scales, between the anterior and posterior transverse scales; there are also seven transverse scales on the middle toe, one more than I have seen in *montanus*, which generally has only five.

The bird described by Mr. Cassin as the young of *B. Harlani*, also presents nothing in its coloration incompatible with the idea of its being a variety of *montanus*, but it has only a single row of large hexagonal scales and one of small ones, on the lateral surface of the tarsus, and the transverse scales of the middle toe extend beyond the distal half of the first joint, being no less than eleven in number.

After carefully examining the birds described above, I do not see, if Buteo borealis, montanus, and calurus are to be considered distinct species, that we can avoid increasing the number by separating from *montanus* two species, one the dark Steilacoom variety, and the other, that from Cape St. Lucas, (which, by the way, is the most distinct

MEASUREMENTS OF BUTEO BOREALIS AND ITS VARIETIES, IN MILLIMETRES.

	Buteo borealis.	Buteo borealis	Buteo borealis.	Buteo borealis.	Buteo borealis.	Buteo montanus ♂	Buteo montanus ♂	Buteo montanus ♂	Buteo montanus.	Buteo montanus.	Buteo montanus y ♀	Buteo montanus ♀	Buteo montanus.	Buteo montanus y ♀	Buteo calurus ♀	Buteo calurus.	Buteo calurus ♀	Buteo calurus ♂	Buteo Harlani ?	Buteo Cooperi.
Length						655	683	698	604		689	706	601	583	651	629	702			
Extent						1582	1582	1607	1506		1634	1658	1301	1317	1684	1583	1826			
Wing from flexure	415	390	415	370	365	405	420	425	415	400	408	440	400	405	420	438	430	420	405	400
Length of tail	209	220	200	180	200	205	208	240	215	208	240	245	220	240	228	228	210	210	214	214
Longest primary	4	4	4	4&5	4	5		4	4	3,4,5	5	4	4	5	4	4	4.5	4	4.5	4
Difference between longest V. 1	109	90	95	100	90	115	112	110	113	110	111	118	110	106	118	125	120	114	120	114
Difference between longest V. 2	43	30	25	30	30	35	35	36	36	35	45	44	39	47	40	50	50	38	45	44
Difference between longest V. 3	7	3	7	4	10	5	7	6	11		8	8	7	15	12	12	15	6		12
Difference between longest V. 4							1					2		2						
Difference between longest V. 5	5	5			6			7					8		2	2		8		4
Difference between longest V. 6	52	50	46	43	45	35	40	55	50	34	55	55	45	40	40	48	1.2	46	45	40
First primary shorter than	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Tarsus	85	78	76	74	75	87	84	85	86	85	85	85	81	82	88	87	87	85	80	88
Middle toe	47	43	42	43	41	44	46	46	50	42	48	44	45	43	45	42	50	46	43	44
Middle toe-nail	30	25	27	24	22	32	29	26	28	26	26	32	26	27	23	26	28		27	
Hind toe	28	23	25	25	24	28	25	28	27	23	24	26	24	25	28	24	26	22	28	26
Hind toe-nail	37	35	37	35	34	40	35	30	36	33	38	45	37	36	33	36	43		40	35
Length of bill on ridge	50	45	43	45	46	46	51	52	50	46	46	52	48	47	49	49	1.8	44	45	47
Length of bill from cere	32	30	32	30	28	32	32	30	31	28	30	32	30	29	31	30	33	30	29	30
* Height of upper mandible	15	14	12	14	14	14	14	14½	14½	14	13½	14	13½	14	14	13	14	18	14	18
* Breadth of upper mandible	11½	11	9½	12	11	11½	11	11½	11	11	11	11½	11	11	11½	11½	11½	10	11	10½
Number of specimen	11975	12012	B	B	B	16925	17212	2354	8582	8545	5836	4372	17218	B	10571	+	16026	5481	A	8525

* Opposite the anterior edge of cere.

variety that I have seen,) from *calurus*, one species, the ferruginous variety from Fort Tejon,—and, by adding to this group one species based on the adult *Harlani* of the Academy, making in all seven distinct species. I have not included in this list the young *Harlani* of the Academy, which differs as much from the adult as from any other specimen of this group; or *Cooperi*, as they are both from New Mexico, a region that has been but little explored, and is on our extreme Southern frontier; and though I think it more probable that they are only varieties of *borealis*, still, as there is but a single specimen of each known at present, it will be wiser to wait until future explorations shall have increased their number before attempting to decide this point. (*See table on page* 114.)

BUTEO HARLANI.

Buteo Harlani, No. 13,228. Above, dark brown, glossed with purple, deepest on the interscapular region, and lightest on the head, with the centre of all the feathers darkest and the shaft black; base of the feathers of occiput and hind-neck white; some of the wing coverts and scapulars narrowly margined with dark rufous; upper tail coverts grayish-brown, barred with dark brown, base more or less white; tail dark ash-brown, the central feathers brown, with eight or nine bars of blackish-brown, the last being broadest. Primaries with their exposed portions deep blackish-brown, with a purple lustre and without bars. Below, same color as above, but duller, except the tibiæ and lower part of abdomen, which are barred with bright rufous and dark brown; crissum pale rusty-white, barred slightly with ferruginous-brown; under surface of the tail light grayish-ash, barred with brown, the bars growing indistinct towards the base; under wing coverts pale rusty-white, marked with ferruginous. No. 19,120 has the color of the upper parts nearly similar to No. 13,228, but with the margin of the feathers more or less rufous, most pronounced on the hind-neck, and the upper tail coverts white, barred with brown; the centre of primaries obsoletely barred. Below, with the throat similar, upper part of breast and abdomen dull ferruginous, with the shafts black, and the feathers washed with slaty-brown, as they approach the throat, principally in the centre; middle part of abdomen rufous, spotted with brownish purplish-black, the spots broader and most conspicuous on the sides; lower part of abdomen and inside of tibiæ, barred with rufous and white, most narrowly on tibiæ; outer surface of tibiæ the same tint of ferruginous as abdomen, with the shafts dark and the margins lighter, as if faded. Crissum white, with a few pale rufous-brown bars, not extending across the webs.

No. 6,455. Upper parts similar to No. 19,120. Below, with the feathers of the breast rather darker and of the abdomen dark brown, with their margins rufous, forming a broad dark band; lower part of abdomen and tibiæ slightly darker; the bars on the under side of tail, except the subterminal, almost obsolete.

Buteo insignatus, No. 6,871. Upper parts very similar to *Harlani*, No. 13,228, but with the longest upper tail coverts barred with white, shaded towards the tips into dull slaty white; tail rather lighter; under parts similar, but with more rufous on the margins of the feathers, less rufous in the barring of lower part of abdomen; crissum white, barred with light wood-brown.

No. 5,576. Similar to last, but with the margins of scapulars and tertiaries, and feathers of hind-neck rufous; throat nearly white, with only a few black lines; upper part of neck brownish, gradually shaded into brownish-ferruginous, each feather with the shaft black, this color extending somewhat into the webs, principally in the centre of abdomen; tibiæ and lower abdomen obsoletely barred; crissum white, with a few bars of pale rufous.

Buteo Swainsonii, No. 5,157. Upper parts intermediate between No. 6,871 and No. 5,576? Below, with throat white; upper part of breast and fore-neck with the feathers wood-brown, some of them quite faded and more or less margined with rufous, but with the brown predominating; flanks and abdomen, rufous streaked and spotted with blackish brown; lower part of abdomen and tibiæ bright rufous, barred with lighter; under tail coverts white, soiled with rufous, but without any distinct bars, except a few obsolete ones near the tips.

No. 8,540. Has the rufous margin of the feathers of the upper parts still broader; upper tail coverts lighter and more distinctly barred; the breast like the last, but with the rufous predominating, the centre of the feathers only being brown, extending over nearly the whole web on the upper part of neck, and gradually becoming narrower on descending till it is only seen on the shaft. Middle of abdomen nearly white, shaded as it were into the dark color of the breast by spots and bars of rufous and brown, which become less frequent towards the thighs; vent and abdomen white, slightly soiled with rufous; tibiæ of the same color, barred indistinctly with pale rufous; crissum slightly soiled white.

No. 17,674. Upper parts more rufous and the margins of the feathers still lighter; the bars, on the outer surface of the primaries obsolete, and very indistinct on the tail, which is hoary on the outer feathers and white at the base. Below, with the throat white, fore-neck and breast dull hoary-ferruginous, with the shafts of the feathers blackish-brown; rest of under parts white; flanks and upper part of abdomen, with the feathers barred very indistinctly in the centre of the abdomen, and gradually more distinctly towards the flanks and breast with brown, and with the shafts also black where they are barred. This specimen is a particularly good one to show that slight differences of the primaries are not to be considered of any importance, it having the third quill the longest on the right side, and the third and fourth equal and longest on the left, the second equal to the fifth on the right, and much shorter on the left, first nearly equal to the seventh on the right and considerably shorter on the left.

Buteo Bairdii, No. 10,761. Head and hind-neck pale ferruginous, each feather with a central spot of dark brown, inversely acuminated on the head and oval on the hind-neck, with the base of all white; rest of upper parts dark brown, the feathers broadly margined with rufous, principally on the scapulars and tertiaries; tail and wings like No. 6,871. Beneath, white washed with pale-ferruginous; a few dark stripes in the centre of the throat, and all the feathers of the neck, breast, and upper part of abdomen with a central terminal spot of dark brown, which, on each side of the shoulders, is so large as to form a dark blackish-brown patch; the spots on the sides are spade-like in form, becoming more linear in the centre of the breast, sagittate on the lower part, and cutting off the tips of the feathers squarely on the upper part of the breast; lower part of abdomen almost unspotted, crissum entirely so; a few faint sagittate-like bars on the upper part of tibiæ. A specimen in the collection of the Academy, the only one I have seen presenting the least appearance of adult plumage, differs from the above, in the brown being of a deeper shade and glossed with purple, and in having a distinct patch running down from the angle of the mouth, and with the one above described, forming a nearly uninterrupted band across the breast; all the spots are larger, and on the sides the feathers, instead of being white spotted with brown, are brown with oval spots of white on both webs; tibiæ brown, barred with rusty; crissum broadly barred.

Buteo oxypterus. Above dark brown; margin of scapulars, more or less rufous, and with the feathers on the sides of the head and forehead so broadly margined with pale rufous, as to appear properly of that color, with a narrow stripe of brown down the centre of each feather, the spots becoming larger on the vertex, and still more so on the occiput and hind-neck. Below, pale rusty-white, spotted as in *Bairdii;* thighs barred with brown; crissum very slightly barred.

If Harlani, insignatus, Bairdii, Swainsonii, and oxypterus, are still to be retained as species, one more must be added, based on the ferruginous variety of *Harlani*, collected by Captain Stimpson; *insignatus* must be separated into two species, one the brown, and the other the ferruginous-colored variety; and *Swainsonii* into three, two of which are characterized, like *insignatus*, by the color of the breast, and a third, which, according to my idea, is the connecting link between this species and *insignatus*, distinguished by the brown spots and bars on the abdomen; this last plumage has as adult an appearance as any of the others, and is strictly parallel to the Steilacoom variety of *montanus*.

MEASUREMENTS OF BUTEO HARLANI AND ITS VARIETIES.

	Buteo Harlani ♀	Buteo Harlani.	Buteo Harlani.	Buteo insignatus.	Buteo insignatus ♂	Buteo insignatus ♂	Buteo Swainsonii.	Buteo Swainsonii.	Buteo Swainsonii ♀	Buteo Swainsonii.	Buteo Bairdii.	Buteo Bairdii ♀	Buteo Bairdii ♀	Buteo Bairdii ♂	Buteo oxypterus.
Length	576	637			576	637			639		4	614	654	654	
Breadth	1583	1583			1478	1428			1584			1541	1609	1558	
Wing, from flexure	415	420	405	895	890	405	890	425	425	880	410	895	410	405	855
Length of tail	208	215	210	185	200	200	210	218	210	180	200	190	218	208	162
Longest primary	3	8	4	4	3	8	4	8	8	8.4	8.4	8	3	3.4	8
Difference between longest V. 1	115	122	115	110	108	125	100	120	115	97	115	101	110	115	95
Difference between longest V. 2	82	40	36	26	87	42	89	40	85	80	85	25	80	83	25
Difference between longest V. 3			4	3			7								
Difference between longest V. 4	7	8			8	15		8	12			8	4		5
Difference between longest V. 5	85	20		25	29	87		25	88	40	29	81	80	29	81
Difference between longest V. 6	60	58	60	44½	55	68	60	58	68	70	68	69	70	63	61
First primary shorter than	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Tarsus	71	72	67	69	65	70	71	72	71	70	71	68	71	62	68
Middle toe	45	48	88	44	89	41	42	43	48	89	41	40	43	40	85
Middle toe-nail	20	21	18	21	21	24	23	23		23	21	19	21	20	19
Hind toe	23	23	21	23	21½	21	23	23	28	20	21	20½	23	23½	20
Hind toe-nail	88	29	26	30	27	31	30	87		30	27	23	29	29	
Length of bill on ridge	43	45	42	44	43	42	44	55	48	45	44	43	46		36
Length of bill from cere	29	28	26½	24	24	26	25	29	29	26	25	25	26		22
* Height of upper mandible	11½	11½	11¾	11½	11	11½	11	11½	13	12	12½	11½	12½		10
* Breadth of upper mandible	9½	10	10	9½	9	9½	10½	11½	11	10	10	10	10		8
Number of specimen	13228	13227	+	6955	19120	5576	8539	8541	5157	8540	10761	12921	5152	19121	8550

* Opposite the anterior edge of cere.

Taking color, therefore, as a sufficient ground for specific distinction, we find that we have in the red-tailed group seven species, and in the other nine, which, with the young Harlani of the Academy, Cooperi, fuliginosus, albonotatus, lineatus, elegans, and Pennsylvanicus, give a total of twenty-three species of this genus which are found in the United States. (*See table on page* 118.)

Mr. C. Stodder read the following paper: —

Organisms found in the Mud from the bottom of Mystic Pond, Medford, near Boston. By R. C. Greenleaf and Charles Stodder.

Some of the mud from the bottom of Mystic Pond, obtained by the soundings of the officers of the United States Coast Survey, having been presented to Mr. Greenleaf, he, with myself, have examined it for the organisms which might be found in it. This is a fresh-water lake, the source of Mystic River, in Medford, about seven miles from Boston. The surface of the lake is about the level of ordinary high tides; it has a narrow, shallow outlet. Extreme high tides flow into the pond. The pond being something like seventy feet deep, the salt water flowing in with the tide, sinks to the bottom, and cannot escape. Consequently, the water at the bottom is constantly salt, while the surface water is usually fresh. This singular lake, might be expected to afford evidence of both lacustrine and marine life, and such proves to be the case. In the natural state of the mud we find the exuviæ of minute crustaceans. On cleaning it by levigation and the application of acids, we find spicules of sponges; also, one species of the dictyoca of Ehrenberg, and one of periptera, the origin of which are unknown, though classed by Ehrenberg among the Polygastric infusoria. Many small fragments of shells of Polycistinæ, — too imperfect to identify the genera, — and also a great variety of shells of the diatomacea, both marine and fresh water. Among which we identify the following species: —

FRESH OR BRACKISH WATER FORMS.

1. Synedra radians.
2. Cocconeis placentula.
3. Epithemia turgida.
4. " argus.
5. " zebra.
6. " gibba.
7. " granulata.
8. " proboscidea.
9. " ventricosa.
10. " alpestris.
11. Pinnularia viridis.
12. " divergens.
13. " stauroneiformis.
14. " major.
15. " nobilis.
16. " mesolepta.
17. " dactylus.
18. " oblonga.
19. " gracilis.
20. Stauroneis phœnicenteron.
21. " acuta.
22. " gracilis.

23. Stauroneis anceps.
24. Cymbella Ehrenbergii. W.S.
25. " cuspidata.
26. " Helvetica.
27. Tabellaria fenestrata.
28. Gomphonema acuminatum.
29. " capitatum.
30. " affine, Kutz.
31. " cristatum ? Ralfs.
32. Nitzchia sigmoidea.
33. Himantidium majus.
34. " arcus.
35. " undulatum ? var.
36. " bidens.
37. " gracile.
38. Navicula amphisbæna.
39. " tumida.
40. " viridis.
41. " gibberula.
42. " firma.
43. " elliptica, Kutz.
44. " nodosa.
45. " obtusa.
46. Eunotia tetraodon.
47. " triodon.
48. Cocconema lanceolatum.
49. " cymbiforme.
50. " cistula.
51. Surirella splendida.
52. " nobilis.
53. " biseriata.
54. " linearis.
55. " angusta.

FRESH WATER.

56. Pleurosigma attenuatum.
57. Mastogloia Smithii.
58. Melosira varians.
59. Cossinodiscus minor.
60. Tryblionella gracilis, W. S.
61. Tryblionella gracilis, var. β *Ann. and Mag. Nat. Hist.*, vol. xix.
62. Orthosira orichalcea
63. Meridion circulare.
64. Amphora ovalis.
65. Navicula polyonca, Breb.
66. " cuspidata, Kutz.
67. Pinnularia cardinalis. W. S.
68. Surirella ovata.
69. Stauroneis birostris, Ehr.

MARINE OR BRACKISH WATER FORMS.

70. Achnanthes subsessilis.
71. Cocconeis scutellum.
72. Cocconeis oceanica.
73. " splendida, Greg.
74. Ephithemia musculus.
75. Rhabdonema arcuatum.
76. Gramatophora serpentina.
77. " marina.
78. Nitzchia obtusa.
79. " plana.
80. " scalaris.
81. " dubia.
82. " sigma.
83. Biddulphia aurita.
84. Navicula Smithii.
85. " suborcularis, Greg.
86. " fusca, Greg.
87. " didyma (several varieties).
88. " punctulata.
89. " pusilla.
90. " lyra.
91. " Jennerii. W. S.
92. Triceratium reticulum, Ehr.
93. Homœcladia sigmoidea.
94. " filliformis.
95. Cossinodiscus radiolatus, Ehr.
96. " excentricus.
97. Gallionella sulcata, Ehr. = marina, W. S.
98. Surirella Gemma.
99. " Peruviana Eh.

100. Surirella, striatula.
101. " two n. s.
102. " lata.
103. Campylodiscus cribosus, W.S. = C. argus, Bail.
104. " parvulus.
105. Doryphoria Boeckii.
106. Pleurosigma Balticum.
107. Pleurosigma strigosum.
108. " strigilis.
109. " hippocampus.
110. Pinnularia peregrina.
111. Stauroneis aspera = S. pulchella, W. S.
112. Actinoptychus senarius.
113. Amphipleura sigmoidea.

Undetermined species of Amphiprora, Navicula, Pinnularia, Amphora, Surirella, and Cossinodiscus.

The President made a communication on the mode of formation of the rattle of the rattlesnake.

In a fœtal specimen examined, the scales cease toward the end of the tail, and the unscaled portion is covered by thickened cuticle, the rudiment of a rattle, which must fall off; as the animal grows, the last three vertebræ are covered with hardened cuticle arranged in ridges; as growth continues this covering is displaced, a new layer forming underneath it, and the old slipped backward over one ridge in a manner not well determined; this is in turn displaced by a new layer beneath, pushed backward over a single ridge, and so on indefinitely. An interesting point yet to be settled is whether the cuticular caudal rings are set free at the time of moulting. That there is no definite relation between the age of the animal and the number of rattles, he said, was shown by specimens over six feet long having only two rattles, and others of eighteen inches with six or seven.

Dr. White announced a very extensive and valuable donation of skins and skulls of North American mammals by the Smithsonian Institution, and mostly of rare animals from the little-explored regions of the western and southwestern territories, known only to naturalists within a few years. Among the skins were those of the grizzly bear, wolf, fox, lynx, mink, skunk, badger, otter, raccoon, weasel, squirrels, spermophiles, woodchuck, beaver, muskrat, porcupine, hares, deer, and prong-horned antelope; many of them in excellent condition for mounting, and making complete many of the series in the Society's cabinet. In a larger building these will make a very striking and instructive addition to its museum. Among the skulls are those of the grizzly bear, wolf, Rocky Mountain sheep, western deer, prong-horned antelope, lynx, and marten, with horns of the antelope. The thanks of the Society were voted for this donation.

Mr. Theodore Lyman presented the "*Nouveau Dictionnaire d'Histoire Naturelle*," 36 vols. 8vo., Paris, 1816–1819, — a work of reference of very great value, especially to the ornithologist, as most of Vieillot's birds are described in it.

Mr. Putnam presented, in the name of Mr. Theodore Gill, a catalogue of the fishes found from Greenland to Georgia. He believed Mr. Gill to be mistaken in carrying the northern fauna so far south as Georgia, as many of the West Indian fishes come to the coast of South Carolina.

Mr. David M. Balch, of Boston, was chosen a resident member.

March 20, 1861.

The President in the Chair.

Mr. A. Agassiz communicated the following paper: —

NOTES ON THE DESCRIBED SPECIES OF HOLCONOTI, FOUND ON THE WESTERN COAST OF NORTH AMERICA. By A. AGASSIZ.

While in California I had the opportunity of seeing in a fresh condition a large number of these fishes. I made colored drawings of all the species, with one exception, and was enabled to identify all the species of Gibbons, which had for the most part been described in the Proceedings of the California Academy of Natural Sciences of San Francisco, at the time when the proceedings appeared only in some of the daily papers. I have been very careful in hunting up all the descriptions thus published, so as to settle definitely the claims of priority of Agassiz, Gibbons, and Girard. Although Mr. Gibbons read papers before the California Academy, describing several species some time before Prof. Agassiz published his first notice of Viviparous Fishes in the American Journal of November 1853, Mr. Gibbons did not publish a single description before the 18th of May, 1854, when four species were described in the San Francisco Daily Placer Times and Transcript. This was some time after the publication of the "Additional Notes on Holconoti," by Prof. Agassiz, in the May number of the American Journal for 1854. After this date Mr. Gibbons read several additional papers before the California Academy, and descriptions were published in the San Francisco Daily Placer Times and Transcript of May 30 and June 31. So that all the species described by Gibbons were published a few weeks before the descriptions which Mr. Girard published in the Proceedings of the Philadelphia Academy.

All the original specimens from which Mr. Girard made his descriptions, have been carefully compared with the originals of Professor Agassiz's descriptions. As there were no original specimens of Mr. Gibbons's in the Museum of the California Academy, I was only able to identify his species from his descriptions. Fortunately they are so characteristic, that with fresh specimens before one's eyes it is hardly possible to mistake them. All the specimens collected for several years by Mr. T. G. Cary, of San Francisco, and those I collected myself during my stay in California, have been examined. These specimens were taken at different seasons and in all the possible stages of growth, and amount to a very large number, sometimes 400 for a single species, so that I have had excellent series of all the species, with one exception, *Embiotoca argyrosoma* of Girard, of which the specimen in the Museum of the Smithsonian Institution is the only representative.

A great number of specimens of these Viviparous fishes having been distributed, I give below their synonymy, and have also added the MSS. names given to them by Prof. Agassiz, as specimens, with these names, have probably found their way into other museums. The fifteen species which are given below have appeared at different times, under no less than fifty different names. Troschel, who translated the papers of Agassiz, Gibbons, and Girard for Wiegman's Archiv, has given a summary (Wieg. Archiv, 1855, I. p. 353) of the whole family. He simply enumerates all the genera and species described by Agassiz, Gibbons, and Girard, thinking he could perceive the specific difference of all the species enumerated from the descriptions alone; but the fourteen genera and thirty species there enumerated are reducible to nine genera and fifteen species, when the specimens are carefully compared. I have, therefore, carefully revised the synonymy of the whole family, with the original specimens before me, and present here the result of this examination, retaining, of course, for each species, the oldest name according to date of publication.

As I intend in a future communication to take up the family again, with the intention of revising the genera, I have retained the generic names of *Damalichthys* Girard, and of *Phanerodon* Girard, although the first genus was established upon an imperfect specimen, and belongs probably to the genus *Embiotoca*, near *E. lateralis*. The genus *Phanerodon* of Girard, is also closely allied to *Micrometrus* of Gibbons, and a better knowledge of the anatomy of these fishes will settle these points.

What makes it very difficult to describe a species thoroughly from a few specimens in this family is the fact, that in some of the species, as in *E. Jacksoni* and *E. lateralis*, some of the characters of the young, such as the transverse banding, the shape of the anal fin, and the more elongated shape of the body, are retained in the adults, and unless complete series can be examined to show the gradation of these changes from the young to the adult, distinct species could easily be supposed to exist by examining merely the extremes of the series. An error of this sort has led to the establishment of species, which Girard supposed to be closely allied to *E. Jacksoni* and to *E. lateralis*, but which are founded merely on some characters of the young, more prominent than usual in the adult or middle-sized specimens.

The only specimen of Girard's *Embiotoca argyrosoma* preserved in the Smithsonian Institution is in such a poor condition that it is impossible to say certainly whether it is a true *Embiotoca* or not. But from what remains of it, it would seem to be a genus by itself, as it differs entirely from any other species of this family by its large scales, the rounded head, and the elongated shape of the body.

Authorities.

Agassiz (*L.*) Extraordinary fishes from California, constituting a new family, Am. Jour. XVI. Nov. 1853, p. 380–390.

Agassiz (*L.*) Additional notes on the Holconoti, Am. Jour. XVII. May, 1854, pp. 365–369.

Gibbons (*W. P.*) Proceedings of the California Academy of Natural Science in Daily Placer Times and Transcript, San Francisco, Cal., issue of May 18, 1854, May 30, 1854, and June 21, 1854.

Gibbons (*W. P.*) Descriptions of four new species of Viviparous fishes from Sacramento River and the Bay of San Francisco. Read before the Cal. Acad. N. S., May 15, 1854. Proc. Phil. Acad. N. S. VII., July 1854, pp. 105–106.

Gibbons (*W. P.*) Descriptions of new species of Viviparous, marine, and fresh-water fishes, from the Bay of San Francisco, and from the river and lagoons of the Sacramento. Read before the Cal. Acad. of N. S., Jan. 9, May 15, 22, 29, 1854. Proc. Phil. Acad. N. S. VII., July 1854, pp. 122–126.

Girard (*Charles*). Descriptions of new fishes, collected by Dr. A. L. Heermann, naturalist, attached to the Survey of the Pacific Rail Road Route, under Lieut. R. S. Williamson, U. S. A. Proc. Phil. Acad. N. S. VII., August, 1854, pp. 134–135.

Girard (*Charles*). Enumeration of the marine fishes, collected at San Francisco, Cal., by Dr. C. B. R. Kennerly, naturalist attached to the Survey of the Pacific R. R. Route, under Lieut. A. W. Whipple. Proc. Phil. Acad. N. S. VII., August 1854, p. 141.

Girard (*Charles*). Observations upon a collection of fishes, made upon the Pacific coast of the United States, by Lieut. W. P. Trowbridge, U. S. A., for the Museum of the Smithsonian Institution. Proc. Phil. Acad. N. S. VII., August 1854, pp. 151–153.

Girard (*Charles*). Notice upon the Viviparous fishes inhabiting the Pacific Coast of North America, with an enumeration of the species observed. Proc. Phil. Acad. N. S. VII., April 1855, pp. 318–323.

Girard (*Charles*). Contributions to the Ichthyology of the Western coast of the United States, from specimens in the Museum of the Smithsonian Institution. Proc. Phil. Acad. N. S. VIII., June 1856, p. 136.

Girard (*Charles*). Report upon fishes collected on the survey upon the routes in Oregon and California. Explored by parties under the command of Lieut. R. L. Williamson, Corps of Top. Eng. in 1855. Pacific R. R. Reports, vol. VI. Washington, 1857. Zoölogical Report, No. 1, p. 25.

Girard (*Charles*). Pacific R. R. Reports, vol. X., Washington, 1858. Fishes, pp. 164–205.

Girard (*Charles*). Route near the 35th parallel, explored by Lieut. A. W. Whipple, Top. Eng. in 1853 and 1854. Pacific R. R. Reports, vol. X.; Zoöl. Report, No. 5, p. 81. Washington, 1858.

Girard (*Charles*). Routes in California to connect with the routes near the 35th and 32d parallels, explored by Lieut. R. S. Williamson, corps of Top. Eng. in 1853. No. 4, Report upon Fishes of the Route, pp. 87–88. Pacific R. R. Reports, vol. X. Washington, 1858.

Suckley (*Geo.*) and (*Cooper T. G.*) Natural History of Washington Territory and Oregon. New York, 1860. No. 5, Report upon the Fishes collected on the Survey, by Geo. Suckley, pp. 357 and 358. Taken from Girard's Report, in vol. X. Pacific R. R. Reports.

Suckley (*Geo.*) Parts II. and III. of the Narrative and Final Report of Isaac I. Stevens, Governor of Washington Territory upon the Route near 47th and 49th parallels. No. 5, Report upon the Fishes collected on the Survey, pp. 357 and 358. Pacific R. R. Reports, vol. XII. part II. Washington, 1860.

Family. HOLCONOTI Agass.

Syn. Holconoti or Embiotocoidæ *Agass.*, Am. Jour. XVI. November, 1853, p. 383.

Labroidæ *Gibbons* (ex parte), Proc. Phil. Acad. N. S. VII. July 1854, p. 122.

Embiotocoidæ *Girard*, Proc. Phil. Acad. N. S. VII. August 1854, p. 134.

Embiotocoidæ or Holconoti *Girard*, P. R. R. Reports, vol. X. p. 164.

EMBIOTOCA Agass.

Syn. Embiotoca *Agass.*, Am. Jour. XVI. Nov. 1853, p. 386.
Embiotoca *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 134.
Embiotoca *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 320.
Embiotoca *Girard*, P. R. R. Reports, vol. X. p. 168.
Holconotus *Gibbons*, Proc. Phil. Acad. N. S. VII. July 1854, p. 122.

Embiotoca Jacksoni Agass.

Syn. Embiotoca Jacksoni *Agass.*, Am. Jour. XVI. Nov. 1853, p. 387.
Embiotoca Jacksoni *Agass.*, Am. Jour. XVII. May, 1854, p. 366.
Embiotoca Jacksoni *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 151.
Embiotoca Jacksoni *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 320.
Embiotoca Jacksoni *Girard*, P. R. R. Reports, vol. X. p. 168, plate XXVII., XVIII., XXVI., fig. 3 and 4.
Embiotoca Jacksoni *Girard*, P. R. R. Reports, vol. X. Zoöl. Rep. No. 4, p. 87.
Holconotus fuliginosus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 123.
Embiotoca Cassidyi *Girard*, Proc. Phil. Acad. N. S. VII. Aug. 1854, p. 151.
Embiotoca Cassidyi *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 320.
Embiotoca Cassidyi *Girard*, P. R. R. Reports, vol. X. p. 171, plate XXIX., XXVI., fig. 12.
Embiotoca Webbi *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 320.
Embiotoca Webbi *Girard*, P. R. R. Reports, vol. X. p. 173, plate XXX.

Embiotoca Caryi Agass.

Syn. Embiotoca Caryi *Agass.*, Am. Jour. XVI. Nov. 1853, p. 389.
Embiotoca Caryi *Agass.*, Am. Jour. XVII. May, 1854, p. 366.
Holconotus Gibbonsi *Cal. Acad. N. S.* Proc. Phil. Acad. N. S. VII. July, 1854, p. 121.

Embiotoca lateralis Agass.

Syn. Embiotoca lateralis *Agass.*, Am. Jour. XVII. May, 1854, p. 366.
Holconotus Agassizi *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 121.

Embiotoca lineata *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 134.
Embiotoca lineata *Girard*, Proc. Phil. Acad. N. S. VII. Aug. 1854, p. 141.
Embiotoca lineata *Girard*, Proc. Phil. Acad. N. S. VII. Aug. 1854, p. 151.
Embiotoca lineata *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 320.
Embiotoca lineata *Girard*, P. R. R. Reports, vol. VI. Zoöl. Rep. No. 1, p. 25.
Embiotoca lineata *Girard*, P. R. R. Reports, vol. X. p. 174, plate XXXI., XXVI., figures 5 and 6.
Embiotoca lineata *Girard*, P. R. R. Reports, vol. X. Zoöl. Rep. No. 5, p. 51.
Embiotoca lineata *Girard*, P. R. R. Reports, vol. X. Zoöl. Rep. No. 4, p. 87.
Embiotoca ornata *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 321.
Embiotoca ornata *Girard*, P. R. R. Reports, vol. X. p. 176, plate XXVI. fig. 11.
Embiotoca perspicabilis *Girard*, Proc. Phil. Acad. vol. VII. April, 1855, p. 321.
Embiotoca perspicabilis *Girard*, P. R. R. Reports, vol. X. p. 178, plate 26, figs. 1 and 2.
Embiotoca perspicabilis *Girard*. Suckley and Cooper, N. H. of W. T. and Oreg. p. 357, plate XXXII.
Embiotoca perspicabilis *Girard*, P. R. R. Reports, vol. XII. part II. p. 357, plate XXXII.

Embiotoca argyrosoma Girard.

Syn. Embiotoca argyrosoma *Girard*, Proc. Phil. Acad. N. S. VIII. June, 1856, p. 136.
Embiotoca argyrosoma *Girard*, P. R. R. Reports, vol. VI. Zoöl. Rep. No. 1, p. 25.
Embiotoca argyrosoma *Girard*, P. R. R. Reports, vol. X. p. 180.

DAMALICHTHYS Girard.

Syn. Damalichthys *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 321.
Damalichthys *Girard*, P. R. R. Reports, vol. X. p. 180.

Damalichthys vacca Girard.

Syn. Damalichthys vacca *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 321.
Damalichthys vacca *Girard*, P. R. R. Reports, vol. X. p. 182.

Damalichthys vacca *Girard*, Suckley and Cooper, N. H. of W. T. and Oreg. p. 358, plate XXXIII.

Damalichthys vacca *Girard*, P. R. R. Reports, vol. XII. part II. p. 358, plate XXXIII.

PHANERODON, Girard.

Syn. Phanerodon *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 153.

Phanerodon *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 321.

Phanerodon *Girard*, P. R. R. Reports, vol. X. p. 83.

Phanerodon furcatus Girard.

Syn. Phanerodon furcatus *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 153.

Phanerodon furcatus *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 322.

Phanerodon furcatus *Girard*, P. R. R. Reports, vol. X. p. 184, plate XXXIV. figs. 1–5.

MICROMETRUS Gibbons.

Syn. Micrometrus *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 30, 1854.

Micrometrus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 125.

Cymatogaster *Gibbons* (ex parte), Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 18, 1854.

Cymatogaster *Gibbons* (ex parte), Proc. Phil. Acad. N. S. VII. June, 1854, p. 106.

Holconotus *Girard*, ex parte (non Agass.), Proc. Phil. Acad. N. S. VII. August, 1854, p. 152.

Holconotus *Girard* (non Agass.), P. R. R. Reports, vol. X. p. 193.

Abeona *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 322.

Abeona *Girard*, P. R. R. Reports, vol. X. p. 186.

Metrogaster *Agass.* MSS.

Micrometrus aggregatus Gibbons.

Syn. Micrometrus aggregatus *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 18, 1854.

Micrometrus aggregatus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 125.

Cymatogaster aggregatus *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 18, 1854.

Cymatogaster aggregatus *Gibbons*, Proc. Phil. Acad. N. S. VII. June, 1854, p. 106.

Holconotus rhodoterus *Girard* (non Agass.), Proc. Phil. Acad. N. S. VII. August, 1854, p. 141.

Holconotus rhodoterus *Girard* (non Agass.), Proc. Phil. Acad. N. S. VII. August, 1854, p. 152.

Holconotus rhodoterus *Girard* (non Agass.), Proc. Phil. Acad. VII. April, 1855, p. 322.

Holconotus rhodoterus *Girard* (non Agass.), P. R. R. Reports, vol. VI. Zoöl. Rep. No. 1, p. 26.

Holconotus rhodoterus *Girard* (non Agass.), P. R. R. Reports, vol. X. p. 193, plate XXXV. plate XXXVI. figs. 1–4, plate XXVI. figs. 7, 8.

Holconotus rhodoterus *Girard* (non Agass.), P. R. R. Reports, vol. X. Zoöl. Rep. No. 4, p. 87.

Holconotus rhodoterus *Girard* (non Agass.), Suckley and Cooper, N. H. of W. T. and Oreg. p. 358.

Holconotus rhodoterus *Girard* (non Agass.), P. R. R. Reports, vol. XII. part II. p. 358.

Metrogaster lineolatus *Agass.*, MSS.

Micrometrus minimus, Gibbons.

Syn. Micrometrus minimus *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 30, 1854.

Micrometrus minimus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 125.

Cymatogaster minimus *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 18, 1854.

Cymatogaster minimus *Gibbons*, Proc. Phil. Acad. N. S. VII. June, 1854, p. 106.

Holconotus Trowbridgii *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 152.

Abeona Trowbridgii *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 322.

Abeona Trowbridgii *Girard*, P. R. R. Reports, vol. X. p. 186, plate XXXIV. fig. 6–10.

HYSTEROCARPUS Gibbons.

Syn. Hysterocarpus *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 18, 1854.

Hysterocarpus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 124.

Hysterocarpus *Girard*, P. R. R. Reports, vol. X. p. 190.

Sargosomus *Agass.*, MSS.

Hysterocarpus Traskii Gibbons.

Syn. Hysterocarpus Traskii *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 18, 1854.
Hysterocarpus Traskii *Gibbons*, Proc. Phil. Acad. N. S. VII. June, 1854, p. 105.
Hysterocarpus Traskii *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 124.
Hysterocarpus Traskii *Girard*, Proc. Phil. Acad. N. S. VIII. June, 1856, p. 136.
Hysterocarpus Traskii *Girard*, P. R. R. Reports, vol. VI. Zoöl. Rep. No. 1, p. 26.
Hysterocarpus Traskii *Girard*, P. R. R. Reports, vol. X. p. 190, plate XXVI. fig. 14.
Sargosomus fluviatilis *Agass.*, MSS.

RHACOCHILUS Agass.

Syn. Rhacochilus *Agass.*, Am. Jour. XVII. May, 1854, p. 367.
Rhacochilus *Girard*, P. R. R. Reports, vol. X. p. 188.
Pachylabrus *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, June 21, 1854.
Pachylabrus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 136.

Rhacochilus toxotes Agass.

Syn. Rhacochilus toxotes *Agass.*, Am. Jour. XVII. May, 1854, p. 367.
Rhacochilus toxotes *Girard*, Proc. Phil. Acad. N. S. VIII. June, 1856, p. 136.
Rhacochilus toxotes *Girard*, P. R. R. Reports, vol. X. p. 188, plate XL.
Pachylabrus variegatus *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, June 21, 1854.
Pachylabrus variegatus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 126.

AMPHISTICHUS Agass.

Syn. Amphistichus *Agass.* Am. Jour. XVII. May, 1854, p. 367.
Amphistichus *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 134.
Amphistichus Girard, Proc. Phil. Acad. N. S. VII. April, 1855, p. 323.
Amphistichus *Girard*, P. R. R. Reports, vol. X. p. 201.
Mytilophagus *Gibbons*, Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, Cal., May 30, 1854.

Mytilophagus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 125.

Amphistichus argenteus Agass.

Syn. Amphistichus argenteus *Agass*. Am. Jour. XVII. May, 1854, p. 367.

Amphistichus argenteus *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 141.

Amphistichus argenteus *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 153.

Amphistichus argenteus *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 323.

Amphistichus argenteus *Girard*, P. R. R. Reports, vol. X. p. 201, plate XXIX.

Amphistichus argenteus *Girard*, P. R. R. Reports, vol. X. Zoöl. Rep. No. 5, p. 51.

Amphistichus argenteus *Girard*, P. R. R. Reports, vol. X. Zoöl. Rep. No. 4, p. 88.

Mytilophagus fasciatus *Gibbons*, Proc. Phil. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 30, 1854.

Mytilophagus fasciatus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1354, p. 125.

Amphistichus similis *Girard*, Proc. Phil. Acad. N. S. VII. Aug. 1854, p. 135.

Amphistichus similis *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 323.

Amphistichus similis *Girard*, P. R. R. Reports, vol. X. p. 203, plate XXXVI. figs. 5–9.

Amphistichus similis *Girard*, P. R. R. Reports, vol. X. Zoöl. Rep. No. 4, p. 88.

HOLCONOTUS Agass.

Syn. Holconotus *Agass*. Am. Jour. XVII. May, 1854, p. 367, (non Holconotus Gibbons, et non Holconotus Girard.)

Cymatogaster *Gibbons* (ex parte), Proc. Phil. Acad. N. S. VII. July, 1854, p. 123.

Amphistichus *Girard* (ex parte), Proc. Phil. Acad. N. S. VII. August, 1854, p. 135.

Ennichthys *Girard* (ex parte), Proc. Phil. Acad. N. S. VII. April, 1855, p. 322.

Ennichthys *Girard* (ex parte), P. R. R. Reports, vol. X. p. 193.

Holconotus rhodoterus Agass.

Syn. Holconotus rhodoterus *Agass*. Am. Jour. XVII. May, 1854 368, (non Holconotus rhodoterus Girard.)

Cymatogaster Larkinsii *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 123.

Cymatogaster ellipticus *Gibbons* ?, Proc. Phil. Acad. N. S. VII. July, 1854, p. 124.

Amphistichus Heermanni *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 135.

Ennichthys Heermanni *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 323.

Ennichthys Heermanni *Girard*, P. R. R. Reports, vol. X. p. 199, plate XXXVIII. and plate XXVI. fig. 9.

Ennichthys Heermanni *Girard*, P. R. R. Reports, vol. X. Zoöl. Rep. No. 4, p. 87.

Holconotus pulchellus A. Agass.

Syn. Cymatogaster pulchellus *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, June 21, 1854.

Cymatogaster pulchellus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 123.

HYPERPROSOPON Gibbons.

Syn. Hyperprosopon *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 18, 1854.

Hyperprosopon *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 124.

Holconotus *Girard* (ex parte), Proc. Phil. Acad. N. S. VII. August, p. 152.

Ennichthys *Girard* (ex parte), Proc. Phil. Acad. N. S. VII. April, 1855, p. 322.

Ennichthys *Girard* (ex parte), P. R. R. Reports, vol. X. p. 196.

Bramopsis *Agass.*, MSS.

Hyperprosopon argenteum Gibbons.

Syn. Hyperprosopon argenteum *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, Cal. May 18, 1854.

Hyperprosopon argenteum *Gibbons*, Proc. Phil. Acad. N. S. VII. June, 1854, p. 105.

Hyperprosopon argenteus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 125.

Non Var. A., H. punctatum *Gibbons*, Proc. Phil. Acad. N. S. VII. June, 1854, p. 106.

Holconotus megalops *Girard*, Proc. Phil. Acad. N. S. VII. August, 1854, p. 152.

Ennichthys megalops *Girard*, Proc. Phil. Acad. N. S. VII. April, 1855, p. 323.

Ennichthys megalops *Girard*, P. R. R. Reports, vol. x. p. 197, plate XXVII. and plate XXVI. fig. 10.

Bramopsis mento *Agass.*, MSS.

Hyperprosopon arcuatum Gibbons.

Syn. Hyperprosopon arcuatum *Gibbons*, Proc. Cal. Acad. N. S. Daily Placer Times and Transcript, San Francisco, May 30, 1854.

Hyperprosopon arcuatus *Gibbons*, Proc. Phil. Acad. N. S. VII. July, 1854, p. 125.

Hyperprosopon argenteum *Gibbons*, Var. A. H. punctatum, Proc. Phil. Acad. N. S. VII. June, 1854, p. 106.

NOTE. — Embiotoca Caryi *Agass.* does not belong to the genus Embiotoca. An examination of the skeleton of this species and of Embiotoca lateralis *Agass.*, has convinced me that they must be separated from Embiotoca, and I would, therefore, propose for the first species the name of Hypsurus Caryi, and for the second, the name of Tæniotoca lateralis. Girard had correctly placed Gibbons' two species of Micrometrus in two distinct genera, Abeona and Holconotus; but as Abeona is identical with the type of Gibbons' Micrometrus and the Holconotus of Girard is not the Holconotus of Agassiz as he supposes, the species which Gibbons called M. aggregatus may be called Metrogaster aggregatus *Agass.*, retaining the generic name which Professor Agassiz had given it on the drawings made at the time when he first received these fishes from California. Besides the two species of Hyperprosopon described by Gibbons, there is a third species, which has the general appearance and about the size of Metrogaster aggregatus *Agass.*, but the teeth and the shape of the dorsal show that it is a true Hyperprosopon, and I would propose for it the name of Hyperprosopon analis.

In speaking of the structural peculiarities of *Holconoti*, Mr. Agassiz remarked, that the part which contains the young is not the oviduct, but the ovarian sheath, which fulfils the functions of the ovary. This organ presents two modes of arrangement; in one, there is a series of triangular membranous flaps communicating with each other, between which the fishes are arranged, mostly longitudinally, the head of one to the tail of another, but sometimes with the bodies curved, to the number of eighteen to twenty; in the other, the cavity is divided by three membranes converging to a point into four apartments, not communicating with each other except toward the genital opening, the young being arranged in the same longitudinal manner. From tracing the egg from its very early stages, he was satisfied that this sheath is the ovary and not the oviduct. He illustrated on the blackboard the progressive development of the embryo, showing how the mouth moved forward, the fins becoming distinct and rayed, and the dorsal and anal at the time of hatching almost covering the caudal posteriorly.

Professor Agassiz remarked that the folds around the young in these viviparous fishes might be compared to those surrounding the eggs in other cases, and that this might after all be only a modification of ordinary ovarian gestation.

Dr. Bryant read a paper on the restricted genus *Catarractes* (Moehring), as follows:—

MONOGRAPH OF THE GENUS CATARRACTES, MOEHRING. BY HENRY BRYANT, M.D.

In consequence of the want of authentic American specimens of this genus, no satisfactory descriptions have been given by any ornithologist, of the species inhabiting our coasts. Wilson does not describe them at all; Audubon confounded *ringvia* and *troille;* Nuttall and Swainson did the same, and in the 9th vol. of the Pacific Railroad Report, the best work yet published on American ornithology, the writer states that he has never seen an American specimen of *troille*, and describes the Pacific species as *ringvia.* A few winter or immature specimens of Brunnich's *Guillemot* have been obtained from time to time, but I am not aware that a single adult in summer plumage has ever been seen on our coast, south of Hudson's Bay, by any ornithologist but myself. Having had an opportunity of examining a great number of the three Atlantic species of this genus, both living and dead, and possessing a large series of specimens, I have been led to think that a monograph of this genus would be acceptable to American ornithologists. In addition to the specimens in my own collection, Professor Baird has, with his usual kindness, allowed me to examine the whole series belonging to the Smithsonian Institution. The different specimens are from the Arctic Ocean, western and eastern coasts of North America, Greenland, Iceland, Faroe and Orkney Islands, and western coast of Europe, and have enabled me not only to describe the American species, but to compare them critically with specimens from many other localities.

I am sorry to propose any change of nomenclature, but if the law of priority is to be carried out, which has so disturbed the nomenclature of the North American birds in the ninth volume of the Pacific Railroad Report, I do not see how this can be avoided. The family *Alcidæ* of Swainson, should be *Plautidæ* of Klein; * *lomvia* of Brünnich, should be *troille* of Linnæus, and *arra* of Pallas, *lomvia* of Linnæus. †

Family PLAUTIDÆ Klein.

Ch. Body flattened ovate, compact and muscular; plumage very thick and elastic; bill compressed, higher than broad; wings short,

* Klein, Hist. Av. Prod. p. 146, 1750. Familia septima, Plautus. Tridactylus, palmipes, digito nullo postico.

† Linn. Syst. Nat. edition x. 130. Alca lomvia. Rostro lævi oblongo, mandibulo superiore margine flavescente.

No. 1. C. lomvia, adult.
No. 4. " " first winter.
No. 2. C. ringvia, adult.

No. 2a. C. troille, adult.
No. 3. C. californicus, adult.
No. 5. " " nestling.

pointed; tail short, of twelve or fourteen feathers; tibiæ placed far back, concealed for the greater part and unfeathered inferiorly; tarsi laterally compressed, shorter than the middle toe, the posterior surface covered with small irregularly shaped rough scales; hind toe wanting; three anterior toes connected by a membrane, which extends their entire length, and also forms a narrow border on the inside of the inner toe; the outer as long as the middle, and both considerably longer than the inner toe; claws laterally compressed except the inner edge of middle one which is expanded.

Sub-family URINÆ Gray.

Ch. Height of bill not much exceeding the breadth; upper mandible with the culmen, commencing in a sharp point, separating the feathers and rounded and more or less curved to the tip, which is hollowed on the under side like a gouge; nasal furrow conspicuous anteriorly, the posterior portion concealed by the feathered scale which partially covers the linear nostril; posterior portion of the cutting edges of upper and lower mandible everted and sharp, then inflexed and rounded for about half their length, with the remaining portion nearly perpendicular; first primary longest; tail rounded, reaching but little beyond the wing.

Genus CATARRACTES Moehring.

Catarractes Moehring, Av. Gen. 1752.

Ch. Upper mandible with the anterior part of culmen slightly curved, at first gradually, more suddenly towards the tip; the cutting edges nearly straight from the rictus, and slightly curved downwards towards the tip, near which they are distinctly notched; nasal scales entirely covered with feathers and extending almost to the anterior extremity of the furrow.; keel ascending, more than half the length of culmen, with the angle conspicuous and grooved longitudinally on its inferior surface. Anterior face of tarsus and upper part of all the toes, but the basal portion of the first joint of the inner covered with narrow transverse scales; sides of tarsus and basal portion of inner toe with numerous irregularly, generally hexagonally, shaped scales, largest on the inner face of tarsus and growing smaller on both faces posteriorly; tail of twelve feathers; a peculiar crease or furrow in the feathers runs backwards from the posterior canthus of the eye for a short distance.

CATARRACTES TROILLE Lin.

Lomvia Hoieri *Raii.* Syn. Meth. Av. p. 120.

Plautus rostro larino *Klein*, p. 146, No. 2.

Colymbus troille *Lin.* Faun. Suec. ed. 1761, No. 109. *Gmel.* Syst. 1, 2, p. 585.

Colymbus minor *Gmel.* Syst. 1, 2, p. 585.

Catarractes *Moehring*, Av. Gen. 75.
Uria *Brisson*, Ornith. sive Syn. Meth. 2, p. 377.
Uria lomvia *Brünnich*, Ornith. Bor. p. 27; Pacific Railroad Report, 9, p. 913; Keys. und Blas. Wirbelthiere Europas, p. 238.
Uria troille *Lath.* Ind. Ornith. 2, p. 796; Temm. Man. 2, p. 921; Ritz, Faun. Suec. p. 149; Nilsson, Ornith. Suec. 2, p. 142; Bewick, British Birds, ed. 1832, 2, p. 182; Selby, British Ornith. 2, p. 420; Yarrell, British Birds, 3, p. 343; Reinhardt, Natur. Bidrag, p. 18, No. 87; De Kay, State Report of New York Zoölogy, 1 p. 279.
Uria major *Ger.* 1, p. 549.
Cepphus lomvia *Pallas*, Zoogr. 2, p. 345.
Figures *Aud.*, Birds of Am. plate 218, fig. 2, Id. 8vo. ed. 473, No. 2, Gould's Birds of Europe, No. 376; Naum. Natur. der Vög. 9, Deutsch. 331; Buffon, Planch. Enl. 903.

Sp. Ch. Upper mandible with the culmen curved almost from the commencement, which is flattened; the cutting edge slightly descending from the rictus to near the posterior extremity of the nostril, then ascending for about the first third of the culmen, and again gradually curved downwards to the tip; the variation from a straight line, except in the terminal portion, being very slight; the lateral outlines narrowly wedge-shaped, with the apex blunt and a slight inflexion anterior to the nasal furrow; nostrils, in fresh specimens, scarcely visible; lower mandible with the cutting edges presenting nearly the same outline as those of the upper, but less pronounced; lateral outlines the same; keel somewhat concave, about two thirds the length of culmen and twice and a quarter the distance from the angle to where the feathers cross the lower edge of the ramus.

Plumage of adult male in spring. Whole upper part dark slaty-brown, with the margins of the feathers sometimes lighter on the back, rump, interscapulars, and wing coverts, so that these parts appear obscurely banded; secondaries narrowly tipped with white, forming a transverse band, broadest next the body, where it is from four to ten millimetres in breadth. Below, with the throat and upper part of neck of a beautiful rich dark-brown, the exact tint of which it is difficult to describe, but in which a slight shade of olive and ferruginous can be perceived; this color is more or less washed over the head, sides, and posterior portion of the neck, seldom, however, extending to the vertex; rest of lower parts, including a triangular indentation in the dark color of the fore-neck, snowy white; flanks with the margins of the feathers streaked longitudinally with slaty-brown, most conspicuously next the back; under wing coverts white, a few longitudinal streaks of dusky on some of the smaller coverts, and the larger almost entirely of a lighter shade of the same color; bill black, inside of bill and fauces bright yellow; iris brown; tarsi and feet brownish black, with the anterior and inner surface of tarsus and upper surface of phalanges between the articulations yellowish; this color, though generally more conspicuous in the dried specimens, cannot always be perceived in them, but I have always found it in recent ones. The female is precisely similar and can only be recognized by dissection. On examining a number of individuals, the colors are found to vary somewhat from the above description, and late in summer the margins of all the feathers become much lighter, except on the head and neck; the tips of the wings and tail much worn and very faded; the brown of the head and neck duller, with little or no appearance of the ferruginous or olive hue seen in the spring specimens. The winter plumage differs principally from that of spring in the throat, fore-neck, and sides of the head being white. This is not separated from the dark color of the upper parts by a sharp line, but is gradually, as it were, shaded into it; it commences on the side of the lower mandible, about half way from the rictus to the nostril, passing a short distance below the eye, then upwards and backwards so as to form a widely interrupted collar on the hind-neck, then downwards and forwards, cutting off the dark color of the neck in a point on the sides, and marking its limits in summer plumage; a long, narrow triangular streak of dusky, bounded above by the feather furrow, runs backward from the eye, surrounded by the white described above.

The young in winter plumage can only be distinguished from the adults by the shorter and more slender bill. The distribution of the colors in the downy plumage, is precisely similar to that of the adult in winter plumage; the bristly termination of many of the downy feathers of the posterior part of head and hind-neck white.

In comparing Labrador with European specimens no difference can be seen in their proportions; the color of the latter, however, is generally lighter, but this may depend on the season when they were procured, or on locality, the lightest specimens are from France; those from the Orkney Islands rather darker, and a single specimen from the Faroe Island is quite as dark if not darker than any of those from Labrador. The specimens from Greenland cannot be distinguished in any way.

Habitat. In summer, from the Bay of Fundy northwards; specimens were procured by Capt. Ross as far north as lat. 81. The most southern locality in which it is known to breed at present, on our Atlantic coast, is near Seal Island, off the southern end of Nova Scotia. Its most favorite breeding-places south of the Straits of Belle Isle, are the Funk Islands, off the coast of Newfoundland, Bird Rock near the Magdalen Islands, in the Gulf of St. Lawrence, and a number of small islands generally called Murre Rocks, between Mecatina and the Esquimaux Islands on the north shore of the Gulf. In winter it is abundant on the coast of Maine, and not at all uncommon as far south as Cape Cod; beyond this point it is rarely met with, probably from the absence of the bold rocky shores in which it delights.

CATARRACTES RINGVIA Brünnich.

Uria ringvia *Brünnich*, Ornith. Borealis, p. 28, Naum. Nat. de Vög. Deutsch. 12, p. 360.

Uria ringvia *Reinhardt*, Natur. Bidrag. p. 18; Keys. und Blas. Wirbelthiere Europas, p. 238.

Uria Alga *Brünnich*, Ornith. Borealis, p. 28.

Uria lachrymans *Choris*. Voyages Pitt. aut. du Monde. 23; Yarrell, Brit. Birds, 3, p. 351; Temm. Man. vol. 4, p. 574.

Uria troille *Girard*, Birds of Long Island, p. 376.

Uria leucopsis *Brehm*., Beit. See Vög. 3, p. 880.

Uria troille leucopthalmos *Faber*. Prod. de Is. Ornith. 42.

Columbus langvia *Plaff*. Reise. n. Isl. 562.

Figures Aud. Birds of Am. plate 218, fig. 1; id. 8vo. ed. plate 473, fig. 1; Gould's Birds of Europe, plate 397; Naumann Natur. der Vög. Deutsch. plate 332.

Sp. Ch. Form similar to that of *C. troille*, but with the body rather more slender.

Plumage. Distributions of colors the same, with the exception of a narrow but distinct white line, which encircles the eye and runs down the furrow in the feathers from the posterior canthus. The brown of the fore-neck and throat is darker and less ferruginous. This plumage, which is that of the adult of both sexes in spring, varies in precisely the same manner as the summer plumage of *C. troille*. I am not aware that any specimens in winter plumage, either of the adult or of the young, have ever been procured in the United States, and if they have, they have probably been confounded with *C. troille*. According to Naumann this plumage can be distinguished from that of *C. troille*, which, in other particulars, it resembles, by the white circle and line above mentioned. On comparing European specimens in summer plumage, the same difference is observed as in comparing specimens of *C. troille*. My specimens were obtained at the commencement of the breeding season, and are probably in very fine plumage. All the European specimens, excepting one from Iceland, are from the Orkney Islands, and were all probably procured very nearly at the same time.

Habitat. Only a single locality on our coast is known at present where these birds are found, Bird Rock in the Gulf of St. Lawrence, where they breed in large numbers. As Audubon did not distinguish this species from the preceding one, he says nothing in his description by which we can infer in what particular localities he found them; the probability is that at the time of his visit they were in the habit of breeding wherever the common species bred. Although I have searched carefully for these birds at all the breeding-places of the Foolish Guillemot I have visited, I have never succeeded in finding even a single specimen in any other locality than at Bird Rock. As it is said to be a more northern species it will probably be found on the eastern shore of Labrador, where great numbers of birds of this genus are known to breed.

CATARRACTES LOMVIA Lin.

Alca lomvia *Lin.* Syst. Nat. ed. 10, p. 130, No. 4.
Uria troille *Brün.*, Ornith. Bor. p. 27.
Uria svarbag *Brün.*, Ornith. Bor. p. 27.
Cepphus arra *Pallas*, Zoogr. Rus. 2, p. 347.
Uria arra *Naum.*, Nat. der Vög. Deutsch. 535; Keys. und Blas. Wirbelthiere Europas, p. 237.
Uria Brunnichii *Sabine*, Trans. Lin. Soc. 12, p. 538; Bonap. Synop. 424; Aud. Orn. Biog. 3, p. 336; Nutt. Man. 2, p. 529; Faun. Bor. Am. 2, p. 477; Yarrell, Brit. Birds, p. 348; Temm. Man. Orn. 2, p. 576; Reinhardt, Natur. Bidrag. p. 118, No. 88.
Uria Francisi *Leach*, Trans. Lin. Soc. 12, p. 585; Girard, Birds of Long Island, p. 377; Peabody, Report on Birds of Mass. p. 400; De Kay, State Report on Birds of New York, p. 280.
Alca pica? *Fab.* Faun. Groen. p. 79.
Figures. Aud. Birds of Am. plate 345, id. 8vo. ed. 7, plate 472; Gould's Birds of Europe, plate 398; Naum. Natur. der Vög. Deutsch. No. 333.

Sp. Ch. Form heavier and more compact than any of the other species. Upper mandible with the culmen curved from the commencement, which is prominent and rounded or even angulated; lateral outline wedge-shaped, with the base proportionably broader than in *troille*, cutting edges widely everted posteriorly, and presenting a prominent point next the rictus; nearly straight to a short distance anterior to the nostrils, then very slightly ascending for about one third the length of the culmen, and then curved downwards, more suddenly than in the other species. The feathered portions of the sides as distant from the edge next the rictus as opposite the nostrils; sides anterior to nostrils, slightly concave for about half their length, sometimes forming a sort of obsolete shallow furrow, extending diagonally from the nostrils to the cutting edge. Lower mandible, with the cutting edges corresponding to those of the upper mandible; lateral outline more regularly and more narrowly wedge-shaped than that of the upper mandible. Gonyx prominent; keel more concave than in *troille*, and somewhat shorter proportionally to the culmen.

Plumage. General arrangement of the colors very similar to that of the other species of the genus; the bare edge of the posterior mandible, described above, is white, and presents a very conspicuous feature; the slate of the head and hind-neck is darker, and with a more distinct shade of bluish; the brown of the fore-neck and throat, with its edge more distinctly defined and bounded nearly by a line which, starting from the anterior extremity of the nasal furrow, runs down the neck, passing immediately below the eye and encroaching somewhat on the nape; the tongue of white, running up the fore-neck, is quite conspicuous. Tip of bill yellowish horn-color. Winter plumage generally similar to that of *troille*, but with the dark color descending lower. White of the throat and fore-neck much less extended, and not so distinctly separated from the dark color; the anterior extremity of the chin is dusky, and the white does not rise higher than a line, which, starting from the rictus, runs directly backwards; the brown of the lower part of the throat is only narrowly separated by white, marking very plainly the outline of the summer plumage of that part. The plumage of the young in winter resembles precisely that of the adult; the bill is, however, quite different, being much more slender and compressed, and the bare edge of the posterior mandible darker and much less conspicuous. In the downy plumage the colors are disposed in precisely the same manner as in the winter plumage, with the same white bristly terminations to some of the downy feathers on the hind-neck, already described in the same plumage of *U. troille*. The bill is very short and slender, and hardly differs from that of the other species at the same age. According to Naumann it can then only be distinguished with great difficulty from the very young *Alca torda*. Having never seen specimens of the latter bird in this plumage, I have not been able to compare the two. Gould, however, states that the white line from the bill to the eye, so conspicuous in the full-plumaged adult, is plainly visible in the downy plumage, though it disappears in the fully fledged young. As the scutellation of the tarsi of the two genera is very unlike, it seems to me that there can be no difficulty in distinguishing them. European specimens from the Orkneys have the same general appearance, the bill not quite so stout and the plumage faded and worn. A specimen from the Herald Island, Arctic Ocean, resembles the European specimens in the lighter color of the plumage, but the bill is stouter. The Greenland specimens are in fine plumage and the bill appears rather stouter even than in those from Labrador, but the cutting edge of the posterior part of the upper mandible is not so prominent or sharp as in the specimen described; in one of them it is yellow and semitransparent, as if it had been rubbed with oil. This color corresponds with Brünnich's description, "*cujus margines etiam in exsiccatis exuviis flavescunt.*" I have never seen any appearance of yellow in any other specimen; the white resembles more an efflorescence of some white salt, on a dark surface, than any thing else, and I have no doubt that it was originally white in the Greenland bird, as I find that it is easily scraped off in my American specimens.

Habitat. Audubon, at the time of his visit to Labrador, did not meet with this bird. I am not acquainted with any other breeding-place than the Bird Rock, in the Gulf of St. Lawrence, already mentioned; not a single specimen was seen by me among the thousands of Foolish Guillemots that frequented the north shore of the Gulf. In winter, it is not uncommon on the shore of Maine, and even as far south as Cape Cod. It is said, by Mr. Cassin, to be the only species found off the coast of New Jersey; if this fact should prove not to be exceptional, it is certainly very singular that the most Arctic species should be found in winter so much farther south than the others.

CATARRACTES CALIFORNICUS.

Sp. Ch. Form, generally similar to that of *troille;* bill rather longer and much straighter; the culmen in some specimens being even slightly concave near its commencement; cutting edges almost straight, slightly curved downward near the tip; the angle formed by the lateral outline rather more acute; under mandible with the cutting edges corresponding to those of upper mandible; gonyx rather deeper, but not so conspicuous, as the rami are stouter; keel straight or even slightly convex and appearing longer, principally from the bare part of the rami being shorter proportionally, as 12 to 31 instead of 12 to 28.

Plumage. All the specimens, though apparently in breeding plumage, as they have the bare space from which the bird plucks the feathers at that season, are extremely light in color, as much if not more so than the lightest European specimen; the color of the upper parts is more slaty, the brown of the fore-neck and throat much duller, and with hardly any ferruginous or olive shade. There are no specimens in winter plumage; the young in downy plumage resemble precisely those of the *troille.*

Habitat. Farrellones Islands, near San Francisco, Cal.

I have ventured to give a name to this bird, and I presume the greater number of ornithologists would consider it to have a fair claim to specific distinction, presenting as it does constant though slight differences to *troille*, and inhabiting a different region; according to the labels, the iris is white; this if so, which I can hardly credit, would be a strong character. I am by no means sure myself that the differences are specific rather than of variety, but in either case it would be desirable to distinguish it from the common bird of our coast. Though when reduced to figures the differences seem to be very slight, it can yet be easily recognized; the greater straightness of the bill, the absence of any inflexion in the keel, the greater depth and the apparent shortness of the rami give, as it were, a recurved appearance to the bill that is quite characteristic. If the specimens are, as they seem to be, in spring plumage, their much lighter color would enable us to distinguish them at a glance from specimens of *troille* in corresponding plumage, but not from specimens which, later in the year, had become faded; as well as can be ascertained from the dried skins, the color of the bill and feet is the same in both birds. In the above descriptions, I have given no measurements, as the differences between the different species are so slight that I thought it preferable to present them in a tabular form, so that they could be more easily compared. In order to illustrate more clearly the difference in form of the bills of the different species, I have had drawings* made of the vertical and lateral profiles of the adults of the four species or varieties, and also of the young of Brünnich's Guillemot, the first winter, and of a nestling of the Californian variety. Of the four species two can be readily distinguished. Brünnich's Guillemot by the short, stout bill, and its white edge next the rictus which can be seen at quite a distance, and the Bridled Gillemot by the white line surrounding the edge and running down the feather furrow. The other two do not present such striking differences, but I have found no difficulty in distinguishing the specimens I have examined.

* In selecting specimens for the drawings, I carefully avoided those that were most marked, not wishing to give an erroneous impression. The specimen from California has the bill longer than some of the others, but not so straight, and the keel resembling more nearly than those of the others, that of *troille*; in the drawing it appears slightly inflexed, but this is not correct, in the bird it is perfectly straight. The line of the cutting edges of the upper mandible is much too straight in the drawings of *troille* and *ringvia*; this was occasioned by the distortion of the part in drying, which I unfortunately forgot to caution the engraver about.

	C. troille ♂	C. troille ♂	C. troille ♀	C. troille ♀	C. californicus ♂	C. californicus ♂	C. californicus ♀	C. californicus ♀	C. lomvia ♂	C. lomvia ♂	C. lomvia ♀	C. lomvia ♀	C. ringvia ♂	C. ringvia ♂	C. ringvia ♀	C. ringvia ♀
Length to end of tail	466	458	440	454	459	459	408	..	450	457	442	440	465	460	458	460
Length to end of claws	550	552	535	540	..	..	..	..	545	520	515	512	564	554	555	550
Length to end of wing	600	590	590	590	..	..	..	..	612	600	605	600	605	605	595	598
Extent of wings	765	740	755	765	739	739	675	..	790	777	771	790	756	741	733	730
Wing, from flexure	216	208	205	215	205	208	205	205	228	220	225	223	212	214	209	206
Tail, beyond wings	40	30	20	21	..	..	..	..	10	20	10	15	22	30	19	25
Difference in tail feathers	10	9	5	6	9	5	5	5	10	6	6	4	9	9	10	10
Length of tail	52	52	52	55	52	45	45	46	50	50	47	49	55	52	52	53
Tarsus	38	32	35	40	38	38	38	36	32	34	35	34	38	36	37	36
Middle toe	45	44	41	45	46	46	45	42	47	44	46	45	48	46	46	47
Middle toe-nail	13	13	11	11½	13	13	13	12	15	10	14	13	13	11	12	11
Outer toe	46	41	40	41	43	45	45	42	44	41½	44	44	45	45	45	45
Outer toe-nail	10	10	8½	9	9	9	9	9	11	9½	11	11	9	8	8	8
Inner toe	35	35	31	31	32	33	32	29	30	30	31	31	32	32	31	32
Inner toe-nail	11	12	10	10	11½	11	11	12	12	10	11	11	11	8½	10	8½
Bill along ridge, from forehead	65	61	61	60	59	64	65	62	56	53	50	52	64	58	64	64
Culmen	46	41	44	42	45	44	48	46	38	35	37	37	44	40	44	43
Bill, from nostril to tip	40	39	37½	39	39	41	43	39	30	27	29	27	40	37	39	37½
Bill, from rictus to tip	70	68	65	64	..	..	..	..	65	62	66	67	68	65	66	65
Depth of bill*	15	14½	14½	13	13½	14½	14	13½	15	14½	15	14½	13½	14	13	14
Breadth of bill*	11	8½	9½	9	8	13½	8	8	11	10	11	10½	9½	9	7	8½
Height of lower mandible, at angle	7	7	6	7	6½	7	8	7	6½	7½	7½	7½	7	6½	6½	6½
Length of keel	27	30	26	27	26	29	33	31	22	28	20	22	27	30	29	27
Length of nostril	6	6	6	6	..	..	..	..	7	7½	7	7½	6	6	6	6
Breadth of nostril	1	1	1	1½	..	..	..	..	1½	1½	1½	1½	1½	1½	1½	1½
Number of specimen †	B	B	B	B	17402	17407	17404	3944	B	B	B	B	B	B	B	B

* Just anterior to nostril.

† The specimens marked B are from my own cabinet; the others from the Smithsonian Institution. The measurements are in millimetres and were all taken from fresh specimens, except those of the Californian species; the length and extent of those are copied from the labels; the other dimensions from the dried skin.

Mr. Francis Alger exhibited some very beautiful specimens of Zincite or red oxide of zinc from Mine Hill, Franklin, Sussex County, New Jersey.

The analysis of a very pure specimen, by Mr. Wm. P. Blake, gives 99.47 per cent. of oxide of zinc, and .68 of oxide of manganese. The exact locality from which it was obtained could not be ascertained, and it is probable that very few specimens of such purity will be hereafter seen. It is very interesting to mineralogists, and very important in its economic application, as affording the pure white zinc paint of commerce. It was first analyzed and named red oxide of zinc by Dr. Bruce, of New York, in 1810; but his specimen must have been an impure one, as he obtained only 92 per cent. of oxide of zinc and 8 per cent. of peroxide of iron and manganese; the impurity was doubtless Franklinite.

Berthier's analysis, some years later, was made from a still more impure specimen, and yielded only 88 per cent. of oxide of zinc, and yet in some mineralogical works it has been made the basis for its atomic formula. There has been great difference of opinion as to the nature of the coloring matter which gives the deep red or ruby hues. Until 1844, the color was attributed to red oxide of manganese; but Dr. Hayes at that time made an analysis of a very pure specimen, and established, as he believed, the two important facts, that the red color is not owing to the presence of manganese, and that this metal does not exist as red oxide, but simply as protoxide; he believes that the peroxide of iron alone imparts the red color. Prof. Rose, of Berlin, made an analysis in 1847, and found 96.19 per cent. of oxide of zinc and 3.70 of oxide of manganese, and decided that the color is due to the latter, which is unessential except as far as color is concerned. Mr. Blake separated the manganese from the zinc by means of bromine, and found it to contain only a trace of oxide of iron; he attributes the color to the manganese.

It is evident that the mineral is simply oxide of zinc, with a small admixture of manganese oxide, not forming an atomic proportion, but diffused in the attenuated form of coloring matter. The crystals are hexagonal prisms, of a ruby red color, cleaving readily parallel to the vertical axis. The substance resembles bichromate of potash, chromate of lead, red oxide of silver, but most nearly realgar or sulphuret of arsenic. Its hardness is between four and five, and its polish and beauty entitle it to rank with the gems; Mr. Alger proposed for it the new name of *Ruby Zinc.*

Dr. C. T. Jackson considered it demonstrated by Mr. Blake's analysis that oxide of iron was not the coloring matter of ruby zinc; he approved the name, as also did Prof. Wm. B. Rogers, there being no red oxide of zinc in nature, and this term not implying that there is.

The President gave an account of the *cysticercus* or immature tape-worm, found in the muscles and brain of a man. In the usual course of production, the hind joints containing the eggs of the tape-worm are voided in human excrement, and thence get into the stomach of the pig; the eggs are hatched in this animal, and the minute globular embryos burrow into the blood-vessels and muscles, as is familiarly seen in "measly pork;" this eaten, by man, introduces what is in him developed into a tape-worm, which produces eggs, and these go through the same circle of growth. It is not easy to account for the development of the *cysticercus* in the tissues of the human body. The eggs have been supposed to be introduced upon vegetables from land manured with night-soil, as is common in the neighborhood of cities, or to be transferred from some other animal, or from man, where cannibalism is practised.

Dr. White mentioned that in long-continued vomiting, where the peristaltic action of the intestines has become reversed, the eggs of the tape-worm have entered the stomach, and the embryos have been set free to burrow into the blood-vessels.

The President made the following communication:—

I have great pleasure in stating that, since our last meeting, Dr. William J. Walker has presented, and, by the necessary legal process, has conveyed to this Society the Estate recently occupied by him in this city. The property has been placed in the hands of trustees to be devoted, under wise and liberal conditions, in such a manner as they may deem most expedient for the promotion of our best interests and of the study of Natural History. This is the largest gift which we have received from any individual. Under any circumstances it would be munificent, now it is both munificent and timely. It is all the more gratifying inasmuch as it was wholly unsolicited. It naturally follows, from the emotions which this beneficence calls forth, that we should rejoice at being the recipients of such a gift, and, in accepting it, should express our gratitude and sense of deep obligation. But we must not rest here, there are other considerations to which we must allow a place at this time.

Standing before the community, identified with the study of natural history and the diffusion of a knowledge of it, we have been liberally endowed in this and other ways. I believe that with our very inadequate means, we have done much to justify our benefactors and the public in their encouragement of us. But every benefaction has imposed and every new one will impose additional and more exacting obligations. Societies are frequently charged, and it is to be feared too often justly, as less faithful to their trusts than individuals. We must have care that such a charge may not apply to us. In accepting the gift now offered us, we bind ourselves, though tacitly yet firmly, to fulfil all the obligations which belong to it, implied no less than direct. We have recently set forth our claims upon the community for patronage. It should be remembered that the public, though it does not formally set forth its claims upon us, has them, and with a deeper interest in the study of nature than has been known before, judges us with a severer scrutiny and by a higher standard than at any previous period. So long as we make our collections useful and our studies conducive to the public good, and thus show ourselves faithful to our trusts, we are justified in the belief that we may confidently expect to receive hereafter, as we have received already, every necessary support and encouragement.

Professors W. B. Rogers and Agassiz congratulated the Society on this addition to their funds at so opportune a moment, and the following resolutions, offered by Dr. A. A. Gould, were unanimously adopted: —

Resolved, That the Society accepts with gratitude the donation of Dr. Wm. J. Walker, on the terms stipulated.

That the accession of so munificent a sum to our funds at a moment when further expansion, with our actual resources, must have been very limited, greatly encourages us to new and more efficient exertion.

That it shall be our diligent care that the avails from the donation shall be applied prudently and practically towards the cultivation and diffusion of useful knowledge; specially aiming to modify the direction of our endeavors, as the spirit of the age may from time to time indicate.

Dr. Christian F. Lütken, of the University Museum, Copenhagen, was elected a Corresponding Member.

DONATIONS TO THE MUSEUM.

January 2, 1861. A tympanic bone of Zeuglodon; by C. S. Hale. An African python, and loggerhead turtle (*Thalassochelys caouana*), young; by James A. Cutting. A collection of human bones; by Dr. Henry Bryant. Two specimens of *Callichthys*, from Surinam; by Henry Morse. Specimens of amethystine quartz, from Uraguay; by R. B. Forbes. Pampas grass (*Gynarium argenteum*); by Dennis Murray. A fossil coral, and palatal tooth of fish, from Wiltshire, England; by Dr. H. W. Adams.

January 16. Six species of *Ophiuridæ*, from the Kingsmill group; by Prof. Agassiz. A *Rotula* from Cape Palmas; by Nathan Farrand.

February 6. Eighty species of birds, two monkeys, and four squirrels, from Equatorial Africa; by Paul B. Du Chaillu. Wilson's phalarope, male and female, from Wisconsin; by Thure Kumlien. A mouse, affected by a parasitic fungus; by Dr. S. Kneeland, Jr.

February 20. Rock perforated by boring animals, from the Bay of St. Lawrence; by Addison Gott. Twenty specimens of silver and other ores, from Mexico; by Henry W. Poole. A young American bear; by J. A. Cutting. A young female mandrill (*Cynocephalus maimon*), from Africa; by John Sears.

March 6. Skins of *Lynx rufus*, and two of *L. maculatus* (Texas), *L. fasciatus* (Puget Sound), and *L. Canadensis* (Nebraska); *Canis occidentalis* (California), and *C. latrans* (Kansas); *Urocyon Virginianus* (Texas); *Putorius vison* (Astoria), and *P. pusillus* (Hudson's Bay); *Mephitis occidentalis* (California); *Taxidea Americana* (Upper Missouri); *Lutra Canadensis* (Virginia); *Procyon Hernandezii* (California); *Ursus Americanus*, very young (Northwest Boundary), and *U. horribilis; Sciurus fossor* (California), two *S. Hudsonius* (Arctic America); *S. Richardsonii* (Oregon); *Pteromys alpinus* (Washington City), and *P. sabrinus; Spermophilus grammurus* (New Mexico), *S. lateralis* (Nebraska), *S. tredecimlineatus*, and *S. Townsendii* (Upper Missouri); *Tamias quadrivittatus* (Fort Benton and Oregon); *Arctomys pruinosus*, two (N. W. Boundary); *Castor Canadensis*, embryo; *Neotoma cinerea* (Nebraska); *Arvicola xanthognathus* (Slave Lake and Arctic America); *Hesperomys myoides* (Slave Lake and Upper Missouri); *Cynomys Ludoviciana* (Oregon), and *C. Gunnisonii* (Upper Missouri); *Fiber zibethicus* (Upper Missouri and Arctic America); *Erethizon epixanthus* (Kansas?); *Lepus sylvaticus* (Alabama and Iowa), *L. Americanus* (Arctic America, Fort Simpson, and New York?), *L. campestris vel Townsendii* (Nebraska), and *L. artemisia* (Nebraska); *Cervus macrotis* (Upper Missouri), and *C. Columbianus* (Puget Sound); *Antilocapra Americana*, two, (Upper Missouri); skulls of *Ovis montana* (two); *Cervus Columbianus vel Lewisii* (two); *Lynx rufus*, *Antilocapra Americana* (two); *Canis occidentalis*, and *Mustela Americana;* antlers of *Cervus leucurus* and *Antilocapra Americana;* by the Smithsonian Institution. A *Cidaris* from the Bahamas; several eggs of the snapping turtle (*Chelydra serpentina*), from Lake Ontario, and of the terrapin; by Dr. H. Bryant. Two lower jaws of the hog (*Sus scrofa*); by Dr. S. Kneeland, Jr.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1861.

Report on the Mollusca and Shells of the United States Exploring Expedition. By A. A. Gould, M. D. Folio. Plates. Philadelphia, 1861. *From the Author.*

Experiments upon Vegetables. By J. Ingen-Housy. 8vo. London, 1779. *From Dr. B. Joy Jeffries.*

On the Genus Raphidophora. By Samuel H. Scudder. 8vo. Pamph. 1861. *From the Author.*

Catalogue of Fishes of the Eastern Coast of North America. By Theodore Gill. 8vo. Pamph. *From the Author.*

Dr. J. L. Smith on the Guernsey Co. (Ohio) Meteorites. 8vo. Pamph. *From the Author.*

Lunar Tidal Wave in North American Lakes. By Brevet Lt.-Col. J. D. Graham. 8vo. Pamph. *From the Author.*

Dissertatio Historico-Zoölogica de Alce. Small 4to. Pamph. Jenæ, 1861. *From Dr. Henry Bryant.*

Memoires et Documents publiés par la Société Historique de Montreal. 8ième Livraison. 8vo. Pamph. 1860. *From Capt. L. A. H. Latour.*

Coleoptera of Kansas and Eastern New Mexico. By John L. Le Conte, M. D. 4to. Pamph. Washington. *From the Smithsonian Institution.*

Botanical and Palæontological Report of the Geological State Survey of Arkansas. By Leo Lesquereux. 8vo. Pamph. Philadelphia. *From the Author.*

Notice of the Origin, &c. of the Academy of Natural Sciences of Philadelphia. By W. S. W. Ruschenberger, M. D. 8vo. Pamph. 1860.

Annual Statement of the Trade and Commerce of Toledo. 8vo. Pamph. 1861. *From the Toledo Academy of Natural History.*

Jules Marcou, Sur le Néocomien dans le Jura, &c. 8vo. Pamph. Genève. 1858. *From the Author.*

Report of the Superintendent of the United States Coast Survey for 1859. 4to. Washington, 1860. *From Prof. A. D. Bache.*

Nouveau Dictionnaire d'Histoire Naturelle. Tomes 36. 8vo. Paris, 1816–1819. *From Theodore Lyman.*

Explorations and Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean. 4to. Vol. XII. Part 2. Washington, 1860. *From the Hon. C. Sumner.*

Contributions to Palæontology. By James Hall. 8vo. Pamph. 1860.

Description of new species of Crinoidea. By the same. 8vo. Pamph. Albany, 1861.

Descriptions of new species of Crinoidea and other fossils, from the Carboniferous Rocks of the Mississippi Valley. By the same. 8vo. Pamph. *From the Author.*

Rambles in Eastern Asia. By B. L. Ball, M. D. 12mo. Boston, 1855.

Native Races of the Indian Archipelago. Papuans. By G. Windsor Earl. 12mo. London, 1853.

Lectures on Natural History. By P. A. Chadbourne. 12mo. New York, 1860.

Year Book of Facts in Science and Art. By John Sims. 12mo. 2 vols. 1851, 1852.

Solly, Samuel. On the Human Brain. 12mo. London, 1836.

Proceedings of the American Antiquarian Society. 8vo. Pamph. Boston, 1860.

Boston Medical and Surgical Journal. 8vo. Pamph. February 7th to March 28th, 1861.

Proceedings of the American Philosophical Society. Vol. VII. No. 64. May, December, 1860. Philadelphia. 8vo. Pamph.

Canadian Journal of Industry, Science, and Art. No. 31, January; No. 32, March, 1861. 8vo. Pamph. Toronto.

Mining Magazine. 2d series. Vol. II. No. 1. January, 1861. New Haven, 8vo. Pamph.

Transactions of the Massachusetts Horticultural Society, for 1860. 8vo. Pamph. Boston.

Canadian Naturalist and Geologist. Vol. V. No. 6, for December, 1860. Montreal.

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

Proceedings of the same. Sig. 36 to end of volume, for 1860; pp. 1–68, 1861.

Silliman's American Journal of Science and Arts. Vol. XXXI. No. 91, for January, 1861, and 92, for March. New Haven.

Jahrbuch der K.-K. Geologischen Reichsanstalt, 1860. XI. Jahrgang.

Württembergische Naturwissenchaftliche Jahreshefte. XVI. Jahrgang. Parts 2 and 3. Stuttgart. 8vo.

Memoires de l'Académie Impériale des Sciences de St. Petersbourg. Tome II. Nos. 4–7. Tome III. No. 1. 4to. St. Petersbourg.

Bulletin de l'Académie Impériale des Sciences de St. Petersbourg. Tome II. Feuilles, 1–17.

Sitzungsberichte der K. Akademie der Wissenschaften. No. 6, Band 39. Nos. 11, 12, Band 40. Nos. 18–7, Band 41. 8vo. Wien, 1860.

Feierliche Sitzung der K. Akademie der Wissenschaften am 30 Mai, 1859. 12mo. Wien.

Naturhistoriske Bidrag til en Beskridelse af Grönland. 12mo. Pamph. Kjobenhavn. 1857. *Received in Exchange.*

Annals and Magazine of Natural History. No. 36, for December, 1860; No. 37, for January, 1861; No. 38, Vol. VII., for February, 1861; also, Vol. VI., No. 31, for July, 1860. London.

Quarterly Journal of the Geological Society. Vol. XVII. Part 1. Feb. 1861. London.

American Almanac, for 1861. 12mo. *From the Courtis Fund.*

Life of Andrew Jackson. By James Parton. Vols. I.-III. 8vo. New York, 1861.

History of New England. By J. G. Palfrey. 8vo. Vol. II.

Lake Regions of Central Africa. By Richard F. Burton. 8vo. New York, 1860.

The Puritans and Queen Elizabeth. By Samuel Hopkins. 2 Vols. 8vo. Boston, 1860.

Curiosities of Natural History. By F. T. Buckland. 2d Series. 12mo. New York, 1861.

Glaciers of the Alps. By John Tyndall. 12mo. Boston, 1861.

Mount Vernon Papers. By Edward Everett. 12mo. New York, 1860.

Studies in the Field and Forest. By Wilson Flagg. 12mo. Boston, 1857.

Garibaldi: an Autobiography. 12mo. London, 1860.

Faraday, Michael. Six Lectures on various Forces of Matter. 12mo. New York, 1860.

Rev. Dr. J. L. Krapf. Travels, &c. in Eastern Africa. 12mo. Boston, 1860.

G. J. Gangooly. Life and Religion of the Hindoos. 12mo. Boston, 1860.

Prescott, G. B. History, &c. of the Electric Telegraph. 12mo. Boston, 1860.

Captain H. Shakespear. Wild Sports of India. 12mo. Boston, 1860. *Deposited by the Republican Institution.*

April 3, 1861.

Dr. A. A. Gould in the Chair.

Mr. Edward Norton presented, by title, a paper entitled —

CATALOGUE OF SEVERAL GENERA OF THE TENTHREDINIDÆ IN THE UNITED STATES. By EDWARD NORTON.

Sub-family CIMBICIDES.

Genus TRICHIOSOMA, Leach.

T. BICOLOR (Cimbex bicolor, H. mss.) Black; fourth and fifth joints of antennæ piceous; thorax covered with ashy hair. (Long. 0.80, Ex. alar. 1.60.)

♂ Color black; antennæ slender and suddenly enlarged into a club, third joint very long; dark piceous, fourth and fifth segments piceous; labrum smooth, produced, with a ridge in the centre and on each side; palpi obscure; head and body and the femora above, covered with long whitish hair, which is black upon vertex and cheeks; apical segment of abdomen piceous; legs black; tibiæ and tarsi testaceous; femora incrassate beneath; a blunt spine on each side of four posterior femora beneath, near the apex; wings smoky, transparent; anterior pair darker at tip; nervures testaceous; stigma black. Hab. Hyannis, Cape Cod, Mass.

Two specimens examined; one sent me by Mr. Scudder, and the other in the Harris collection.

ZAREA.

Z. INFLATA, (n. sp.) Head and thorax greenish-black; abdomen blue-black, obovate; apex of basal membrane whitish. (Long. 0.48, Ex. alar. 0.90 in.)

♀. Head and thorax greenish-black, with a metallic hue; antennæ black, the apical joints piceous beneath, club truncate; head much narrower than thorax, coarsely punctured; ocelli blue-black; palpi pale; head, prothorax, and pleura covered with whitish hair; collar and abdomen blue-black; two narrow transverse white lines back of scutellum: metathorax at base and apical half of basal membrane pale luteous; abdomen short, ovate, flattened segments distinct, each of a greenish hue upon the summit; each of the five apical segments having in the middle a glaucous band of pale, fine hair; the first two segments of abdomen beneath, and the legs testaceous; coxæ at base, and a band in middle of femora black; nails dark; wings hyaline, nervures and stigma piceous; apex of superior wings and a broad band about the stigma fuscous. Hab. Farmington, Conn.

One specimen taken. It bears a close resemblance to *Z. fasciata* of Europe.

Sub-family TENTHREDINIDES.

DOSYTHEUS, Leach.

Antennæ, nine-jointed, filiform, third joint longer than the fourth; clypeus notched; body moderately long; superior wings, with two marginal and three submarginal cells, the first very short and rounded; second, longest, receiving three recurrent nervures; the lanceolate cell below the submedial, with an oblique cross vein; inferior wings with two middle cells.

"Larvæ, with twenty-two legs; not ejecting a fluid from the sides of the body." "The larvæ of certain species are covered with a woolly or powdery coating." (St. Farg. Mon. Tenth.)

Hartig does not separate this genus from Dolerus, from which Leach divided it. Stephens remarks that "the Dosythei invariably have the middle of the abdomen red, whereas the Doleri have that part entirely black." In two cases I do not find this hold true; viz: *D. arvensis* and *D. collaris*, which approach more closely to *Dosytheus* than *Dolerus*.

1. D. ARVENSIS. Say. Long's Sec. Ex. 2. 319. "Blackish violaceous; thorax rufous, a spot before and triangular spot behind, black; length over seven twentieths of an inch. Inhabits United States." Maine, N. H., Mass., Conn., N. Y., Md., Fla., Mo.

Twenty-nine specimens, all females. In many respects this resembles *D. unicolor.*

2. D. COLLARIS. Say. West. Quar. Rep. 2, 72, 1823. "Black, thorax rufous before. Inhabits Missouri." Mass. (H. Coll.), Ct., Me.

"Body entirely black; with the exception of a yellowish rufous anterior thoracic triangle and anterior segment or collar of the same color, which descends on each side.

Length to the tip of the wings nine twentieths of an inch; length of body five and a half twentieths.

Four specimens examined.

3. D. APRICUS. Say. Harris's Cat. Black; abdomen rufous; the three apical joints black. (Long. 0.25 to 0.30 in. Ex. alar. 0.50 to 0.60 in.)

♀. Black; head and thorax sericeous and punctured, very coarsely upon the face, below the ocelli; a sinus above each of the upper ocelli; palpi fuscous; wing scales and first six segments of abdomen rufous; apical edge of sixth and three remaining segments, black; legs black; anterior femora wholly, and the four posterior femora, except at tip, rufous; anterior tibiæ rufous beneath; tarsi fuscous; wings hyaline, faintly clouded toward tips; upper edge of stigma black.

♂. All the femora of the male are black, except at tip; the four anterior tibiæ rufous; posterior tibiæ and tarsi fuscous. Hab. Mass. (H. Collection), Conn., Md. (Mr. Uhler), Maine (Mr. Packard).

Twelve specimens examined.

Var. *Albifrons.* ♀ ♂. Color paler than *D. apricus.* First three joints of antennæ of male fulvous beneath; a point between antennæ, the clypeus and labrum of male, and the edge of clypeus and the labrum of female, white; legs yellowish rufous; apical two thirds of intermediate and posterior tibiæ, and the tarsi blackish.

Two specimens taken in Farmington, Conn. They resemble *D. apricus*, except in the above points, which are distinct.

4. D. APRILIS, (n. sp.) Black; abdomen with a rufous band; legs black. (♀ ♂ Long. 0.30 to 0.38 in.; Ex. alar. 0.60 to 0.70 in.)

♀. Color black; head and thorax thinly pubescent; legs sericeous; labrum black; head and thorax densely punctured; pleura coarsely and mesothorax sparsely punctured; abdomen rufous; apical half of seventh segment and the two apical segments black; seventh segment black beneath; wings faintly clouded in middle; legs black; knees of anterior pair, and, in some cases, part of tibiæ ferruginous.

♂. The male has more pubescence upon the face, and sometimes more than three apical segments of abdomen black. Hab. Conn., Me.

Fifty-three specimens examined. (♀-25, ♂-28.) Two received from Mr. Packard. A large number were taken in April on the Salix vitellina. This can readily be distinguished from *D. apricus* by its black legs; and by the color, which in that inclines to honey-yellow.

5. D. SIMILIS, (n. sp.) Black; the prothorax, collar, and abdomen rufous; two apical segments of abdomen black. (Long. 0.33, Ex. alar. 0.60 in.)

♀. Black; head and pleura coarsely punctured, sericeous; clypeus moderately emarginate; palpi fuscous; prothorax, collar, and wing scale rufous; abdomen rufous; two apical segments black; legs black; anterior femora at tip, and tibiæ at base rufous (tibiæ indistinctly rufous throughout); wings hyaline; nervures black. Hab. Conn., Maine, (H. Coll.)

Three specimens examined.

6. D. MACULICOLLIS, (n. sp.) Black; thorax ferruginous, before; abdomen dark ferruginous. (Long. 0.35, Ex. alar. 0.70 in.)

♀. Black, antennæ short; head wide, vertex coarsely punctured; front of prothorax, collar, and anterior edge of pleura ferruginous; abdomen stout, dark, indistinctly ferruginous above and on sides, black beneath; legs black; wings somewhat clouded.

One specimen received from Mr. Akhurst, Brooklyn, L. I. It resembles *D. bicolor* more nearly than any other, but is quite distinct.

7. D. BICOLOR. (Tenth. bicolor. P. de Beauv. Ins. Af. and Am. 97.9.) "Yellow; antennæ, head and spots on thorax, breast, scutellum, feet, oviduct, and veins of the wings black." The head and thorax are punctured, very coarsely on vertex; head as wide as thorax; mandibles rufous at tip. In some cases the black spot on metathorax is wanting; both pairs of wings clouded at base. The abdomen is short and stout. Hab. Mass. (H. Coll.), Conn., N. Y. (♀ Long. 0.30, Ex. alar. 0.60 in.)

Three specimens.

8. D. ABDOMINALIS, (n. sp.) Black; abdomen rufous. (Long. 0.33, Ex. alar. 0.68 in.)

♀. Black; clypeus angulate, deeply emarginate; head and thorax coarsely and rather sparsely punctured, sericeous, face with long, scattered white hair; basal membrane and abdomen rufous; abdomen rather stout; ovipositor and legs black; posterior coxæ rufous at base; wings clouded, semitransparent; nervures back. Hab. Maine. (Mr. Scudder and Mr. Packard.)

Two specimens.

9. D. TEJONIENSIS, (n. sp.) Rufous; head black; wings dark. (Long. 0.48, Ex. alar. 0.90 in.)

♀. Rufous; head black; antennæ stout; vertex punctured; summit shining, a sinus behind ocelli; thorax above smooth; abdomen stout; ovipositor, pectus, and legs black; anterior tibiæ and tarsi ruby red beneath; wings violaceous black, semitransparent. Hab. California, Fort Tejon. (Smith. Inst.)

Two specimens examined.

DOLERUS, Leach.

"Third and fourth joints of antennæ of equal length. In other respects resembles Dosytheus."

The color of the body is black or blue-black. In both of these genera the inner spine of anterior tibiæ is bifid, but more minutely in Dolerus. The apical joints of the antennæ are, in the following species, rather longer than in Dosytheus, and the antennæ longer and more slender.

1. D. SERICEUS. Say. Long's 2d Ex. 2, 320. "Entirely black, immaculate. Inhabits United States." Maine, Mass., Conn., New York, Mo.

"♂. ♀. Body, particularly the venter and feet, sericeous; with short hairs; wings dusky; tergum glabrous, polished. Length seven twentieths of an inch."

Nine specimens, one of which, the female, is larger than the males.

2. D. (Tenthredo) UNICOLOR. P. de Beauv. Ins. Af. et Am. 97.7. "Black bronze, antennæ setaceous; nine articles. It is all one color, black, with reflections of bronze, violet, and copper; wings transparent and almost white. On the corselet one sees three eminences; a little cordiform."

♂. Length, six twentieths of an inch.

Eleven specimens, all males, from Maine, Mass., Ct., and Missouri.

The color is distinctly bluish or violet. Mr. Say has noted that the three apical joints of the antennæ of this (especially the last joint) are longer than those of *D. sericeus.*

EMPHYTUS, Leach.

Antennæ nine-jointed; third and fourth joints of equal length; wings with two marginal and three sub-marginal cells, the first as long as the second, generally longer; the first receiving one recurrent nervure, the second two.

The larvæ are said by Dahlborn to feed with the tail bent sidewise, and raised above the back in the form of a conical spire.

The transformations of two species are described by Hartig. "Bodies round, smallest behind, segments overlapping, some of the tail segments covered with small spines; skin thickly punctured, with distinct spiracles at the sides. They live upon shrubs, and are often very abundant. They finally go into the pith wood of the rose and other plants, working in deeply and there remaining until the following spring."

Sec. 1. (Emphytus, Hartig.) Hind wings without middle cell; Lanceolate cell on superior wings, with a slightly oblique cross vein.

1. E. (DOLERUS) INORNATUS. Say. Long's 2d Ex. 319, 1. "Body black, polished; feet white; tarsi dusky. Length one fourth of an inch.

♀. Labrum and palpi whitish; thorax, with a line before the wings and wing scale white; scutel with a small bullate white spot on each side; wings a little dusky; nervures blackish-fuscous; pleura with an abbreviated white line over the intermediate feet; coxæ color of the feet." Inhabits United States.

I have examined seven specimens from Massachusetts and Connecticut, of which two are males. They resemble the females, except that the antennæ are shorter and the body more slender.

2. E. APERTUS. H. Cat. Black, with rufous spots on the tergum; the venter and legs white. (♀ ♂. Long. 0.19 to 0.25, Ex. alar. 0.36 to 0.44 in.)

♀. Black; a suture running back from ocelli, ridged on each side; antennæ slender; clypeus, slightly marginate; clypeus, labrum, mandibles, except at tip, and the palpi, white; wing scale, upper half of collar, apical segment of tergum, a line above intermediate legs and the venter, except at apex, white; tergum, with rufous or honey-yellow spots at base of each segment, joining each other on the fourth, fifth, sixth, and seventh segments; legs white; apex of posterior tibiæ and tarsi blackish; wings hyaline; junction of stigma and costa white.

♂. The male is like the above, except that the antennæ are ferruginous beneath; apex of venter pale, base black. Hab. Mass. (H. Coll.), Easton, Pa. (Dr. Clemens.)

Three specimens examined.

3. E. MELLIPES. H. Cat. Black, long, and slender; a spot on first and a band on fifth segment of abdomen, white. (Long. 0.34, Ex. alar. 0.58 in.)

♀. Black; antennæ slender; apical joints pale beneath; head as wide as thorax; a crescent-shaped sinus back of ocelli, a spine between antennæ; clypeus deeply emarginate; mandibles piceous;

three apical joints of palpi pale; wing scale, two dots behind scutellum; a spot on first segment of abdomen, and a dot on each side; a band on basal half of fifth segment, interrupted beneath, and the tip of apical segment, white; legs honey-yellow; apex of coxæ, the trochanters and base of femora white; base of coxæ black; tarsi fuscous above; wings faintly clouded. Hab. Maine, N. H., (H. Coll.)

Two specimens examined. The abdomen is not enlarged.

Sec. 2. (Harpiphorus, Hartig.) Hind wings with one middle cell. Lanceolate cell with an oblique cross vein.

a. Body long, second recurrent nervure received near base of second submarginal cell.

4. E. VARIANUS. Testaceous; antennæ white at tip; fourth and fifth joints black; thorax mostly black. (♀. Long. 0.45, Ex. alar. 0.90, ♂ Long, 0.38, Ex. alar. 0.70.)

♀. Testaceous; antennæ stout, serrate beneath; first three joints testaceous, the next two black, and the four apical joints white; a spot on occiput above, and about ocelli, and one beneath each of the antennæ, black; clypeus deeply emarginate, covered with pale hair; labrum white, fringed with hair; mandibles at tip and palpi testaceous; thorax black, in part, above and beneath; wing scale, scutellum, two dots behind and ridge of metathorax, dull white; front of thorax and metathorax more or less testaceous; abdomen flattened; basal edge of second segment and ovipositor sheath black; legs testaceous-yellow; coxæ, except at apex, middle of anterior femora and apex of posterior femora and tibiæ, black; apex of coxæ, trochanters, and base of femora and tarsi, white; nails black; wings long, hyaline, basal half of stigma pale.

♂. The male has the vertex black; clypeus and labrum white, four anterior femora, same color as tibiæ. Hab. Farmington, Conn.

Six specimens examined.

5. E. TESTACEUS. Color testaceous; antennæ white at tip; third, fourth, and fifth joints black. (Long. 0.40, Ex. alar. 0.80 in.)

♀. Testaceous; antennæ shorter and not so stout as those of *E. varianus*, slightly serrate beneath; two first joints testaceous, third, fourth, and fifth black, apical joints white; a black spot back of ocelli; clypeus emarginate; labrum pure white; mandibles black at tip; palpi whitish; wing scale and two dots behind scutellum white; scutel immaculate; sides of mesothorax and spots on pectus, before each of four anterior coxæ, black; legs testaceous; coxæ black; their tips, the trochanters, base of femora and tarsi, white; posterior tibiæ at apex black; wings hyaline, base of stigma white; superior pair clouded toward tip. Hab. Easton, Pa. (Dr. Clemens.)

One specimen. This is smaller and the abdomen more slender than the preceding species.

6. E. SEMICORNIS. Say. B. Jour. 1, 220. "Honey-yellow; tip of the antennæ (four terminal joints) and disk of the pectus black. Length over three tenths of an inch."

I have not seen this species, but presume it belongs in this section.

7. E. TARSATUS. Say. B. Jour. 1, 219. "Black; tarsi and tips of the antennæ white. Inhabits Indiana. Length rather less than half an inch."

Three specimens from New England are larger. (Long. about 0.60, Ex. alar. 1.05 to 1.10 in.) Antennæ stout, serrate beneath, wing scale, scutellum and tip of basal membrane, white (in one case the scutellum is black); coxæ all black; trochanters, base of femora, and tarsi white; tibiæ and two thirds of basal joints of posterior tarsi black; head roughened; thorax smooth above; pleura coarsely punctured.

b. Second recurrent nervure received near middle of second submarginal cell; body short.

8. E. MACULATUS, (n. sp.) Black; an interrupted brownish band on each segment of abdomen. (Long. 0.20 to 0.22, Ex. alar. 0.42 to 0.47 in.)

♀. Black; antennæ short and slender, third joint longer than fourth, flagellum sometimes ferruginous beneath; clypeus wide, produced, somewhat crenate; labrum retracted; clypeus, labrum, and palpi dull white; head and pleura sericeous; body smooth and shining; wing scale, edge of collar, and a spot on first segment of abdomen, white; a brownish interrupted band on each following segment; legs varying from white to pale-brown; four anterior femora beneath; apical joints of tarsi above, and all the coxæ, except at tip, black; posterior femora, tibiæ at tip and the tarsi, except base of first joint, black; wings hyaline; stigma beneath brownish black, base pale.

♂. The male differs only in having the antennæ brown beneath; the interrupted bands of abdomen dull white, and the legs varying from white to reddish-brown; coxæ and posterior femora (above only) black. Hab. Farmington, Conn.

Eight specimens examined. This resembles Blennocampa fenusa, Europe.

9. E. RECENS. Say. B. Jour. 1, 221. "♂. Antennæ, basal joint white; 'pectus and feet white. Length one fifth of an inch."

I have not seen this insect.

Sec. 3. (Aneugmenus, Hartig.) Hind wings with two middle cells. Lanceolate cell without cross vein.

10. E. PLATYCERUS. Say. B. Jour. 1, 221. ♂. Black; tibiæ and tarsi white; first and second joints of the antennæ short, equal. Length less than three twentieths of an inch. I have but one specimen, a female, and do not feel quite sure that it is the same, as the first joint of the antennæ is a little longer than the second.

NEMATUS, Leach.

"Antennæ, nine-jointed, third joint longest; one marginal and four sub-marginal wing cells, the second receiving two recurrent nervures; lanceolate cell at base (basal half) closed;" inferior wings with two middle cells; tibiæ simple. "Larvæ twenty-footed, the fourth and eleventh segments footless; body hairy, with warts behind the abdominal feet."

"*a.* Solitary; feeding upon the leaves of plants; resting at the edges or upon the surface of leaves.

b. Social; feeding upon leaves, generally of pines.

c. Living in the galls of plants." (Westwood, Dahlbom, Hartig.)

"The pupa is enclosed in a cocoon, egg-shaped, like Lophyrus, with less firmness, but more outside silk. This is generally placed in the earth, but sometimes on the surface under fallen leaves." (Hartig.) Dr. Fitch states that he found the cocoon of *Nematus suratus* upon the limb of a tree.

Dr. Hartig gives a full description of these larvæ in his Familien der Blattswespen, &c. He has also arranged the perfect insects in several divisions, based upon the colors of the body. But for the present, I have thought best not to attempt any division of the American species.

1. N. VERTEBRATUS. Say. Bost. Jour. 1, 218. "Green; antennæ and spots above (thorax trilineate) blackish. ♀ Length one fourth of an inch."

2. N. INTEGER. Say. Boston Jour. 1, 219. "Greenish-yellow; antennæ, spots on thorax (trilineate) and tergum black; costal edge not emarginate at the carpus. ♀ Length over one quarter of an inch."

A specimen in the Harris Collection, and another sent by Mr. Scudder, agree with the above description, except that the costal edge of the wing is somewhat bent at the stigma. This and the preceding species seem closely allied.

3. N. BIVITTATUS, (n. sp.) Orange-yellow; the head, two vittæ on mesothorax, metathorax, first segment and middle of each segment of tergum, black. (Long. 0.18 to 0.22, Ex. alar. 0.45 in.)

♀. Color orange-yellow; head black; antennæ stout toward base; a transverse suture angulate at ends, back of ocelli; clypeus not emarginate; a spot beneath antennæ, clypeus, labrum, base of mandibles, and palpi, color of body; two vittæ on mesothorax, basal half of scutellum, metathorax, first and base of second segment, and a spot in middle of following segments of tergum, black; legs paler than body; apex of posterior tibiæ and the tarsi black; wings hyaline; stigma beneath and the costa dark-brown. Hab. Mass., (H. Coll. and Mr. Scudder.)

Three specimens examined.

4. N. LONGICORNIS. Say. Bost. Jour. 1, 219. "Black; beneath, head and before the wings, whitish. ♀. Length three twentieths of an inch."

Two specimens from Connecticut. The length of the antennæ and the pale pectus distinguish this from *N. ventralis*.

5. N. VENTRALIS. Say. Long's Sec. Ex. 2, 315. "Black; venter and feet pale;" obsolete or indistinct pale bands on the edge of each segment of abdomen.

"♂. Length from one fourth to three tenths of an inch."

Eleven specimens examined; one male from Mass. and Pa. They differ so much in size and appearance that it is doubtful if all belong to this species. The dividing nervure between the third and fourth sub-marginal cells, is, in several cases, wanting. The larvæ are said to feed on the willow.

6. N. SURATUS. Fitch. Third Rep. N. Y. St. Ag. Soc. No. 94. "Black, with four transparent, slightly smoky wings; mouth, cloud-like spot on the shoulders, edges of abdominal segments and legs, lurid white; the four anterior thighs being black upon their under sides, and the hind pair wholly black, except at their base. Length 0.25 in.; to the tip of wing 0.30 in." Sex not given.

I have not seen this insect. It seems to differ from *N. ventralis* in the absence of white orbits and in its black venter.

7. N. CORNIGER, (n. sp.) Black; antennæ long, flattened, pale beneath; venter and legs pale. (Long. 0.17, Ex. alar. 0.40 in.)

♂. Shining black; antennæ as long as body, toward base somewhat flattened, slightly enlarged at joints, pale beneath; head coarsely punctured; clypeus incurved; labrum covered with white hair; a spot between antennæ, clypeus, labrum, base of mandibles and palpi pure white; tegulæ, upper half of collar, venter, and legs, white; tips of posterior femora and tibiæ and the tarsi black; wings hyaline; stigma and costa blackish. Hab. Conn.

One specimen.

8. N. EXTENSICORNIS, (n. sp.) Black; antennæ long; tip of venter, knees, and tibiæ pale. (Long. 0.27, Ex. alar. 0.60 in.)

♂. Shining black; antennæ slender, longer than body, joints slightly enlarged; second joint short, third, fourth, and fifth of equal length; head and shoulders thinly covered with black hair; head thickly punctured, rugose; punctures on thorax running into longitudinal striæ; clypeus emarginate, face immaculate; apex of venter, knees, tibiæ, and tarsi in part pale luteous; wings hyaline, strongly bent and emarginate at stigma; stigma and costa luteous; nervures black. Hab. Mt. Washington, N. H.

One specimen taken on the summit by Mr. Scudder. The enlargement of the joints of the antennæ is not like that of Pristiphora.

9. N. NIGRITUS, (n. sp.) Black; mouth, tegulæ, tip of venter, and legs pale. (Long. 0.18 to 0.20, Ex. alar. 0.50 in.)

♂. Shining black; antennæ not so long as body; head rugose, almost lineate; pubescent with brownish hair; clypeus hardly emarginate; mouth dull white; orbits beneath and behind whitish; tegulæ, spot on first segment of abdomen, tip of venter and legs, dull white; base of femora and coxæ black; apex of posterior tibiæ and all the tarsi blackish; wings hyaline, bent at stigma; stigma and costa pale-greenish. Hab. Farmington, Conn.

Two specimens. One of them is smaller than the other, and has a slight ferruginous tinge.

10. N. FULVIPES. H. Cat. Black; legs and body beneath fulvous; mouth dull white. (Long. 0.22, Ex. alar. 0.44 in.)

♂. Color black; head about the ocelli roughened; clypeus moderately emarginate retracted; a black spot in disk of labrum; edges of clypeus and of labrum, base of mandibles and palpi, dull white; tegulæ, pleura, pectus, and legs, fulvous; a large black spot beneath wings; abdomen at apex and beneath, with a fulvous tinge; tibiæ and tarsi dull white; posterior tarsi black; wings hyaline; stigma and costa pale. Hab. Mass., (H. Coll.)

One specimen.

11. N. PALLICORNIS and N. LABRATUS. H. Cat. Black; antennæ fuscous; body with a ferruginous tinge; labrum and legs dull white. (Long. 0.19, Ex. alar. 0.42 in.)

♀. Black; antennæ fuscous, palest beneath, two basal joints black at base; head rounded, a deep sinus about each of antennæ; clypeus retracted, not emarginate; labrum almost square, whitish, with a narrow black line in middle; mandibles at base and palpi pale; tegulæ, a spot on first segment of abdomen, and the legs, dull white; tips of tarsi dark; body with a ferruginous tinge, varying in different specimens, most distinct at sides and beneath; wings hyaline; stigma and costa pale. Hab. Mass., (H. Coll.)

Four specimens. One of which was thought by Dr. Harris to be the female of *N. fulvipes*. A variety named *labratus*, by Dr. Harris, has the labrum a little wider; the femora black in middle, and the tibiæ and tarsi blackish, and but two submarginal areolets.

12. N. PROXIMATUS, (n. sp.) Black; the mouth, tegulæ, edge of collar and legs luteous. (Long. 0.15, Ex. alar. 0.36 in.)

♀. Collar black; antennæ sub-fuscous; a blunt spine between antennæ; clypeus wide and retracted, not emarginate; labrum and mandibles reddish luteous; palpi pale; tegulæ, edge of collar and legs luteous; base of coxæ and middle of femora black; tibiæ toward apex, and tarsi, in part, blackish; abdomen short and stout; segments distinct; wings large, hyaline; stigma and costa pale-luteous. Hab. Mass., (H. Coll.)

Two specimens. This resembles *N. proximus* of Europe.

13. N. OBSCURUS, (n. sp.) Dull black; tegulæ, base of abdomen and knees, indistinctly ferruginous. (Long. 0.25, Ex. alar. 0.58 in.)

♀. Dull black, pubescent; third joint of antennæ but little longer than fourth and fifth; clypeus crenate, labrum brownish-red, shining; mandibles rufous at tip; palpi pale; a longitudinal suture upon scutellum; basal membrane, sides of tergum, knees and front of tibiæ, indistinctly ferruginous; abdomen stout; wings faintly clouded; stigma dull fuscous; costa black. Hab. Mass., (H. Coll.)

One specimen. The wings are quite long and broad.

14. N. LUTEOTERGUM. Black; antennæ long; abdomen and legs honey-yellow. (Long. 0.20, Ex. alar. 0.43 in.)

♂. Color black; antennæ long and slender; third, fourth, and fifth joints of equal length; a W-shaped depression, half inclosing the upper ocelli; clypeus slightly emarginate; labrum rounded, smooth, and shining; edge of clypeus, labrum, and base of mandibles pale-yellow; palpi fuscous; basal membrane, abdomen, and legs honey-yellow; four anterior femora at base, posterior femora, except at tip, posterior tibiæ, except at base, and the tarsi blackish; wings hyaline, stigma and costa pale. Hab. Maine, (H. Coll.)

One specimen. Resembles *N. dimidiatus* of Europe.

15. N. MONOCHROMA. H. Cat. Honey-yellow, pleura piceous. (Long. 0.30, Ex. alar. 0.60 in.)

♀. Color honey-yellow; (antennæ wanting, except two basal joints, which are color of body;) ocelli black, set in an irregular depression; clypeus retracted, crenate; labrum angulate, hairy; face immaculate; tegulæ, collar, venter, and coxæ paler than body and legs; pleura dark, almost piceous; wings hyaline, stigma and costa pale-yellow. Hab. Mass., (H. Coll.)

One specimen examined. It resembles *N. luteus* of Europe.

16. N. STIGMATUS. H. Cat. Greenish-luteous; thorax and tergum black. (Long. 0.30, Ex. alar. 0.60 in.)

♀. Color greenish-luteous; first two joints of antennæ black; an irregular H-shaped sinus on vertex and occiput, inclosing ocelli; a small black spot about each of ocelli; clypeus hardly emarginate; labrum angulate, hairy; part of mesothorax, the metathorax, the first seven segments of tergum and ovipositor, black; a spot on first segment, the apex of seventh and apex of abdomen, color of body; a black spot on pleura, between wings; nails and tips of tarsi dark; stigma and costa pale-green. Hab. Mass., (H. Coll.)

One specimen. In form and general appearance it resembles *N. monochroma*, and may prove to be a variety of it.

Mr. L. W. Bailey presented the following paper: —

New species of Microscopical Organisms, chiefly from the River Para. By Loring W. Bailey, Cambridge, Mass.

The species of Diatomaceæ here described as new, together with other species contained in the accompanying list, were obtained chiefly from soundings made by one of the United States Exploring Expeditions, in the River Para, and the mouth of the Amazon, in the year 1854. The soundings were submitted to my father, Prof. J. W. Bailey, for microscopic examination, and by him most of the following species were discovered, and drawn for the purpose of publication. As neither the drawings nor the descriptions have ever yet been published, and as many of the forms are still new to microscopists, I have endeavored, by reference to the unpublished letters and memoranda of my father, and the study of the original specimens in the possession of the Society, to complete the work of describing and figuring the beautiful forms which this locality contains.

As nearly six years have elapsed since these forms were first observed, it is probable that some, at least, of the species here described as new, may have been seen, and perhaps named, by other writers. I have, however, carefully examined all the books at my disposal, and am convinced that most of the forms are still quite unknown. One species only, the *Syringidium Americanum* B., has been figured by other authors. A figure of this species may be found in the last edition of Pritchard's Infusoria.

The descriptions here given are derived from the study of the original forms, and from similar specimens prepared from the rough material of the Society. Much assistance has also been derived from pencil notes accompanying the original camera sketches.

In several well-marked species, where no name has been given by its discoverer, I have ventured to propose names, chosen with reference to their form or locality, and have omitted from this descriptive list, several forms contained in the engraved plate, which, from the absence of names and details, could not be satisfactorily distinguished from species now known.

All the forms here described as new, were originally discovered by my father, but in the accompanying list I have been able to add several new forms to those already seen by him.

Plates illustrating the forms here described are now in course of preparation, and will be published, together with more detailed descriptions, in the Journal of this Society.

Amphora delphina, L. W. B., nov. sp.

Frustules elliptic-oblong, with broad, slightly rounded ends; valves very minutely and transversely striated; nodules very large, extending in a bar across the centre of the valve; valves in front view gibbous at the centre; outer portions canoe-shaped; aspect hyaline; terminal nodules distinct.

Habitat. Para River.

AMPHITETRAS CUSPIDATA, Bail., nov. sp.

Sides concave; lateral view quadrangular, with angles produced and rounded; cellules distinctly hexagonal; connecting membrane minutely punctate.

Hab. Para River.

DITYLUM, Bail., nov. gen.

Siliceous, free, simple, one-celled, bivalve; consisting of two triangular pyramids, applied base to base. Vertices of one or both pyramids terminating in acute spines.

DITYLUM TRIGONUM, Bail., nov. sp.

Two, nearly equal, triangular pyramids, applied base to base; base of each pyramid triangular, with rounded angles. Vertex of each pyramid terminating in an acute spine. Valves punctate in radiant, interrupted lines. Frustules equally bivalve; turgid; lateral view triangular.

Hab. San Antonio Bay, Para River; four fathoms.

DITYLUM INÆQUALE, Bail., nov. sp.

Differs from *D. trigonum*, B., in having one side turgid, with the other side less turgid, and rising considerably within the margin; punctate all over.

Hab. San Antonio Bay.

MELOSIRA GRANULATA, L. W. B., nov. sp.

Slender; joints cylindrical and punctate in parallel rows; joints separated by narrow bands, devoid of striæ, all closely connected. End of filament armed with (six) spines, all greater length than the narrow bands; joints longer than broad, closely binately conjoined.

Hab. Para River.

COSCINODISCUS TENUIS, Bail., nov. sp.

Shell excessively thin and hyaline, with radiant rows of minute cells, a small central inconspicuous rosette and a radiate margin.

Hab. Para River.

NAVICULA SEPTENARIA, Bail., nov. sp.

Minute; in general outline rhombic; sides undulated, producing seven wide parts and six constrictions; central nodule and line distinct; striæ wanting or obscure.

Hab. Para City.

EUNOTIA ANISODON, Bail., nov. sp.

Large; venter concave; dorsum convex, with two ridges symmetrically arranged, and the dorsum of each ridge composed of three subordinate ridges; ends produced and broadly rounded; striæ minute, converging slightly.

Hab. Para River.

PINNULARIA DILATATA, Bail., nov. sp.

Small, linear; in lateral view slightly dilated at the centre and ends; ends obtuse and rounded; median band large; central nodule distinct.

In front view panduriform, the constrictions meeting the connecting membrane at the centre. Striæ fine, close, and nearly parallel.

Hab. lat. 0° 29′ 58″ N.; long. 45° 58′ 33″ W.; 33 fathoms.

SURIRELLA DUPLEX, Bail., nov. sp.

Large, oblong; in front and lateral views panduriform; ends broadly rounded; median band panduriform; costæ close, distinct, and externally dilated.

Hab. Para River.

CAMPYLODISCUS COLLECTUS, L. W. B., nov. sp.

Large, saddle-shaped; in front view undulate; in side view broadly elliptic; costæ conspicuous, short and radiant.

Hab. Para River at Una.

DICLADIA? MAMILANA. Bail., nov. sp.

Smooth ?; valves sometimes equal, sometimes unequal; mammillated, turgid. One or both valves with conical mamillæ, connecting at the base; valves separated by a median band not striated; styles and spines wanting.

α. Valves with two cones on one side and none on the other.

β. Valves with only one cone on each side.

γ. Valves with one cone on one side and two on the other.

δ. Valves with two cones on each side.

Hab. Para River.

TERPSINÖE MAGNA, Bail., nov. sp.

Very large, oblong, quadrangular, with a variable number of note-like costæ, but with no transverse bars; side view like that of *T. musica*, Ehr.

Hab. Para River.

TERPSINÖE TETRAGRAMMA, Bail., nov. sp.

Small, quadrangular; each valve marked with two inward-bent costæ; connecting membrane marked with two horizontal and one vertical bar, which do not cross the valves; side view consisting of one large, nearly circular inflation, with two small terminal compartments; punctæ fine.

Hab. Para River.

TERPSINÖE MINIMA, Bail., nov. sp.

Small, quadrangular, with slightly undulate ends; valves divided into three compartments by two transverse bars at each end, and one at the centre, which cross the entire frustule; valves also marked by two short costæ on each side of the central single bar.

POLYMYXUS, Bail., nov. gen.

Siliceous, free, simple, bivalve; in front view quadrangular, with undulate ends. In lateral view circular. Valves composed of curved ridges, appearing in front view like mamillæ, but in lateral view tapering to the depressed and stellate centre; summits of ridges, armed with minute spines. (?)

POLYMYXUS CORONALIS, L. W. B., nov. sp.

Frustules large, symmetrical, bivalve; in front view quadrangular, with mammilated ends; in lateral view circular. Lateral surfaces of valves elongated into projections, which in front view appear like mamillæ, but in oblique view taper down to the depressed and stellate centre. Summits of the elevations terminated by minute spines on the margin of the shell. Valves and median band minutely punctate.

Hab. Para River and mouth of Amazon.

TRICERATIUM SHADBOLTII, Bail., nov. sp. ?

Sides concave, in front view constricted beneath the processes; concave sides decussately punctate. Lateral surfaces bearing distinct rows of short curved setæ, and three long sharp spines near the bases of the processes.

Differs from *Tr. contortum*, of Shadbolt, in the sides being concave instead of straight.

Hab. San Antonio Bay, Para River.

SYRINGIDIUM AMERICANUM, Bail., nov. sp.

"Frustules minute, punctated; central portion quadrangular; valves unequal, one with a quadrate base suddenly contracted, and then tapering into a pyramidal spine terminated by a mucro; the other valve sub-globose, with two short basal processes, each ending in a spine." *Vid.* Pritchard's Infusoria, fourth edition, Plate VII. figure 34.

Hab. Para River and mouth of the Amazon

SYRINGIDIUM SIMPLEX, Bail., nov. sp.

Frustules minute, punctated; central portion quadrangular, larger and stouter than in *S. Americanum*. Valves unequal, *both gradually* tapering into pyramidal cones, one of which terminates in a mucro, the other in a minute sharp spine. Valves nearly symmetrical. No basal processes as in *S. Americanum*.

Hab. Para River.

NITSCHIA OBLONGA, L. W. B., nov. sp.

Small, linear-oblong, with sub-acute apices; valves a little narrower at the middle than at the ends, but with no central constriction. Marginal puncta small, and close. Surface minutely punctate in transverse parallel striæ.

Hab. Para River.

Several other forms believed to be new, will be hereafter described in connection with the plates. The following list includes all the forms yet observed in the Para and Amazon.

LIST OF DIATOMACEÆ, COLLECTED DURING THE CRUISE OF THE UNITED STATES BRIG DOLPHIN, IN THE PARA AND AMAZON.

Achnanthes.
Actinocyclus.
Actinoptychus senarius, Ehr.
Actinoptychus denarius, Ehr.
" 13 rays.
*Amphitetras cuspidata, Bail.
Amphora ovalis, K.
* " delphina, L. W. B.
Biddulphia Baileyii ? Sm.
" tridentata, Ehr.
* " tenuis, Bail.
Cerataulus turgidus, Ehr.
Coscinodiscus eccentricus, Ehr.
" gigas, Ehr.
" lineatus, Ehr.
" oculus-iridis, Ehr.
" subtilis, Ehr.
* " ? tenuis, Bail.
Dicladia Capreolus ? Ehr.
* " mamillana, B.
Dictyocha fibula, Ehr.
Diploneis,
Discoplea Kützingii, B.
. .=Cyclotella Kützingiana, Sm.
*Ditylum trigonum, Bail.
* " inæquale, B.
" (not named).
Eunotia dizyga ? Ehr.
* " (with unequal teeth).
Eupodiscus —— nov. sp ?
Allied to E. radiatus.
*Fragillaria constricta ? Ehr.
*Gomphonema sphæosphorum ? Ehr.
Grammatophora, —— ?
Hyalodiscus,
*Lithodesmium contractum, Bail.
Melosira sulcata.
* " granulata, L. W. B.
Navicula Bacillum ? Ehr.
" Baltica, E. S.
" Lyra, E.
" lineolata ? Ehr.
* " septenaria, B.
" viridis ? Ehr.
*Nitschia oblonga, L. W. B.
" mesolepta, B.
= N. linearis ? Sm.

*Nitschia punctata, Bail.
Pinnularia nobilis? Ehr.
" interrupta, Kütz.
" dilatata, B.
*Polymyxus coronalis, L. W. B.
Pleurosigma.
Pyxidicula? compressa, B. MS.
Stauroneis lineolata? Ehr.
Stauroptera aspera, Ehr.
" cardinalis? E. K.
" parva.
" lanceolata?
Striatella.
*Surirella collecta, Bail.=Campylodiscus collectus, L. W. B.
* " decora, Bail.
* " duplex, Bail.
" quatamalensis, Ehr.
" splendida, Ehr.
Surirella striatula, Sm.
*Syringidium Americanum, Bail.
* " simplex, Bail.
* " occidentale, Bail.
Synedra Ulna, Ehr.
" acuta, Ehr.
*Terpsinöe magna, Bail.
* " minima, Bail.
" musica, Ehr.
* " Tetragramma, Bail.
Tetragramma Americana, Bail.
Triceratium alternans, Bail.
" comptum, Sh.
" favus, Ehr., three varieties.
* " Shadboltii, Bail.
Zygoceros rhombus, Ehr.
* " hemitropus, B.

The forms marked thus (*) are believed to be new, and are either described on the preceding pages, or will be noticed in connection with the plates hereafter.

To the above, most of which have been observed by both my father and myself, I can now add several other forms, not observed by him. They are as follows: —

Triceratium megastomum, Ehr.
Ceratoneis? spiralis? Kütz.
Eupodiscus crassus.
Epithemia.
Hyalodiscus Californicus, Bail.
Cymbella.
Spongiolithis Agaricus, Ehr
*Amphora obtecta? B.
Navicula firma.

Together with several Rotaliæ, Globigerinæ, and several minute, undetermined Cocconeidæ.

The following forms are from several different localities, and will be figured with the preceding; —

AMPHORA OBTECTA, Bail., nov. sp.

Frustules in front view barrel-shaped, with straight truncated ends; in lateral view linear-oblong, with concave venter and convex dorsum. Outer portions of valves canoe-shaped; nodules wanting or obscure. Whole frustule covered with close transverse striæ, which in front view intersect fine longitudinal lines or folds in the connecting membrane, giving the shell the appearance of being woven over.

Hab. lat. 0° 19′ 05″ N.; long. 45° 43′ 36″ W.

AMPHIPENTAS OBTUSUS, Bail., nov. sp.

Sides five, concave; angles conical and rounded; lateral surfaces slightly concave, minutely granulated; connecting membrane punctate in parallel vertical rows. Differs from *A. flexuosa*, B. MS. in the sides being concave instead of gibbous.

Hab. lat. 0° 19′ 05″ N.; long. 45° 43′ 36″ W.

CYCLOLELLA? PULCHELLA, L. W. B., nov. sp.

Disc small, with a central umbo, from near the base of which radiate (16) dilating styliform rays. Margin with large granules, corresponding to the rays.

Hab. lat. 1° 01′ 29″ N.; long. 46° 17′ 46″ W.

BILOCULINA SERRATA, Bail., nov. sp.

Smooth, opaque, porcellaneous, globose, with serrated margin, which is distinct on the under side, and indistinct on the upper.

Hab. Gulf Stream, 150 fathoms.

CYMATOPLEURA? CAMPYLODISCUS, Bail., nov. sp.

Large; lateral view almost circular, sometimes broadly oval. Marginal striæ close, short, and showing under high powers marginal glandlike dots. Lateral valve with one deep undulation.

Hab. Honeylake valley, foot of Sierra Nevada.

CYMBELLA GIBBA, Bail., nov. sp.

Small; valves with very convex, almost conical dorsum, and slightly convex venter; striæ fine and close.

Hab. Honeylake valley, Sierra Nevada.

The two following forms have been detected by me, the first in soundings off Key Biscayne, Fa., the second in rough material from the Para. They are here introduced for the sake of comparison with the two species of Syringidium previously described.

SYRINGIDIUM CUCULLATUM, L. W. B., nov. sp.

Frustules small, balloon-shaped and punctate; valves unequal, one consisting of a turgid semiglobose cap, armed with two stout processes, the other of an undulate pyramidal cone. No spines or mucro.

Hab. Gulf Stream.

SYRINGIDIUM PARAENSE, L. W. B., nov. sp.

Frustules minute, punctated; central portion quadrangular; valves unequal, one with a circular base, suddenly contracted, and again expanded into a conical form, armed near the apex of the cone with two processes; the other valve suddenly contracted and tapering into a pyramidal spine terminated by a mucro.

Hab. Para River.

These two forms, with others, will be figured at the earliest opportunity.

Dr. A. A. Hayes presented some specimens of ores, interesting in a scientific and economic point of view, with the following remarks: —

Mr. President: In calling the attention of the Society to the specimens before me, I am aware that the remarks I shall make belong to a Technological Institute, rather than to a Natural History Society. But as there are some points of a truly scientific character, involved in the descriptions, I have thought that my excuse, if necessary, might rest on these.

A specimen of brown hydrate of iron, from the Sierra Nevada Region, containing gold.

2,000 lbs. of this ore afford $1\frac{686}{1000}$ oz. of gold. The usual measure of such ore, used by the miners, is the cubic cord, or 128 cubic feet, and the yield of gold is there calculated on the cord of ore, which is very abundant.

Having made numerous analyses of iron ores, differing in no respect physically from this ore, the question has often arisen in my mind, why one specimen in a thousand should contain gold, and the remainder not any.

We do not answer this question fully when we say that the pyritous ore from which it was derived was in one case auriferous, and in the other not so, for it appears from the most extended observations, that gold belongs to the minerals of certain localities, and is not found in the same minerals in other localities.

Argentiferous Galena in its gangue rock, from the vicinity of Pike's Peak. In a region as yet but little explored, this rock occurs containing galena, blende, pyrites, and oxide of manganese. The lead contained in 2,000 lbs. weighs 860 lbs. and this quantity of lead affords $12\frac{48}{100}$ oz. of silver.

By stamping and washing the ore, a more concentrated product would be obtained, and a further step in the way of reduction on the spot would enable the miners to throw into the market a great quantity of rich silver lead, bearing the charges of transportation and cost, besides yielding a profit to the miner.

Antimonial Galena with silver from Sonora.

This ore is here presented in its marketable form, and the specimen is part of a shipment, which was assayed by myself. 2,000 lbs. of this ore afforded 1,228 lbs. of lead. This portion of lead was so rich in silver that $32\frac{968}{1000}$ pounds of silver were contained in it; or the silver in a ton of the ore has a value of about six hundred and sixty dollars.

The specimen which is here presented is interesting in consequence of exhibiting such partial decomposition as permits the formation of other ores of lead and silver in quite regular forms.

Thus we recognize, as covering the surface, beautiful crystals of carbonate of lead, white, transparent, and lustrous, as well as gray. Sulphate of lead, as a crystalline powder, and, more remarkable still, the red antimonial silver in transparent, though minute crystals, as well as in massive form. In the ore there is much bisulphuret of iron and little copper pyrites, which aid the decomposition and leave an ochrey deposit, in which the crystallized minerals have formed. In the humid mass, the hydrate of oxide of lead is present, and the formation of carbonate of lead in crystals proceeds by the union of carbonic acid from the air and water with it. The other compounds of lead unite, with acids present, such as sulphurous, to become sulphuric and silicic acids.

The formation of the crystals of red silver ore is no more difficult as a study, than is the production of the equally insoluble carbonate and sulphate of lead. It is true that, if we remain embarrassed by the belief that *solution is necessary to the production of perfect crystals*, we shall proceed slowly; and it is better, therefore, to previously consider the many instances known, where crystals are formed from their constituents in a divided form, *merely suspended*, but not *dissolved*, in water.

In the present case, the investing, dark, compact covering close on the compound sulphuret, exhibits the first stage of decomposition by oxidation. Further removed, we have oxides forming salts. Finally, in the cavities and on the surface, we see crystals perfected; this now irregular surface having been naturally buried in a soft adhesive ochre.

We know that in other cases, where polarization can take place, the transfer of either compounds or elements follows, and where there is sufficient moisture, permitting this imperfect flow of minute particles to continue, perfect crystals will be built up, *without* solution being necessary.

The formation of perfect crystals of carbonate of lead, in artificial processes of manufacturing, does not take place on metallic lead, because there is insufficient moisture, or only mere vapor present; while lead buried in soft, wet earth, becomes covered with transparent crystals of both carbonate and sulphate of lead.

Where there is a continued moist, investing mass, chemical changes taking place in the compound buried, will, as a necessary consequence, induce polarity throughout that mass, and, the conditions of transfer being present, compounds insoluble in water, or fluids present, may form as the simple consequence of such conditions. The crystals of red silver ore, in this case, are microscopic, not quite regular, but they illustrate the dependence of their formation on the previous decomposition of the compact ore.

In relation to the coloration of ruby zinc, Dr. Hayes said that, from examination of tolerably pure specimens, he thought it due to scales of transparent peroxide of iron, visible under the microscope; he did not find any red oxide of manganese in the mineral.

Dr. C. T. Jackson said that, in the purest specimens, such as had been submitted to Mr. W. P. Blake's analysis, there was only a trace of peroxide of iron, but an appreciable quantity of manganese. This was the first specimen, pure enough for reliable analysis, a crystal without any mechanical mixture.

Mr. Alger said that he had attributed the coloration to the oxide of manganese, but should submit some of the pure crystals to Dr. Hayes for further analysis.

Mr. Alger exhibited a pseudomorphic crystal of native copper from Copper Falls Mine, Lake Superior.

Who, he asked, has ever seen a crystal of native copper in the form of a rhombohedron?

I ask this question in order to call your attention at once to the subject in hand.

It is well known to you that crystals of copper belong to the monometric or regular system in crystallography, and are found in nature in modifications derived from the cube or octohedron, frequently, as in the trap rocks of Lake Superior, in perfect rhombic dodecahedrons. Copper is not a dimorphous metal, that is, it is never known to occur in forms incompatible with each other, or belonging to different systems, which we know is the case with some other substances. For instance, bisulphuret of iron is found in the form of a cube, and of a right rhombic prism; carbon in the regular octohedron (diamond), and in the regular hexahedral prism (graphite). Carbonate of lime in the rhombohedron and right rhombic prism. The specimen I now present is a rhombohedron of native copper, but it offers nothing inconsistent with what has already been said, for it is evidently the cast or impression of a crystal of calc-spar, which has disappeared, and whose place it has taken with much precision. I believe this is the first occurrence of a perfect pseudomorph of copper in any form. I find no mention of any in the writings of Haidinger or Blumm, who have written largely on the subject. I found the specimen in examining a collection of specimens brought from Copper Falls. It was partly incrusted by calc-spar in cleavable crystals, indicating very clearly its pseudomorphic origin. On removing this calc-spar I found, presented on the opposite side of the specimen, a fine example of arborescent or dendritic copper, giving it rather a remarkable character.

In reply to Dr. Jackson, who thought the crystal might be a cube, a form which copper might naturally assume, Mr. Alger said that the crystal was an obtuse rhomboid, and that its plane seemed to correspond with the natural faces of the calc-spar in which it was imbedded.

Mr. Marcou made some remarks on the occurrence of silver and gold in the Rocky Mountains and California.

According to his own and others' observations, all the gold mines are in the chains running north and south, as the Sierra Nevada, which is separated from the Rocky Mountains, and older than they are. Gold Mountain is near Santa Fè, where the mountain chain is interrupted. In the Sierra Madre, running north and south in Arizona and Sonora, gold is also found; he was of opinion that Pike's Peak must be out of the true line of the Rocky Mountains, and an isolated part of a north and south chain. Silver, on the other hand, is found in the chains running northwest and southeast, as the Sierra Cerbal, farther to the east, and in a chain having the same direction in Arizona and Sonora.

In reply to a question, if gold is not usually found with pyrites, Dr. Jackson said that gold generally occurs in metamorphic micaceous or argillaceous slates, and that in auriferous rocks the pyrites almost always contain gold; in the Southern States the pyrites do not contain it, but the hematite of North Carolina and Georgia does.

Mr. Marcou observed that the gold region of California has the outward reddish appearance of an iron district.

Professor W. B. Rogers stated that in the auriferous region of Virginia and the Carolinas, there is a large mechanical mixture of the gold with sulphuret of iron. As an instance of the extent to which this is decomposed, he said that he had often found the interior of cubical cavities, formerly filled with pyrites, containing pure crystallized sulphur.

Dr. Hayes was of opinion that the gold was originally mineralized with pyrites, and that its separation has been the result of chemical and electrical actions, the oxidation of the iron going on, but not that of the sulphur.

Dr. Jackson stated that there had been much discussion as to whether the gold was mechanically or chemically mixed with the pyrites; in common with many practical miners, he believed that it is mechanically mixed.

Dr. Hayes said that in common with most chemists, so far as he knew, he considered the gold as chemically mixed with the sulphuret of iron.

Professor Rogers thought it would be extremely difficult, if not impossible, to decide the question positively, as in the last degree of attenuation practicable, all the time yielding gold by amalgamation with quicksilver, the quantities are so small as to defy chemical appreciation.

The Treasurer notified the Society that the sum of $10,000 bequeathed to it by the Hon. Jonathan Phillips, had been received, and was in process of investment.

Mr. Dillaway, in behalf of the Publishing Committee, stated that it was desirable to obtain some of the early numbers of the Society's Journal and Proceedings, in order to furnish complete sets to Societies and individuals, especially in foreign countries for purposes of exchange. He requested members knowing where such numbers can be procured to notify the Committee.

Messrs. C. H. Hitchcock, William F. Hall, and David Thaxter, were elected resident members.

April 17, 1861.

The President in the Chair.

Dr. John Bacon read the following: —

NOTE CONCERNING THE COCOA-NUT PEARL. BY JOHN BACON, M.D.

I have a few additional facts to present in regard to the cocoa-nut pearl from Singapore, on which I made a communication in May, 1860. No botanical authority which I had then consulted gave any account of such a concretion. A few months afterward, I found a brief description in an article on calculi, by the chemist Fourcroy, in the Annales de Chimie for 1793. The specimens seen by Fourcroy were so highly valued, that he was not permitted to use any portion for analysis. The publication of my communication of last May in the Répertoire de Chimie, Paris, (for which I am indebted to Mr. F. H. Storer,) elicited a notice from Professor Bleekrode of Holland, who states in the Répertoire of December, 1860, that the cocoa-nut pearl, though extremely rare, is well known in the East Indies, and is described by the celebrated botanist Rumphius in the Herbarium Amboinense; also in the Nouveau Dictionnaire d' Histoire Naturelle, Paris, 1818; a copy of which has been added to our library within a few weeks, under the name of Mestiques, in which a brief abstract of the account by Rumphius is given. The library of Harvard College contains a copy of the Herbarium Amboinense, which I have consulted. This work was published in 1741, and thirty-five years after the death of Rumphius.

Rumphius, who resided many years at Amboyna, gives a description of the cocoa-nut pearl under the synonyms of Calappites, Mestica

Calappa, and Calappus-Stein; accompanied by figures of two forms, round and ovoid. He states that they are chiefly found at Macassar and other localities in Celebes, and even there do not occur so often as once in a thousand cocoa-nuts; similar concretions are found in other fruits from the same localities. A few have been found in the trunk of the cocoa-nut tree. In the nut, they are sometimes attached to the inside of the shell, and sometimes more freely in the milk. The smaller ones, of the size of a pea, are always found unattached They are prized by the Indians above the most precious gems.

From the hardness and general appearance of the cocoa-nut pearl, it has been regarded as a siliceous concretion; analogous to the tabasheer, occasionally found in the joints of the bamboo; and I presume that no microscopic or chemical examination has been made except by myself.

Mr. Burt G. Wilder presented a paper on the Comparative Myology of the Chimpanzee. Referred to the Publishing Committee for publication in the Journal.

Mr. John Homans, Jr., exhibited two living tritons, from one of which, about a year since, he removed the entire fore-leg; no bleeding resulted, the wound healed, and in a month a little pad had appeared, having two indentations, the rudiments of future toes; last October the limb was entirely reproduced, though of less size than the other, having grown but little if any for six months; from the other he had removed a hind leg at the ankle joint, which had also been reproduced, though of less size than the other; both of these were adult when operated on.

The President stated that the formation of two toes, and two lateral subsequently, was an exception to the law prevailing in mammals, birds, and scaly reptiles; the proteus and amphiuma which have only two toes on one or both sets of limbs, represent the embryonic condition, as illustrated by the growth of the above-reproduced limbs; other batrachians have three, four, and five toes, the fore-feet, however, never having more than four.

Mr. Marcou called attention to two ammonites, *A. bifrons* or *Walcoti* and *A. communis*, presented to the Society several years ago, by Rev. Mr. Malcom, by whom they had been brought from the banks of the river Irrawaddi. The former, if the locality had been unknown, he should pronounce Jurassic, and identical with those of England and France, and the latter as belonging to the upper Lias of England. Previous to this, he was not aware that any Jurassic fossils had been found in the East Indian peninsula, or any where in Asia so far south as this.

Mr. Bouvé stated that the ammonites from India were accompanied by the teeth of an elephant and a ruminant, fossil wood, and fossil crabs, said to have come from the same place; these had probably been transported from the north.

Mr. Marcou observed that ammonites are worn about the necks of the Indian natives as talismans, and as such may be extensively circulated, very far from their natural localities.

Much discussion, Mr Marcou remarked, has arisen concerning the bituminous coal of Hindostan, as to whether it is true carboniferous, Jurassic, or red sandstone; Dr. McClelland found there the flora of the new red sandstone, and later explorations have disclosed labyrinthodont remains (Permian and Triassic), and Trias-like fossil fish (*ceratodus*), which indicate an extensive new red sandstone formation in India. He presented the second part of his work on "The Rocks of the Jura," and their geographical distribution in the two hemispheres. He believed that the red sandstone of the Atlantic border may be Jurassic, though no fossils have yet been found to prove this.

Dr. Samuel A. Green sent in his resignation of the office of Curator of Herpetology, which was accepted.

Drs. C. E. Ware, J. B. S. Jackson, and Samuel A. Green were appointed a nominating committee for officers for the ensuing year.

May 1, 1861.

ANNUAL MEETING.

The President in the Chair.

The Annual Reports of the Treasurer, Librarian, and Curators, with the exception of those of Botany, Radiata, and Herpetology, were read and accepted.

The Treasurer congratulated the Society upon a state of financial prosperity unprecedented in its history. During the past year the legacy of $10,000 from the late Jonathan Phillips has been received and invested; and a donation from Dr. William J. Walker, of an estate in Bulfinch Street, valued at $30,000. It has also received from the State a grant of land on the Back Bay, on such conditions as are considered equivalent to a gift. The property of the Society may be safely estimated at $75,000. The total number of paying members is over 200.

The Auditing Committee reported that the Treasurer's account was correctly cast and properly vouched.

The Librarian reported that 311 volumes and parts of volumes had been added to the Library the past year, of which 225 were obtained by exchange, and 59 by donation. The Library contains more than 5,000 volumes, and is valued at over $20,000.

For want of room the cabinet has not been greatly increased during the past year, but when a larger building shall be ready for occupation, extensive additions will at once be made in all the departments. The most that can be done with the present limited accommodations is to identify, arrange, and preserve the specimens.

The cabinet-keeper reported that 8,000 persons had visited the collection during the year, an average of more than 150 on each day of weekly exhibition.

On motion of Mr. Binney, a vote of thanks was passed to the Massachusetts Mechanics Charitable Association, for the gratuitous use of their hall at the last Anniversary Meeting on May 11, 1860.

On account of the war excitement, it was thought advisable to dispense with the Anniversary Meeting this year.

The Nomination Committee reported the following list of officers for the ensuing year, who were duly elected: —

PRESIDENT,
JEFFRIES WYMAN, M.D.

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

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

RECORDING SECRETARY,
SAMUEL KNEELAND, JR., M.D.

TREASURER,
AMOS BINNEY.

LIBRARIAN,
CHARLES K. DILLAWAY.

CURATORS,

THOMAS T. BOUVÉ,	OF GEOLOGY.
JOHN BACON, M.D.,	MINERALOGY.
CHARLES J. SPRAGUE,	BOTANY.
THOMAS M. BREWER, M.D.,	OÖLOGY.

HENRY BRYANT, M. D.,	ORNITHOLOGY.
NATHAN FARRAND,	CONCHOLOGY.
F. W. PUTNAM,	ICHTHYOLOGY.
THEODORE LYMAN,	RADIATA.
J. C. WHITE, M. D.,	COMPARATIVE ANATOMY.
SAMUEL H. SCUDDER,	ENTOMOLOGY.
ALBERT ORDWAY,	CRUSTACEA.
B. J. JEFFRIES, M. D.,	MICROSCOPY.
FRANCIS H. BROWN, M. D.,	HERPETOLOGY.

CABINET-KEEPER,

CHARLES STODDER.

Dr. Gould exhibited what appeared as a brilliant carmine powder, obtained from a carpet. It proved to be a group of minute arachnoids, allied probably to the genus *Coptus* (Latr.); most of them were living.

Dr. C. T. Jackson announced the decease of Dr. John Evans, a corresponding member of the Society, who died at Washington, on April 13, of pneumonia.

He spoke of the valuable services of Dr. Evans as a geologist, and proposed the following resolution, which was seconded by Mr. Marcou, and unanimously adopted: —

Resolved, That the Boston Society of Natural History have learned with deep regret the decease of their corresponding member, Dr. John Evans, United States Geologist of Oregon and Washington Territories and of the Chiriqui Expedition, and deplore the loss which the country has sustained in the death of this active and enterprising geologist.

It was voted that a copy of this resolution be sent to his widow, Mrs. Sarah Z. Evans, at Washington, D. C.

Mr. Marcou exhibited Boué's geological map of the world, and portions of a map in course of preparation by himself, on a larger scale, and with more complete details than Boué's. The portions exhibited were North and South America; these were printed in colors, and were difficult to execute as well as very expensive. Among the recent discoveries that he was able to indicate, is the occurrence of Jurassic strata on the coast of Greenland and Arctic America.

Dr. Jackson observed that these tentative maps, on which what is actually known is put in distinctive colors, and the unknown and unexplored left blank, are of great value to the progress of geology; the present active researches of scientific travellers in all parts of the world, will, in a few years, fill up the blank portions.

Mr. Putnam presented two living specimens of *Scaphiopus*, taken on May 1, at Cambridge, Mass.

At the present time they are to be found in considerable numbers, as it is their spawning season. The spawn is smaller and darker than that of the common toad, and placed around a spike of grass. They have also been found in Danvers, Mass., these being the only localities in the State so far as he knew. They are nocturnal in habit, spawning in the morning and on land, and dig rapidly into the ground; they swim with the right and left feet alternately, and the male clasps the female around the thighs.

May 15, 1861.

Dr. A. A. Gould in the Chair.

In the absence of the Recording Secretary, Dr. J. C. White was appointed Secretary *pro tempore.*

On motion of Mr. Pickering the act passed by the last General Court, granting to this Society power to hold a large amount of property, was accepted and placed on record.

Mr. Scudder presented by title a paper, entitled —

Notice of some North American Species of Pieris. By Samuel H. Scudder.

Pieris oleracea, Boisd. Spec. Gen. I. 518.

Pontia oleracea, Harris, New England Farmer, VIII. 402.

Pontia oleracea, Harris, Ins. Injurious to Vegetation, first edition, p. 213; second edition, p. 233.

Pontia oleracea, Harr. Agassiz' Lake Superior, p. 386, pl. 7, fig. 1.

Pieris cruciferarum, Boisd. Spec. Gen. I. 519.

Pontia casta, Kirby, Fauna Bor. Am. IV. 288, pl. 3, fig. 1.

The butterflies described by Harris, Boisduval, and Kirby, under the above-mentioned names, are one and the same insect. It is found inhabiting the northern and eastern portions of North America, reaching south but rarely as far as Pennsylvania, and extending to the east to Nova Scotia, west at least as far as Lake Superior, while to the north it is found up to the Great Slave Lake, in the Hudson Bay Company's Territory, and even, according to Kirby, to lat. 65° N. on McKenzie River.

I have examined many specimens obtained by Mr. R. Kennicott at different points in British America, from Lake Winnipeg to the Great Slave Lake, and by Mr. Drexler upon the southeastern shore of Hudson Bay, all of which were kindly placed in my hands for examination by W. H. Edwards, Esq., of Newburgh, N. Y. I have also had before me in my comparisons specimens in the Museum of Comparative Zoölogy at Cambridge, from various points in the northern United States, among which are those collected by Professor Agassiz on the north shore of Lake Superior; besides these, I have availed myself of my opportunities of studying the specimens contained in the cabinet of the late Dr. Harris, now in possession of this Society, and have, in addition, compared with them specimens in my own collection, obtained in various portions of the New England States.

I have never seen a perfectly white specimen of this insect; the most immaculate ones I have examined had a few gray scales scattered about the base of the primaries and along the basal half of the costal border, while beneath, the whole surface of the secondaries was bathed with a scarcely perceptible tint of a pale-yellowish color; from this limit every possible intermediate variation may be found, in males and females equally, till it comes to have an upper surface with obsolete spots similarly situated to those on the upper surface of *P. Rapæ* of Europe, and the line along the costal border extending sometimes, with much distinctness, beyond the tip, nearly half way down the outer border; the upper surface is also sometimes faintly tinged with pale greenish-yellow, the extremities of the nervules tipped with black, and the grayish scales of the base extended into the secondaries; but upon the under surface are found the widest limits of variation, for not only may the tips of the primaries become distinctly greenish or lemon-yellow, and the nervules at the apical portion, together with the median nervure, be somewhat heavily bordered with grayish scales, but also the whole surface of the secondaries may have its ground color distinctly greenish or lemon-yellow, and all the nervures, from origin to tip, very broadly and thickly bordered with grayish scales, while a slender line of grayish scales — the continuation of the third superior nervule — crosses the cell longitudinally; the costal border also at base is colored with orange, and the inner border at base with grayish scales; at the same time specimens are found with the under surface of the secondaries having broadly bordered nervures combined with a basal color of nearly pure white.

No possible step in the gradation from one extreme to the other is wanting, and both extremes are found equally among numerous examples from as widely distant places as Massachusetts and the Great Slave Lake, though the suite of specimens with which I have made my comparisons would seem to indicate that the paler forms are more commonly met with in the more southern localities, and the more heavily marked ones are the characteristic forms of the north. It may be noticed in this connection that Kirby, by a comparison between a single specimen from Massachusetts with three from lat. 65° N., separated the northern from the southern as being *less* heavily marked.

PIERIS PROTODICE, Boisd. and Lec.

An examination of a large number of specimens in the collection of the late Dr. Harris, in that of the Museum of Comparative Zoölogy, and in my own, has shown me that this butterfly also enjoys a wide geographical range, extending from Texas on the southwest, Missouri on the west, and the mouth of the Red River of the North on the northwest, as far as Connecticut, and the southern Atlantic States on the east.

Coincident with these widely separated geographical limits is its wide range of variation, especially to be noticed on the under surface of the secondaries, wherein it corresponds remarkably with *P. oleracea*. On the one hand, we have secondaries which are immaculate, save some scarcely perceptible yellow scales on the discal nervule, bordered by a very few scattered gray scales, a cluster of a few distant gray scales near the border, between the first and second superior nervules, and a dozen or so, more widely separated, similarly situated between the second and third, and the edge of the wing light greenish-gray, with the fringe white. On the other hand, we find greenish-gray scales spread quite heavily along the borders of all the nervures, with the exception of the basal half of the superior and first inferior nervules, which being clustered together toward the border into arrow-head spots, and uniting together at their widest portion, form a transverse zigzag bar; in the place of the few grayish scales, between the first and second superior nervules, we have a large spot of greenish-gray extending across the first superior nervule to the border; a few scales only border the anterior half of the third superior and first inferior nervules, and the yellow scales of the discal nervule are only slightly increased in number, though the scales which border it make a large spot, and are generally deficient in the greenish tinge; the narrow border is interrupted by the darker scales which form the swollen tips of the arrow-head spots.

These extremes of variation I have found most generally in the male; in the other sex, I have not seen any specimens which had these wings so nearly immaculate as that first mentioned, the nearest approach to it being in specimens which discover a few scattered scales along the borders of the nervures, the cross-bar of arrow-head spots, reduced to an indefinite indistinct zigzag band, and the central spot of yellow, bordered with gray scales quite indistinct.

It may also be said of this species, as of *P. oleracea*, that these differences are observable equally in any locality in which the insect may be found, and the gradation is complete, though I have not as yet seen any heavily marked males from the extreme western limit of their range, but all I have examined have been nearly immaculate.

P. protodice is the American representative of the European *daplidice*, the Alpine *callidice*, the Siberian *leucodice*, the South American *autodice*, the Arabian *glauconome*, and the South African *hellica*. We have in temperate North America no representative of the European *P. chloridice*.

In eastern Labrador there is a white butterfly, very closely allied to, but yet distinct from *P. oleracea*. It was considered by Boisduval to be the same (see Spec. Gen. I. 518). Four specimens were obtained by an expedition sent out in the summer of 1860, by the Lyceum of Natural History in Williams College, to Labrador and Greenland; they were collected by Mr. A. S. Packard, Jr., on Caribou Island, Straits of Belle Isle, and have been sent me for examination with numerous other insects;—it may be called

PIERIS FRIGIDA (n. sp.)

Two of the specimens obtained were males and two females; the shape of the secondaries of the male of *frigida* is as in the female of *oleracea*, those of *frigida* being proportionally narrower across the hind margin, and broader across a line parallel to it, near the base of wing, than in the same sex in *oleracea;* or in other words, the secondaries of *frigida* are relatively more quadrate, and those of *oleracea* more triangular; the outer half of the costal border of the secondaries is slightly more docked in *frigida* than in *oleracea;* the dark narrow line which follows the costal border of the primaries extends around over rather more than half the outer border of the wing, while in *oleracea* it seldom extends beyond the tip, and very rarely half way round the outer border; the nervures on the under surface are more heavily marked than in the darkest individuals of *oleracea*, though the markings are in the same locality, such as the outer and uppermost nervules of the primaries, the median nervure, the nervures of the secondaries, except the discal, the inner margin next the base, and a band crossing the cell, which is the extension of the third superior nervule; the markings of the primaries are heaviest towards the outer border, those of the secondaries away from it; the costal border of the secondaries at base is slightly tinged with saffron; the color of the under surface of the wings is slightly dirty white, tinted with very pale greenish-yellow, especially noticeable on secondaries and upper half of primaries; when any color is present on the primaries of *oleracea* it is confined to the tip; it differs further from *oleracea* in having the black scales at base of both wings above more profuse and widely spread, frequently bordering the nervures quite broadly; indeed grayish scales are more or less scattered over the whole of the upper surface, giving the insect a grim appearance, increased rather than diminished by the slightest possible yellowish tint.

By this description it would be exceedingly difficult to distinguish this species otherwise than by immediate comparison with both sexes of *oleracea* ; the differences are more easily to be seen than described, though the extreme limits of variation of *oleracea* do by no means permit us to include within its boundaries this comparatively persistent form ; it is more heavily marked than the extreme of *oleracea*.

In order the better to compare together some of our species of *Pieris*, I introduce here descriptions of some new species of this genus from our western coast.

PIERIS VENOSA (n. sp.)

Above, white tinted with very pale greenish-yellow ; base of all the wings black, and costal border of primaries with a black band, extending about half its length ; extremities of upper nervules of primaries broadly margined with black scales, with a spot of the same color in the middle of the space between first and second inferior nervules; a black dot at the tips of the nervules of secondaries. The female differs from the male in having nearly all the nervures on upper side of primaries somewhat bordered with grayish scales, and the extremities of the lower nervules almost equally with the upper ; but most characteristically by the presence of a band of grayish scales along the posterior border of primaries, which is bent abruptly upwards in the direction of the spot in the space between first and second inferior nervules, and continues to the third inferior nervule, sometimes interrupted at the angle.

Beneath, as in the darker forms of *P. oleracea*, with the ground color slightly more highly colored than the upper surface, the nervures of the secondaries being heavily, and those of the primaries more narrowly bordered with grayish scales, with a saffron-colored spot at base of costa of secondaries.

Antennæ black, with incomplete white annulations interrupted above ; tip of club yellowish ; body black, with whitish hairs beneath ; the wings expand from 1.75 to 2 inches.

I have examined twenty specimens (5 ♂, 15 ♀), brought to the Museum of Comparative Zoölogy by Mr. Alexander Agassiz, from San Mateo and Mendocino city, California.

[Doubleday in his Gen. Diurn. Lep. states that *P. callidice* Godt. is found among the Rocky Mountains ; Boisduval, in his Lép. de la Californie enumerates *P. leucodice* Eversmann among them, remarking that his specimens "do not differ from individuals from Altaï ;" and lastly, Ménétriés, in his St. Petersburg Catalogue, gives *P. autodice* Hübn, as an inhabitant of California. Since no description has been given in any of these cases, and the insects themselves are so closely allied, one can scarcely doubt that these entomologists had before them specimens of the same

Californian species. Among the large number of species from the Pacific coast, which I have examined, I have never seen anything approaching near enough to either of these to warrant the positive assertion that it was the species referred to by them. *P. venosa* is the most nearly allied, for which I cannot but think they have mistaken it, sad as the blunder may be. *P. callidice, leucodice,* and *autodice* are represented by *P. protodice,* belonging to an entirely different section of the genus from *P. venosa.*]

PIERIS MARGINALIS (n. sp.)

This species is most closely allied to the preceding, *P. venosa*. The ground color is as in *venosa*, but almost devoid of markings; base of all the wings black; costal border of primaries with a narrow black band, extending about half its length; a few grayish scales at the tip of wings; outer edge of primaries, and posterior edge of secondaries with a very fine black line, slightly swollen at the tips of the nervures; fringe white; beneath as in *P. venosa*, with the secondaries and apex of primaries more yellowish; males and females alike in their markings.

Body black, with some white hairs above, and a considerable number of yellowish-white ones beneath; antennæ as in *P. venosa*. The wings expand two inches.

I have seen only two specimens (1 ♂, 1 ♀) which are in the Museum of Comparative Zoölogy. The male came from the Gulf of Georgia, and the female from Crescent City, California. They were obtained by Mr. Agassiz.

PIERIS PALLIDA (n. sp.)

Above, very pale-yellowish, nearly white; base of both wings and basal half of costal border of primaries dotted with grayish scales; whole costal edge of primaries black; the female has, in addition, a band of grayish scales on the posterior border of primaries as in the female of *P. venosa*, turned abruptly towards, and sometimes interrupted at the angle, extending to the third inferior nervule; and in the middle of the space between the first and second inferior nervules, as in both sexes of *P. venosa*, a cluster of grayish scales.

Beneath, secondaries and apex of primaries yellowish, with sometimes a few indistinct grayish scales scattered along the nervures, otherwise quite immaculate.

Body, above black, with scattered yellowish hairs; beneath yellow; antennæ as in *P. venosa*. The wings expand two inches.

This species was obtained by Mr. Alex. Agassiz, at the Gulf of Georgia. I have had before me five specimens (3 ♂, 2 ♀), which are in the Museum of Comparative Zoölogy.

PIERIS TAU (n. sp.)

Above, pure white; costal border of primaries with a broad black band, suddenly bending downwards and outwards, and following the discal nervule to its uttermost extremity, forming, with the black body, an elegantly formed T; this band has a white streak in it at the base; beyond the costal band, and connected with it by the black edge of the costal border, is a large apical spot, the inner edge of which runs parallel to the outer edge of the extension of the costal band, till it reaches the first inferior nervule, when it curves towards the base a short way, and again extending downwards, with an incurved border, reaches the second inferior nervule, where it is rather abruptly broken; this spot has three or four, sometimes five white, unequal, oval, sometimes round spots, the largest nearest the apex; some blackish scales follow the principal nervures of the secondaries for a short distance, and the tips of the nervures are sometimes black, otherwise there are no markings on the secondaries of the female, except the dusky reflection of the marking of the lower surface, which the transparency of the wing allows; the male, however, repeats slightly at the outer angle the markings of the lower surface.

Beneath, pure white; the markings of the upper surface of the primaries are repeated, with the white spots and streaks slightly enlarged and increased; the nervures of the secondaries are all narrowly bordered with blackish scales, which expand at the tips; commencing at the termination of the first superior nervule, a submarginal narrow band approximately follows the curve of the margin, is bent at the third superior nervule, and extends to the inner angle.

Labial palpi with mingled black and white hairs; antennæ black, with white scales scattered irregularly over the sides and under surface, as far as the club. Body black, with whitish hairs, especially below. The wings expand two inches.

It represents in Washington Territory the *P. Sisimbrii* Boisd. of California. A large number of specimens are in the Museum of Comparative Zoölogy, obtained by Mr. A. Agassiz at the Gulf of Georgia.

The distinction I have made between males and females in the foregoing descriptions, is founded upon characters which I first noticed by comparing together the two sexes of *P. protodice*, a species whose sexes have been known for a long time, and which are easily distinguished by their markings. On placing together, side by side, series of males and females of this species, it was discovered that there was a sexual distinction in the *cut* of the hind margin of the secondaries; it consists in the male having the outer angle more prominent, and so the whole hind margin less regularly curved, or as it might be expressed, more flattened,—these differences, though slight and requiring a careful examination, hold persistently in all species of *Pieris* I have examined. I have in several cases tested it carefully, by separating, upon this characteristic, the specimens of those species which exhibit two classes of individuals with distinct markings, and have in all cases found the markings to be coincident unequivocally with the cut of the wing. It will be seen, however, that in all the species it does not hold, as in *P. protodice*, that the female is the darkest.

Two of the species I have described from Western America, *P. venosa* and *P. pallida*, represent respectively the *P. napi* and *P. rapæ* of Europe. It will be noticed in the European species that each has the same plan of ornamentation upon the upper surface of primaries, namely, a large apical and small submarginal central spot, and that the peculiar distinction between the two is found in the presence or absence of the dark scales bordering the nervures of the secondaries. Just so is it in the Western American species, separated most characteristically from one another by the same distinction in the under surface of the secondaries, and linked together in the same way by certain characters of ornamentation (which, however, are not borrowed from its European congeners), that is, by the presence in the females of the bent band of the inner margin of primaries, and a small submarginal central spot. But when we turn to Eastern America we find this striking circumstance, that *P. oleracea*, within its own wide range of variation represents both *P. rapæ* and *napi* of Europe, and both *P. pallida* and *venosa* of the Pacific coast;--and what do we discover here, but that, discarding the strict lines of demarcation which separate alike *P. rapæ* and *napi* and *P. pallida* and *venosa*, it follows instead, with remarkable similarity, the range of variation discoverable in *P. protodice*, as before described, a species much farther removed from it in the genus than are they, thus simulating rather its *geographical neighbor* than its *nearest congeners*.

P. frigida and *P. marginalis* appear to have no true representatives.

Prof. Agassiz presented a catalogue of the Koninck library recently added to the Zoölogical Museum at Cambridge, which would be accessible to all students of Natural History, as soon as it could be put in order. The collection consists of 3,000 works, chiefly palæontological, making between 5,000 and 6,000 volumes.

Prof. James Hall, of Albany, corresponding member, exhibited some very interesting fossils, chiefly crinoids, from the carboniferous and lower Silurian deposits of the West.

He exhibited also a table, drawn up on the plan of Barrande's, illustrating the vertical distribution of Trilobites and allied fossil forms in the Quebec group of Palæozoic rocks, based on Sir William Logan's investigations, and showing that certain genera pass from the primordial to the lower Silurian, which are, therefore, beds of passage. A discussion followed upon this point, in which Prof. Agassiz and Mr. Marcou expressed the opinion that no sufficiently minute examination of the locality in question had been made to warrant any such conclusion.

Dr. Winslow showed the nest of a California Tarantula, with its cover. Prof. Agassiz said it was identical in appearance with one he had lately seen from Charleston, S. C.

It was resolved that no more meetings should be held until September.

W. H. Edwards, of Newburgh, N. Y., was elected a corresponding member; and Dr. John G. Blake, of Boston, a resident member.

ERRATUM.

In the table of measurements on pages 114 and 118, in the sixth and following lines, for *V* read *and*.

DONATIONS TO THE MUSEUM.

April 3, 1861. Specimens of iron, argentiferous and antimonial galena, from the Sierra Nevada region, Pike's Peak, and Sonora; by Dr. A. A. Hayes.

April 17. A female *Ascaris lumbricoides*, more than twelve inches long, vomited by a child; by Dr. J. C. White.

May 1. Two living specimens of *Scaphiopus*, from Cambridge, Mass.; by F. W. Putnam. Skulls of domestic hog, porpoise, two dogs, cat, skunk, two skulls of birds, some human bones, and the skeleton of a skunk; by H. Bryant.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1861.

Message, &c., of the President of the United States. 8vo. Washington, 1860. *From Hon. C. Sumner.*

Lettres sur les Roches du Jura, &c. By Jules Marcou, 2d et dernièr Livraison. 8vo. Paris, 1860. *From the Author.*

Etudes, &c., sur le Métamorphisme et sur la Formation des Roches Cristallines, Par M. Daubrée. 4to. Pamph. Paris, 1860. *From the Author.*

Proceedings of the Berwickshire Naturalists' Club. Vol. IV., No. 4. 8vo. Pamph. *From B. Embleton, Secretary.*

Notes on the Presence of Animal Life at vast depths in the sea. By G. C. Wallich, M. D., &c. 8vo. Pamph. *From the Author.*

Natural History of English Song Birds. By E. Albin. 12mo. London, 1779. *From B. Joy Jeffries, M. D.*

Owen, Professor. Five pamphlets, being reprints from the publications of the Geological Society of London. *From the Author.*

Synonymy of the Cyclades; Part II. By Temple Prime. 8vo. Pamph. *From the Author.*

Audubon's Ornithological Biography. Vols. IV. and V. 8vo. Edinburgh, 1838. *From C. W. Folsom.*

Proceedings of the Entomological Society of Philadelphia. 8vo. Pamph. May, 1861. *From the Entomological Society.*

Catalogue Annuel de la Librairie Française, Par C. Reinwald, 1858, 1859, 1860. 3 vols. 8vo. Paris. *From S. Urbino.*

Proceedings of the American Association for the Advancement of Science. 8vo. Newport Meeting. August, 1860. *From the Association.*

Dawson J. W., LL. D., &c., on the Pre-Carboniferous Flora. 8vo. Pamph. *From the Author.*

Life of John C. Warren, M. D. By Edw. Warren, M. D. Boston, 1860. 2 vols. 8vo. *From J. Sullivan Warren.*

Bulletin of the Wisconsin Agricultural and Mechanic Association. Milwaukee. 8vo. Pamph. 1860. *From the Association.*

D. C. Danielssen. Beretning om en Zoölogish Reise i Sommeren, 1858. 4to. Pamph. Also 8vo. 1859. Pamph.

Skirner, 1847, 1848. 2 pamph.

Bidrag til Pectinibranchiernes Udviklingshistorie. 8vo. 2 pamph.

Urda et Norsk Antiquarisk-Historisk Tidsskrift. 8 numbers. 1834–1839. Also 1842 and 1847. Bergen.

Fauna Littoralis Norvegiæ. Andet Hefte. 2de Livraison. Long 4to. Bergen.

Syphilisationen anvendt mod Syphilis og Spedalsked. *From Bergen's Museum.*

Mémoires de la Société des Sciences Naturalles de Neuchatel. Tome IV. 4to. 1859.

Journal of the Royal Geographical Society. Vol. XVIII. 1860. 8vo. London. Also Proceedings, Nos. 4 and 5. 8vo. 1860.

Memorie della Accademia delle Scienze dell' Istituto di Bologna. Tome VIII. and IX. 4to. Also Rendiconto. 8vo. 3 Nos. Pamph. 1857–60.

Entomologische Zeitung. Vols. I.–XIV. and XXI. 8vo. Stettin, 1840–1853. 1860.

Linnæa Entomologica. Vol. XIV. 8vo. Leipzig. 1860.

Archiv für Naturgeschichte. II. III. 1860. Berlin.

Ueber das Bestehen und Wirken der Naturforschenden Gesellschaft zu Bamberg. I. II. III. IV. 4to. Pamph. 1854–56.

Sitzungsberichte de K. Academie der Wissenschaften. Band XL. No. 9. XLI. 18, 19, 20. XLII. No. 21. 8vo. Wien, 1860.

Fürhrer durch den Zoölogischen Garten. 12mo. Pamph. Frankfurt a M. 1860.

Proceedings of the Royal Institution of Great Britain. Part 10. Nov. 1859–July, 1860. London. Pamph. 1860.

Journal of the Royal Dublin Society. Nos. 18, 19. July and October, 1860. 8vo. Pamph.

Mémoires de la Société Royale des Sciences de Liége. Tome 15ième

Bulletin de la Société des Sciences Naturelles de Neuchatel. Tome V. 1 et 2 Cahiers. 1860.

Actes de l'Académié Impériale des Sciences, &c., de Bordeaux. 3e Série, 22e Année, 1860. 1er Trimestre. Pamph. 8vo. Paris, 1860.

Mathematische Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin aus dem Jahre 1859. 4to. Berlin. Also Physikalische A. d. K. Akademie. 4to.

Schriften der K. Physikal-Ökonomischen Gesellschaft zu Königsberg in Pr. Erster Jahrgang, Erste Abtheilung. 4to. Pamph. 1860.

Mémoires de la Société de Physique et d'Histoire Naturelle de Genève. Tome xv. 2ème Partie. 4to. 1860.

Kongliga Svenska Vetenskaps-Akademiens Handlingar, Ny Följd. Andra Bandet. Andra Häftet. 4to. 1858. Ofversigt af K. V—A. Förhandlingar; Sextonde Argangen, 1859. 8vo. Stockholm, 1860. K. S. Fregatten Eugenies Resa Omkring Jorden, &c. Zoölogi. iv. Haft 7. 4to.

Smithsonian Contributions to Knowledge. Vol. xii. 4to. Washington, 1861.

Proceedings of the American Antiquarian Society for 1861. 8vo. Pamph.

Proceedings of the Academy of Natural Sciences of Philadelphia. Sigs. 4, 5, 6. 8vo. Pamph. 1861.

Canadian Journal of Industry, Science, and Art, for May, 1861. Toronto.

Silliman's American Journal of Science and Arts. Vol. xxxi. No. 93. 1861.

Mining Magazine. Vol. ii. No. 2 (2d series), for April, 1861. New Haven.

Actes de la Société Linnéenne de Bordeaux. 2ème Série. Tome x. 5e Livraison. 1856. Pamph.

Annual of Scientific Discovery for 1857 and 1860. By D. A. Wells, M. D. 12mo. Boston. *Received in Exchange.*

Annals and Magazine of Natural History. Vol. vii. Nos. 40, 41, and 42. 1861. London.

Ichnographs from the Sandstone of the Connecticut River. By James Deane, M. D. 4to. Boston. 1861.

History of Infusoria, &c. By A. Pritchard. 8vo. London. 1861.

Proceedings of the Zoölogical Society of London (illustrated). 8vo. 1860.

Thesaurus Conchyliorum. By G. B. Sowerby. Part 20. 8vo. London. 1860. *From the Courtis Fund.*

Thirty Years in the United States Senate. By Thomas H. Benton. 2 vols. 8vo. New York.

Autobiography of Dr. Alexander Carlyle. 12mo. Boston. 1861.

Encyclopædia Britannica. Eighth edition. Vol. xxi. 4to. Boston. 1860.

Life of Major André. By Winthrop Sargent. 12mo. Boston. 1861. *Deposited by the Republican Institution.*

September 4, 1861.

The President in the chair.

Dr. C. T. Jackson presented, in the name of the author, the following paper: —

Descriptions of new Cretaceous Fossils from Texas. By B. F. Shumard.

The fossils described in the present communication were obtained chiefly from the counties of Lamar and Navarro. Those from Lamar are from the Red River group of my section of the cretaceous rocks of Texas. (*Trans. Acad. Science, St. Louis*, vol. I. p. 583.)

They were collected by Dr. George G. Shumard, assisted by A. R. Roessler, chiefly from the bluffs bordering Red River. The fossils from Navarro come from an interesting series of beds not hitherto recognized in Texas. Most of them were obtained from Septariæ, imbedded in blue and gray arenaceous clays. We have found more than fifty species of fossils in these strata, a large proportion of them new to science, and now for the first time described. Others correspond with species described by Mr. Conrad from the Ripley Group of Tippah County, Mississippi, and Eupaula, Alabama. I have been able to recognize the following species common to the Tippah and Navarro beds: *Nautilus Dekayi*, *Baculites Tippaensis*, *B. Spillmani*, *Purpura cancellaria*, *Rapa supraplicata*, *Strombus densatus*, *Ficus subdensatus*, *Pleurotoma Ripleyana*, *Pholadomya Tippana*, *P. elegantula*, *Cardium Spillmani*, *Legumen elliptica*, *Siliquaria biplicata*, *Pecten simplicius*, *P. Burlingtonensis*, and *Exogyra costata*.

It is somewhat remarkable that although several species of Cephalopoda, belonging to the Genera Nautilus, Ptychoceras, Helicoceras, Turrilites, and Baculites have been found in the Navarro beds, not a single species of Ammónites or Scaphites has been met with.

The precise stratigraphical relations of the Navarro beds, with reference to the other members of the cretaceous in Texas, have not been certainly determined, though I am inclined to believe their position is above the Austin limestone of the Texas section.

St. Louis, Mo., August 12, 1861.

CEPHALOPODA.

Genus Scaphites, Parkinson.

S. verrucosus, (n. sp.) Shell of medium size, short, subovate, volutions slightly embracing; last volution enlarging somewhat rapidly towards the aperture, produced horizontally for a distance equal to one fourth the entire length of the shell, and then turned suddenly upwards and backwards so as to bring the aperture near the spire; sides and dorsum strongly rounded; aperture wider than high, apparently semi-elliptical; surface of body volution studded with small nodes, with circular bases, and arranged in three or four revolving rows on either side; also marked with small moderately distinct rounded costæ, some of which pass entirely across the volution, and others becoming obsolete at the nodes. The ribs are scarcely as wide as the intervening spaces.

Septæ with slender branches; dorsal lobe about as long but not as wide as the superior lateral, having four branches on either side, the basal ones simple, those next above with two, and the third from base with three slender points, terminal ones divided, each branch bearing several points, inner limb the longest; dorsal saddle as large or larger than the superior lateral lobe, divided into two unequal branches by an auxiliary lobe, the largest external and subdivided into two branches by a short trifurcate lobe; superior lateral lobe broadest at base, having two or three branches on either side, the terminal ones largest and bifurcated.

Length two and a half inches, height at middle of last volution about one inch.

We are in possession of merely a fragment of this well-marked species, consisting of about three fourths of the body volution. It appears to be somewhat closely related to *Scaphites iris*, Conrad (*Jour. Acad. Nat. Sci. Philad.*, *N. S.* vol. 3, p. 325, pl. 35, fig. 3), but Mr. Conrad states that the sides of his species are flattened, and the spaces between the nodes smooth, which characters do not apply to our shell.

Found near Dresden, Navarro County, in strata supposed to be of the age of the Austin limestone.

Genus PTYCHOCERAS, D'Orbigny.

P. TEXANUS, (n. sp.) Shell small and fragile, gently convex on the sides, and flattened on the dorsum; larger, or body portion, very slightly tapering to the curve behind, and marked with a moderately deep gutter on the ventral side, for the reception of the convex inner side of the slender portion, the transverse section of which is broad ovate; surface marked with strong, simple, annular costæ, which are slightly oblique, wider than the spaces between, and on the dorsum each bearing two slightly elongated nodes.

This shell differs from *Ptychoceras* (*Hamites*) *annulifer* of Morton and *P. Mortoni*, Meek and Hayden, by its flattened form and larger size, also from the former by its nodose ribs, and from the latter by its simple instead of divided costæ.

Formation and Locality. Cretaceous septariæ (Ripley Group), near Chatfield Point and Corsicana, Navarro County.

Genus HELICOCERAS, D'Orbigny.

H. NAVARROENSIS, (n. sp.) Shell large, dextral and sinistral, composed of distant, free, convex volutions; last volution rounded, gradually enlarging to within a short distance of the aperture, where it becomes suddenly expanded and flattened above and below; dorsum ornamented with two revolving series of prominent nodes, one series situated near the middle and the other at the base of the volution. On the anterior third of the volution the nodes are flattened, and the inferior ones project obliquely downwards and forwards. The nodes of one series usually alternate with those of the other, but sometimes they are nearly opposite. The surface is likewise marked with prominent, rounded, oblique annular costæ, which are indistinct on the ventral side, and frequently bifurcate at the nodes.

The diameter of the last volution, a short distance from the expanded aperture is about 15 lines; diameter of base 3½ inches.

Of this fine species, I have seen only the last and a portion of the succeeding volution of an apparently mature shell, from which the entire height may be estimated at not less than six inches.

Found by Dr. G. G. Shumard at Chatfield Point, Navarro County, associated with the preceding species.

Genus TURRILITES, Lamarck.

T. SPLENDIDUS, (n. sp.) Shell turretted, spire sinistral and dextral, very much elevated; spiral angle 23°; volutions about ten, strongly rounded, contiguous; suture deeply excavated; umbilicus small, occupying a very small part of the diameter of the last volution; aperture subcircular. A short distance behind the aperture is a prominent ring, anterior to which the diameter becomes suddenly contracted to the margin; surface elegantly ornamented with prominent rounded, simple and bifurcating ribs, which on the body volution commence at the margin of the umbilicus, and pass in an oblique upward and backward curve, until they get near the suture, where they are suddenly bent forwards. The number of ribs on the last volution varies from twenty-four to twenty-eight, and they are here wider apart and not so regular as on the turns of the spire. Ribs bearing each two small elongated tubercles, one situated near the inferior edge and the other near the middle.

Length, twenty-one lines; diameter of last volution seven lines. In form and general appearance this beautiful Turrilite is similar to *T. catenatus*, D'Orb., but differs in having a smaller umbilicus, in the different position of the tubercles, and their smaller size.

There are fragments of a Turrilite in the State Collection, which appear to belong to this species, whose dimensions are double those above given.

Ripley Group, Chatfield Point, and near Corsicana, Navarro County.

T. HELICINUS, (n. sp.) Shell sinistral, depressed conical, composed of about five rounded, contiguous volutions; spire very short; spiral angle about 80°; suture very deeply impressed; aperture subcircular; umbilicus deep, exhibiting the inner volutions, not as wide as the last volution; surface ornamented with prominent, sharp, annular costæ, which, on the last volution, pass obliquely backwards from the umbilicus to the suture. The costæ are usually simple, but occasionally they bifurcate, and this generally occurs near the edge of the umbilicus; about forty ribs may be counted on the last volution. The ribs of the last volution, in some specimens, are garnished with a double series of small indistinct nodes, situated on the middle third of the volution. No traces of nodes have been observed on the turns of the spire.

This shell resembles in many respects *T. Astierianus*, D'Orbigny. (*Palæont. Franc.* T. 1, p. 578, pl. 140, figs. 8–11), from which it may be at once distinguished by the nodes upon the last volution, when they are present. In specimens without nodes, there are no well marked characters to separate our shell from the foreign species. It cannot be confounded with any of the known Turrilites from American strata.

With the preceding species at Chatfield Point and Corsicana, Navarro County.

B. F. and G. G. Shumard and S. B. Buckley, collectors.

GASTEROPODA.

Genus VOLUTILITHES, Swainson.

V. NAVARROENSIS, (n. sp.) Shell large, thin, fusiform, expanding gradually from extremities to middle; spire conical, scarcely occupying one fourth the total height; volutions five or six, those of the spire flattened; last volution much elongated, sides presenting a somewhat regular convex curve, from suture to base; suture distinct; aperture narrow, elliptical, occupying two thirds the total length; surface marked with rather obscure, broad, rounded folds, and fine, imbricating striæ of growth.

The folds are most distinct on the inferior half of the volutions of the spire and the upper part of the body volution. The striæ become quite prominent on the upper part of the volutions, and near the suture are suddenly directed obliquely upwards and forwards. Besides the folds and striæ the surface is also ornamented with prominent, rounded, revolving carinæ, separated by broad and rather deep furrows. On the body volution there are eighteen carinæ, the two upper ones being smaller than the others, but on the turns of the spire there are only four or five.

The columella is so enveloped in the matrix that I am not able to see the folds, and hence there is some doubt as to whether this shell really belongs to the above genus.

Length, 3.72 inches; width, 1.01; length of aperture, 2.48; width of same about 0.48.

Ripley Group, near Corsicana, Navarro County.

Genus RINGICULA, Deshayes.

R. PULCHELLA, (n. sp.) Shell small, oblong oval; spire moderately elevated, conical, acute at tip, enlarging rather rapidly from apex volutions five, rounded; last one large and ventricose; suture distinct, depressed; aperture narrow, curved, pointed above, gradually widening to the base; outer lip thickened, broad, acute above, prolonged upon the spire, inner edge strongly crenulated, outer surface marked with distinct, longitudinal, and transverse lines, and presenting a finely cancellated appearance; columellar lip thickened and marked below with strong teeth. Surface with rather coarse, rounded revolving lines, of which there are about sixteen on the body volution; these are crossed by very fine, crowded striæ of growth, which give to the intervals between the revolving lines a minute punctate appearance.

Length, 0.26 inch; width, 0.20; apical angle, 60°.

Ripley Group, Chatfield Point, Navarro County.

B. F. Shumard and W. P. Riddell collectors.

R. SUBPELLUCIDA, (n. sp.) Shell small, ovate, smooth, polished spire elevated, conical; volutions four to four and a half, gently convex; last one ventricose; suture sharply impressed, linear; aperture narrow, grooved, acute above, gradually enlarging to middle and thence rapidly to base: outer lip thickened, prolonged, terminating above in an acute point, which is sometimes free, inner edge neatly crenulated, external margin marked with fine, longitudinal lines; columellar lip coated with a thin callus, and bearing below two prominent flexuous folds, with a smaller one in the interval between. Surface with extremely fine lines of growth, and a few revolving striæ at base, which are scarcely visible to the naked eye.

Length, 0.23 inch; width, 0.15.

Marly clay group, bluffs of Red River, Lamar County.

G. G. Shumard and A. Roessler collectors.

R. ACUTISPIRA, (n. sp.) Shell small, elongate-ovate, polished, length not quite double the width; spire elevated, conical, acute at tip; volutions six and a half or seven, gently convex and marked at the upper margin with a narrow brown band; body volution moderately ventricose; suture linear, distinctly defined; aperture occupying about half the total length of the shell, acute above, rounded below and notched by a short sinus; outer lip with a narrow reflected margin and terminating above in a narrow produced angle; columellar lip coated with a thin limy deposit and bearing below two prominent sinuate lamellar folds; surface with extremely fine striæ of growth, crossed below the middle of the body volution with two distant, slightly impressed revolving lines, and at the base with five or six close striæ.

Length, 0.26 inch; width, 0.14; spiral angle 59°.

This is a remarkably pretty species, and readily distinguished from the preceding, by its greater proportionate length, more acute spire, and by the revolving lines of the body volution. I have seen but a single example of the species.

Red River, Lamar County, in marly clay group.

Dr. G. G. Shumard collector.

Genus SOLIDULA, Fischer.

S. RIDDELLI, (n. sp.) Shell small, moderately thick, elongate-ovate; length about double the height; spire short, composed of convex whorls (number unknown); spiral angle convex; last volution widest about the middle, narrowly rounded at the inferior extremity; suture deeply impressed, linear; aperture narrow, elongate, terminating above in a sharp angle; surface elegantly marked with fine lines of growth, and numerous, distinctly impressed, revolving, punctate striæ, alternating with finer and shallower ones. The striæ are not so wide as the intervals between, and on the body volution they amount to nine or ten in number.

Length, 0.48 inch; width, 0.23.

This species may be compared with *S. attenuata* of Meek and Hayden, but is proportionally wider and the revolving striæ are coarser.

Found in the Ripley Group, Navarro County. This species is dedicated to Dr. W. P. Riddell, of the Texas Geological Survey.

Genus TORNATELLA, Lamarck.

T. TEXANA, (n. sp.) Shell small, thin, ovate, somewhat polished; spire short, enlarging rapidly from apex, spiral angle 78°; volutions four and a half or five, rounded; last one large, ventricose; suture sharply impressed, linear; aperture narrow, subovate, strongly rounded below and narrow above, about as long again as wide, and a little longer than the width of the shell; outer lip sharp; columellar lip with a notch near the middle, and a distinct, twisted, oblique fold just below; surface marked with very fine striæ of growth, crossed with fine, sharply impressed revolving punctate striæ, close together on the upper and lower portions of the body volution, and separated by wide equidistant spaces on the middle. The striæ of growth are most prominent on the upper part of the body volution.

Length, 0.28 inch; width, 0.15; length of aperture, 0.17.

Lower Cretaceous, Red River, Lamar County.

Dr. G. G. Shumard collector.

Genus CYLICHNA, Lovén.

C. STRIATELLA, (n. sp.) Shell elongate-ovate, rounded at apex, nearly elliptical, length almost double the width; spire umbilicate; aperture narrow, arched, with subparallel sides above the middle and gradually enlarging below to near the base, where it is again slightly narrowed; umbilicus closed by the callus of the columella; surface marked with fine lines of growth, and from fifty-six to sixty distinct, revolving striæ much narrower than the raised intervening spaces.

Length 0.90 inch; width, 0.48.

Ripley Group, Navarro County.

Collected by Dr. S. S. Riddell.

C. SECALINA, (n. sp.) Shell small, subcylindrical, rounded at inferior extremity, subtruncate above, length more than double the width; spire umbilicate, aperture narrow, widest below, slightly expanded above, and prolonged a little above the summit of the body of the shell; umbilicus closed; surface with very fine striæ of growth, and fine revolving striæ, which are more distinct near the extremities than the middle of the shell, spaces between irregular, but broader than the striæ.

This shell may be readily distinguished from the preceding by its narrow, subcylindrical form, finer striæ and smaller size.

Ripley Group, Corsicana, Navarro County.

C. MINUSCULA, (n. sp.) Shell very small, thin, subovate, narrowly rounded below, subtruncate above, length about double the width; spire umbilicate; aperture narrow above, and expanding somewhat rapidly below the middle; outer lip thin, straight, nearly parallel with the long axis of the shell, except at extremities, where it is curved; umbilicus very minute circular; surface polished and marked with very fine, feebly impressed lines of growth.

Length of largest specimen in the State Collection, 0.18 inch; width, 0.10; greatest width of aperture, .04.

Lower Cretaceous, Red River, Lamar County.

Dr. G. G. Shumard collector.

Genus SCALARIA, Lamarck.

S. FORSHEYI, (n. sp.) Shell conical, turreted; spire elevated; volutions about seven, strongly rounded, and separated by a deeply impressed suture; body volution neatly rounded beneath; aperture ovate, slightly oblique to the long axis of the shell, a little longer than wide; columellar lip with a moderately strong callus, which almost entirely closes the umbilicus; surface elegantly ornamented with prominent, rather sharp, longitudinal ribs, with very fine, filiform lines between, crossed by fine, raised, revolving lines, and finer ones in the intervals, giving to the surface a finely cancellated character. The number of ribs on the body volution is from twenty-two to twenty-five.

Length, 1.03 inch; width, 0.50; length of aperture, 0.35; width of same, 0.21.

But one specimen of this very handsome species was found by Dr.

G. G. Shumard in the Ripley Group, at Chatfield Point, Navarro County.

Named in honor of Col. C. G. Forshey, Superintendent of the Texas Military Institute.

Genus FICUS, Klein.

F. (Pyrifusus) GRANOSUS, (n. sp.) Shell subpyriform, height and width about equal; spire very much depressed, acute at apex; volutions four, gently convex; upper two thirds of last one very large, ventricose, flattened above and gently convex on the side, lower third suddenly contracted; aperture semielliptical, longer than wide; surface elegantly ornamented with prominent longitudinal ribs, crossed by prominent revolving lines, forming small granules at points of intersection. On the last volution of the largest specimen before me, there are eight revolving lines and eighteen longitudinal ribs. The expanded portion of the same specimen is obtusely subangulated above and below. The spire is proportionally more depressed in young individuals.

Length, one inch; length of aperture, 0.90.

A few examples only of this fine species were discovered in septariæ of the Ripley Group, at Chatfield Point, Navarro County.

Collected by B. F. and G. G. Shumard and W. P. Riddell.

Genus TURRITELLA.

T. CORSICANA, (n. sp.) Shell large, thick, elongate-conical; spire much elevated, gradually tapering to a sharp point; volutions ten to twelve, regularly increasing in size, flattened convex; last one flattened below; suture distinctly defined, situated at the bottom of a profound channel; surface marked with three prominent, sharp, revolving carinæ, separated by deep channels, which are nearly double the width of the carinæ. Besides the main carinæ a fourth very small carina is found at the base of the volution, just above the suture. The volutions are also crossed by numerous, extremely fine, flexuous striæ of growth.

Length, 2.60 inches; diameter of last volution, 0.84; spiral angle, 20°.

Resembles in some respects *T. Tippana*, Conrad, but in that species there are only two revolving carina, while ours is marked with three.

This well-marked species occurs in great abundance in septariæ of the Cretaceous Formation, near Corsicana and Chatfield Point, Navarro County, but it is quite difficult to procure perfect specimens.

T. WINCHELLI, (n. sp.) Shell of moderate size, elongate-conical, gradually tapering from base to apex; volutions nine to ten, gently convex; last one convex beneath; suture distinct, situated in a moderately deep channel; aperture subquadrate, longer than wide;

surface of volutions of spire bearing three, moderately prominent, rounded, revolving carinæ, with fine, elevated, revolving lines, in the interspaces. In the specimen under examination, there are two of these lines, between the upper and middle carinæ, one between the middle and inferior and two in the sutural channel. The last volution has four carinæ, and the space between the upper two, is wider than betweeen the inferior ones, and bears two fine, revolving lines.

Spiral angle, 16°; length, 1.50 inch; width at base, 0.45.

Occurs with the preceding species.

Dedicated to Professor Winchell, State Geologist of Michigan.

Genus PLEUROTOMA, Lamarck.

P. TEXANA, (n. sp.) Shell small, elongate-conical, very slender, tapering gradually to an acute point; volutions fourteen to fifteen, moderately convex; last one flattened convex beneath; suture deeply channelled; aperture subcircular, approaching subquadrate; outer lip thin, strongly sinuate; umbilicus closed; surface of volutions marked with numerous, unequal, moderately distinct, raised revolving lines, of which three or four are more prominent than the others, also with fine, very flexuous longitudinal lines of growth.

Spiral angle variable, from 15° to 18°; length, 0.58 inch, width, 0.16.

This fine little species was found in considerable abundance at a single locality near Red River, Lamar County, in some Cretaceous strata. It is associated with *Cucullæa millestriata* and *Scalaria Lamarensis*.

Genus SCALARIA, Lamarck.

S. (Scala) LAMARENSIS, (n. sp.) Shell small, turriculate; spire elevated, and enlarging somewhat gradually to apex; volutions five or five and a half, rounded; last one angulated and carinated below and flattened beneath; suture deeply impressed; aperture nearly circular, subtruncate below; surface ornamented with very prominent, strong, rounded, longitudinal folds, separated by specimens double their width. The under surface of the last volution is marked only with very fine revolving and longitudinal striæ, the folds not being prolonged beyond the carina. The number of folds amounts to ten on the inferior turns.

Spiral angle, 33°. length, 0.27 inch; width, 0.11.

Occurs with the preceding species. Bluffs of Red River, Lamar County.

S. (Scala) BICARINIFERA, (n. sp.) Shell small, turriculate; spire moderately elevated; volutions six, strongly rounded, last one moderately ventricose, rounded beneath; suture deeply impressed; aperture circular or slightly ovate; lip thin, margin everted before; surface ornamented with prominent, longitudinal folds, more slender than those of the preceding species, and of which there are sixteen on the inferior whorls; base of last volution having two revolving, rounded, varicose carinæ and several fine revolving raised lines between the carinæ and columella. The longitudinal folds do not cease at the carinæ as with the preceding species, but are continued to the columella.

Spiral angle, 32°; length, 0.25 inch; width, 6.13.

Distinguished from the preceding species by its smaller and more numerous longitudinal folds, and its two revolving carinæ at base.

Locality same as the last.

Genus PLEUROTOMARIA, Defrance.

P. AUSTINENSIS, (n. sp.) Shell large, depressed conical, spire short, very rapidly expanding from apex; volutions five, convex; last one subangulated below, and very gently convex beneath; an obscure, rounded, revolving ridge near the suture, and a narrow, carina (band of sinus) a little above the middle, carina quite prominent on the anterior half of the volution and becoming nearly obsolete, before reaching the spiral turns; umbilicus deep, exhibiting the inner volutions, broad, nearly as wide as the diameter of the last volution at aperture; suture distinct.

The only example we have found of this species is a cast, which, on the anterior portion of the last volution, exhibits traces of fine revolving striæ.

Diameter at base, 2½ inches; spiral angle, 102°. Austin Limestone near city of Austin.

Genus ANISOMYON, Meek and Hayden.

A. HAYDENI, (n. sp.) Shell patelliform, very thin; length greater than the width; apex situated nearer the posterior margin, curved slightly forward; base oval; anterior side forming a gently convex curve from apex to front margin; posterior side nearly straight, forming, with the anterior side, an angle of about 115°; sides nearly flat, sloping at an angle of 94°. Surface marked with fine, concentric lines of growth, and some indications of obscure concentric folds.

Length, 13 lines; width, 11 lines; height, 6 lines.

Nearly related to *A. patelliformis*, Meek and Hayden, but is not so elevated and the apex is nearer the centre.

Several species of this genus have been discovered by Messrs. Meek and Hayden in the Cretaceous strata of Nebraska, but this is the only species hitherto observed in southern localities.

Chatfield Point, Navarro County.

Dedicated to Dr. F. W. Hayden, one of the founders of the genus.

Collected by Dr. G. G. Shumard.

Genus SCALPELLUM, Leach.

S. INÆQUIPLICATUM, (n. sp.) Shell depressed conical, length about one third greater than the height; apex situated nearer the anterior margin than the centre; surface marked with prominent unequal folds or costæ, which commence at the beak and radiate to the lateral and front margins; posterior side smooth, or marked with one or two obscure, longitudinal elevations. The number of ribs on the only specimen I have seen amounts to eleven, those of the left side being smaller and more numerous than those of the right.

The specimen is so embedded in the matrix that the interior characters cannot be made out. It is therefore only placed provisionally in the above genus.

Length, 1¼ inch; height, 7½ lines.

Ripley Group, near Chatfield Point, Navarro County,

Collected by Dr. G. G. Shunard.

CONCHIFERA.

Genus PHOLADOMYA, Sowerby.

P. LINCECUMI, (n. sp.) Shell below medium size, very thin, subpyriform, length double the width, width and thickness about equal, gibbous and broadly rounded before, narrowing towards the posterior margin, which is rounded and gaping; buccal margin sinuate; cardinal margin straight; beaks but little elevated, rounded, situated near the anterior margin; surface ornamented with about thirty radiating raised lines, crossed by narrow concentric, sinuate folds and five striæ of growth. The radiating lines are closer together on the middle region of the shell than at the extremities, and are frequently interrupted by the furrows between the folds; the whole surface, except a small space at each extremity, presenting a beautifully cancellated appearance.

Length, 1.12 inch; width, 0.58.

We have found but a single specimen of this species in the Ripley Group at Corsicana, Navarro County.

The species is dedicated to Dr. Gideon Lincecum of Long Point, Washington County, to whose liberality the State Cabinet is indebted for a number of interesting fossils.

Genus PANOPÆA, Menard.

P. SUBPLICATA, (n. sp.) Shell large, subovate, approaching subquadrate, length in young individuals nearly double the width, becoming proportionally shorter with age; anterior extremity strongly rounded, gaping; anal end broadly truncate, rounded above and below, widely gaping; cardinal and pallial margins subparallel; beaks situated a little nearer the anterior than the posterior end, depressed, incurved; surface marked with fine concentric lines of growth and wrinkles, which are most distinct on the upper part of the shell.

Length of full-grown shell, 3½ inches; height, 2⅛; thickness 20 lines.

This species is closely allied to *P. plicata*, D'Orbigny, from which it is distinguished by its larger size and wider and more regularly rounded buccal margin.

Found in Septariæ of the age of the Ripley Group (Cretaceous) at Chatfield Point, Navarro County.

Genus Ostrea.

O. Owenana, (n. sp.) Shell rather large, a little oblique, ovate, narrow near the beak and expanding towards the front, which is strongly rounded, lateral edges very gently convex. Superior valve moderately thick, convex, rather elevated, greatest convexity at the middle and near the front; back obtusely rounded and more or less turned to one side; hinge area very large, triangular and deeply excavated in the middle; inferior? valve very thick in the umbonial region, and gradually diminishing in thickness to the front, which is strongly curved downwards; exterior flattened convex in the umbonial region and with a broad shallow depression extending from near the middle to the point; hinge area large, subquadrate, wider than long, with sides subparallel and its inner margin strongly arched in the middle and concave on either side; surface of both valves marked with distant, concentric folds, and imbricating lamellæ of growth.

This species is tolerably uniform in its characters. The lower valve is several times thicker than the upper, and viewed in profile presents a distinct sigmoidal outline. The hinge areas are marked with longitudinal striæ, crossed with flexuous transverse striæ.

The *O. Owenana* is related to *O. Leymerii*, Deshayes, but differs from that species in having the superior valve much more convex, while the inferior valve is relatively much thicker.

Length, 4⅛ inches; greatest width, 3 inches; greatest thickness of inferior valve, 1¼ inches.

Ripley Group, Chatfield Point, Navarro County.

Dedicated to Professor Richard Owen, of the Geological Survey of Indiana.

Ostrea Lyoni, (n, sp.) Shell variable, oval oblong, or suborbicular, oblique, length usually a little greater than the width, front and sides rounded; valves thin, unequal; superior valve shorter and less convex than the inferior, moderately convex in the umbonial region, and flattened towards the front; inferior valve usually rather strongly convex, but variable in this respect, interior deeply excavated; beak acute, straight or turned to one side; surface marked with imbricating lamellæ of growth; muscular impression shallow, semi-elliptical; inner margin of the valves neatly crenulated in well-preserved specimens.

Length, 2¼ inches; width, 2 inches.

This species is closely allied to *Ostrea acutirostris*, D'Orb., but its transverse diameter is greater, and the back less acute.

Lower Cretaceous, Pine Bluff, Red River County. Collected by Dr. G. G. Shumard.

O. PLANOVATA, (n. sp.) Shell small, thin, irregularly ovate, narrow at rostral end, and somewhat rapidly expanding to the front; length about one fourth greater than the width; inferior valve flattened beneath, lateral edges of rostral half turned upwards; pallial margin broadly rounded and reduced to a sharp edge, right side straight or very slightly convex; left side broadly arcuate; beak truncated or obtusely rounded, curved to the right; point of attachment to foreign substances indicated beneath by an irregular excavation; cavity of valve somewhat deeply excavated with the raised margin finely crenulated; muscular impression approaching semi-elliptical, and very slightly impressed; hinge area small, broad, triangular and with a narrow, distinctly impressed deltoid excavation, which equals in width the raised space on either side; surface marked with thin concentric lamellæ of growth; superior valve unknown.

Width from back to pallial margin, 1.36; from side to side, 0.92.

Navarro County, near Dresden, in light gray shale, supposed to be of the age of the Austin Limestone.

Genus CRASSATELLA, Lamarck.

C. LINEATA, (n. sp.) Shell somewhat trapeziform, gibbous, length about one fourth greater than the width, valves thick; buccal end short and narrowly rounded; posterior margin obliquely subtruncate and subangulated at inferior extremity; posterior cardinal margin very slightly arched, forming, with the anal margin, an obtuse angle; pallial margin gently rounded; umbonial region very gibbous; a sharp carination extending from the posterior side of the beak to the postero-inferior angle, and limiting an obtusely triangular space behind, which is excavated above and plane below; beaks prominent, elevated, strongly incurved, situated between the middle and anterior margin; surface marked with from ten to twelve sharp concentric lines, separated by spaces which gradually widen from beak to pallial margin. The spaces are also marked with fine, transverse lines of growth.

Length, 1.57 inch; width, 1.20; thickness, 1.00.

This fine species occurs very abundantly in Septariæ of the Cretaceous Period. Ripley Group, in the bed of a small branch, near Corsicana, Navarro County.

C. (?) PARVULA, (n. sp.) Shell small, thick, subovate, triangular, very gibbous; anterior margin strongly rounded; posterior end obliquely truncated from beak to postero-inferior extremity, and forming with the pallial margin an angle of about 50°; umbonial region very gibbous; posterior area rather broad-ovate, forming with the side of the valve, nearly a right angle, and marked with an obtusely rounded ridge, which extends from behind the beak to the postero-inferior extremity; beaks elevated, incurved, situated between the middle and anterior extremity; surface marked with irregular, concentric folds and fine striæ of growth.

I have not been able to see the hinge of this species, and it is, therefore, placed in the genus *Crassatella*, with a mark of doubt.

Length, 0.40 inch; height. 0.30; thickness, 0.28.

Lower Cretaceous, Red River, Fannin County. Collected by Dr. G. G. Shumard.

Genus CUCULLÆA, Lamarck.

C. MILLESTRIATA, (n. sp.) Shell somewhat trapeziform, gibbous, rather thin, a little longer than wide, narrow before and broad posteriorly; cardinal extremities rounded; margin straight; anterior margin neatly rounded; posterior margin obliquely truncated, and strongly rounded at inferior extremity; pallial margin gently convex; beaks moderately elevated, rather sharp at tip and located a little before the middle; surface marked with numerous, very fine concentric striæ of growth and radiating lines; hinge with from thirteen to fourteeen strong teeth, arranged in an arcuate series; ligamentary area, very narrow, lanceolate; posterior muscular impression bounded internally by a thin elevated septum.

Length, 0.88 inch; width, 0.70; thickness, 0.52.

Lower Cretaceous, Red River, Lamar County.

Dr. G. G. Shumard and A. Roessler collectors.

Genus NUCULA, Lamarck.

N. BELLASTRIATA, (n. sp.) Shell small, subovate, or more or less triangular, transverse; umbonial region gibbous, sloping to posterior end and base; beaks near the anterior extremity, more or less elevated, pointed (in cast); buccal side very short, rounded, obtusely subangulated; posterior side cuneate; base gently arched; cardinal border very slightly convex posteriorly, anterior muscular impression broad, subovate; hinge with from eighteen to twenty slender, closely-set teeth behind, and from eight to ten before the beaks. Surface elegantly ornamented with fine concentric lines of growth and numerous fine crowded striæ, which commence at the beaks and radiate to the margins.

Length, 0.49 inch; width, 0.30; thickness, 0.24.

This is a very handsome little species and quite distinct from any known to me from American strata.

Red River Bluffs, Fannin County. According to Dr. G. G. Shumard it is very abundant in the Septariæ beds of the Marly Clay Group.

Genus NEÆRA, Gray.

N. ALÆFORMIS, (n. sp.) Shell somewhat wing-shaped, or elongate-subovate; anterior side short, strongly rounded; umbonial region very gibbous; anterior slope falling abruptly to the margin, flattened convex; posterior side much elongated, suddenly contracted and pointed?; posterior cardinal margin straight or slightly sinuate; beaks elevated, incurved, acute, situated a little posterior to the widest part of the shell and directed slightly backwards; pallial sinus short, obtusely rounded above; surface marked with irregular fine striæ of growth.

Length, 0.94 inch; width, 0.58; thickness, about 0.38.

Resembles *N. ventricosa* and *N. Moreauensis*, Meek and Hayden, (*Proc. Acad. N. Sci. Phil.* vol. VIII. p. 83), but is a much larger species, and the pallial sinus is not triangular as in *N. ventricosa*. It may be also compared with *N. caudata*, Koch and Dunker, sp. (*Verst. Deutsch. Oölithgebild*, p. 31, pl. 2, fig. 7), from which it differs chiefly in its greater size.

Bluffs of Red River, Fannin County.

Dr. G. G. Shumard, collector.

Genus AVICULA, Klein.

A. IRIDESCENS, (n. sp..) Shell (cast) large, approaching subcircular, very inequivalve, as wide as long; gibbous, cardinal margin equal to the whole length of the shell, straight except at posterior extremity, which is elevated; buccal, pallial, and anal margins rounded, and together describing about three fourths of a circle; anterior wing produced, short, triangular; right valve more gibbous than the left, greatest convexity between the middle and beak; beak moderately elevated above the cardinal margin, located between the middle and front; left valve regularly rounded, most convex near the middle; muscular scars numerous, indicated in the cast by a series of small granules and impressions, commencing at the cardinal margin in front of the beaks, and passing in a curve downwards and backwards.

A portion of the nacre adheres in several of the casts in the State Cabinet, retaining still the original beautiful iridescent hues. We have not been so fortunate as to find any specimens exhibiting surface characters.

Length, 2.64 inches; thickness, 1.48.

Clearly related to *A. Pedernalis*, Roemer, (*Kreid. Texas.* p. 61, tab. 8, fig. 1 *a*, *b*,) from which it is distinguished by its unequal valves, greater proportional width, and smaller muscular scars.

Lower Cretaceous, head of Pine Cr. Lamar County.

Dr. G. G. Shumard collector.

Genus CYPRINA, Lamarck.

C. LAPHAMI, (n. sp.) Shell small, subtriangular, longer than wide, broad anteriorly and cuneate behind; umbonial region very gibbous; posterior slope falling abruptly to the margin, and almost perpendicular to the sides; buccal side short, narrowly rounded; anal side long, truncate at extremity, declining in a very gentle curve from beak to posterior end; pallial margin gently convex; beaks near the anterior margin, elevated, incurved, pointed.

There are a number of specimens of this species before me, but the substance of the shell in all of them has been changed into pulverulent chalk, which does not preserve any of the surface markings.

Length, 0.40 inch; width, 0.32; thickness, 0.27.

Resembles *C. Saussuri* (Brong. sp.), but is a much smaller species.

Bluffs of Red River, Fannin County. Named in honor of I. A. Lapham, Esq., of Milwaukie, Wisconsin.

Dr. G. G. Shumard collector.

Genus LUCINA, Bruguière.

L. PARVILINEATA, (n. sp.) Shell broadly ovate or subcircular, a little longer than wide, compressed; valves very gently convex; buccal, pallial, and anal margins rounded and forming a continuous curve; anterior cardinal margin longer than the posterior and gently arcuate; beaks small, moderately elevated, directed backwards and situated nearest the anterior end. Surface marked with closely crowded, concentric striæ, and obscure radiating lines on the anterior and posterior slopes.

Length, 0.74; width, 0.70; thickness, 0.26. We have seen but one example of this very neat species. It was found in the Ripley Group, near Corsicana, Navarro County.

S. B. Buckley collector.

Genus ANATINA, Lamarck.

A. SULCATINA, (n. sp.) Shell large, ovate, thin, inequivalve, very inequilateral; length not quite equal to the width; anterior end broadly rounded; posterior end short, contracted, narrowly rounded; pallial margin gently convex; beaks small, but little elevated, situated posterior to the middle; cardinal margin straight, or very slightly convex before the beaks, and very slightly arched behind: a narrow, distinctly impressed and very gradually expanding sulcus, extending from beak to pallial margin, which it cuts a little behind the middle;

surface with from twenty to twenty-five rounded, concentric folds, becoming indistinct on the posterior part of the shell. There are also many fine, concentric lines of growth visible to the naked eye.

Length, $3\frac{1}{2}$ inches; width, $1\frac{1}{2}$ inches; thickness $6\frac{1}{2}$ lines.

Ripley Group, Chatfield Point, Navarro County.

A letter was read from Mr. I. A. Lapham, of Milwaukee, announcing that massive datholite, from Lake Superior, (see present volume of Proceedings, p. 61,) had been previously analyzed and described in Silliman's Journal, vol. XXVIII. 1859, by Mr. J. D. Whitney.

A letter was read from Mr. Amos Binney to the President, dated August 15, 1861, resigning the office of Treasurer of the Society, which he had held for the last four years, as he had entered the service of the United States.

Major Binney's resignation was accepted, and on motion of Dr. C. T. Jackson, the thanks of the Society were voted to him for the able and efficient manner in which he had discharged the duties of Treasurer during the last four years.

The Council, during the vacation of the Society, having voted to nominate Mr. T. T. Bouvé as a candidate for the office of Treasurer, he was unanimously elected.

The Corresponding Secretary read the following letters, namely—

From Dr. S. Weir Mitchell, Philadelphia, January 29; James Anderson, February 19; Charles H. Hitchcock, Amherst, April 17; accepting membership.

From T. Apoleon Cheney, Cherry Creek, N. Y., in behalf of the Georgic Library of that place, asking for the publications of the Society; the Entomologischer Verein zu Stettin, October 15, 1860, in acknowledgment of a donation from the Society, and promising to reciprocate; Dr. D. F. Weinland, Frankfort a M. announcing donation of "Zoölogische Garten," Nos. 1–12; H. Crosse, editor of the Journal de Conchyliologie, Paris, May 1, proposing an exchange of publications; Société Entomologique de France, June 10, acceding to a proposition on the part of the Society for an exchange of publications. From the Société Royale des Sciences de Liége, July 12, 1860; the K. Universitat, Göttingen, November 7, 1860; the Académie des Sciences, Paris, November 2, 1860; the K. Akademie der Wissenschaften, Wien, December 18, 1860; the Royal Geographical Society, London, January 10 and March 2, 1861; the Naturhistorischer Verein, Bonn, January 23, 1861; Regents of the University of New

York, Albany, February 11, April 13, and June 2; Lyceum of Natural History, New York, February 25, and June 24; Verein für Naturkunde in Nassau, Wiesbaden, March 5; Real Academia de Ciencias, Madrid, March 30; President of Bowdoin College, April 13; acknowledging the receipt of the Society's publications. From the Société Royale des Sciences de Liége, July 12, 1860; Académie Royale des Sciences de Stockholm, November 18, 1860; Royal Geographical Society, London, January 18, 1861; K. Preussische Akademie, February 28, 1861; Verein für Naturkunde in Nassau, Wiesbaden, March 5, 1861; K. Akademie der Wissenschaften, Wien, February 26 and April 16, 1861, and Gustav Gräbner, Leipzig, March 28, 1861, presenting various publications. From the Academia delle Scienze dell' Istituto di Bologna, September 4, 1860; K. Preussische Akademie der Wissenschaften, Berlin, October 18, 1860; Société de Physique et d'Histoire Naturelle de Genève, November 1, 1860; K. Gesellschaft der Wissenschaften, Göttingen, February 21, 1861, acknowledging the receipt of the Society's publications and presenting their own. From the Geological Survey of India, Calcutta, November, 1860; K. Physikalisch.-œkonomische Gesellschaft, Königsberg in Pr., November 13, 1860 and May 6, 1861; Naturforschende Gesellschaft zu Bamberg (Bäyern), December 15, 1860; Verein zür Beförderung des Gartenbaues, Berlin, February 18, 1861; Dublin University Zoölogical and Botanical Association Botanical Society of Canada, August 9, 1861, presenting their various publications and desiring an exchange. K. Hof-und Staats-Bibliothek, München, December 20, 1860; Royal Society of London, March 18, 1861, acknowledging the receipt of the Society's publications, and asking that deficiencies may be supplied, and presenting various publications. K. Bayerisch. Akademie der Wissenschaften, München, December 20, 1860, acknowledging the receipt of the Society's publications, and asking that missing numbers may be supplied.

September 18, 1861.

The President in the Chair.

Dr. Bacon exhibited five specimens of siliceous calculi from the urinary organs of animals; four from the ox, and one from the sheep; and read the following account of these and other cases:—

SILICEOUS URINARY CALCULI. By JOHN BACON, M.D.

Genuine siliceous calculi are so extremely rare that the following list includes all the cases which I have been able to find on record of the occurrence of silica in calculi in determinate amount. Those in which the largest proportions were found are placed first. A fuller account than can be given here, will be found in a paper in the Boston Medical and Surgical Journal of June 20, and another which will appear in the same Journal of September 19.

I. A calculus from the urethra of a lamb. Analyzed by Lassaigne in 1830. Proportion of silica about $\frac{8}{10}$. Remainder, animal matter, and a trace of oxide of iron. This calculus is usually reported as wholly composed of silica.

II. A calculus from the urethra of an ox, killed on account of retention of urine caused by it. Analyzed by myself. Contains 80 per cent. of silica, with a little carbonate and phosphate of lime, and animal matter. In this, and in other siliceous calculi, analyzed by me, the silica occurs, partly at least, as a *hydrate*.

III. A collection over six hundred little spherical calculi from an ox-bladder. Analyzed by myself. Silica forms 78 per cent.; with water, and a little chloride of potassium, and other potash and soda salts. It is not uncommon to find calculi in ox-bladders, resembling these in appearance, but composed of carbonate of lime.

IV. A calculus, analyzed by Fourcroy and Vauquelin, about 1798, and stated to be from the human bladder. Silica formed about $\frac{2}{3}$ of the nucleus and two inner layers, and was not present in the three outer layers.

V. A calculus from the kidney of a sheep, analyzed by myself. It contains about 50 per cent. of silica; with carbonate of line, carbonate of magnesia, and organic matter.

VI. A calculus from the urethra of an ox, analyzed by myself. The animal died from rupture of the bladder, caused by the impacted calculus. Silica forms about 43 per cent. The other constituents are 29 per cent. of carbonate of lime; 5 per cent. of carbonate of magnesia; some animal matter; with water, and traces of phosphate of lime and oxide of iron.

VII. A calculus from the urethra of a bull, analyzed by Wurzer in 1833. It had the size and form of a small bean, and contained 38.5 per cent. of silica, and 36.3 per cent. of carbonate of lime.

VIII. A calculus from the urethra of an ox, whose death was caused by it. Analyzed by Wurzer in 1822. In size and shape, it resembled a small bird's egg. Silica formed 38.2 per cent, and carbonate of lime 36.8 per cent.

IX. A collection of four little calculi from the kidney of an ox. One, analyzed by Mr. R. Crossley, several years since, consisted mostly of carbonate of lime, with a trace of phosphate of lime and peroxide of iron, some animal matter, and also silica. The proportion was not determined. Another, recently analyzed by myself, is composed of carbonate of lime chiefly; with a little carbonate of magnesia and traces of phosphate of lime and oxide of iron; also, animal matter, and sufficient silica to yield a porous, friable mass when the other constituents are removed. I estimate the proportion as about $\frac{1}{4}$ of the weight of the calculus.

X. A calculus from the bladder of a fresh-water turtle, analyzed by Lassaigne in 1844. The chief constituent was phosphate of lime, amounting to 56 per cent.; $4\frac{3}{4}$ per cent. of silica occurred, in transparent grains.

XI. A large, ovoid calculus, removed by lithotomy from the bladder of a man. Analyzed by Wurzer in 1806. It contained 1 per cent. of silica; with about 75 of uric acid, 17 of phosphate of lime, and animal matter.

XII. A calculus, weighing nearly fifteen ounces, from the human kidney. Analyzed by Koninck in 1836. The principal constituent was triple phosphate, and the proportion of silica was $\frac{1}{3}$ of one per cent.

I cannot learn that any of the above specimens have been preserved in any cabinet, except the five now exhibited. Three of these belong to the Cabinet of the Boston Society for Medical Improvement, and two to the Warren Anatomical Museum at the Harvard Medical College. About a dozen additional instances are reported, of the occurrence of a little silica, mostly traces only, in calculi from the ox, the horse, and the human subject. All these cases are noticed in my article in the Medical and Surgical Journal of last June.

Dr. Winslow alluded to the jet of fluid which he had often seen escape from the green cocoanut, fresh from the tree, when the eye is punctured; this he believed was due to the pressure arising from the upward motion of the sap, or *vis a tergo.* He did not think the nut contained any gas.

Dr. Bacon observed that such a jet might arise either from dissolved gas or a very elastic shell.

Professor Agassiz thought that any pressure from below, or *vis a tergo*, impossible in a nut with a hard shell and not in direct communication with the stem; the inner meat becomes less and less solid from without inward, and in contact with the milk is very fluid; as the meat consists of cells, which would be most flattened by pressure toward the circumference, perhaps the elasticity of these flattened cells might explain the jet.

Professor Rogers regarded the accumulation of a highly compressed gas the most probable explanation.

A letter was read from Oneida County, New York, giving a description, and an account of the ravages of an *Aphis*, on the wheat, barley, and oats of that district.

Mr. Scudder remarked that it was evidently the same as had been observed in Central Massachusetts, where, however, it was not supposed to have committed any great injury; it was generally believed to be the *A. granaria* (Fabr.), brought to this country with the grain distributed from the Patent Office. It had appeared in great numbers, and in isolated localities far removed from each other. Another species had done great damage to the cherry trees.

Another insect pest, the army worm, had appeared this year in immense numbers, though not for the first time; according to authors there have been four or five previous visitations; as the myriads of this year must have proceeded from eggs laid last year, it must be that a far greater number than usual of these eggs have been hatched, and that their natural enemies (small *hymenoptera*) have been much less abundant. It is a moth of the *noctua* tribe. The so-called army worm of the South, which attacks the cotton plant, is a different species.

Some fossil corals from the drift at the Readville station, Dedham, Mass., were presented by Dr. H. Bryant.

According to Professor Agassiz, these are identical with the madrepores now found in Florida, and, as such are foreign to this region, must have been brought here by human and not by geological agency.

Messrs. William M. Gabb, of Philadelphia; Prof. Henry A. Ward, of the University of Rochester, N. Y.; and N. H. Bishop, of Pointville, N. J., were elected corresponding members; and Mr. Carleton A. Shurtleff, of Brookline, a resident member.

DONATIONS TO THE MUSEUM.

September 4, 1861. Several species of land shells from Cuba; by Dr. Gundlach. Shells from Old Point Comfort, Va., and young clupeoids from the Potomac River; by Dr. S. Kneeland, Jr.

September 18. Human skeleton; head of an Egyptian mummy from Thebes; skeleton of a dog; several human crania; elephants' teeth, miscellaneous human bones, skulls and horns of ruminants, minerals, and weapons of Pacific islanders; by Mrs. J. F. W. Lane. Fossil corals (madrepores), from Readville station, Dedham, Mass.; by Dr. H. Bryant. Specimens of argillaceous clay, from Bladensburg, Md.; by Dr. S. A. Green.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPT. 30, 1861.

Index to Catalogue of Books in the upper Hall of the Public Library of the City of Boston. 8vo. Boston, 1861. *From the Trustees of the Public Library.*

Contributions to the Comparative Myology of the Chimpanzee. By Burt G. Wilder. 8vo. Pamph. Cambridge, 1861. *From the Author.*

Garten-Nachrichten. 52 numbers. 4to. Pamph. By Dr. K. Koch. *From the Author.*

C. M. Wheatley. On the Mesozoic Red Sandstone of the Atlantic Slope. 8vo. Pamph. *From the Author.*

Notes on new species of Microscopical Organisms from the Para River, S. America. By Loring W. Bailey. 8vo. Pamph. Cambridge, 1861. *From the Author.*

Illustratio systematis Sexualis Linnæi per Johannem Miller. Folio. London, 1744. *From C. J. Sprague.*

Synopsis of the Mollusca of the Cretaceous Formation, &c. By W. M. Gabb. 8vo. Pamph. 1861. *From the Author.*

Iconographie Générale des Ophidiens. Par M. Le Prof. Jan. Première Livraison. 2 numbers. Long 4to. Pamph. *From the Author.*

Catalogue of the Astor Library, Q–Z. 8vo. New York, 1861. *From the Trustees of the Astor Library.*

Blicke in das Universum. L. Gruson. 8vo. Pamph. Leipzig.

A. V. Streubel's Naturalien-Sammler. 8vo. Leipzig.

Der Raupen-und Schmetterlingsjäger. 8vo. Leipzig.

Zeitschrift für Medicin, Chirurgie, und Geburtshülfe. Dr. A. W. Varges. XV. Band 1 Heft. 8vo. Pamph. Leipzig, 1861. *From G. Gräbner.*

Annals of the Botanical Society of Calcutta. Vol. I. part 2. 4to. Pamph. 1861.

Memoirs of the Geological Survey of India. Vol. II. part 2. 8vo. Calcutta, 1860.

Proceedings of the Academy of Natural Sciences of Philadelphia. Sigs. 7, 8, 9, and 10. 1861.

Canadian Journal of Industry, Science, and Art; No. 34, July, and No. 35, September, 1861. Toronto.

Canadian Naturalist and Geologist. Vol. VI. Nos. 1–4. Montreal, 1861.

Proceedings of the American Philosophical Society. Vol. VIII. pp. 1–276. 8vo. Pamph.

Transactions of the Royal Irish Academy. Vol. XXIV. Part 1. 4to. Dublin, 1860.

Proceedings of the Entomological Society of Philadelphia. June to August, 1861. 8vo. Pamph.

Silliman's American Journal of Science and Arts. No. 94, July, and No. 95, September, 1861.

Annals of the Botanical Society of Canada. Vol. I. Part I. 4to. Kingston. 1861.

Proceedings of the Royal Society of London. Vols. v. to ix., 1848–1859, and Vol. xi. Nos. 42 and 43, 1860–1861. 8vo. Also Abstract of Papers printed in the Philosophical Transactions of the Royal Society. Vols. i, ii, iii and iv. 4to. 1800–1843. 8vo.

Verhandlungen der K. K. Zoologisch—Botanischen Gesellschaft in Wien. 1860.

Der Zoologische Garten. Nos. 1–6. 1860–61. Vol. ii.

Jahrbücher der K. K. Central-Anstalt für Meteorologisch—und Erdmagnetismus. Von Karl Kreil. vii. Band. Jahrgang. 1855. 4to.

Gelehrte Anzeigen. Vol. xlix–l. 4to. München.

Jahrbücher des Vereins für Naturkunde. Wiesbaden. 8vo. 1859.

Sitzungsberichte der K. Akademie der Wissenschaften. Nos. 22–28. 8vo. Wien. 1861.

Archiv für Naturgeschichte. No. 4. 1860. Vol. xxvi.

Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westphalens. Siebenzehnter Jahrgang, Zweite Hälfte. Bonn. 1860.

Bulletin de la Société de Géographie. Tome xx. 8vo. Paris, 1860.

Proceedings of the Royal Geographical Society of London. Vol. v, Nos. 1 and 2. 8vo. 1861.

Bulletin de la Société d'Histoire Naturelle du Département de la Moselle, 9e cahier. Metz. 1860.

Sitzungsberichte der K. Bayer. Akademie der Wissenschaften zu München. Heft 1–3. 1860. 8vo.

Monatsberichte der K. Preussischen Akademie der Wissenschaften zu Berlin. Aus dem Jahre, 1860. 8vo. 1861. Berlin. Register. *Received in Exchange.*

Annals and Magazine of Natural History. No. 43, for July, and No. 44, for August, 1861. London.

Quarterly Journal of the Geological Society. Vol. xvii. Part 2. 8vo. London, 1861. May.

Explorations and Adventures in Equatorial Africa. By Paul B. Du Chaillu. 8vo. London, 1861. *From the Courtis Fund.*

Index to the Encyclopædia Britannica. 4to. London. 1861.

The Uprising of a Great People. The United States in 1861. From the French of Count Agénor de Gasparin. 12mo. *Deposited by the Republican Institution.*

October 2, 1861.

The President in the chair.

The following paper was presented, a continuation of the one presented January 2, 1861:—

CATALOGUE OF THE MINERALS CONTAINING CERIUM. By DR. WILLIAM SHARSWOOD.

Under the above general title I have continued my "Catalogue of the mineralogical species Allanite," (Proc. vol. VIII, pp. 55–58,) so as to include all the minerals containing this element, whether in sufficient quantity to be termed ores, or merely containing it as a constituent.

YTTROCERITE.
FLUOCERITE.
FLUOCERINE.
ALLANITE, { Allanite. Cerine. Orthite. *Pyrorthite.* Xanorthite. Bagrationite. Uralorthite. Bodenite. Muromontite. }
GADOLINITE.
CERITE.
TSCHEFFKINITE.
MOSANDRITE.
WÖHLERITE.
EUKOLITE.
PYROCHLORE.
PYRRHITE?
FERGUSONITE.
TYRITE.
SAMARSKITE.
POLYMIGNITE.
ÆSCHYNITE.
YTTROILMENITE.
EUXENITE.
CRYPTOLITE.
PHOSPHO-CERITE.
MONAZITE.
LANTHANITE.
PARISITE.

YTTROCERITE.

——— Finbo and Brodbo, near Fahlun, Sweden.—Berzelius, Afh. Sv. Ak. IV. 151. In quartz with Albite and Topaz.

——— Massachusetts.—Jackson, Am. J. Sci. and Art, XLVII, 353. Hitchcock, loc. cit. XLV. 331; XLVII. 351.

FLUOCERINE.

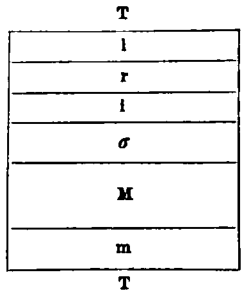
——— Finbo and Brodbo, near Fahlun, Sweden.—Berzelius, Afh. Sv. Ak. V. 56.

——— Bastnäs, Sweden; and Finbo, near Fahlun, Sweden.—Berzelius, Afh. Sv. Ak. V. 64. Hisinger, Sv. Hand. 1838, 189.

ALLANITE.

ALLANITE. Swampscot, Massachusetts.—Mr. David Balch.
——— Rutland, Maine.—Dr. Frederick Aug. Genth.
——— Reading, Pennsylvania.
——— Moriah, Essex County, New York. — Found at this locality by Dr. Charles T. Jackson.

William Haidinger observes, in a letter to me, that the crystals of this mineral were carefully compared with Kokscharow's paper and measurements, and identified in the annexed figure.



Kokscharow ("Materialien zur Mineralogie Russlands") found them in Bagrationite.

The following are synonyms of symbols:

Kokscharow.*	Miller and Miller.†	ANGLES.		Dana.‡
Ti = 99° 23′ 36″	T	010	- - -	O
TM = 115°	i	210	- - -	—
Tm = 137° 40′ 32″	M	100	- - -	$\underline{\dot{2}\dot{2}}$
Tσ = 110° 36′ 24″	m	210	- - -	
Tl = 154° 6′ 48″	σ	310	- - -	
	l	120	- - -	

CERINE. Near Riddarhyttan, in Wesmannland.—G. Rose, Krystallograph.—Chemisches Minn. System, 85.

ORTHITE. In addition to the localities of Orthite, enumerated on page 57, the following are known.

SWEDEN.

GOTHLAND.

Œster-Goethland or Ostrogothia, } Guttenwik. Engelholm.

* Materialien zur Mineralogie Russlands, St. Petersburg, III. p. 344; pl. 58; fig. 12.
† Brooke and Miller, Mineralogy . . . . . 1852; pp. 311–312.
‡ Manual of Mineralogy, 1854, p. 208, f. 402.

SWEDEN.

Upland and Soederupland,	Kulleberg. Marieberg. Danvikstull, Katlbergstrakten, Eriksberg, Bernängen, Langholmen, Carthagobacken, Hessingen,	Near STOCKHOLM.
Soedermannland,	Askeberg.	
Westmannland.	Fernebo-Kirchspiel.	
Wermland,	Agegrufvan.	
Dalarne,	Ferudal.	

NORWAY.

SOEDENFIELD.

Aggershuus, Rödkindholm, near Frederiksvärn.

Christiansand,	Langsev Mine, Barbo Mine, Thorbjörnsbön Mine, Alveholms Mine, Solberg Mine, Aslak Mine, Nul Mine, Braastad Mine, Buön Mine, Narestöe Mine, Barrestved Mine, Nödebröe Mine,	ARENDAL.
	Haneholm, Solberg Mine, Lyngrot Mine,	Near TREDESTRAND.

Scheerer, in his "Commentatio de Fossilium Allanit, Orthite, Cerin, Gadolinitque natura et indole," mentions the following localities for Orthite and Allanite, in addition to those I have already mentioned.

NORWAY.

Ramsfossen, Lofthuus, } near Snarum.

With Albite, Hornblende, Apatit, Quartz.

Brervig.

In Zirconsyenite.

Laurvig.

SWEDEN.

Lallarföd, near Fahlun.
Kongsholmen, near Stockholm.

SÖDERMANNLAND, { Aker.
Kärr — Grufva.
Tunaberg.

WËRMLAND, { Gulsjo.
Malsjo.

FINLAND.

Laurila Sacki.
Hiramdale.
Kimitio.
Sillböhle.
Helsingfors.

BAGRATIONITE. Finland.—v. Kokscharow, Ann. Ch. u. Ph. LXIII. 182. Hermann, J. f. prakt. Ch. XLIV. 206.

URALORTHITE. Miask. — Hermann, v. Leonhard, 1848, 823. Kenngott, Miner. Forschungen, 1844–'49, 209.

BODENITE. Near Marienberg, in the Saxon Mts. — Breithaupt, Ann. Ch. u. Ph. LXII. 273. Kerndt, J. f. prakt. Ch. XLIII. 219.

MUROMONTITE. Mauersberg, near Marienberg in the Saxon Mts. —Th. Kerndt, J. f. prakt. Ch. XLIII. 228–234.

GADOLINITE.

SPLINTERY VARIETY. Flekkéfjord, near Hitteröe, Norway. — Scheerer, Ann. Ch. u. Ph. LXI. 640.

——— Finbo, near Fahlun, Sweden.—Berzelius.

——— Lallarfved, at Fahlun, Sweden. — Scheerer, Inaug. Diss. 35.

——— Brodbo, Sweden.—Berzelius.

——— Kararfvet.—Berzelius.

VITREOUS OR CONCHOIDAL VARIETY. Ytterby.—Berlin, Hartm. Nachricht. 232; Kenng. Uebersicht, 1844–1849, 213.

——— Near Galway, Ireland, (in Trap with Epidote).—Mallet, (W), Ph. Mag. (4) I. 350.

CERITE.

——— Bastnäs.—Cronstedt, (Bastnäs Tungstein,) Abhand. Sch. Ak. 1751, 235. Hisinger, Afh. Kem. och Min. III. 283. Vauquelin, Ann. Mines, v. 412. Rammelsberg, Ann. Ch. u. Ph. CVII. 632.

TSCHEFFKINITE.

——— G. Rose, Ann. Ch. u. Ph. XLVIII. 551 (Tschewkinite). H. Rose, Ann. Ch. u. Ph. LXII. 591: Choubine.

MOSANDRITE.

——— Lammanskaret, Sweden.—Erdman, Jahresb. XXI. 178.

WÖHLERITE.

——— The Island of Rödkindholmen, near Fredriksvärn.—Weibye, Ann. Ch. u. Ph. LXI. 222.

EUKOLITE.

——— Two miles from Brevig, near Langesund, Fjord.—Scheerer, Ann. Ph. u. Ch. LXI. 222; LXXII. 565.

PYROCHLORE.

——— The Island Rödkindholmen, near Fredriksvärn.—Weibye, Ann. Ch. u. Ph. LXI. 222.

——— Miask.—Hermann, J. f. prakt. Ch. L. 185.

PYRRHITE.

——— Azores. Hayes, Am. J. Sci. and Art, S. S. IX. 423.

It is not yet definitely ascertained if this mineral contains Cerium.

FERGUSONITE.

——— West Greenland.—Hartwall. R. Weber, Ann. Ch. u. Ph. CVII. 590.

SAMARSKITE.

——— Illmengebirge, Siberia.—Hermann, J. f. prakt. Chl. I. 176.

——— Rutherford Co., North Carolina.—Shepard (Rutherfordite), Am. J. Sci. and Art, S. S. XII. 220. Hunt (T. Sterry), Am. J. Sci. and Art, S. S. XIV. 341. H. Rose, Ann. Ch. u. Ph, CIII. 320.

POLYMIGNITE.

——— Fredricksvärn and St. Avearn, Norway. — Berzelius, Afh. Sv. Ak. 1824, 338.

ÆSCHYNITE.

——— Miask.—Hartwall, Ann. Ch. u. Ph. XVII. 483. R. Hermann, J. f. prakt. Ch. XXXVIII. 118; L. 193.

YTTROILMENITE.

——— Illmengebirge, near Miask. Hermann, J. f. prakt. Ch. XXXVIII. 91; XLIV. 216.

EUXENITE.

——— Alve on Tromoen, near Arendal, Norway.—Forbes, Ed. N. Ph. J. (2), I. 62.

——— Tredestrand, Norway.—Scheerer, Ann. Ch. u. Ph. LXXII. 567.

——— Jölster.—Scheerer, *loc. cit.*

CRYPTOLITE.

—— Arendal, Norway.—J. Wöhler, Ann. Ch. u. Pharm. LVII. 268.

In the rose-colored Apatite.

PHOSPHO-CERITE.

—— Johannisberg, Sweden. — Chapman, Q. J. Ch. Sc. Lond. II. 154; Watts, *loc. cit.*

MONAZITE.

—— Miask.—R. Hermann, J. F. prakt. Ch. XXXIII. 90; XL. 21.

MONAZITOID.—Near Miask.—R. Hermann, J. f. prakt. Ch. XL. 28.

LANTHANITE.

—— Bethlehem, Lehigh Co., Pennsylvania. — Smith (J. L.), Am. J. Sci. and Art, S. S. XVIII. 378.

Genth, Am. J. Sci. and Art, S. S. XXIII. 425.

—— Canton Mine, Georgia. Shepard, Am. J. Sci. and Art, S. S. XXIV. 43.

—— Sanford Iron Ore Bed, Moriah, Essex County, N. Y. Blake, Am. J. Sci. and Art, S. S. XXVI. 245.

PARISITE.

—— New Grenada. Bunsen, Ann. Ch. u. Pharm. LIII. 147; Leonh. 1846, 726–730; Berzelius, Jahr. XXIV. 283; Kenngott, Uebersicht, 1844–49, 50.

It is to be regretted that two different mineral species should be only characterized in their nomenclature by a difference in their penult; thus Par*i*site and Par*a*site, the latter name being applied by Volger to a borate.

Dr. J. H. Otis presented some bones of the gorilla recently obtained by him in Western Equatorial Africa.

He had just returned in a national vessel from the Gaboon and Camma Rivers and the vicinity of Mr. Du Chaillu's explorations. He stated that it was comparatively easy to obtain specimens at the latter locality, at the factory, and through Bishop & Co., in New York city; young gorillas, he said, are not uncommonly seen in captivity there, and are frequently brought in by the natives.

Professor Wyman observed that these bones were very important and interesting, as they belonged to an adult female, which, as yet, are very rare in collections. There was a nearly complete skeleton, with the exception of the hands and feet; from the absence of cranial crests and the general absence of extreme angularity in the face, he pronounced the two skulls female, though the length of the canines in one led him to infer that it might be a young adult male; in the undoubted female skull, which was of a very old animal, the sutures were obliterated, but in the other the intermaxillary bone was still separated. The pelvis was that of a female, the bones being lighter, smaller, and with a less pelvic cavity than that of the male; the forward curvature of the thigh bones was very well marked; the sternum was composed of three separate pieces and two terminal ones united together, not consolidated in a single piece as in the chimpanzee and in man; the proportions of the scapula are much more human than in the male; the fore-arm is shorter than the humerus, and in this respect the gorilla comes the nearest to man of the anthropoid apes; in the length of some of the lower cervical processes, on the contrary, it is less human than the chimpanzee.

Dr. J. C. White exhibited some small worms which had been discharged from a tumor on the upper eyelid of a girl, to the number of twenty-three.

They come near, if they do not belong to, the genus *Agamonema*, which has been found in fishes, but never before in the human subject.

Dr. John Green alluded to a microscopical examination which he had made some years ago of the scales of *Megalops*, in which he found bone cells like those of ganoid scales; he had since discovered that the scales of *Amia* present the same structure.

Captain Atwood presented a specimen of *Aspidophorus*, which he had taken on the Newfoundland Grand Bank; it is doubtless the same species that is rarely found on this coast; it is very common on the Grand Bank. He also presented a large barnacle which he had taken from the skin of a hump-backed whale, killed at Provincetown; it had attached to it another cirripod of the genus *Coronula;* he stated that the right whale has no barnacles attached to it, though it has numerous small parasites.

Dr. B. F. Shumard, of St. Louis, Mo., was elected a corresponding member; and Messrs. James S. Melvin, of Boston, and William T. Brigham, of Cambridge, resident members.

October 16, 1861.

The President in the chair.

The following papers were presented :—

NOTICE OF THE GENUS SELANDRIA. BY EDWARD NORTON.

This genus was separated into four sections by Hartig, named *Blennocampa*, *Hoplocampa*, *Eriocampa*, and *Selandria*. These names, founded in part on the slimy, spiny, or woolly skins of the larva, are doubtless correct in Europe, where they are generally adopted. But, as will be seen from the following descriptions of our species, the reverse seems to be true here, as far as our knowledge extends. The smooth or spiny larva of *S. vitis* or *S. rubi* come under the head of *Blennocampa*, while the slimy larva of *S. cerasi* and the slug-like *S. rosæ* belong to *Eriocampa*. Therefore, I question whether these names of subdivisions should be adopted in this country. The sections themselves, however, are founded on the external characters of the mature insect, and in these both European and American species agree.

ORDER HYMENOPTERA.

SELANDRIA, Leach.

Antennæ mostly short and stout, nine-jointed, third longer than fourth; terminal joint short; mandibles bidentate; wings broad, thin, with two marginal cells divided by a straight oblique nervure, and four submarginal cells, the first small and rounded, the second and third of equal size, the second receiving one and the third two recurrent nervures; body broad, hardly longer than thorax; legs simple, with two short, unequal spines at the apex of the tibiæ, the inner spine bifid on the anterior pair. Larvæ twenty and twenty-two-footed, presenting great differences in appearance and habit, being slimy, hairy and woolly; feeding in companies or alone; eating the whole leaf as they go, or removing only the cuticle of the leaf, and forming sometimes one and sometimes two broods in a year.

Section 1. (*Blennocampa*, Hartig.) Lanceolate cell of upper wing petiolate.

Tribe 1. (*Blennocampa* Hartig.) Under wing without middle cell.

1. S. VITIS, Harris. Ins. Inj. to Veg. p. 413. *Tenthredo pygmæa*. Say. Long's 2d Ex. 2, 318.

♀ ♂ Shining black, with red shoulders; antennæ somewhat thickened in the middle; second joint nearly as long as the first; apical joint short; nasus and labrum white; mandibles stout, second tooth prominent, with several small projections beneath; the pro- and mesothorax, tegulæ, and edge of collar rufous; four anterior legs pale beneath, with more or less of black above; posterior legs sometimes pale on under side; coxæ pale beneath; upper wings clouded; marginal dividing nervure received at middle of third submarginal cell. Inhabits United States.

The larvæ are twenty-footed; skin smooth; body somewhat enlarged in the middle and slender toward the tail. While growing, the color is light green above, with black dots across each ring, and yellow beneath, with head and tail black. They live upon the vine, and are very destructive, feeding in companies on the lower side of the leaf, and eating it all as they go from the edge inward. Two broods appear in a season.

Both Harris and Say seem to have given the name of *vitis* the preference, although that of *pygmæa* was published earlier.

2. S. INHABILIS, Harris. Length 0.16, Ex. wings, 0.40 inch. ♀. Shining black, with red shoulders; antennæ short; second joint half as long as first, apical joints short; face below the ocelli roughened and dull; labrum dull white at tip; the pro- and mesothorax, tegulæ, collar, and half of pleura rufous; abdomen short, as wide as long; tips of femora and the tibiæ pale, with more or less of black upon the tips of tibiæ; wings ample, fuliginous; marginal recurrent nervure somewhat bent and received near the third submarginal nervure.

Two specimens from Mass. (H. Coll.) Resembles *S. ephippium* of Europe.

Tribe 2. (*Monophadnus*, Hartig.) Under-wing with one middle cell.

Sub-tribe A. (*Monophadnus*, Hartig.) Antennæ thread-like, short.

3. S. (ALLANTUS) BARDA. Say. Boston Journal, 1, 218. Length 0.28, Ex. wings, 0.64 inch. "Black, the thorax and anterior upper angle of the pleura rufous." The antennæ are of equal size to the tip, third joint long; marginal recurrent nervure oblique and received near the third submarginal nervure.

Two specimens from Mass. (H. Coll.)

4. S. (ALLANTUS) MARGINICOLLIS. Harris's Cat. Length 0.20, Ex. wings, 0.52 inch. ♀. Dull ochre-yellow, spotted with black; antennæ black, slender; head black, with scattered punctures; nasus and labrum pale; front of pro-, middle of mesothorax, the metathorax, second segment of abdomen and the pectus, black; edge of prothorax, tegulæ, and legs paler than rest of body; wings hyaline; stigma and costa pale; marginal recurrent nervure received in middle of third sub-marginal cell.

One specimen from Mass., in Harris's Coll.

5. S. (HOPLOCAMPA) RUBI, Harris. Address by Noyes Darling, New Haven, 1845, p. 13. N. E. Farmer, I, p. 164; II, p. 33. Proc. Bost. Soc. N. H. 7, 235.

♀. "Black, a spot each side of the collar; middle of the dorsum and legs dirty-yellow; color of wings smoky." Marginal recurrent nervure received near third sub-marginal nervure; mandibles stout, second tooth prominent, a smaller tooth beneath.

Inhabits Conn., Mass. (H. Coll.), and Ohio.

"Larva green; six dorsal rows of tubercles bearing two black bristles, and four lateral ones on each side bearing white bristles. Appears in May, and feeds on the raspberry." Dr. Kirtland, Ohio Farmer, June 16, 1860, mentions a larva which "eats longitudinal blotches out of the leaves of the raspberry, and seems to be partly gregarious." It is probably this.

6. S. TILLE, n. sp. Length 0.24, Ex. wings, 0.56 in. ♀. Shining black; antennæ stout, third joint as long as fourth and fifth; face black, corners of nasus angulate; second tooth of mandibles retracted, a third smaller blunt tooth behind; tips of femora and the tibiæ white; tarsi partly white; wings hyaline, faintly clouded at base of upper pair; marginal recurrent nervure received nearer the third than second submarginal nervure; a faint minute dot in middle of second brachial as well as the second submarginal cell.

Inhabits Farmington, Conn.

Twenty-one specimens, taken on the linden leaves in June. I have not seen the larva, but have found irregular holes eaten in the leaves. This bears some resemblance to *S. albipes* of Europe.

Sub-tribe B. (*Phymatocera*, Dahlbom.) Antennæ bristle-shaped, long.

7. S. RUDIS, n. sp. Length 0.20, Ex. wings, 0.44 in. ♀. Black, thorax mostly rufous. Antennæ moderate; the first and second joints, nasus, and labrum pale rufous; corners of nasus angulate; tegulæ and thorax rufous, except metathorax and pectus; tips of all the femora, the anterior tibiæ beneath, and the tips of tarsi, pale rufous; wings hyaline; marginal recurrent nervure received near third submarginal nervure.

One specimen received from Mr. Packard, Brunswick, Me. In this and the two following species, the third and fourth joints of the antennæ are of equal length, and are somewhat enlarged at the tips.

8. S. RUFULA, n. sp. Length 0.18, Ex. wings, 0.40 in. ♂. Black, the tegulæ and edge of collar reddish-yellow; antennæ nearly as long as body; nasus and labrum, tegulæ and edge of collar, dull honey-yellow,; tips of anterior femora and the tibiæ whitish; wings hyaline, ample.

One specimen; Farmington, Conn.

9. S. FUMIPENNIS, n. sp. Length, 0.24, Ex. wings, 0.56 inch. ♀ ♂. Entirely black; antennæ long, (as in *Cladius*), joints distinct and all enlarged at tips; mandibles large, second tooth widely separated from the first; abdomen of female flattened, wider than thorax; anterior tibiæ faintly whitish; wings ample, semi-transparent, violaceous, marginal dividing nervure curved; lanceolate cell suddenly expanded at base.

Six specimens; Farmington, Conn.

Section 2. (*Hoplocampa*, Hartig.) Lanceolate cell contracted in the middle: antennæ short, the third joint hardly longer than the fourth and the end joint frequently thickened.

10. S. HALCYON, Harris's Cat. Length, 0.18, Ex. wings, 0.40 in. ♀ ♂. Color ochre-yellow; antennæ filiform, pale, blackish above (in some cases the joints only tipped with black); mandible slender, the second tooth retracted, with a small obtuse tooth below; a small spot about the ocelli, the metathorax, and a large spot on the tergum; black; the sides of tergum and two apical segments pale, (the male has all the tergum except the apex, and the thorax above, blackish); legs of one color; the posterior tarsi blackish; wings hyaline; stigma and costa pale; under-wings with two middle cells.

Inhabits Mass. (H. Coll.), and Md.

Six specimens. Taken by Mr. Uhler in April, for successive years, on the Amelanchier Canadensis. Resembles *S. Cratægi* of Europe.

Section 3. (*Eriocampa.*) Lanceolate cell, with oblique cross line.

Tribe 1. No middle cell.

Tribe 2. Under-wing with two middle cells.

11. S. CERASI, Peck. Natural History of the Slug Worm: Boston, 1799. Harris, Ins. Inj. p. 419. Length 0.20, Ex. wings, 0.44 in. ♀. Shining black; antennæ polished; second joint nearly as long as first, the three apical joints smaller than the others; mandible stout, second tooth nearly as large as first, with three irregularities beneath; tips of four anterior femora, the tibiæ and tarsi (more or less) dull white; wings hyaline, a large clouded spot in middle of upper pair; marginal recurrent nervure oblique, almost touching the third submarginal nervure.

Inhabits Northern States.

The larva is twenty-footed; is larger before than behind, and is covered with an olive-colored, sticky slime. It comes forth in June and September, (found September 15, 1861.) It feeds on the upper side of the leaves of the cherry and pear, not eating the veins and skin, and there are usually but one or two on a leaf. Professor Peck and Dr. Harris give the details of these transformations. This somewhat resembles *S. æthiops* of Europe.

12. S. FLAVIPES, n. sp. Length, 0.22, Ex. wings, 0.46 in. ♀ ♂.

Shining black; joints of antennæ decreasing regularly in size and length; edge of labrum pale; first tooth of mandibles sharp, curved, second retracted; tegulæ, edge of collar and legs pale yellow; abdomen much flattened; wings hyaline; marginal recurrent nervure received nearer the third than second submarginal nervure.

Five specimens; Conn. and D. C. Resembles *S. stramineipes* in general appearance, but is smaller.

Tribe 3. Under-wing with one middle cell.

13. S. ROSÆ, Harris, Cat. and Ins. Inj. to Veg. p. 416. Length, 0.20, Ex. wings, 0.44 in. ♀ ♂. Shining black; second joint of antennæ half as long as first, third but little longer than fourth; second tooth of mandibles retracted; legs black, the two anterior pair dull-white below the tips of the femora; tarsi blackish. Sometimes the middle tibia is black on the upper side, and the posterior tibia and tarsi are whitish; wings somewhat violaceous, darkest toward base; marginal recurrent nervure received on middle of third submarginal segment.

Inhabits Northern States.

Larva twenty-two footed; slug-like, not slimy; not enlarged toward the head; color pale green, beneath yellowish; head yellowish with a black dot on each side. It appears to be soft and free from hairs, to the eye. It comes forth in June and August, feeds on the rose, on the upper side of the leaf, not eating the veins and skin beneath. But one or two are found on a leaf.

This is our most destructive species.

The fourth section (*Selandria*) does not yet seem to be represented in this country.

DESCRIPTIONS OF SEVERAL OF HARRIS'S NAMED TENTHREDINIDÆ.

By EDWARD NORTON.

CLADIUS, Illiger.

C. ISOMERA. Harris's Cat. Length, 0.24, Ex. wings, 0.50 in. ♀. Shining black; antennæ moderate; face black; legs dull white; femora, except at tip, tips of posterior tibiæ and tarsi, blackish; wings somewhat smoky, darkest toward base; stigma large and black; costa pale, dividing nervure of costa oblique.

Inhabits Mass. (H. Coll., 1823, and Mr. Sanborn) and Ct.

Three specimens. I think that this belongs to section *Priophorus*, but have seen no males.

LYDA, Fabr.

L. (TARPA) SCRIPTA. Say. Long's 2d Ex. 2, 312. Length, 0.44, Ex. wings, 0.92 in. This belongs to section 2, Hartig. (Anterior tibia without side spur.) Tribe 1. (Fourth joint of antennæ much longer than fifth.)

Two specimens in Harris's Coll. from New Hampshire.

XYELA, Dalman.

X. INFUSCATA. Harris's Cat. Length, 0.24, Ex. wings, 0.52 in. ♂. Fuscous brown, almost black; antennæ black, basal joint partly covered with pale hair; nasus, labrum, base of mandibles, tegulæ, most of abdomen beneath, and the legs dull reddish-yellow; posterior tarsi blackish; wings smoky hyaline; cells as in *ferruginea;* lanceolate cell large, with oblique cross line; lower wings in this and in *ferruginea*, with three inner cells, two of them submarginal and one beneath; five spurs on each of intermediate and posterior tibiæ.

One specimen in Harris's Coll. Mass.

CEPHUS, Fabr. Latr.

1. C. HETEROPTERUS. Harris's Cat. Length 0.30, Ex. wings, 0.60 inch. ♂. Resembles *C. abbreviatus*, Say, except that the basal segments of the abdomen are obscure ferruginous above (rufous beneath). There are two pale dots on the mesothorax, and all the legs are pale honey-yellow; posterior tarsi blackish. The small marginal areolet of upper wing is wanting or incomplete.

Inhabits Mass. and N. H. (H. Coll.)

I think it the mate of *C. abbreviatus.*

2. C. INTEGER. Harris's Cat. ♀. (*filicornis*, H. Cat. ♂.) Length. ♀. 0.36, Ex. wings, 0.72 inch. ♀. Resembles *C. abbreviatus*, Say. It differs only as follows: the three basal segments of abdomen are rufous; posterior femora blackish, tips black; dividing nervure of first marginal wing cellule complete, the whole cellule nearly covered by a blackish spot beneath the stigma. The mandibles of both species are large and white at base, covering the labrum.

Inhabits Mass. (H. Coll.) and New York. (Mr. Akhurst.)

The species called *filicornis* in the Harris collection is imperfect, but closely resembles the above.

Mr. Alex. Agassiz made the following communication on "The Acalephan fauna of the southern coast of Massachusetts (Buzzard's Bay)."

During a visit which I made at Naushon, during the month of September, I was enabled to observe a large number of Acalephs, and to satisfy myself that Cape Cod is the line of division of an Acalephan Fauna entirely distinct from that of the coast north of Cape Cod, as far as we know it from Acalephs observed by Professor Agassiz at Nahant and Grand Manan, and from the Acalephan Fauna of the coast of South Carolina, as far as known from observations of McCready and Prof. Agassiz. I shall merely mention here the results which I have obtained with reference to the geographical distribution of the Acalephs, and reserve a more minute comparison and full description of the new species, no less than eighteen in number, for another occasion.

Among the CTENOPHORÆ we have:

Two species common to Nahant and Naushon,—*Idya roseola*, Ag., and *Pleurobrachia rhododactyla*, and one new species of *Bolina*.

Among DISCOPHORÆ:

Cyanea arctica, Per. and Les. was quite common here, and although I did not observe any species of *Aurelia*, on account of the lateness of the season, I have no doubt that either our common species *Aurelia flavidula* will be found here, or a representative species; as we have the genus *Aurelia* in Charleston and Florida. A new species of *Pelagia* was also observed.

Among the HYDROIDS, four of the *Campanularians* are identical with the species found at Nahant, and one of them, which McCrady has named *Obelia commissuralis*, is found at Nahant, Naushon, and Charleston. The three others are *Clithia bicophora*, *Laomeda diaphana*, and *Campanularia amphora*. The genera *Epenthesis*, *Eutima*, *Eucheilota*, *Turritopsis*, *Dipurena*, of McCrady, were all represented each by one species, as well as *Sarsia*, *Stomobrachium*, *Willsia*, *Atractylis*, *Pennaria*, *Slabberia*, *Nemopsis*, *Bougainvillia*, and a species of *Thaumantias*, closely allied to *T. mediterranea* of Gegenbauer; two species of *Eudendrium*; one new genus closely allied to *Eucheilota*.

This would make in all twenty-seven species of Acalephs, of which six species are common to Nahant and Naushon, two species or perhaps three to Charleston and Naushon, one which is common to Charleston, Boston, and Naushon, leaving seventeen species found thus far only in that Fauna.

The twenty-seven species observed can be arranged as follows: —

One species common to Charleston, Naushon, and Nahant.

Six species common to Nahant and Naushon.

Two species common to Naushon and Charleston.

Five species which are representatives of genera found at Nahant, Naushon, and Charleston.

Two species which are representatives of genera occurring at Nahant and Naushon.

Seven species which are representatives of genera common to Charleston harbor and Naushon.

Three species belonging to genera which had not yet been observed on our coast (*Atractylis*, *Slabberia*, and a true *Thaumantias*).

One species belonging to an entirely new genus.

Of these twenty-four were free Medusæ and only three fixed Hydroids.

Prof. Agassiz remarked that these observations coincided with the zones of distribution of our crustacea as stated by

Prof. Dana, and with those of fishes as observed by himself; and he had no doubt that the mollusks would come under the same law.

The President read a communication from Francis Lousada, Esq., British Consul at Boston, accompanying a portion of a meteoric stone, which fell at Dhurmsalla, India, July 14, 1860, and presented to the Society by the Governor General of India. Accompanying it was a printed paper giving an account of the fall. The specimen was referred to Dr. C. T. Jackson for analysis.

Dr. C. T. Jackson presented numerous fragments of rolled corals from Cumberland County, New Jersey, where they occur loose in large quantities in the soil.

Prof. Rogers pronounced them tertiary, the remnant of a very extensive sheet in Southern New Jersey, the greater portion of which had been removed by denudation. Prof. Agassiz also pronounced them tertiary.

The following paper was presented: —

Homologies of Radiata. By L. Agassiz.

Having studied the homologies of Radiata for a great many years I feel now sufficiently acquainted with them to present conclusions which I believe to be new to science. I have studied them in such a manner that I am able to transform the different classes belonging to Radiata one into the other, simply by changing certain similar terms in what I may call the general formula of Radiata, thus showing that these three classes belong to one and the same type. I think I have succeeded in transforming a Polyp into an Acaleph or an Echinoderm, and either of them into the other two, just as formulæ made up of similar terms can be transformed one into the other.

If what I have attempted to prove is true, — that the great types which we recognize in the animal kingdom are characterized by the plans upon which the animals of which they consist are built, — that the classes are distinguished by the different modes of execution of that plan, — that the orders are defined by the complication of structure of these modes of execution, — the families by different patterns of form resulting from peculiarities of structure, — the genera by structural differences affecting only certain parts,— the species by differences of proportions, size, ornamentation, color, etc.,— then we ought to be able to prove beyond a doubt that the different classes are only different modes of execution of one and the same plan, by showing that they are convertible one into the other by means of such changes as are only different modes of carrying out the same plan; or by showing that one formula which should represent the general plan of Radiation can successively be so transformed, that it will be the formula for a Polyp, an Acaleph, or an Echinoderm, and no longer the general formula for the plan of Radiation; or, that the formula of a Polyp, an Acaleph, or an Echinoderm, can be so changed as to reproduce the formula of the other two classes.

As has been shown by Baer, there are four different modes of development corresponding to the four types which Cuvier was the first to point out. If then, classes are simply the different modes of execution of the plan, the mode of development of each of these classes must be a particular way in which the mode of development peculiar to Radiata is carried out. The egg in Radiata is wholly transformed into what is to become the future animal, which is not formed by the gradual development of one portion of the yolk, as in the other types, but by the direct transformation of the cells of the yolk into the new animal. In Polyps a main cavity becomes hollowed out from the cells of the embryo by the liquefaction of the central portion of the yolk. Vibratile cilia cover the whole surface of the yolk, enabling the young embryo to move freely about. Little by little there is a slight depression formed, which eventually becomes the mouth, around which are formed small tentacles. About this time the small Polyp, instead of continuing to move freely about, becomes attached, and we have an animal with radiating partitions little developed, and with a small number of chambers. The new Polyp once fully developed in this way will in its turn lay eggs which will undergo the same changes. But, besides the development by eggs, these animals can increase by budding. A small knob on the outside wall of one of these Polyps first makes its appearance, a digestive cavity is gradually scooped out of the solid substance, and tentacles become formed in a manner similar to that observed in the development from the egg. To the multiplication of individual Polyps by division I need not allude here.

Neither the eggs nor the embryos of Acalephs are at first different from those of Polyps. Like the Polyp, the young Acaleph rarely remains free; generally it soon becomes fastened to the ground, lengthens, a cavity is formed, and tentacles are seen round the mouth; but as it lengthens, slight bands are noticed across the Polyp-like animal; these gradually become deeper and deeper until there finally separates from the upper part of this fixed Polyp an animal entirely different from the parent stock; this is a young Medusa. The Acalephian mode of development passes quickly through the stages which form the whole of the development of a Polyp, and has in common with them only that which is characteristic of the mode of development of Radiata, the manner in which it is carried out being Acalephian. In many Acalephs, Medusæ are formed directly by budding from the Polyp-like body.

Let us now consider the Echinoderms:—they pass still more quickly through the earlier stages which remind us of the Polyps, and soon assume a form which recalls that of the higher Acalephs, the Ctenophoræ, and then commences the peculiar mode of execution of the type of development belonging to Radiata which is characteristic of Echinoderms. The young, which begins simply as a coating upon the digestive cavity, encroaches gradually more and more upon the parent stock, until finally the greater part, if not the whole, becomes absorbed or is cast of, and the young Echinoderm has been formed by absorbing the parent stock. Yet these Echinoderms, although their mode of development is so peculiar, have in common with Polyps and Acalephs the same mode of development, as far as it is characteristic of Radiates, but it is carried out in a peculiar way for Polyps, Acalephs, and Echinoderms. It is not a little strange that we should have in Echinoderms a mode of carrying out the development peculiar to that class which starts from a form recalling the highest Acalephs; and that the mode of development which is peculiar to the Acalephs should begin with a form which is eminently Polyp-like, while all three classes should agree in having in common a particular mode of development concordant with the plan of Radiation, which is then carried out further in a peculiar way for each class.

To appreciate truly the organic connection of the growing Echinoderm and its Acalephian nurse, it is only necessary to take into consideration the relation of the twin individuals, suspended along the pendant chain of a *Diphyes*, in which couples the Polypoid form produces one which is Medusoid. And I believe it is a mistake to consider these chains as made up of single animals (*Einzelthiere*); they are really twins, one of which is Polypoid and the other Medusoid; as during their growth the young Echinoderms form twin couples, one of which is Acalephian and the other Echinodermoid. In the *Siphonophoræ* the polypoid animal is mostly split open upon one side, like the radiate flowers of *Compositæ*, forming a sort of scale-like covering, from which the proboscis hangs free. But proboscis and scale (*Hydrophyllium* or *Deckstück*) are but one animal in these communities.

Having shown how the mode of development peculiar to Radiata was carried out in a special manner for the three classes which constitute the type of Radiata, let us now take representatives from each of these classes, and see if we can transform the formula which represents the structure of each into the other. The general formula for any radiated animal is that it is made up of a number of spherical wedges, arranged round a vertical axis, having two poles, the actinal, at which stands the mouth, and the abactinal, opposite to it. This general formula can be changed to stand for a Polyp by making the spherical wedges a number of chambers, separated by partitions radiating toward a digestive cavity, which is only the prolongation of the outer wall turned in, thus making an opening commonly called the mouth,—some of the partitions reaching the wall of this digestive cavity, and others only extending a short distance from the outer wall of the Polyp. The upper part of each one of these chambers is surmounted by a hollow tentacle, which is nothing but the prolongation of the chamber itself. Along the sides of these radiating partitions are attached the bunches of eggs, one on each side of the partition, at the extremity nearest the digestive cavity. This would be the general formula for radiation carried out in a special manner so as to apply to the class of Polyps. Next comes the formula for Acalephs. Here we have a central cavity from which radiate tubes hollowed out of the solid mass, on each side of which are placed the ovaries, running toward the circumference, where they are either united by a circular tube, or by numerous anastomoses. The digestive cavity is not, as in the case of Polyps, formed by the turning in of the outer wall; it is cut out of the solid envelope, and around its edge hang down fringes or lobes. Opposite each one of the radiating tubes we have a tentacle, which may be hollow or not. In this connection the presence of tentacles along the edge of the circular tube need not be taken into consideration, since they are only a feature of a later growth.

How can we transform the formula for Polyps, as it is given above, into this Acaleph formula? Let us take that formula as made up of a number of chambers, separated by thin walls. Increase the thickness of these walls, the chambers become gradually smaller and smaller, until they may be reduced above and below to such an extent as to change them into tubes. These tubes will open into a central cavity. But where are the appendages of the mouth of Acalephs? Supposing that we take what we have called the digestive cavity of our formula for Polyps, and turn it inside out like the finger of a glove, cutting it open at the same time into as many lobes as there are radiating tubes, we shall have a series of fringes surrounding the opening of a cavity scooped out of a hollow mass, from which tubes radiate toward the circumference. The tentacles will be placed in a similar position at the end of the radiating tubes, as we find them in Polyps in the prolongation of the chambers which are homologous to the radiating tubes. The only thing wanting now is the circular tube to connect these radiating tubes. In Polyps there is a hole in the upper part of each radiating partition, connecting the upper part of adjoining chambers. As we thicken our partitions, we of course change this passage from one chamber to another, which was a mere hole, into a tube of the depth of the wall, and thus form a circular tube which connects the radiating tubes. But as we thicken the walls of our Polyp formula, we separate the bunches of eggs which were before only kept apart by a thin partition, and bring thus together the bunches of two different partitions, exactly as we find them on the sides of the radiating tubes in Acalephs. At the base of the tentacles of Acalephs, placed in the prolongation of the radiating tubes, we find an accumulation of pigment cells, which becomes in some of them quite a complicated eye. At the base of the tentacles of Polyps, we find also a similar accumulation of cells, which, though never becoming a perfect eye as in Acalephs, shows by its position that it is this rudimentary eye which is more developed in the Acalephs.

When we come to Echinoderms we have a solid envelope, in which we find an alimentary canal, with a distinct wall, winding from one pole to the other, and tubes with a complicated system of suckers running on the inner side of this envelope.

How can this formula be transformed into that of a Polyp or an Acaleph, and the reverse? Let us take our Acaleph formula; instead of the gelatinous mass out of which the tubes and the cavity have been scooped, we shall have a cavity and tubes with distinct walls, if we suddenly condense all this mass, and throw it to the circumference, leaving the tubes and cavity to hang loosely in the envelope which has become solid by the deposition of limestone particles. Let us see how this formula agrees in other respects with the other formulæ. The ovaries of the Acalephs and Polyps are placed on each side of the partitions, on what I would call the interambulacral spaces. We find the ovaries of Echinoderms in the space between the tubes, or in the interambulacral spaces. The eyes, which in the Acalephs and Polyps are at the extremity of the radiating tubes, we find in our formula for Echinoderms also at the end of the radiating tubes. And to make the homology complete, there is at the end of the rays in all genuine Starfishes an odd ambulacral sucker, identical in all its organic relations with the tentacles in the prolongation of the radiating tubes of Acalephs. I need not urge that the complication of the radiating tubes of Echinoderms assuming the form of gills, as in many Echinoids,—or of extensively ramified tentacles, as in Holothurians,—does not affect the homology of the ambulacra with the radiating chambers of Polyps, any more than the presence of protractile ambulacral suckers, since among Holothurians the *Synaptæ* have simple radiating tubes taking the place of ambulacra.

The three formulæ by which we represent Polyps, Acalephs, and

Echinoderms, are only the peculiar way in which our general formula of radiation is carried out. In Polyps, we have hollow spherical wedges, the sides of which form projecting partitions;—in Acalephs, these spherical wedges are solid with the exception of the radiating tubes representing the chambers of the former;—in Echinoderms, this is still differently carried out by the condensation of the mass toward the periphery, leaving tubes and digestive cavities with distinct walls hanging freely in the envelope. Whether our formula for Polyps has a limited number of radiating partitions, as in *Halcyonoids*, or a large number, as in *Fungidæ*, this will make no difference; the transformation from the Polyp into the Acaleph or the Echinoderm can always be made. Even in Acalephs we have such forms as *Æquorea*, in which the number of radiating tubes is as great as that which we find in many of the Polyps. Whether the Acaleph is a flat disc, like *Aurelia*, or assumes the shape of a *Beroë*;—whether the Echinoderm is a flat Starfish, a spherical Sea-urchin, or a tubular Holothurian, the transformation can still be made. The spherical *Beroë* presents only this peculiarity, that the radiating tubes, tending first horizontally, branch up and down at the periphery. The Sea-urchin can be transformed into a Starfish simply by slitting it open through the middle of the interambulacral space, and stretching the abactinal area to the extent necessary to cover the space above the ambulacral zone. In Crinoids, the abactinal area has the upper hand, forming the calyx and stem, while in Holothurians it is reduced to a minimum.

It has already been stated that the plan of structure of Radiates consists of spherical wedges symmetrically arranged round a vertical axis, but this does not imply that in their natural attitudes as living animals all Radiates stand either mouth upward or downward. We have differences in this respect even among members of one and the same class, as, for instance, among Crinoids as compared to Starfishes or Sea-urchins:—or among members of the same orders, as for instance, in *Pleurobrachia* as compared to *Bolina*. Nor does it always happen that the mouth is either above or below; the structural vertical axis may assume a horizontal position, as in Holothurians, and it is a great mistake, therefore, to believe that the mouth in Holothurians is in a homologous position to the mouth of worms, or that the sides of a Holothurian are homologous to the sides of a worm. It is contrary to the plan of their structure to speak of a back and a ventral side in Holothurians or in Spatangoids; the sides on which they rest are truly homologous to the vertical sides of a genuine *Echinus* or to those of an *Actinia*. Nor is the position of the mouth in Holothurians the extreme of the tendency observed among Spatangoids to bring the mouth forward. The side on which Holothurians rest is the anterior ambulacral side of their body, considered homologically with reference to all other Radiates; while the side on which Spatangoids rest, is their posterior interambulacral side.

These are only special cases of the transformation of our general formula.

Having thus shown that there is a general formula to which all animals built upon the plan of radiation can be reduced,—that this plan of radiation is carried out in a special manner in the three classes of which this type is composed,—that the formulæ which I make to represent three different classes are nothing but a different method of carrying out the general formula of radiation,—and that each of these formulæ can be transformed into the other,—we cannot fail to come to the conclusion that these general formulæ for the plan of radiation, and for the peculiar manner in which it is carried out in the three classes of Radiata, are formulæ which really exist in nature, and not simply representations of any ingenious manner in which long study would enable me to combine them, and are therefore indications of thought in the plan of their creation.

The Corresponding Secretary read the following letters, viz:—

From Maj. Amos Binney, Washington, Sept. 11th, in acknowledgment of the vote of the Society communicated to him; from Mr. Edward Norton, Farmington, Conn., Sept. 10th, and October 12th, concerning a paper which he proposed to offer to the Society; Mr. C. A. White, Medina, Ohio, Oct. 6th, on a similar subject; Lyceum of Natural History, New York, Sept. 16th, and Entomological Society, Philadelphia, Sept. 18th, acknowledging the receipt of the Society's publications.

Prof. Sanborn Tenney, of Auburndale, and Mr. Francis J. Campbell, of Newtonville, were elected resident members.

November 6, 1861.

The President in the chair.

The following communications were presented :—

Chemical Analysis of a Meteoric Stone from Dhurmsalla, India. By C. T. Jackson, M. D.

This interesting meteorite was presented to the Society by the Governor General of India, though H. B. M. Consul, Francis Lousada, Esq., of Boston, with a printed report, stating all the circumstances relating to its fall and discovery.

It appears from this report that the meteorite fell on the 14th of July, 1860, with several violent explosions, accompanied by flame. Fragments have been found in four different places, where they were seen to fall, and were brought to the military station.

The most curious fact alleged in the report is, that the pieces, which were picked up immediately after they fell, when held in the hand for half a minute, were so cold as to benumb the fingers, and this is mentioned as very remarkable, since a few moments before the surface of the meteorite was in a state of ignition, and still bears evident marks of partial fusion.

The temperature of the day was 80° F., and the cold could not have been occasioned by the soil in that climate. Indeed, the temperature required to produce the effect alleged must have been far below zero.

Now, supposing the fact to be true, that it was intense cold that was produced by the stone, may it not have been owing to the low temperature of the region from which the meteorite fell? the interplanetary spaces, according to Baron Fourier's estimate, being about —50° centigrade, or nearly 100° Fahr. below freezing.

Allowing that the meteoric mass came from those regions, the matter being a very slow conductor of heat, we can easily conceive that when the mass entered the earth's atmosphere, it might become heated and inflamed on the surface by condensing the air before it, in its descent toward the earth; and since it would have to fall through about eighty miles of the atmosphere, the density of which increases as it approaches the earth, the inflammation would take place only where the air had sufficient density, and not in the highest regions. Such being the case, the expansion of the exterior of the meteorite, the surface being incandescent, while the interior was very cold, would cause the mass to fly to pieces with violent detonations, and this, too, quite near to the earth.

The surface of so imperfect a conductor of heat might be ignited, while the interior of the mass remained intensely cold. We know that imperfect conductors of heat, when heated to redness, and plunged into cold water, so that they can be momentarily handled, will again become nearly red hot on the surface, by heat derived from the interior. Thus, specimens of lavas, which I collected in the crater of Vesuvius, handled freely, and wrapped up in paper, frequently set fire to the paper in a short time after they were so enveloped. I brought home many specimens which had browned and charred the paper.

It is also known to all assayers and chemists, that a crucible full of melted flux, if cooled on the surface by plunging the crucible into water, will soon become hot again on the surface, and that the interior of the flux will remain red hot, while the surface of the crucible may be held in the hand for a short time.

Therefore, *mutatis mutandis*, there is no inherent improbability that these masses of meteoric stone really would produce the sensation of intense cold, if they were originally cold in the interior, and only rapidly heated on the surface. If the facts are as alleged, this is the first recorded recognition by the human senses of the cold of the interplanetary regions. It would have been a curious and instructive experiment, to have placed one of these stones, soon after it fell, in water, when the formation of a crust of ice on the surface would have visibly demonstrated the fact of intense cold; and an estimate of the degree of cold could also have been made, by similar means, ascertaining how much the temperature of a given quantity of water was reduced by it, and computing the degrees of cold thereby.

The weight of the fragment presented to the Society is 4½ ounces. It is 2½ inches long, 1¼ inches wide, and 1 inch in average thickness.

Its specific gravity is 3.456 at 68° Fahr., Barom. 29.9. Its structure is imperfectly granular, but not crystallized, and there are small black specks of the size of a pin's head, and smaller, of malleable meteoric iron, which is readily removed from the crushed stone by the magnet. The color of the mass is ash gray. A portion of the surface is black and is scorified by fusion.

Its hardness is not superior to that of olivine or massive chrysolite. Chemical analysis shows that its composition is that of a ferruginous olivine.

One gramme of the stone, crushed in an agate mortar, and acted on by a magnet, yielded 0.43 grm. of meteoric iron, which was malleable. After the removal of this a qualitative analysis was made of the residual powder. Another gramme was also taken, without picking out the metallic iron, and was tested for chlorine and for phosphoric acid. The results of the qualitative analysis were that the stone contains silica, magnesia, a little alumina, oxide of iron, and nickel, a little tin, an alloy of iron and nickel, phosphoric acid, and a trace of chlorine.

These ingredients being determined, the plan for a quantitative analysis was laid out, and was duly executed by the usual and approved methods. The following are the results of this analysis, per centum:

Silica, with traces of tin	40.000
Magnesia	26.600
Per-oxide of iron	27.700
Metallic iron	3.500
Metallic nickel	0.800
Alumina	0.400
Chlorine	0.049
Phosphoric acid	not weighed.
	99.049

Being unwilling to destroy more of this very valuable specimen, I did not quantitatively determine the phosphoric acid, the presence of which was distinctly shown by the molybdate of ammonia test.

Specimens of the meteoric stones which were seen to fall in Nobleboro', Maine, and in Weston, Connecticut, were exhibited, and compared with the Dhurmsalla stone, which they closely resemble. Indeed, the Weston meteorite can hardly be distinguished from them.

A mass of meteoric iron from Clayborn Co., Alabama, in which Dr. Jackson first discovered chlorine, was also shown.

On motion of Dr. Jackson, the thanks of the Society were voted to his Excellency the Governor General of India, for this valuable specimen; it was also voted that a copy of Dr. Jackson's report be sent to him.

On the Homologies of Echinoderms. By L. Agassiz.

Since the publication of the memoirs of Gray, and of Müller and Troschel, hardly anything has been done with reference to Starfishes. The simultaneous appearance of the results of their researches has spread through our nomenclature the names of many genera under several names, and a revision of the whole order is greatly needed. The many Starfishes in the collections of the Museum of Comparative Zoölogy, at Cambridge, have enabled me to reëxamine the whole subject, and I propose, in a series of communications to this Society, to present the results at which I have arrived. Neither Gray nor Müller and Troschel have adopted a terminology founded upon homology, and their nomenclature has so little relation to that used in describing the other members of the class, as for instance, Echini or Crinoids, that in reading their descriptions of Starfishes it would hardly appear that they belong to the same class. Echinoderms thus far have been described by means of an entirely arbitrary terminology; there is no uniformity of language in the description of Echinoderms belonging to different orders, and in the terminology used for Crinoids there is such a difference, that it would seem as if they had nothing in common with the other orders. It is with reference to this difficulty that I propose to make a few general remarks —not that I mean to introduce a radical change, but only to modify the language commonly used in such a way that its adaptation to all the members of the class shall be easy.

In the description of Starfishes we find that different authors, when alluding to parts along the margins of the furrows on the lower surface of the rays, speak of avenues which have been called ambulacral avenues, and of other parts as spines, which have been called ambulacral papillæ, implying a certain homology with the Echini; and thus far similarity is recognized between the ambulacral tubes of the two orders. But a closer examination shows us that there is a great diversity among the plates bordering on the ambulacral furrows and among the spines articulating upon their surface, which require to be distinguished with greater precision than has thus far been the case. In reality, the plates and spines bordering upon the ambulacral furrows belong to two different systems. To compare Starfishes and Sea-urchins homologically, we must take into account their differences as orders; both have two distinct regions, one of which has the mouth for its centre, from which radiate the ambulacra and interambulacra, while in the other, opposite to it, are situated the ocular and ovarian plates, and many other small parts. These two areas I have called the *actinal* and *abactinal* areas, and it seems to me that there is great advantage in dividing the animal at once in such a way as to contrast strongly the parts of the opposite areas. Take the case of Echini, composed as they are of ambulacral and interambulacral zones. The actinal portion, consisting of these parts, makes up nearly the whole surface of the animal, and the abactinal portion is limited to a small area, more or less directly opposite to the mouth. In Starfishes, on the contrary, these areas have about the same extent; the actinal area is generally limited to the comparatively small space occupied by the mouth and the furrow on the lower side of the rays, while the abactinal area occupies the interval between the rays and the whole of the upper surface. These areas in Starfishes and Sea-urchins are homologous, notwithstanding this great difference in their extent, which constitutes their essential distinction as orders, since it can be demonstrated that the whole back of a Starfish and the sides of the rays are homologous to the abactinal area of an Echinus, so stretched as to cover the five arms, while on the lower side we have the actinal portion, corresponding to the actinal area of an Echinus, but limited to a smaller space. It is in this furrow that we find in a Starfish the two kinds of plates, the ambulacral and interambulacral, which constitute almost the whole of an Echinus; the perforated or ambulacral plates, however, being larger than the imperforated or interambulacral plates which extend along their side, and it is upon these plates alone that spines, homologous to the spines of Echinus, are placed. (These spines are called *Furchenpapillen* by Müller.) In Sea-urchins, both ambulacral and interambulacral plates increase gradually from the mouth outward and upward, until they reach the maximum diameter of the animal, and then decrease again toward the abactinal area, which they surround, thus forming an arch. In Starfishes the largest plates are situated nearest the mouth, diminishing gradually toward the end of the ray, thus giving the animal a more or less pentagonal or star-shaped form. These facts may be made use of in a more accurate description of Starfishes and Sea-urchins.

The ambulacra and interambulacra have thus far furnished the best characteristics, but I propose to take equally into account the abactinal area.

This is generally crowded with spines and other appendages, but these are merely external, and in making preparations to study the abactinal region, I have brought out features which have thus far entirely escaped the notice of naturalists, and which differ widely in what had before been considered as closely related forms. The characters given of different genera, derived from the rows of spines of the ambulacral areas, are also susceptible of much more precise definition than formerly. Rows of such spines have been called ambulacral spines, which do not belong to this system at all, and which merely have a certain resemblance to ambulacral spines, while in reality they belong to a system peculiarly developed in Starfishes, having no connection with the Sea-urchin type of ambulacral spines. At the end of the series of ambulacral plates of the Starfishes we find an odd plate, under which stands an eye-speck, and over the latter we find an odd ambulacral sucker. Now, all the other ambulacral suckers are arranged in pairs on each side of the ambulacral furrow, and this sucker has thus far been confounded with the other ambulacral suckers. The plate above the eye does not belong to the ambulacral or interambulacral system, but to the abactinal system, and the odd sucker is homologous to the tentacle found in the prolongation of the chymiferous tubes of Acalephs. This being determined, if we consider the rows of large plates on the sides of the arms in such genera as *Astropecten*, *Anthenea*, *Goniaster*, &c., we see at once that all the plates of similar Starfishes, which Gaudry does not hesitate to consider as interambulacra, have nothing in common with either the ambulacral or interambulacral region, but are a part of the abactinal system; showing thus plainly that we may have in the abactinal system a differentiation of parts aping structural features of a system in Sea-urchins, with which the system to which these plates belong has nothing in common; showing us, also, that those Starfishes which thus ape this system of plates have a specialization of parts which places them higher than the Starfishes in which these plates are either wanting or only slightly developed. In the same way, from a want of precision in his definition, Gaudry finds interambulacral plates in Ophiurans, while the absence of an interambulacral system along the ambulacral plates is the ordinal character separating them from the Starfishes proper, and it would be more natural to associate the Ophiurans with the Crinoids than with the true Starfishes.

The great difference in the composition of the abactinal area in different families of Starfishes requires some further discrimination. The moment it is understood that the so-called marginal plates of *Astropecten*, *Astrogonium*, *Goniodiscus*, &c., belong to the abactinal area, it appears at once that there is great uniformity in the composition of the whole of that area in such Starfishes as *Asteracanthion* and allied genera, while in the above-named genera the abactinal area is subdivided into distinct regions, the plates between the marginal plates and those of the actinal area differing more or less from the marginal plates themselves, as well as from those occupying the upper side of the Starfish. I propose, therefore, to designate them by special names, calling *Paractinal* those which occupy the space between the mouth, the ambulacral furrows and the marginal plates; *Metactinal*, those commonly called marginal, but for which this name cannot be retained, since there exists in *Solaster* a row of specialized plates homologous to the marginal plates, which are not along the margin of the rays; and *Epiactinal*, the plates of the upper surface, among which we may further distinguish the middle row opposite the ambulacra, *Antiactinal*, and secondary rows parallel to that, as well as the specialized rows, *Metagenial*, which may extend from the angle between the rays toward the centre of the abactinal area; then, again, we may notice specialized plates surrounding the anal aperture, and others opposite the angle of the mouth, *Antistomal*.

Finally, there exist among Starfishes peculiar plates, affording excellent generic characteristics, which have been entirely overlooked, extending between the upper and lower floor, in the direction of the interval between adjacent rays, which I propose to call *Diactinal* plates; sometimes they form a wide partition, dividing the interior of a Starfish into distinct chambers, while in others they form more or less extensive bridges between the two floors.

The Taconic and Lower Silurian Rocks of Vermont and Canada. By Jules Marcou.

At the meeting of Oct. 17, 1860, I had the honor to read before the Society extracts from three letters of M. Barrande, relating to the stratigraphical position of the primordial fauna in North America. Two of those letters were addressed to me, the third was a copy of a letter to Professor Bronn of Heidelberg. I added a few remarks, and the whole was published in the *Proceedings*, Vol. vii. p. 369, under the title "*On the Primodial Fauna and the Taconic System*, by Joachim Barrande, *with additional notes* by Jules Marcou."

The views there exposed were received with little favor, at first, by those geologists who, for the last fifteen years, have refused to recognize the Taconic system, on the ground that it was not sustained by any stratigraphical, paleontological, or lithological evidence. It was hard for them to admit that the paleontological character at least was against them, some going so far even as to deny the validity of paleontological evidence in determining the age of strata. As the same persons have long considered the lithological character "entirely valueless," American geology was deprived of its two best supports, and left entirely at the mercy of suppositions and conjectures. It was evident, however, that the summary method, so frequently used, of suppressing observations which did not agree with the views of those regarded by some as the best and highest authorities on this continent, could not succeed now, as it was impossible to rule out the science of paleontology and its supporters.

Three months later, Mr. Logan of Montreal, in a letter to M. Barrande (in which he inadvertently omitted to mention our Boston pamphlet), admits that the views entertained by him on the rocks of Point Levi and Georgia were erroneous, and tries to explain the position of strata at Point Levi, putting together all the rocks found there, as the "*Quebec group of rocks.*"

Mr. James Hall, of Albany, in a letter to the editor of *Silliman's Journal*, one month later, takes up the paleontological evidence, letting it be understood that, if any mistake was made, it was due to stratigraphy; and mixing together, even more than Mr. Logan had done, all the fossils found in the various places and strata at Point Levi, he comes to the conclusion that "M. Barrande's plan of successive Trilobitic faunæ" *does not meet the case* in hand; and, without giving any decisive opinion, he evidently leans toward the view that he has always entertained, in common with the Professors Rogers, of the Hudson River group.

This letter of Mr. James Hall appeared in *Silliman's Journal* of March, 1861, together with a reprint of Mr. Logan's letter, and also a part of our pamphlet, under the altered and false title * of, *On the Primordial Fauna and the Taconic system of Emmons, in a letter to Prof. Bronn of Heidelberg.*

While these publications were in progress in America, M. Barrande, in the *Bulletin de la Société Géologique de France*, Vol. xviii. p. 203, at the meetings of Nov., 1860, and Feb., 1861, gave a long, elaborate, and impartial memoir, entitled, "*Documents anciens et nouveaux sur la faune primordiale et le système Taconique en Amérique,*" with two plates; in which he gives at length the numerous, sagacious, and profound observations of Dr. Emmons on the Taconic system, so long kept in the background.

Professor Agassiz, who has contributed much to the enlargement of our views and notions as to the great value of paleontological characters for the determination of the relative age of strata, desirous to assist in the elucidation of the difficulty, signalized with such a masterly hand by M. Barrande, sent me to Vermont and Canada to collect all the specimens of fossils, and all the facts I could reach, for the benefit of his Museum of Comparative Zoölogy. I give below a very summary resumé of what I have seen, reserving all the detailed sections, new fossils, and geological maps, for a longer memoir now in preparation.

I must begin by the statement that the Taconic system of Dr. Emmons is the true base of the sedimentary strata in North America, and that I agree in the main with all the observations, sections, and descriptions of fossils of Dr. Emmons, who, in establishing the foundation-stone of the pillar of American Stratigraphy, has given in his different memoirs on the Taconic system the most difficult and important geological works which have ever been produced on this side of the Atlantic.

My researches were principally directed toward the upper part of the Taconic series and the Lower Silurian, and I give a tabular view, showing the succession of groups of strata. This I was able to make out for the vicinity of Georgia, St. Albans, Swanton, Highgate-Springs, and Phillipsburgh, on the north-eastern shore of Lake Champlain.

Lorraine Shales.—This group, which has been also called *Pulaski Shales* and *Hudson River Group*, does not occur at Snake Mountain, nor in the vicinity of St. Albans, Georgia, Swanton, and Highgate. Indeed, I did not find a single trace of this group anywhere on the main land of Vermont, and I only saw it on the peninsula of Alburgh, between Missisquoi Bay and Rouse's Point, where it presents the rocks

* I regret to say that this is the second instance since 1858 in which the editors of *Silliman's Journal* have not only appropriated letters belonging to me, but attributed them to persons who have had nothing whatever to do with them.

THEORETICAL SECTION OF THE UPPER TACONIC AND LOWER SILURIAN ROCKS OF VERMONT.

	GROUPS.	FEET.	LOCALITIES, SUBDIVISIONS, AND FOSSILS.	
LOWER SILURIAN.	LORRAINE SHALES.		Alburgh Peninsula.	Second fauna.
	UTICA SLATE.	40	Highgate-Springs.	
	TRENTON LIMESTONE.	60	Highgate-Springs.	
	BLACK RIVER GROUP.	40	7. At the base a blue limestone, very fossiliferous, with *Ampyx Halli;* 2 feet. Highgate Springs.	
	CALCIFEROUS SANDSTONE.	700 to 900	3. Gray and blue shales, containing nodules of blue limestone, with fossils; about 150 feet. East of Phillipsburgh (Billings). 2. Blue and black limestone, very fossiliferous (*Bathyurus Saffordi*); about 300 feet. Phillipsburgh (Billings). St. Albans Bay. 1. Gray and almost white limestone, containing numerous veins of calc-spar, marble, and magnesian limestone; about 300 feet. Phillipsburgh (Billings). St. Albans Bay. Swanton.	Second fauna.
Overlie the Taconic strata in discordance of stratification.				
UPPER TACONIC.	POTSDAM SANDSTONE.	300 to 400	4. Dolomitic conglomerate; 30 feet. Saint Albans. 3. Red sandstone, with *Conocephalites Adamsi, C. Vulcanus;* 30 feet. Saxe's Mills. St. Albans. 2. Dolomite; 150 to 200 feet. Saxe's Mills. Swanton. St. Albans. 1. White and red sandstone; 40 feet. St. Albans Bay.	Primordial fauna.
	LINGULA FLAGS.	500 to 600	Brown, green, and blackish slates, with *Lingulæ, Orthisina, Orthis, Chrondites, Graptolites.* Highgate-Springs.	
	GEORGIA SLATES.	500 to 600	Gray, black, sandy slates, with *Paradoxides (Olenellus) Thompsoni, P. Vermontana, Peltura holopyga, Con. Teucer, Obolella cingulata, Orthisina festinata, Camerella antiquata, Chrondites, Fungus.* W. Georgia. Swanton.	
	ST. ALBANS GROUP.	2500 to 3000	Green, brown, and reddish slates, containing large lenticular masses of very hard, whitish-gray limestone. Trilobites. St. Albans. Georgia Centre.	

Quartzite, Conglomerates, and Talcose slates. Between St. Albans and Fairfield, and belonging to the Lower Taconic.

and fossils which characterize it at Sandy Creek, the typical locality of Jefferson county, in the State of New York.

Utica Slate. — The only locality where I met with these strata was on the shore of Lake Champlain, a short distance behind the hotel of Highgate-Springs. The thickness of what is not covered by the water is forty feet; they have been overturned, and lie below the Trenton Limestone. Dr. G. M. Hall, of Swanton, has found this group on several of the islands in the middle of the lake.

Trenton Limestone. — This group, with its usual characters, is found at Highgate-Springs.

Black River Group. — Comprising the *Black River limestone*, *Birdseye limestone*, and *Chazy limestone*. It is common to find now and then, scattered along the whole line from Highgate-Springs to Bridgeport, in small patches, lying in discordant stratification over the different divisions of the upper Taconic, some beds of limestone of this group. The thickness seldom reaches forty feet. They contain numerous fossils characteristic of the group. Localities: Highgate-Springs, West Georgia (near Mr. Parker's house), and Snake Mountain. At Highgate-Springs the last bed of the Black River group is formed of a hard blue, grayish limestone, two feet thick, with *Ampyx Halli*, very fossiliferous, and constituting a very conspicuous and easy *point de repère.*

Calciferous Sandrock. — Until lately this group was not considered of the importance that it really is, and it is due mainly to the researches of Mr. Billings, of Montreal, that we have at last come to a true knowledge and understanding of its characters, and the great place it occupies in the Lower Silurian. In fact, the Calciferous Sandrock is the base of the Lower Silurian, and contains half the thickness of the beds composing the Lower Silurian of North America. In the *Paleontology of New York*, by James Hall, Vol. i., thirteen or fourteen fossils are described as being the only remains of organized beings found in the Calciferous Sandstone, whereas now Messrs. Jewett Billings, G. M. Hall, Perry, Farnsworth, J. Richardson, J. Bell, and myself, have succeeded in collecting from this group in Vermont, New York, Canada, and at Belle Isle (Newfoundland), more fossils than in all the other Lower Silurian groups put together, — that is to say, about twelve hundred species, of which one hundred are new Trilobites. To any one, however, acquainted with the different Silurian faunæ of Europe, it was evident that the second fauna of North America had not been well worked out by the Paleontologist of New York, and that at least a good half of it had escaped his hasty and superficial researches in the field; so that this discovery of numerous fossils belonging to the second fauna in the Calciferous Sandstone, however sudden it might be, was not unexpected to any one who has studied the different memoirs of Barrande on the subject.

A series of gray and blue shales, containing nodules of blue limestone, with fossils characteristic of the Calciferous Sandrock, was discovered in August last by Mr. Billings, ten miles east of Phillipsburgh, on the road to Freligsburgh, in Canada. Mr. Billings saw it lying over the limestone that forms the following subdivision, but was unable to make out its thickness, and its junction with the Black River group, so that giving about one hundred and fifty feet for it is a mere guess.

The second subdivision in descending the series has been called by Mr. Billings, in his interesting memoir, entitled, *On some Rocks and Fossils occurring near Phillipsburgh, Canada East*—(see the *Canadian Geologist*, August, 1861, p. 310, Montreal,) —*Blue, Thin-bedded and Nodular Limestone.* As Mr. Billings has given a good description of it, I will not repeat it here. The fossils are very numerous one mile east of Phillipsburgh, and just behind the houses of the village of St. Albans Bay. The most characteristic are, *Camerella calcifera ; Orthis; Maclurea matutina; Ophileta sordida, O. levata, O. complanata ; Ecculiomphalus Canadensis, E. intortus, E. spiralis; Pleurotomaria; Murchisonia; Holopea; Capulus ; Orthoceras; Cyrtoceras; Nautilus; Lituites imperator, L. Farnsworthi ; Bathyurus Saffordi, B. Cordai ; Amphion Salteri ; Asaphus ;* Crinoids, Corals and Fucoids.

Below this subdivision, and passing gradually into it without any well defined line of separation, is a series of gray, almost white, limestone, containing numerous veins of calc-spar, white marble, and magnesian limestone. Mr. Billings has called it *Magnesian limestone*, but as true dolomite is found in large quantities in the middle of the Potsdam Sandstone group, I think this name will have to be changed. The fossils are rare in this lower subdivision, but Dr. G. M. Hall has found in it some Cephalopods and Gasteropods half a mile south-east of Phillipsburgh. This last subdivision was very plastic whenfirst deposited, for it re-covers in discordant stratification the slates, and sometimes also the Potsdam Sandstone of the Taconic system, and follows all the accidents of the Taconic strata, as though they were covered with a sheet of paste or plastic clay. I regard it as the bottom rocks of the Silurian system in North America, containing the second fauna of Barrande. Itcan be observed at Phillipsburgh, on the shore line, east of Swanton, and north of St. Albans Bay. It may be that it forms the marble of Middlebury and Rutland, but I am unable to speak with any certainty, as it requires a special investigation, which I have been unable to make.

The Calciferous Sandstone always lies in discordance of stratification on the different groups of the Upper Taconic Strata; sometimes the discordance is 40°, generally 15° to 20°, and the direction of the *têtes de couches*, or strike, as it is called in English, cuts always the direction of the Taconic strata, at an average angle of 25°.

Potsdam Sandstone. — In Vermont the Potsdam Sandstone has exactly the same aspect and composition as at Potsdam, in the State of New York. Near Saxe's Mills, a mile east of the Highgate-Springs, it contains two species of *Conocephalites*, *C. Adamsi* and *C. Vulcanus.* Being the capping group of the Taconic in the *renversement* (overturn) of the strata, it has been broken into pieces and narrow parallel bands, which have rested upon the more inclined strata in a sort of unconformable stratification, very apparent everywhere, squeezing the Lingula-flags and Georgia Slates near the point of contact, and giving them for about two feet depth a sort of agitated structure (*structure tourmentée*). These narrow bands of Potsdam Sandstone are numerous and well developed west of Mr. Parker's farm at Georgia, and also on the road between St. Albans and Swanton; at first they appear to be interstratified with the Georgia Slates, but they are not so, and may be compared to the steps of a ladder placed over, or even a little wedged into the Georgia Slates and Lingula-flags. This group has been known for a long time in Vermont by the name of *Red Sandrock.* It is found all the way from Saxe's Mills to Western Georgia. It forms the top and eastern side of Snake Mountain, contrary to the view of Dr. Emmons, who refers these Snake Mountain rocks to the Calciferous Sandstone. All the fossils found until now in the Potsdam Sandstone of Vermont and New York are of primordial form; and there is also a great break and discordance of stratification between this group and the Lower Silurian; and I think the opinion I first expressed one year ago is fully justified by paleontological and stratigraphical evidences.

Below the Potsdam Sandstone lie great masses of slates, four or five thousand feet thick, which for convenience I should divide into three parts. No regular line of division can be traced between these three groups, as the strata pass from one to the other without any well marked difference; it is merely for the fossils, and as a matter of convenience, that I propose the division.

Lingula-flags. — The upper group, or Lingula-flags, is formed of brown, green and blackish slates, five or six hundred feet thick, with numerous lines of cleavage, cutting the strata in all sorts of directions. In some parts the fossils are very numerous, and I found at Highgate-Springs, where I first saw them, in company with Dr. Hall, a quantity of *Lingulæ*, *Orthis*, *Orthisina*, and *Chrondites.* The *Lingula* is new, and the *Orthisina* is nearly related to, if not identical with, an *Orthisina* quite common in the Lingula-flags of Wales in Great Britain. Mr. Billings informs me that since my visit there he found at Phillipsburgh some *Graptolites*, in slates near the shore of the lake, which I consider as of the upper group, or Lingula-flags.

Georgia Slates. — The middle group, or Georgia Slates, is composed of gray and black sandy slates, sometimes passing into a true yellowish sandstone, with nodules of oxide of iron, and spots of red oxide of iron on some slates. Thickness, five to six hundred feet. In this division, fifty yards from the house of Mr. Noah E. Parker, in West Georgia, the celebrated Georgia Trilobites were found. They were discovered accidentally, about six years ago, by Mr. Parker, in quarrying large slates for a floor. Having found one Trilobite, and not knowing what it could be, Mr. Parker showed it to the schoolmaster of the village, who wrote at once to the late Zadoc Thompson, of Burlington, then State Geologist of Vermont. Mr. Thompson immediately visited the quarry, and made a collection of several specimens and species; unfortunately he died a short time after, without publishing anything about this discovery. The specimens having been placed in the hands of Mr. James Hall, that paleontologist described and figured them in a memoir under the very odd title of *Trilobites of the Shales of the Hudson River Group :* Albany, 1860. It was this title that startled Mr. Barrande so much, and was the occasion of bringing once more before the world, and this time not to be suppressed, the Taconic system of my learned friend Dr. Emmons. Mr. James Hall does not give a single geological fact to sustain his opinion of the Hudson River group; he regards it as a matter of course, beyond all doubt; and in order to give it a sanction which will make all discussion useless, he calls to his support the testimony of Mr. Logan (who, by the way, has never visited the locality), and adds, as overwhelming proof, that "it would be quite superfluous for him to add one word in support of the opinion of the most able stratigraphical geologist of the American continent." The only other geological indication that I have been able to find is in *Silliman's Journal* for January, 1861, p. 125, where Mr. James D. Dana calls the Georgia rocks "metamorphic black slates." I regret to say that all these statements and opinions are erroneous; there is no trace of the *Hudson River group* at Georgia, nor at any other place in the vicinity, and I was unable to find indications of metamorphism in any of the rocks there, for at least three miles around the quarry of Mr. Parker. The fossils are not numerous, with the exceptions of the *Chrondites;* and the Trilobites are certainly much less common there than the *Paradoxides Harlani* in the quarry of Mr. Haywood at Braintree. I found at West Georgia the three Trilobites described by Mr. James Hall, *Paradoxides* (*Olenellus*) *Thompsoni*, *P. Vermontana*, *Peltura holopyga ;* and besides *Obolella cingulata*, a *Fungus*, *Chrondites*, and a *Bryozoon*, related to the *Graptopora socialis* (Salt.), all primordial fossils.

Until this summer We-t Georgia was the only place for these Trilobites. Two other localities have been added in the last two months. Dr. G. M. Hall and Rev. J. B. Perry have found the *P. Thompsoni*, *P. Vermontana*, *Obolella cingulata*, *Orthisina festinata*, *Camerella antiquata*, *Conocephalites Ceucer*, and *Chrondites*, a mile and a half east of the village of Swanton; and Mr. James Richardson has collected specimens of the same *Paradoxides* farther east, at L'anse au Loup, on the north shore of the straits of Belle Isle, Labrador; (see *New Species of Lower Silurian Fossils*, by E. Billings. Montreal, Nov., 1861).

Saint Albans Group.—The road between St. Albans and Georgia, and thence from Georgia to Mr. Parker's house, lies all the way on green, brown and reddish slates, containing now and then large lenticular masses of very hard, whitish-gray limestone. Thickness, between twenty-five hundred and three thousand feet. I did not find any fossils, although I heard of one specimen of Trilobite picked up behind the town of St. Albans by an inhabitant, nor was I able to see that specimen. The reddish slates, which are not well developed in Vermont, as regards the red color of the rocks, lie at the base of the upper Taconic strata. They are worthy of notice, as containing the veins of sulphuret and copper pyrites of the Acton mines, in Canada, and the Bruce and Wallace mines of Lake Huron.

Below the St. Albans group are quartzite, conglomerates, talcose slates, clay slates, mica-schist, and gneiss, with intercalation of beds and lenticular masses of crystalline limestone, resting on the unstratified and oldest crystalline rocks of the White Mountains, and composing the *Lower Taconic system*. Dr. Emmons did not put in his Lower Taconic the mica-schist and gneiss, which form the central and eastern part of Vermont, but on a close examination of the subject in the vicinity of Rutland, Bolton, and Island Pond, I have come to the conclusion that these rocks have a stratified and sedimentary origin, and that they are the base of the Taconic system. All the strata of the Lower Taconic system are more or less metamorphic, especially at the base;— the metamorphism produced by the action of mineral springs during the deposits, together with pressure caused by the divers dislocations to which they were afterward submitted. The Lower Taconic is at least ten thousand feet thick, making fifteen thousand feet the *minimum* for the Taconic system of Vermont. It is difficult to give the thickness of the strata with any exactness, as the Green Mountains present a fan-like structure, similar to that of the Alps and Pyrenees.

Twelve years after the discovery and description of the Taconic system, Mr. Logan, having met with some of the Taconic rocks on the southern edge of the Laurentine Mountains, between the Saguenay River and the Bruce mine on Lake Huron, and overlooking entirely the researches of Dr. Emmons, proposed to introduce into the table of the American strata two new systems, which he called the *Laurentian and Huronian systems*; (see *Esquisse Géologique du Canada*, Paris, 1855). The Laurentian system is composed of the Lower Taconic, to which are added all the unstratified crystalline rocks forming the centre of the Laurentine Mountains, such as granite, syenite, diorite and porphyry, mixing together strata and eruptive rocks, an attempt which was unexpected from a stratigraphical geologist. His Huronian system is formed of a mixture of the St. Albans group of the Upper Taconic, with the Triassic rocks of Lake Superior, the trap native-copper bearing rocks of Point Keeweenaw, aud the dioritic dyke containing the copper pyrites of Bruce mine on Lake Huron.

The different dislocations which have affected the rocks of the vicinity of Quebec have not brought to light the complete series of the Taconic nor of the Lower Silurian, and the difference of opinion that exists between Mr. Logan and myself is partly owing to this want. In his *Remarks on the Fauna of the Quebec Group of Rocks and the Primordial Zone of Canada*, Jan., 1861, and in his *Considerations relating to the Quebec Group*, May, 1861, Mr. Logan gives the following series for the vicinity of Quebec:—

u^2.	— Dark gray shales and sandstones (Hudson River).	
u^1.	— Black shales (Utica).	
b.	— Limestone (Birdseye, Black River, and Trenton).	
q^6.	— Sandstone and red shales (Sillery).	Quebec Group.
q^5.	— Red and green shales.	Quebec Group.
q^4.	— Green and gray shales and sandstones.	Quebec Group.
q^3.	— Sandstones and magnesian conglomerates.	Quebec Group.
q^2.	— Green shales.	Quebec Group.
q^1.	— Magnesian conglomerates and shales.	Quebec Group.
p^2.	— Sandstones.	Potsdam.
p^1.	— Black shales and limestones.	Potsdam.
g.	— Gneiss (Laurentian).	

All the fossils found at Point Levi are placed by Mr. Logan in a single group of strata, which he calls the *Quebec group*. He speaks also several times of shales and limestones beneath the Quebec group, which he considers as deep-water deposits of the Potsdam Sandstone. Unhappily he does not give any precise localities or sections at Quebec or Point Levi where that Potsdam may be found, and I was unable to discover what strata he thus names. But wherever these strata may be located, he says that he found no fossils in them in Canada, "but that the shales resemble those in which *Oleni* have been found in Georgia." So that Mr. Logan considers the *Georgia Slates* and the *Potsdam Sandstone* as the *same* group, one being a deep-water deposit and the other a coast deposit. I will only remark that at Mr. Parker's house, in Georgia, the two groups are found one above the other.

Mr. James Hall, in his last descriptions of the Georgia Trilobites (*Thirteenth Annual Report of the State Cabinet of Natural History* *of New York*, 1861), overlooking the remarks of Mr. Logan on the Georgia Slates, includes the *Georgia Slates* in the *Quebec group*, adding new confusion to an already very diffuse explanation.

In a tabular view of my observations in the vicinity of Quebec, we shall have the following theoretical section:—

THEORETICAL SECTION OF THE ROCKS OF THE VICINITY OF QUEBEC.

	GROUPS.	FEET.	LOCALITIES, SUBDIVISIONS, FOSSILS.	
LOWER SILURIAN.	LORRAINE SHALES.		Not seen.	Second fauna.
	UTICA SLATE.	40	Montmorency Falls.	
	TRENTON LIMESTONE.	80	Montmorency Falls, Beaufort, and Indian Lorette.	
	BLACK RIVER GROUP.		Not seen.	
	CALCIFEROUS SANDSTONE.	600	*a.* Blue schistose marls, interstratified with conglomerates and blue limestone. Compound *Graptolites.* Citadel, City of Quebec, and Point Levi. *b.* Gray slates, sometimes blackish, with alternation of yellow sandstone, magnesian conglomerate, and 20 or 30 feet of gray limestone. The limestone is very fossiliferous: *Bathyurus Saffordi*, *B. Cordai*, *Ecculiomphalus Canadensis*, *Camerella calcifera*, etc. Terre du Curé at Point Levi. The lower part of the group is not visible.	
TACONIC.	POTSDAM SANDSTONE.		Not seen.	Primordial fauna.
	LINGULA FLAGS.		Not seen.	
	GEORGIA SLATES.		Not seen.	
	ST. ALBANS GROUP.	3000	*a.* Green, brown, and black slates of Gilmor wharf, east of Point Levi, and also on the road to Arlaka. Containing the large lenticular mass of whitish gray limestone of La Redoute or Guay quarries. The Redoute limestone contains: *Dikellocephalus*, *Conocephalites*, *Menocephalus*, *Arionellus*, *Orthisina*, *Capulus* and *Crinoids*. *b.* Sillery and Chaudière red slates and sandstones.	

Quartzites of Montmorency Falls. Its position in the Lower Taconic still undetermined.

Lorraine Shales or Hudson River Group. —Mr. Logan, in his section from Montmorency to the Island of Orleans, regards the bed of the St. Lawrence as entirely formed by dark gray shales and sandstones, which he considers of the age of the Hudson River group. Having no diving apparatus at my disposition, I was unable to follow him to the bottom of the St. Lawrence. If this group really exists in the vicinity of Quebec, it will be brought out by a careful examination of all the strata between Ste. Foix and Indian Lorette.

Utica Slates. — Dr. Emmons, in his *Geology of New York*, 1842, p. 117, refers the slates of Montmorency Falls to the Utica Slates, having found there the characteristic Trilobites of *Triarthus Beckii.* Dr. Bigsby also calls them Utica slates (*On the Geology of Quebec and its environs*, 1853), and so did, after their example, Mr. Logan. In my short exploration of 1849, I erroneously considered those black slates of Montmorency Falls as older than the Trenton Limestone forming the summit of the falls; but at my recent visit I found the opinion of the geologist above named to be correct.

Trenton Limestone.—The thirty feet of limestone at the top of Montmorency Falls, and at the foot of the precipice immediately in contact with the quartzite, are of the Trenton Limestone age, as Mr. Logan has stated in his description of Montmorency formations; fossils are very abundant in both places.

Black River Group.—I was unable to refer any strata to the subdivisions of this group. Mr. Logan does not give any special localities for it, having only put it in his diagram and theoretical section without other notice.

Calciferous Sandstone.—This group is composed, at the summit, of blue schistose marls, interstratified with thin bedded limestones, blue and sometimes almost black, and large masses of conglomerate, the size of the rounded pebble attaining even that of the true boulder. In this upper part, especially in the cliff on the road from the ferry to Notre Dame church at Point Levi, are found a quantity of the celebrated compound *Graptolidæ.* The citadel and the old town of Quebec are built on it. Then there is a succession of gray slates, sometimes almost black, with alternations of yellowish coarse sandstone, magnesian conglomerate, and twenty or thirty feet of a gray limestone, brecciated, hard, and very fossiliferous. I did not see the lower part of the Calciferous Sandstone; perhaps it has been concealed by the dislocations, or was never deposited in this part of Canada. The thickness of the whole is about six hundred feet. This number appears at first a small one, but if we take into consideration the numerous foldings of this deposit, and also the narrow band it forms, it will be seen to be sufficient, for the ridge which it forms is never more than a mile and a half in width, extending from Quebec to the Plains of Abraham, Claremont, and Cape Rouge, the extremity of Point Levi, and a little of the cliff west of it, and finally a part of the island of Orleans. It rests unconformably upon the different subdivisions of the St. Albans group; that is to say, on the Taconic slates of Gilmor Wharf, the Redoute limestone, and the Sillery and Chaudière red rocks. This unconformability is somewhat difficult to make out, because the strata have been so dislocated, folded, and squeezed, that they often appear as if they lay below the St. Albans group instead of being above, as they are in fact. But patient and numerous observations made with a theodolite, or a good compass, will clear up all the difficulty.

In *Remarks on the Fauna of the Quebec Group*, &c., Mr. Logan gives some details, calling separate exposures or outcrops, A, A^1, A^2, A^3, A^4, B^1, B^2, and B^3, and considering the whole as one group of strata. I tried without success to understand his explanation when I was at Point Levi, his memoir in one hand and my hammer in the other. The only thing I was able to make out was: 1st, that what he calls the more northern outcrop, A^2, was mainly the quarries of the Notary Guay, or the *Redoute limestone*; I say mainly, for other strata may be included in it, of limestone and conglomerate which surround the lenticular mass of the Redoute*; 2d, that his outcrops A^1, A^3, A^4, B^1, B^2 and B^3, were a single group of strata, with repetition of several beds by folding, situated between the churches of St. Joseph and Notre Dame, a little east of that line, and in a parcel of ground called by the Canadians *Terre du Curé* (land of the Curate of St. Joseph); 3d, the cliff A is exposed very well on the road leading from the ferry to Notre Dame church.

Mr. Logan includes also in his Quebec group the Sillery red shales and sandstones, the whole having, perhaps, a thickness of five or seven thousand feet, and regards it as the equivalent of the Calciferous Sandstone and Chazy Limestone. The Chazy Limestone is a small subdivision of the Black River group, and I did not see it, or any equivalent of it. The cliff A is in part subdivision *a* of the Calciferous Sandstone of my tabular view. The outcrops A^1, A^3, A^4, B^1, B^2, and B^3, form entirely my subdivision *b*; I will call them *strata de la terre du Curé*. The fossils are very numerous in several beds, especially in some of the brecciated limestone; the most common are: *Bathyurus Saffordi*, *B. Cordai*, *B. bituberculatus*, *B. quadratus*; *Cheirurus Apollo C. Eryx*; *Agnostus*; *Ecculiomphalus Canadensis*, *E. intortus*; *Holopea dilucula*; *Pleurotomaria*; *Murchisonia*; *Orthoceras*; *Cyrtoceras*; *Orthis*; *Camerella calcifera*, etc., all belonging to the second fauna. Mr. Logan

*So called by the older Canadians because there was a Redoubt there during the last French war.

names several fossils, especially Trilobites, *Bathyurus* and *Menocephalus*, which are common to the outcrops A^1, A^3, A^4, B^1, B^2, and B^3 (*strata de la terre du Curé*) and the outcrop A^2, but I did not find any; it may be that some boulders and pebbles of A^2, or *la Redoute* Limestone, are enclosed in the conglomerates of the different beds of the *strata de la terre du Curé*.

The outcrop A^2 is entirely distinct from the others. It is true that La Redoute is almost entirely surrounded by small bands of Calciferous Sandstone, that form as it were the frame of a small island, but such accidents are not rare in much disturbed and dislocated countries, and it is not difficult to see that La Redoute is independent of all the other hills of Point Levi, forming a conspicuous landmark, which can be seen from all the environs of Quebec, and having a north and south or meridian direction, in common with the whole of the Green Mountain system, which put an end to the Taconic deposits, while the other hills of Point Levi and Quebec run north-east and south-west. The *strata de la terre du Curé* do not include, I think, all the Calciferous Sandstone, as it is developed in Vermont and Phillipsburgh; the lower part, or white limestone of Phillipsburgh shore, is wanting here.

Potsdam Sandstone. — I did not see any rocks in the vicinity of Quebec which I can refer to this capping group of the Taconic system.

Lingula-flags. — Not seen.

Georgia Slates. — Not seen.

St. Albans Group. —This lower group of the upper Taconic is well developed on the south shore of the St. Lawrence, which it occupies almost entirely, with the exception of one or two miles at Point Levi. It extends far into the interior. Its thickness is at least three thousand feet. The upper part is composed of green, brown, and black slates, affected by numerous lines of cleavage, and can be seen very well developed near the Gilmor Wharf, east of Point Levi, also on the road from St. Joseph's church to Arlaka, at one mile from the church. I consider the Redoute Limestone, or quarries of the Notary Guay, as forming a lenticular mass inclosed in them, similar to one that I observed at St. Albans. I did not find any fossils in the slates, except the *Chrondites*, so common and characteristic of all the upper Taconic slates. The Redoute Limestone presents a highly interesting fauna. The strata are almost perpendicular, with a direction almost due north, and a deviation to the east of 5° or 7°. The stratification is indistinct, as it always is with lenticular masses. The limestone is gray, almost white, very hard, sometimes oölitic, with little veins of chalcedony. Its whole thickness cannot be less than eighty or one hundred feet. In some of the strata fossil remains are numerous, but composed only of fragments, chiefly heads and *pygidia* of Trilobites; and it is very difficult to obtain specimens on account of the great hardness of the stone. I succeeded, however, in collecting the following species: *Conocephalites Zenkeri; Dikellocephalus magnificus, D. planifrons, D. megalops, D. cristatus; pygidia* of a *Dikellocephalus* not named by Billings, but figured No. 11 and 12; *Arionellus cylindricus, A. subclavatus; Menocephalus Sedgewicki, Menocephalus globosus;* a large *Capulus,* an *Orthisina*, and the stems and even the foot of a Crinoid.

All the known species of the Redoute limestone have been described in a masterly manner by Mr. Billings in his memoir, *On some species of Fossils from the limestone near Point Levi, opposite Quebec*, August, 1860. I did not find the *Dikellocephalus Belli* and *D. Oweni*, nor *Agnostus Americanus, A. Orion* and *A. Canadensis*, which Mr. Billings describes as part of his fauna of Limestone No. 1. Without touching the stratigraphical question, Mr. Billings separates the species under the heads of Limestones Nos. 1, 2, 3, and 4. His numbers 2, 3, and 4, are evidently what I call the Calciferous Sandstone strata, and his No. 1 represents in part the *Redoute Limestone*. I say in part, for, perhaps, he has put in No. 1 some specimens resembling those of the *Redoute Limestone*, especially when broken in very small fragments, that really belong to the *strata de la terre du Curé*. For instance, I found a good specimen of his *Bathyurus bituberculatus*, not at the Redoute, but at the *terre du Curé*, and I did not find a single specimen or trace of the genus *Bathyurus* in the Redoute Limestone; consequently my observations in the field do not lead me to consider the genus *Bathyurus* as a primordial one; it belongs exclusively to the lower part of the second fauna. According to my observations, the fauna of the Redoute Limestone is entirely primordial, without any mixture whatever of fossils of the second fauna, being limited to the genera *Conocephalites, Dikellocephalus, Arionellus, Menocephalus, Capulus, Orthisina*, and a Crinoid, which characterize the primordial fauna in America as well as in Europe.

The inferior part of the St. Albans group is formed by what has been called the Sillery and Chaudière red shales and sandstones, in which no fossils have as yet been found. In Canada this part of the group is much more developed than in Vermont, or perhaps the difference in colors is due to metamorphism in Vermont.

Finally, there is a beautiful *quartzite* at the falls of Montmorency, which Mr. Logan, for an unknown reason, continues to call Laurentian *gneiss*. It forms the bed of the Montmorency river and the chasm of the precipice. It is indistinctly stratified by beds from ten to twelve feet thick, very dark and compact, and has all the characters of a metamorphic sandstone or true quartzite. Direction or strike N. 45° E. to S. 45° W., dipping south-east at an angle of 80 or 85 degrees.

Such is the series of rocks seen by me in the vicinity of Quebec. Mr. Logan says, "from the physical structure alone no person would suspect the break that must exist in the neighborhood of Quebec; and without the evidence of the fossils every one would be authorized to deny it;" thus throwing on Paleontology all the mistakes made and all the difficulties accumulated in his Quebec Group. I ask permission to say that the Stratigraphical and Lithological differences between the Silurian and Taconic rocks of the vicinity of Quebec are to me at least as great and as plain as the Paleontological ones; and that I find no facts whatever which show any conflict between Paleontology and Stratigraphy.

It is doubtful if all the shales between the chasm of Montmorency Falls and the waters of the St. Lawrence are of the Utica Slate age; the *Graptolitas bicornis* and *G. pristis* are found in the *black shales* near their contact with the Trenton Limestone, but as yet no fossils have been found in the *gray shales*. In the ravine east of the Falls, there is probably a fault between the black and gray Shales; the dipping of the Trenton Limestone, the black Shales and gray Shales, disagrees, and varies from fifteen to eighty degrees, in a space of less than 150 feet. I am inclined to consider the gray Shales as the upper part of the Calciferous Sandstone group, but it will require further investigations in the field to determine the true stratigraphical structure of Montmorency Falls.

The Corresponding Secretary read letters from Dr. Christian Lütken, of the University of Copenhagen, and Dr. B. F. Shumard, of St. Louis, Mo., acknowledging their election as Corresponding Members of the Society; also, a letter from the Entomological Society of Philadelphia, acknowledging the reception of the Society's Proceedings, Vol. viii., pp. 161—192.

On motion of Prof. Rogers, G. B. Emerson, Esq., and Rev. R. C. Waterston, were added to the Building Committee.

Mr. William C. Cleveland, of Cambridge, was chosen a Resident Member.

November 20, 1861.

The President in the chair.

The following communications were presented:—

NOTE ON CLEANING DIATOMACEÆ. BY ARTHUR M. EDWARDS, NEW YORK.

Not having found any of the published methods for cleaning subpeat deposits or guanos, so as to develop the Diatomaceæ contained in them, to work with entire satisfaction, some months ago I instituted a series of experiments for the purpose of discovering whether a more perfect process could not be contrived. The result was the method to be described here, which I think will be found to answer the purpose sought, viz., that of giving a reliable process by means of which *all* the organic matter may be removed from sub-peat deposits, guanos or tidal muds.

Guanos should be concentrated as much as possible, by removing all their easily soluble constituents by means of boiling in water, or, when only the coarser Diatoms are wanted, by boiling for a few minutes in a solution, not too strong, of Carbonate of Soda (washing soda). This removes most of the Ammonia, and Lithic acid, and a greater part of the coloring matter. The residue is best boiled for a few minutes in clear water, and then in Chlorohydric acid, to remove lime, and thoroughly washed with water. What is now left is treated in the same manner as sub-peat deposits and tidal muds, as follows: the residue after washing, with water adhering to it, is transferred to a test tube or flask, and enough Nitric acid poured over it to cover it to about the depth of half an inch; the liquid is then boiled as long as vapors of Hyponitric acid are given off. These vapors range in depth of color from a yellow to a deep ruby-red, the quantity of organic matter in the gathering determining the depth of tint. In this way the Nitric acid is decomposed, a large part of its Oxygen uniting with the Carbon of the organic matter and going off as Carbonic acid. When the red vapors have ceased to be evolved the residuum is well washed with filtered or distilled water, until all acid is removed. The remaining Diatoms, with some undecomposed organic matter still adherent, is transferred to a porcelain dish, covered with Sulphuric acid to the depth of half an inch, and boiled. While in a state of ebullition ground Bichromate of Potassa is introduced in small portions, always allowing the violent action, which results from the introduction of one portion, to subside before another is added. The Bichromate is decomposed by the Sulphuric acid, Chromic acid being set free; this, coming in contact with the organic matter, is in its turn decomposed into Sesquioxide of Chromium and Oxygen, which latter substance, uniting with the Carbon of the organic matter, is evolved as Carbonic acid. The Sesquioxide of Chromium unites with the Sulphuric acid, and this, with the sulphate of Potassa, forms a double salt, the solution of which is of a deep chrome green color. As soon as all the organic matter is removed no more of the Chromic acid formed is decomposed, and the liquid becomes of a yellowish green tint in place of deep chrome green. The mixture is then permitted to cool, and, when quite cold, the remaining Diatoms are washed free of salts and acid with clear water.

This process has the advantage over the one in which Chlorate of Potassa is used, that the vapors evolved are neither deleterious to the lungs nor explosive. Beside, in the change of color undergone on the removal of organic matter, we have an easy method of ascertaining when to stop the action of the chemicals used.

Mr. Stodder said, in regard to the marks of Diatoms, that Wenham some years ago stated that they are hexagonal, while Prof. Rood, in the last number of *Silliman's Journal*, (Nov. 1861,) maintains that they are circular. He exhibited some photographs sent him by the latter gentleman, in support of his position. Mr. Stodder was still of the opinion that the marks are hexagonal.

ON MELANIA (AMNICOLA) LAPIDARIA. BY JAMES LEWIS, OF MOHAWK, N. Y.

Some time ago I had some correspondence with Mr. W. G. Binney, in which I called his attention to a small mollusk which is catalogued in the Check Lists of the Smithsonian Institution as *Amnicola lapidaria* (Say), it having been described originally by Mr. Say as a *Cyclostoma*.

There are some peculiarities in the *habits* of this little mollusk which are somewhat anomalous, and which, taken in connection with the true generic characters which I have recently ascertained, prompt me to present the following notes, which may be useful to other naturalists who have not had the same opportunities I have to examine the soft parts of the animal.

MELANIA LAPIDARIA, (Lewis.)
Cyclostoma lapidaria, (Say.)
Amnicola lapidaria, (Binney,) in Sm. Catalogue.

Soft parts identical in form with *Melania*.

Foot short, broad anteriorly; head proboscidiform; eyes lateral, projecting, surrounded by an elevated process which is continued anteriorly to the base of a short and drooping tentacle. Mouth, foot, and neck of a translucent slate color, which becomes blended with a delicate reddish brown on the space between the eyes. Opercle, as in *Melania*.

Habits, evidently air-breathing.* Specimens in water seemed not embarrassed in their movements, though they soon made their way out, apparently preferring to be out of it. The drooping of the tentacles is evidently caused by their adherence to the moist surface of the

* Specimens dropped into water for the purpose of examining the soft parts gave off numerous small bubbles of air.

head. The tentacles are closely appressed to the head, when out of water, and are not discernible with a strong magnifier.

The progressive movements of the animal are made by alternate expansions and contractions of the foot, as in some species of *Melania*, and suggest, as a comparison, the movements of certain caterpillars.

This mollusk is found in moist grounds under bits of decaying wood, leaves, etc., associated with several species of air-breathing mollusks. The following species have been observed as its associates:

Helix alternata, Say; *H. multilineata*, Say; *H. monodon*, Rackett, (Var. *Leaii*, Ward);* *H. lucida*, Drap.; *H. striatella*, Anthony; *H. chersina*, Say; *H. electrina*, Gould; *H. indentata*, Say; *Pupa contracta*, Say; *Carychium exiguum*, Say; and *Succinea avara*, Say.

I am indebted to A. O. Currier, Esq., of Grand Rapids, Michigan, for living specimens of this mollusk, and information respecting its habits and associates.

I have received specimens of *Helix Leaii* from Alabama, Ohio, and Michigan. They are invariably smaller than either of the other varieties known as *monodon* and *fraterna*, with a more open umbilicus, the shell of a darker tinge, usually brownish, with a ruddy tint pervading the more solid parts of the lip, which is usually white in *monodon* and *fraterna*. The soft parts are very much darker than the soft parts of *monodon* and *fraterna*. The habits of the animals confine them to damp localities where *monodon* and *fraterna* are never found. There are two very strongly marked varieties of *monodon* (umbilicus open) that have come under my notice. They are evidently as distinct as *H. hirsuta* and *H. stenotrema* are declared to be by Mr. W. G. Binney. I can hardly understand why Mr. Binney should hold so tenaciously to *H. stenotrema* as a separate species, while he places *fraterna* and *Leaii* in the synonymy of *monodon* as varieties. Certainly there are as good grounds for distinction in one case as in the other.

Prof. Wyman exhibited a preparation of the bones of a supernumerary leg from a goose.

This was attached to the trunk on the left side near the tail, trailed on the ground, and did not appear to be in any way under the control of the will. It was connected with the body by the common integuments and a thin layer of muscular fibres, which were attached to the abdominal muscles on the right side; another similar layer probably existed on the left, but was inadvertently cut away in the dissection. Near its attachment was a small opening, connected by means of a

* *Helix Leaii* (Ward). This shell is very strongly characterized as a distinct species, both by the character of the shell and soft parts, and the habits of the animal.

short canal with the intestine. The leg had a similar form, and the same temperature as the others, but no muscles were found upon it.

With the exception of those of the toes, all the different bones of the limb were anchylosed with each other. The first segment of it was made of an imperfect pelvis, which consisted of rudimentary ilia and pubic bones; there were no indications of ischia. To the ends of the ilia was attached a misshapen femur, and at right angles to this the bones of the leg. These were three in number, viz., a middle symmetrical tibia, and on either side of it a fibula. The tibia ended below in two articulating surfaces, to each of which was attached a tarso-metatarsal bone, and each of them had the usual number of toes. The latter, however, were twisted in such a manner that the inner borders touched and were fused. The three outer toes had the usual number of phalanges, but in the place of the two inner toes was a single one, consisting of a symmetrical phalanx, provided with two terminal ones, viz., a right and a left. This toe was common to the two feet, and, like the tibia, composed of parts corresponding to the outer halves of right and left bones, showing a condition of things analogous to Cyclopism.

Prof. W. B. Rogers, in behalf of the Building Committee, made a report, embracing the substance of their doings since their appointment, and presented to the Society as their choice, after mature and long deliberation, a plan offered by Mr. Jonathan Preston. The plans and sections were exhibited and explained by Dr. J. C. White. According to the estimates, as correct as could be made, without having obtained actual offers from contractors, enough of a substantial, spacious, convenient, essentially fire-proof, and handsome building, for the immediate wants of the Library and Cabinet, can be finished for about $62,000.

In conclusion, the Committee recommended to the Society the adoption of the following Resolutions:—

1. Resolved, That, the plan of a building, as designed by Mr. Jonathan Preston, and described and set forth in the report of the Building Committee, be accepted by the Society, as at once graceful and ample in its proportions, and well adapted for all the purposes which the Society have in view.

2. Resolved, That the Building Committee be requested to have detailed specifications forthwith prepared and made known, relating to all the different materials and branches of labor included in so much of the building as is referred to in the report of the Building

Committee, with the view of obtaining a positive estimate of the amount to be disbursed.

3. Resolved, That should the aggregate cost, deduced from the actual offers and proposals received, be found not to exceed the available fund as increased by further contributions, the Building Committee shall be empowered, without further action of the Society, to make arrangements for commencing the building forthwith.

The Report was accepted, and the Resolutions were adopted.

Dr. C. T. Jackson presented a specimen of Domeykite, from the vicinity of Portage Lake, Lake Superior.

The specific gravity is put down in the books at 4.5; he had ascertained it to be 7.431. The hardness is 3½; color tin white, often iridescent on surface; it is sectile, and is readily crushed to a fine granular powder. Its composition is, copper, 70.643, and arsenic 29.445, in 100 parts.

Dr. White related an instance of intelligence in a hawk.

It flew on board ship in a storm at sea, was fed, and partially tamed, and finally on reaching port escaped, though with clipped wings, flying and paddling toward the shore. Getting frightened, it paddled back to the vessel, passing by numerous others not very unlike it, and on reaching the one it had left, climbed up by means of a rope thrown to it.

Dr. White read the following account of specimens added to the department of Comparative Anatomy:—

The following animals, forming the collection known by the name of Goodwin's Menagerie, were collected mostly several years since by Mr. John Sears. They were burned to death on the night of the 13th inst., by the taking fire of the stable in Portland street, below the room in which they had just been placed in cages for exhibition. The scene presented to one entering the blackened, half-burned room, the following morning, was very pitiful and horrid. The slender bars of the cages, which would have readily given way before the dash of the larger brutes, had they known there was such a thing as existence outside their narrow limits, showed no evidence of any attempt at a forcible escape on their part. The positions of the victims were expressive of the frightful nature of the death they suffered; some lying upon their backs, with paws uplifted, others resting upon their companions, and all with parted lips. The male Jaguar, the most savage of all, was found crouching in his old, sullen attitude, with nose pushed far between the bars, and grasping the iron with his paw defiantly.

Perhaps the saddest sight of all was the cage of the wonderfully intelligent Macaw. The poor bird was stretched upon his back, clinging to the wooden rail with both wings and beak.

The spectators outside say that no sound was heard from any of them during the conflagration, from which we may infer that they were either speedily suffocated by the smoke, or else were cowed at once by the element the wild beast fears so much. Their skins were damaged by the combined action of heat and the water used in quenching the fire, but the bodies were not otherwise injured. They were obtained for the Society from the agent of the Conway Fire Insurance Company. Through the kindness of Dr. Holmes, Professor of Anatomy in Harvard University, the dissecting room of the Medical College was placed at my disposal, for the accommodation of part of them, and the students of the Institution willingly undertook their dissection. The remainder of the collection our President was obliging enough to take into his private dissecting room at Cambridge.

The Society may consider itself fortunate in having secured so valuable an acquisition to its already extensive osteological collection. Such an opportunity will probably never occur again. It raises this department of the cabinet far above any in the country in importance, and will enable us to grace our new halls with an almost perfect collection of skeletons of the large cats of the Old and New Worlds. The collection consists of the following specimens: —

1. Fine male Lion, 5 years old; shipped from Delagoa Bay, Africa. Dimensions, 8 feet to end of tail, 6 feet 4 inches to root of same.

2. Very large female, the sister and mate of above. Dimensions, total length, 6 feet 10 inches.

3. Lioness from Cape of Good Hope; 9 years old. [Given to Prof. Wyman.]

4. Male Jaguar, from South America; 4 years old, 6 feet to end of tail.

5. Female, mate of same. [Given to Prof. Agassiz.]

6. Young Bengal Tiger, female; 2 years old, 7 feet 4 in. to tip of tail.

7. Hunting Leopard, or Cheetah, female; 8 years old, from Asia. Had the habit of sucking her own nipples.

8. Young Leopard from Asia; 2 years old — male.

9. Cougar; 3 years old — male. South America.

10. Ocelot; 6 or 7 years old. From Central America. Female.

11. Civet cat, — *Viverra zibetha;* 6 years old, female. Asia.

12. Spotted or laughing Hyena; 8 years old. Cape of Good Hope Male.

13. Jackal; 7 years old. Cape of Good Hope. [Given to Prof. Wyman.]
14. Young black Bear.
15. Raccoon, male.
16. Raccoon, female.
17. Llama, from South America; 4 years old. Female.
18. Domestic Goat; young male.
19. American Opossum.
20. Peccary; 3 years old. Brazil. Female.
21. Monkey, from Japan.
22. Baboon.
23. Monkey.
24. Monkey.
25. Eagle; young white head.
26. Various birds.
27. Skull of Gnu — *Connochœtes gorgon;* 4 years old.

A vote of thanks to the agent of the Conway Fire Insurance Company for this very valuable donation, was adopted.

The following letters were read, which had been received since the last meeting: — From Nathaniel H. Bishop, of Pointville, N. J., Nov. 5, 1861, acknowledging his election as Corresponding Member; six from the Smithsonian Institution, Washington, Oct., 1860, to May, 1861; Royal Institution of Great Britain, March 12, 1861; Liverpool Literary and Philosophical Society, April 16, 1861; Institut Impérial de France, Sept. 23, 1861; K. K. Geologische Reichsanstalt, Wien, Nov. 20, 1860; K. K. Zoologisch-botanische Gesellschaft, Wien, Nov. 5, 1860; and Naturforschende Gesellschaft in Emden, Feb. 4, 1861, acknowledging the reception of the Society's publications.

Messrs. George Brooks and John G. Park, and Dr. Wm. E. Rice, of Boston, and Mr. William Glen, of Cambridge, were elected Resident Members.

M. Joachim Barrande, of Paris, France, was elected an Honorary Member of the Society.

December 4, 1861.

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

The following papers were presented:

On new Genera and Species of Starfishes of the Family Pycnopodidæ* (*Asteracanthion* Müll. and Trosch.) By William Stimpson.

Genus Pycnopodia Stm.

Body depressed, multiradiate; rays equal; disc very broad, but with the inter-radial septa of its cavity extending inward quite to the mouth, and nearly reaching the walls of the stomach; septa thin, with only minute scattered calcareous deposits, but strengthened near their sharp inner edges by a flexible, perpendicular band of articulating feathered plates. Dorsal skin very sparsely provided with calcareous matter, containing only a few small scattered tergal ossicles, bearing slender spines. On the back of the rays these ossicles are rounded and entirely isolated, but on the disc they are sometimes connected by a thin deposition of calcareous matter. Ambulacral furrows very broad, with the pores in four rows, except at the base, where they form only two rows. Interambulacral ossicles strongly developed and very regular in their arrangement; those of the outer row trilobate, closely approximated, and imbricated. One madreporic plate. Papulæ† in clusters.

The type of this genus, and the only species known, is—

Pycnopodia helianthoides.

Asterias helianthoides Brandt, Prodr. desc. anim. Mertens. p. 71.

It is found on the shores of Oregon and California.

Genus Asterias Lin.

The reasons for retaining this ancient name for the typical *Asteracanthia* of Müller and Troschel are discussed at length in the monograph. *A. rubens* may be considered its type.

* Müller and Troschel give, as the essential and distinctive character of this family, "ambulacral feet in four rows;" all other true Starfishes having only two rows. But the increased number of rows is simply the result of the *crowding* necessary for the arrangement of the more numerous feet possessed by some of the species. We have *Asteracanthia*, with only two rows (not, however, exactly rectilinear), and others with six or eight more or less distinct rows near the base of the ray. We have named a genus *Pycnopodia*, in order to secure an appropriate name for the family.

† By the term "papulæ" we have designated those delicate closed vesicles, or protrusions of the internal lining membrane, which project from the pores among the tergal and interambulacral plates, and which are generally, but incorrectly, termed "dorsal feet." We have rejected the term "papillæ," because this has been frequently applied to the ambulacral spines.

Asterias acutispina (nov. sp.)

Closely allied to *A. tenuispina* Lam., and has probably been confounded with it. Rays rather short and swollen, and somewhat trigonal from the prominence of the median dorsal ridge. A few pedicellariæ on the interambulacral plates in the ambulacral furrows. The ambulacral spines are frequently arranged in two rows on the inner half of the ray, with two spines (at intervals only one) to each interambulacral plate. Sometimes there will be two rows on one side of the furrow, and only one on the other, — an irregularity resulting from the heteractinic development of the species. These spines are flattened, linear, and truncate at the extremity, rarely showing any concavity or groove near the extremity, which constantly occurs in *A. tenuispina*. Ventral spines rather stout, somewhat compressed, tapering, but scarcely acute, a little longer than the ambulacral spines, and forming two or three longitudinal series, according to the distance from the disc; those of each transverse row connected at base, as usual; those of the outermost series have a half-crown of minor pedicellariæ * at about the middle on their outer sides. The dorsal spines are acute, subconical, slender, with wreaths of minor pedicellariæ near their bases, and are arranged, as in the other species of the group, in five rows. In the marginal rows there is about one to each alternate ossicle. In the median row, which is regular, the spines are rather larger and more numerous than in the intermediate rows. There are a few elongated major pedicellariæ, variable in size, scattered between the dorsal spines. On the disc there is generally one pretty large interval between the ossicles, which is excentric in position.

Of this species there are four specimens in the Museum of the Smithsonian Institution. They vary in diameter from three to five inches. Their individual character is shown in the following table:

No. of specimen.	No. of Madreporic plates.	No. of rays.	Large rays.	Small rays.
a.	3	9	5	4
b.	—	8	4	4
c.	3+2	7	2	5
d.	3	8	4	4

In specimen *c* the madreporic plates are confluent in two groups, placed on the same side of the disc, and separated only by the space occupied by two rays.

* The pedicellariæ afford excellent specific characters in the true Starfishes. In the *Pycnopodidæ* two kinds may be distinguished. Those which we term *major* pedicellariæ are generally sessile, and of large size, with valves either compressed or appressed. Those of the other kind, which we call *minor* pedicellariæ, are always minute and pedunculated, the pedicels often branching, and the valves oblong, thick, and blunt. The wreaths around the bases of the dorsal spines are always formed of the latter kind.

These Starfishes were brought from the island of Ousima (near Loo Choo), by the U. S. North Pacific Expedition. W. Stimpson.

ASTERIAS MADEIRENSIS (nov. sp.)

Allied to *A. glacialis*. Rays five, stout, flattened above and below, with perpendicular sides; height a little more than one-third the breadth; disc small. Proportion of smaller to greater radius, 1 : 7. Ambulacral pores narrow. Ambulacral spines rather stout, flattened, linear; tips very blunt, a little thickened, and sometimes a little indented on the outer side. They are arranged as usual in this group, one to each interambulacral plate, but are crowded alternately to the right and left, thus appearing to be in two rows. There are a few slender pedicellariæ at the inner bases of these spines, very much smaller than those in *A. glacialis*. Rarely there is a large triangular pedicellaria, twice as long as broad at base, at the outer base of the ambulacral spines. Ventral spines in two rows, very stout, cylindrical, with thickened blunt tips, sometimes bevelled off; those of the outer row with thick semicircular clusters of minor pedicellariæ at their outer bases. Dorsal spines in five rows; those of the marginal row (about twenty) larger than the others; those of the median row next in size; those of the intermediate rows sometimes irregularly scattered. They are stout, cylindric, or subconical, about one-eighth inch long, half as thick as they are long, with their tips irregularly sulcated longitudinally. They are occasionally bifurcated at the tip. On the disc the spines are smaller and irregularly scattered, scarcely forming a pentagon. Around the bases of the dorsal spines there are thin wreaths of minor pedicellariæ. No major pedicellariæ on the dorsal surface. Papulæ in groups. The madreporic plate is protected by a semicircle of five or six spines at the inner side. Diameter, nine inches.

Habitat, Madeira. North Pacific Expedition. Wm. Stimpson.

ASTERIAS CONFERTA (nov. sp.)

Rays five, stout, rounded, and dilated at base; disc large. Proportion of smaller to greater diameter, 1: 3.5. Ambulacral furrows broad at the base of the ray, where the pores are crowded into six rows. Ambulacral spines in one regular row, slender, compressed; subcylindric, as long as the ventral spines, somewhat tapering, with bluntly-rounded tips. Ventral spines crowded, very numerous, in six or seven rows near the base of the ray; short, subcylindric, a little bent outward, and slightly flattened externally, with more or less longitudinal striation near the tip. Beyond the ventral spines there are no regular channels, but the surface is covered with pedicellariæ and minute spines. The dorsal spines are numerous, equal in size, but very small — not more than one-twentieth of an inch in length, scarcely capitate, but more or less pointed. They are uniformly distributed over the disc and rays in a reticulating manner, the interspaces being from one-tenth to one-half inch in diameter, and thickly crowded with groups of papulæ and minor pedicellariæ; the latter generally occurring about the bases of the spines, but not forming wreaths or crowns. The major pedicellariæ are very short and stout, regularly conical or somewhat wedge-shaped, with very broad valves. They are very numerous, particularly on the disc, where they often stand in groups of ten to twenty together. The largest are found isolated in the angles of the rays below, where one occurred having a diameter of eight-hundredths of an inch, and a regularly conical form, with a square base. Diameter of our only specimen, ten inches.

It is allied to *A. ochracea*, but differs in its more numerous spines, pedicellariæ, and ambulacral pores.

Habitat, Puget Sound. North-West Boundary Commission. Dr. C. B. Kennerly.

Asterias fissispina (nov. sp.)

Five rays, short, and dilated at base; disc large. Proportion of the diameters, 1 : 3. Ambulacral pores near base of ray crowded, alternating, indistinctly six or eight rowed. Ambulacral spines in one regular row, as long as the ventrals, and flattened on the outer side. Ventral spines sub-equal, stout, sub-cylindrical, truncated, with fissured tips, and a deep, longitudinal sulcus on the outer side; they form five regular rows. The marginal dorsal spines are as large as the ventrals, capitate, with striated sides and pinched tips, and form an irregular row, of much fewer spines than occur in a ventral row. The spines of the back are few in number, and of only half the size of the ventral spines. They are shaped like the marginal spines, from which they are not ordinarily distinct, and are arranged on reticulating ridges, forming a rather open net-work. On the disc they form a pentagon, from each angle of which extends a median row reaching to one-third the length of the ray. Within the pentagon, close to its periphery, the madreporic plate is situated. The dorsal spines increase in size toward the tips of the rays. Papulæ in groups. Minor pedicellariæ nearly as in *A. ochracea* and *A. conferta;* major pedicellariæ smaller and far less numerous than in those species, but of similar short and stout form. Diameter, thirteen inches.

Habitat, Shoalwater Bay, Oregon Coast. Northern Pacific Railroad Expedition. Dr. J. G. Cooper.

Asterias capitata (nov. sp.)

Rays five, not contracted at base; disc large. Proportion of diameters, 1 : 4.5. Ambulacral pores rather narrow, in four regular rows.

Ambulacral spines in one regular row, linear, compressed, and blunt. Ventral spines as long as the ambulacrals, capitate, with bluntly-rounded heads, elegantly striated on the convex inner face and tip, and with a median sulcus on the outer side. They are arranged in four rows, those of the outer row being largest; and there are some minor pedicellariæ on the outer sides of the spines in all of the rows. The dorsal spines are not very numerous, but are for the most part large, their regularly globular and beautifully striated or radiated heads being about eight-hundredths of an inch in diameter, and larger than those of the ventral spines. They are arranged without order, standing about one-seventh of an inch apart; but five or six longitudinal rows may be obscurely traced, the marginal row being most distinct, containing eighteen or twenty spines. On the disc, there is a central tubercle, but scarce any indications of a pentagon. Around the bases of the dorsal spines there are regular wreaths of minor pedicellariæ. The major pedicellariæ, which are of the short, conical or sub-globular form, with broad valves, are scattered between the spines as in *A. ochracea*. Papulæ in groups.

Color in life purple, according to Dr. Newberry. The spines are probably white, or at least of a lighter color. Diameter, five and a half inches.

This very pretty species differs from *A. ochracea* in its larger dorsal spines, which are not arranged in a reticulating pattern; and from *A. Lütkenii*, in its shorter and more numerous ventral spines, as well as in the presence of major pedicellariæ on the back.

Habitat, San Diego, Cal. Colorado Expedition. Dr. J. S. Newberry.

ASTERIAS LÜTKENII (nov. sp.)

Rays five, rather broad, with blunt tips; disc moderately large. Proportion of the diameters, 1 : 4.25. Ambulacral pores in four regular rows. Ambulacral spines in one regular row, slender, long (but not longer than the ventrals), not compressed, but tapering to a blunt point. Ventral spines in four approximated rows, elongated, scarcely capitate; heads elongated, subtruncate, striated within, and often sulcated along the middle on the outer side, where there are always semicircular clusters of minor pedicellariæ. Beyond the ventral spines there are distinct lateral channels. The dorsal spines are uniform in size and distance, being about one-fourth of an inch apart in one specimen, and arranged without order, except in the regular marginal row, which consists of about thirty spines; and they form no pentagon on the disc. They are one-eighth inch high, and half that in breadth, capitate, with the heads striated and conical, with pinched tips. Around the base of each there is a rather narrow ring of minor pedicellariæ. There are no major pedicellariæ scattered among the dorsal spines, but a few occur in the lateral channels, similar to those of *A. ochracea* and *capitata*, but of smaller size and with narrower valves. Papulæ in groups. Diameter, one foot. It differs from *A. gigantea* in having only five rays, and in other particulars.

Habitat, Coast of Oregon. (Mus. Smithsonian.)

ASTERIAS PAUCISPINA (nov. sp.)

Rays five, high, trigonal above, rounded below; disc rather large. Proportion of the diameters, 1 : 4.75. Skin-skeleton less firm than in the four preceding species, the net-work being more open. Ambulacral pores in four regular rows. Ambulacral spines in one very regular row, equal, not crowded, slightly compressed, and slightly tapering, with blunt extremity. A considerable number of sharp, appressed major pedicellariæ, of variable size, may be seen on the inter-ambulacral plates at the inner bases of the ambulacral spines, together with a few small clusters of the minor kind. Ventral spines of moderate size, cylindrical, tapering to a blunt tip not striated, and arranged in three rows, or in about thirty transverse rows of three each, the two outer ones placed together on each of the ossicles of the single ventral series, and the inner one on the tranverse connective piece which passes to the marginal interambulacral plates. Each of these transverse rows corresponds to five ambulacral spines. A small cluster of minor pedicellariæ at the outer base of each of the ventral spines, most prominent in those of the outer row. Lateral channel distinct, with a row of stout, narrow, wedge-shaped major pedicellariæ, extending from the base of the ray to the middle of its length. Dorsal spines equalling the ventrals in size, less than one-twelfth inch in height, and subcapitate, with conical, truncate, and striated heads. They are few in number, and are arranged in five regular rows; those of the marginal row, twenty-five in number, being a little smaller and more elongated than the others; median row consisting, like the marginal row, of twenty-five spines, one to each ossicle; intermediate row with only ten spines, and becoming "zig-zag" toward the extremity of the ray. On the disc there is a regular pentagon of about ten spines, one (rarely two) to each angle, and one (rarely two) at the middle of each of the concave sides. No spines within the pentagon except one central one, which is always present; madreporic plate within the pentagon, at the periphery. Minor pedicellariæ are scattered, in clouds, over the dorsal surface, but there are more of the major kind on the back. Papulæ in groups. Diameter, four and a half inches.

Habitat, Puget Sound. North-West Boundary Commission. Dr. C. B. Kennerly. This fine species is common in the circumlittoral zone.

ASTERIAS RUGISPINA (nov. sp.)

Rays five, rather broad at the base, flattened above and below, with the sides nearly perpendicular; latero-inferior angle acute; ossicles very regular; disc large. Proportion of the diameters, 1: 3. Ambulacral furrows broad, with the pores in four rows. Ambulacral spines in one row, rather large, longer than the ventrals, slightly clavate, and granulated toward their bluntly-rounded tips. In the furrows, at the bases of the ambulacral spines, there are a few major pedicellariæ twice as long as broad. Ventral spines in two or three rows, and similar in form to the ambulacral spines, but with more flattened and rugose heads. The outer row, on the angle of the ray, is the most distinct. The side of the ray, between this angle and the margin row of dorsal spines, is bare of spines, but has scattered pedicellariæ of both kinds. The dorsal spines are few in number, and of small but uniform size, being as thick but only half as long as the ventrals. They are regularly capitate, and the heads appear as if corrugated, being sculptured with radiating, tuberculated ridges. With the exception of the marginal ones, which form a regular row (of eighteen spines), the dorsal spines are, for the most part, irregularly scattered. Those on the disc generally form a circle or pentagon. The madreporic plate is made up of very few laminæ, and is situated in the periphery of the pentagon, half way from the centre to the margin of the disc. Papulæ crowded, in numerous groups. Minor pedicellariæ are scattered between the dorsal spines, mostly near the lateral rows.

In this species the minor pedicellariæ (or what we take to be their representatives) are much larger than usual, being at least one-third the size of the major ones. They are also of peculiar though variable shape, often approaching the broadly valvate form seen in the *Goniasters*, etc. Their valves are usually flattened, rounded, and expanded, much broader than long. Sometimes one valve is much larger than the other, and double forms occur, in which a thick central valve has two others lapping against it from opposite directions, one on each side. Diameter, two and three-tenths inches.

Habitat, Orange Harbor, Terra del Fuego. U. S. Exploring Expedition.

ASTERIAS TROSCHELII (nov. sp.)

Rays five, slender, and somewhat pentagonal, regularly tapering to a point; disc small. Proportion of the diameters, 1: 7. Ambulacral pores in four regular rows. Ambulacral spines in two or three rows, generally two, but occasionally one, to each plate; they are sub-cylindrical, and bear clusters of minor pedicellariæ at the middle of their outer sides. There are four rows of ventral spines (rarely five, near the base of the ray), which are longer than the ambulacrals, slender, with acute tips pointing outward. At the bases of the ventral spines there are numerous minor pedicellariæ, clustered at the outer side in the inner rows, but forming wreaths around those of the outer row. The marginal row of dorsal spines, on the side of the ray, consists of about fifty spines as slender as the ventrals, but capitate, with truncated tips. The other dorsal spines, above, are of two kinds, a larger and a smaller. The larger ones are few in number, shorter but much thicker than the ventrals, capitate, with flattened heads, and are arranged in a pretty regular though somewhat zigzag median row of about twenty-five spines, crowded near the disc, but farther apart near the extremity of the ray. Between this row and the marginal row there are scattered a few more of the larger kind, sometimes in clusters or short rows of three or four. On the disc they form a more or less distinct pentagon, within which there is another circle, and a spine of large size in the centre. The spines of the smaller kind, minute, slender, and truncated, are scattered between the large ones. Minor pedicellariæ are scattered in considerable numbers between the spines, and form wreaths around the bases of the larger ones. The major pedicellariæ are very few in number, small in size, and of rather slender form. Papulæ numerous, but not forming regular groups. Diameter, five inches.

A pretty and well-characterized species, related to *A. epichlora*.

Habitat, Puget Sound. North-West Boundary Commission. Dr. C. B. Kennerly.

ASTERIAS ARENICOLA (nov. sp)

Rays five, depressed, subcylindrical, somewhat contracted at base, and with blunt extremities; disc small. Proportion of diameters generally about 1 : 5.3. The ambulacral spines are arranged regularly two to each plate, but the pairs are placed alternately a little to the right and left, so that they often appear to be in four rows, those of the inner row being much shorter and more pointed than the others, while those of the outer row are flattened, a little concave on the outer side, and have truncated extremities. There are no pedicellariæ on these ambulacral spines, except an occasional one on the spines toward the mouth. There are a few pedicellariæ on the interambulacral plates in the furrows. The ventral spines are arranged, longitudinally, in two rows, there being two in each transverse row, both on the same plate, and corresponding to three or four pairs of ambulacral spines. They are cylindrical, blunt, as long as the ambulacral spines and twice as thick, and they sometimes bear a few minor pedicellariæ on their outer sides near the base. To them follows a lateral row of spines (the marginal dorsal row) about twenty-five in number, similar to the ventrals in size, and also bearing a few minor pedicellariæ on the upper side. The spines of the back are shorter than the ventrals, and blunt. They are not very numerous, and are scattered without order, though sometimes a median row may be traced. Among them a few occur having only one-fourth the size of the rest. They have, for the most part, a thin, indistinct wreath of minor pedicellariæ about their bases. Scattered between the dorsal spines at regular intervals may be seen the major pedicellariæ, which are small, about a hundredth of an inch in length, very short branched, appressed, and, when closed, rounded or short triangular, about as broad as long. The papulæ do not form very regular groups. The madreporic plate is placed rather nearer to the margin than to the centre of the disc.

Diameter, three and three-fourths inches.

This starfish is found abundantly on the sandy shores of Carolina and Georgia.

ASTERIAS TENERA (nov. sp.)

Rays five, very slender and convex above, about as high as broad, not contracted at base ; disc small. Proportion of the diameters, 1 : 6. Ossicles of the skin slender, and forming an open net-work. Ambulacral furrows deep, with the pores much less crowded than is usual in the genus, so that they do not as distinctly form two rows. Ambulacral spines small, very slender, rather pointed, and arranged, for the most part, alternately one and two to each plate. At the middle of most of these spines there is a thin semicircular cluster of minor pedicellariæ. (One specimen occurred with the ambulacral spines in one regular row, one to each plate, and destitute of pedicellariæ.) The sides of the rays are so high that the ventral and lateral spines are not certainly distinguishable from each other, but there are four rows of very slender spines on the basal half of the side, the lowermost row, next the ambulacral spines, being sometimes absent, and always fading out toward the extremity of the ray. The spines of the lower rows are longer than those of the upper. On the back, toward the disc, five longitudinal rows of spines may be distinguished, which become irregular toward the tips of the rays. These spines are as slender, but considerably shorter than the lateral spines. On the disc, the spines are similar to those of the back of the rays, and usually not more crowded, but they are scattered without order. The spines, both of back and sides, bear a small crown of minor pedicellariæ, which are more numerous than in *A. Grœnlandica.* The madreporic plate consists of very few laminæ, and has a cancellated appearance like the interior of the human vertebræ. It is surrounded by six or eight spines, and is placed rather near to the margin of the disc. There are no major pedicellariæ in some specimens, but in others a single one, of an oblong appressed form, occurs in the angle of the rays below. Papulæ few, large, and placed singly.

In life, this species is of a very pale flesh-color, or white.

Diameter, two and one-half inches; breadth of ray at the middle, one-sixth of an inch. It is related to *A. Mülleri*, Sars.

Twenty specimens of this species were dredged from a rocky bottom in twenty fathoms, in Massachusetts Bay, ten miles south of Cape Ann. Wm. Stimpson.

Asterias compta (nov. sp.)

Rays five, depressed, regularly rounded above, and not at all angular; disc small. Proportion of the diameters, 1 : 5.5. Ambulacral and interambulacral plates large and not crowded. Ambulacral spines slender, arranged alternately one and two to each plate, forming three irregular rows; those in the two outer rows bearing thick clusters of minor pedicellariæ on their outer sides. There are also some minute pedicellariæ in the furrows on the interambulacral plates. There is no clear distinction between the ventral and lateral spines, but beyond the ambulacral spines there are several longitudinal rows of slender, cylindrical, or somewhat tapering spines, and then a pretty well marked channel separating them from the dorsal spines proper. Of these latero-ventral spines, which are surrounded at base by thick wreaths of minor pedicellariæ, there are four rows near the disc, three at the middle, and two at the end of the ray, — the inner and outer rows fading out. The spines of the back are evenly distributed, without order however, and are numerous, very slim, shorter than the ventral spines, and surrounded by very thick wreaths of minor pedicellariæ, thickest toward the end of the ray, where they are in contact with each other. In the angle of the rays below a major pedicellaria occurs, which is about half as long as an ambulacral spine, one-third longer than broad, and obtuse. The papulæ stand singly. Diameter, three inches.

The very thick wreaths of pedicellariæ will serve to distinguish this beautiful species from *A. Mülleri*, *Grœnlandica* and *tenera*, to all which it is related in its general characteristics.

Dredged in thirty-two fathoms, in the Atlantic Ocean, off the coast of New Jersey, by Capt. Gedney, U. S. N.

Asterias cribraria (nov. sp.)

This species has very much the aspect of a *Cribrella*. Body thick and tumid, with a smoothish appearance resulting from the great number and small size of the spines. Skin rather pliable or coriaceous; ossicles very slender, but very numerous. Rays five, not contracted at base, and rather higher than broad. Disc rather large. Proportion of the diameters 1 : 4.8. Ambulacral pores not crowded, and forming two zigzag rows rather than four distinct rows. Some small, acutely triangular major pedicellariæ in the furrows. Ambulacral spines cylindrical with bluntly rounded tips, forming (except toward the extremity of the ray) two regular rows, two to each plate, and bearing small clusters of minor pedicellariæ at their outer bases. Ventral and lateral spines in regular rows, but passing imperceptibly into the dorsal spines on the high rounded side of the ray; — four of these rows may be counted, in which the spines are small, slender, shorter, and more pointed than the ambulacral spines, and surrounded at base by thick wreaths of minor pedicellariæ, which wreaths, in alcoholic specimens, touch each other at their bases. The dorsal ossicles, with their interspaces, are mostly transverse in direction on the rays, and anastomose pretty closely, except that there is on each side a series of transverse membranous interspaces much larger than the rest (often one-fifth the width of the ray) and each containing from two to five papulæ. The papulæ elsewhere stand singly, sometimes two together. The dorsal spines are very numerous, minute, no thicker, and much shorter than the latero-ventrals, and are more or less capitate; — they are somewhat variable in size, and arranged in groups on the ossicles. Among them are considerable numbers of minor pedicellariæ, which are often half as large as the spines themselves. On the disc the spines are very much crowded, as they also are along the middle of the ray, forming a more or less distinct median series. The spines of the eyelids and extremities of the rays are much stouter than any of the others either above or below. The madreporic plate is large, but not surrounded by any special arrangement of protecting spines. The minor pedicellariæ in this species are strongly truncated at the extremity. The major pedicellariæ are few in number, and situated on the disc below, — small ones at the inner bases of the labial spines, — and two or three very large ones in the angle of the rays; the latter having stout, almost cylindrical valves, one of which is sometimes notched at the extremity for the reception of the point of the other. A large specimen, probably of this species, was found, in which some of these large major pedicellariæ also occurred on the sides of the rays.

Diameter, usually two and one-half inches.

This fine species appears to be allied to *A. Mülleri*, although so different in aspect.

Dredged in considerable numbers on a muddy bottom in from twenty to thirty fathoms, in the Arctic Ocean, north of Behring's Straits. U. S. North Pacific Expedition. Capt. John Rodgers.

Asterias acervata (nov. sp.)

Rays six, more convex and more tapering than in *A. polaris*. Disc of moderate size. Proportion of the diameters, 1:4.5. Ambulacral spines in two rows (two to each plate), rather stout, cylindrical, and thickly covered with minor pedicellariæ near the tips. Ventral spines standing in two or three irregular rows. Lateral channel not well marked, and sometimes occupied by very small spines. Lateral spines standing singly in one row, and more pointed than the ventrals. Dorsal spines more numerous and crowded than in *A. polaris*, and of greater diversity in size, the larger ones being collected in heaps which form three regular longitudinal rows on the rays. These large spines are capitate, with obtusely conical and striated heads; there are usually about six spines in each heap, the central one being much the largest and overtopping the others, which form a circle around it. The small spines between the heaps are quite uniform in size, and have globular tips. Disc surrounded by a ring of six heaps of spines, within which there is sometimes another ring of the same number, and always a heap in the middle. Madreporic plate surrounded with a circular canal and a ring of thirteen spines. All the spines, both ventrals and dorsals, are surrounded by minor pedicellariæ, as in *A. polaris*. The major pedicellariæ, which are most numerous on the sides of the rays, are scattered, and very irregular in size, varying from one two-hundredth to one-twentieth of an inch in length; — the largest ones are stout, as long as broad, conical, or almost globular, having valves with broad, dentated extremities. Papulæ numerous, scattered, and often forming groups.

Color in life: above, clouded with very dark brown; madreporic plate cream-colored. Sides of rays, and inferior surface, of a yellowish cream-color.

Diameter, five and a half inches. Habitat, Behring's Straits, on clean gravelly bottoms, in from five to fifteen fathoms. U. S. North Pacific Expedition. Wm. Stimpson.

Asterias hexactis (nov. sp.)

Rays six, depressed or rounded, and more or less tapering. Disc large. Proportion of the diameters, 1 : 4. Ambulacral spines, subequal, in two regular rows toward the disc, two to each plate; — form cylindrical, obtuse, sometimes a little clavate, with a few pedicellariæ of both kinds on their outer side at the middle. On the latero-inferior side of the ray there are four longitudinal rows of spines, separated from the dorsal spines by a more or less well marked channel. These spines are scarce thicker than the ambulacrals, but are longer, and have small clusters of minor pedicellariæ at their outer bases. In some specimens the lateral spines are distinct from the ventrals, being separated from them by a channel, and forming a crowded row of confluent clusters like the dorsals. Dorsal spines small and numerous, in little heaps, which, being confluent in a longitudinal direction, form three or five (according to the distance from the disc) rows, separated from each other by corresponding rows of papuliferous depressions. These spines in some specimens, however, are fewer, and do not form heaps. On the disc they are arranged after a reticulating pattern. The spines are capitate, and sparsely surrounded by minor pedicellariæ. All rise to about the same height, thus giving an evenness to the outline as seen in a side view. The major pedicellariæ are few, and formed on the labial spines, or rarely a single one on the side of the ray; — they are more or less pointed, about one-fortieth of an inch long, and twice as long as broad. Dorsal papulæ in small groups. Ventral papulæ mostly single, and curving upward or outward. Diameter, one and three-fourths inch.

A variety occurs with more slender and tapering rays.

It is smaller than *A. Camtschatica* Brandt, and has longer arms, etc.

Habitat, Puget Sound. North West Boundary Commission. Dr. C. B. Kennerly.

ASTERIAS ÆQUALIS (nov. sp.)

Rays six, rather slender and much tapering. Proportion of the diameters 1 : 3.5. This species has a general resemblance to *A. hexactis* in shape, etc., but differs in the character of its spines, particularly the very numerous dorsals, which are uniform in size, and shorter and more crowded, giving to the back in a much greater degree that general evenness of surface which is characteristic of the *Stichasters* and *Cribrellæ*. These spines are deeply striated or radiated on their flattened heads, each showing eight or nine ridges. On the side of the ray there are two or three rows of longer spines, also striated. The ambulacral spines are for the most part arranged alternately one and two to each plate, but there are two to each plate near the disc. There are minor pedicellariæ about all the spines, as in the preceding species, but they are much less numerous. We can discover no major pedicellariæ excepting an occasional small pointed one in the ambulacral furrows. They would perhaps be found on the sides of the ray in specimens more perfect than those we possess. The papulæ stand singly or in groups of three or four, arranged in indistinct longitudinal rows. Diameter, one inch and a half.

Habitat, Monterey, Cal. A. S. Taylor.

DESCRIPTIONS OF TWO NEW SPECIES OF SHELLS. BY TEMPLE PRIME.

BATISSA PONDEROSA. Prime.

B. testâ ovato-orbiculari, oblique inæquilaterali, ventricosâ, tumidâ, crassâ, solidâ, valvis intus albis, ad margines infernè posticèque purpureo-violaceis; epidermide nigro-virescente vestitâ, in latere antico latè sulcatâ, striis remotis; umbonibus prominentibus, erosis, anticè inclinatis; cardine lato, crasso, valdè obliquo, inæqualiter tridentato, dente mediano bifido; dentibus lateralibus subæqualibus, serrulatis; ligamento crasso.

Long. $3\frac{1}{4}$; lat. 3; diam. $1\frac{3}{4}$ poll.

Habitat, Nova Caledonia. Collect. Cuming et Prime.

CORBICULA DUCALIS. Prime.

Cyrena fluminea. Mousson, Moll. Java. 87, pl. xv. f. 3.

C. testâ ovato-trigonâ, obliquè inæquilaterali, tumidâ, utrâque extremitate æqualiter obtusâ, epidermide olivaceo-flavâ, nitente vestitâ, transversè sulcatâ, striis valdè distantibus; umbonibus inflatis obtusis, erosis; valvis crassis, intus albis, ad dentes laterales violaceis; cardine angusto; dentibus cardinalibus tribus, mediano crassiore, posticè angusto, lateralibus angustis, serrulatis.

Long. $\frac{18}{16}$; lat. $\frac{11}{16}$; diam. $\frac{1}{2}$ poll.

Habitat, Java. Collect. Prime.

LATERAL SYMMETRY IN BRACHIOPODA. BY N. S. SHALER.

In the course of some examinations into the nature and value of the type characters of the Mollusca, I have been led to certain conclusions, which I hope will tend in some degree to remove the doubt which has been freely expressed by Malacologists of high authority, as to those features which are now generally accepted as characteristic of the type.

Since the time of Cuvier's division of the animal kingdom, the type of Mollusca has been usually accepted by naturalists, and though there has been some difference of opinion concerning what groups are to be admitted into the category, and much doubt as to the more important divisions within the type, still the existence of the group has never been questioned. Yet while naturalists have with unanimity recognized the distinction exhibited in the Mollusca, and expressed such distinction in their systems of classification, they have always been much at variance as to what the characters of the type are. Even Cuvier, though he gives many good reasons for distinguishing the Mollusks from the other branches, fails to give us any hint as to what the fundamental ideas of the type are, and though he presents to us extensive details of the points of difference between members of the type of Mollusca and representatives of the other branches, he does not seem to have apprehended those fundamental thoughts of the type to which these structural points stand in a secondary relation. I think that it is in the Essay on Classification that we find for the first time a clear statement of the idea which finds expression in Mollusca; I think it gives in a few words the most important features of the fundamental thought of the type. As there defined, this thought is, a massive concentration of the structure, with a differentiation of the weight of organization on to the sides of the body.

In attempting to apply this characterization to the different groups which are unquestionably included within the type, we have always found an unexpected difficulty. Applying with equal force to all the members of the Cephalopoda and Gasteropoda, there have always been certain contradictions apparent when it came to be applied to some members of the third and lowest class, viz., Acephala. Nowhere in the type is the feature of laterality more conspicuous than in those bivalves with which our eyes are everywhere made familiar; in the oysters, the clams, and the fresh-water mussels, this laterality is so presented as to be evident to the most cursory examination. The two valves are one right and one left, with the end of the alimentary canal in the same plane as the junction line of the valves. The breathing organs, or gills, are one upon the right and one upon the left; the labial palpi, and many other parts of the organization, share in this lateral arrangement. Indeed, it would not be too much to state that the whole aspect of the animal is determined by this character.

But in examining the structure of the Brachiopoda, the order next below the Lamellibranchiata, naturalists have very generally failed to find any evidence of bilaterality in their organization. If we consider one of their valves as right and the other as left; or if, as is most usual, we take one to be dorsal and the other ventral in their relation to the organization, then the feature of bilaterality will seem to be altogether wanting. Supposing that one valve is right and the other left, we shall then have all the breathing organs or oral arms upon one side, both oviducts upon one side, the cavities of the body divided unequally, and a full negation of all those relations of the sides of the animal, which we find throughout the type, and especially marked in the next order in the scale of development. If this view of the relations of Brachiopoda were correct, we should have good reasons to suspect the value of bilaterality as a type character, and a doubt would, to most minds, be thrown upon those generalizations on the subject of type characters, which have made the study of relative structure a study of personified thought.

But I am fully convinced that these views of the organization of Brachiopoda are erroneous, and that in this order we have as beautiful an instance of bilateral symmetry as can be found in the whole range of Mollusks.

A fruitful source of trouble has been that Malacologists are ac quainted 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; and since opportunities for the examination of the structure of the few living species are rare, and the study of their anatomy attended with peculiar difficulties, there is not much chance of an ordinary observer's correcting this presupposition. But since the researches of R. Owen and the anatomical investigations of Albany Hancock have given us full details of the structure of the living Brachiopoda, there can no longer be any doubt as to the special points involved in our inquiry.

The method of determining the longitudinal axis of the body is by passing a plane through the two extremities of the alimentary canal; this axis being found, the two others, the lateral and the perpendicular, are derived very easily. The anterior opening of the alimentary canal in Brachiopoda, in the common *Terebratula caput-serpentis* of our shores, for instance, is situated at the base, and between the brachial coils, and is thus within the socket or dorsal valve, as it is called. Following it toward its termination, we see that it first bends slightly toward the same valve, then turns toward the umbo, passes through the fork of the occlusor muscles, this again doubling on its first course, and extends across the space inclosed in the arch of the valves, terminating near the opposite valve in the same vertical plane in which it originated.

It is now evident that the longitudinal axis lies in a plane described by drawing a line from the back to the middle of the border of each valve, and that we have here one valve before and one behind, and further, that half of each valve will be right and half left.

If bilaterality is a character in the group, we may expect to find throughout the main systems of organs lateral equivalents, one on either side of the longitudinal axis, each complementary to the other, and presenting that peculiar reverse symmetry we find where there is bilaterality.

Considering first the exterior of the animal, we find that each side of each valve is perfectly complementary to the other; every line and curve on the one side has a similar line and curve on the other, which is its equal in every respect except the reversion of curve. The structural features of the hinge are perfect specimens of bilateral symmetery, and if the shell is ornamented with striæ, or radial plications, they are precisely equivalent on the right and on the left. Passing to the interior, we find the several processes which give a general support to the viscera, and a special foundation to the oral arms, to be most markedly bilateral. The muscular system, so complicated and beautiful in the Brachiopoda, has each of its main divisions in pairs, one member of each pair on one side of the mesial line and one upon the other; or if, as is sometimes the case, these muscles are more consolidated, the plane of the longitudinal axis so divides them that the sides are perfectly equivalent. The organs of breathing consist of two coils bearing fringes; these are situated one on each side of the longitudinal axis, and are each complements of the other, being coiled on the sides of the shell, and curved in reverse directions, the one being around to the right, the other to the left. The ovarian masses are, in the higher groups at least, arranged in pairs, two, sometimes three pairs in different groups, but in every case one member of each pair is upon the right and one upon the left. The oviducts, one pair, are similarly disposed.

The circulatory system consists of a heart, two main systems of ramifying excurrent vessels, and returning lacunes, together with four auxiliary pulsating vesicles.

The heart is central, but each of the great systems of ramifying excurrent and returning vessels, one on each side of the body, is balanced with the other; the two pair of auxiliary pulsating vesicles have one unit of each pair on each side. The mesial position of the heart is to be expected, since that feature is common in the Lamellibranchiata; the only exceptional cases where the heart is divided and thrown upon either side of the alimentary canal occur in the upper members of that order. Those masses, which are termed livers, and which are in some way accessories of the digestive function, are in two pairs, and situated, one of each pair on either side of the longitudinal axis.

The main cavity of the abdomen is prolonged into the mantles in two pairs of tubes, the function of which is quite unknown. In these, as in those other features of the organization which we have observed, the disposition is bilateral. The nervous system also exhibits a tendency to form lateral equivalents. The main ganglion is central; the two lesser ganglia closely connected with it are one right and one left, and the two large nervous centres or loops near the occlusor muscles balance each other. The ramifications of the circulatory and nervous systems are so nearly alike, that they can almost be represented in the same diagram, and in both of them there is the same sort of correspondence between those on one side and those on the other as there is between ridges and wrinkles on the right hand and on the left in man. Nearly every main twig, and even the minute ramifications in most cases, are duplicates.

It would be possible to name other parts of the animal of Brachiopoda where differentiation upon the sides is more or less plainly indicated, but since the anatomy of the animals is unfamiliar, and not easy to understand, I will not carry the special description any further; trusting, however, that enough has already been given to demonstrate how fully the idea of bilateral symmetry is developed in the order. We have seen that it is exhibited throughout the organization, from the general form of the shell to the minute ramifications of the vascular system. Nor is this bilaterality confined to simply having organs similar in their functional characters alone; but, more than this, every line and curve of one side has its mate on the other side, so that viewing the organization as a whole, we find even as much, if not more, of that lateral symmetry than we have in the human body.

One thing remains to be noticed in this connection. In *Terebratula*, in *Lingula*, and in most of the genera intervening between these extremes of the order, there is a more or less evident tendency to form a groove and ridge along the plane of the perpendicular of the shell, and consequently dividing the surface of the valves equally into right and left. The only purpose which this ridge and groove can have, since it seems to have no structural relations, is as an index of the lateral equivalence of two sides, — it is an effort to carry this differentiation of right and left to the surface of the animal; and since right and left cannot have a surface expression under normal conditions, as it has in the oysters and clams, it results in this sinus; and to show that this is the true meaning of the feature, in one group, the *Diphyes* of the Jurassic period, the sinus is so far developed that it nearly sunders the right half from the left half of the shell.

Since our best, if not only, guide to the homologies of the Mollusca is to be found in the relative position of organs, it will be readily seen how much importance is to be attached to this mode of considering the Brachiopoda as a key to the relations existing between them and the other Mollusca. It is not possible for me to consider here the homologies which could be made between the Brachiopoda and the other Acephala, but a glance at the various portions of the organization will show how probable it is that the oral arms correspond to the labial palpi in Lamellibranchiata. The heart is, by all the tests we can apply to it, homologous with the same organ in Lamellibranchiata. The position of the liver-like organs is comparable with what we have in the *Ostrea*. The nervous centre or œsophageal ganglionic ring seems to correspond in every important feature with the same structure in Lamellibranchiata. But notwithstanding the assistance derived from a proper understanding of these axial relations, it will be necessary to seek the aid of embryology before we can hope to come to a full understanding of the character and extent of the homologies which unite this order with the other groups in the class. The homologies which I have referred to as probable, are given with the hope of disabusing the minds of some naturalists who have questioned the existence of any homological relations between the Brachiopoda and the other Mollusca.

Before leaving this question of the connection of the two orders, there is one point which is worthy of attention, bearing as it does on the value of resemblance of groups widely removed from each other. There exists between certain Brachiopoda and certain members of the *sub-order* of Ostreans in the order above, a peculiar correspondence of form and a great similarity of the structural features of the hinge. So close is this resemblance that it affords a degree of approximation in external features not usually found between the two groups which are really so remote from each other. If that hypothesis be correct, which makes the higher form in a series the offspring of the lower, there would seem nothing more likely than that the Lamellibranchiata were developed out of Brachiopoda. The latter are the earliest in time, as well as the lowest in the scale of development, while the former begin to appear in quantity only when the latter had obtained a high state of development. The two groups are each figured in the other by forms which seem to a general view to bridge over the gulf which lies between them. But how would it be possible to convert this seeming into an actual transition? What imaginary series of forms could have turned around the longitudinal axis so that it would be in a position at right angles to its former place, changing at the same time all those features which would necessarily be altered in such a transition? It is evident that such a transition would require a series of forms, each of which must present a negation of that very principle of bilateral symmetry which we have found of so much importance. And must we not, therefore, conclude that the series which united these two orders is a series of thought, which is in itself connected, though manifested by two structures which have no genetic relation?

Professor Agassiz agreed with the substance of Mr. Shaler's paper, and thought that some confirmation of this idea of the relations of the longitudinal axes could be derived from the Bryozoa. He had long believed the relation of this group to the Brachiopoda to be more intimate than is generally acknowledged; he thought that the horse-shoe ring of tentacles of these animals corresponds homologically with the brachial coils in the Brachiopoda.

He thought bilateral symmetry should be distinguished from laterality, which relates to the disposition of the organs on the sides of the body without reference to symmetry; in mollusks this laterality is on right and left sides; in articulates, the weight of the organs is on the dorsal and the ventral surfaces, for which he would employ the term tergality; by radiality he would signify the radiated arrangement of the organs in radiates, and by cephality the preponderance of the head and its contained organs in the vertebrates.

Descriptions of new Genera and Species of Shells. By Augustus A. Gould.

Vertigo nacca. T. ovata, lucida, alabastrica, tenuissimè striata; anfr. 4 + ventricosis; apice obtuso; sutura profunda: apertura subcircularis dente palatali (interdum bifido) dente columellari, dente basali denteque labiali armata; peritremate valdè reflexo; umbilico rimato. Axis. $\frac{1}{16}$; diam. $\frac{1}{12}$ poll. Hab. Hawaii. *Dr. Newcomb.*

The denticles are similar to those in *V. Gouldii* and *V. tantilla*. The latter is smaller, has a rugose surface, and one more denticle.

Nassa plicatella. T. parva, elongata, ovato-conica, acuminata, sublivida et fasciâ albidâ cincta, longitudinaliter confertim plicata et striis volventibus plicas haud secantibus cincta; anfr. 7 planulatis; suturâ benè impressâ et marginatâ: apertura angusta, elliptica, posticè acuta: labro simplici: sinu obliquo, vix reflexo. Axis 15; diam. 17 millim. Hab. British Burmah. *Mr. Benjamin.*

Resembling somewhat *N. achatina*, though very much smaller.

Chrysallida curtina. T. minuta, ovato-turrita, albida; spiræ anfract. 6-7 convexis, seriebus granularum quatuor cancellatis, granulis anticè sensim defuentibus, anfr. ultimo dimidiam longitudinis testæ superante: apertura angusta, anticè producta; columellâ posticè plicâ munitâ. Long. 5; lat. 2 millim. Inhabits S. Carolina.

It has the aperture, and in general the sculpture of Chemnitzia, with the columellar fold of Odostomia.

Dunkeria suturalis. T. minuta, eborea, turrita; anfract. 7-8 convexis, longitudinaliter 10-12 plicatis (plicis anticè evanescentibus) et striis volventibus tenuibus cinctis quorum unâ subsuturali benè impressâ; anfract. ultimo dimidiam longitud. testæ breviore: apertura lunata, trientem longitud. testæ brevior. Long. 3 +; lat. 1 millim. Hab. Fort Johnson, Charleston Harbor, S. C.

This minute shell belongs to the Chemnitziæ, with strongly marked sculpture, and with ventricose whorls.

Rissoa incompta. T. minima, elongata, vitrea, lactea posticè rubiginosa; anfr. 7 rotundatis, costis ad tres cinctis, longitudinaliter inordinatim clathratis et indentatis, posticis carinatis: apertura circularis, peritremate simplici, incrassato. Long. 2; lat. 1 millim. Among coral sand, Florida; abundant.

Rissoa (s. g. Setia) patens. T. minuta, ovata, tenuis, vinosa, levis; anfr. 5-6 ventricosis, lineâ subsuturali impressâ ornatis: apertura rotundata posticè emarginata; columellâ parum reflexâ; labro subincrassato, fusco. Axis 3; diam. 2 millim. Hab. Fort Johnson, Charleston Harbor, S. C.

This minute Rissoid is remarkable for its large aperture and subsutural impressed line.

MANGELIA (Astyris) LABECULA. T. parva, ovato-fusiformis, cerina, maculâ castaneâ intra et extra labium ornata, spiraliter tenuissimè striata, longitudinaliter ad 16-plicata, plicis ad anfractum ultimum sensim evanescentibus, striis simul crescentibus; anfr. 7-8 convexiusculis, lineâ subsuturali impressis: apertura parva, ovalis; labro gibboso, extus incrassato, intus granulato; sinu haud notabili. Axis 7; diam. 3 millim. Dredged off the coast of Georgia.

The brown blotch on the lip is a sufficient characteristic.

BELA UNDATELLA. T. ovato-rhomboidea, lucida, lactea, nitida, vix spiraliter striata; apice mamillato; anfr. 4 tabulatis (angulo rotundato) lineâ subsuturali impressis, undulis opacis longitudinalibus ad 8 ornatis: apertura longitudine dimidiam testæ adequans. Axis 3; diam. 1, 5 millim. Dredged in 400 fathoms off the coast of Georgia.

The transparency and mamillated tip of this minute shell renders it plausible that this may be the young of some larger shell.

MARGINELLA (s. g. Gibberula) LACHRIMULA. T. minima, ovata, lactea, lucida, nitida, longitudinaliter exilissimè striata; apice haud eminente, vitreo: apertura angusta, crescentica; labro obtuso, extrorsum varicoso posticè latè arcuato et apicem admodum superante, intus vix crenulato; columellâ anticè 4-plicatâ. Axis 1, 5; diam. 1 millim. Dredged in 400 fathoms off the coast of Georgia.

This may be distinguished from one or two other minute species found in the W. Indies, by its transparency and its ventricose form.

SEMELE NEXILIS. T. oblongo-ovalis, compressa, haud nitida, alba versus umbones pallidè incarnata concentricè laminato-striata et sulcis radiantibus remotioribus concinnè reticulata, ad intersectiones punctata, et versus extremitatibus muriculata; umbonibus vix post medianis; plicâ haud profundâ; dentibus lateralibus satis conspicuis æquè ab umbone remotis; paginâ interiori erubescente. Long. 25; alt. 15; lat. 7 millim. From the coast of Georgia.

The sculpture is similar to that in the young of *Lucina tigerina*, but much more delicate.

SEMELE ORNATA. T. parva, elliptica, rubescens propè marginem rosaceo concentricè et radiatim tincta, concentricè costato-striata et radiatim striata presertim ad umbones et versus extremitates: plicâ satis conspicuâ: cavositas flavo et sanguineo tincta admodum radiata; dentibus præcipuè validis. Inhabits Georgia.

Similar in form and sculpture to the preceding, but different in coloration and hinge.

ERVILIA CONCENTRICA. T. minuta, oblongo-ovata, pellucida, nitida, (senioribus, incrassatis, margaritaceis) confertim sed profectò concentricè arata; umbonibus paullo postmedianis; extremitate antico acutiori quam extremitate postico. Long. 6 +; alt. 4; lat. 3 millim.

Dredged off the coast of North Carolina. *Coast Survey.*

This little shell, which seems to be abundant along the whole Southern coast, is quite different from anything before described.

GOULDIA FASTIGIATA. T. parvula, obliquè triangularis, solidula, flavida, concentricè arata præcipuè versus umbones; umbonibus acutioribus antrorsum versis; margine anteriori concava; margine dorsali arcuatâ; marg. ventrali subrecto; angulo ventrali antico ferè recto; ang. postico rotundato. Long. 8; alt. 8 millim.

From Frying-pan Shoals, N. Car. *Coast Survey.*

Another species of the genus established to receive the little Astartoid shells, with more or less developed lateral teeth.

LUCINA PUSILLA. T. minuta, reniformis, straminea, concentricè leviter striata; umbonibus postmedianis, eminentibus; margine dorsali anteriori excavato, extremitate rotundata, retusa; extrem. postica latè rotundata, subtruncata; intus radiatim striata, radiis versus umbones evanescentibus. Long. 3; alt. 2, 5 millim.

From the coast of North Carolina. *Coast Survey.*

This very minute species has the form of the subgenus Codakia, but is destitute of the divaricate striation. It approaches the genus Lasea.

LEDA UNCA. T. parvula, solidula, rufescens, sub-æquilateralis; omninò liris reflexis profundis arata; extremitate antico latè rotundato; extrem, postico acutissimo; margine dorsali posticâ concavâ, cristatâ, levigatâ; marg. ventrali posticè sub-emarginatâ; denticulis utrinque 12-15. Long. 8 + ; alt. 6; lat. 4 millim.

From Frying-pan Shoals, N. Carolina. *Coast Survey.*

This small, acutely rostrate species greatly resembles one from the Bay of Bengal. The specimens examined were destitute of epidermis, and probably worn.

Genus COPTOCHEILUS. T. chrysalidiformis, acuta, arctè perforata, castanea; apertura a spirâ ferè disjuncta; peristomate plus minusve duplici, laminâ internâ posticè incisâ. Operculum (*C. altum*) corneum, multispirale, circulare, planulatum.

Type C. altum Sowb. and with it C. sectilabrum Gould, C. pauperculum Sowb., and C. funiculatum Bens.

These species, which have been included in the genus Megalomastoma, are essentially different from the remarkable shells of the West Indies coming under that genus, although the single species M. Antillarum has much the same character. Their habitat, general aspect, and especially the double peristome, which is quite obvious posteriorly, where the inner plate has a nick on one side or the other, give them a marked affinity. They group with Tortulosa, Pupina, Registoma, and similar eastern genera.

Genus OSTODES. T. parva, turbinata, solida, ossea, albida, spiraliter sulcata interdum undulata, profundè umbilicata: apertura ferè circularis; peristomate simplici, ferè continuo; fauce porcellanâ. Operculum corneum, multispirale, suturâ modicâ; vibraculis subulatis, tenuibus; oculis haud pedicellatis.

Type Cyclostoma strigatum Gould, including also Cycl. plicatum Gd. (C. apiæ Recl.), C. obligatum Gd., C. tiara Gd., C. flavum Brod., and probably C. margarita Pfr. and C. euomphalus Phil.

This small group of shells, which has been included in the genus Cyclophorus, § 3, Pfr., comes nearer to Omphalotropis in the family Pupinæ. They are known by their bony structure, dingy white, unpolished, striated, waved or indented surface, simple aperture, and deep, spiral umbilicus, almost like Torinia. They are all from the Pacific Islands, mostly from the Samoa group.

LUCIA. Ligamentum nudum (?) latum: valvis carinatis, apiculatis delicatè pictis, pallidis, angulato-punctatis, ultimo gibboso, umbone centrali valdè elevato; marginibus insertionis dentibus pectinatis numerosis instructis.

L. confossa Gould, on which this genus is founded, has nine prominent pectinated teeth of insertion on the anterior valve, about twenty-five on the posterior, and five or six on each side of the central valves. The ligament, most likely, was finely imbricate. The posterior valve is very remarkable, the hinder portion rising vertically so as to form a right angle on the umbo. The pale lemon or cream color, delicately variegated with shades of red, and the sort of triangular or squamose puncturation, are quite characteristic. *Ch. petaloides* G. doubtless belongs to this genus; though the details of the plates of insertion were not examined.

Both these shells are from the Pacific Islands, — the one from the Feejees, and the other from the Sandwich Islands; and, so far as I know, they are the only Chitons yet found at the Polynesian Islands.

It is allied to Callachiton by its plates of insertion and central posterior umbo, but differs in its marginal ligament, and general aspect and ornamentation.

TEREDO, subgenus CALOBATES. Pallettes stilt-shaped, bony. Type, *T. thoracites* Gd.

Genus JULIA. T. equivalvis, valdè inæquilateralis; umbonibus eminentibus, compressis, incurvatis; areolâ cordiformi valdè impressâ: cardo utrâque valvâ sistens dente unico subcochleari, dextro post sinistrum aptante, et rimâ transversâ anticè limitato; sinistro ab umbone fissurâ sejuncto; ligamentum marginale: cicatrix unica, subcentralis.

This curious genus bears no resemblance to any one yet described, unless it be to Reniella Swains., which has been pronounced to be the early stage of Vulsella. It is very difficult to assign it a place; but it must at present be associated with Vulsella and Pedum, though externally it has the texture, polish and ornamentation of the Veneridæ. The delicate fissures issuing at the hinge indicate the possession of a byssus. Further observations must solve our doubts.

JULIA EXQUISITA. T. parva, ovata, anticè insigniter rostrata, ossea, polita, concentricè undulata, smaragdina ubique fusco radiatim punctata et interdum albo articulata; margine postero-dorsali latè arcuato; m. ventrali instricta: intus margaritacea, radiatim exilissimè striata; margine everso, tenuissimè crenulato. Long. 5; lat. 4; alt. 4 millim.

Inhabits Sandwich Islands. *Rev. Mr. Johnson.*

A beautiful little shell, colored like Smaragdinella from the same islands. The sudden and profound depression in front of the beaks is quite striking, and thus produces a very pointed somewhat upturned anterior end. A single valve looks much like some of the Bullidæ, *Chelidonura*, for instance.

Mr. Marcou referred to some animals which had been drawn up by the broken telegraphic cable between Africa and Marseilles. The Mediterranean is very deep along some portions of this line, even three or four miles; living acephala, very rare on the coasts, echinoderms of a very beautiful red color, had been drawn up from a depth of two miles, where, probably, no light penetrates. From this and similar instances, previously alluded to, he was led to the opinion that we know very little about the downward extension of submarine animal life.

Dr. Gould observed that the deep living animals are red or bright colored, while those most exposed to the light, like the clam, are white. He did not think it proved that this cable had ever reached the bottom or the depth indicated; and we know comparatively little that is certain in regard to the penetration of light to great depths; still, facts are constantly coming to notice, showing that the range of animals in the marine depths is much greater than was till recently admitted.

Prof. Agassiz alluded to the beautiful variety of color in the liver of fishes, the color being even characteristic of genera, though he was unable to state upon what structure or secretion the color depended; the color of the bile has a remarkable uniformity in the class. He stated that, according to Oersted, different rays of light penetrate to different depths in water, — green the least and red the deepest.

Mr. Marcou said that the fact of the more extended distribution in depth of marine animals would have important geological bearings, as changing the views of paleontologists in regard to the necessity of a shore line for many fossil species.

Dr. Pickering remarked that the clearness of the water made a great difference in the depth to which light will penetrate, though it will certainly penetrate to a considerable depth even in turbid water. Fishes were obtained by Risso from great depths in the basin of Nice, even from 3000 feet, which had the eyes very large.

Messrs. Thomas W. Duprée and William T. White, of Panama, were elected Corresponding Members; and Messrs. David H. Hayden and Erastus B. Bigelow, of Boston, Resident Members.

December 18, 1861.

The President in the chair.

The following communications were presented:—

Dr. B. J. Jeffries called attention to the eyes of a Horse Mackerel, which he exhibited.

The entrance of the optic nerve, or "papilla," is oblong, its length being some six or eight times its breadth. The nerve before its entrance into the sclerotica is round, and quite large, being composed, however, of longitudinal folds. The papilla seems as if formed by one of these folds passing through the sclerotica, it being as long as the diameter of the nerve before its entrance.

The cornea is partly set in the bony portion of the sclerotica; its anterior lamella being continuous to the fibrous portion of the sclerotica, with which it may be separated from the deeper lamellæ.

The central portion of the crystalline lens does not become opaque, like the cortical portion, upon immersion in alcohol.

The capsule of the lens is firm and attached to the hyaloid and processus ciliares by a strong fold or ligament, which is of special interest in the present state of the question of anatomical relations during the accommodation of the eye. This was thought to be of such interest that the members of the Society were requested, when opportunity offered, to preserve specimens similar to the above for future examination, the eyes of the larger fishes being specially suitable for careful dissection.

Mr. N. S. Shaler made the following communication on the geology of Anticosti Island, in the Gulf of St. Lawrence:—

The Canadian Geological Report for 1857 first drew the attention of geologists to the beds exhibited upon this island. The peculiarities of the deposits described in that report being such as to render them unprecedented among known strata, it was judged advisable to make some further examination into the geology of the island. With this intention three students of the Museum of Comparative Zoology, in Cambridge, visited the Gulf of St. Lawrence last summer, explored the deposits of Anticosti and the shores directly to the north, and were fortunate enough to secure ample collections from nearly, if not quite, all the important points in the great section there exposed.

It was the intention of the party to have made an immediate and careful investigation of the collections, with a view of ascertaining certain facts lightly touched upon in the Canadian Report, but since the return of the expedition two of the members have been unable to give any time to the work. Deeming it advisable that geologists should not take the result as given by the Canadian Report as the true view of these singular beds, I have ventured to lay before you a very brief abstract of certain conclusions attained from a careful study of the Brachiopoda of the collection. I would especially request that these few remarks be not taken as a report of the results of the expedition, but only as a preliminary notice upon the question, until time shall allow of a full and careful research into the whole matter.

The geological position of Anticosti indicates it as a portion of the paleozoic beds deposited around the Laurentine Mountains during the Silurian period. This conclusion may be arrived at by the stratigraphical relations of the beds, without any reference to the contained fossils.

Mr. Richardson, of the Canada Survey, has already lucidly set forth these arguments, drawn from the stratigraphy of the region, and I willingly concur with him when he assigns to the beds of the Anticosti section a position among the deposits of the Silurian epoch. But, while I accept the general determinations of the Canadian Report, I must protest against the important conclusion arrived at, that these beds afford a passage from the Lower to the Upper Silurian, presenting in their fossil contents forms regarded as characteristic of these separate formations. Having had the best opportunities for a comparison of the Anticosti Brachiopoda with those from Europe and the western deposits of the United States, I have been led by such comparison to the following conclusions: —

First — That the Anticosti section, from the base at the level of the Canadian channel to the summit at the south-western point of the island, gives us beds entirely Upper Silurian and synchronous with the Clinton and Niagara of New York, with the Wenlock Shale and Wenlock Lime in England, with Divisions E and F of Barrande in

Bohemia, and with certain portions of the Upper Silurian in the Scandinavian beds.

Secondly — That, though synchronous with these several deposits, the Anticosti beds contain few, if any, fossils identical with those in their European or American equivalents; in other words, that the sea, at the time of the deposition of these synchronous but distant beds, held a different *fauna* at Anticosti from that existing in the European seas, or in the neighboring basin of New York.

Thirdly — That the fauna of Anticosti shows a more intimate relation to the synchronous fauna of northern Europe than to that of the New York basin.

This last conclusion, though well supported by the testimony derived from the comparison of fossils, is presented with much doubt.

It is not possible to present here the data for these conclusions. The other gentlemen engaged upon the expedition will soon have completed their work upon the collections, when the geology of this interesting island will be made the subject of a special report. In giving the results of the examination of a single order I feel that I may have committed many errors, but, as the assertions of the Canadian Report have more than once been made the basis of argument in this Society, I feel justified in presenting these possibly immature conclusions.

Mr. Marcou, in alluding to the few localities in which primordial fossils have been found in Europe (at only two places in Bohemia,) mentioned several in this country, as Braintree, St. Mary's Bay (Newfoundland), Georgia, Highgate, and Swanton, Vt., the vicinity of Quebec, and in Tennessee. In Vermont had recently been discovered a species of *Ampyx*, the first ever found in America, which had been named *A. Halli*. He exhibited several specimens of *Conocephalites*, *Ampyx*, *Camerella*, &c.

He also read an extract from a letter to himself by Prof. Oppel, announcing that he had found in the lithographic stone at Solenhofen, Bavaria, in the Upper Jurassic, a fossil having a long tail, as in *Ramphorhynchus* (De Meyer), feathers of the wings and tail well preserved, about twenty elongated vertebræ, a very small pelvis, as in Pterodactyl, and the leg as in birds with a simple metatarsus, with three toes having long nails; the head is wanting; the length is about 1½ feet. Prof. Wagner, of Munich, has described it as a reptile, though it seems rather to belong to the birds. If birds existed at this remote epoch, perhaps some of the tracks of the Connecticut River Sandstone were made by this class. Fossil bird remains had previously not been found older than the base of the eocene.

Dr. Pickering stated that he had seen, many years ago, bones of birds in the green-sand of New Jersey, which he had determined to belong to the scolopax family; they were described by Dr. S. G. Morton.

Dr. Wyman thought that the prevailing character was reptilian, though some of the features were decidedly ornithic.

Mr. Marcou also referred to human instruments found in strata undoubtedly of an age anterior to many extinct mammals, like the spelæan bear and the mammoth.

Mr. Francis Alger presented, in the name of Mr. Harris, a number of geological specimens collected by himself in the recent expedition to the Arctic regions under Dr. Hayes. Most of them were primitive rocks, obtained between 75° and 81° 35′ N., the farthest point gained; no indication of iron, copper, or other metalliferous deposit was found. He presented also some plants from 78° 37′, stating that the growth is exceedingly rapid, taking place in eighteen to twenty days.

A vote of thanks was passed to Mr. Harris for his valuable donation.

Mr. Harris exhibited several of the weapons and implements of the Esquimaux, and explained their mode of using them.

In 78° 37′, their winter quarters, there was abundance of game, two hundred and fifty reindeer, beside walruses and bears, having been killed during their stay, keeping the party free from scurvy, and in good health to start northward in the spring. Above 79° no animal life was found, the principal reason why the search for the polar sea was not more persistently made. The average temperature was 45° to 47° F. below zero, the lowest 68° below, and the highest 60° above; the prevailing winds were north-east and south-west, and strong.

Mr. Scudder presented the resignation of Mr. Albert Ordway, Curator of Crustacea, he having accepted a position in the Federal Army. His resignation was accepted.

Observations upon the Rocks of the Mississippi Valley which have been referred to the Chemung Group of New York, together with Descriptions of New Species of Fossils from the same horizon at Burlington, Iowa. By C. A. White and R. P. Whitfield.

The fossils from which the following descriptions are drawn were all collected at and in the vicinity of Burlington, Iowa, from the lower beds there, which have been referred to the Chemung group of New York.

A part of them have been for some years in the cabinet of C. A. White; the others were collected under the direction of Prof. James Hall, the State Geologist of Iowa, and on account of the geological work of that State. This work having been temporarily suspended, Prof. Hall has kindly placed these fossils in our hands for description.

The following general remarks are also, in part, the result of observations made while pursuing some geological investigations under his direction, the final results of which will appear in his fourth volume of New York Paleontology.

Discussions as to the geological equivalency of these rocks with those of the Chemung group of New York having been lately renewed,* it seems necessary for us, in referring our species to their proper horizon, to offer some general remarks upon the subject.

The Hamilton group of New York presents us with not only decided Devonian characters, but also a reliable horizon in its extension westward, as seen at various points in Illinois and Iowa. This horizon is referred to and regarded by all as being reliable, and as being of Devonian age. Several species of fossils in this formation are abundant, and have a wide geographical distribution, which renders it comparatively easy to recognize it in all its lithological changes. The fossils referred to are principally Brachiopoda, which are usually in a much better state of preservation than others, which adds still more to the facility of identifying species.

On the contrary, the Chemung group of New York, which overlies the Hamilton group, presents many and sudden changes in its paleontological characters, even within the limits of that State, and as we pass westward into Pennsylvania and Ohio these changes become very marked, even when we are able to trace the strata in direct continuity.

In north-eastern Ohio we have so far been able to recognize few, if any, of the species as common to the corresponding strata of New

* See F. B. Meek and A. H. Worthen, on the age of the Goniatite Limestone at Rockford, Indiana, in American Journal for Sept., 1861; also note by the editors, page 288.

York, and passing the east branch of the Cincinnati axis into the Michigan basin, the paleontological characters of the corresponding beds there seem to be as different, or nearly so, from those of Ohio and New York as they are from each other. Of course the strata cannot be traced continuously from New York to Michigan, yet we feel warranted in regarding them as of the age of the Chemung group of New York, and so far as we know no one has questioned it.

A wide geographical range of species in the Chemung rocks has not heretofore been satisfactorily made out, and the references which have been made of the rocks in the Western States to this group seem to have been based upon their relative position, and the *generic* value of the fossils which they contained, together with a not unremarkable similarity of lithological characters.

If it is our desire, as far as possible, to recognize formations over wide areas, which are already well known and named, it appears evident that we must ultimately be confined to the use of generic values and relative position; but we believe we are not reduced to this necessity as regards the rocks under discussion; for we are confident that some of the species found at Burlington and other places in the West, of the same geological horizon, are identical with some of those found in the Chemung rocks of Ohio, which rocks can be traced continuously to New York. In the Chemung rocks of Licking Co., Ohio, Prof. Hall has discovered a Goniatite (*G. hyas*) which is identical with one of the Rockford species, and Messrs. Meek and Worthen have identified several species in the Rockford beds with some found in the known equivalents of the lower beds at Burlington, in Missouri and Illinois; we have identified several species as common to the lower rocks at Burlington and the Chemung of Ohio. Thus it seems clear that the paleontological connection of these rocks is complete; and until the intermediate ground between the Mississippi river and New York has been carefully examined in detail, and it shall fully appear that we are wrong in our identification of the species referred to, we deem it inexpedient to use any other name for the rocks from which our fossils are derived, than that adopted by the State geologist of the State in which they are located, and now become a part of its geological nomenclature; for, notwithstanding their carboniferous character, we think their reference to the Chemung of New York legitimate and proper.

It is well known that great difference of opinion has existed among geologists as to the proper position in the geological scale of the rocks under discussion. De Verneuil had doubtless good reason for considering a part of the Chemung rocks of Ohio as carboniferous; and if he had been in possession of facts since ascertained, but only in part published, he might have been, if possible, even more confident; for we find, in tracing these rocks westward from New York, a tendency of the fauna to assume a decided carboniferous character. In fact, in some parts of north-western Ohio, this character is as decided as that of the fauna of the Burlington Limestone, and considerably more so than that of the lower beds at Burlington.

On the other hand, a direct continuity of the strata of the Chemung rocks of New York can be traced from that State to those of Ohio before mentioned, and Prof. Hall seems very naturally to have inferred that, but for the interposition of the Cincinnati axis, their continuity might have been traced to those rocks of the West which he has referred to that group. This opinion appears to have been fully justified by the relative position of the rocks above and below them in the Western localities.

Messrs. Meek and Worthen seem to have made the presumed want of specific identity of species thus far discovered in the rocks of the western localities, with those now known in the Chemung rocks of New York, the principal reason for separating them from those rocks; and their affinity with the carboniferous limestones of the West, for supposing them to be properly referable to the Carboniferous system, "or at any rate much more recent than the Chemung."

If, as we believe, and have attempted to show, the Chemung rocks of Ohio are a direct continuation of the Chemung of New York, we cannot think it possible that those Ohio rocks, containing, as they do, a fauna so decidedly carboniferous, can belong below those rocks which underlie the Burlington limestone in the West, and which, if at all referable to the Carboniferous system, must occupy its very base. We do not lose sight of the fact that some of the species of the Hamilton group pass up into and intermingle with those of the Chemung rocks of eastern New York, and that this group there presents decided Devonian characters; nor that in the West the rocks which we deem their geological equivalents are closely allied to the carboniferous limestones. We admit also that this great difference in the character of the fauna is not fully explained; but it will be borne in mind that a similar state of things exists in Europe, where the rocks have been carefully studied for years, while all the ground has hardly been carefully reconnoitred in our own country.

The most northerly point in the Mississippi valley at which we have observed these rocks, is near Indiantown, in Tama county, Iowa, but this locality has not been thoroughly explored. At Burlington the rocks have been minutely described by one of the writers in a previous paper,* and also in the appendix to the 1st Vol. of Geology of Iowa. At various points in Missouri and Illinois we have sections and de-

* See Art. 2d, Vol. VII., Boston Journal of Natural History.

scriptions by the geologists of those States, and others. At these places the Burlington Limestone holds its position and retains its characters with remarkable constancy, and the other members of the Carboniferous Limestone series, above it, are well defined. But passing to the eastern outcrop of these carboniferous rocks, on the west side of the Cincinnati axis, we find the Burlington Limestone, as such, entirely wanting, and the lines of subdivision of the other members of the Carboniferous Limestone series usually less distinctly marked than along the Mississippi river, while the beds which have been referred to the Chemung group have undergone so great a change as to be scarcely recognized by lithological or paleontological characters.

Starting at the Muldraugh's Hill range, where it is crossed by the Louisville and Nashville railroad, going in a northerly direction, passing "the knobs" in Kentucky, New Albany, New Providence, and thence as far north as Montgomery county, Indiana, we find a series of sandy shales resting upon the "Black Slate," which extend upward, and gradually mingle with the Carboniferous Limestones. The lower part of this mass has, so far as we know, afforded too few fossils to designate its age, but which has heretofore been considered equivalent to the Chemung of New York. As we pass upward, however, we begin to find carboniferous fossils, and so far as we have examined them, they approach more nearly in character to those of the Keokuk Limestone than to those of the Burlington Limestone, or those of the Chemung rocks of the Mississippi Valley; but barely enough of the fossils of the Burlington Limestone are recognized there to show that it is represented.

When we see that a formation, so well developed as in the Burlington Limestone, can undergo such great changes in a distance comparatively so short, we need not be surprised to find the great difference which exists between the Chemung rocks of New York and those of the Mississippi Valley.

DESCRIPTION OF NEW SPECIES.

BRACHIOPODA.

Genus Orthis, Dalman.

Orthis subelliptica (n. sp.)

Shell of medium size, subelliptical in outline. Hinge line about two-thirds or three-fourths as long as the greatest breadth of the shell. Cardinal extremities rounded, valves subequal, moderately convex;

the ventral somewhat flattened towards the front, very ventricose on the umbo; beak small and pointed; area about one-third as high as long, foramen twice as high as wide. Dorsal valve more regularly convex than the ventral, and the beaks less elevated, very small and pointed, but little incurved.

Surface marked by fine, equal rounded striæ, which are curved upwards near the extremities of the hinge line, and some of them run out on the cardinal border. Increased both by bifurcation and implantation.

This species differs from *O. Swallovi*, Hall (Iowa Geological Rept., Vol. I., Part II., pl. 12, fig. 5), which it most nearly resembles, in the proportionally much greater elevation of the area; and it never attains a size greater than one-third that of full-grown individuals of that species.

Genus STREPTORHYNCHUS, King.

STREPTORHYNCHUS INFLATUS (n. sp.)

Shell above a medium size, somewhat semicircular in outline; the hinge usually a little shorter than the greatest width of the shell, causing a slight rounding of the cardinal extremities. Ventral valve concave in the centre, and elevated at the beak, which is straight and pointed, directed obliquely backward from the hinge line. Area rather high, irregular in width, and about one-third as high as long; foramen very narrow, extending to near the point of the beak, closed to near the base by a thin, rounded deltidium. Dorsal valve strongly inflated, very prominent on the umbo, a little flattened at the cardinal extremities.

Surface marked by moderately strong, rounded, somewhat alternate, radiating striæ, which present a wiry appearance. The interior of the dorsal valve is characterized by a very large, flabelliform cardinal process, marked by several strong plications.

This species differs from *S. inæqualis* (*Orthis inæqualis*, Hall), Iowa Geol. Rept., Vol. I., Part II., page 490, pl. 2, fig. 6, with which it is associated, in having a much more ventricose dorsal valve; in the much greater height of the area of the ventral valve, in which the foramen is about three times as high as wide; while in that species it is much wider than high. The striæ are also coarser, and more elevated.

Genus SPIRIFER, Sowerby.

SPIRIFER HIRTUS (n. sp.)

Shell of medium size, extremely ventricose, about once and a half as wide as high. Hinge line very short, not more than one third as long as the width of the shell; front and cardinal angles regularly rounded. Ventral valve most ventricose, a little forward of the beak, which is obtuse and incurved; area scarcely perceptible; foramen broad, triangular, nearly as wide at the base as the length of the area; front half of the valve marked by a broad, shallow, undefined sinus. Dorsal valve less ventricose than the opposite, regularly convex, without a visible mesial elevation; beak obtuse, incurved, extending above the cardinal line.

Surface marked by strong, equidistant, concentric ridges, indicating different stages of growth; also by indistinct, radiating striæ, which form little pustules at the margin of the ridges, as if for the attachment of setæ. No appearance of plications have been observed on any of several specimens examined.

This species is closely related to *S. pseudolineatus*, Hall (Geol. Rept. of Iowa, Vol. I., Part II., page 645, pl. 20, fig. 4), from which it differs in being proportionally narrower; in the shorter hinge line, and smaller area; and the mesial elevation seldom projects above the general convexity of the valve. From its general form and the closely incurved beaks, as well as from the lamellose surface, it has been mistaken by collectors for an *Athyris*.

Genus Retzia, King.

Retzia sexplicata (n. sp.)

Shell small, broadly subtriangular, or subquadrangular, very ventricose; marked by about six strong, simple, deep plications; the two central ones direct from the beak to the front margin, the others strongly curved outwards; the outer ones on each side very small, scarcely seen on young shells. Hinge short. Beak of the ventral valve elongate, slender, largely perforate at the extremity, and deeply marked by the plications to the margin of the perforation; area small, triangular. Dorsal valve less ventricose than the opposite, beak depressed, hinge alations minute.

Surface of the shell marked by very fine concentric striæ, which are undulated as they cross the plications, and frequently by strong concentric ridges, indicating different stages of growth.

This species very closely resembles *Retzia? ferita*, *Terebratula ferita*, Von Buch, but is rather smaller, with fewer plications, and the area is more distinct.

Genus Rhynchonella, Fisher.

Rhynchonella opposita (n. sp.)

Shell very small, triangular in outline; cardinal slopes straight, and strongly divergent, forming an angle of about seventy-five or eighty degrees, equalling in length the breadth of the front. Valves subequally convex; the ventral regularly arcuate from beak to base; beak small, incurved, perforate (perhaps from accident). Dorsal valve most gibbous near the umbo; beak small, closely incurved, filling the foramen of the opposite valve. Both valves marked by four broad, rounded plications, which become obsolete near the middle of the shell; those of one valve opposing those of the other, causing an equal number of projections on the front margin. The entire surface marked by several strong concentric lines of growth.

This species may easily be recognized by the peculiarity of the opposite plications, which is a rather remarkable feature.

Genus Pentamerus, Sowerby.

Pentamerus lenticularis (n. sp.)

Shell small, broadly ovate, or subcircular; length and breadth nearly equal, profile lentiform. Valves subequal, depressed convex. Beaks small, pointed, slightly incurved, sides and front regularly rounded. Ventral valve a little the most convex; the beak pointed, and projecting beyond that of the dorsal. Spoon-shaped process of the interior of the ventral valve proportionally large, in some specimens nearly one-third the width of the shell, and extending about one-third the length of the valve; longitudinal septum reaching to near the centre of the shell. Interior of dorsal valve with a single longitudinal septum, with horizontal plates curving toward the cavity of the opposite valve. Strong radiating muscular or vascular markings appear on internal casts of both valves.

Surface apparently smooth, without mesial fold or sinus.

This species has the general form of *P. oblongus* as it occurs in the Clinton group of New York, but is quite small, seldom measuring more than six-tenths of an inch in length. The internal characters of the ventral valve are precisely those of *Pentamerus*, but those of the dorsal vary somewhat from those of most species of the genus, in having but one longitudinal septum, with the crural appendages spreading horizontally from it.

Although species of this genus have been observed in the Old World, in rocks as high even as the carboniferous formation, yet we believe this is the first instance of their having been noticed in this country in strata of a higher geological position than the Hamilton group of New York.

CONCHIFERA.

Genus Aviculo-pecten, McCoy.

Aviculo-pecten limaformis (n. sp.)

Shell below a medium size, subovate in outline, higher than wide, greatest width below the middle. Valves very depressed, convex, the left a little the most ventricose; hinge line short, less than half as wide as the body of the shell. Auricular extensions small, flattened, and subequal, separated from the body of the shell by shallow constrictions. Beaks minute, not elevated above the hinge. Anterior lateral margins straight to near the middle of the shell; basal margins broadly rounded; posterior straight, longer and more oblique to the hinge than the anterior. Lateral borders flattened, outside of a line passing from the beaks to the extremities of the basal line, the entire convexity of the shell being confined to the body of the shell, within these lines, which gives to the body of the valve an elongate triangular form.

Surface marked by fine, closely arranged concentric striæ; entirely destitute of radiating striæ.

This shell differs from *Avicula circulus*, Shum., from the oölitic beds of the same locality, in being more elongate, in the less extension of the hinge line, in the flattening of the lateral spaces, and in being destitute of the fine radiating striæ of that species. It closely resembles *Pecten dissimilis*, Flem., as figured by De Koninck, Anim. Foss., pl. 4, fig. 7, in general form and proportions, but that species is destitute of the peculiar flattening of the lateral borders, and is also radiately striate. This species is also found in the Chemung of Ohio.

Aviculo-pecten nodocostatus (n. sp.)

Shell of medium size, semi-circular in outline, valves depressed convex, the left one most ventricose. Hinge line straight, equalling the greatest width of the shell. Anterior extension separated from the body of the shell by a deep marginal sinus, and by a broad flattened depression on the surface, extending from the beak to the extremity of the auricle; posterior side having no sinus. Beak of the right valve minute, depressed, that of the left ventricose, prominent, situated at two-fifths of the length of the hinge from the anterior extremity.

Surface marked by from forty-five to fifty rugose, radiating plications, which sometimes bifurcate; those on the body of the shell about twice as wide as the interspaces; while those of the sides are much finer. The depression, separating the anterior auricle on the right valve, has but one plication, that of the left valve marked by several. Strong, undulating concentric lines cross the radii, giving them their rugose surface.

The semi-circular form, and the nodose character of the radii, will serve to distinguish this from any other described from rocks of the same age.

Genus Mytilus, Linn.

Mytilus fibristriatus (n. sp.)

Shell very elongate ovate, alternate at the beaks, more ventricose below, extremely compressed toward the extremity of the hinge and posterior margin. Beaks terminal, small and pointed; hinge line straight, about half as long as the shell. Postero-dorsal margin gently curved toward the sharply-rounded posterior extremity; ventral margin gently arcuate, more strongly rounded near the beaks; a little below which the ventral surface of the shell is somewhat protruded, and the margins slightly gaping, forming a distinct byssal opening.

Surface marked by very fine, closely arranged, radiating striæ, which become very faint, or obsolete, on the antero-ventral portion; also by distant, somewhat indistinct, concentric undulations, parallel to the margin of the shell.

Mytilus occidentalis (n. sp.)

Shell extremely elongate, very ventricose, the diameter through the valves on the upper third of the shell as great or greater than the breadth from the ventral to the dorsal margins; becoming more compressed toward the posterior, which is abruptly rounded. Dorsal line nearly straight, extending about two-thirds the length of the shell. Ventral margin gently arcuate to near the anterior, where it slopes abruptly to the beaks. Beaks terminal, obtusely pointed; umbonal prominences subangular.

Surface marked by closely arranged, concentric, lamellose lines, parallel to the margins of the shell. No radiating striæ are visible.

This and the preceding species appear to possess all the necessary characters of the genus *Mytilus*, as far as external characters can be relied on.

This differs from the preceding in the less prominence of the dorsal line, in being destitute of radiating striæ, and in the greater gibbosity of the valves.

Sub-Genus Orthonota, Conrad.

Orthonota ventricosa (n. sp.)

Shell elongate quadrangular, dorsal and ventral margins subparallel, or a little diverging from the anterior extremity; length a little more than twice the greatest breadth. Dorsal line very little arcuate; posterior extremity broadly rounded, anterior end more narrowly rounded. Beaks small, somewhat prominent and incurved, situated near the anterior end. Umbonal slope ventricose, becoming more depressed near the postero-ventral angle. Surface marked by concentric undulations, which are bent upwards at, and become more distinct above, the umbonal ridge.

This shell appears to possess the characters of Conrad's genus *Orthonota;* but the beaks are more prominent, and the valves more ventricose than most species of the genus yet described. The peculiar plications of the dorsal line have not been observed. It greatly resembles *O. parallela*, Hall (Pal. of New York, Vol. I., page 299, pl. 82, fig. 7), but is much shorter anteriorly.

Genus Nucula, Lam.

Nucula iowensis (n. sp.)

Shell small, subovate or subtriangular in outline, very ventricose. Beaks situated near the posterior (short) end, prominent and incurved. Hinge plate bent abruptly beneath the beaks; occupied by from five to seven long narrow teeth on the long side, and by from three to five smaller ones on the short side. Posterior end broadly rounded; anterior end prolonged, obtusely pointed; basal margin strongly arcuate, and the border of the shell thickened.

Surface characters not determined. This species, like most of the others, occurs in the condition of internal casts, and in some instances the impressions of the exterior surface have not been preserved.

This shell appears to be subject to considerable variation, at different stages of growth; young specimens often being distinctly triangular, with the posterior end very short, and the basal margin but little arched, while old specimens are subovate in form, and the posterior end more prolonged. In one full-grown individual the muscular impressions are very strongly marked, the anterior one being nearly double the size of the posterior, and the basal portion of the shell shows a great degree of thickening.

Genus Leda, Schum.

Leda Barrisi (n. sp.)

Shell elongate elliptical in outline; the length twice as great as the breadth; valves very ventricose, most gibbous near the anterior end. Beaks of medium size, situated about two-fifths of the entire length from the anterior extremity; incurved, not prominent. Hinge line gently arcuate throughout its entire length; occupied by a large number of small, curved teeth. Anterior extremity rounded, longest below the middle; basal margin gently arcuate; posterior extremity obliquely truncate, longest near the hinge line, with a slight emargination below. Umbonal slope slightly prominent, with a gentle depression between it and the cardinal line.

Surface marked by fine, closely arranged, equidistant, concentric lines, which are distinctly undulated as they cross the umbonal slope and the depression above it. Many of the internal casts preserve faint impressions of the concentric lines, except near the basal margin, where they are obscured by the thickening of the shell. A species closely allied to this one occurs in the Chemung rocks of Ohio.

Genus Macrodon, Lycett.

Macrodon parvus (n. sp.)

Shell small, elongate quadrangular, or arca-form; length equal to twice and a half the breadth. Valves extremely ventricose. Beaks prominent and incurved, situated at about two-fifths of the entire length from the anterior end. Hinge line straight, nearly as long as the body of the shell. Posterior end obliquely truncate, somewhat prolonged at the postero-basal angle. Anterior end gradually rounding from the hinge line on to the basal margin, which is gently arcuate, with a slight emargination in the middle, forming a small byssal opening. Hinge plate narrow, bearing on the posterior end two long linear, lateral teeth; the inner one the longest, reaching nearly one-third of the length of the shell; the anterior end having about four short, oblique teeth, but less distinct than those of the posterior. Anterior muscular scar subcircular, situated near the upper anterior angle. Posterior scar larger than the anterior, with its upper margin excavated out of the hinge plate. Pallial line entire, connecting the muscular scars.

Surface smooth, except a few concentric undulations, which are scarcely visible except on the upper side of the posterior umbonal slope.

With the above characters shown on a large number of individuals, it is hardly possible to refer this shell to any other than the genus *Macrodon*.

Genus Conocardium, Bronn.

Conocardium pulcellum (n. sp.)

Shell small, general form triangular, with ventricose valves. Hinge line straight, the length equal to that of the posterior slope. Anterior end cuneate; posterior end obliquely truncate. Basal line gently arcuate, widely gaping near the anterior extremity; hiatus elongate ovate, distinctly crenate on the inner border. Beaks minute, incurved, situated posteriorly; umbonal slope rounded, posterior space concave; siphonal tube small. Entire surface marked by distinct, diverging radii, those of the posterior space a trifle finer than those of the body of the shell; also by very fine concentric striæ.

This species resembles *C. carinatum*, Hall, of the Warsaw division of the carboniferous limestone, but differs in the less expansion of the anterior end, in the concavity of the posterior space, and in the rounded umbonal slope. *C. aliforme*, Sow., as figured in De Koninck's Anim. Foss. pl. 4. fig. 12, except in size, is much like our shell; but specimens have not yet been obtained that measure more than four-tenths of an inch in their greatest length; while that one sometimes measures one and a half inches.

CYPRICARDIA ? RIGIDA (n. sp.)

Shell elongate quadrangular, a little widest at the posterior end. Dorsal line straight, bounded by a rather broad escutcheon, which is more than half as long as the entire length of the shell. Anterior end truncate, prolonged near the basal margin; posterior extremity obliquely truncate; basal line straight, slightly emarginate, a little anterior to the middle, by a shallow sinus which crosses the shell from beak to base. Lunule large, deeply marked; beaks small, flattened on the umbones, and enrolled, situated anteriorly; umbonal ridge very prominent and angular, extending from the beak to the postero-basal angle. A second but less prominent ridge passes about midway between the first and the dorsal line, the posterior margin being very oblique between the end of this ridge and the dorsal line.

Surface marked by sharp, closely-arranged lines, parallel to the margin of the shell, which are bent at right angles as they cross the umbonal ridge, and less abruptly at the minor ridge. Interior of the shell (as shown on casts), with a sharp, muscular ridge, passing from the anterior side of the beaks, with a forward curvature, about two-thirds the distance across the shell.

This shell is placed provisionally under the genus *Cypricardia*, being closely related externally to that genus, from which it differs, however, in the presence of an anterior muscular ridge, and therefore cannot properly be considered as belonging to that genus.

This character has been made a feature both in *Nuculites* of Conrad, and *Cleidophorus* of Hall; but our shell differs from the first not only in the absence of the hinge teeth, but also in the external characters. From the latter genus it differs very much in the external form, and in the presence of a distinct escutcheon and lunule, and most probably a partially external ligament.

Genus CYPRICARDELLA, Hall.

CYPRICARDELLA QUADRATA (n. sp.)

Shell small, general form sub-quadrangular, height equal to three-fourths the length. Valves depressed convex, most ventricose a little posterior to the beaks along the umbonal ridge. Hinge line slightly arcuate, gradually sloping to the posterior truncation. Anterior end oblique, longest near the antero-basal angle; posterior end narrow, squarely truncate; basal line regularly rounded from the anterior to the posterior truncation. Beaks minute, flattened on the umbones, slightly incurved; umbonal ridge angular, gently arcuate. Escutcheon narrow, elongate, extending to near the extremity of the hinge line.

Surface beautifully marked by fine, equal, concentric lines, which are abruptly bent upwards as they cross the umbonal ridge.

There seems to be no doubt about the generic affinities of this shell with *Cypricardella* of Professor Hall. It somewhat closely resembles *C. subelliptica*, one of the typical species (Iowa Geol. Rept., Vol. I., Part II., pl. 23, fig. 10), but is of a more quadrangular form, and the umbonal ridge is distinctly marked.

Genus Edmondia, Koninck.

Edmondia Burlingtonensis (n. sp.)

Shell of medium size, broadly subelliptical in outline, with regularly ventricose valves, breadth equal to three-fifths of the length. Beaks situated within the anterior third, strong, prominent, and incurved. Hinge line and basal margin gently and equally curved; anterior and posterior extremities broadly and equally rounded.

Surface marked by numerous strong, concentric undulations, parallel to the margin of the shell. In full-grown individuals there is a shallow, undefined sulcus, commencing near the centre of the shell, and reaching the border near the middle of the basal line.

This species resembles *E.? radiata*, Hall (Iowa Geol. Rept., Vol. I., Part II., pl. 29, fig. 3), but differs in having the posterior extremity slightly narrower than the anterior, instead of much broader; and also in the concentric undulations.

GASTEROPODA.

Genus Euomphalus, Sowerby.

Euomphalus ammon (n. sp.)

Shell small, discoid, spire not elevated above the plane of the outer volutions. Volutions three or four, closely coiled, gradually enlarging from the apex, slightly angular on the upper side, rounded below, and on the back. Umbilicus very broad, exposing nearly the whole of the inner volutions.

Surface of the shell marked by fine, closely-arranged transverse striæ of growth, which have a gentle backward curvature from the suture line to the under side of the volution.

This is a small but very distinct species, the larger specimens measuring about five-eighths of an inch across the disc, and the volution near the aperture having a diameter of three-sixteenths of an inch. In general appearance it resembles *E. Spergenensis* Hall, of the Warsaw limestone, but differs in the angularity of the top of the volution, and in the less number, as well as their more rapid expansion; the spire is never elevated above the level of the outer volutions, as is frequent in that species.

Genus PLATYCERAS, Conrad.

PLATYCERAS PARALIUM (n. sp.)

Shell rather below the medium size, composed of but little more than one loosely-coiled volution. Apex minute, laterally compressed; the upper half of the shell somewhat angular on the dorsum, more rapidly expanding and less angular in the outer part. Body of the shell marked by several proportionally strong, irregular plications, which give a deeply undulating or dentate character to the margin of the aperture. General form of the aperture irregular ovate. Peristome much prolonged on the anterior portion, and a little more expanded on the right side.

Surface marked by strong, concentric lamellose lines of growth, which are strongly undulated as they cross the plications.

This small shell is of the type of *P. (Capulus) acutirostre* Hall, (Iowa Rept., Vol. I., Part II., pl. 23, fig. 14), being of that class which have their volutions coiled on the same plane. It is easily distinguished by its laterally compressed beak, and the deep longitudinal plications.

PLATYCERAS BIVOLVE (n. sp.)

Shell small, ventricose, composed of about two closely-coiled, rounded volutions, spire not elevated above the surface of the outer volutions. Inner whorl minute, outer volution more rapidly expanding and ventricose. Section of the volution transversely ovate, narrowest at the inner or ventral margin; border of the aperture with a shallow sinus on the upper side, and another below the middle.

Surface marked by fine transverse striæ, parallel to the border of the aperture.

Shell of the type of *P. ventricosum*, Conrad, and closely resembling young specimens of that species.

Genus PLEUROTOMARIA, Defrance.

PLEUROTOMARIA MISSISSIPPIENSIS (n. sp.)

Shell rather above a medium size, spire elevated, composed of five to six volutions; the height a little greater than the diameter of the base. Volutions flattened on the upper side, the plane extending from the suture to the middle of the whorl, regularly rounded on the inner side. Periphery marked by a revolving band, which on the outer volution is an eighth of an inch in breadth, prominent at the margins, and depressed in the centre. Volutions coiled upon each other at the base of the band. Angle of the spire seventy to eighty degrees. Surface characters unknown. The nature of the imbedding material is such that it has entirely destroyed the surface markings; but the form of the shell is so entirely distinct from any other described from rocks of the same age, that it is easily recognized.

Genus MURCHISONIA, D'Archiac

MURCHISONIA ? PROLIXA (n. sp.)

Shell extremely elongate, spire much elevated, turritiform or subulate. Whorls eight or ten, very gradually increasing in size from the apex, flattened or slightly convex on the outer surface, with a very moderate angularity in the middle; the last one equal in length to the two preceding ones, somewhat angular at the lower lateral border, depressed convex below; suture distinct, not channeled. Aperture broadly subovate, sharply angular at the upper side, and rounded below; columella slender, arcuate or sub-spiral.

Surface marked by strong revolving lines on the surface of the volutions, the central one strongest and most prominent; finer revolving lines mark the under side.

The extremely attenuated spire, and the flattened volutions, are characters by which it may easily be recognized. The strong revolving lines give it much the appearance of a *Turritella*, and as the surface of our shells has been exfoliated, it is with some doubt we place it under *Murchisonia*.

Genus PORCELLIA, Léveillé.

PORCELLIA CRASSINODA (n. sp.)

Shell large, discoidal, consisting of three to four volutions, which rapidly increase in size from the apex; contiguous or very slightly embracing. Volutions sub-triangular, rapidly increasing in diameter from the venter to the dorsum, the relative diameters of which are as two to five, exclusive of the nodes on the dorso-lateral angles; the diameter from the ventral to the dorsal margins being a little greater than the breadth of the back. Lateral surfaces slightly convex; back gently rounded, marked along the middle by a shallow groove marking the position of the slit in the aperture. Dorso-lateral angles ornamented by a single row of distant, strong, obtusely-pointed nodes, those of one side a little in advance of those on the other.

Surface marked by fine, flexuose, revolving striæ on the back, and by revolving and transverse striæ on both sides and back. Margin of the aperture broadly sinuate on the dorsum, with a narrow notch in the middle.

This shell differs conspicuously from *P. nodosa*, Hall (Geol. Survey of Iowa, Sup. to Vol. I., Part II., page 92), in the subtriangular form of the volutions, and in the stronger nodes of the dorso-lateral angles, as well as the less numerous and more rapidly increasing volutions.

Genus Bellerophon, Montfort.

Bellerophon vinculatus (n. sp.)

Shell of medium size, subglobose; the diameter of the axis a little greater than that of the plane of the shell. Dorsum marked by a proportionally broad band, bounded on each side by an elevated flattened line. Sides of the shell marked by transverse bands, which rise from the edges of the revolving band, and pass with a gentle forward curve toward the axis, where they become obsolete. These bands are elevated on the forward margin and depressed on the posterior, presenting the appearance of a succession of low steps. Centre of the revolving band marked by a succession of retrorse curves, which are a continuation of the transverse bands that have been interrupted by the revolving lines. Margin of the aperture gently curving backwards from the axis to the middle, where it is deeply notched.

This species very closely resembles *B. bicarenus*, Léveillé, DeKoninck's Anim. Foss., pl. 28, fig. 8, but the transverse bands are not more than half the number, in the same space, and our shell is not umbilicate.

Bellerophon perelegans (n. sp.)

Shell small, subglobose; umbilicus small, aperture transverse, reniform. Back and sides marked by fine, sharply elevated revolving lines, which are about equal to the spaces between them, finer and more closely arranged in the middle than on the sides of the shell. Dorsum marked by a narrow, elevated, revolving band; bounded on each side by a shallow depression. The revolving lines on the band are much finer than those on the body of the shell. Very fine transverse striæ of growth across the revolving striæ, giving a finely cancellated appearance to the surface. Margin of the peristome nearly straight, or with a gentle backward curvature to the shallow central notch.

This species resembles *B. cancellatus*, Hall, of the Warsaw division of the Carboniferous Limestone, from Spergen Hill, Ind., but the revolving striæ are much coarser, and unequal in different parts of the shell; and the transverse striæ are finer, while the revolving band is much more distinct.

Bellerophon bilabiatus (n. sp.)

Shell of medium size, the inner whorls subglobose, the outer with a narrow, sharp carina on the back, and a broadly-expanded peristome, which becomes somewhat reflexed near the border, and deeply notched in the middle, giving to the aperture a strongly bilobed outline; umbilicus large. Surface smooth, except a few faint undulations, which have a gentle forward curvature from the carina to near the margin of the umbilicus, where they become obsolete.

This shell appears to be identical with an undescribed species from the Chemung group of New York, in the collection of Prof. Hall. Species of this type, with broadly-expanding apertures, are quite common in the Hamilton and Chemung groups of N. York.

CEPHALOPODA.

Genus GONIATITES, De Haan.

GONIATITES OPIMUS (n. sp.)

Shell depressed suborbicular, umbilicus rather small, varying somewhat in different individuals. Volutions three to four or more, their ventral borders only showing in the umbilicus, the remaining portion being embraced within the succeeding volution; depressed convex on the sides, rounded on the margin of the umbilicus, and on the dorsum. Axial diameter equal to one-third of the transverse diameter of the shell. Aperture depressed semilunate, three-fifths as wide as long; the inner volution occupying nearly one-half of its length. Septa moderately distant, divided into six lobes and six saddles; form of dorsal lobe not determined; dorsal saddle but little elevated, forming with the superior lateral lobe and lateral saddle shallow undulations; inferior lateral lobe deeper than the others; breadth and depth about equal, rounded at bottom; ventral saddle much wider than the other, highest at its outer end, and gradually declining to the umbilicus; extending about one-third of the distance across the volution.

Surface of the shell marked only by very fine transverse lines of growth.

RADIATA.

Genus LOPHOPHYLLUM, Edwards & Haime.

LOPHOPHYLLUM CALCEOLA (n. sp.)

Coral small, subturbinate, oblique, more or less curved, moderately but irregularly expanding from the base upward; flattened on the outer side of the curvature, and rounded on the inner side; transverse section subtriangular, subelliptical, or circular in different individuals. Apex small, pointed; exterior surface rugose, from unequal growth. Interior of cup of moderate depth, characterized by a subcentral fossette, which extends from the centre to near the back, and is equal to about one-eighth of the transverse diameter of the cup in the centre, and gradually contracting towards the dorsal sides; also by about thirty principal rays, in a specimen of three-eighths of an inch in transverse diameter, which converge towards and coalesce near the margin of the cavity. Smaller rays, to a number equal to the principal ones, occupy the interspaces, but extend only a short distance into the cup. Margin of the cup extended on the dorsal side.

This species is rather abundant, and may be easily recognized by the flattened outer surface, which is often so great as to give a transverse diameter double that in the opposite direction. Specimens are met with measuring from a fourth of an inch to more than an inch in length.

Genus ZAPHRENTIS, Rafinesque.

ZAPHRENTIS ACUTUS (n. sp.)

Coral small, or of a medium size; subturbinate, gently curved, acutely pointed at the base, more rapidly expanding and somewhat inflated near the middle. Margin of the cup oblique to the axis, transverse section circular. Cavity of the cup of moderate depth, with from twenty-five to thirty-five thin longitudinal rays, which unite in the border of a deep subcentral fossette. Fossette large, extending from the centre to the margin on the short side; elongate ovate or clavate in form, widest at the inner end; outer end occupied by a single ray. Transverse septa extending from the border of the central fossette to near the external walls, leaving small perforations into the lower chambers. Outer walls and longitudinal septa thin and smooth; exterior surface smooth (perhaps from weathering).

Genus FAVOSITES, Lam.

FAVOSITES.

Coral irregularly hemispherical; cells strong, very rapidly diverging from the base, increasing by frequent interstitial additions; vertical walls proportionally thick, and apparently smooth on the surfaces. The pores of the cell walls have not been observed, owing to the strongly crystalline nature of the material filling them. Transverse partitions thin, closely arranged; from two to three in a space equal to the transverse diameter of the cell; less numerous near the commencement of the individual cells.

This species differs from similar forms in the lower rocks, and especially from most species in rock of a similar age, in the great divergency of the cells and in their more rapid increase in number.

DONATIONS TO THE MUSEUM.

October 2, 1861. Two skulls, pelvis, and other bones of the female gorilla, from western equatorial Africa; by Dr. J. H. Otis *Aspidophorus*, from the Grand Bank of Newfoundland, and large barnacle from the skin of a rorqual; by Capt. N. E. Atwood. Ferns from Hawaii; volcanic sand blown on board ship in lat. 18° 49′ S. and 170° 40′ W.; a fungus, from Sutton, Mass.; female *Corydalis cornutus;* and viviparous fishes (*Embiotoca*), enclosed in the membranes, from San Francisco; by Dr. C. F. Winslow. A stuffed woodchuck, from Cohasset, Mass.; by Dr. H. Bryant. Large tarantula, from Fernando Po; by Dr. J. H. Otis. *Epeira riparia*, and caterpillar of *Papilio asterias*, from Lynn, Mass.; by Dr. H. Richardson.

October 16. Rolled tertiary corals, from Cumberland Co., New Jersey; by Dr. C. T. Jackson. Portion of meteoric stone from Dhurmsalla, India; by the Governor General of India. Various invertebrates from the reef at Aspinwall; fossil shells and a shark's tooth, from Monkey Hill, near Aspinwall; by Dr. C. F. Winslow.

November 6. Five specimens of *Clypeaster rosaceus*, three of *Diadema*, and one each of *Tripneustes* and *Asteropecten*, from the Bahamas; by Dr. H. Bryant. A slab of sandstone from Connecticut river, at Turner's Falls, exhibiting quadrupedal tracks; by Dr. John Bacon.

November 20. Specimen of Domeykite, from vicinity of Portage Lake, Lake Superior; by Dr. C. T. Jackson. Goodwin collection of animals, mentioned in the Proceedings of the meeting; by the Conway Fire Insurance Company.

December 18. Geological and botanical specimens, collected at high northern latitudes during the recent Arctic Expedition under Dr. Hayes; by Mr. Harris, a member of the party.

BOOKS RECEIVED DURING THE QUARTER ENDING DEC. 31, 1861.

Descriptions of New Species of Fossils from the Upper Helderberg, Hamilton, and Chemung Groups. By Prof. J. Hall. 8vo. Pamph. Albany, 1861. *From the Author.*

Collection of papers of the Sanitary Commission. 8vo. Pamph. *From the Sanitary Commission.*

Manual of Etherization. By C. T. Jackson, M. D., &c. 12mo. Boston, 1861. *From the Author.*

Notice of North American Species of Pieris. By Samuel H. Scudder. 8vo. Pamph. *From the Author.*

Thirteenth Annual Report of the Regents of the University of the State of New York. 8vo. Pamph. 1860. *From the Regents.*

Account of Total Solar Eclipse of July 18, 1860. By Lt. J. M. Gillis, U. S. Navy. 8vo. Pamph. *From the Author.*

Annual Report of the Regents of the Smithsonian Institution for 1860. 8vo. Washington. *From the Regents.*

New Species of Lower Silurian Fossils. By E. Billings, F. R. S. 8vo. Pamph. Montreal. 1861. *From the Author.*

Notes on Cretaceous Fossils. By W. M. Gabb. 8vo. Pamph. *From the Author.*

Transactions of the Massachusetts Horticultural Society for 1861. 8vo. Pamph. *From Edward S. Rand, Jr.*

Thomas Bland, F. G. S., on the Geographical Distribution of the Genera and Species of Land Shells of the West India Islands. 8vo. Pamph. New York, 1861. *From the Author.*

Michigan Geological Report. 8vo. Lansing, 1861. *From A. Winchell.*

Report of Commissioners of Patents for 1861. 2 vols. 8vo. Washington. *From Hon. C. Sumner.*

Notice of Land and Fresh Water Shells collected on the Rocky Mountains. By T. Bland and J. G. Cooper. 8vo. Pamph. *From the Authors.*

Barrande, M. J., Observations sur les Rapports de la Stratigraphie et de la Paléontologie. 8vo. Pamph.

Extension de la Faune Primordiale de Bohême. 8vo. Pamph.

Notes sur quelques nouveaux Fossiles. 8vo. Pamph.

Depot organique dans les loges aeriennes des Orthocères. 8vo. Pamph.

Troncature normale ou périodique de la Coquille dans certains cephalopodes paléozoïques. 8vo. Pamph.

Documents anciens et nouveaux sur la Faune primordiale et le Système Taconique en Amerique. 8vo. Pamph.

Graptolites de Bohême. 8vo. Pamph.

Observations sur quelques genres de Cephalopodes Siluriens. 8vo. Pamph

Bemerkungen über die Abhandlung des Hrn. Ed. Suess: "Ueber Böhmische Graptolithen." 4to. Pamph.

Parallèle entre les Dépôts Siluriens de Bohême et de Scandinavie. 4to. Pamph.

Analyse du Travail de E. Suess sur les Brachiopodes de Vienne. Par M. Deshayes. 8vo. Pamph. *From M. J. Barrande.*

Proceedings of the Academy of Natural Sciences of Philadelphia. Sig. 11–25. 1861.

Silliman's American Journal of Science and Arts. Vol. XXXII., No. 96, for Nov., 1861 New Haven.

Proceedings of the Entomological Society of Philadelphia. No. 3. 1861.

Proceedings of the Zoölogical Society of London. Part 3, 1860, and Parts 1, 2, 1861. 8vo.

Canadian Journal of Industry, Science and Art. No. 36, for Nov., 1861. Toronto.

Silliman's Journal of Science and Arts. No. 97, for Jan., 1862.

Proceedings of the California Academy of Natural Sciences. Sig. 4–8. Vol. I. 8vo. Pamph. 1860.

Terrestrial Air-Breathing Mollusks of the United States. Vol. IV. By Wm. G. Binney. 8vo. Boston. 1859. *Received in Exchange.*

Malakozöologische Blätter. Band VI. Bogen 13, to end. Also Band VII. and Band VIII. Bogen 1–5.

Annals and Magazine of Natural History. Nos. 45, 46 and 47, Vol. VIII., for September, October, and November, 1861. London. *From the Courtis Fund.*

Seasons with the Sea Horses. By James Lamont. 8vo. New York, 1861.

Carthage and her Remains. By Dr. N. Davis, F. R. G. S., &c. 8vo. New York, 1861.

History of Civilization in England. By Henry Thomas Buckle. Vol. II. 8vo. New York, 1861.

The Okavango River: a Narrative of Travel, Exploration, and Adventure. By Charles John Anderson. 8vo. New York, 1861.

The Armies of Europe. By Geo. B. McLellan. 8vo. Philadelphia, 1861.

History of the Invasion and Capture of Washington. By John S. Williams. 12mo. New York, 1857.

Life and Liberty in America. By Chas. Mackay. 12mo. New York, 1859.

Narrative of the Earl of Elgin's Mission to China and Japan in 1857–8–9. By Laurence Oliphant. 8vo. New York, 1860.

Napoleon at St. Helena. By John S. C. Abbott. 8vo. New York, 1855

The Spanish Conquest in America. By Arthur Helps. 3 vols. 12mo. New York, 1857.

Essays by the late George Brinley. 12mo. New York, 1861.

History of the State of New York. By John Romeyn Brodhead. 8vo. New York, 1859.

History of the United Netherlands. By John Lathrop Motley. 2 vols. 8vo. New York, 1861.

History of the Council of Trent. From the French of L. F. Bungener. 12mo. New York, 1855.

The Cotton Kingdom. By Frederick Law Olmsted. 2 vols. 12mo. New York, 1861.

Chronicle of the Conquest of Granada. By Washington Irving. 12mo. New York, 1860.

The last Travels of Ida Pfeiffer. 12mo. New York, 1861.

Homes and Haunts of the most eminent British Poets. By Wm. Howitt. 2 vols. 8vo. New York, 1856.

The Puritans and Queen Elizabeth. By Samuel Hopkins. Vol. III. 8vo. Boston, 1861.

Recollections and Private Memoirs of Washington. 8vo. By G. W. P. Custis. New York, 1860.

Lives of American Merchants. By Freeman Hunt. Vol. II. 8vo. New York, 1858.

The Queens of Society. By Grace and Philip Wharton. 12mo. New York, 1861. *Deposited by the Republican Institution.*

ERRATA FOR VOL. VIII. OF PROCEEDINGS.

Page 7, line 22, for "III. p. 319," read II. p. 72

" 7, omit lines 29–30, and insert *according to Haldeman (Proc. Am. Ass. Adv. Sc.* II. p. 336) *R. lapidicola Burm. differs from R. maculata Harris in not having the posterior tibiæ of the male waved at the base.*

Page 16, line 18. for "*nucleses*" read "nucleus."

" 182, line 20, transpose "male" and "female."

" 183, " 28, for "male" read *female.*

" " " 29, " " " "

" 184, " 13, " " " "

" " " 15, " "female" read *male.*

" " " 39, " " " "

" 185, " 17, " "males" " *females.*

" 205, last line, for "Reports" read "Regents."

" 224, 225, for "McReady" read "McCrady."

" 261, line 13 from top, for "*feathered*" read "*flattened.*"

" 261, line 8 from bottom, dele "and interambulacral."

" 265, line 6 from bottom, for "one specimen" read "our specimens."

" 266, line 6 from bottom, for "more" read "none."

[NOTE. — In the Report of the meeting of the Society, Nov. 6, 1861, on page 240 of the present volume of the Proceedings, a foot-note to a communication by Mr. Marcou is introduced, making a grave charge against the editors of the *American Journal of Science.* The Publishing Committee wish to state explicitly, that they have always purposed to exclude from the Proceedings everything of a personally offensive nature, and regret that, through any inadvertence, the note in question should have been inserted. — *Publishing Committee.*]