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1871.

PART 1.

Meeting January 5th, 1871.

Eight members present.

Dr. W. S. W. RUSCHENBERGER, Director, in the chair.

Various donations to the Museum and Library were announced.
The following papers were read and referred to committees:

“Descriptions of some new types of Palæozoic Shells.” By
F. B. Meek.

“Descriptions of new species of Nudibranchiate Mollusca inhabiting Polynesia, No. 2.” By Wm. Harper Pease.

Mr. Tryon read extracts from a letter from Mr. Wm. M. Gabb, of St. Domingo, referring to the tenacity of life in the genus *Littorina*. Specimens of *L. muricata*, collected by Mr. G. in Sept., 1870, and forwarded by him to the Section, were exhibited, being apparently as healthy and active as if just taken out of the water.

Mr. S. R. Roberts exhibited a second specimen of the rare rayed variety of *Unio cylindricus*, Say. This individual was collected by Mr. Roberts in the Wabash river, Ind.

Referring to the statement of the disappearance of Aurora Island (one of the New Hebrides Group), recently printed in the newspapers, Mr. Tryon exhibited two species from the Academy's collection supposed to be peculiar to this island; remarking, that in the event of its reported submergence being confirmed, these must be regarded as lost species. In his report on the mollusca collected by Wilkes' U. S. Exploring Expedition, Dr. Gould gives the following account of Aurora Island: "The little island of Metia or Aurora Island, to the northeastward of Tahiti, is one of peculiar interest. It is a coral island, which has been elevated 250 feet or more, and has no other high island near it. On it were found four small land shells, belonging to three genera, viz.: *Helix pertenuis*, *H. dædalea*, *Partula pusilla* and *Helicina trochlea*. None of these were found upon any other island. They seem to have originated there, after the elevation of the island, and have a significant bearing upon the question of local and periodical creations in comparatively modern times."

Meeting February 2d, 1871.

Six members present.

MR. TRYON, Vice-Director, in the chair.

Several donations to the Library and Museum were reported.

The following papers, offered for publication in the Journal, were referred to committees:

"On the Lingual Dentition of *Clausilia tridens*, Chemn." By Thomas Bland and Wm. G. Binney.

"Notes on the Synonymy and Distribution of Marine Gastropoda." By Wm. Harper Pease.

Dr. F. A. Hassler reported that the specimens of *Littorina muricata* presented at the last meeting were still living.

Messrs. H. E. van Rijgersma, of St. Martins, W. I., and G. Nevill, of Calcutta, were elected Corresponding Members of the Section.

Meeting March 2d, 1871.

Six members present.

DR. RUSCHENBERGER, Director, in the chair.

The Conservator read the record of additions to the Museum and Library.

The following papers were presented for publication:

“Descriptions of new species of Land Shells.” By Wm. Harper Pease.

“Notices and Reviews of New Conchological Works.” By Geo. W. Tryon, Jr.

The specimens of *Littorina muricata* presented to the Section in January, were stated to be still living, and a letter was read from Prof. W. M. Gabb, dated St. Domingo, Feb. 10th, stating that at that date his specimens of the species (a portion of the same collection) were living.

DESCRIPTIONS OF SOME NEW TYPES OF PALÆOZOIC SHELLS.

BY F. B. MEEK.

One of the greatest difficulties with which the student of Palæozoic Conchology has to contend, is the impossibility of ascertaining, in many cases, the nature of the hinge and interior of lamellibranchiate types. In such cases the most usual custom, where the species happen to belong to none of the known genera that present well marked external distinctive characters, is to refer them provisionally to such genera as they happen to resemble more or less nearly, until specimens in a condition to give a clue to their true affinities can be found. In general this is certainly better than to propose new groups, without having seen the most important generic character. It sometimes happens, however, that we meet with forms presenting such strongly marked external peculiarities, that we may feel well assured they can safely be regarded as types of undescribed groups; and in such instances it seems to me that we are less liable to err and mislead others, by at once proposing new sections for the reception of such shells, than by any other disposition we can make of them.

For these reasons I have ventured to propose new groups for two of the types described in this paper, without having seen their hinges or internal characters.

Genus SANGUINOLITES, McCoy.*

Subgenus PROMACRUS, Meek.

Shell thin, more or less elongate-subtrapeziform, nearly or quite equivalve, either inequilateral or equilateral, the beaks being nearer the anterior or posterior end, or central, according to the species; valves closed all around, and each with a well defined keel, or more obtuse ridge extending from the posterior side of the beaks to the posterior basal extremity; anterior side attenuated and produced; posterior margin wider (higher) than

* Synop. Carb. Fossils of Ireland, p. 47, 1844.

the other, and obliquely truncated; dorsal margin sloping in front of the beaks, and more nearly horizontal and apparently without an escutcheon behind them; ligament external or marginal, rather long. Surface with concentric lines and ridges, and sometimes obscure radiating markings on the umbonal region. (Hinge muscular, and pallial impressions unknown.)

Type. *Promacrus nasutus*, M.

Although this group is here proposed as a subgenus under *Sanguinolites*, I have thought it desirable to give its characters in rather more detail than is usual in defining a subgenus, because it is really very doubtful whether these shells can be properly included, even as a marked subgenus, under that group. Until the typical species of Prof. McCoy's genus can be better known, however, I have concluded to place them under that genus, with a distinct name that can be retained in a generic sense, should these shells be found to belong to a new genus, as they most probably will. They certainly differ from any of the species included in *Sanguinolites* by Prof. McCoy, as well as from his diagnosis, in having the anterior side much produced and attenuated, instead of "short, rounded," and in having the margins closed all around instead of "gaping" behind. In re-defining his genus (British Palaeozoic Fossils, p. 276) Prof. McCoy also distinctly states that its hinge margin is "inflected to form a long posterior lunette;" while in the shells here under consideration it seems to be erect, with the long ligament rather deeply inserted between the erect edges.

With due deference to the acknowledged ability of that distinguished palaeontologist, it certainly seems to me that Prof. McCoy has included in *Sanguinolites*, as I have elsewhere intimated (Palaeont. Upp. Mo. p. 39), forms belonging to more than one genus. Some of these appear to be identical with *Allorisma*, King, but as it remains to be seen whether or not Prof. McCoy's typical species (*Sanguinaria angustata*, Phillips) really possesses the characters of *Allorisma*, I am not yet prepared to agree with those who regard the latter group as being synonymous with *Sanguinolites*.

* It is very much to be desired that some one having access to the better specimens of British Palaeozoic Lamellibranchs, doubtless now known, than those originally described by Phillips, Sowerby and others, should give full descriptions and illustrations of these shells, as Mr. Davidson has done of the *Brachiopoda*. This is all the more necessary, because later authors have either expressly cited some of these species as types of their new genera, or so alluded to them that they will probably have to be regarded as the types of the same, and yet these typical forms must remain very imperfectly known to all who have not access to authentic specimens, until better illustrations and descriptions of them have been published.

In regard to the family affinities of the group of shells here under consideration, it is of course impossible to arrive at any satisfactory conclusions, until specimens showing the hinge and interior can be found. I have the impression, however, that they belong either to the *Anatinidæ*, or to some allied family.

SANGUINOLITES (PROMACRUS) NASUTUS, Meek. Pl. 1, fig. 1.

Shell somewhat less than three times as long as high, rather compress, especially in front of the keels, the greatest convexity being about half way down these ridges; basal outline forming a long, very gently convex curve from end to end; anterior side long, compressed, cuneate, and narrowing regularly to the very narrowly rounded extremity; posterior side distinctly shorter and wider than the anterior, with its truncated margin nearly straight or but slightly convex in outline from its subangular lower extremity obliquely forward and upward to the dorsal margin, which is straight and slopes a little backward from the beaks; anterior dorsal margin forming a long, nearly straight slope from the beaks to the anterior extremity; beaks rather depressed, compressed, and placed distinctly behind the middle; umbonal ridges well defined from the beaks to the posterior basal angle. Furrows and striæ of growth moderately distinct; radiating striæ of the umbonal region nearly obsolete.

Length, 5.22 inches; height, 1.96 inches; convexity of the two valves about half way down the keels, 0.97 inch.

The typical and only specimen of this species I have ever seen was given to me by Prof. Swallow in 1866. It was found at the Choteau Springs in Cooper Co., Missouri, in what was called, in the Geological Report of that State, the "Choteau limestone," now known to belong to the oldest member of the Carboniferous system, and to be equivalent to the Waverly series in Ohio, the Marshall group of Michigan, and the Kinderhook group of Illinois.

SANGUINOLITES (PROMACRUS) MISSOURIENSIS, Swallow, MS.
Pl. 1, fig. 2.

Solen ? Missouriensis, Swallow, 1860. Trans. St. Louis Ac. Sci. i., p. 655.

Shell about four times as long as high, rather compressed; post-umbonal angular ridges well defined from the beaks to the posterior basal extremity; basal margin nearly straight from end to end; anterior side shorter than the other, but well produced, and narrowly rounded at the extremity; posterior side wider and near one-third longer than the other, with its trun-

cated margin straight and very oblique, so as to give the posterior basal extremity an angular outline; dorsal margin with a long nearly straight slope in front of the beaks, and nearly straight and horizontal behind them; posterior dorsal regions flattened and compressed above the carinæ. Surface with rather strong ridges and striæ of growth, crossed on the umbonal regions by moderately distinct radiating striæ.

Length, 5.70 inches; height about 1.51 inches; convexity, 0.80 inch.

This species, although presenting all the external generic characters of the last, will be at once distinguished specifically, by its more elongate, depressed form, straighter basal margin, and especially by the farther anterior position of its beaks.

The specimen has a little of the anterior extremity and the posterior dorsal margin broken away. The former has been restored in outline in the figure by the curves of the marks of growth farther back, and the latter from an impression in the matrix.

On seeing the typical species of this group in Prof. Swallow's collection, some years back, I at once expressed the opinion that it belonged to an undescribed group that would include his *Solen?* *Missouriensis*; when he gave me the specimen of the former, and loaned me that of the latter. Subsequently he informed me, by letter, that he was willing to refer his species *Missouriensis* to the new group. Consequently I have cited it as above written, as his manuscript name, though it may be proper to state that I do not know whether or not he would agree with me, at present, in placing it provisionally in a subgenus under *Sanguinolites*.

Locality and position. Pike County, Missouri, from near the same horizon as the last.

NOTE. I have recently seen another fine species of this group among the specimens from the Waverly Sandstone at Sciotoville, Ohio, collected by the Geological Survey of Ohio, under the direction of Prof. J. S. Newberry, and placed for investigation in my hands. This species may be readily distinguished from both of the foregoing by having its beaks central, and its posterior umbonal slopes rounded instead of angular, excepting very near the beaks. It measures about 6.50 inches in length, and 2.20 in height. A full description and figures of it will be prepared for publication in the Reports of the Ohio Geological Survey. For this species I would propose the name *Sanguinolites* (*Promacerus*) *Andrewsi*, in honor of Prof. E. Andrews, of the Ohio Survey, who discovered the typical specimen.

Genus PROTHYRIS, Meek, 1869.

Prothyris, Meek ; Proc. Ac. Nat. Sci. Phila., July, 1869, p. 172.

Shell equivalve, very inequilateral, longitudinally oblong ; valves compressed or moderately convex ; nearly closed or a little gaping behind, and more or less widely gaping in front, where the hiatus is increased in size by a nearly rectangular notch in the margin, mainly below the middle ; beaks depressed and very near the anterior end, with a small ridge usually extending from the anterior side of each to the corner of the anterior marginal notch ; dorsal margin without escutcheon or lunule, being erect and sharp behind the beaks ; surface merely marked with striæ of growth. Hinge and interior unknown.

Type *Prothyris elegans*, Meek.

In regard to the affinities of this genus it will of course be difficult to decide until its hinge and internal characters can be known. The specimens being all casts of the exterior only, it is necessarily from external characters alone that we can judge of its probable relations. From its general form, however, and open anterior end, I am inclined to think it related to the *Solenidae*. Its form is not unlike that of some types of that group, while its gaping anterior would seem to indicate that it had a large foot, as we see in *Solen*, *Pharus*, and other types of the family.

This genus seems to range through the whole of the Carboniferous System. Until recently I had supposed the typical species peculiar to the Upper Coal-measure beds at Nebraska City, Nebraska ; but I have since seen it from different horizons in the coal-measures of Illinois ; while another more convex species has been discovered by Prof. Winchell in his Marshall group, at the very base of the Carboniferous system in Michigan ; and the same species has been discovered at that horizon during the progress of the Ohio Geological Survey in that State.

PROTHYRIS ELEGANS, Meek. Pl. 1, fig. 3.

Shell small, very thin, compressed, elongate-oblong, being about three times as long as high ; basal and dorsal margins straight and parallel, or nearly so ; posterior extremity obliquely truncated, compressed and nearly closed ; anterior end more gaping, but with its hiatus chiefly formed by the rectangular marginal notch of each valve, which extends about half way up, and has its lower margin rounding into the anterior basal edge, and its upper into the little projection above ; beaks depressed quite to the level of the dorsal margin, placed very near the an-

terior end, and so compressed as to be very inconspicuous ; valves without any post-umbonal ridge or prominence, but showing a faint marginal impression along near the cardinal border, and another below this, extending obliquely to a point just above the middle of the truncated posterior edge ; ridge extending down in front of the beaks to the corner of the notch, almost linear, and narrowing upward ; while, in some specimens, there are appearances of two other much smaller linear ridges, or little impressions,* farther back, diverging from each beak. Surface striae of growth rather sharply defined and regular on the anterior ventral region, but nearly obsolete elsewhere.

Length of the largest specimen seen 1 inch ; height 0.33 inch ; convexity about 0.07.

The typical specimens of this species were collected by Dr. Hayden and his assistants during his geological survey of Nebraska, in the Upper Coal-measures at Nebraska City. I have fully described and illustrated the genus and species in Dr. Hayden's Report, but as it may not be published for some considerable time, and this is the type of a new and interesting genus, it has been thought desirable to give a notice of it here with an outline figure.

Specifically this shell will be readily distinguished from the only other known species, already alluded to, from a much lower horizon (*Prothyris Meeki*, Winchell, MS.), by its much more compressed valves without any distinct posterior umbonal prominence, straighter dorsal outline, more depressed beaks, and less widely gaping and rather more distinctly notched anterior margin.

This shell is rather common in the clay beds at Nebraska City, Nebraska, and, as already intimated, it occurs less numerously at different horizons in the Coal-measures of Illinois.

MARTESIA ? ROESSLERI, Meek. Pl. 1, fig. 4, 4a.

Shell cuneate-ovate, being very gibbous anteriorly, and narrowed and compressed posteriorly ; posterior extremity narrowly rounded ; anterior side very short, moderately gaping, the hiatus having apparantly become gradually narrower with the growth of the valves ; beaks rather prominent, gibbous, incurved and located near the anterior extremity ; basal margin semiovate in outline, being most convex a little in advance of the middle,

* The anterior one of these appears to be an extremely slender, linear, external ridge, while the other has more the character and appearance of an impression made by an internal ridge through the very thin shell. This is doubtless a generic character.

dorsal margin sloping a little posteriorly from the beaks. Surface ornamented with radiating costæ, which are slender on the anterior half of the space in front of the linear furrow, extending obliquely backward and downward from the beaks to near the middle of the base of each valve, but stronger and more widely separated between this and the furrow; while behind the latter they are very oblique, less strongly defined, and about as widely separated as on the anterior region; small regular ridges and furrows also mark the valves concentrically.

Length 1.16 inches; height and convexity each about 0.66 inch.

The only specimen of this shell yet brought in, is mainly a cast in brown ferruginous matter. It seems to be a little inequivalve, the posterior ventral margin of the right valve projecting slightly beyond the other, but this may be due to distortion, although there would appear to have been no displacement of the upper margins of the valves. A cast of the posterior adductor muscle, is seen to be narrow ovate and situated near the cardinal margin, about one-third the length of the valves from the posterior end. The gap of the anterior margins does not result from a notch or distinct truncation, and seems not to have been very wide at any stage of growth. A slight portion of the anterior margins of the valves, near the beaks, having been broken away in the specimen, their exact character there cannot be well made out, but they seem to have been a little reflexed. Between the beaks some remaining portions of the matrix adheres, and in this I have thought I could see some indications of a broken accessory valve, but no traces of its form can be determined.

Of course, without better specimens it is scarcely possible to determine, beyond doubt, whether or not this shell really belongs to the existing genus *Martesia*. It is more probable that if we knew all of its characters it would be found to belong to a distinct group. Mr. Tryon, who is well known to be an excellent authority on the *Pholadacea*, thought, on examining the specimen, that from all of its characters that can be made out, it will probably be found to be nearly related to *Martesia*.

The specific name is given in honor of Mr. A. R. Roessler, of the Geological Museum of the General Land Office at Washington City, to whom I am in indebted for the type specimen.

Locality and position. The specimen was brought by Mr. Roessler from near Fort Belknap, Texas, where he says it was found in a formation containing fossil wood replaced by oxyd of copper, and believed by him to be of Permian age. It certainly has a more modern look than any palæozoic shell I have ever before seen.

DESCRIPTIONS OF NEW SPECIES OF NUDIBRANCHIATE
MOLLUSCA INHABITING POLYNESIA. No. 2.

BY W. HARPER PEASE.

DORIS VILLOSA, Pease. Pl. 3, fig. 1.

Animal coriaceous, oblong oval, rounded at either end, convex above, covered with crowded, erect, elongate, conical papillæ, which to the touch resemble the pile on velvet.

Dorsal tentacles small, elongate oval, peduncles long, and retractile into tubular cavities. Labial tentacles small, cylindrically tapering.

Branchial star large, wider than the mantle, encircling the vent, except on its posterior side; plumules six, quadripinnate, retractile into a minute cavity. Foot elongate, rounded behind, truncate rounded in front, which part has a marginal transverse fissure.

Color pale grey, darker centrally, and obscurely maculated with rather close, irregular, dusky brown spots. Tentacles and margins of plumules pale olivaceous. Under surface pale, and closely dotted with brown.

Length, two and seven-tenths inches.

Habitat, Island of Huaheine.

Station, (lurking among sea-weed, in the upper region of the laminarian zone. Like most of the coriaceous species, it is very sluggish in its movements. A. G.)

DORIS DEBILIS, Pease. Plate 5, fig. 2.

Animal smooth, subpellucid, oblong, slender, the anterior half slightly the narrowest, rounded at either end, margins broadly undulated.

Branchial star inserted far back, a short distance from the posterior end of the mantle; very large, extending over the sides of the mantle; consisting of six plumules, the four anterior simply quadripinnate, the posterior pair composed of three quadripinnate plumules, attached to one base, all retractile into

a simple cavity. Dorsal tentacles ovate, very obliquely lamellate, and retractile into simple cavities. Labial tentacles, none.

Foot elongate oblong, transversely fissured and truncately rounded in front, somewhat pointed behind, and during locomotion projects behind the mantle.

Color varies from a brownish red to an olivaceous, or deep black, more or less dotted with white; on some the dots are grouped together, forming nebulous spots; margins blueish. Dorsal tentacles pale, with deep brown lamellæ, and tipped with white. Branchiæ dusky olivaceous. Lower surface paler than above and immaculate.

Length, three and a half inches.

Habitat, Island of Huaheine.

Station, (in sheltered locations, on sea-weed, at low water mark. Active in their motions. A. G.)

DORIS COMPTA, Pease. Plate 4, fig. 1.

Animal oval, smooth, soft, subpellucid. Mantle widest at the middle, rounded equally at both ends, depressly convex; margins thin, narrowly undulated, projecting equally on all sides beyond the foot. Branchial plumes of moderate size, ten in number, rudely arborescent, subpellucid, and retractile into a common simple cavity. Anal tube prominent. Tentacles abbreviately ovate, obliquely and closely laminate, and retractile into simple cavities. Labial tentacles simple, small, diverging lobes. Foot thin, subpellucid, narrow elongate, acutely rounded in front and rounded behind. Color blueish white, dotted with brown, the dots decreasing in size toward the margin of the mantle, and remotely freckled with opaque white. Foot sparingly specked with dusky spots. Branchial plumes blueish white. Tentacles fawn yellow.

Length, one inch.

Habitat, Island of Apaiang.

DORIS RUBRILINEATA, Pease. Plate 3, fig. 2.

Animal smooth, flaccid, subpellucid, oblong oval, depressly convex, rounded at either end, widest at the middle, and very thin along the margins. Dorsal tentacles very large, on stout peduncles, oblique, with eight or nine very oblique, coarse laminae, tipped with a small truncate mucronation, and retractile into a simple cavity. Branchial star small, consisting of six bipinnate plumules, retractile into a large simple cavity. Vent very pro-

minent. Head without labial appendages. Foot oblong elongate, much narrower than the mantle, and during locomotion projecting but little behind the body.

Color pale dusky brown, and a few scattering remote round pale dots; the mantle is edged with blackish brown, and an intramarginal carmine band. Tentacles pale, tipped with opaque white—the laminæ brown. Branchiæ pale, tinged with brown. Beneath paler than above, the hinder portion of the foot stained with carmine.

Length, one half of an inch.

Habitat, Tahiti.

Station, (under stones at low water mark. A. G.)

DORIS CINEROSA, Pease. Plate 5, fig. 1.

Animal subpellucid, oblong oval, coriaceous, similarly rounded at either end. Mantle entirely covering the foot, convex above and covered with closely set asperities like the pile on velvet.

Dorsal tentacles remote, erect, short and stout, on short, very stout peduncles; laminæ very oblique, rather coarse, and retractile into simple cavities. Labial tentacles stout, tapering and recurved. Branchial star pale, small, and retractile into a common simple cavity; plumules six, arborescent, tripinnate. Foot elongate oval, rounded behind, truncately rounded and fissured in front. Color pale grey, dotted with black. Dorsal tentacles pale olivaceous, tips white. Under surface same as the upper, the spots being visible through the substance, as is also the viscera.

Length, three-fourths of an inch.

Habitat, Island of Huaheine.

Station, (under stones at low water mark. A. G.)

DORIS NUBILOSA, Pease. Plate 6.

Animal flaccid, oblong oval; mantle convexly rounded above, widest on the posterior half, rounded at either end, covering the foot; margins thin and irregularly minutely gashed. Upper surface covered with closely set unequal sized soft papillæ, among which are interspersed small tentacular processes.

Dorsal tentacles small, ovate, very finely and obliquely laminate, retractile into tubular papillose cavities. Labial tentacles small and finger-shaped. Branchial star large, not as wide as the mantle, plumules six, quadripinnate, recumbent, broad, and retractile into a common cavity. Vent, a prominent slender

tapering tube, with a crenulate orifice. Foot oblong oval, rounded behind, truncately rounded in front, much smaller than the mantle.

The upper surface is beautifully mottled with different shades of brown and grey, the former color assuming two dorsal longitudinal rows of large cloud-like spots.

Dorsal tentacles pale, tipped with white. The under surface of the mantle and foot is pale cinereous, the former with crowded small whitish yellow spots, which become more scattered towards the body, and maculated with irregular chocolate spots, those along the margin running into one another.

Locomotive disk mottled with whitish yellow and closely spotted with pale chocolate brown. Upper surface of the foot mottled with pale brown.

Length, six and a half inches.

Habitat, Island of Huaheine.

Remarks. (While in confinement the animal cast off large portions of its mantle, in the same manner as species of *Harpa* cast off their foot. A. G.)

DORIS SORDIDA, Pease. Plate 4, fig. 2.

Animal smooth, subpellucid, elongate oblong, convex above, rounded at either end, margins thin, rather widest on its anterior half. Dorsal tentacles well developed, elongate, conical, slightly swollen, erect on stout peduncles, laminæ very oblique, not deeply cut, retractile into simple cavities. Labial tentacles, none; head subquadrate.

Branchial star inserted far back, projecting a short distance beyond the margin of the mantle; plumules six, arborescent, retractile into a simple cavity. Vent prominent. Foot narrow, elongate, fissured and truncately rounded in front, rounded behind, and projecting beyond the mantle.

Color blackish slate, with a few scattering opaque white spots. Tentacles with brown laminæ and tipped with white; beneath paler. Foot pale brownish.

Length, one and a half inch.

Habitat, Tahiti.

Station, (among sea-weed and under stones at low water mark. Motions rather lively. A. G.)

DORIS FUSCESCENS, Pease. Plate 4, fig. 3.

Animal oblong oval, somewhat flaccid, subpellucid; dorsal region convex, rounded on either end, widest at the middle,

studded with somewhat distant, unequal, small hemispherical papillæ. Dorsal tentacles small, oblong ovate, slightly oblique, on stout peduncles, coarsely and very obliquely laminated, and retractile into tubular cavities.

Branchial star small, one-third the width of the body, composed of sixteen incurved lanceolate plumules, forming a beautiful rosette around the vent. Mouth notched beneath; no distinct head or labial tentacles.

Genital papillæ on the anterior third of the right side. Foot oblong, much narrower than the mantle, truncately rounded in front, rounded behind, and not projecting beyond the mantle posteriorly.

Color along the dorsal region wood brown, most minutely punctured with white; marginal region pale brownish grey, papillæ much darker. Dorsal tentacles and branchiæ wood brown, the former tipped with white; peduncles colorless.

Length, one inch.

Habitat, Maiao Island.

Genus CHROMODORIS, Alder and Hancock.

I have remarked heretofore that the arrangement of colors on Nudibranchia may be considered a generic character. The upper surface of the body and mantle of the species of this genus are invariably lineated with bright colors and, with exceptions, spotted. They excel those of any other genus in the gaudy, variegated colors with which they adorn themselves, as the following species will prove.

The nidamental ribbon is coiled up in two or three remote whorls. While depositing it the animal remains motionless, or nearly so, the body curved to one side. The coil is formed by the foot, which folds up at its extremity, forming a groove, through which the ribbon passes. The process is slow, occupying about two hours.

CHROMODORIS VARIEGATA, Pease. Plate 7, fig. 1.

Animal smooth, elongate, convexly rounded above. Mantle narrow, sides nearly parallel. Anterior portion dilated and rounded in front; posterior end rounded and slightly emarginate.

Branchial star as wide as the mantle, inserted far back; plumules ten, sub-erect, lanceolate, pinnate, and retractile into a common slightly tubular cavity. Vent prominent.

Head furnished with short, stout, divergent, conical tentacles. Dorsal tentacles large, clavate, erect, coarsely lamellate

obliquely, and retractile into tubular cavities. Foot nearly as wide as the mantle, much elongated, rounded in front, tapering posteriorly to an acutely rounded tip, which projects some distance behind the mantle.

Color subpellucid, colorless, with a median longitudinal cream yellow stripe, extending from the inter-tentacular space to the branchial star; on each side of the dorsal stripe is a bright buff colored one, which does not extend anteriorly quite as far, and passes around the branchial star posteriorly; the stripes are separated by a dark purple line, and the lateral stripes are margined by a narrower and paler line of same color. Mantle margined with cream yellow, with the addition on the front end of an intra-marginal violaceous band. Upper fourths of the branchial plumes violaceous. Tentacles on their basal third orange red, the middle third purple, and the upper violaceous. The under surface of the animal colorless except the mantle, which is margined with cream yellow.

Foot tipped with violet on its upper posterior end.

Length, one and a half inch.

Habitat, Tahiti.

CHROMODORIS MACULOSA, Pease. Plate 7, fig. 2.

Animal subcylindrical, elongate, narrow, smooth, flaccid, subpellucid. Mantle dilated in front and rounded, rounded behind, sides nearly parallel. Cervical tentacles large, sub-erect on stout bases, elongate oval, laminae deeply incised, retractile into simple cavities. Branchial star moderately developed, consisting of eight sub-erect, lanceolate, narrow pinnate plumules, connate at their bases, and retractile into a common simple cavity. Vent, a simple orifice. Labial tentacles small, finger-shaped. Foot elongate, narrow, truncately rounded and fissured in front; acutely rounded and projecting far beyond the body posteriorly.

Color cream yellow, margined with fulvous, on which there is a series of abbreviate reddish lines, three irregular radiating, fulvous lines, extending from the front margin of the mantle toward the tentacles; lineated longitudinally with opaque white, lines four, the two median encircle the branchiae and pass between the dorsal tentacles, which they partly encircle, the two lateral lines extend from the tentacles to the posterior end of the body; the spaces between the lines dotted with purple. Cervical tentacles pale, a broad brownish red zone on their basal half, and one narrower red zone just below the apex. Branchial plumules pale slate color tipped with red. Upper surface of the foot and

under sides of the mantle lineated same as above, and dotted with violet, the former shaded with violet beneath and along the upper margin, and the latter margined with dingy red.

Length, one and a half inch.

Habitat, Tahiti.

Station, (under stones at low water. A. G.)

CHROMODORIS RUFOMACULATA, Pease. Plate 8, fig. 1.

Animal oblong, flaccid, smooth, pellucid, rounded above, slightly dilated anteriorly, obtusely rounded in front, slightly undulated along the margin, and rounded behind. Cervical tentacles well developed, erect, oblong ovate, mucronate; finely lamellate, peduncles stout and retractile in tubular cavities. Labial tentacles small, finger-shaped. Branchial star small, rather remote from the hinder end of the body, composed of nine lanceolate, pinnate plumules, which are incurved and retractile into a common cavity. Vent prominent.

Foot elongate, fissured and truncately rounded in front, tapering behind to an acutely rounded point, which projects considerably posterior to the body.

Color cream white, passing into cream yellow toward the margins, which are ornamented with a series of oblong violet spots. The central portion of the mantle is studded with numerous slightly elevated orange dots. Branchiæ colorless. Tentacles chocolate brown, laminae white.

Under surface colorless, with the exception of a slight tinge of the dorsal colors, which are transmitted through the pellucid mantle.

Length, one inch.

Habitat, Island of Huaheine.

Station, (under stones at low water mark. A. G.)

CHROMODORIS SIMPLEX, Pease. Plate 8, fig. 2.

Animal smooth, oblong, convexly rounded above, sides nearly parallel and rounded at either end. Cervical tentacles well developed, subclavate, slightly compressed laterally, peduncles stout, laminae deeply cut, very oblique, and retractile into tubular cavities. Branchial star small, half the width of the body; plumules eight, sub-erect, lanceolate, pinnate, retractile into a simple cavity. Labial tentacles reduced to small lobes.

Foot elongate, narrow, slightly dilated and rounded in front, tapering behind to an acute point, projecting beyond the mantle some distance.

Color pale pinkish flesh, passing into white toward the margins, which are edged with a more or less broken bright red line. All the specimens observed were marked with a single red spot on the dorsal region, a short distance posterior to the middle. Cervical tentacles and plumules on their upper half bright red.

Under surface same as the upper, but somewhat paler.

Length, three quarters of an inch.

Habitat, Island Maiao.

CHROMODORIS INORNATA, Pease. Plate 8, fig. 3.

Animal flaccid, subpellucid, elongate oblong, convexly rounded, smooth, rounded and dilated in front, rounded behind. Cervical tentacles large, oblique, on stout peduncles, coarsely lamellated, obtusely mucronate, and retractile into simple cavities.

Branchial star small, inserted far posteriorly, composed of seven arborescent, lanceolate, pinnate plumules, which are retractile into a simple cavity. Vent prominent. Labial tentacles stout, conical. Foot much elongated, narrow, tapering posteriorly, and extending some distance beyond the mantle.

Color cream white, margined with orange and dotted with purple. Branchiæ colorless. Cervical tentacles orange. On the under surface the dorsal markings may be seen through the pellucid body.

Length, one and a half inches.

Habitat, Island of Huaheine.

CHROMODORIS LENTIGINOSA, Pease. Plate 9, fig. 1.

Animal flaccid, pellucid, smooth, depressly convex, oblong, somewhat dilated and rounded in front, and rather acutely rounded behind. Cervical tentacles well developed, sub-erect, oblong ovate, finely and closely lamellate, peduncles stout, retractile into tubular cavities. Labial tentacles short, stout and finger-shaped. Branchial star small, not as wide as the body, composed of six narrow, lanceolate, pinnate plumules, which decrease in size posteriorly, projecting obliquely upward and backwards, and retractile into a common cavity. Foot elongate, narrow, slightly dilated anteriorly, obtusely rounded and fissured in front, tapering posteriorly to an acute tip, and projecting far behind the body.

Color. The mantle has a widely diffused pale orange red margin, marked with a regular series of purple dots; a cream colored line traverses each side of the back, passing around the

front of each tentacle, and meeting round the branchial cavity; the space between these lines and the marginal band is marked with purple dots. The back is marked with a median interrupted cream colored stripe, in which are also disposed purple dots. Along each side of the median stripe are several cream colored spots, with central purple dots. Branchiæ colorless. Tentacles brown. The under surface of the mantle is same color as above, but paler, the color being transmitted through the pellucid mantle.

Length, three quarters of an inch.

Habitat, Island of Huaheine.

CHROMODORIS VARIANS, Pease. Plate 9, fig. 2.

Animal subpellucid, flaccid, oblong, smooth, convex above, slightly dilated anteriorly, and rounded at both extremities. Branchial star small, only about one-half the width of the body, and recurved; plumules five, narrow lanceolate, pinnate, and retractile into a simple cavity. Cervical tentacles large, suberect, clavate, elongate, issuing from tubular cavities, closely lamellated; lamellæ not very oblique, but close and deeply cut. Labial appendages small and conical. Foot elongate, narrow, slightly dilated in front, tapering posteriorly to a point, which projects considerably behind the mantle.

Color rose red, with a median dorsal white line extending from the intertentacular space to the branchial star. Margin of the mantle with yellow. Cervical tentacles rose red. Upper portion of the branchiæ purple violet. Under surface of mantle same as above, paler. Foot pale purple violet.

A variety occurs, on which the rose red of the upper surface is replaced by purple violet, and branchial star with one more plumule.

Length, one inch.

Habitat, Islands of Huaheine and Maiao.

Station, (under stones in the upper region of the laminarian zone. Motions lively. When in motion the anterior portion of the mantle is kept flapping up and down continually. A. G.)

NOTES ON THE SYNONYMY AND DISTRIBUTION OF
MARINE GASTEROPODA.

BY W. HARPER PEASE.

The localities and distributions of the tropical forms of Mollusca, are being now accurately determined by the researches of collectors permanently located at several points in the tropics, and the errors of transient collectors, on whom we have heretofore mostly depended, are being corrected and consequently the synonymy of the species.

As the local catalogues published by such gentlemen are deserving of the highest credit, it is the more necessary that any errors they may have fallen into as to the identity of species should be corrected.

The following synonyms of the species inhabiting the Island of Bourbon, have been determined from specimens named by M. Deshayes for the gentlemen from whom I received them.

They have, in addition, been carefully compared with the published descriptions and figures.

RISSOINA ANGASII, *Pse.*

Rissoina turricula (Ang. non *Pse.*) *Proc. Zool. Soc.*, 1867, p. 114.

Name preoccupied for a species inhabiting Polynesia, described in *Proc. Zool. Soc.* 1860, p. 438.

TEREBRA CONTIGUA, *Pse.*

Terebra assimilis (*Pse.* non Ang.) *Am. Jour. Conch.*, 1869.

Name preoccupied by Mr. Angas for an Australian species, described in *Proc. Zool. Soc.* 1867.

TRITONIDEA ASSIMILIS, *Rve.*

Buccinum assimile, *Rve.*, *Con. Icon.*, Sp. 90.

The above species is credited to Australia by Mr. Angas in his catalogue, *Proc. Zool. Soc.*, 1867, p. 187.

It is closely related to *D'Orbygnii*, Payr, inhabiting the Medi-

terranean, as Mr. Reeve states, and has been classed by Mr. Weinkauff as a synonym of that species. The figure in Con. Icon. was apparently taken from an immature specimen. Whether that determination is correct or not, the Australian species is quite distinct as to shape, sculpture and color. No comparison is necessary. I describe it as

TRITONIDEA AUSTRALIS, Pease.

T. assimilis, Ang. non Rve., Proc. Zool. Soc., 1867, p. 187.

T. fusiformi, elongata, longitudinaliter leviter costata, transversim regulariter sulcata; spira elongata; anfr. 6, convexo rotundata, ultimo ad basin vix recurvo; apertura angusta, labro leviter crenulato, intus vix lirato; columella subelevato laminata, dentato lirata; castaneo aut purpurascentis fusca, fascia lata albida cingulata, interdum irregulariter maculata, sulcis rufescentis.

Long. 14, diam. 6 mill.

Shell fusiform, elongate, somewhat cylindrical in shape, slightly ribbed longitudinally, ribs rounded, 9-11 in number, transversely grooved throughout, the interstices forming narrow rounded ribs; spire elongate, its whorls convexly rounded; whorls six, the last slightly recurved at base; aperture narrow, outer lip finely crenulate on its edge, faintly ridged within; columella slightly elevately laminate, dentately ridged; color dark purplish or reddish brown, encircled by an irregular broad whitish band, or irregularly spotted, grooves reddish.

COLUMBELLA DERMESTOIDES, Lam.

The above is credited to Australia by Mr. Angas, in Proc. Zool. Soc., 1867, p. 195.

He remarks that the Australian form "is certainly conspecific with *C. dermestoides* of Kiener, which species is recorded as coming from the West Indies."

The *C. dermestoides*, of Kiener, is identically the same as that described by Lamarck, and both authors assign it to the Mediterranean.

It is a small variety of *Nassa corniculum*, (Olivi) which should be classed under genus *Amycla*, H. and A. Ad., as the columella is smooth and truncate at base. The Australian species belongs to another genus, being a true *Columbella*. It also differs from the Mediterranean form in other respects.

The species figured and described in Con. Icon. under the above name from the West Indies is distinct, and approaches more nearly to *C. interrupta*, Ang., described from South Australia, in Proc. Zool. Soc., 1865.

Mr. Sowerby has also selected a West Indian species from the Cummingian Coll, to represent the above in Thes. Con.

The Australian I describe as

COLUMBELLA MACULOSA, Pse.

T. elongato-ovata, lævis, nitida; anfr. 6, plano convexis, ad suturam marginatis, ultimo basin sulcato, recurvo; apertura parviuscula; columella tridentata; lineis flavescens reticulata.

Anfr. infra suturam, fascia purpurascens cingulatis, et albo maculatis, supra suturam, albo, et flavescens alternatim maculatis.

Long. 7, diam. $3\frac{1}{2}$ mill.

Shell elongately ovate, smooth, shining; whorls six, flatly convex, marginate at the suture, the last grooved at base and recurved; aperture rather small; columella tridentate; openly reticulate with fine yellowish lines, with an irregular band of same color encircling the last whorl; whorls encircled above next the suture with a purplish band, which is spotted with opaque white, and below next the suture, with a line of alternate white and yellowish spots. The last whorl is usually partly encircled on its base with a purplish line or narrow band.

OPERCULATUM INDICUM, Gme.

This species is credited to Australia by Mr. Angas, who gives it a wide range in other provinces.

The only species, so far as I am aware, inhabiting Polynesia is *O. aurantium*, Pse.

Judging from a single specimen in my collection of the shell of the Australian species, and the color of the animal as given by Mr. Angas, viz., "greenish yellow," it is possible that when the animal is closely examined, it may prove to be distinct from the East Indian.

MARGINELLA DEBILIS, Pse.

M. oryza, Pse. Proc. Zool. Soc., 1860. p. 147.

Name preoccupied, changed as above.

Mr. Redfield, in his monograph of the above genus, published in this Journal, 1870, has classed the above as a synonym of *M. australis*, Hds.

A mistake must have occurred as to the identity of the species, as the two are widely distinct. *M. australis* is described as having the outer lip smooth within and the shell smooth and colored. The lip of *M. debilis* is dentate, the shell striate, white, and I would add to the description, marginate at the suture.

The two species also differ in size and shape.

SISTRUM MARGINALBUM, (Blain.)

Purpura marginalba, (Blain.) Nouv. Ann. du Mus., 1832, p. 219.

Sistrum tuberculatum, (Ang. non Blain.) Proc. Zool. Soc., 1867, p. 191.

The above species has been confounded with *S. tuberculatum*, (Blain) by Mr. Angas and other authors.

The two agree as to sculpture, but may be readily distinguished by the characters of the aperture. They also differ in shape.

NASSA SUTURALIS, Lam.

Buccinum suturale, Lam. An. s. Vert, Vol. 10, p. 166.

Nassa intermedia, Dkr. Reise du Novar, p. 5, pl. 1, f. 2.

The above species is found throughout the Papuan Islands, as well as Australia, and varies widely.

At some localities, it is almost colorless, excepting the transverse lines, which are constant.

The nodules on the upper part of the whorls are occasionally much enlarged, passing down on to the last whorl, connecting it with varieties of *N. hirta*, Kien. The variety figured and described in Voy. Novarra, is also noticed by Reeve in Con. Icon. plate 2.

In addition to the above, I have also received typical specimens from Coll. of Novar. Exped. of *Purpura distinguenda*, Dkr., collected at the Nicobar Islands, which I had previously received from the Andamans and Red Sea.

It is the variety of *P. hippocastanum*, Lam, described by M. Deshayes as *P. Savignii*, (*stellata*, Bolt.)

Cerithium gibberosum, of the same work, should be compared with *C. patulum*, Sow.

Genus MITROIDEA, Pse.

Mitroidea, Pse. Proc. Zool. Soc., 1865, p. 514.

Mauritia, A. Ad. Proc. Zool. Soc., 1869, p. 273.

It is gratifying to learn of the discovery, at the Mauritius, of a second species of the above peculiar form, for which Mr. Adams proposed the above generic name.

DOLIUM MELANOSTOMUM, Jay.

The original locality given to the above species by Dr. Jay, viz., Tonga or Friendly Islands, has not been confirmed, although that group of Islands has been visited by several collectors during the past few years. It does inhabit the Hawaiian Islands,

though but very seldom met with. I have heard of but two having been found within the past fifteen years.

The metropolis of the species appears to be on the small Islands to the West, which form a continuation of the Hawaiian group, running parallel with its axis and extending, with long intervals, over 1,000 miles. They are seldom visited. The last expedition from Honolulu was sent out about two years ago. The Captain, on his return, brought ten or more specimens, which he had picked up on a sand beach at French Frigate Shoals. With the exception of two or three they were bleached perfectly white, though perfect in other respects. Several had attained to an enormous size. The largest measured 35 inches in circumference. Those in my collection are 24 inches, which is about the usual size of the species.

COLUMBELLA MISER, Sow.

C. miser, Sow. Thes. Con. 1844, p. 129, pl. 38, f. 111.

C. Pacifica, Gask. Proc. Zool. Soc., 1851, p. 4.

Having had opportunity of examining a large number of specimens and their animals, I am confident that but one species of the above type inhabits the Hawaiian Islands. It passes through some remarkable variations. The denticulations on the outer lip are absent on some full grown specimens, which I consider evidence of immaturity.

The variety mentioned by Mr. Sowerby is the most common, whorls smooth, and I would add, occasionally angulate at suture. The type is comparatively rare. All are grooved at base.

The reds spots are generally disposed longitudinally in an angulate or zigzag manner. Specimens occur; wholly white or of straw color.

PLEUROTOMA RUGOSA, Migh.

P. rugosa, Migh. Proc. Bost. Soc., 1845, p. 23.

P. scalarina, Desh. Conch. Isle Reunion, 1863, p. 109.

The above species appears to be widely distributed. In addition to its original locality, Hawaiian Islands, I have received it from Tahiti, Philippines, Ceylon, and lastly from Bourbon. Although it varies somewhat in shape and color it may be easily recognized. It is a beautiful species, with bold and pleasing characters. From the elongate, turriculate form, figured by M. Deshayes, it varies to an abbreviate, ovate shape. The extremes measure 10 by 4 to 6 by $3\frac{1}{2}$ mill.

It is described by M. Deshayes as being grooved transversely. I would add that the grooves are separated by fine elevated ridges, which give the shell a corded appearance.

The apex as well as base is occasionally stained with dark purple or black, and specimens are met with faintly banded with brown or yellow.

The figure in Conch. Reunion is not correctly colored, and does not agree in that respect with the description.

DAPHNELLA BELLA, Pse.

? *Daphnella bella*, Pse. Proc. Zool. Soc., 1860, p. 147.

Pleurotoma gemmulata, Desh. Conch. Reunion, p. 107.

The above generic name was attached to this species by the late Mr. Cumings, when forwarded to him with the description. I allow it to remain unaltered, as it does not agree with any one of the divisions of *Pleurotomidæ*. It resembles somewhat *Columbella*.

The Bourbon specimens are identically the same as those inhabiting the Hawaiian Islands.

CERITHIUM JANTHINUM, Gld.

C. janthinum, Gld. Proc. Bost. Soc., 1849, p. 121.

C. aspersum, Desh. Conch. Reunion, 1863, p. 97.

The name given to this species by Dr. Gould is an unfortunate one, as specimens wholly purple are of rare occurrence. As remarked by M. Deshayes, the species is very variable as to color, and I would add, the most so of any of the genus. Of over 40 specimens in my collection, no two are alike as to color or marking. They are wholly purple, or yellow, or violet, or white, or rose color, or various shades of brown; they are light with a dark sutural band, or banded, or spotted, or lineated with various colors. The varices are, however, invariably white.

TRIFORIS INCISUS, Pse.

T. incisus, Pse. Proc. Zool. Soc., 1860, p. 434.

T. triliratus, Desh. Conch. Reunion, p. 102.

The description by M. Deshayes was evidently taken from an immature specimen. It varies somewhat in color, being wholly brown, or obscurely mottled with pale colors.

On mature specimens, the punctures are longitudinal in shape.

PERNA HAWAIIENSIS, Pse.

P. californica, Conr. Jour. Acad. Phil., 1837, p. 245.

The above species is confined in its distribution to the Hawaiian Islands. As doubts have arisen as to its identity for reason of its name, which is a misnomer, I have thought advisable to change it as above.

DESCRIPTIONS OF NEW SPECIES OF LAND SHELLS.

BY W. HARPER PEASE.

PARTULA EXPANSA, Pse. Plate 9, fig. 3.

T. solidiuscula, late umbilicata, oblique ovata, striis incrementis subrugosula, non striolata, albescente, sublente lineis interruptis, albis, cingulata, (probabiliter epidermide induta); *Spira brevis*, parva; anfr. 4, convexus, ultimus magnus, tumidus, oblique valde productus, $\frac{2}{3}$ longitudinis testæ æquans; perist. æqualiter late expansum, superne marginibus approximatis; columella vix dilatata; apertura obliqua, ovalis, basi rotundata.

Alt. $14\frac{1}{2}$, diam. $17\frac{1}{2}$ mill.; ap. $7\frac{1}{2}$ mill. longa, 5 mill. lata. Hab. in Insula Tutuila.

The above peculiar species is of a type new to the genus. The shell is rather solid, openly umbilicate, more so than any of the genus, without the usual transverse striæ, but slightly roughened by lines of growth; color whitish, and encircled by interrupted opaque white lines. When living it was probably covered with an epidermis. The spire is small, the last whorl comprising most of the shell, which is swollen and very much produced obliquely, so much so that the diameter is greater than its altitude. The peristome is equally and widely expanded all around, the margins approaching each other at the whorl, so that the aperture is slightly the broadest anteriorly.

It was collected at the above locality, by Mr. John Brazier.

PARTULA BICOLOR, Pse. Plate 9, fig. 4.

T. solida, perforata, acute ovata, nitida, striis confertis, obsoletis transversim notata, straminea, anfr. spiræ fascia rufescente juxta suturam cingulatis; perist. extus intusque rufescente; anfr. 4, convexus, ultimus $\frac{1}{2}$ longitudinis testæ æquans; perist. incrassatum, breviter et æqualiter expansum; apertura vix obliqua, ovalis, callo parvulo profundo in ventre anfr. penultimi.

Alt. 15, diam. 9 mill., ap. 5 mill. longa, 4 mill. lata. Hab. in Insula Guam.

The above may be distinguished from *P. gibba* (Terr.), which occurs at the same locality, in being of smaller size, last whorl not inflated, and in its color.

PARTULA BRAZIERI, Pse. Plate 9, fig. 5.

T. dextrorsa, umbilicata, conico-elongata, recta, solidiuscula, striis confertis transversim distincta notata, nitida, pallide straminea, prope basin, pallide fusco obsolete bifasciata; anfr. 5 convexis, ultimus $\frac{1}{2}$ longitudinis testæ fere æquans; sutura impressa, simplici; apertura vix obliqua, ovalis; perist. album, incrassatum, convexum, breviter et æqualiter expansum; columella superne late dilatata.

Alt. $22\frac{1}{2}$, diam. 12 mill.; ap. 9 mill. longa, 6 mill. lata.

Hab. in Insula Tutuila (Brazier).

This species was collected by Mr. Brazier at the above locality. It is of the type of *P. conica*, (Gld.) and *canalis*, Mouss. The shell is straight, elongate dextral, whorls convex, marked transversely by the usual fine striæ and longitudinally by lines of growth. The color is pale yellow, with two indistinct bands of pale brown encircling the last whorl near its base. The lip is callous and but slightly expanded; columella widely dilated above, its callosity extending some distance over the wall of the aperture.

Genus HYALOPSIS, Pse.

Testa purpæformis, callo nitido obducta; perist. simplex, vix incrassatum, margine columellari integro, canali verticalis ad insertionem marginis dextri. Apertura circularis.

The above genus is another link connecting the several genera *Pupina*, *Registoma* and *Callia*.

I quite agree with Mr. Dohrn that they should be united, but that the several groups should retain their names as subgenera.

HYALOPSIS TUMIDA, Pse. Plate 9, fig. 6.

T. dextrorsa, oblique ovata, nitida, pellucida, lævigata, fulvo-cornea; anfr. 5, rotundato-convexis tumidis; apice vix obtusa; sutura filo-marginata; perist. circularis, vix incrassatum, album.

Alt. $7\frac{1}{2}$, diam. 5 mill. Hab. Insulis Salomonis.

Shell dextral, obliquely ovate, shining, smooth, pellucid, yellowish horn color; whorls five, roundly convex, somewhat swollen; apex obtuse, suture narrowly marginate; peristome circular, slightly callous, white.

Collected at the above locality by Mr. John Brazier.

**ON THE LINGUAL DENTITION OF CLAUSILIA TRIDENS,
CHEMNITZ.**

BY THOMAS BLAND AND W. G. BINNEY.

Clausilia tridens, Chemn., occurs in Puerto Rico only, and no other species of the genus has been found in the West Indies. The jaw and lingual membrane here described were received from Mr. Robert Swift.

Jaw slightly arcuate, low, long, of almost equal height throughout; ends slightly attenuated, bluntly truncated; anterior surface without ribs; cutting edge with a blunt median projection. Figure 4 is drawn from a photograph taken by our friend Mr. Sam. Powel. It will be seen that the cutting edge is developed beyond the well marked median beak. This extension is thinner than the rest of the jaw; and can, we believe, scarcely be normal. Should it prove to be constant in the species, the concave margin can hardly be said to have a median projection, but still the well marked beak upon the inner line will show the species to be related, by the characters of its jaw, to the subfamily Pupinæ. (See Land and Fresh Water Shells of N. A., Part I, p. 223).

Lingual membrane short and broad, composed of numerous rows of about 30—1—30 teeth each. Centrals long, narrow, incurved at sides, concave and either excavated or thinned at base, rounded at top, and with a recurved, small, blunt apex. Laterals shorter and broader than the centrals, their base cut away for two-thirds their length nearest the centrals, their sides parallel, curving outwards from the centrals, the top rounded or indented; apex recurved, produced into a stout tri-lobed or bilobed denticle, the central or larger lobe bearing a stout, prolonged, conical point. At about the twelfth lateral the teeth commence to change gradually into the marginals, the extreme form of which are subquadrate, wider than high, broadly recurved into an oblique, irregularly denticulated apex; the marginals decrease rapidly in size as they pass outward towards the

margin of the membrane; they are exceedingly variable in the number and disposition of the denticles on their recurved apices.

The membrane is peculiar in the small size of the recurved apex of the central teeth as compared with that of the laterals.

On plate 2 we have given a figure of one central (fig. 8), with the first laterals (fig. 3 and 8), the second lateral (fig. 8), the fifth lateral (fig. 7). The passage of the laterals into the marginals is shown in fig. 1. The fully developed marginals in fig. 2. Figure 5 gives also a form intermediate between laterals and marginals. Figs. 1 and 2 are from the right of the central line. The others are from the left, except fig. 8, which gives teeth from both sides of the central line.

These figures, as well as that of the jaw, are drawn from photographs taken directly from the microscope by our friend Mr. Sam. Powel.

ON THE LINGUAL DENTITION OF *HELICINA OCCULTA*

BY THOMAS BLAND AND W. G. BINNEY.

In the Annals of the New York Lyceum of Natural History, vol. ix, p. 287, we described and figured the lingual dentition of *Helicina occulta*, Say. We had at that time examined a single membrane, imperfectly mounted. An opportunity has more recently been given us to study several other membranes. This has shown us that we were quite mistaken in our determination of the fifth lateral tooth. It is evident that what we described and figured as the fifth lateral is in reality a basal expansion of the fourth lateral, belonging to the row of teeth immediately above the row from which our figure is drawn. It may be that this expansion forms the point of attachment of the fourth lateral, which would account, perhaps, for the crimping of its base.

In describing the fourth lateral, we remarked that it seemed to have, in some instances, a wing-like expansion behind the uncini. This was, no doubt, the fifth lateral, imperfectly seen in the lingual-examined.

The figure (fig. 6, plate 2) we have here given shows the lower

half of the fourth lateral tooth and the fifth lateral tooth. It is taken from a photograph, for which we are indebted to our friend Mr. Sam. Powel, of Newport, R. I.

There is considerable variation in the shape of this fifth lateral tooth. In some cases the upper margin is excavated along three-fourths of its length.

Explanation of Plate 2, illustrating the articles by Messrs. Bland and Binney.

Figure 1. *Clausilia tridens*, Chemn. Three lateral teeth, about the eleventh, twelfth and thirteenth on the right of the central line. These are given to illustrate the passage from the laterals into the marginals.

Figure 2. *Clausilia tridens*. The seventh and eighteenth teeth on the right of the central line. These are fully developed marginals.

Figure 3. *Clausilia tridens*. The first lateral on the left of the central line.

Figure 4. *Clausilia tridens*. The jaw.

Figure 5. *Clausilia tridens*. The twelfth lateral on the left of the central line. Compare with figure 1 from another transverse series of the same lingual membrane.

Figure 6. *Helicina occulta*, Say. The fifth lateral tooth, with a portion of the fourth lateral, to show its basal extension.

Figure 7. *Clausilia tridens*. The fifth lateral to the left of the median line.

Figure 8. *Clausilia tridens*. The central tooth with the adjacent laterals.

NOTICES AND REVIEWS

OF

NEW CONCHOLOGICAL WORKS.

BY GEO. W. TRYON, JR.

I.—AMERICAN.

American Journal of Science and Arts. N. S., Vol. 50. No. 150, Nov. 1870.

Contributions to Zoölogy from the Museum of Yale College.
No. 8.—*Descriptions of some New England Nudibranchiata.* By A. E. VERRILL.

The following new species are described:

<i>Dendronotus robustus,</i>	<i>Doridella</i> , n. gen.
<i>Doris bifida,</i>	<i>Doridella obscura.</i>

American Journal of Science and Arts. 3d Series, Vol. 1, No. 1. Jan. 1871.

Descriptions of some imperfectly known and new Ascidians from New England. By A. E. VERRILL.

<i>Molgula Manhattensis</i> , DeKay.	<i>Molgula littoralis</i> , Verrill.
“ <i>pannosa</i> , Verrill.	“ <i>papillosa</i> , Verrill.
“ <i>retortiformis</i> , Verrill.	“ <i>pilularis</i> , Verrill.

No. 2. Feb., 1871.

Same paper continued.

<i>Cynthia stellifera</i> , Verrill.	<i>Cynthia echinata</i> , Linn.
<i>Ascidia monoceros</i> , Möller.	“ <i>pyriformis</i> , Rathke.
Syn. <i>C. condylomata</i> , Packard.	“ <i>pulchella</i> , Verrill.
<i>Cynthia carnea</i> , Verrill.	<i>Ascidia complanata</i> , Fabr.
“ <i>placenta</i> (pars), Packard.	<i>Ciona tenella</i> , Stimpson.

Note on transversely striated muscular fiber among the Gasteropoda. By W. H. DALL.

A reply to Mr. Dall's criticism on the Brachiopods as a division of the Annelids. By EDW. S. MORSE.

American Naturalist. Vol. IV, No. 10. Dec. 1870.

Distribution of the Marine Shells of Florida. By DR. WM. STIMPSON.

Of three hundred and fourteen species collected by the author, only one hundred and forty-five, or less than half, were common to the east and west coasts of Florida; fifty-eight being peculiar to the east and one hundred and eleven to the west coast. The higher temperature of that portion of the Gulf of Mexico, due to the Gulf Stream, gives a tropical character to its molluscan fauna; yet in the north-western portion of the Gulf, where the temperature is lower, the species of the Atlantic coast appear again predominantly, and indicate a connection of the waters of the Gulf with those of the Atlantic through, perhaps, shallow lagoons and sandy straits, within a comparatively recent geological period.

II.—FOREIGN.

BRITISH.

Report of the 39th Meeting of the British Association for the Advancement of Science, Held at Exeter in August, 1869.

On the Land and Fresh-water Mollusca of Nicaragua. By RALPH TATE.

The land shells of Guatemala, Honduras, Yucatan, and Mexico resemble those of the West Indian Islands in the prevalence of species of *Cylindrella*, *Macroceramus*, *Adamsiella*, *Megalomastoma*, *Chondropoma*, *Cistula*, and *Tudora*, none of which genera have been observed in Nicaragua, and south to the Isthmus of Darien. This circumstance, viewed in connection with the distribution of the Nicaraguan species, points to a different origin for the fauna, and the author is thereby induced to regard Nicaragua as comprised within the Columbian region of the distribution of land and fresh-water shells, and not within the Mexican.

Conchologia Iconica. Parts 284, 285.

Philine, 2 plates, Oct. 1870 (with colored plates).

P. truncatissima, Sowb., n. sp. Hab. ?

P. orientalis, Adams MSS. Hab. ?

Bullina, 1 plate.

Nucula, 4 plates, Oct., 1870.

Utriculus, 1 plate.

Ostrea, 5 plates, Oct., 1870 (not complete).

Linteria, 1 plate.

L. acuminata, Sowb., n. sp. Guadalupe, Sandwich Is.

L. fasciata, Sowb., " Hab. ?

Scaphander, 1 plate.

Solenella and *Neilo*, 1 plate.

S. subequivalvis, Sowb., n. sp. Australia.

Journal of the Ceylon Branch of the Royal Asiatic Society. 1867
-70. Part 1. Colombo. 1870.

Description of a New Genus and Five New Species of Marine Univalves from the Southern Province, Ceylon. By G. and A. NEVILL.

Robinsonia, n. g. *Pleurotoma (Mangelia) Bakeri*.

R. Ceylonica, " *curculio*.

R. pusilla, " *lemniscata*.

Annals and Magazine of Natural History. 4th Series. No. 35. London, Nov., 1870.

On Astarte excurrents and A. modesta. By SEARLES V. WOOD.

The recent Mediterranean species *A. modesta*, H. Adams, is generically distinct (being a *Gouldia*) from *A. excurrents*, Wood, with which Mr. Adams supposed it to be possibly identical.

Helix personata, Lamarck. By J. GWYN JEFFREYS.

This species is now believed to belong to the British fauna, as it occurs in the Post Tertiary of Belfast, in Ireland, etc.

No. 36, December, 1870.

Report on the Testaceous Mollusca obtained during a Dredging Excursion in the Gulf of Suez in the Months of February and March, 1869. By ROBERT MCANDREW.

The author obtained in all 818 species, a proof of the amazing fertility of the sea in a region where the land is so barren. 619 species have been identified or described, and 199 are still undetermined. In the list of named species are 355 not previously recorded as inhabiting the Red Sea, and of these 53 are

new to science, as are probably also most of the 199 undetermined species.

"The extraordinary dissimilarity between the fauna of the Red Sea and of the Mediterranean, which has been frequently remarked, and which appears to be confirmed by further researches on both sides of the isthmus (holding good with respect to the other invertebrata and fishes as well as the Mollusca), shows that a barrier between the seas must have existed from very remote time; and this is not inconsistent with Prof. Issel's statement that an examination of the geological conditions of the isthmus leads to the conclusion that the two seas were united during the Eocene and Miocene periods.

"It is true, as has been observed by the authority I have quoted, that some of the Suez species appear to be so nearly related to their representatives in the Mediterranean and Atlantic, that it is easy to suppose that they may have been originally the same, and that their distinguishing characters may have been acquired during the series of ages through which they may have been separated, though I could hardly admit this with respect to all the species quoted by Issel as Mediterranean equivalents. Such species, however, form but a small percentage of the whole; and I am not sure that more remote localities, such as Japan and Australia, do not furnish about as many examples of relationship to the European fauna.

"The number of Suez species that are common to Japan, the Philippine Islands, Australia, the Sandwich Islands, &c., is worthy of remark, as showing that the Mollusca of the Pacific and Indian oceans have a much wider distribution than those of the Atlantic, where the shores of America possess but few species in common with the coasts of Europe and Africa. The fact of a species having in several instances been obtained from only two localities very remote from each other, such as Suez and Japan, is to be attributed to (which it is a proof of) the very small amount of knowledge we possess of the fauna of the intervening seas.

"It is not to be supposed that my present list is any near approach to a complete catalogue of the Mollusca of the Gulf of Suez, much less to those of the Red Sea, to which it forms but a small contribution. Up to the very last, we never returned from a day's work without having added several species to our collection, and we might probably have long continued to do so. It is also remarkable in how many instances we obtained only one or two examples of a species."

Mediterranean Mollusca. No. 2. By J. GWYN JEFFREYS.

Platydia Davidsoni = *Megerlia truncata* (abnormal).

Lucina transversa, Bronn, is an *Axinus*.

Various other errors in the first paper on this subject, published in the "Annals" for July, are here corrected.

On Georissa, Acmella (Cyclostoma tersum, Bens.), Tricula and Cyathopoma millium, Bens. By WILLIAM T. BLANFORD.

Georissa is not distinguishable from *Hydrocena*, and merges in it.

Acmella, gen. nov., type *Hydrocena tersa*, Pfr. = *Cyclostoma tersum*, Bens.

DANISH.

Videnskabelige Meddelelser fra Naturhistorisk Forening i Kjøbenhavn for Aaret, 1868.

Faunula Molluscorum Islandiæ. By O. A. L. MÖRCH.

This paper contains, first, a bibliographical review, and, secondly, a list of species, with descriptions, synonymy and critical remarks. One hundred and fifty-six species are enumerated.

Zillæg til "*Faunula Molluscorum Insularum Færøensium.*" By O. A. L. MÖRCH.

GERMAN.

Systematisches Conchylien-Cabinet von Martini und Chemnitz. Continued by H. C. Küster. Part 200. Nürnberg, 1870.

The text completes the monograph of *Donax*, and continues those of *Murex* and *Ranella*.

Donax rostrata, Römer, n. sp. Upper Guinea.

Novitates Conchologicæ. Supplement III. Monographie der Molluskengattung *Venus*. By Dr. Edward Römer. Parts 26 to 29. Cassel, 1870. 12 colored plates.

The monograph of *Tapes* is continued in these numbers.

Novitates Conchologicæ. Land Conchylien. By Dr. Louis Pfeiffer. Part 37, (with three colored plates).

Bulimus Dammarensis, Pf., n. sp. Africa.

Novitates Conchologicæ. Meeres Conchylien. By Dr. W. Dunker. Part 16.

The following new species are described:

Barbatia Petersii, Dkr. Madagascar.

Arca Crossei, " Mazatlan.

Arca fusco-marginata, Dkr. Madagascar.

The following corrections of specific names previously published in the "Novitates," is given:

Cytherea cordiformis, Dkr., = *C. obliquata*, Hanley. Möreb, in his Yoldi Catalogue, calls the same species *Cyth.* (*Cardium*) *albida*, Martyn.

Mactra Lühdorffii, Dkr., = *M. Sachalinensis*, Schrenck.

Sunetta concinna, Dkr., = *S. (Meroë) truncata*, Deshayes.

Lucina mirabilis, Dkr., = *L. Voorhævei*, Deshayes.

Anomalocardia paucigranosa, Dkr., = *Arca nodifera*, Martens.

Barbatia eximia, Dkr., = *Arca magellanica*, Chemn.

Fasciolaria Heynemanni, Dkr., n. sp., is proposed for the shell previously described and figured as *F. purpurea*, Jonas, var. ?

Ricinula speciosa, Dkr., = *R. Reeveana*, Crosse.

Dolium Japonicum, Dkr., = *D. luteostomum*, Küst.

The present number completes a volume of the marine division of the "Novitates."

A M E R I C A N JOURNAL OF CONCHOLOGY.

N E W S E R I E S .

PUBLISHED BY THE

CONCHOLOGICAL SECTION of the Academy of Natural Sciences of Philadelphia

VOL. VII.

1871-72.

PART 2.

Meeting April 6th, 1871.

Six members present.

Dr. RUSCHENBERGER, Director, in the chair.

Several additions to the museum and library were received.

Hugh Nevill, of Point de Galle, Ceylon, was elected a corresponding member.

Meeting May 4th, 1871.

Six members present.

G. W. TRYON, JR., Vice-Director, in the chair.

A number of donations to the museum and library were announced.

The following papers were presented for publication and referred to Committees :

“Supplement to the Revision of the Terebratulidæ and Lingulidæ, with Additions, Corrections and a Revision of the Craniidæ and Discinidæ;” by Wm. H. Dall.

"Notes on Dr. James Lewis' paper on the Shells of the Holston River (published in Am. Jour. Conch., VI, part 3);" by Geo. W. Tryon, Jr.

Meeting June 1st, 1871.

Six members present.

Mr. TRYON, Vice-Director, in the chair.

The following papers were offered for publication in the Journal:

"Descriptions of Sixty new forms of Mollusca from the West Coast of North America and the North Pacific Ocean, with Notes on others already described;" by Wm. H. Dall.

"Notes on the genus *Anisothyris*, with a Description of a new Species;" by Wm. H. Dall.

"Description of a new Species of *Monoceros* from California, with Remarks on the Distribution of the North American Species;" by R. E. C. Stearns.

"Descriptions of new California Shells;" by R. E. C. Stearns.

Extracts were read from a letter received from Mr. Wm. M. Gabb, dated San Domingo, April 15th, 1871, stating that nineteen of the twenty-two specimens of *Littorina* collected by him in Sept., 1870. were still living. Dr. F. A. Hassler stated that specimens in his collection, collected by Mr. Gabb, were alive, and in confirmation, exhibited the individuals, which were quite active, although nine months out of water.

SUPPLEMENT TO THE "REVISION OF THE TEREBRATULIDÆ," WITH ADDITIONS, CORRECTIONS AND A REVISION OF THE CRANIIDÆ AND DISCINIDÆ.

BY W. H. DALL, SMITHSONIAN INSTITUTION.

Since the publication of the paper above referred to, much new material and many new facts have come to hand. To such an extent has this been the case, that I have been impelled to offer a supplement, which, besides containing additions and corrections, should also furnish a ready list of the other species of recent brachiopods not included in the first paper, so that the two taken together might form for the student of these animals a sort of index of reference. While doing this I am well aware that I cannot hope to escape errors, and trust that such as may occur may receive as speedy and thorough refutation as the progress of science demands. Accuracy being the one thing needful in all scientific work, no one should regret any advance toward it, whether it militate for or against his individual views.

I have to express my great obligations to various authors for kindly and valuable criticism and assistance in my work, and to none more than to Thos. Davidson, Esq., F. G. S., whose paleontological studies among the members of this group, stand almost unique among monographs, as do those of Barrande among cephalopods and trilobites. To J. Gwyn Jeffreys, Esq. and Mr. E. Billings I am under obligations; I have also to express my indebtedness to Prof. Agassiz, who, with the kind concurrence of Count Pourtales and Dr. Wm. Stimpson, has afforded me the opportunity of examining and dissecting series of the brachiopods obtained in the well known deep sea dredgings of the U. S. Coast Survey on the course of the Gulf Stream. The report upon them will be published by the Museum of Comparative Zoology.

In the preliminary portion of my first paper on the Brachiopods, I indulged in some brief remarks on the systematic position of the group. These remarks were prompted, it is true, by some recent publications of Prof. E. S. Morse, but were rather in-

tended as a statement of the case, than as a criticism upon the special views put forward by that gentleman. However, he has seen fit to regard them in the latter light, and has complained that they were not in the nature of impartial criticism.* I sincerely regret that such should be his feeling, and can only state in defence, that they were not intended as a criticism, but as a statement of certain important characteristics of the various groups compared, and hence could not include much reference to the many trivial and irrelevant facts which he had brought forward in support of his theories.

I propose, however, at present to meet him on his own ground, and to give at the same time as thorough a statement of the case from my point of view, and as impartial review of all the facts as the case will admit.

As it is impossible to solve an algebraic problem without affixing a definite value to some of its terms, so it is impossible to fairly discuss any theory until the ground upon which the different parties stand, is clearly defined.

Prof. Morse has advanced two theories, but has mainly directed his efforts to the sustentation of the second of them. They are, 1st. The brachiopods present a comprehensive type. 2d. The brachiopods are not mollusks, but a subdivision of the annelids.

It seems to me that these two statements are irreconcilable.

In the first view I am inclined to agree with Prof. Morse to a certain extent. In the second, I am entirely unable to agree with him.

It is evident that much, if not all, the discussion must turn upon the point, what is a mollusk or molluscoid, and what is an annelid, or, in general terms, a worm.

I have repeatedly desired Prof. Morse to define these two types from his standpoint, and he has never responded. Is it, therefore, to be supposed that he has no clear ideas upon these subjects, or that he fears that any definition would so expose the weakness of his theory as to insure its immediate rejection? It would, perhaps, be hardly fair to draw such conclusions.

For my own part, I am quite willing to define my views and position with regard to the question in detail; though I am as conscious that there are others who might state the case far more ably than myself. If any one person, by some miraculous gift, were able to study all the forms which have lived upon the earth since it first became habitable, and that person was also gifted with the mental attributes necessary for the comprehension

* Silliman's Am. Journ., Sci. and Arts, Feb., 1871, p. 136.

of all their structural characters ; few would assert that such study would reveal sharp lines of demarkation between vertebrates and invertebrates, mollusks and annulosa, radiates and protozoans. On the contrary, we know that with the very limited knowledge which we possess of the forms inhabiting the earth at the present period, there are such close approximations between members of the different great groups as to render it a matter of great difficulty to refer them to their proper places in the natural system. This difficulty has seemed so insuperable to some of the most eminent naturalists of the present day, that they have entirely rejected the great groups (representing different fundamental types of structure to Cuvier) and have substituted a larger number of smaller ones ; and even of some of these small groups the boundaries are a matter of discussion.

Under these circumstances, we should naturally expect to find among the older types of animal life, a more generalized structure than in those of later development, and that the living representatives of these old types should be among those which offer the greatest difficulties in referring them to a definite place in our systems.

For my own part I confess I incline to the belief that, after eliminating the *Protozoa*, the revised sub-kingdoms or embranchements of Cuvier have still a meaning and a value, though not such as he ascribed to them. Among the lower invertebrates, however, there are many forms which, from their simplicity, offer few characters ; and in such cases we can only strike the balance and refer them to places indicated by the majority of their characteristic features. This process must always depend, to some extent, upon the individual opinion of the particular student, and while the majority of naturalists may be united upon a given question, there may be others who view the subject differently upon the same evidence. It does not appear to me that the brachiopods can be included in this category of doubtful forms. Indeed, their class and ordinal characters seem to indicate their position with sufficient clearness to admit of no doubt upon the subject.

Before proceeding to discuss this point, however, I shall define, to the best of my ability, the groups under consideration, and then show, as far as may be, the grounds upon which I consider the brachiopods to belong to one, rather than to another group ; after which I propose to take up separately each of Prof. Morse's supposed homologies, and sift it as thoroughly and impartially as possible. In the first place, the *Mollusca*, including both the typical forms and the *Molluscoidea*, appear to present the following characters as typical features of structure :

Type MOLLUSCA, Cuvier (emend.)

Heterogangliata, Owen, 1835. *Saccata*, Morse and Hyatt, 1865.

Animals characterized by the development of organs singly or in single pairs,* with the inarticulated, non-radiated soft parts enveloped in a sac† or mantle of varied form, which secretes the usually external hard parts, if any exist, and which is invariably pierced for the oral aperture, and generally more or less open elsewhere; furnished with a mouth and intestine which is bent more or less upon itself; with a nervous ganglion below the oral opening and usually nervous cords therefrom, forming a ring about the œsophagus; other ganglia, if any, distributed in a scattered manner and never along a pair of symmetrical, sub-abdominal, median cords‡. Animals free, or having an organic connection with extraneous objects.

The respiratory, reproductive and circulatory systems are so variable and offer such wide discrepancies, that no characters are afforded by them for the typical diagnosis.

The same may be said of their embryology. The type, or sub-kingdom, offers two sub-types or divisions, but we have not the data to exactly define the limits of the gap between them. The following diagnoses are generally applicable.

Sub-type MOLLUSCA VERA.

Mollusca having three principal ganglia (or pairs of ganglia); a heart and a circulation within definite vessels; the heart situated on the opposite side of the intestinal canal from the sub-œsophageal ganglion or encircling the intestine, or rarely double or possessing accessory "pulsatile vesicles," (as in the cephalopods) in connection with the branchial arteries; reproducing by ova only; breathing free air or water; usually possessing a "water-vascular" system.

This subdivision presents three well marked classes, the *Cephalopoda*, *Gasteropoda* and *Conchifera*, which are, however, of very unequal value. The last is much more widely separated from either of the others than they are from each other, and, as

* Clark, Mind in Nature, p. 195, 1865.

† Morse, Class. Moll. on the principle of Cephalization, Com. Essex Inst. p. 178, 1865.

‡ Owen, Enc. Brit. Art. Mollusca; Ed. viii, p. 320, vol. xv, 1858. The nerves of the appendix in *Appendicularia* are furnished with successive dilations, but they are not sub-abdominal nor bilaterally symmetrical, being on each side irregularly distributed without reference to those on the opposite side.

has been pointed out by Morse and others, may be regarded as the typical group of the sub-kingdom. The pteropods present no features of class value, much less the heteropods.

The fact that the pulmonates have been separated as a distinct class by Huxley* excites surprise, as the characters given are insufficient for such a distinction, and very gradual transitions toward the other gasteropods may be pointed out. The flexure of the intestine varies greatly, and is by no means a constant character.

A transition between the lamellibranchs and tunicates is indicated through the genus *Rhodosoma* (*Schizascus*, Stimpson) and Prof. Morse observes † “the relations between the tunicates and lamellibranchs are too obvious to indicate.” It has been proposed by Girard to combine the Planarian worms with the mollusks on embryological and anatomical grounds; and by Mœrch that the trematodes, cestodes and other low forms of worms should also be transferred to this sub-kingdom, but their obvious affinities, in spite of their simplicity of structure, have deterred other naturalists from following these examples.

In some points of their structure, the brachiopods are allied to the Conchifera, and by others to the cephalopods and some aberrant groups of gasteropods. So intercrossed are the threads of affinity, that a kind of reticulation is the result, and it is far more easy to point out these features than to assert for some a preponderance over all others.

The heart (though far more simple) of the brachiopods with its accessory “hearts,” or “pulsatile vesicles” and their relations to the blood vessels which supply the branchial apparatus, is closely paralleled both in appearance and in function, in the so-called “branchial hearts” of the cephalopods.‡ In the conchifers also a notable dilatation of the blood vessels§ on their entry into the branchiæ may be observed, though not differentiated as strongly as in the others.|| The heart lies free upon the intestine in *Anomia*¶, much as it does in *Terebratula*, and the greatly enlarged oral “tentacles,” the absence of other branchiæ, or of a large, well differentiated “foot,” as well as the complex muscular system and the peduncular attachment, all recall a somewhat similar state of things which exists in the brachiopods. In some

* Introduction to the Classification of Animals, p. 39, 1869:

† Class. Moll. on the Basis of Cephalization, Com. Essex Inst. p. 176, 1865.

‡ See Bronn, Kl. and Ordn. Thierr. 2d Abth. Taf. cxvii.

§ The circulating vessels are most simple in the aberrant *Soleniconchæ*.

|| Garner, Tr. Zool. Soc. Lond., ii, p. 90, 1841.

¶ Ibid. l. c. p. 91.

cases among the lamellibranchs we find two distinct hearts.* The young conchifer is attached in the beginning by a byssiform peduncle, is without lamelliform gills, and respire by the vascular and ciliated surface of the mantle lobes, and has two distinct hearts.† They are sometimes furnished with setæ or bristles (*speischen*) upon the mantle lobes in their larval condition, as in *Anodon*.

The gap between the conchifers and gasteropods presents no well marked interruptions, though the *Dentaliidae* and some pteropods, perhaps come nearer than any others toward bridging it.

The genitalia, respiratory apparatus, embryology and the curves of the alimentary canal present such differences and modifications that it is impossible to generalize briefly upon them in this sub-division.

The blood is sometimes colored, but more generally translucent.

The oral aperture and efferent orifice (when the latter exists, as it usually does) are, in the majority of cases, contiguous.

Striated muscular fiber has not yet been detected in the cephalopods, but is known to exist in members of the other two classes.‡

Many conchifers are attached by a more or less permanent byssus, and some gasteropods, as well as conchifers, are attached by the calcareous matter of their external shells, to which they are organically fixed by muscles.

One group among the gasteropods merits special attention, on account of the many points in which it offers some analogy with articulate animals. I refer to the *Polyplacophora* or chitons. This remarkable order, in its dorsal vessels and (in some cases) fasciculated setæ, resembles the annelids; in its differentiated carapax-like head (in the young condition) and successive hard plates recalls the crustacea; while its symmetrical genitalia and lateral branchiæ bear a distant relation to those of the conchifers. It is to be observed, however, that the apparent segmentation is confined to the valves and fasciculated setæ, and that the internal organs present no similar series of repetitions. The head and foot, odontophore, nervous system and alimentary canal are typically molluscan, and of the balance of characters there can be no doubt. The eyes, present in the young, are lost in the adult condition; the pores of the girdle, though perhaps not homologous, present some analogies with the perforations of the

* Huxley, Intr. Class. p. 34, 1869.

† Owen, Lect. Comp. Anat. Inv. p. 528.

Dall On striated muscular fiber in the Gasteropoda, Silliman's Am. Journ. Sci. and Arts, Feb. 1871, p. 123.

Terebratulidæ and in some forms, as among the brachiopods, are wanting.

It is noticeable that if a diagram be made of a chiton with ambient branchiæ, in the position which it assumes when removed from its station on a rock, that the position of the oviducts, branchiæ and heart resembles that of the same structures in the *molluscoidea*, but with the position of the heart reversed in relation to the ganglion, indicating the position of the group to be among the typical mollusks. I observe a character, which, in one sense, may be termed degradational; that is, that there appears to be a sort of fading out of the characters of the anterior part of the body, so that the oviducts, heart, and in many cases the branchiæ, are more or less concentrated toward the posterior end of the body. It has been stated that the branchiæ proceed from the tail toward the head, but this appears to me to be incorrect. In all the chitons I have examined, the branchiæ point toward the tail, even when wanting in the cephalic region, and there is always a space entirely without branchiæ at the posterior extremity. In the chitons with ambient gills, no such space occurs in front, the arteries and nerves are most emphasized anteriorly, so that I am forced to the conclusion that the branchial cordon really springs from the cephalic region as in the limpets, though very different in character from theirs.

The annulated mantle filaments of *Lima* recall the similarly annulated setæ of some brachiopods, though no homology is intended to be indicated by this observation. (See Forbes and Hanley, Brit. Moll. i, pl. R.)

Sub-type MOLLUSCOIDEA.

Mollusca having one principal subœsophageal ganglion or pair of ganglia; provided with an *atrial* system; hæmal vessels more or less imperfect; heart provided with accessory "pulsatile vesicles," imperfect, or entirely absent; when present, situated on the same side of the intestinal canal as the ganglion, though through the flexure of the intestine, it is often on the opposite side of the body, and thus apparently, but not really, on the opposite side of the intestine;* respiratory apparatus about, and to a greater or less extent surrounding, the mouth or oral aperture; reproduction by gemmation or ova; breathing water only.

While the classes included in the above diagnosis possess the

* Those cases which form exceptions to this general rule also exhibit abnormal relations, in position, of the other parts, and are to the normal forms as the sinistral varieties of *Buccinum* are to the typical dextral form of the particular species.

aforesaid points in common, many other characters peculiar to the individual classes are very diverse. In no point is this more marked than in their embryology. The whole sub-type has been removed from the mollusca by Mørch, while Prof. Morse, leaving the ascidians (the most aberrant of all, and presenting more than any other mollusoid group features which suggest affinities with the *Annulosa*) with the mollusks, removes the Brachiopods and Polyzoa and degrades to the rank of a subdivision of the Annelids, two groups almost universally recognized as having the value of classes. At the same time Dr. Mørch would annex the *Plathelminthæ*, Trematodes, Cestodes and *Turbellariæ*, to the *Mollusca*. Hæckel, Gegenbaur and others, while leaving the brachiopods with the mollusks, would carry to the *Annulosa* the *Polyzoa* and *Tunicata*. While disagreeing with all these various efforts at dismembering the molluscan type, I cannot but admit that, in the case of the Ascidians, at least, they are not without some basis, though, as I suppose, an insufficient one, but the classification which would leave these last with mollusks, while depriving them of their companions the Polyzoa and Brachiopods, would seem the most unphilosophical of all.

Among the characters of this group which, from their inconstancy have little value, or are of value only in subordinate groups, I may mention the fact that the circulating fluid (whether due to the presence of hæmoglobin or to other causes) differs in color, being in the majority translucent, but varying from bluish to red or even brownish in some forms, while others, closely allied, have no such features.

The majority of the Tunicates and Brachiopods, and all, or nearly all, of the Polyzoa are fixed by an extension of the tegumentary covering, which is usually of a horny texture, or by the calcareous shell which is secreted by the mantle; but this character is not constant, even within the same genus, and a great many brachiopods and tunicaries are entirely free.

Transversely striated muscular fiber is found in many but scattered instances, and, as a systematic character, cannot be considered as of value.

The modifications of the breathing organs are numerous, but the apparatus as a whole preserves the same general relation to the mouth—as regards its position.

The vascular system is not thoroughly understood but exhibits great diversities.

The ovary is usually on the same side of the intestine as, and near to, the heart, but this is not universal. In many forms the ova undergo a sort of incubation before being expelled into the surrounding medium. The Polyzoa and some Ascidians are gemmiparous or propagate by buds as well as by eggs.

The most extraordinary manner in which some Ascidians are developed, as worked out by Kovalevsky and others, would, in a strictly embryological classification, place them in the vertebrata. On the other hand, other nearly allied species are without the singular features referred to, in their embryonic condition. This may be referred to the suppression of certain stages by some naturalists; yet, the very admission that suppression of characters in the embryonic progress is possible, undermines the whole value of embryology as an assistant in systematic classification; for who shall say when or to what extent suppression may not have occurred and what essential features of embryonic life may not have been lost thus in any given case?

It has been stated that the flexure of the intestine in *Appendicularia* is radically different from that of the other tunicaries, but this does not appear by the later researches of Moss.* On the other hand, Mr. Alder describes certain species of *Ascidiae* (*A. parallelogramma*, and *Phallusia turcica*) as having the intestine flexed in a different direction from that which usually obtains. These facts are further proofs of the little dependence to be placed upon this character as a basis for classification.

For our present purpose it is unnecessary to define the *Tunicata* and *Polyzoa*, and for the sake of brevity I shall confine myself to giving a definition of the class *Brachiopoda*. Attention should be directed, however, to the homologies between the *Polyzoa* and *Conchifera*, as suggested by *Rhabdopleura* and worked out by that well-known student of the *Polyzoa*, Mr. Allman.† The homologies between tunicates and conchifers, drawn by Allman and Hancock, masters of the subject, are well known.

Class *BRACHIOPODA*.

Animals provided with a shelly covering composed of two valves, each of which is normally bilaterally symmetrical, and to which it is organically attached by three principal pairs of muscles. Soft parts also bilaterally symmetrical; consisting essentially of a mantle composed of two lobes, to which the valves correspond, of which lobes the outer edges are disunited throughout the greater part, or the whole of their extent; a disk of membrane, variously modified in form, with its edges fringed with a series of tubular brachia; the mouth situated within this disk at its posterior portion; a stomach with a more or less anteriorly recurved intestine; a circulatory system, more or less

* Trans. Lin. Soc. Vol. xxvii, Part ii, p. 299, pl. xlvii, 1870.

† Journal of Microscopical Science, N. S. ix, p. 63, 1869.

confined within closed vessels, furnished with a heart and sometimes one or two pair of accessory "pulsatile vesicles," and a series of sinuses between the laminæ composing the lobes of the mantle; diœcious (?) with the genitalia usually suspended in the sinuses of the mantle lobes; the genital products expelled through one or two pairs of oviducts opening externally; principal nervous ganglia below the œsophagus encircling it with nerve filaments; respiration performed by direct contact of the sea water with the vascular tissues of the brachia and mantle-lobes; reproducing by ova only.

The above diagnosis includes *all* the characters *common to the class* (which are not included in the definition of the type and the subdivision to which this group belongs, according to my views and those of much more eminent and competent naturalists) which, after much study and reflection, I have been able to discover.

I shall, further, assume that no characters not constituting a large share, or possessing a preponderating value, in the definition of the class, or not contained in such an impartial definition, shall be taken as proofs of the position of the class in a natural system of classification. In this assumption I think I am sustained by logic, common sense and the usual practice of naturalists.

It will be noted that I have excluded from this definition any allusion to peduncular or other attachment. I have not done this without due consideration, but the fact that this character is not even of family value, will amply justify the omission. The *Rhynchonellidæ*, *Thecidiidæ*, *Spiriferidæ*, *Strophomenidæ*, *Productidæ*, *Craniidæ*, and even the *Lingulidæ*, offer examples of pedunculated and non-pedunculated, free and attached forms, when the fossil forms are considered, and these comprise all but two of the families of *Brachiopoda* admitted by Mr. Davidson in his well-known works.

The oviducts differ within the same family from a simple perforation of the perivisceral tissues surrounded by distant papilla-like elevations of the membranes, to a complex organ such as exists in *Waldheimia* and *Lingula*.

Some genera are undoubtably diœcious, and all may prove so, but this is not yet fully determined.

Setæ on the mantle edge are not constant characters in the same family, or even in the same individual at different ages.

The embryology is yet imperfectly known. A larva, supposed to be that of a brachiopod, was figured by Fritz Müller, but it has never been confirmed, and still remains in doubt. The researches of Prof. Morse (which agree with my own upon other

species) do not indicate a strict metamorphosis, such as would be inferred from Müller's figure, and apparently exists in *Thecidium*, as shown by the researches of Lacaze Duthiers. It is probable that the embryonic stages differ widely in different forms of Brachiopods, as they do in the Ascidians and other groups; and no reliance can be placed upon them in classification, as far as can be judged at present.

The position of the valves with relation to the animal has been a subject of discussion. It would appear from the paper of Lacaze Duthiers* that they are anterior and posterior, being articulated across the back, and consequently both dorsal. I have elsewhere called them hæmal and neural respectively, as more expressive and correct terms than dorsal and ventral. This opinion had been previously expressed by Huxley, Hancock,† Jeffreys and others. This relation, however, may not be constant throughout the group, as, for instance, in *Lingula*.

The embryos of *Thecidium* are divided into segments like those of some Pteropods, *Dentalium* and *Chiton*. Nothing of the kind, however, is indicated in Morse's notes on the embryonic stages of *Terebratulina caput-serpentis*.‡

Prof. Morse at one time put forth the theory§ that the pedunculated or middle dorsal end of the Brachiopods was the anterior end, but this being opposed to all known anatomical and embryological facts he has since withdrawn it.

One character common to all the Brachiopods which I have examined, and perhaps universal, consists in having a projection of the posterior oral labium fitting into a depression in the anterior labium, and much resembling the "epistome" in *Polyzoa*. This is a character of apparently little structural importance, however, and further observations are necessary to establish its constancy throughout the class.

The relations of this class with the *Polyzoa* are unquestionable, and may be compared to the relation existing between the Cephalopods and Gasteropods in the typical Mollusca, while the *Tunicata*, on the one hand, and the *Lamellibranchiata*, on the other, stand somewhat aloof,|| and are perhaps closer to each other than any other two classes of the respective subtypes.

* Annales Sci. Nat. 4th ser. Zool. xv, p. 332, 1861.

† Trans. Roy. Soc. 1858, p. 851.

‡ Am. Naturalist, Sept. 1869, p. 385.

§ Comm. Essex Inst. iv, p. 173, 1865.

|| Lacaze Duthiers (Comptes Rendus, Nov. 6, 1865, p. 800) remarks: "Do we not find an Ascidian (*Chevreulius* = *Rhodosoma* or *Schizascus*) presenting symmetrical muscles analogous to those of the *Terebratulæ*, and this merely because its tunic has become bivalve, and without our

In this connection it may not be unfair to quote Prof. Morse himself: "We find (in *Lingula*) the intestine also running parallel with the sides of the body, at its posterior portion becoming convoluted and terminating on the right side, the straight part producing a curve arching toward the hæmal valve and surmounted by a heart as we witness in most Lamellibranchiata, showing clearly in this view alone its homological identity with the Lamellibranchiata. The limits of this paper will not allow us to carry homologies from this point to the other two classes of Mollusca, and in fact it would be hardly necessary to do so, as the path is rendered apparent and plain through the medium of Lamellibranchiataes." While no one will deny to naturalists the right to modify their opinions on the development of new facts in science, it seems strange that, after pointing out the obvious homologies of two groups so forcibly as in the paragraph I have just quoted (Proc. Boston Soc. Nat. Hist. ix, p. 60, 1862), the gentleman in question should turn his back on his expressed opinions, while the facts still remain undeniable and undisputed.

I shall not hope to succeed in or even to essay the definition of the type which essentially corresponds to the *Articulata* of Cuvier, which has defied the best efforts of the most eminent naturalists. It might almost be said that they are characterized by diversity in the development of special features of structure, with a marked tendency to the repetition of similar organs or groups of organs antero-posteriorly, in bilateral symmetry. This diversity exhibits itself no less in the distinct classes than in the entire group of animals. The different subdivisions are united by features which are more or less characteristic of small groups, which at the same time present vestiges of other characters, which are typical of other small groups, and so the frequently interrupted threads of affinity, though binding the mass more or less completely together, nevertheless exhibit a notable want of continuity.

I trust I shall not be accused of undue attachment to broken idols when I remark that the group *Annuloida* of Huxley appears to me to be heterogeneous and unsatisfactory. With the exception of the Echinoderms, it might advantageously be combined with the *Annulosa* without violence to their affinities.

We now come to the Annelids, the group to which Prof. Morse

being able to remove it from the group (*Tunicata*) to which it belongs?" And also, "If we suppress in the lamellibranchiate Acephalan the foot and the pedal ganglia, there remains an organism having the greatest analogy with that of the Brachiopod, always excepting the position of the valves."

would transport the Brachiopods and Polyzoa. We do not suppose that under this head he includes the Scolecid worms, although he has borrowed a few characters from them to complete his catalogue of supposed affinities. He has distinctly specified this as the group of which the Brachiopods are a mere subdivision, and hence cannot call upon us to prove that they are not also a subdivision of the *Scolecida*,* if that were possible.

Class *ANNELIDA*.

= *Polychæta*, *Oligochæta* and *Gephyrea*.

Animals of *elongated form*, characterized by a *successive repetition of pairs of similar organs or single organs representing pairs, enclosed in a muscular tunic, apart from the true skin*, which is or is not differentiated into segments (corresponding to the successive groups of organs) by successive constrictions and internal dissepiments.

Nervous system consisting of two median cords (separated or combined throughout the greater part of their extent) *connecting a series of subabdominal ganglia*, from which nervous filaments are given out, each ganglion corresponding to a segment, if segmentation or repetition be exhibited; *these cords are united above the œsophagus, near or in front of the oral aperture*; connected or non-connected by a subœsophageal nerve.

Circulation without vessels of any kind, or without a differentiated heart, when contained within closed vessels, in which case there is usually a dorsal vessel. Blood colored or uncolored.

Branchiæ external, internal or wanting; attached either at the anterior or the posterior extremity.

Genitalia usually repeated in every segment after the first few anterior segments. Monœcious or diœcious; with or without copulatory organs.

Reproducing by ova or fission; frequently exhibiting two or more sexual forms.

Absolutely free from any organic connection with extraneous objects, but often forming tubes of sand, mud or calcareous matter, or occupying the vacant receptacles of other animals.

With or without fasciculated chitinous setæ of varied form; with or without a "segmental organ;" with or without eyes, with or without "porenkanale."

* It is hardly to be supposed that Professor Morse is opposed to the course of all modern students of the group, and would, in opposition to their views, unite the Scolecids with the Annelids in one heterogeneous class.

Alimentary canal without a differentiated stomach; usually straight with a posterior anus and anterior mouth, but these latter characters do not apply to some of the *Gephyrea*, which have a mouth which is not anterior, an anus either anterior or posterior, or no anus at all; with a convoluted intestine.

Terrestrial, fluviatile or marine in habitat.

The above very qualified diagnosis well illustrates the prevailing diversity of the forms of this type, and may itself require further qualification. The only portions of it which appear to be essentially universal are those in italics.

The subclass *Gephyrea* contains many aberrant forms, once associated with the Trepangs. The greatest variations occur in this group. Jourdain* found in four species of *Sipunculi* three without an anus and the other with a posterior anus. Keferstein and Ehlers† describe *Sipunculus nudus* and *tesselatus* as having a posterior anus. The *Aspidosiphonidae* are characterized by a dorsal anus, the *Loxosiphonidae* by a terminal anus,‡ and in the other groups this character varies greatly. Most of these forms have colorless blood, as do all the *Aphroditacea* (and many others) among the typical Annelids §

The "segmental organ" described by Dr. Williams,|| its discoverer, as prevailing "throughout the *Actiniidae* (*Acalephae*) *Echinodermata*, *Rotifera* and *Annelida*," is stated by Claparède¶ to be wanting in some Annelids, or reduced to simple apertures in the wall of the body, or wanting an internal orifice, as in some *Capitellea*; it also exists in the anterior segments of many Annelids in which the genital products do not penetrate to that region. Its wall is often glandular and it can hardly be doubted that it also plays an excrementitious part. In the *Oligochaeta* only a small number of these organs are modified for the purpose of conducting outward the sexual elements, while the rest incontestably fulfil other functions. The same is true of the *Polychaeta*. The "*porenkanale*" occur only in the species with a thick cuticle, and not even in all these. They are tubular pores corresponding with subadjacent cells. (Claparède, *loc. cit.*)

Pores for the discharge of certain secretions appear to exist in all species of Annelids. (Ib.)

* Comptes Rendus, April, 1867, p. 871-3.

† Bull. Sci. 1861, p. 387.

‡ Baird, P. Z. S., 1868, pp. 76-114.

§ Owen, Comp. Anat. Inv. p. 246.

|| Proc. Royal Soc. viii, p. 371-6, 1857. An. Nat. Hist., Second Ser., xix, p. 393-7, 1857.

¶ Annals Nat. Hist. 3d Series, xx, p. 355-6, 1867, and Biblioth. Univ. Arch. Sci. p. 1-44, Sept., 1867, and also in Introduction to his work on the Annelids of the Bay of Naples, 1868.

The branchiæ are anterior and external in *Serpula*, posterior and internal in *Bonellia* and many *Gephyrea*, and rarely form a continuous disk encircling the mouth, as is universal in *Brachiopoda*.

Most, if not all, of the true Annelids are provided with a "trompe," a curious organ contained within the œsophageal cavity, exsertile, and usually furnished with denticles; and many of the Annelids have strong horny jaws or lateral mandibles, somewhat as in insects; none of these structures are found in the entire group of *Molluscoidea*, including the *Brachiopoda*.

In fact, if the typical characters of the Annelids as a group are compared with those of the Brachiopods, it will be seen that all the important features of each are incompatible or diametrically opposed to those of the other group, respectively.*

That the Brachiopods form a "comprehensive type," in the wide sense in which Prof. Morse seems to imply, I cannot admit, as they are a well-defined group whose characters as here shown (I trust and believe impartially), are distinctly allied to those of the other groups included in the *Molluscoidea* and, through their combined characters, to the typical *Mollusca*. That they are a peculiar group, exhibiting a few characters not shared by their associates, and indicating a distant affinity with animals not included in the type or sub-kingdom, I am willing to allow. That these faint evidences are sufficient to authorize their deportation and degradation to a subordinate place among the Annelids, I consider unreasonable.

In the light of the facts previously set forth I will now proceed to sift the homologies and asserted affinities claimed by Prof. Morse in his original paper † and his subsequent publications. I should have preferred to await the publication of his complete memoir, but it may safely be assumed that had he possessed any more cogent arguments he would not have failed to bring them forward, and the facts upon which my own arguments are based are mostly of long standing and unquestioned by any one, so that they can hardly be affected in any way by Prof. Morse's coming work.

Prof. Morse's remarks are in italics, for brevity and to save tautology.

* Quatrefages defines the Annelids as "essentially diœcious animals, composed of segments which repeat themselves and bear on each side a perfectly characteristic organ—a foot armed with exsertile and retractile setæ." But the learned *savant* does not include the *Oligochæta* and *Gephyrea*, as do most modern naturalists. Cf. An. Mag. Nat. Hist. xvii, p. 5, 1866.

† Am. Journ. Sci. Arts, Vol. 50, July, 1870.

1. *Relations between the cœcal prolongations of the mantle in Terebratula and a similar character in the test of Crustacea. Resemblance between the polygonal cells in the shell of a young Discina and a similar feature in certain lower crustaceans. The scale-like structure of the test of Idotea like the scale-like structure of Lingula.*

These characters are too vague to meet, and are histological and not systematic in any case. Were they sustained as correct they would in no way affect the question. What, it may be asked, is the "scale-like structure of *Lingula*?" Dr. Carpenter records nothing of the kind in his admirable researches into the structure of the shells of the *Brachiopoda*.

2. *The skin of Nereis has similar punctures or dots, as seen in Terebratula and the peduncle of Lingula.*

The "porenkanale" are cœcal tubes, opening outwardly, closed at their inner end, and lined with an invagination of the external cuticle. (See Claparède *anté*, and also in *Recherches sur des Annelides*, Geneva, 1869, p. 14.) The punctures of the shell in *Terebratula* are precisely the reverse, being lined by outward prolongations of the mantle from the inside, and cœcal at their outer extremity. I have failed, with the most careful search and high powers, to discover any punctures on the peduncle of *Lingula Murphiana* and *L. hians*. It should be remembered that when Prof. Morse speaks of *Lingula*, in most cases he refers to a species of *Glottidia* (*G. pyramidata*, Stm.)

3. *The shell of Discina chitinous and that of Lingula, phosphatic rather than cretaceous.*

The fact of such differences existing between two nearly allied genera is sufficient proof that they are of little systematic value, even if chemistry were allowed to have any bearing on systematic classification, which is more than doubtful.

4. *Valves of all Brachiopods, dorsal and ventral, a strong articulate character.*

The first statement is almost certainly an error (cf. *anté*), and many, if not most, Articulates are without ventral plates. (Cf. Marey, *Lect. on Flight in the Animal Kingdom*, with regard to Insects, and any work on the Cypridian crustacea.)

5. *Horny setæ entirely absent in the Mollusca, and peculiar to the worms.*

The first statement was refuted in my first paper on the Bra-

chiopods, and the second is erroneous. All of the *Scolecida* and some Annelids are without setæ, which are not characters of class value, and are absent in many Brachiopods, as before shown. Nevertheless the presence of setæ may be allowed to be indicative of faint articulate affinities, as in the case of *Chiton*.

6. *Setæ of Brachiopods moved freely by the animal, and identical in structure with those of the worms.*

The first statement needs confirmation, and at any rate can refer to very few Brachiopods, and I have already proved that they are far from being identical with those of the Annelids. Neither do they bear the same position with regard to the other parts as in the worms.

7. *Resemblance between the lophophore of Brachiopods and a similar structure in the tubicolous worms.*

This resemblance is very distant, and the structure is totally dissimilar. The homology between the anterior segments of *Sabella* and the mantle of Brachiopods, which follows, is superficial and erroneous to an extraordinary degree, as any one who will take the trouble to look at the two structures may readily perceive. The organization of the two animals is so utterly different that any such homology is impossible.

8. *Thin and muscular visceral walls suggest similar parts in the worms.*

This is obscure, and it is impossible to say whether it refers to the walls of the viscera or of the visceral cavity. Those of the viscera in Brachiopods are anything but thin, and it is difficult to see the bearing of the observation in any case, as the character of the visceral walls is of no systematic importance.

9. *Lamellæ on the internal surface of the mantle in Balanus and Lingula.*

The discovery of branchial lamellæ on the mantle of *Glottidia*, discovered by Prof. Morse, is exceedingly interesting and a valuable contribution to our knowledge of the group. It remains, however, to be seen whether it also occurs in *Lingula* proper. As to its homologies, they may as well be sought in the *Patellidæ* and *Siphonariidæ* as among the Cirrhipedes. With regard to the position of the ovaries in the latter and in the Brachiopods, the homology needs confirmation, and the fact is of very doubtful importance in classification, especially when we remember the varied position of the ovary in the true mollusks.

10. *Relation between the statoblasts of Polyzoa, the ephippia of Daphne, and the winter eggs of Rotifers.*

It is difficult to see the special value of the external appearances of eggs which produce very different animals. Our business is rather with the contents than with the shells. Eggs are very much alike all the world over, whether they be those of mollusks, salamanders, or fish, birds, or turtles. Moreover, the eggs of many of the Brachiopods, as I have had numerous opportunities of noting, are quite spherical, and differ as much from those of *Polyzoa* and some other Brachiopods as they do from those of very different animals.

11. *The "segmental organs," or oviducts of Brachiopods, and their close affinity to the oviducts of worms.*

The segmental organs of worms undoubtedly bear, in some cases, a resemblance in appearance and in function to the oviducts of the Brachiopods. The preceding remarks in regard to these organs in the Annelids may be referred to in this connection. There is also a somewhat similar resemblance to be traced between them and the fallopian tubes of vertebrates. Whether there be any homology between them in either case is another and an undecided question. In structure, however, the Annelidan organ is very different from that of the Brachiopods. (Cf. Claparède, *Annel. Chætop.* Golfe Naples, and Williams, *Proc. Roy. Soc.* l. c.) Moreover, they are not peculiar to these two groups, if we may believe Dr. Williams, but may also be found, or their homologues, in the Acalephs and in *Synapta*. In the Brachiopods, the term "segmental" would be a misnomer, for, shall we believe that *Rhynchonella* is composed of twice as many "segments" as *Terebratulina*, with, in many respects, an almost identical organization? On the other hand, a vast number of worms are entirely without these organs (Cf. Diesing, *Bdellideen*, Vienna, 1858, and Van Beneden, *Recherches sur la Faune lit. de Belgique*, Bruxelles, 1860), which cannot be said to be characteristic of even the whole class of *Annelida*, to say nothing of the other worms. If the Brachiopods are to be Annelidized on this single character, what shall be done with those Annelids which do not possess it?

The segmented embryo of *Thecidium* and *Dentalium* has been already referred to, as well as the fact that Prof. Morse's studies on the embryology of *Terebratulina* did not discover any segmentation in that quarter. The character cannot be considered as of value in any but the most limited sense.

12. *Bristles or setæ in larval worms and Brachiopods.*

I have already stated that the very young of *Terebratula* are without any setæ, as well as the adults of many genera of Brachiopods, and hence no systematic value in relation to the position of the class can be assigned to such features.

13. *Close resemblance in nearly every point of their structure (of Crepina and Phoronis) to the hippocreptian Polyzoa.*

I have already shown that this so-called "close resemblance" is confined to the fact that both have a crown of tentacles, and is otherwise entirely fallacious and non-existent.

14. *Sand tube of Lingula (=Glottidia) differing in no respect from the sand tubes of neighboring Annelids.*

An examination of this "sand tube" shows that it differs from those of Annelids in being merely sand adhering to a flocculent mass of mucus surrounding the peduncle, without firmness, persistency or any particular shape; and is, of course, formed in a totally different manner from the tubes of any Annelid. The colored blood noticed in this species is exceptional, but is a character of very slight importance from a systematic point of view. (Cf. *anté*.)

A few other statements made by Prof. Morse before the Boston Society of Natural History, Nov. 16, 1870, require notice. After reiterating the statements which I have just reviewed he calls attention to—

15. *Serial arrangements of setæ and gill-laminæ in Brachiopods as in Annelids.*

No serial arrangements of these organs (other than such as is seen in the branchiæ of *Patella* and various other mollusks) is to be observed in any of the many Brachiopods which I have dissected, nor does any such serial arrangement as occurs in the fasciculated setæ of Annelids obtain in any Brachiopod. This is a notorious and easily observed fact.

16. *Striated muscles absent in the Mollusca.*

This error is refuted in the same number of *Silliman's Journal** which contains Prof. Morse's communication.

Transversely striated muscular fiber occurs in all the classes included under the type Mollusca, except the Cephalopods, where it will probably be found when carefully searched for. On the

* Feb., 1871, p. 123.

other hand, only one (Oligochætos) Annelid has been reported (by Ratzel) as having such fiber. The character, however, has no systematic value but is purely histological.

17. *Mr. Dall's startling homology of the peduncle of Lingula and the syphonal tube of a clam.*

I have never drawn any such homology; but have showed that the arrangement of the tissues in each is similar and should not be made the basis of any homology which does not include both.

18. *Mr. Dall's statement that because the setæ are not found the entire length of the peduncle, therefore, they are not identical with those of worms.*

I have never made any such statement or entertained any such idea. What I did state will be found in my first paper, and simply shows that being dissimilar, *per se*, they are, therefore, not identical.

19. *The bilobed lophophore and cephalic collar.*

The "lophophore" of Brachiopods is by no means universally bilobed, but is trilobed in most of the *Terebratulæ*, and four lobed in *Megathyris* and *Thecidium*. If Prof. Morse had studied the articulated brachiopods as thoroughly as he has the inarticulated forms, he would not have made this observation. His reference to the "cephalic collar," whatever that may be, is in itself and its bearing on the question, alike inscrutable.

Prof. Morse complains that I have overlooked the unisegmental "Vermes," and the more highly cephalized Annelids, and states that the former form a large proportion of the class. (Which class he refers to is doubtful, certainly it cannot be the Annelids.) But I am unable to see any characters in the forms he refers to which have not already been discussed, or are not of too little significance to have any bearing on the present discussion.

20. *The worms are invariably attached to a bivalve or multivalve shell, whether it be the scuta of Sternaspis, the oval plates of Lepidonotus, or the hardened integuments of others.*

It does not seem possible that any modern naturalist should seriously homologize the integument of a worm with the shell of a brachiopod. Such a homology is its own best refutation. As for the rest, where is the "hardened integument" of *Planaria*, or the *Trematoda* or the *Hirudinæ*? Where are the muscles by which they are attached to their "bivalve or multivalve shells?"

and how are these muscles attached? Homologies and muscles alike fail in such an emergency!

Prof. Morse likewise remarks that "*Sipunculus* and its allies claim it as a right to have an anterior termination to their intestine." I do not dispute their right, but it is very evident, from my preceding remarks on this subject, that they are very far from attempting to exercise it, on many occasions.

The other points brought up by Prof. Morse have been met incidentally or directly in the preceding observations.

The reader who has taken the trouble to follow out this train of reasoning will observe that there is not a single character of class or ordinal importance among those which Prof. Morse has brought forward. Most of them are histological and doubtful, and the sum of the whole may be comprised in the setæ and the oviducts. These have swollen to undue importance in his eyes, as has been already shown—and *per se* are not of much systematic value.

The following tabular comparison will illustrate the differences in the characters of real value in the several forms:

SYNOPTICAL COMPARISON.

<i>Mollusca vera.</i>	<i>Brachiopoda.</i>	<i>Annelida.</i>
Subœsophageal ganglion present, others scattered, not in a subabdominal chain.	Subœsophageal ganglion present, others scattered, not in a subabdominal chain.	Ganglia suprœsophageal and in a subabdominal chain.
Possessing a heart with or without pulsatile vesicles.	Heart and pulsatile vesicles present.	Without a heart and sometimes without vesicles.
Intestine always bent.	Intestine bent.	Intestine usually straight, sometimes bent.
Fixed organically or free.	Fixed organically or free.	Always free or not organically fixed.
Setæ rarely present.	Setæ sometimes present.	Setæ present usually.
With or without organically attached calcareous shells.	With organically attached calcareous shells.	Without organically attached calcareous shells.
Mon- or diœcious.	Mon- or diœcious.	Mon- or diœcious.
With oviducts.	With oviducts.	With or without oviducts.
Always reproducing by eggs.	Always reproducing by eggs.	Reproducing by eggs or fission.
No sexual metamorphosis.	No sexual metamorphosis.	Often with two sexual forms.
Aquatic or terrestrial.	Aquatic.	Aquatic or terrestrial.

The annexed homological diagrams will illustrate the principles under discussion.

We may now turn our attention to the additions and corrections which it is desirable should be made to my previous paper.

The page numbers refer to those of the original paper, *Am. Journ. Conch.* vi, Part 2, pp. 88—168, 1870.

Pages 98, 107, 138. By an unfortunate wording the diagnoses of *Waldheimia* and *Kraussina* are made to read as if the mouth was situated outside of and behind the brachial disk, whereas the meaning intended to be conveyed was that the brachial cirri were not continued behind the mouth. This observation having been made on dry specimens, which did not convey the characters fully, should be eliminated; as elsewhere stated, the mouth in the Brachiopods is invariably situated within the brachial disk behind the great mass of the brachia, but before their posterior junction. In some species the cirri appear not to be continued behind the mouth, while in others they reach their greatest development in this position.

Page 98. *Eichwaldia subtrigonalis*, Bill., is from the Trenton limestone. Some information in regard to the interior of what Prof. Hall regards as an allied species, is to be found on pp. 274—8 of the XXth report of the Regents of the University of New York, Albany, July, 1868.

The type of *Leptocælia*, Hall, is the *L. concava*, This was afterwards erected by Prof. Hall into a new genus, *Cælospira*, leaving those species of which the interiors were still unknown, under the first name. This, however, is clearly inadmissible; the first name must be retained and *Cælospira* falls as a synonym of it.

Pages 100, 154, 163—4—5. *Spondylobolus* has been misprinted *Spondylobus* throughout, and this was not noticed in the proofs. A similar misprint occurs in Davidson's Introduction to the Classification of the Brachiopoda.

The following is the synonymy of the order which includes the articulated *Brachiopoda*:

Order *ARTHROPOMATA*, Owen.

Arthropomata, Owen, Enc. Brit. Ed. viii, xv, article *Mollusca*, p. 336, 1858.

= *Apygia*, Bronn, Klass. Ordn. Thierr. iii, 1st Abth. p. 301, 1862.

= *Articulata*, Huxley, Lect. Class. 1864. Intr. Class. An. p. 116, 1869.

Intestine ending in a closed sac. Lobes of the mantle united behind. Valves articulated by teeth and sockets.

TEREBRATULIDÆ.

Terebratula cubensis, Pourtales, p. 105. (Bull. Mus. Comp. Zool. iii, pl. 1, fig. 2, 8—16, May, 1871.)

This species is unquestionably quite distinct from *T. vitrea*, to which it has been referred by some eminent European naturalists.

Among other points developed in numerous dissections of this species, were the apparent absence of the anterior prolongations of the "great pallial sinuses" in the anterior parts of the mantle lobes. The genitalia are very posterior and form a reticulated net work on each side of the muscular attachments, but do not pass before them.

In front of the ocluser muscles the tissues of the parieties appear to be thickened, or cellular tissue is interposed between the laminae, forming a singular projecting mass which I have called the *nasiform body*, from its resemblance in shape to the human nose. Below the lower border, and more prominent portion of this body, is a groove, the *inter-corporeal groove*, and below this again, is a transverse mass, in structure similar to the first mentioned, shaped like a roll of parchment, which I have named the *supra-oesophageal body*. A small space exists between this and the posterior junction of the brachia behind the mouth. Spiculæ, like minute thorny brambles, were abundant in the tissues. The very young of this species have a kidney-shaped nucleus to the valves, of different texture from the remainder of the shell. The brachia are arranged in a single line around the edge of a semilunar membrane. There are no setæ at this stage, and the stomach is bag-shaped. This fry had the shell and hinge-teeth fully formed and of normal shape, but was without apophyses. It was .02 of an inch in length.

TEREBRATULINA.

Page 105. *T. marginata* and *T. quadrata* of Risso are to be added to the synonyms of *Terebratulina caput-serpentis* on Mr. Davidson's authority. The following additional localities are given for the species: Scandinavia, Sars; Sicily, Sequenza; Dalmatia, Brusina; Australia, J. W. Flower (?); Jamaica, Barrett; probably *T. Cailleti*, jun.

Terebratulina Cailleti, Crosse, off Chorrera, Cuba, in 270 fathoms; near Cosima in 450 fathoms; at Double-headed Shot Key, Tortugas, in 471 fathoms, and near Tennessee reef in 115 fathoms, United States Coast Survey Expedition, in charge of M. de Pourtalés. The specific name should be corrected to read as above. Crosse's figure is very poor, and represents an

extreme variety. The normal form is remarkable for its elongated form, nodulous strong ribbets, large triangular foramen, straight hinge line and *Pecten*-like auriculation of the valves. It is very close to *T. michelottina*, Dav., Mon. It. Tert. Brach., p. 14, 1870, and they may be identical. It is hardly necessary to observe that it is perfectly distinct from *T. caput-serpentis*. The soft parts were crammed with spiculæ; one specimen had an enormously lengthened peduncle with a second attachment, like that of an ivy to a stone, half way between the terminal attachment and the shell. The occasion of this abnormal growth appeared to be the growth of a sponge upon the stones, which, but for the lengthening of the peduncle, would have enclosed the brachiopod and perhaps have killed it.

Genus AGULHASIA, King.

Agulhasia, King, Am. Mag. Nat. Hist., 4th Series, vii, p. 109, 1871.

"Areigerous. Beak pointed. Deltidium closed by a plate fixed to the inner surface of the area. Foramen at the cardinal termination of the deltidium. Loop short, reflexed, and attached to the hinge by two crura. Shell substance permeated by branching tubuli."

Type *Agulhasia Davidsoni*, King, l. c. p. 111, Pl. xi, f. 1-8, Feb., 1871.

Hab. Agulhas Banks, south coast of Africa.

The above is Prof. King's diagnosis of a very minute shell (.25 inches in greatest length) which, from its solidity, appears to him to be mature. I trust I shall not be considered hypercritical in making the observation that, it appears to me to be a young *Terebratulina*, in which the crura have not become united, and which, nevertheless, is abnormally calcified. The fry of all the *Terebratulidæ* present a very similar appearance. The loop is that of a typical *Terebratula* but is perhaps immature, or the very delicate connecting band may have been broken away. Such fractures are very common, and I have examined a very large series of adult *Waldheimia cranium*, for instance, in vain for a single perfect example with the reflexed portion of the loop in its place. Mr. Jeffreys has had the same experience, as he relates in his British Conchology, p. 13, vol. ii. Prof. King says that (p. 110, note) he is not acquainted with any other Ancylobrach, in which the beak is not truncated for the foramen, except *Stringocephalus*. It is, nevertheless, true that none of them have it so truncated in the immature stages, as I have had many opportunities of seeing, and the Professor apparently forgets

that his own genus *Gwynia*, and all the *Megathyrinæ* have it non-truncated in the adult condition, when perfect. The internal plate closing the posterior part of the foramen, is also more or less developed in all the young *Terebratulæ* that I have examined.

If the form in question be adult, it represents the immature stage of *Terebratulina*, and while it may, in such a case, have a subgeneric value, I think that this requires further confirmation. That it really belongs with *Terebratulina*, rather than *Terebratula*, may be inferred from the peculiar branching tubulation, first pointed out by Prof. King as occurring in *Terebratulina caput serpentis*. (Tr. Roy. Ir. Acad. xxiv, part xi, 1869.)

Prof. King himself, in a note, says that he has some grounds for suspecting that there is a closer relation between *Terebratulina* and *Agulhasia* than would at first sight be admitted. In this I agree entirely, and had the learned Professor had as good an opportunity for examining the young stages of the recent species as he has had for the adult fossil forms, I believe he would hardly have raised this one to the rank of a genus.

WALDHEIMIA.

Page 110. *W. cranium*, Müll. This species has not been found in Japan, although so reported; the shells found and referred to this species do not belong to it. The "suture," or breaking point, described by Messrs. Jeffreys and Carpenter as existing in the loop of *W. cranium*, is due to the deposition of the laminae of the loop in layers parallel with the longer axis of the valves, which makes the loop weaker at the point of reflection than elsewhere.

To the localities for *W. Grayi* may be added Sta. Cruz, Id., Purissima and Lobitas, California; Newcomb and Stearns.

W. Raphaelis, Dall (p. 111), is very much larger than either *floridana* or *septigera*, from which it appears to differ in anatomical characters as well, and may be considered as a well characterized species.

It has been further compared with other allied forms, and proves to be quite distinct from *W. septigera*, though belonging with it and *W. floridana*, in a peculiar group of the genus.

Waldheimia septigera, Lovén, p. 112, (Bull. Mus. C. Zool. iii, pl. 1, fig. 4, and pl. ii, fig. 9) is quite distinct from *floridana* and from *T. septata*, Phil., which proves to be a *Terebratella*. It has not been found in Japan, and that locality should be erased.

Waldheimia floridana, Pourtalés (p. 112). (Bull. Mus. C. Zool. iii, pl. 1, fig. 3, and pl. 2, fig. 1-3.) This species, after comparison with a series of forms of *W. septigera*, kindly forwarded by Mr. J. Gwyn Jeffreys for comparison, appears to be very distinct, an opinion in which Mr. Davidson concurs. *Terebratula septata*, to which this species has been referred, is a fossil *Terebratella*.

? GWYNIA, King.

I am indebted to the extreme courtesy of Mr. J. Gwyn Jeffreys, F.R.S., for specimens of *Gwynia capsula*, Jeffreys, and the opportunity of examining his series of the very young of *Cistella lunifera*, *W. cranium* and *T. caput-serpentis*.

These all exhibit, more or less, the characters used as generic in the description of *Agulhasia* by Prof. King. Those in which the apex is perfect, preserve the kidney-shaped nucleus described by me in the young of *T. cubensis*, and observed by Prof. Morse in *T. septentrionalis*.

Mr. Jeffreys informs me that *W. cranium* has never been found associated with his *T. capsula*, though the other species mentioned are found with it. I notice that *W. cranium* is common in the Scandinavian seas, and *T. capsula* has been found by Sars at Christiania. The young of *T. cranium* resemble *T. capsula* very much; the specimens of the former are usually a little longer, and the valves more unequal. All things point toward the probability of *T. capsula* being an immature form, but of what species I am unwilling to express a decided opinion. It is certainly not a *Cistella* or "*Argiope*," and, if it eventually prove adult and distinct, the genus *Gwynia* must stand.

MAGASINÆ.

TEREBRATELLA.

Page 116. *T. transversa*, Sowerby, should be removed from the synonymy of *T. dorsata*.

Page 117. To the synonymy of *T. pulvinata*, Gld., should be added *T. pulvilla*, Gld., Cpr. Rep. Br. Assoc. 1856, p. 213 (name only).

Page 119. Having had an opportunity of examining Sowerby's Thesaurus Conchyliorum since my first paper was written, and having carefully compared the figures and remarks of different authors, I am convinced that *T. caurina*, Gould, and *T. transversa*, Sowerby, are one and the same thing. The latter name has four years' priority. To the synonymy should be added *T. canrena*, Cpr., Rep. Br. Assoc. 1856, p. 298 (name only).

Page 123. *Terebratella rubella*, Sby., is a *Laqueus*, and is the same as *L. suffusus*, n. s.? Dall, p. 125. Sowerby's name has priority. Mr. Davidson has compared specimens of *Laqueus suffusus* with the types of *rubella*, and finds them identical, though the coloration varies very greatly. In this decision I cheerfully acquiesce.

Terebratella suffusa, Reeve, p. 122.

Mr. Davidson, who possesses the typical specimen of this species, having examined the apophyses, kindly informs me that it possesses the "large elevated septum and loop of *Magasella*, to which subgenus it will require to be referred." The species described by me at p. 122, and figured (pl. vi, fig. 4) in my first paper, being a true *Terebratella*, and not, as I supposed, the species described by Reeve, may take the name of *Terebratella rubiginosa*.

Add *Terebratella spitzbergensis*, which is erroneously referred to the subgenus *Magasella* at p. 127.

Subgenus ISMENIA, p. 127.

Zittel, in Dunker and Von Meyer's *Paleontographica*, Aug., 1870, has figured the interior of many species of fossil Brachiopods. Among them is *Terebratula pectunculus*, Schloth., which proves to have the lateral loops closed, so that it is nothing more than a *Megerlia*. The diagnosis of *Ismenia* on p. 127 refers to the recent species only. These shells, by their smooth surface, oblong shape, thin shells, and open lateral loops, differ greatly in appearance from the sculptured, transverse, thick *Megerlia* with closed loops; and, since the *I. sanguinea* was the first species in Dr. Gray's Catalogue, it may be well to retain the name of *Ismenia* for the recent species alluded to above in a subsectional sense.

ISMENIA? JEFFREYSI, Dall. Pl. 11, fig. 7-10.

Under the name of *Frenula Jeffreysi* I published in the *American Naturalist* (V, p. 55, March, 1871,) a provisional description of a few lines referring to a shell which may be described as follows:

Shell magaselloid in external appearance, smooth, with an incomplete horseshoe-shaped foramen. Without a septum in either valve. Loop unattached, except by the hæmal processes to the hinge plate. Loop complex, somewhat like that of *Ismenia sanguinea*. Crura well marked, long and slender in the adult. Hæmal processes connected, the connecting band produced into a sharp point in the median line with a sinus above it; the point produced toward the hæmal valve, below the hæmal processes.

Lateral loops open. Anterior extremities of the hæmal processes produced into sharp points. Reflected portion of the loop broad, connected by perpendicular lamellæ to the hæmal band between the hæmal processes, and by lateral extensions to the hæmal processes themselves.

Shell smooth, waxen, with close conspicuous punctations; sub-circular, compressed, with the margin of the valves nearly straight. Area marked by an incised line, deltidia wanting; the two separated parts of the area narrow, and very small. Beak of the hæmal valve rather prominent, smooth. Neural beak incurved, truncated, not prominent. Lon. $\cdot 34$, Lat. $\cdot 33$, Diameter $\cdot 17$ inches. *Hab.* N. E. Atlantic; 155—345 fathoms with *W. cranium*, Jeffreys. Norway; with same, MacAndrew.

The specimen from which the above description was drawn up had the apophyses, which are accurately represented in the accompanying figures, in a beautifully perfect state of preservation. My largest specimen had the loop partially broken away but unmistakably belonged to the same species. None of the specimens had the slightest trace of a septum, and the shell appearing quite different from anything which has been figured in the works accessible to me, I felt justified, perhaps too hastily, in considering it as a new form. Since that time, by the kindness of Mr. J. Gwyn Jeffreys, I have had the opportunity of examining a number of young shells which had been referred to *Terebratella Spitzbergensis* and *Waldheimia cranium* as being the young state of one or the other of those species. One of these shells contained the apophyses in a perfect condition, but evidently abnormally distorted and malformed, being unsymmetrical and having the loops much compressed and abnormally united together. All of them possessed a filiform but rather stout septum. The appearance of these shells was so like that of the species above referred to, that, while I am not certain that they are identical, I feel pretty confident that they are the same, and that in the specimen figured and the others, which were broken, the septum must have been broken away, and left no trace of its existence. As it is slender and cylindrical it is possible that this may have happened. At all events, I am unwilling, without further material, to describe the shell more than specifically. The open loops, if the above surmises prove correct, would place it in the section *Ismenia* of the genus *Megerlia*.

Megerlia truncata, Lin., p. 130. *T. monstrosa*, Sacchi, must be removed from the synonymy of this species. It is a *Megerlia*, but a probably distinct species, according to Mr. Davidson. *Platidia Davidsoni*, Desl., may be a synonym of it, but the interior of this last is unknown, and judgment must be suspended

until more material is obtained. Davidson (Italian Tert. Brach. Pl. xxi, f. 16,) figures *T. monstrosa*, Scacchi, under the name of *Platidia Davidsoni*, as he has subsequently informed me.

MAGASELLA, p. 134.

Mr. Davidson thinks that the shell he figured and described as the type of the genus *Waltonia* was a mutilated, immature *Magasella*. As this is not certain, and the diagnosis of *Waltonia* would in no wise apply to *Magasella*, I have preferred to retain the latter name for the present, as there is no doubt as to what that stands for. But, if Mr. Davidson be correct, the name *Waltonia*, with a new diagnosis, should justly take the place of *Magasella*, on the sole ground of priority. The figure of *Waltonia* might represent a young *Terebratella* or other brachiopod, as in their young stages all the shells are very similar.

Page 137. "*Magasella*" *Spitzbergensis*, Dav., is a *Terebratella*. Add locality, "35 miles N. N. W. of Unst, 90—100 fms," Jeffreys.

Add *Magasella suffusa*, Rve., as previously noted.

Add *Magasella Adamsi*, Davidson MSS., Japan, A. Adams.

Add *Magasella inconspicua*, Sby. Thes. Conch. i, p. 359, pl. lxxi, f. 102—4, 1846. New Zealand, off Sinclair Head and in Lyall Bay, N. Z. Col. Mus.

This species resembles *Terebratella rubicunda*, Sol., in form and coloration, and was referred to that species, wrongly, by Reeve. It has the open foramen and septum of *Magasella* and should be removed from the synonymy of *rubicunda* and reinstated as a distinct species. I would add that some fine specimens of *T. cruenta*, Dill., (p. 117) having been received from the New Zealand Colonial Museum, show that it is perfectly distinct from *T. rubicunda*.

Add *Magasella Gouldii*, n. s. Plate 11, fig. 11.

Shell small, strongly ribbed with 18—20 radiating, rounded costæ, very transverse, cistella-shaped. Foramen large, incomplete, with a wide sharply defined flat area, and small, widely separated deltidia. Hinge teeth very strong, septum long, slender, hinge line of hæmal valve almost straight; hæmal valve nearly flat, neural valve rather deep, with a well defined median sulcus; interior white or reddish, outside yellowish, with red upon the ribs. Striæ of growth rather strong. Shell very thick and solid. Soft parts without a median brachial lobe. Yellowish. Apophyses as usual in *Magasella*; very slender. Lon. .16, Lat. .22, Diameter .07 inches.

Habitat. Hakodadi, Japan, on *Terebratella coreanica*; Stimpson.

One specimen, agreeing with no other described species, was found attached by its peduncle to an alcoholic specimen of *T. miniata*, Gld. = *T. coreanica*, Ad. & Rve., in the locality indicated.

PLATIDIINÆ, p. 143.

PLATIDIA, Costa.

Platidia anomioides, Scacchi, sp. (p. 143) has been obtained by M. de Pourtalés in two hundred and thirty-seven fathoms, off the Florida coast, and since by Mr. Jeffreys in three hundred and forty-five fathoms in the Shetland Channel. This is the second genus of Brachiopoda, *Crania* being the other, which has been added to our fauna by the researches of the U. S. Coast Survey parties. This species had previously been known only in the Mediterranean in deep water.

Subfamily MEGATHYRINÆ, Dall, (p. 143.)

The diagnosis relating to the soft parts should be amended to read,

Brachia in a single series, following the loop surrounding a smooth untwisted membrane, in the median posterior part of which is situated the oral groove and mouth. Mantle edge without setæ.

The statement of Woodward that the mouth of *Megathyris* is situated in the centre of the brachial disk is an error, as I have since proved by dissections; the mouth is in a position exactly equivalent to that obtaining in the other brachiopods.

Genus MEGATHYRIS, D'Orb. (p. 144.)

It has been stated by some authors that Savigny's name was *Argyope* or *Argyopes*, and that therefore *Argiope*, Desl., is not preoccupied; but this is an error, which a reference to the paper of Thorell or to the original work of Savigny will enable them to correct.

Add to the synonymy of *M. decollata*, *T. aperta*, Hidalgo; *T. ungula*, Retzius, Diss., 1788; and *T. pectiniformis*, Costa, all on the authority of Mr. Jeffreys; and to the localities, Atlantic coast of Spain, Jeffreys.

Subgenus CISTELLA, Gray, (p. 145.)

Bull. Mus. Comp. Zool. iii, 19 Pl., f. 6, 6 a, May, 1871.

Add to the list on p. 146,

Cistella (? *Schrammi* var.) *rubrotincta*, Dall. Bull. Mus. Comp.

Zool. iii, p. 19, pl. , fig. 6, 6a, May, 1871. West of Tortugas, in 30—43 fathoms, Pourtalés.

Differs from *Schrammi* in color and sculpture, but may prove to be a variety of it, as the descriptions and figures of Crosse and Fischer exhibit some discrepancies. To the septum is attached a cordate nodulous transverse plate, not hitherto noticed in any species of *Cistella*.

Cistella (? *Barrettiana*, Dav. var.) *lutea*, Dall, l. c. p. 20, pl. 1, fig. 5, 5a, and pl. 2, fig. 4—8. Tortugas, 30—43 fathoms, Pourtalés.

This also differs in color and sculpture, as well as in the extent of the loop, from *C. Barrettiana* and *C. antillarum*, but may eventually prove conspecific. I have preferred in these two cases to give a provisional varietal name to the forms described, rather than unite what may prove to be different without positive proof. *C. Schrammi* appears to be distinct from *C. Woodwardiana*, but *C. antillarum* may very possibly have to be united with *C. Barrettiana*.

The frilled openings of the oviducts in the variety *lutea* are almost rudimentary, and there is no long tubular extension, but the opening for the genital products is directly in the midst of the rudimentary folds. The brachia behind the mouth are very much longer than the others. The ovaries hang upon the edge of a rather broad ribbon-like lamina, the heart is present but lower down than in most brachiopods, and quite small; no accessory vesicles were to be found. The intestine is cœcal. There are no setæ in this or the last species.

Cistella cistellula, p. 146, is reported from the Mediterranean.

Family RHYNCHONELLIDÆ.

Animal with two prolongations of the brachial disk spirally coiled inwards, with the apices of the coils directed toward the body of the hæmal valve. Punctate or impunctate.

Four oviducts and four accessory "pulsatile vesicles" present.

It appears to me that *Atrypa* and its allies would, from the position of the spires of the brachia, be placed more naturally in this family than in the *Spiriferidæ*. Prof. Theodore Gill has proposed a new family,—*Atrypidæ*—for these forms, but it is questionable whether the mere calcification of the spires is a family character.

The genus *Rhynchopora* has been proposed by Prof. King for the *Rhynchonella Geinitziana*, which possesses a punctate structure.

I am indebted to the kindness of Mr. Davidson for information

in regard to *Rhynchonella loxia*, F. de W., the type of the genus. Although referred by Bronn and Herrmannsen to *Spirifer cuspidatus*! it appears to be allied to *R. acuta* and other Liassic species, and is from the Jurassic formation near Moscow.

The name *Stenocisma* has been proposed for certain fossil *Rhynchonellæ* of the older rocks, on the ground that they differ from the recent species and from the *R. loxia*. The latter supposition would appear to have little foundation, but cannot be decided until the interior of *R. loxia* is worked out. It is much more likely that, if differences exist, they should be between the *R. loxia* and the recent forms, and that *R. loxia* should agree with the older fossil species. In this case a new name would be required only for the recent forms, for which the name *Hemithyris*, proposed by D'Orbigny for *R. psittacea*, would have to be used. The value of the differences, so far established, does not appear to be very great.

Add to the list of recent species (p. 153), *R. sicula*, Sequenza, Davidson, Mon. Italian Tertiary Brachiopods, ii, p. 23, Pl. xx, f. 6, 1870. *Hab.* Fossil in the Pliocene at Messina; recent off the coast of Portugal. Jeffreys.

Genus DIMERELLA, Zittel.

Dimerella, Zittel, Dunker and Von Meyer's Paleontographica, Aug. 1870, p. 220.

Shell small, Rhynchonelloid, impunctate, with a large foramen. Neural valve with an entire edge, without a septum. Hæmal valve with a large, very prominent septum, which divides the cavity of the shell, when closed, into two chambers; with two stout, diverging, hook-shaped crura as in *Rhynchonella*.

Type *D. Gumbeli*, Zittel, l. cit. p. 222, Pl. xli, figs. 27--30. Aug. 1870.

In December (2d) 1869, Mr. J. Gwyn Jeffreys, F. R. S., published in "Nature" of that date, p. 136, the following remarks. "Among the mollusca were valves of an imperforate Brachiopod with a septum in the lower valve, which I propose to name *Cryptopora gnomon*."

For some reason not stated, Mr. Jeffreys adopted a second name in his subsequent publications, and in the Preliminary Report of the Porcupine Expedition for 1869 (No. 121 of the Proc. Roy. Soc.) he states, "among the mollusca were valves of an imperforate Brachiopod, with a septum in the lower valve, which we propose to name *Atretia gnomon*." (¶ 36, p. 421.) I have not seen specimens of either *Dimerella* or *Atretia*, but in a late communication, Mr. Jeffreys remarks, in regard to *Dimerella*

"It was published after my publication of *Atretia*, but I admit that the latter was not fully described. You are right as to the relationship, if not the identity of these genera."

It is for naturalists to settle which name should be adopted.

Atretia gnomon, Jeffreys, west of Ireland, in very deep water. 1000 + fms. ? Jeffreys.

Order *LYOPOMATA*, Owen.

Lyopomata, Owen, Enc. Brit. Ed. viii, vol. xv., article Mollusca, p. 339, 1858.

= *Pleuropygia*, Bronn, Thierr. iii, 1st Abth. p. 301, 1862.

= *Inarticulata*, Huxley, Lect. Class. 1864. Intr. Class. An. p. 116, 1869.

Arms free, unsupported by shelly apophyses. Intestine opening by a lateral anus. Borders of the mantle lobes entirely disunited. Brachia without a distinct median lobe. Shell in most cases without hinge teeth, articulation, or cardinal process.

Family CRANIIDÆ, H. and A. Adams.

Craniidæ, H. and A. Adams, Gen. Rec. Moll. ii, p. 583, 1858.

The complete synonymy of this family and its subordinate groups will be found in the Report already alluded to.

Shell hingeless, without perforation for a pedicel; attached by the entire surface or by the umbone of the lower valve, or rarely free. Upper valve suborbicular; lower valve subcircular or more or less pyriform. Four principal muscular impressions in each valve. Shell structure punctate. Arms spiral, free. Mantle extending to the edge of the valves, closely adhering, without setæ on the margin.

Synopsis of the Family.

Genus *Crania*, Retz. Shell attached, upper valve with the muscular impressions usually excavated but occasionally convex, without apophyses of any kind; inner surface vaulted without septa; impressions of the pallial sinuses flabelliform, separated in the median line in front. Margin of the valves rough, tuberculose or papillose. Type *Crania craniolaris*, Lin. = *Anomia craniolaris*, Lin., S. N. xii, p. 1150, 1767.

? Subgenus *Pseudocrania*, McCoy. Shell free, with the pallial impressions fimbriated and confluent in front. Anterior muscular impressions larger than the posterior ones. Margin of the valves smooth. Type *Crania antiquissima*, Eichwald, sp., McCoy, Annals Nat. Hist. viii, p. 388, 1851.

The value of this subdivision is doubtful.

Subgenus *Cranopsis*, Dall. Attached; upper valve with two slender pointed apophyses divaricating from the internal apex of the upper valve. Type *Crania Parisiensis*, DeFrance, Davidson, Mem. Lin. Soc. Norm. x, pl. xiii, f. 23 a, b, 1856.

Genus *Craniscus*, Dall. Fixed valve divided by a transverse and a longitudinal median septum into three cells, the posterior of which contains the muscular impressions and the rostellum. Type *Crania tripartita*, Munster, sp., Davidson, Mem. Lin. Soc. Normandie, l. c. fig. 21, 1856.

This is a very strongly marked section, and it seems extraordinary that it should have been allowed to remain with the typical *Crania* so long. The septa are not identical with the rostellum.

Spondylobolus, McCoy (misprinted, on pp. 100, 154, 163, 164, 165, as *Spondylobus*), appears, as stated by McCoy, to be more nearly related to the *Lingulidae* than to the *Craniidae*.

Pholidops, Hall, appears congeneric with *Pseudocrania*, but, as it is chiefly known from casts, may be established by future researches as distinct.

Genus CRANIA, Retzius.

Crania, Retz., Schrift. Berliner, Ges. Naturf. Freunde, Bd. ii, p. 72, 1781.

= *Cranicella*, Raf., 1815, + *Orbicula*, Cuvier, 1798, + *Orbicula* (pars), Lamarek, 1799, + *Discina* sp. Turton, 1822, + *Anomia* sp. Lin., 1760, + *Patella* sp. Muller, 1776, + *Siphonaria* sp. Quenstedt, 1852! + *Criopus*, Gray, 1821.

The full synonymy of this unfortunate group will be found in the report alluded to, with an exhaustive discussion of the nomenclature of the type and some other species.

Type *Crania craniolaris*, Lin. sp.

= *Anomia craniolaris*, Lin., S. N. xii, i, pt. ii, p. 1150, No. 216, 1767.

= *Crania brattensburgensis*, Retz. (pars), l. c. p. 73, 1781.

= *Crania nummulus*, Lam., An. s. Vert. Ed. i, vi, p. 238, No. 2, 1819.

= *Crania personata* (part), Lam., l. c. p. 238, 1819.

= *Ostracites numismalis*, Beuth., Jul. et Mont. subt. p. 130, t. 7, No. 46, 1776, *vide* Bronn. Ind. Pal.

A fossil species from Sweden, confounded with the recent species by Retzius, Gmelin, Dillwyn, Chemnitz and Lamarek.

The following are the recent species which may be referred to this genus:

Crania Suessi, Reeve, Mon. *Crania*, Conch. Icon. pl. 1, fig. 2, 1862, from Sydney, Australia.

Crania rostrata, Hoeninghaus, Mon. *Crania*, p. 3, No. 3, f. 3, 1828. Rve., l. c. pl. i, fig. 3, 1862.

Mediterranean and (?) West Africa.

I have received a specimen of this species from the Mediterranean through the kindness of Mr. Davidson. It is quite distinct from *C. anomala*. Deshayes' synonymy is very erroneous, and includes both *anomala* and the presumed variety *turbinata*.

Crania anomala, Müller, (as *Patella a.*), Prodr. Zool. Danica, 2870, 1766. Reeve, l. c. pl. i, f. 4, 1862.

= *Patella distorta*, Montague, 1808, *P. Kermes*, Humphrey, *Criopus orcadensis*, Leach, 1852. *Orbicula norvegica*, Cuvier, 1798, and Lamarck, 1801 (but not of Sowerby, 1822, Rang, 1829, nor Blainville, 1825), + *Criopodermis turbinatum et Criopus fimbriatus pars*, Poli, 1792, + *Crania personata*, Lamarck, 1819, + *Crania ringens*, Hoeninghaus, 1828, + *C. rostrata*, Deshayes (pars), 1836 (not Hoeninghaus), &c. &c.

North European Seas.

Crania anomala, var. *alba*, Jeffreys, Brit. Conch. v, p. 165, 1869.

Shetland and the Hebrides.

Crania (? *anomala* var.) *Pourtalesii*, Dall. Bull. Mus. Comp. Zool. iii, No. 1, p. 35, pl. 1, fig. 7, a, b, May, 1871.

Florida Keys.

The few specimens obtained by M. de Pourtalés differ in smaller size and in strong radiating rugosities, as well as in texture and color, from the typical *anomala*. A larger series of specimens will perhaps establish its specific rank. For the present, however, I prefer indicating it under a varietal name.

The seventy-four synonyms of *anomala* will be found in the Report already mentioned. I am indebted to Mr. G. W. Tryon for an examination of Poli's work and evidence as to its non-binomial character, which should exclude it from all strict synonymy. Mediterranean specimens received from Mr. Jeffreys establish the identity of *C. turbinata*, Poli, with *C. anomala*.

Crania Japonica, A. Adams, Annals and Mag. Nat. Hist. 3d ser. xi, p. 100, 1863.

Gotto Islands, Japan, 71 fms.

The muscular scars are exceedingly prominent.

Family DISCINIDÆ, Gray.

Discinidæ, Gray, Syn. Brit. Mus. i, p. 155, 1840.

Orbiculidæ, King, Owen, Chenu, and the earlier authors.

Shell structure permeated with very minute tubuli; valves inarticulated. Attached to foreign bodies by a peduncle passing through the lower valve. Valves suborbicular, with a subcentral apex. Animal with free spiral arms; mantle very vascular, fringed with long chitinous setæ.

For synonymy of family, see my report in Bull. Mus. Comp. Zool. vol. iii, No. 1, June, 1871.

Synopsis of the Family.

Genus *Discina*, Lam., 1819. Type *D. striata*, Schum.

Subgenus *Discina*, (sensu stricto).

Shell with subequal externally convex valves, with subcentral apices. Lower valve with a small subtriangular prominence in the centre, with a minute circular orifice for the pedicel, beneath it, from which an impressed line or furrow extends, on the inside, posteriorly. Shell of rather solid texture, impunctate, perforated by minute tubuli? Type *D. striata*, Schumacher, 1817, = *D. radiosa*, Gould, + *D. Evansii*, Davidson, + *D. norvegica*, Sowerby, + *D. ostreoides*, Lam.

Subgenus *Orbiculoidea*,* D'Orbigny (*Schizotreta* Kutorga.†

Shell similar to the last, but with the circular perforation at the posterior instead of the interior end of the furrow, which last is impressed from the outside instead of from the inside, as in *Discina*. Type *Orbiculoidea elliptica*, Kutorga, Davidson, Intro. p. 129, Pl. ix, f. 253-4-5, 1852.

Subgenus *Discinisca*, Dall. (= *Discina* sp. Auct.)

Lower valve more or less flattened, concave or compressed, upper valve more convex; apices of both subcentral, or sub-posterior. Lower valve with a small septum as in *Discina*, behind which is a disk or area impressed from the outside, and traversed by a longitudinal fissure in the median line of the valve, extending from a short distance behind the septum, nearly to the posterior margin of the valve, which is often slightly indented behind it. Shell more or less horny in texture, minutely tubulous. Type *Discina lamellosa*, Brod., Rve. Conch. Icon. Pl. i, f. 4, 1862.

* Comptes Rendus, xxv, p. 269, 1847, August.

† Verh. Kais. Min. Ges. 1847.

Genus *Trematis*,* Sharpe, (= *Orbicella* D'Orb., l. c.)

Upper valve with a posterior apex and small false area. Lower valve flattened, with a large foramen extending nearly to the posterior border. Shell structure in two layers, the outer calcareous, with a peculiar reticulated sculpture. Inner layer horny, minutely tubulous as in *Discina*. Type *Orbicula terminalis*, Conrad, in Nat. Hist. N. Y. Part iv, Geology, by Emmons, p. 395, f. 4, 1842.

I am not prepared at present to admit *Siphonotreta* and *Acrotreta* into this family, but incline to the opinion of Kutorga, that they form a group by themselves.

Keyserlingia, Pander (Bull. Ak. Sci. St. Petersburg. iii, p. 46, 1861. Type *K. reversa*, Pand. Pl. ii, f. 1, a—g.) appears to have relations with *Siphonotreta*, but its position is at present doubtful.

Genus DISCINA, Lam.

Discina, Lamarck, Hist. An. Vert. vi, p. 236, 1819.

= *Crania*, β ., Schumacher, Essai, p. 102, 1817.

= *Orbicula*, Sowerby, Min. Conch. vi, p. 4, Pl. 506, 1830.

= *Orbicula*, sp., Lamarck and Owen.

Not *Orbicula*, Cuvier, Tabl. Elem. Regne An. p. 435, 1798, Lam. An. s. Vert. i, vi, pt. i, p. 242, 1819, Schum. Essai. p. 55, 1817, = *Crania*.

Type *Discina striata*, Schum. sp.

= *Crania* (β) *striata*, Schum. Essai, p. 102, Pl. xx, f. 1, a—f. 1817. (Not *C. striata*, DeFrance). *Hab.* ?

= *Crania radiosa*, Gould., 1852. *Hab.* Cape Palmas.

= *Orbicula striata*, Sowerby, Thes. Conch. i, p. 366, Pl. 73, f. 9, 1847. Forbes and Hanley, Brit. Moll. ii, p. 368, 1853.

= *Orbicula norvegica*, Sowerby, Tr. Lin. Soc. xiii, p. 468, Pl. xxvi, f. 2, 1823. (Syn. exclus.) N. Africa.

= *Discina ostreoides*, Lamarck, An. s. Vert. vi, p. 237, 1819. No description.

= *Orbicula ostreoides*, Reeve, Conch. Icon. Pl. i, f. 7 a, b.

= *Orbicula Evansii*, Davidson, P. Z. S. 1852, p. 81, Pl. xiv, f. 32—34. *Hab.* Bodegas, Cala. in error.

Not *Orbicula striata*, Sowerby, Silurian Syst. t. v. fig. 21, 1839, and Siluria Pl. xx, f. 3. 1859, a fossil species.

Not *Orbicula norvegica*, Lamarck, = *Crania anomala*.

Not *Discina ostreoides*, Turton, Dith. Brit. p. 238, 1822.

* Quart. Journ. Geol. Soc. No. 13, vol. iv, p. 66, June, 1847.

A full resumé of the synonymy, and a rectification of the same, will be found in the Report before alluded to. Carelessness in the identification of types and the neglect into which this and the last family have fallen, are the probable causes of the confusion which has hitherto pervaded them. These rectifications will perhaps meet with some opposition from those naturalists who forget that accuracy is the basis and aim of all Science. There can be no doubt as to the true type of this genus, and that it is as distinct from the forms which have been usually regarded as typical *Discinæ* on the one hand, as *Orbiculoidea* is on the other.

The following are the recent species. Those marked with an ! I have personally examined.

Discina striata ! Dall ex Schum. l. c.

Habitat. North west coast of Africa.

Discinisca stella ! Gould, Proc. Bost. Soc. Nat. Hist. vii, p. 323, Sept. 1860, Rve. Conch. Icon. Pl. 1, fig. 1, 1862.

Singapore and Philippines, Cuming. China Seas, Stimpson.

Discinisca lamellosa ! Brod. P. Z. S., 1833, p. 124. Rve. Conch. Icon. Pl. 2, f. 3, 1862.

Panama to Peru.

This is the subgeneric type. I have examined an immense number of specimens from Panama and find that they exhibit many varieties. This species has no radiating striæ and is a thinner shell than *D. levis*.

Discinisca tenuis, Sowerby, Thes. Conch. i, p. 366, Pl. 73, f. 4—5, 1847. Not of Reeve, Conch. Icon. Pl. 1, f. 5, 1862.

Habitat ?

Reeve's figures of *Orbicula tenuis* do not represent Sowerby's species, but agree well with some of the varieties of *D. lamellosa*. I have seen no specimens of either, but the figures exhibit discrepancies too great to be reconciled. Sowerby gives no localities, and Reeve's localities, or one of them, probably refer to the form which he figures. It can hardly be found both in Chili and South Australia, and the double habitat is probably due to an error in labelling or identification.

Discinisca levis ! Sby., Trans. Lin. Soc. xiii, p. 468, Pl. xxvi, f. 1, a—d, 1822. Reeve, Conch. Icon. Pl. i, f. 4, a—b, 1862.

Concepcion, Chili, Cuming.

A specimen of this species was received from Peru, through Mr. Cuming, labelled *strigata*, Brod.

Discinisca Cumingii! Brod., P. Z. S. 1833, p. 124. Reeve, Conch. Icon. Pl. i, f. 6, 1862, = *D. strigata*, Brod. *vide* Rve.

Cape St. Lucas to Panama.

Mr. Reeve's figures afford no characters by which this might be distinguished from the last species. The specimens received under this name from Mus. Cuming cannot be distinguished from *D. stella*, Gould, by constant characters.

Dincinisca ? *antillarum*, D'Orbigny, Moll. Cuba, p. 368, Pl. 28, f. 34-36, 1853. Reeve, Conch. Icon. Pl. 1, f. 2, 1862.

Cuba, Martinique, Cuming.

I have never seen this species which is stated by Reeve to resemble *D. stella*. It has relations with *D. Cumingii*, and a series should be compared.

Discina (? *Discinisca*) *atlantica*, Jeffreys, MSS.

North east Atlantic.

I am indebted to Mr. Jeffreys for information in regard to this species, which is on the point of publication in the Proceedings of the Zoological Society of London.

Family LINGULIDÆ.

LINGULA, p. 156.

Add to the list of recent species :

Lingula affinis, Hancock, Trans. Roy. Soc. p. 851, Pl. lxvi, f. 1, 2, 1857. E. Indies.

GLOTTIDIA, p. 157.

The internal laminæ support the posterior retractor (adjustor of Hancock) muscles, not the post-parietals as suggested previously.

Add San Diego, Palmer, and Monterey, Cal., Stearns and Newcomb, to the list of localities for *G. albida*.

Glottidia (? *albida* var.) *Palmeri*, Dall.

Shell imperforate ; texture moderately solid but contracting about the edges in drying ; very narrow and elongated, rather square in front. Beaks sharply acuminate, valves in the natural condition rather widely gaping. Hæmal valve with a small

concave area, transversely striated. Exterior of the valve with two obscure carinae extending from the beaks to the anterior corners of the shell, and another, even less evident, in the median line. The posterior portion of the shell creamy white, extreme edges lightly horny; area between the two carinae of a fine brown, stronger on the lines of growth and diminishing posteriorly; median carina paler. Surface polished, with obscure impressed lines and slight rugosities under a lens.

Interior whitish, not polished. When fresh all the organs are represented in a faint impression on the inner surface, but this becomes obscure when the shell is contracted by drying. Internal laminae prominent. In all the specimens of this genus which I have seen the right lamina in the neural valve is a little longer than the other.

The muscles are attached on the inner concave edges of the laminae. The muscular impressions are very small and obscure.* Length of shell 1.7 inches, greatest width 0.55 inches. Length of peduncle 4.5 inches. *Habitat* at the head of the Gulf of California on the Lower Californian side, opposite the mouth of the Colorado River; in sandy shelly mud at low water mark. Ten specimens, with the animal in alcohol, were collected by Dr. Edward Palmer. Cabinets Smithsonian Institution, W. H. Dall, Philadelphia Acad. Nat. Sciences, Thomas Davidson, Esq. and the Boston Society of Nat. History.

This magnificent species was collected alive by the indefatigable exertions of Dr. Palmer, who spent many hours groping in the mud after the small number of specimens above recorded.

I should have no hesitation in considering it a distinct species, coming as it does from a distinct zoological province, from the *G. albida*, but that the number of specimens of the latter (very rare species) which I have seen, is quite limited.

The principal differences are as follows :

The *albida*, as before described, agrees with the descriptions of Hinds, Reeve and Sowerby. The shell under my eyes differs from them in being much more elongated and narrow, proportionally, than the *albida*; the beaks are more acute, the internal laminae are closer together and less widely divergent. The peduncle is very much longer, the brown color so conspicuous on the exterior is not found in *G. albida*, which also has a much more prominent median carina and a more solid shell which does not gape.

On the whole, the shell in question, if not a distinct species, as I am inclined to believe, is at least a very strongly marked va-

* The scars of the post-adductor are thickened and plate-like.

riety and cannot fail to be recognized. It is longer and narrower than any other species and cannot be confounded with any described species. All the specimens were unattached.

The anatomy of this species will form the subject of another paper.

TRIMERELLA, Bill. and GOTLANDIA, p. 160.

In provisionally proposing the name *Gotlandia* for the shell figured by Dr. Lindström, I felt a slight doubt as to its distinctness from *Trimerella*, principally because figures, and especially restorations, are not infrequently insufficient representations of the objects intended. Still I could hardly question the plain statements in the paper alluded to. Since that time some misapprehension as to the identity of the fossils examined by me in Prof. Hall's collection having arisen, I have been indebted to the kindness of Mr. Billings for an opportunity of examining various specimens of *Trimerella*, both from Canada and from Götland. The latter were collected by Dr. Lindström.

The Canadian species are all casts in a calcareous rock and more or less incrustated with calc-spar. The specimens from Götland retain the shelly matter, but in a metamorphosed condition, so that the shell structure cannot be determined. Besides these, I have had the opportunity of examining a few specimens of another species from the Niagara group, collected by the Geological Survey of Ohio, in charge of Dr. J. S. Newberry, and in very poor condition. In these, the shell is only represented by rude incrustations of calc-spar, originally made over the shell which has since been entirely dissolved away.

Although these materials are anything but complete, they still afford some information. Among the Canadians specimens three forms of probably specific value appear to be represented, beside the species from Ohio, which appears to differ essentially from the others. With regard to the Götland shell the materials are not satisfactory for a full comparison.

One thing appears to be certain. In none of the American species is there any pit, interlocking process, or hinge-teeth, such as are figured by Lindström in his paper on the Götland shell.

The provisional genus *Gotlandia* was suggested on the supposed differences above mentioned; if they do not exist, it of course, falls to the ground, and with it the figures and description upon which the characters were based.

On the other hand, though none of the Götland shells have the cardinal border well exposed, yet I am equally unable to discover anything of the kind there; though that it may not exist, I would not be understood as asserting. Dr. Lindström had doubt-

less sufficient material upon which to base his description and figures, and I do not desire to impugn his statement on such slender material as that before me. Still it would have been satisfactory to have been able to confirm it.*

Several casts of what must be supposed to be the neural (ventral) or long beaked valve are before me. They are from the Guelph limestone of Canada. They appear to represent a spatulate or spoon-shaped shell, with an acuminate beak. The cardinal border is transverse (though slightly irregular) rather prominent and with an anterior convexity in the median line. The beak has a well defined, somewhat depressed, false area, with a rounded ridge on each side of it extending to the hinge-line. On each side of this ridge is a broad shallow gutter, between the former and the edge of the beak. The hinge line being very much arched, this groove is continued on each side, some little distance anteriorly outside of and beyond the most transverse portion of the hinge line. Over the whole of the beak are strong transverse rugæ or striæ of growth, which are especially prominent upon the area, but which are readily traced over the ridge and groove to the extreme edge of the beak at the sides. The margins of the valves appear to have been wide and thick as in *Crania*, but smooth. The beak somewhat resembles that of *Obolus*, or less that of *Acrotreta*, in its plane aspect. No subapical pit exists in the American fossils.

I am inclined to suspect that these shallow areal gutters are what have been considered as sockets or grooves for the insertion of the edge of the hæmal (dorsal) valve by Dr. Lindström. After careful examination of his specimen, I fail to find any grooves on the lateral margins of the neural valve, such as he figures. On the contrary, these are very wide, flattened and smooth. That in the American species these gutters cannot have served such a purpose is evident, for they are strictly confined to the lateral extensions of the area which was not opposed to any part of the opposite valve. The area, as noticed by Mr. Billings, is at an obtuse angle to the plane of the margin of the valves in most specimens.

The hollow processes, as indicated by the casts, differ consid-

* It is possible that the *processus cardinalis* of Lindström may be, with the supposed cardinal pit, due to erosion of the much incurved beak of the hæmal valve, reciprocally with that part of the area opposite to it, in the neural valve, such as is occasionally seen in the opposed beaks of bivalves.

A note from Mr. Davidson confirms the existence, in some specimens, of a depression on the hinge-margin of the Gotland shell and a corresponding convexity in the dorsal valve, while corroborating my supposition in regard to the absence of the marginal grooves, as figured by Lindström.

erably in different specimens. The hæmal valve appears to have had them more prominently developed than the other, in all cases. The median septum of this valve also seems to be more extended anteriorly than that of the neural valve. The internal tubular processes of the hæmal valve are, as Lindström represents them, abruptly raised from the surface of the valve or even overhanging it, so that they represent two cylinders side by side, with a gutter between them, which represents the top of a septum which is prolonged beyond their ends, anteriorly. In the neural valve, however, these cylinders are less prominent, and in some of the specimens the structure loses the appearance of cylinders and assumes the aspect of a plate or lamina, supported by a median septum and passing off into the body of the valve at its lateral edges, as described in the generic diagnosis of *Trimerella* in my first paper. In the Ohio species the internal arrangement differs somewhat in detail. Instead of the anterior ends of the cylinders being abruptly truncate, as in Lindström's figures, the upper edge is anteriorly produced and rounded off at the sides, so that it projects beyond the lower termination of its respective cylinder, while the septum is very prominent and also rounded and projecting above, over its attachment to the shell below.

The following provisional diagnosis comprehends the most evident characters.

TRIMERELLA, Billings, 1862.

= *Trimerella*, Billings, Pal. Fos. Geol. Can. i, p. 166, June, 1862.

> *Trimerella*, Dall, op. cit. p. 160, 1870.

? *Trimerella*, Lindström, op. cit. p. 253, 1867.

? *Gotlandia*, Dall, (after Lindström) op. cit. p. 160, 1870.

Shell allied to *Obolus*. Neural (ventral) valve with a produced beak bearing a false area of which the middle part is more or less concave, and the whole of which is crossed by strong imbricated lines of growth. The plane of the area is at an obtuse angle with the plane of the margin of the valves. Hæmal (dorsal) valve with a more or less incurved apex, on either side of which is a small transversely striated area. Margins smooth, flat, thickened, rarely flexuous. Neural valve with a subtriangular plate, proceeding forward from beneath the hinge margin, more or less concave in the median line and more or less elevated above the body of the valve at its lateral edges. Supported below by a median septum which is usually prolonged beyond the anterior edge of the plate.

Hæmal valve with a similar arrangement, except that the plate is more convex on each side of the median line, more elevated

at its lateral edges, and more deeply grooved over the septum, so that the apparatus presents the appearance of a pair of cylinders side by side, whose anterior edges are more or less flexuous, and with the septum longer and more prominent than in the neural valve. Shell calcareous, with concentric lines of growth, apex rather pointed, anterior margin broadly rounded, without a foramen, hinge teeth or interlocking processes.

The Götland specimens are too poor to state whether these characters are common to them. It is my impression that they will prove to be so, notwithstanding Dr. Lindström's figures.

Type *T. grandis*, Billings, op. cit. p. 166, f. 151, a, 6, 1862.

Characterized by a nearly straight hinge-line slightly flexuous in front, and by the large cavities below the neural lamina, not reaching the beaks.

Locality. Casts found in the Guelph limestone, middle Silurian, at Galt, New Hope and Elora, J. Richardson, J. Dalgleish, R. Bell and E. Billings.

T. acuminata, Billings, op. cit. p. 167, fig. 152. Pl. , fig. 4-5. Ibid. Am. Journ. Sci. Arts, 3d series, i, p. 471, June, 1871.

Characterized by the extension of the septum and cavities of the lamina into the beaks below and behind the hinge margin, which is narrow and straight. The valve below the lamina appears to have been somewhat thickened, so that the under surface of the cavities was raised above the body of the valve.

The shell represented by figures 4 and 5 is referred by Mr. Billings to this species.

Locality, with the preceding.

T. BILLINGSI, n. s. Plate 11, fig. 1, 2, 3.

Characterized by the lamina in the neural valve being hardly raised above the shell except at the anterior extremity; the septum hardly extending beyond the end of the lamina anteriorly; the area with a broad depressed transversely striated space in the middle, on each side of which are two longitudinal ribs or elevations, separated by a shallow gutter, across all of which the striæ of accretion pass without interruption; margins flat and nearly straight. Posterior margin slightly concave in the middle.

Locality. Guelph limestone, E. Billings.

One cast of a neural valve, showing the characters of the area, posterior margin, &c., distinctly, was kindly lent for examination and description by Mr. Billings. I have also seen two other specimens from the same locality.

T. MINOR, n. s? Plate 11, fig. 6. ✱

Characterized by the narrow median groove of the false area, and the striæ stronger outside of this than inside; the apparent absence of any lateral ridges or gutters on the area; the septum rising above the anterior part of the lamina in the median line; the flat but proportionally more elevated neural lamina and the straighter beak; a slight but conspicuous median flexure occurs in the anterior margin of one specimen, and is nearly wanting in the other.

Locality. Guelph limestone, Galt, Canada, E. Billings, 1857.

One certainly (and one probably) neural valve were received from Mr. Billings. There is a possibility that this may prove to be a form of the last species, but the character of the area appears very different. A much larger and more perfect series is needed to determine the specific range of these protean shells. It is certainly a *Trimerella*.

TRIMERELLA CONRADI, Hall.

Obolus conradi, Hall, 20th Regents Rep. on the State Cabinet, p. 368, Pl. 13 (4), f. 1, 2, 1867.

This species is probably a *Trimerella*, as Prof. Hall inferred in his description, though at that time, in deference to the opinions of Messrs. Davidson and Woodward, he placed it in the genus *Obolus*. It appears to differ from any of the other species here mentioned, in its broadly transverse shell, very short beak, and the form of the internal plates.

Locality. Leclaire limestone, upper Niagara group, at Leclaire, Iowa; and in a similar deposit at Racine, Wisconsin. Hall, loc. cit.

T. OHIOËNSIS, Meek.

T. ohioënsis, Meek, Sill., Am. Journ. Sci. and Art. p. 305, April, 1871.

Characterized by the strongly flexed posterior margin and deeply incurved hæmal beak; large and very prominent tubular processes, almost equally so in both valves; the anterior end of the septum raised and rounded, very prominent, the anterior ends of the cylindrical processes flaring and oblique, the upper edges overhanging and effuse.

Locality. Niagara limestone, Genoa, Ottawa Co., Ohio. Sinking Springs, Ohio, I. S. Newberry. Guelph limestone, Canada? one valve, E. Billings.

✱ In the above species, the beak is very short and the tubular processes are very prominent, almost equally so in both valves. This is not a *Trimerella*, but a *Trimerella* of the *Trimerella* group, and is very different from the *Trimerella* of the *Trimerella* group.

Three specimens and some fragments collected by the Ohio Geological Survey, appear to belong to a distinct species for which Mr. F. B. Meek has proposed the above name.

? *T. LINDSTROMI*, Dall.

= *Trimerella* sp. Lindström, Ofv. Vet. Ak. Förk. xxiv, p. 253-7, Pl. xxi, 1867.

= *Gotlandia Lindstromi*, Dall, l. c. p. 161, 1870.

Not *Trimerella grandis*, Bill.

Were the character of this species certainly such as Lindström ascribes to it, it could not remain in this genus. I am inclined to believe that it does not differ generically from the American species, however, though the material at my command will not suffice to determine the question or even to characterize the species. It must therefore remain for the present in abeyance. It seems to be most closely allied to *T. ohioensis*. Mr. Davidson having obtained the necessary material, will undoubtedly settle the question in a satisfactory manner.

REFERENCES TO THE FIGURES.

PLATE 10.

- Fig. 1. Diagram of a bud of *Rhabdopleura*, a marine polyzoön, after Allman.
2. Diagram of *Phallusia*, a Tunicate, after Huxley.
3. Diagram of *Appendicularia*, a free Tunicate, after Moss. The appendix is represented as if cut off near the body.
4. Diagram of an articulated Brachiopod. Original.
5. Diagram of a *Lingula*, an inarticulated Brachiopod, after Hancock.
6. Diagram of a *Chiton* with ambient gills, after Middendorff.
7. Diagram of *Mya*, a lamellibranch, after Allman.
8. Diagram of *Buccinum*, a marine gasteropod, after Huxley.
9. Diagram of *Gadinia*, a pulmonate gasteropod, with a hæmal flexure of the intestine. Original.

10. Diagram of *Pompholyx*, a pulmonate gasteropod, with a neural flexure of the intestine. Original.
11. Diagram of a *Cephalopod*, after Huxley.
12. Explanation of the signs used in the diagrams preceding. a, branchial apparatus; b, mouth; c, heart; d, ovary and oviduct; e, sub-œsophageal ganglion; f, anus.

PLATE 11.

Fig. 1. Neural valve of *Trimerella Billingsi*, from a mold taken from the natural casts by means of gutta percha. Slightly restored.

2. Side view of both valves of *T. Billingsi* in juxtaposition. Restored from the casts.
3. Section of the same.
4. Hæmal valve of *Trimerella acuminata*, Bill., (Canadian) from a gutta percha mold.
5. Side view of hæmal valve of *Trimerella acuminata*, Bill., from a mold. Restored (Ohio).
6. *Trimerella minor*. Slightly restored from a mold of a neural valve.
7. Apophyses of *Ismenia*? (*Frenula*) *Jeffreysi*, much enlarged, from behind.
8. The same, from in front.
9. Side view of the same.
10. *Ismenia*? *Jeffreysi*, two and a half times the natural size.
11. *Magasella Gouldii*, three times the natural size.

Note. There is every reason for supposing that the restorations of the *Trimerella* here figured are essentially correct, yet, as in all restorations, it is possible that there may be some deficiencies in the representation of the more minute details.

The diagrams on the preceding plate are made as simple and as diagrammatical as possible, being only intended to show the relative position of the several parts represented by arbitrary signs.

NOTES ON DR. JAMES LEWIS' PAPER, "ON THE SHELLS OF THE HOLSTON RIVER."

(Published in Am. Jour. Conch., VI, Part III, 216, 1871.)

BY GEORGE W. TRYON, JR.

I propose in the following few pages to review the synonymy of the operculated fluviatile mollusks included in the paper above quoted. It appears that Dr. Lewis has made use, principally, of very abundant material, the result of two years' exploration of about twenty miles of the course of the Holston River by an intelligent and industrious collector—Miss Annie E. Law, of Concord, E. Tenn. I have carefully examined a large number of specimens from the same stream, collected many years since by Prof. S. S. Haldeman, and I have otherwise enjoyed advantages for the study of the *Strepomatidæ*, such as have been afforded to no other naturalist. I had the entire collections of Dr. Gould, Mr. C. M. Wheatley, Prof. Haldeman and Smithsonian Institution, Mr. J. G. Anthony's type specimens and my own collection, with facilities of comparison with the collection of the Academy of Natural Sciences, and that of Dr. Isaac Lea. The last named gentleman kindly gave me much of his valuable time and experience in perfecting the synonymy of the *Strepomatidæ*, and when I published my paper I had attained a very satisfactory knowledge of most of the species of this difficult family. I have since had but few occasions to doubt the correctness of my published views.

It will thus be seen that my conclusions, so different from those arrived at by my friend Dr. Lewis, are based upon abundant material, including specimens collected in the Holston. On the other hand, Dr. Lewis uses his Holston collection as a basis for his determinations, and however extensive it may be, I believe that a merely local collection, in this family, is not well adapted to the elucidation of questions of synonymy, especially as several of the shells which are made synonyms were not originally obtained or described from the Holston River, and as they are not well understood species, it may be suspected with some reason that their identification is apocryphal.

No. 69. ANCULOSA CINCINNATIENSIS, Lea.

This shell is stated to be the young of *A. tintinnabulum*, Lea, which is excluded from the synonymy of *A. subglobosa*. As a partial reason, it is asserted, on the authority of Mr. U. P. James, that the true *tintinnabulum* is found in the Ohio River. The shells alluded to must be a form of *A. prerosa* mimetic of *tintinnabulum*, which is of rather frequent occurrence. Mr. J. G. Anthony, who resided many years at Cincinnati, did not find *tintinnabulum* in the Ohio, but he *did* find *Cincinnatiensis*, and satisfied himself that it is the young of *prerosa*.

No. 71. ANCULOSA SUBGLOBOSA, Say.

I believe that *A. virgata*, Lea, has not been correctly identified, or it would scarcely be said to differ from *A. subglobosa* and to = *vittata*. The latter species it does not resemble at all. I am fully convinced that *A. subglobosa* and *A. tintinnabulum* are the same species, as I have examined thousands of specimens from many localities.

No. 72. ANCULOSA TRYONI, Lewis.

This I believe to be *A. tæniata*, Conrad, which does *not* exclusively "belong to a different system of drainage." A large number of species of *Streptomatidæ* are common to the waters of the Alabama and the Tennessee Rivers, and among them is *tæniata*.

Figures 101, 102 in Am. Jour. Conch. ii, p. 133, which Dr. Lewis says are varieties of *Tryoni* figured as *tæniata*, were drawn from specimens collected by Dr. Showalter in the Coosa, a tributary of Alabama River!

No. 73. ANCULOSA VIRGATA, Lea.

Evidently unknown to Dr. Lewis. See No. 71.

No. 75. ANGITREMA VERRUCOSA, Raf.

Lithasia fuliginosa is very different.

No. 76. EURYCÆLON ANTHONYI, Budd.

Lithasia Tuomeyi which Dr. Lewis thinks is the same species, undoubtedly belongs to the genus *Lithasia*. *Eurycælon* (*Anculosa*) *turbinata* is a good species; I have examined an extensive series of different stages of growth. The quite young shells resemble the young of *E. (A.) crassa*, Hald., but are more disk-like in shape, being quite depressed, wide, and with a sharp carina.

No. 82. SOMATOGYRUS CURRIERIANUS.

S. parvulus and *S. aureus* are made synonyms. I think it

doubtful whether *Currierianus* and *aureus* have been correctly determined; the three species are quite distinct.

No. 83. STREPHOBASIS CLARKII, Lea.

Dr. Lewis is in error regarding varieties approximating *plena*, *Spillmanii* and *corpulenta*. They are all very different from *S. Clarkii*.

No. 88. TRYPANOSTOMA CURTUM, Hald.

This is placed in the genus *Trypanostoma* because, on the authority of Dr. Hartman, whose paper is published in a recent number of the Am. Jour. Conch., the operculum differs generically from that of *Strephobasis*. I have satisfied myself that no generic or specific characters of value are to be found in the opercula of the *Strepomatidæ*; hence it should be replaced in *Strephobasis*.

To this unfortunate species is referred a synonymy embracing eleven species, belonging indubitably to three different genera! I may not take the time to disprove this wholesale reduction of species, and perhaps it is not necessary that it should be done. Dr. Lewis modestly "suggests" the synonymy, not as entirely conclusive but deserving of inquiry; but it should be distinctly understood that every species should remain unquestioned (in print) unless it can be *proved* to be a synonym; otherwise we have "confusion worse confounded."

Upon the invitation of Dr. Isaac Lea I have carefully re-examined his types of the species included in Dr. Lewis' strange synonymy, resulting in a renewed assurance that my original determinations respecting them were correct. I suspect that some of the supposed synonyms have not been correctly determined. A very large suit of *Str. curta* was included in Prof. Haldeman's Holston River collection.

No. 90. TRYPANOSTOMA GRADATUM, Anthony?

If these shells resemble externally a *Strephobasis*, then I am afraid they have not been correctly determined.

No. 95. TRYPANOSTOMA UNDULATUM, Say.

Why does Dr. Lewis include this species in his list, when, in the same paragraph, he admits his inability to recognize it?

I have neither the time nor inclination to demonstrate at length the reasons for believing Dr. Lewis to be in error in all the above instances, and perhaps it is sufficient to indicate the more palpable mistakes as I have done, and in other cases merely express my dissent from his views. As soon as my complete monograph of the family *Strepomatidæ* is published by the Smithsonian Institution, students will have better means of determining the species correctly than those now available.

NOTE ON THE GENUS ANISOTHYRIS, CONRAD, WITH A DESCRIPTION OF A NEW SPECIES.

BY W. H. DALL.

The shells described by Mr. Conrad, Prof. Gabb and Mr. H. Woodward, of which a large proportion come under the above designation, are, from the laminated colored clays of the Amazon Valley, identical, according to Prof. Orton, with the "Drift" of Prof. Agassiz. They are from Pebas, near the mouth of the Ambiyacu; and Pichana on the south side of the Marañon, and are also reported from other localities. While further information in relation to their stratigraphical position would seem desirable, from any point of view they form a very interesting group. The authors above mentioned unite in regarding them as mostly brackish water forms; some of them undoubtedly are, but on the whole I am inclined to the belief that the fauna was more strictly marine than it has been regarded, and that the intermixture of fresh water and land shells may have been due to their having been washed into the estuary in which the marine forms were indigenous. This view receives some confirmation from Mr. Woodward's remarks in reference to *A. tenuis*. Many of the genera, judging from their recent representatives, are exclusively marine, as far as we know, and there are none of them, except *Hemisinus* and *Bulimus*, which may not have lived in unadulterated sea water. Some of them are types of which we have no recent representatives, and on these we can make no decisive observations. The aspect of the shells, the well preserved colors, epidermis, and even remains of the cartilage, show conclusively that they are of very late geological age, and I am of the opinion that they cannot be older than Pliocene, and are perhaps later. In this supposition I am supported by older and much more experienced paleontologists.

Genus CORBULA, Brug.

Corbula, Brug., Enc. Meth. Pl. ccxxx, 1792. Lam., Hist. An. s. Vert. v. p. 494, 1818.

Subgenus ANISOthyris, Conr.

Pachydon, Gabb, Am. Journ. Conch. iv, p. 198, 1869.

Anisothyris, Conrad, Ib. vi, extra, published in advance, Oct. 10, 1870. H. Woodward, Annals and Mag. Nat. Hist. ser. iv, vol. vii, p. 104, Feb. 1871.

Not *Pachydon*, Schum., Essai, p. 139, (as *Paxyodon*) 1817.

The nomenclature of this group is somewhat involved. It is a mooted question whether we may rightly alter a name given by an author to correspond with our own ideas of correct spelling and derivation. When the derivation is given and the spelling is manifestly erroneous it may be quite proper to correct it, even if, by so doing, we reduce the name to the rank of a synonym. When no derivation is given and we are left to our own resources to determine the correctness of the name, I am inclined to the opinion that we have no right to change it. Neither Schumacher nor Gabb gave any derivation, and while it may be said that it is sufficiently obvious, yet in matters of this kind it should not be permitted to take anything for granted, more especially when such a course is calculated to throw stumbling blocks in the path of study with the sole result of vindicating the supposititious classical learning of the innovator. Such a course is in the nature of an *ex post facto* law.

Nevertheless, in the present case I prefer to follow Messrs. Conrad and Woodward in adopting the name *Anisothyris*, in a modified sense, though I do not justify the proceeding.

Recent as is our knowledge of the group, several very grave errors have marked the publications upon it.

Prof. Gabb, in associating it with *Isocardia*, was undoubtedly mistaken, as has been pointed out by Mr. Conrad. It has little or nothing in common with that genus (or family), except the spiral beaks of some of the species.

The following extraordinary and entirely erroneous statement is made by Mr. Woodward in his paper above quoted :

"The recent species (of *Corbula*, Azara, *Neera* and *Cardilia*) all have the umbones directed toward the posterior (siphonal) end ; in the fossil species (of *Anisothyris* ?), on the contrary, the umbones look toward the anterior side. We find also that the cardinal tooth is in the left valve in the recent, and the right valve in the fossil shell, and the socket *vice versa*."

After a most careful comparison of the forms comprised under the name *Anisothyris* with the recent *Corbula ovulata*, *C. crassa*, *C. nuciformis* and three undetermined species from Panama, Japan and China, and with the fossil *Corbula pyriformis*, Meek, (Nevada tertiaries), *C. gibbosa*, Lea (Alabama eocene), *C. oniscus*, Conr. (do.), and *C. nasuta*, Conr. (do.), I am prepared to state

unreservedly that no constant differences whatever are to be found between the true recent and fossil marine *Corbulæ* and the species of *Anisothyris*!

The teeth, muscular impressions, beaks and sculpture vary among the species of *Corbula* as they do among the species of *Anisothyris* and so on interchangeably.

Taking any one of the characters which at first sight appear to characterize *Anisothyris*, and comparing its different species and the different species of *Corbula*, it will be found that there is as much difference between the different species of the former as there is between some of its species and species of *Corbula*.

Neither the obliquity of the beaks, nor their spiral form, nor the inequivalve shell, nor the form and size of the teeth, nor the hinge line, nor the external sculpture, nor the general form of the shell, have any generic constancy, or difference (except in gradual and almost insensible degrees) from true *Corbulæ*. The muscular impressions, pallial line, &c., are relatively and precisely similar in both, with the exception of differences which are not constant in the same species.

I therefore feel hardly justified in retaining the name at all, and only do so because, on the whole, there is a general physiognomy which is somewhat peculiar, though valueless when subjected to rigid criticism; and the following characters are especially emphasized in most of the species.

The beaks are usually (but not always) more oblique and more posterior and more spiral than in most *Corbulas*, and the external surface is usually smoother, though often exactly like that of typical *Corbulas*. In consequence of the obliquity of the beaks the teeth and hinge line are similarly affected in such cases.

I feel entirely warranted in asserting that no positive diagnosis can be drawn up, including the characters of all the species of *Anisothyris*, which will not apply as well to the genus *Corbula* as a whole.

The type of the group is *Anisothyris obliqua*, of Gabb, (l. c. p. 199.)

Mr. Woodward, forgetting the axiom, that "a name is a name and not a definition," changes the *A. tenuis*, Gabb, to *A. Hauxwelli*, Woodw. This proceeding is akin to those of the earlier authors, who have created in this matter so much confusion for later students, and it is to be hoped that it will be reprobated as it deserves by other authors. The only basis for the change consists in the opinion of Mr. Woodward that the shell is not "thin!" It would be well for him to consult the preface to

Adanson's Senegal, p. xv, et. seq., where he will find that the eminent French naturalist, on account of the dire confusion caused in science by the frequent changes of names from their real or fancied inapplicability, was driven to the expedient of inventing "nonsense names," which should have no meaning at all, in order that no one should have an opportunity of changing them on the ground that if one were "thick" another was "thicker," and hence name number one must be discarded!

It may not be amiss to add that the younger specimens of *A. tenuis* before me, such as Prof. Gabb had for description, are decidedly thinner in proportion than those of the other species with which he was acquainted.

CORBULA (*ANISOTHYRIS* ?) *LEDÆFORMIS*, n. s. Pl. 16, fig. 14, 15.

Shell somewhat compressed, nearly equivalve. Posterior end much produced; truncated obliquely at the extremity. Anterior end rather long; dorsal margin forming an acute angle with the ventral margin; the last nearly straight. Beaks erect, inconspicuous, not oblique, slightly curved anteriorly. Teeth in general as in the other species, slender, small. Externally sculptured as in *Leda*, with a carina extending posteriorly and giving a somewhat double-tube-like appearance to the interior of the siphonal produced extremity. Length .3 in., height .14 in.

A single specimen of this very distinct species was found in a lump of the agglutinated fossiliferous clay sent by Prof. Orton to the Smithsonian Institution. It is very much longer and more compressed than young specimens of *A. carinata*, of the same size relatively, and bears no resemblance to any of the others. It is probably young, but not the young of any of the described species.*

List of the bivalves of the formation.

<i>Corbula</i>	(<i>Anisothyris</i>)	<i>obliqua</i> ,	Gabb.
"	"	<i>tenuis</i> ,	Gabb.
"	"	<i>ovata</i> ,	Conr.
"	"	<i>cuneata</i> ,	Conr.
"	"	<i>erecta</i> ,	Conr.
"	"	<i>carinata</i> ,	Conr.
"	"	<i>ledæformis</i> ,	Dall.

Tellina Amazonensis, Gabb.

Anodon Batesii, H. Woodward.

* Mr. Woodward is in error in stating that *Ebora* "closely resembles *Lacuna*," which is not a "North American genus" exclusively, nor does it "inhabit brackish water," but is found in the littoral and laminarian zones in salt water.

**DESCRIPTIONS OF SIXTY NEW FORMS OF MOLLUSKS
FROM THE WEST COAST OF NORTH AMERICA AND
THE NORTH PACIFIC OCEAN, WITH NOTES ON OTHERS
ALREADY DESCRIBED.**

BY W. H. DALL.

The shells described in this paper are from many different sources, of which two deserve special mention.

While acting as Chief of the Scientific Corps of the Western Union Telegraph Expedition, in 1865-6, I obtained leave of absence for three weeks, and proceeded to the town of Monterey, some ninety miles south of San Francisco, on the coast of California. This was in the month of January. During my stay, I devoted my entire time to the examination of the Mollusk fauna of that locality, which is very rich and varied. The results of much arduous labor (I was unable to dredge), in which I was most kindly seconded by Dr. C. A. Canfield, of Monterey, may be found briefly summed up in the Proceedings of the California Academy of Sciences.* I prepared at that time a faunal catalogue of the shells of Monterey, with notes on habitats, and on such species as appeared to be undescribed. Copies of this MS. were sent to Dr. J. G. Cooper, R. E. C. Stearns, Esq., the late Dr. A. A. Gould, Dr. P. P. Carpenter, Dr. Wm. Stimpson, and Mr. Geo. W. Tryon, Jr., for examination and corrections or suggestions, in March, 1866.

Being called away by duties which took me to the confines of the Arctic Circle, I thought it best, in view of the fact that we were almost entirely without books or typically named shells in California, to defer the publication of this paper until my return. Meanwhile, the types of my collections were sent to Dr. P. P. Carpenter, of Montreal, the most eminent authority on the Mollusks of the West Coast of America, for his examination. Subsequent study has shown the wisdom of this course, several of the species having been incorrectly determined for want of types.

* Vol. iii, p. 271, 1866.

and others having been already named in MSS. by Dr. Carpenter.

During the two years following, the dredging which I was able to do in the North, and the collections of shells made in Alaska by the Scientific Corps under my charge, added a mass of very interesting material, which, on my return, yielded a number of new and rare forms. Most of these were also submitted to Dr. Carpenter, to assist him in his work on the shells of California, in preparation for the series of the Geological Survey of that State.

I had anticipated presenting a thorough report on these mollusks, including anatomical details and a complete revision of their synonymy; but up to the present time, such have been the unexpected and annoying delays in the return of the types, some of which have not yet reached me, and the multiplicity of other duties, that I have not been able to prepare for publication more than a very small portion of the mass of notes, drawing, anatomical details, &c., which have accumulated. As I am again called away by unavoidable duties to the extreme northwest coast, I have thought it best to prepare diagnoses of most of the new species, and a very few of the anatomical and other notes which are in a state for publication. Any deficiencies in the present paper must therefore be regarded in the light of the circumstances which have rendered them unavoidable.

That portion which relates to the Pteropods, Nudibranchs and naked mollusks generally, must be regarded as provisional, careful drawings having been taken from life, which, with the results of dissections, are reserved for future publication.

I trust to be able to add largely to our present knowledge of the fauna of the coast of Alaska and the Aleutian Islands, in the course of the explorations and dredgings which I am about to undertake in that region, under the auspices of the U. S. Coast Survey.

Among the collections which have afforded interesting species or notes, are to be especially mentioned those of Prof. R. Pumpeley, on the coast of Japan; Dr. E. Palmer, on the shores of the Gulf of California; Dr. J. G. Cooper, R. E. C. Stearns, Esq., and others.

I am indebted to Dr. P. P. Carpenter for suggestions and corrections to my Monterey paper, and in regard to the other, more northern, collections; also to the Smithsonian Institution, in charge of Prof. Joseph Henry, for the use of their collections and library during these researches.

It is to be anticipated, as material for study becomes less limited and opportunities for comparison more numerous, that many

of the forms which have been named as species will be consolidated. This is especially likely to be the case in the genera *Odostomia*, *Bittium*, *Lacuna*, *Cerithiopsis*, *Scalaria* and others. Some now considered distinct will probably be found identical with North Atlantic species; while, on the other hand, I am convinced that many of the forms which have been considered identical with European Crag fossils, will prove, on examination of larger series, to be quite distinct.

I am also impressed with the belief that the zoological provinces of the coast, from Panama to Bering Sea, will require much modification. There seem, indeed, to be but two well-marked faunæ—one, the Northern, merging into the Indo-Pacific in the Japanese seas, and into the Middle American in the vicinity of San Diego or somewhat south of it; and the Middle American fauna, from that region to the coast of South America. Beside this we have the Boreal or Circumpolar Province. The two former are at best of subordinate rank, and, with that of South America, may form a Pacific, in contradistinction to the Indo-Pacific Province.

That the distribution of mollusks and other marine animals is governed principally by temperature and not by depth, is no new theory. I became convinced of its truth after a short experience in dredging in the North Pacific, and every new investigation adds weight to the same view, which, after the various deep-sea explorations, may be taken as proven. I long since showed that the cod, the sea-bear and sea-lion, beside other marine vertebrates, are affected by similar influences.

That temperature is not the sole agent in determining their distribution must, however, be conceded. Something is due to the character of the bottom, something to the supply and nature of their sustenance, and something to those mysterious geographical laws, of whose workings we have as yet only a bare inkling, in Ornithology, but which cannot remain much longer without elucidation.

Class **CEPHALOPODA.**

ARGONAUTIDÆ.

ARGONAUTA PACIFICA, Dall.

Argonauta Pacifica, Dall, Am. Nat. iii, p. 237, 1869.

Argonauta argo, Cooper, not Linné.

? *Argonauta argo*, Rve., Conch. Icon. fig. 2 c.

I have elsewhere stated my opinion that the Argonaut, so common at certain periods on the coast of California, is entirely

distinct from the Mediterranean *argo* and also from the Indo-Pacific *A. maxima*. The materials at my command have, however, been rather limited, and the press of other work has prevented me from giving due attention to the subject. The animal of the Californian species is orange, with a sprinkling of fine purple dots, more crowded and larger on the back. The proportions of the arms are different from those of the *A. argo*. The first pair are a little the longest; the second next in length, while in *A. argo* they are the shortest; the third pair are the shortest, and the fourth equal to the third. The web extends along only one-half of the fourth pair, and is proportionately smaller than in *A. argo*; the siphon is shorter, with a blunt elbow. The dentition also differs. The central tooth is proportionately larger, much broader, and slightly convex in the middle line in front. The first lateral is smaller, and the inner corner is produced into a denticle. The second lateral is proportionately larger, and the third narrower and smaller than in *A. argo*. The shell is more ventricose, and the arrangement of the sculpture and tubercles is different from that of the Mediterranean species.

More material, however, is needed to complete the comparison of the shells. I have no doubt that it will be found, as I have shown in the case of other very distinct species, that each is limited to its own zoological province.

ONYCHOTEUTHIDÆ.

ONYCHOTEUTHIS, Licht.

ONYCHOTEUTHIS? LOBIPENNIS, n. s.

Body short and inflated, somewhat cup-shaped. Ventral posterior portion rounded and produced, giving the animal a decidedly pot-bellied appearance. Anterior portion slightly constricted or concave behind the edge, which is oblique, roundly excavated in front, and produced into a sharp point in the median line behind. Back slightly keeled. Fins rounded ovate on each side, not continuous around the posterior extremity, which is produced into a conical point. Nuchal collar prominent, keeled in the median line behind and on each side of the funnel; margin interrupted by the funnel, otherwise entire. Head rather swollen. Eyes large, blue in life, with a black inner ring. Color yellowish white, with brown ocellated spots on the back and sides, and brown specks on the arms and head. Sessile arms subequal, tentacular arms somewhat longer. Length of pairs: i, .8; ii, .9; iii, 1.3; iv, .9; v, .8 in. Length of back, along dorsal keel, .7; do., on ventral surface, .5; max. diam.,

·43; width of back, ·46; width of fins, ·66 transversely, ·23 longitudinally. Length of head and collar on the dorsal line, ·4; total length, 2·2 in. Diameter of eye, ·2 in. Cupules in two rows. Two hooks in the median line of the extremities of each of the tentacular arms between the cupules. Mouth surrounded by a six-keeled frill of integument.

Habitat, caught in the towing net off San Francisco, Cal., in lat. $37^{\circ} 22'$ and lon. $140^{\circ} 10'$, one specimen, Dall., July 17, 1865. Coll. reg. No. 302.

This pretty little species is doubtfully referred to the genus *Onychoteuthis*. It is well characterized by its pot-bellied appearance and narrow rounded fins. The posterior part of the funnel is very globose.

LOLIGINIDÆ.

LOLIOLUS, Steenstrup.

Loliolus, Stp., Wieg. Arch. 1856, i, pl. x, p. 256.

LOLIOLUS STEENSTRUPI, n. s.

Animal in general form much resembling *L. typus*. Body elongate, cylindrical, tapering near the end to a rounded point behind. Fins semicircular, on each side, continuous around the end of the body, but very narrow there.

Anterior edge of the body with a wide shallow sinus below the siphon, produced at each side of it, and with a linguiform process in the median line of the back, extending forward between the eyes. Anterior arms with two rows of cupules, a web extending from the outer edge of each to the third pair, forming a sort of sheath for the long second pair. Second pair cylindrical, lanceolate at the ends, with about three rows of cupules, very irregularly disposed; no hooks. Third pair stout and thick; fourth smaller; fifth quite small; all with two rows of cupules. Respective lengths: i, ·3; ii, ·7; iii, ·4; iv, ·2; v, ·14 in. A band of membrane, forming a six-sided figure, passed around the mouth, inside of the bases of the arms. Total length, 1·7 inch. Diameter of body, ·3; of disk of fins, ·5. Length of body, ·8 in. Color yellowish white, with round spots and ocelli of various shades of purple; a large purple blotch behind each eye.

"Pen" deeply grooved in the middle, as long as the body, shaped like that of *Sepioteuthis* as figured by Chenu, but with the "quill" proportionately longer.

Habitat, Gulf of California, obtained near the mouth of the Colorado River by Dr. Edward Palmer.

Class **GASTEROPODA.**

PLEUROTOMIDÆ.

BELA, Leach.

BELA? LÆVIGATA, n. s.

Shell short, stout, of four or five robust whorls, smooth, or with excessively fine revolving lines; spire short, usually one-third or less of the total length, but varying somewhat; suture distinct but not channelled, whorls not turrited, apex rather obtuse, nucleus minute, whitish, smooth, of a whorl and a half; aperture about two-thirds as long as the shell, wide; outer lip effuse, sutural sinus more or less marked; canal short, straight, wide; exterior sometimes marked with rather rugged lines of growth, or quite smooth, but not polished; color livid purple, with a superficial wash of white, a solid white line below the suture, anterior extremity of the columella white, callus evident but not conspicuous. Lon. .33, lat. .2 in. Defl. 65°.

This very peculiar little shell is of a solid and rugged aspect, even living specimens looking as if beach-worn and dead.

It varies in the roundness of the whorls and the elevation of the spire. Living specimens sometimes present no revolving lines, while others show excessively fine ones. A variety (?) *tenuilirata*, is pure white, with distinct revolving lines decussated by regular lines of growth. Only one specimen of this description was found, which is even more globular than the typical form, and has a deeper sinus and narrower aperture. It may be distinct.

Dr. Carpenter suggested that it was the fry of a *Buccinum*, and, while my opinion was strongly adverse to this, as the shell has a distinct nucleus of its own, differing from that of the *Buccinums* of that region, I should hardly have felt willing to describe it had I not found living specimens.

The animal is identical with that of *Bela*, but the operculum is more like that of *Drillia*, as it wants the pointed spur figured by Adams in the operculum of *Bela nobilis* (Gen. Rec. Moll. pl. x, f. 3 a, b.) Its depressed spire and smooth whorls differ from the typical *Bela*, and it may eventually require a section to itself.

Habitat, Norton Sound, Alaska Territory, at the Fort of St. Michael, on the beach, dead, in very large numbers, and alive among stones at low water.

MANGELIA? ALASKENSIS, n. sp.

Shell elongate, fusiform, of a reddish or purplish brown, of

eight evenly rounded whorls; aperture less than half and more than a third as long as the shell, rather narrow; outer lip thin, sharp; columella straight, with a slight callus; canal short, wide, very slightly recurved; sutural sinus obsolete. Sculpture of almost imperceptible revolving lines, crossed by oblique longitudinal ribs, waved near the suture and obsolete on the lower half of the whorl. Lines of growth irregular, quite evident; epidermis thin, olivaceous; whorls slightly shouldered; nucleus and first few small whorls whitish; nucleus smooth, obliquely bent, minute; suture deep, impressed; a slight callus on the columella. Interior of the aperture polished, smooth, fuliginous. Ribs rather strong on the upper whorls. Lon. $\cdot 8$, lat. $\cdot 3$ in. Defl. 40° .

Habitat, Unga Island of the Shumagin group, in the North Harbor, four fathoms, muddy bottom; one specimen living; Dall, 1866.

This shell may possibly be a *Bela*, though the whorls are not cancellated, the columella not flattened, and the shell hardly turritid. I have compared it with the North European forms of *Bela* and with all the types of the West Coast species of *Mangelia* in the Smithsonian collection, and find nothing which resembles it.

MANGELIA ALEUTICA, n. s.

Shell pure white, elongated, acuminate, of seven whorls carinated above, though not very strongly. Aperture narrow, long, two fifths the length of the shell; outer lip sharp, thin, strongly flexuous, produced below, sinus close to but not on the suture, not very deep or prominent; canal one-third as long as the aperture, straight, narrow; columella smooth, almost straight, without callus; nucleus smooth white, pointed, drawn out; sculpture consisting of longitudinal ribs thirteen or fourteen on the last whorl, obsolete on the lower third of the whorl and not extending to the suture, below which is a smooth band only marked by oblique lines of growth; ribs slightly nodulous at their posterior terminations (where they are united by a slight carina) strong on the upper whorls, slightly flexuous on the convexity of the whorl. Whorl below the carina marked by very faint grooves close together and passing over the ribs, stronger at the anterior end of the last whorl. Lon. $\cdot 68$, Lat. $\cdot 24$ in. Defl. 35° .

Habitat, with the last; three specimens, Dall, 1866.

This species has relations with *M. angulata* and *M. crebricos-*

tata, Cpr. It is much larger and differently colored from *angulata*, and the carina in that species is near the middle of the whorl, the grooves are much stronger and the ribs reach the suture, which is not as deep as in the *aleutica*. In *crebricostata* the whorls are not so much angulated, the ribs pass from the suture to the lower end of the whorl, and the mouth is narrower and longer. The shell is also much more slender and smaller. These comparisons have been made with the typical specimens.

MANGELIA FUNEBRALE, n. s.

Shell reddish black, small, slender, acuminate; whorls seven or eight, rather rounded; aperture elongate, narrow; canal short, slightly recurved. Inner lip and columella smooth; sinus almost imperceptible. Sculpture consisting of fine rounded grooves about fifteen in number on the last whorl, rather stronger on the convexity of the whorls, separated by evenly rounded ridges about twice as broad as the grooves. These are crossed by rounded, regular, longitudinal ribs, about twelve in the last whorl obsolete on the anterior end of the whorl; suture impressed, not deep.

Lon. .46, Lat. .16 in. Defl. 30°.

Habitat, Sitka, Alaska Territory, one specimen; F. Bischoff, of the Scientific Corps of the W. U. Telegraph Expedition.

After a careful comparison with types I find no species at all resembling this from the Upper Californian coast. I refer it to *Mangelia* with some doubt, as that and allied genera stand sadly in need of careful revision and definition.

DAPHNELLA FUSCOLIGATA, n. s.

Clathurella? indet. Dall, MSS., 1866.

Shell fusiform, slender, solid, of four or five whorls; spire half as long as the shell, aperture the same; the latter narrow, with no perceptible sinus, and a short open canal; columella and outer lip smooth. Sculpture consisting of strong, revolving, elevated lines, six on the last whorl, crossed by strong, regular, longitudinal costæ of about the same size, twelve on the last whorl. These ridges are remarkably uniform, and their intersections produce a very conspicuously regular reticulation. The longitudinal ridges are, perhaps, a little thicker on the convexity of the whorls than above and below. General coloration white, with a reddish brown band between the suture and the first revolving ridge, another between and including the third and fourth ridges, the other revolving ridges being dotted with brown be-

tween their intersections with the costæ. These intersections, especially on the last whorl, appear somewhat nodulous.

Lon. 29, lat. 13 in. Defl. 30°.

This pretty little species belongs in the same group with "*mitromorpha*," *aspera* and *filosa*. The sculpture differs from *D. filosa*, and it is larger than and differently colored from *D. aspera*, which otherwise somewhat resembles it, but is much more acuminate at both ends, and more slender.

Habitat, Monterey, two specimens dead on beach; Dall, 1866.

CLATHURELLA, Cpr.

Clathurella, Cpr.; Maz. Cat. p. 399, 1857.

= *Defrancia* Millet 1826, not of Bronn, 1825.

(*Defrancia*, Bronn = *Pelagia*, Lamx., 1821, not of Pèron & Leuseur 1809, nor Quoy & Gaim., 1832.)

The acceptance of the generic name *Clathurella* depends primarily upon the stability of the genus *Pelagia* of Peron and Leuseur. I have been recently informed that this genus was not accepted by naturalists. If this be the case, *Pelagia*, Lamouroux, would stand, to the exclusion of *Defrancia*, (Bronn) which would in turn supersede *Clathurella*, for the present genus. As I have not had opportunity of verifying this information, for the present I prefer to retain the term *Clathurella*.

CLATHURELLA CANFIELDI, n. s.

Shell solid, elongated, turritid, of five or six whorls; apex pointed, nucleus small, hyaline, of one whorl, smooth, subsequent whorls more or less shouldered or carinated above, or rounded, suture impressed rather deep. Aperture less than half and more than a third as long as the shell, rather narrow; outer lip thickened, very effuse, internally ridged with from three to six elevated lines terminating in tooth-like nodules. Canal short, rather wide. Sinus somewhat below the suture, deep and prominent with the portion between it and the suture, forming a toothlike projection on the upper part of the inner lip. Columella smooth in the young, with from one to four crenulations or nodules in the adult, near the anterior end. Upper portion smooth. Sculpture consisting of revolving rounded even ridges, sixteen or less on the last whorl, crossed on the upper part of the whorl by numerous indistinct longitudinal plications, which vanish on the lower half of the whorl. One of the revolving ridges near the suture is sometimes stronger than the rest, giving a carinated shouldered or tabulate appearance to the upper portion of the whorls. Color yellowish white with three purplish

bands often absent, wholly or in part, one on the lower, one on the middle and one on the upper portion of the whorl. These are only apparent on the last whorl in most cases.

Lon. .32, lat. .14 in., defl. 35°.

Habitat, Monterey, California; dead on beach, ten specimens; Dall, 1866.

The species of *Clathurella* with crenulated inner lip and thickened striated outer lip and deep, subsutural sinus may eventually require a section for themselves as distinguished from those with a smooth columella and outer lip and inconspicuous sinus. The above species and the next would belong together in that section of the genus. They can hardly be placed in *Borsonia* or *Cordiera*, as the crenulations are not true plicæ, and the outer lip in those genera is thin and simple, and the sinus is sutural and almost obsolete.

The nearest ally of *C. Canfieldi* is the following species:

CLATHURELLA AFFINIS, n. s.

Shell resembling the last but smaller, though with as many whorls. Sculpture similar, but much coarser and stronger, with the longitudinal plicæ represented by strong rounded ribs, which pass clear over the whorls, which are more inflated than in the last. Aperture smaller and narrower than in the last, less than one third as long as the shell. Canal very short and narrow. Outer lip internally lirate, much thickened with two strong toothlike dentations. Inner lip with four or five crenulations on the columella. Coloration livid purple with a single white band on the middle of the last whorl, which appears just above the suture on the next whorl.

Lon. .25, lat. .11 in., defl. 30°.

Habitat, Cape St. Lucas; 1 specimen; J. Xantus. Cab. Smithsonian Institution, No. 4084.

DRILLIA KENNICOTTI, n. s.

Shell solid, acuminate, white, with traces of a thin yellowish epidermis. Columella twisted; canal slightly recurved; inner lip with a thin white callus; outer lip strongly flexuous, deeply excavated below the suture, exceedingly effuse anteriorly, thin and sharp. Nucleus smooth, white, small, obliquely bent. Sculpture of the upper whorls consisting of a very strong, broad, rounded carina, a little below the middle of the whorl, flattened on top, with a faint revolving ridge on each side of it, the lower one just above the suture, which is appressed. The whorls are quite flat except for the ridges and carina, and marked by strong

oblique lines of growth. Last whorl flat above the carina and rounded below it. The ridge below the carina becomes almost as large as the latter, which is less prominent than upon the upper whorls. Below the ridge alluded to are others gradually diminishing in size anteriorly to the number of eight or ten, of which only two or three are at all prominent.

Lon. $\cdot 84$, lat. $\cdot 36$ in., defl. 30° .

Habitat, North Harbor, Unga Island, in six fathoms, muddy bottom, Dall, 1865.

I take a melancholy pleasure in dedicating this beautiful species to the memory of the lamented Robert Kennicott, first Director of the Scientific Corps of the W. U. Tel. Expedition, well known by his labors in the cause of science, and a martyr to his devotion to them, in the field. It has a remote general resemblance in miniature to the large *Pleurotoma oxytropis*, Sby., from Panama, but is not closely allied to any species known to me, or figured in the monographs.

MARGINELLIDÆ.

PERSICULA DUBIOSA, n. s.

Shell stout, solid, very thick and rather broad. Form less attenuated than that of *P. phrygæa*, posteriorly; shorter and stouter than *P. imbricata*. Apex covered with a thin, even layer of callus. Labium and labrum nearly parallel. Outer lip moderately thickened, inner with a moderate deposit of white callus. Outer lip nearly smooth, with a few faint grooves on the internal margin near the posterior end. Inner lip with one broad fold, grooved in the middle, two plicæ above and one (forming the posterior termination of the columella) below it. Notch deep and oblique, a shallow sinus at the anterior extremity of the outer lip. Color lively yellow brown, with uncertain fluctuating white bars, spots and streaks irregularly disposed, with a general tendency to elongation in the direction of the lines of growth. Callus above the spire marked with a circle of radiating brown dots, with an obscure white band outside of them; a dark brown patch on the outer edge of the outer lip.

Lon. $\cdot 3$ in., lat. $\cdot 2$ in.

Habitat, Acapulco, Mexico.

One specimen was obtained from half a bushel of fragments and beach worn shells, purchased by me at Acapulco, in October, 1868.

It is at once distinguished by its color and markings from any other of the west coast species. The plications of the inner and

outer lips are much fewer than in *P. imbricata*, which is a much longer, larger and more pyriform shell. *P. phrygæa*, beside its totally different markings, has three times as many plicæ, is much thinner, more delicate, and much more pointed behind.

I have obtained *P. catenata*, Phil., or a form entirely undistinguishable from it, from Panama, Cape St. Lucas and the Galapagos Islands. It is a common West Indian species.

BUCCINIDÆ.

Genus VOLUTHARPA, Fischer.

Volutharpa, Fischer, Journ. de Conchyl. v, p. 85, 1856.

Bullia sp., Jay, Middendorf.

1. VOLUTHARPA AMPULLACEA, Midd., Bull. Phys. Math. Acad. Sci. St. Petersb. vii, No. 16. Beitr., Mal. Rossica, p. 179, 1849. Sibirische Reise, Bd. ii, p. 237, pl. viii, f. 3, 4, xvii, f. 1—3, 1851.

Volutharpa Deshayesiana, Fischer, Journ. de Conchyl. v, p. 86, pl. iii, f. 8, 9. 1856.

Hab., South coast of the Ochotsk Sea, Mid. Plover Bay, Eastern Siberia, Dall.

2. VOLUTHARPA PERRYI, Jay.

Bullia Perryi, Jay, Perry's U. S. Japan Exp., vol. ii, p. 295, pl. v, f. 13—15, 1857.

Volutharpa Perryi, Möerch, Journ. de Conchyl. vii, p. 44, 1858.

Hab., Bay of Yedo, Japan.

3. VOLUTHARPA AMPULLACEA, var. *acuminata*, Dall.

Shell with a sharper and longer apex than *V. ampullacea*; last whorl less rounded above, columella much less arched, in fact nearly straight, not concave in the middle and projecting at the anterior end as in that species; outer lip much less effuse and canal much narrower. In the typical *ampullacea* the epidermis is thin yellowish, and in perfect, fresh specimens covered with minute, very short cilia, caused by the elevation of minute threads of the epidermis at the intersection of the crowded fine revolving striæ which cover the whorl, with the lines of growth. In some apparently perfect specimens, however, the epidermis appears perfectly smooth and even polished. In the present variety, however, the epidermis is much thicker and stronger, almost pilose, though preserving the same general characters. In both the suture is canaliculated.

Habitat of the variety, Sitka, Alaska Territory, in abundance, Dall and Bischoff.

The *Volutharpa Mærchiana*, Fischer, (Journ. de Conchyl. vii, p. 299, Mar., 1859,) is, without doubt, a depressed variety of the North Pacific form of *Buccinum cyaneum*, Brug. This has been confirmed by the examination of specimens, but is sufficiently evident from the very good figures in the Journal de Conchyliologie.

Apropos of this species, M. Fischer observes that it forms a passage from *Volutharpa* to *Buccinum*, which, as far as the shell is concerned, is quite true, except that the suture is not canalculated, which alone, conchologically, would remove it from *Volutharpa*, all the forms of which have a channelled suture.

The *Volutharpa Perryi* is insufficiently described and figured, yet appears specifically different from the *ampullacea*. The dimensions are not given, but if the figure be of natural size, it is much larger than that species.

Although M. Fischer expresses doubts as to the validity of his genus, in view of the differences of the ovi-capsules, dentition and soft parts, it must be considered as well sustained, after eliminating the stranger whom he had inadvertently admitted.

Troschel (Geb. der Schn. ii, pl. vi, f. 14) figures the dentition of a species which he refers to *V. Perryi*. It differs in some particulars from that of *Buccinum*. He also states that the animal was without an operculum. Other authors do not mention an operculum.

With regard to the *V. ampullacea*, a very remarkable fact may be mentioned. The majority of the individuals are without opercula, even without a trace of the pad-like gland or area from which the operculum is secreted. About ten per cent. of the individuals of the var. *acuminata* which I have examined had traces of this gland or area, marked by its smooth and rather whitish surface on the granulous dark slate colored foot. About fifteen per cent. *had well developed opercula* in the proper position. I have ascertained the same to be the case with regard to the typical form, from alcoholic specimens, collected by Dr. Stimpson in Belring Strait. There is no mistake about this, strange as it may and must appear, that different individuals of the same species are indifferently operculate or inoperculate.

A careful examination of this appendage reveals some singularities in it worthy of note. At first the operculum is of an ovoid form, with the nucleus near the edge at the larger end, and increases by additions around the edge, but principally upon the smaller or upper end. However, at some late period of its

growth it takes a new start, and, seemingly, a new operculum is commenced underneath the old one, with a central nucleus which increases by annular additions, and finally has its edges very much thickened and curved upward, giving it a saucer-like appearance, while the old operculum seems as if laying upon the saucer, with its nucleus and some of the adjacent portion projecting over the edge anteriorly. It has in all a diameter of .1 in. The drawings of this operculum were made under a camera, and correctly represent it. That its form is not due to an individual abnormality is evident from the fact that all the specimens examined were similar.

The ovicapsules are not at all like those of *Buccinum*, but rather like those of *Busycon*, though smaller, consisting of disk-like capsules, united by one edge to a ribbon or stalk, as in *Busycon*. They contain from eight to twelve embryos, which attain the length of .12 in., and a shell of two whorls, which, except in the absence of epidermis, essentially resembles the adult. The first whorl, however, is whitish and amorphous, and very fragile; it is large for the size of the embryo, and is invariably lost in shells which have attained maturity. The remainder of the embryonic shell is translucent purplish red, or wine-color, with revolving lines. I found the embryos on the point of escaping from the ovicapsules in September. The disks of the capsules are three-quarters of an inch in diameter and two tenths of an inch thick, with the edges perpendicular to the top and bottom, and the angles serrate or furnished with slight coriaceous, projecting points.

Defl. 65° in the var. *acuminata* and 90° in the typical form; lat. .5 and .7; lon. .8 and .9 in., respectively.

BUCCINUM FISCHERIANUM, n. s.

Shell almost precisely the shape of *Volutharpa* var. *acuminata*, and with the same number of whorls, but four times as large.

Epidermis smooth, thin, yellowish, marked with very fine, wavy, revolving lines, much finer than those of *Volutharpa*, and not ciliated. Surface of the whorls smooth, but marked with rather evident lines of growth, which are raised into plicate rugosities near the suture, which is appressed and not canalculated. Whorls inflated, amply rounded, solid, porcellaneous and strong. Aperture elongate-ovate; outer lip thickened, broadly, effusely arched. Peristome white. Throat of a muddy pink. Inner lip with a thin callus, thicker on the columella, where it is colored with dash of deep pink. Columella twisted, broad, arched. Canal wide and shallow, very short. Color ex-

ternally yellowish pink, upper whorls a little livid, last whorl with a few indistinct revolving brown lines, frequently interrupted. Traces of obscure, revolving ridges appear in a few places on the last whorl. Shell with four whorls, of which the upper three form less than one-sixth of the whole length, though acuminate.

Lon. 1.3; lat. .9 in.; defl. .80°.

Habitat, St. George's Island, Bering Sea. One perfect specimen and fragments, Dall, 1868.

This shell has precisely the form of *Volutharpa*, but its non-canalculated suture, solid texture, coloration and general aspect confirm me in my belief that it is a true *Buccinum*. It is nearest to *B. cyaneum*, Brug., to which, for some time, I was disposed to refer it as a variety. Dr. Carpenter and Dr. Stimpson appeared to dissent from this view, and after a careful comparison of it with several hundred specimens of *B. cyaneum*, finding no specimens which appear intermediate in form, I have ventured to describe it. I should here remark that the *B. cyaneum* here alluded to (as identified with the eastern *B. cyaneum*, Brug., by Dr. Stimpson,) is perhaps the dwarf variety alluded to by him in his Review of the Northern Buccinums. At all events, none of the specimens from Alaska approach the large typical form in size, none exceeding an inch and a half in length. They are stated to have been described by Moeller as *B. Humphreysianum* (not of Bennet), and from specimens named by Mr. Cuming are the same as *Volutharpa Mærchiana*, Fisch., although the specimen figured is more depressed than the majority of specimens. I have, however, specimens from Sitka which exactly agree with it. Since the differences in size, &c., are so constant, and the large form has not yet been described from the North Pacific, it would, perhaps, be well to retain M. Fischer's name in a varietal sense, if, indeed, it be not specifically distinct from the large eastern *cyaneum* of Brugiere.

The *Fischerianum* differs from the var. *Mærchianum*, above referred to, in the absence of the regular grooves and revolving ridges which characterize that form, in its much more inflated shape and in the proportions of the spire, which is rather acuminate in the majority of specimens of *Mærchianum*, (though not in that figured by M. Fischer), in having, though a larger shell, a smaller number of whorls; and in its more pleasing coloration especially of the aperture. The pattern of coloration is the same. The columella, too, is more arched and broader, and the canal shorter, wider, and more shallow than in the *Mærchianum*. I have another allied, but apparently undescribed, species, from Unalashka, which, as it is decorticated, I do not feel willing to characterize.

BUCCINUM KENNICOTTI, n. s.

Shell of six whorls, which are rather shouldered but not at all carinated. Aperture one-half the length of the shell or a little less. Outer lip strongly arched, forming a right angle with the body whorl, somewhat effuse anteriorly. Columella with a thick white callus, with a groove behind it, somewhat arched and twisted. Siphonal fasciole well marked, rather narrow. Canal narrow, recurved, rather elongated. Color of the shell white, with a purple tint within. Sculpture consisting of faint, primary, revolving ridges, obsolete on the convexity, and more evident on the anterior part of the last whorl; absent on the upper whorls. Secondary sculpture of fine crenulated thread-like lines, about eighty to the inch, which are decussated by the lines of growth. The whorls are crossed by stout, waved, rounded ribs (twelve on the last whorl), which are evanescent on the anterior portion of the last whorl, roundly shouldered on the last whorl, less so on the upper ones; their anterior declivity rather sharper than their posterior slope. These ribs are a little wider than the interspaces. Epidermis yellowish brown, thin, smooth, following the sculpture of the surface.

Lat. 2.5, lon. 4.5 in.; lon. apert 2.4, lat. of do. 1.4 in.; defl. 55°. The suture is very deep, not channelled, and the upper part of the ribs of one whorl fit into the interspaces of the whorl above.

Habitat, Captain's Harbor, Unalashka. One specimen. I am under the impression that a fine specimen of this shell is in the cabinet of Dr. Newcomb, now belonging to Cornell University, and came from the Aleutian Islands.

This magnificent species, after a careful examination by Dr. Stimpson, was pronounced to be new, and further study has confirmed me in the opinion. There is no species of *Buccinum* known to me which closely resembles it. The shell most like it is the *Chrysodomus Beringi*, of Middendorf, which, apart from its generic characters, is immediately distinguishable by its smooth surface, irregular ribbing, straight canal and columella, and subtriangular aperture. The present species is one of the largest and finest species of the entire genus.

CHRYSODOMUS LIRATUS, Mart.

Buccinum liratum, Martyn, Un. Conch. 43, pl. 13 and 14, f. 1, 1784, teste Cpr.

Murex lyratus, Gmel., Syst. Nat. 3531, No. 175.

Chrysodomus Middendorffi, Cooper, Pac. R. R. Rep., xii, pt. ii, p. 370.

Tritonium decemcostatum, Middendorf.

This shell has been considered identical with *Chrysodomus decemcostatus*, of Say, by Drs. Middendorf and Carpenter. Mr. W. Cooper separated it under the name of *Middendorfi*, being ignorant of Martyn's publication.

Having dredged a very large series of this species on the north-west coast, and having had the opportunity of comparing an also very extensive series of eastern specimens dredged by Dr. Wm. Stimpson, materials upon the authenticity of which no doubt could be thrown, were in hand for examination.

I availed myself, with much interest, of the opportunity thus afforded for a careful comparison. The results are as follows:

Proportional length of the aperture, including the canal, to the spire, from the posterior sinus of the mouth to the apex: in twenty-five specimens of *liratus* 32×13 ; in the same number of *decemcostatus*, 30×18 . Average number of revolving ribs in *liratus*, twelve; in *decemcostatus*, nine; maximum in *liratus*, fifteen; minimum, nine; maximum in *decemcostatus*, eleven; minimum, six. Width to height in *liratus*, 17×32 ; in *decemcostatus*, 14×22 . Maximum length of *liratus*, six inches; of *decemcostatus*, four inches. Maximum width of *liratus*, 2.4 in.; of *decemcostatus*, 2.2 in. Average relation of height to width in *liratus*, 2.2 to 1; in *decemcostatus*, 1.63 to 1.

The following comparative characters have also been noted:

C. decemcostatus.

Animal frequently pure white, sometimes flecked with blackish.

Shell with posterior part of whorl generally tabulate or concave. Ribs strong, in adults broad and flattened on top, interspaces usually channelled, lightly grooved or smooth. General shape of shell less fusiform, and whorls less rounded. Aperture white; channels corresponding to the ribs, sometimes chestnut brown.

Siphonal fasciole broad, excavated, and with the fold strong.

C. liratus.

Animal always black spotted; end of siphon and proboscis black.

Shell with posterior part of whorl rounded, making a smaller angle with the suture; often with more or less strong ribs above the first prominent rib. Ribs slender, more equal, less elevated, not flattened on top; interspaces not channelled, strongly grooved, often, with quite prominent intercalated ribs. Aperture purple or livid; if partly white, the white is in the channels corresponding to the ribs, with the interspaces purple.

Siphonal fasciole long and slender, usually nearly obsolete, sometimes quite so.

Canal curved backward from the plane of the aperture.

Canal curved more or less strongly to the left of the aperture.

Outer margin of the mouth darker than the throat.

Outer margin lighter than the throat.

On the whole, I can add little to the admirable differential diagnosis given by Judge Cooper in his description of *C. Midendorffii*. He had but one specimen of the Western form, which he compared with one hundred and thirty specimens of the Eastern shell. From a comparison of a nearly equal number of both species, I have come to the same conclusions. It should also be remembered that *liratus* does not occur on the Arctic shores of North America, and the two species are separated by a vast expanse of water.

Some of the characters in the comparative table graduate toward each other in exceptional cases, but the sum of the characters is always sufficient to discriminate between the two, and this is all that can be expected between any two nearly allied forms. I regard the two as perfectly distinct.

MURICIDÆ.

Genus PURPURA, Brug.

Purpura, Brug., Enc. Meth. i, pp. xv and 241, 1789. Lam., Syst. An. sans Vert. p. 77, 1801.

Type *Purpura persica*, Lam., l. c.

Subgenus PURPURELLA, Dall.

Shell purpuroid; aperture contracted, posterior and anterior sinuses obsolete; outer lip strongly dentate, not furnished with spines or digitations; inner lip concave, flattened, with one or more distinct spiral ridges or plaits upon the columella.

Type *Purpura (Purpurella) columellaris*, Lam., An. s. Vert. vii, p. 236, 1822.

Habitat, Galapagos Islands.

This "very singular" shell, as Lamarck called it, was considered by Swainson to form the passage from *Purpura* to *Ricinula*, and has been the subject of remarks from almost every author who has referred to it. It is somewhat surprising that it has not been sectionally separated before this time. It is quite as distinct from the typical *Purpura*, with its unarmed outer lip, simple columella, and effuse aperture, on the one hand, as *Monoceros* is on the other. The contraction of the peristome is very marked

and peculiar in young shells, which usually have only one spiral ridge on the columella, while the adult form has two. These are not mere nodules, as might appear on a cursory examination, but regular spiral ridges, extending through nearly all the whorls.

This is very readily shown by a section, exposing the columella.

Family COLUMBELLIDÆ, Moersch.

Genus AMPHISSA, H. and A. Adams.

Amphissa, H. and A. Ad., Gen. Rec. Moll. i, p. 111.

Truncaria, Cpr., not Ad. and Rve.

Amyela, Cpr., not H. and A. Adams.

Buccinum, sp., Rve.

This genus was considered by the Messrs. Adams as a subgenus of *Cominella*, with which it has very little affinity. The animal of the typical species resembles in general appearance that of *Cominella*, as figured by the brothers Adams. The teeth are of the Columbelloid type, and indicate its family position. The operculum, whatever may be its value in other groups, is of little value among the *Columbellidæ* for determining affinities. This has been clearly shown by Moersch, and it is to be regretted that Dr. Carpenter, in his works on the shells of the West Coast, has ignored this fact.

Type AMPHISSA CORRUGATA, H. and A. Adams, l. c.

Buccinum corrugatum, Rve.

Truncaria corrugata, Cpr., part.

Amyela corrugata, Cpr., part.

This species has been confounded with the following one by Dr. Carpenter, under the above names, under which it has been extensively distributed.

AMPHISSA VERSICOLOR, Dall.

Amphissa versicolor, Dall, MSS. 1866.

Truncaria corrugata, Cpr., part. Suppl. Rep. p. 662, 1863.

Amyela corrugata, Cpr., part. MSS., labels, &c.

Amyela undata, Cpr., MSS., labels, not Cpr., Suppl. Rep. p. 662, 1863, per types.

This species was first distinguished by me in the MSS. already alluded to, in 1866. It had previously been confounded with the *corrugata*, and has since been confused (in MSS. labels at least) by Dr. Carpenter, with his "*Amyela*" *undata*, which,

however, I am able to state, from examination of the typical specimen, is a very different shell, and probably belongs to another genus. It is certainly not an *Amycla*. The animal of *A. versicolor* is white, with black dots and streaks. The teeth, as figured, are typically Columbelloid.

The terms applied to opercula are so very indefinite, that two authors may intend the same thing by different names, or different things by the same name. A few words of explanation may not be out of place.

A buccinoid operculum, as I term it, is one after the type of the operculum of *Buccinum undatum*, in which the nucleus is simple, close to the outer margin, which is convexly arcuate, but usually a very little inside the margin, which increases by regular concentric lines of growth toward the inner side, and which is provided on the inner surface with a smooth polished callosity, which borders the outer, and, to a greater or less extent, the entire margin. Some species have a subcentral nucleus.

The operculum of *Amphissa* differs from this only in having a straight spur of callus extended toward the centre of the operculum. The operculum of *Nitidella Gouldii* is of similar construction. The nucleus is close to the outer margin, but in perfect specimens of *Amphissa* it is not quite marginal.* In imperfect or worn specimens it is often marginal, or even worn off entirely. This kind of operculum may, for distinctness, be called *amphissoid*.

A purpuroid operculum, on the other hand, is often externally similar to the one above described, but on the internal surface it is quite different and characteristic. The nucleus is within the margin, and the outer border is covered with a thick callus. The nucleus is, however, surrounded with peculiar lines of increase, concentric, but irregular, as if the operculum had rotated at different periods of its growth, with relation to the aperture of the shell. This form of operculum is seen in *Purpura patula* and *P. lapillus*, and is quite different from that of *Nitidella Gouldii*, which Dr. Carpenter calls Purpuroid.

A nassoid operculum, as I regard it, is subquadrangular without a very distinct nucleus, notched on the upper and lower edges, smooth and sharp on the outer and inner edges, and increasing by additions to its inner edge, with a border of callus on the other three sides, when perfect. Such is the operculum of *Nassa levis*, figured by the Messrs. Adams, differing totally again from the operculum of "*Amycla*," (= *Astyris* + *Amphissa*), described as nassoid by Carpenter, though probably like the

* In *Nitidella cribraria* and *Astyris carinata* it is subcentral.

operculum of the true *Amycla* (*corniculum*, Oliv.), of Adams, which is a nassoid form, as shown by Troschel.

A comparative diagnosis will best serve our purpose in distinguishing *Amphissa versicolor* and *A. corrugata*, which have a somewhat similar facies.

A. CORRUGATA.

Shell of seven or more whorls; covered with a rather thick yellowish epidermis when perfect; longitudinally plicated with obsolete ribs which are evanescent on the lower half of the whorls. In ordinary specimens there are twenty-five or thirty of these plications, with a stout pinch behind the upper angle of the aperture. The riblets are crossed by deep channelled grooves, sparser and deeper on the lower half of the whorl, about thirty-five on the last whorl. The riblets are nearly parallel with the longer axis of the shell.

The columella is usually covered with a thick deposit of callus, the outer edge of which is sharply raised above the whorl, forming a sort of groove. Colors livid brownish, variegated with irregular yellowish and brownish spots not well defined, sometimes livid rufous.

Lon. 1.3 in. to .8 in., as extremes; lat. .5 in. to .35 in. as extremes.

A. VERSICOLOR, n. s.

Shell of about five whorls, last whorl two-thirds the length of the shell. Epidermis imperceptible; shell ornamented with rather strong sinuous ribs, which often invade the lower third of the whorl; there are fourteen to sixteen of these on the last whorl in well grown individuals, and they are crossed by rather strong, thread-like lines, between broad channels on the convexity of the whorls, which become narrower and groove-like on the anterior part of the last whorl. They are about seventeen in number, in average adult specimens, on the last whorl. Post labial pinch almost obsolete, quite so in some specimens. Colors very variable, pink, salmon color, livid bluish purple, brown and pure white, all plain, or variously marked with a network of white and brown lines, patches, dots, &c., &c.

Columellar callus less prominent than in the last; both have the entire aperture striated internally in some fine individuals, and often two or three tooth-like tubercles on the columella.

Lon. .48 in.; lat. .26 in.

This species is the most common beach shell found at Monterey. They are very uniform in size though so variable in color. They live under and about the stones at and near low-

water mark. I have handled or examined, first and last, a bushel or two of this species, which is extensively used for "shell work." I have not seen specimens from north of San Francisco, and Monterey is its headquarters. I have been rather lengthy in describing the differences between this and *A. corrugata*, not on account of any very close resemblance between normal specimens, but because they have been so widely confounded. Occasionally, at Monterey, a stunted, beach worn specimen of *A. corrugata* turns up, which, at first sight, much resembles a very large specimen of the *versicolor*, but I never saw any perfect specimens which were not instantly distinguishable. The normal specimens of *corrugata*, at Monterey, though smaller and brighter colored than the northern ones, are quite as distinct. The home of *A. corrugata* is from Sitka to Neah Bay, where the other species is never found. Monterey is the most southern range of the former, and I have specimens from Kadiak. It occasionally reaches a very large size, and the var. *stylina*, Cpr., is abnormally slender and elongated. The smallest specimens I have seen are larger than the largest *A. versicolor*.

The "*Amyela*," *undata*, of Carpenter, is an acuminate shell with shoulder whorls, strong ribs and short, hardly twisted canal, without the post-labial pinch of *Amphissa*. It is very different from the previously mentioned species, and comes from Catalina Island in deep water.

Genus ASTYRIS, H. & A. Ad.

Alia, part, H. & A. Adams, i, p. 183.

Columbella and *Amyela*, sp., Cpr.

Columbella, Gld., Auct.

Astyris, Dall, Proc. B. Soc. Nat. Hist. Mar., 1870, p. 242.

ASTYRIS CARINATA, Hinds.

Columbella carinata, Hinds., Zool. Sulph. Voy. p. 39, pl. x, f. 15, 16, 1844.

Columbella gausapata, Gld., Proc. Bost. Soc. Nat. Hist. iii, p. 169, Jan., 1850. Otia, Conch. p. 71.

Alia gausapata, Gld., Otia Conch. p. 245, 1862.

Columbella Californiana, Gaskoin, P. Z. S. 1851, p. 12.

Columbella Hindsii, Rve.

Amyela gausapata, Cpr., Suppl. Rep. p. 662, 1863.

Amyela? *Californiana*, Cpr., l. c.

The name *Alia*, of Adams, precedes *Astyris* in their work, but no type being named, and this species not agreeing with the generic diagnosis of *Alia*, we are at liberty to accept the genus *Astyris*, with which *Alia* is in great part synonymous.

Having examined many thousands of the protean little shells which have received the above names, I do not feel presumptuous in referring them to a single specific designation. All Californian conchologists, I believe, agree in the opinion that the various forms above referred to, merge imperceptibly into one another, and, in a range extending from Sitka to Cape St. Lucas, we may reasonably expect to find many local variations. The name *gausapata* may well be retained in a varietal sense for the large, smooth, northern variety without a carina, but which passes, by imperceptible stages, into the smaller *Californiana*, the subcarinate *Hindsii* and the stumpy, strongly carinate *carinata*. The operculum, like that of *Nitidella cribraria*, differs from that of the *Amphissæ* and *Nitidella Gouldii*, only in having the nucleus somewhat more within the margin. It is shaped like the others and has a similar callus, but has no resemblance to that of *Nassa*, as previously described.

Nitidella Gouldii so closely simulates some forms of this species that I have been especially careful, in examining the opercula of both, to select specimens which had been determined by Dr. Carpenter as typical examples of each species.

The nucleus of this species is minute, smooth and dark brown, the apex is acuminate in perfect specimens.

ASTYRIS TUBEROSA, Cpr.

Amycla tuberosa, Cpr., Suppl. Rep. p. 662, 1863.

Of all colors, red, dark brown, white, yellow, salmon, and livid purple, either plain or marked with a pretty tracery of brown lines. Characterized by a more or less carinated or angulated appearance of the lower part of the last whorl. The nucleus is white and smooth, flat on top, as if truncated, but not swollen. Whorls flattened, suture hardly impressed.

ASTYRIS AURANTIACA, n. s.

Amycla aurantiaca, Dall, MSS. 1866.

Shell minute, fusiform, smooth, with five gently rounded, non-carinated whorls. Color generally orange yellow, semitranslucent, and without markings, but occasionally darker, passing into dark brown, or with close zigzag brown lines on the yellow ground. Columella slightly arcuated, outer lip slightly sinuated, hardly striate inside. No callus on the columella. Nucleus subglobular, rounded above, swollen as large or larger than the first whorl in most specimens. Lon. .18 in., lat. .08 in.

Habitat, Monterey, in the sand along the wave marks, dead; Dall, seven specimens. Stones at low water, living; Stearns and Canfield.

This little species is about one-half the size of the preceding, yet has as many whorls. The latter are rounded though not inflated, not flattened as in the last. The nucleus also differs. *A. tuberosa* is conoid, this is regularly fusiform. I have not seen any specimens of *tuberosa*, with exactly similar zigzag lines, such as three of my specimens of *aurantiaca* exhibit.

NITIDELLA ELEGANS, n. s.

Shell small, smooth, polished, solid, of eight whorls, which are very slightly convex, though not flattened. Suture appressed, not strongly marked. Canal short, outer lip sharp, slightly lirate inside, straight, or hardly sinuated. Columella smooth, with a thin callus, outside of which a few faint striæ pass round the canal on the anterior part of the last whorl. Shell subulate, acutely pointed; nucleus yellowish white, pointed; first four whorls with a brownish yellow ground reticulated by white dots, an ornamentation which also appears on the anterior part of the last whorl. Markings in general consisting of transverse, alternate, dark red brown and white bars, slightly fluctuated on the last whorl. The white and brown rectangular bars, not being continuous from one whorl to another, give the shell a tessalated aspect. Lon. .28, lat. .11 in. Defl. 33°.

Habitat, Panama; among a large number of minute shells collected by the late Thos. Bridges, F. L. S., one specimen occurred.

This shell is readily distinguished by its subulate form, peculiar and beautiful markings, and proportionally less solid and heavy texture, from the well-known *N. cribraria*. It has as many whorls as that species, but does not reach a quarter of the size. It does not resemble any of the other species from the coast, but may be compared with *Columbella dichroa*, Sby., from the West Indies.

RISSOIDÆ.

ALVANIA PURPUREA, n. s.

Rissoina?? *purpurea*, Dall, MSS. 1866.

Shell small, of four rounded whorls, rather pointed. Sculpture of six or seven revolving ribs, on the last whorl, only two appearing on the second whorl; apical whorl smooth. These ribs are crossed by about twenty longitudinal riblets, which do not pass the second revolving rib on the last whorl. On the antepenultimate whorl they reach from suture to suture, and are conspicuously angulated at their intersections with the two

revolving ribs. Suture deep. Color whitish, the revolving ribs in perfect specimens being a beautiful purple. Aperture rounded, interrupted by the body whorl; peristome thickened, with a groove behind the columella. Alt. $\cdot 07$, lat. $\cdot 04$ in. Defl. 25° .

Habitat, Monterey, seven dead specimens, Dall.

This species was pronounced new by Dr. Carpenter, who still retains the perfect specimens. It has also been found, I believe, by Drs. Canfield and Cooper.

PYRAMIDELLIDÆ.

ODOSTOMIA BERINGI, n. s.

Shell small, white, thin, short, broad, and pointed. Whorls five, flattened toward the apex. Suture not impressed. Surface smooth or marked with faint lines of growth. Aperture less than half as long as the shell; rounded in front, sharply angulated at the suture. Peristome thin. Columellar fold distinct, close to the body whorl. A deep groove behind the inner lip extends into a distinct tubular umbilical perforation, which is not encroached upon by the inner lip. Lon. $\cdot 22$, lat. $\cdot 13$ in. Defl. 45° .

Habitat, St. Michael's, Norton Sound, Alaska Territory; one specimen, Dall, 1867.

Fragments, too imperfect to describe, were found belonging to another species.

None of the species figured by Forbes and Hanley appear to be closely allied to this species. The number of nominal species and varieties from the Northwest Coast of the Pacific is too large, most of them having been described from a very small number of specimens, which results in such labels as the following: "*Odostomia (nuciformis* var.) *nitens*, form *avellana*; compare *O. sutura*." (!) which, to say the least, do not lessen the difficulties of identification, or improve on binomial nomenclature. Nevertheless, after a careful comparison of this species with the types of Dr. Carpenter's species, I do not find any which approach it very closely. The nearest is, perhaps, *O. straminea*, Cpr., which is a thinner shell, of a different color, and without the umbilical perforation.

TURRITELLIDÆ.

MESALIA, Gray, 1840.

Type *Mesalia brevialis*, Lam.

MESALIA POLARIS, Beck.

Turritella erosa, Couthouy, Bost. Journ. Nat. Hist. ii, p. 103, pl. iii, f. 1, 1838.

A careful comparison of North Atlantic, Greenland, and Massachusetts Bay specimens with those obtained at Unga, Unalashka, and Kodiak, has left no doubt in my mind as to their identity. The only difference perceptible was that the Atlantic specimens, which indubitably belong to one species, are a little more polished and have a smoother epidermis than the North Pacific specimens.

MESALIA RETICULATA, Mighels.

Turritella reticulata, Mighels, Bost. Journ. Nat. Hist. iv, p. 50, pl. iv, f. 19, 1843.

Mesalia lacteola, Cpr., Suppl. Rep. Brit. As. p. 655, 1864.

? *Mesalia lactea*, Möll.

A comparison of the type specimen of *lacteola*, Cpr., with Greenland specimens of the *lactea* of Möller, shows that the plicæ are stronger and continued further over the whorls than in the latter. This character is somewhat variable, however.

Specimens of *Mesalia* exactly agreeing with the type of *lacteola* were labelled *reticulata*, Mighels, by Dr. Carpenter, and agree with Nova Scotia specimens so named by Dr. Wm. Stimpson. If *reticulata* be distinct from *lactea*, it will probably stand also for the North Pacific form, with which it appears to agree exactly.

MESALIA ACICULA, Stimpson.

Turritella acicula, Stm., Shells of N. England, p. 35, pl. i, f. 5, 1851.

Mesalia tenuisculpta, Cpr., Proc. Cal. Acad. Sci. iii, p. 216, 1865, *partim*.

The specimens in the Smithsonian Collection, marked by Dr. Carpenter as the types of his *Mesalia tenuisculpta*, are of two species; one, to which the "*fusco-cinerea*" of his description applies, has a resemblance to *Bittium*; it is, at least, not conspecific with the other, which is undoubtedly a *Mesalia*. The latter I have compared with specimens of *T. acicula*, Stm., named by the describer, and the two appear to be identical. In both the canal is more obscure than in the typical species, but still evident.

Prof. Moersch has stated in this Journal (iv, p. 46, 1868,) that the operculum of *reticulata* differs from that of *M. brevisalis*, and

therefore they cannot be congeneric. Having compared the operculum of the different species with that of *M. brevis*, as figured by the Messrs. Adams, I can detect no difference, except that the latter is slightly concave while the former are flat, or nearly so. This can hardly constitute a generic difference; the whorls of the operculum offer no special differences, though Adanson's figure represents a distinct siphonal fasciole which is not seen in other figures of *M. brevis*, and does not exist in any of the species I have examined.

Specimens of the *reticulata* and *polaris* were obtained by me at Plover Bay, E. Siberia, in 1865—6.

TRICHOTROPIDÆ.

TRICHOTROPIS, B. and S.

Subgenus IPHINOË, H. and A. Ad.

IPHINOË PERMABILIS, n. s.

Shell globose, of four whorls, covered with a yellowish velvety epidermis, translucent white. Spire slightly elevated, with two carinæ on the upper whorls; (nucleus eroded;) last whorl with six regular, equidistant, revolving ribs or carinæ rounded on top, and in a fresh state furnished with squarish transverse, minute prolongations of the epidermis. Upper surface of the whorl, between the suture and the first carina, subtabulate, transversely striate; suture channelled, very narrow. Aperture nearly two-thirds as long as the shell, sharply angulated below and above. Outer lip roundly arcuated, thin, sharp. Inner lip smooth, not callous. Columella reflected, straight. Umbilicus pierced, not large, sharply carinated behind.

Lon. .5; lat. .34 in.; defl. 80°.

Habitat.—One living specimen in four fathoms mud and shell, North Harbor, Unga Island, of the Shumagin group.

This pretty little species is very close to *Iphinoë dolium*, Petit, from Spitzbergen, but is much less elevated and acute, with more tabulate whorls and a much smaller umbilicus. The columella of Petit's species is also oblique instead of straight, and the shell is much larger, with the same number of whorls.

TRICHOTROPIS BICARINATA, Sby.

Under this name several forms appear to have been confounded, though the material at hand is insufficient for a thorough differentiation of them. The typical form described by Sowerby in the Tankerville Catalogue, and also figured there, is

quite a different shell from that figured in the Conchological Manual, and by Chenu.

The forms appear to be as follows :

T. BICARINATA, typical.

Turbo bicarinatus, Sby., Tank. Cat. p. xii, No. 1401, pl. 9, f. 1—2. Thes. pl. 285, f. 8.

Shell of three whorls; spire from the intersection of the outer lip with the body whorl to the apex less than two-fifths the whole length. Columella very broad, especially at the lower end, where it is truncated. Aperture rounded, hardly pointed below; umbilical region broadly excavated, wide, and carinated. Width of the shell almost equal to its height.

Defl. 90°. Very solid and thick.

Habitat.—Newfoundland, Sowerby. Plover Bay, Eastern Siberia, Dall. Three specimens were obtained on the beach.

T. (BICARINATA, var. ?) ALTA.

Shell of four whorls, spire from the intersection of the outer lip, one-half the length of the shell. Columella nearly as broad as in the last. Aperture rounded, proportionately narrower and smaller than in the last. Umbilical excavation very much narrower and smaller, anteriorly falling behind the elevated outer edge of the columella, while in the last it is more prominent and in advance of the columella, of which the outer edge is but slightly elevated. Width of the shell less than three-fourths of its height.

Defl. 76°. Solid and strong.

Habitat.—Plover Bay, E. Siberia, one specimen, Dall. Revolving striæ cover the whorls, absent in the last.

TRICHOTROPIS (BICARINATA var. ?) SPECTABILIS, Dall.

Shell of five whorls, spire, as before, one-half the length of the shell. Columella narrow, waved, not truncate, straight, not arched, as in the two preceding. Aperture proportionately larger than in the last, but smaller than in the typical form, painted within and on the columella with sea-green, sharply pointed below. Outer edge of the columella strongly elevated. Umbilical excavation reduced to a mere groove behind the columella. Whorls much flatter above and below than in the others. Spire acuminate, while the last whorl is wide out of proportion to it. Whorls marked with revolving striæ. Second carina apparent on all the whorls, while in the others there is only one carina on the upper whorls. Width of the last whorl equal to its height, and to three-fourths the whole height, while in the last the width of the last whorl is considerably less than its height.

Defl. 60°. Shell very thin and fragile.

Habitat.—Seniavine Strait near Plover Bay, E. Siberia, one living specimen.

Alt. 1·15; lat. ·9 in.

All the forms are strongly bicarinate, and in a fresh condition are covered with a strong epidermis, produced on the carinae into triangular filaments.

I do not feel sure that this is the shell intended by the figures in Sowerby's and Chenu's Conchological Manuals, though in respect to the umbilicus they resemble it more than the typical form. In both figures the aperture is too much rounded, and the spire too short and stout. Chenu figures a much stronger process on the columella than exists in the present form, and the umbilicus of Sowerby's figure is too large. Further specimens are needed to determine whether any of these should be raised to the rank of species, though Dr. Stimpson, who examined them with me, was disposed to so consider them. The specimens referred to in the preceding comparative diagnoses are nearly of uniform size.

PEDICULARIIDÆ.

PEDICULARIA JAPONICA, n. s.

Testa elongato-sinuata, albida et purpurea suffusa; valde transverse striata, vertice umbilicata; supra mammillata; infra longitudinaliter compressa, sinuata; labio arcuato; columella inconspicua, recta; apertura elongata, angusta, sinuata; extremitatibus canaliculatis. Lon. ·5, lat. ·24, alt. ·24 in.

Shell elongated, sinuated; whitish, with an irregular suffusion of rose pink, apex yellowish pink, interior darker, livid pink. Externally rather coarsely grooved and striated. Apex somewhat mammillated, vertex umbilicated. Columella straight, inconspicuous. Shell laterally much compressed, sinuated; lateral margins much produced, concave, effuse; extremities narrow, canaliculate.

Habitat, Nippon, Japan, 60 fms. on *Gorgonia*, R. Pumpelly.

This species differs in its elongated, compressed and sinuated form from any described species. The striæ are coarser than in *P. Pacifica*, which also has the vertex apparently covered and not umbilicated, the striæ granulate and decussated, and is of a uniform tint; beside which the columella is much thicker and more prominent. *P. sicula* bears no resemblance to it. *P. californica*, Newc., is more globose, widely effuse, shorter, and

smaller, with a much thicker columella. It is of much more lively color, as also is *P. elegantissima*, Desh., which comes from a widely distinct zoological province.

TRIVIIDÆ.

TRIVIA CALIFORNICA, Gray.

Habitat, Bodega Bay to Cape St. Lucas.

Mr. Stearns kindly furnishes the following notes on the animals:

"Shell nearly covered by the mantle, of which the superior edges are closely spotted with white dots, and furnished on each side with four tentacular filaments, with white tips. Soft parts of an orange color; mantle mottled with brown, upper edge crenulate or waved; end of muzzle dark brown; siphon long, slit underneath. Tentacles long and slender."

MARSENIIDÆ.

LAMELLARIA STEARNSII, n. s.

Lamellaria depressa, Dall, MSS. 1866.

Shell pure white, suborbicular, depressed, of three whorls. Columella sharp, thin, widely arcuated; loosely twisted so that the apex is discernible from below. Spire hardly elevated above the last whorl; suture distinct, sharply defined; aperture very effuse, rounded. Exterior marked by lines of growth, crossed by microscopic fine revolving striulæ. Interior polished. Lat. .26, lon. .2, alt. .12 in.

Habitat, Monterey, California; two specimens dead on beach; Dall, 1866.

LAMELLARIA (? STEARNSII, var.) ORBICULATA.

Shell resembling the last; of two whorls and a half; but larger than *L. Stearnsii*; whorls more inflated, aperture very oblique, suture deeper, spire more elevated and proportionately larger, columella rather thicker and more drawn out. Lat. .34, lon. .32, alt. .24 in.

Habitat, with the last. Five specimens.

LAMELLARIA RHOMBICA, n. s.

Shell pure white, subrhombical in shape, moderately elevated, of three whorls. Columella thickened, stout, reflected, narrow, with a groove behind the callus. Whorl appressed against, and

slightly flattened below, the suture; spire very small, not elevated; apex not above the level of the last whorl. Aperture subquadrate, outer lip very much produced, slightly angulated above and below. Suture deep appressed. Nucleus smaller than in the last; surface of the whorls smooth, without striulæ. Lat. .46, lon. .32, alt. .2 in.

Habitat, with the last two specimens.

These shells are closely allied, and though their differences in form are evident and considerable, and the fact that one of the species is without the striulæ which appear to distinguish the other, and also that these differences are apparently constant, still I should have hesitated about describing them as more than varieties, if it were not that differences appear in the soft parts also. In *L. Stearnsii* the shell is wholly covered and internal; in *L. rhombica* a portion of it appears to remain permanently open and uncovered. These differences were observed in the living animals and communicated to me by Mr. R. E. C. Stearns of California, one of the most active and careful of the conchologists of the West Coast, to whom I have the pleasure of dedicating the first named species. These observations are also confirmed by alcoholic specimens.

The following notes are added by Mr. Stearns:

The animal is bluish subtranslucent, white, looking like a lump of mucus; the mantle is deeply notched in front. The tentacles are long, with the eyes on their outer bases; an aperture exists on the right side of the body, in the posterior third, which in life opens and shuts like the aperture of the pulmonary cavity in *Limax*.

The larval shells (*Echinospira*) of one or both of these species were abundant on the beach at Monterey, in January, 1866. They were transparent, of a cartilaginous consistency, enrolled upon themselves, with an extent of a whorl and a half, and provided with three simple carinæ, equidistant from each other. *Helicophlegma* of D'Orbigny is probably the same thing.

VELUTINIDÆ.

VELUTINA CRYPTOSPIRA, Midd.

Velutina cryptospira, Midd., Beitr. Mal. Ros. ii, p. 106 a. Sib., Reise, ii, p. 216, pl. xxv, f. 8—10. Martens, Wieg. Arch. i, 1858, p. 150.

This species is not uncommon in various parts of Bering Sea. I have obtained it from Unalashka, St. Paul's Island and Norton Sound, and Middendorff reports it from various parts of

the Ochotsk Sea. I think, with von Martens, that it is quite distinct from *coriacea*, Pallas, which has a much rounder and less produced shape. It is interesting to note that it is not always, though usually coriaceous, one of the specimens before me having the whole interior lined with a cretaceous deposit which forms a solid shell in about half of the specimen. This shell is white, and marked with revolving ridges and striæ. This specimen is one of the largest I have seen, and measures 1.1 by .9 in.

VELUTINA PROLONGATA, Cpr.

I have obtained this species from Unga Island, Sitka and Fort Simpson. It extends southward to Monterey.

VELUTINA HALIOTOIDEA, Fabr., Moll. = *Velutina levigata*, Pennant.

This species ranges from the Arctic Ocean to Monterey, usually smaller than Atlantic specimens.

NATICIDÆ.

AMAUROPSIS, Moerch.

AMAUROPSIS PURPUREA, n. s. ?

Shell elongate-globose, covered with a yellowish epidermis; color purple brown, when weathered purplish white. Whorls four, inflated, globose. Suture deeply canaliculated. Aperture more than half as long as the shell; outer lip thin; columella white, thickened, rounded; a thin callus on the inner lip. Umbilicus closed, or a mere chink. Spire very short, bluntly rounded. Sculpture of numerous close, very fine revolving grooves, and a few inconspicuous ridges.

Lon. 1.0, lat. .8 in.

Habitat, St. Michael's Norton Sound, Alaska Territory; abundant, dead and alive, on the beach at low water mark and below it.

The species is somewhat variable in length, some specimens being more elongated than others. The depth of color also varies somewhat.

It appears to differ from *A. helicoides*, Johnst., in its sculpture and color, and is usually more globose. *A. canaliculata*, Gld., is very similar in form, but is described as smooth. Dr. Carpenter considers it as distinct; and a specimen kindly compared with those in the British Museum, was stated to be different from any in that collection, by Mr. Dawson.

TROCHIDÆ.

CALLIOSTOMA AFFINIS, n. s.

Shell moderately elevated, of seven whorls, rounded and inflated. Sculpture of fine, rather sharp, revolving ridges, with fine intercalated striæ, all decussated by the lines of growth. There are about ten primary ridges between the sutures of the antepenultimate whorl. Apex acute, upper whorls rather flattened, but slightly convex, last whorl rounded, periphery not carinated, aperture rounded-quadrate. Base very convex, sculptured with ten or twelve grooves, more crowded toward the periphery. Columella callous, oblique, with a groove between the callus and the basal rib. Mouth silvery-pearly. Color light orange to yellowish-white, with irregular patches of chestnut brown and white on the upper surface of the whorls and on the periphery. Nucleus of two and a half smooth brown whorls. Suture distinct but not conspicuous.

Maj. diam. .9; min. diam. .7; alt. .9 in.; defl. 80°.

Habitat.—Simoda, Japan, five specimens.

I have searched everywhere, including the worthless monograph of *Ziziphinus*, by Reeve, without finding any species to which this might be referred. It is nearest *C. unicum*, of Dunker, a fine specimen of which was obtained at the same locality. The patches of color are very similarly distributed, but the coloration is quite different. There is no coloration peculiar to the ribs of *affinis*, but in *unicum* the ribs are alternated with brown and white. The whorls of the latter are shouldered, of the former almost flat. The base of *affinis* is of a plain yellowish brown, in *unicum* the painting and dotted markings extend over all the shell. It has not the granulated surface of *C. Antoni*.

CALLIOSTOMA PALMERI, n. s.

Shell shaped like *eximium*, Rve., but rather more depressed, of seven whorls, glistening and polished, though sculptured with finely granulated, revolving lines. Upper whorls carinate and shouldered, last whorl bicarinate. Sculpture consisting above of about fifteen revolving, elevated, finely granulated lines, alternately spotted with light yellow brown and white; basal surface with about eleven similarly colored ribs, which are not granulated, but have the interspaces slightly decussated by the lines of growth. Upper surface also painted with narrow waved white and broad livid patches, which are absent below. Umbilical region cobalt blue, or blue-purple, rather excavated, and bordered by a carina; mouth subquadrate, brightly pearly;

columella arcuate, white; toothlike process blue. Nucleus of two and a half whorls, flesh-color, with revolving lines.

Maj. diam. .75; min. diam. .61; alt. .7 in.; defl. 85°.

Habitat.—Guaymas, ten specimens, Dr. E. Palmer.

This shell does not appear to have been described in any of the works at my disposition. It is nearest to *eximium*, from which it is readily distinguished by the blue umbilical region and the different coloration of the revolving ribs, which, in *eximium*, are much less prominent and are mostly colored with alternate purple, black and white instead of brown and white. The color and sculpture differs from that of *C. lima*, which is granulate on the base and wants the upper carina. I know of no other species with which it can be well compared.

CALLIOSTOMA COSTATUM, Martyn.

This species passes through a number of variations, which, however, do not obscure the specific characters. The ribs are usually yellowish, smooth with reddish brown interspaces. The apex is blue when eroded. The whole sometimes has a more or less olivaceous cast. The yellow of the apical ribs is usually interrupted by patches of brown. This is sometimes continued on the lower whorls, when the three ribs nearest the suture and often one or two on the carina of the whorls are prettily painted with alternate patches of dark brown and greenish white. The ribs are more or less prominent, some specimens having them quite sharp while in others they are hardly raised. In one other exquisite variety the three sutural ribs and their interspaces are of a very rich purple blue, which is not due to erosion. The umbilical rib is sometimes salmon-colored. The nacre is of great brilliancy. Found from Sitka to Santa Barbara and San Diego. Mr. Stearns and myself, after an examination of the type, were disposed to consider *C. splendens*, Cpr., as a very young specimen of the blue painted variety above alluded to.

CALLIOSTOMA CANALICULATUM, Martyn.

This is, perhaps, less variable than any other Californian species. The ribs have a slight tendency to become beaded, and always are more or less so on the apical whorls. The nucleus is heliciform, smooth and whitish-hyaline, comprising a whorl and a half. The ribs of the first three whorls are more or less beaded. Five radiating brown spots are to be seen on the apical whorls, and obsolete, but similar markings may be seen on the others. The apex when eroded is light blue; the principal variations in color are in the darker or lighter brown of the interspaces. Northern specimens are usually darker and smaller. There is

usually a small blue patch on the umbilical callus. The shell is distinguishable from the sharp-ribbed specimens of *costatum* by the more pointed apex, stronger carina and less rounded aperture. Found from Sitka to San Diego, Cal.

CALLIOSTOMA GLORIOSUM, n. s.

Shell six-whorled, acute, whorls gently rounded, with fine, revolving, thread-like ribs; four or five ribs near the suture granulated. Last whorl roundly carinated, base flattened, with about twenty-five revolving striæ. Columella thick, not reflected, but base somewhat grooved or depressed behind it. Aperture about one-third of the length of the whole shell, rhomboidal, pearly, smooth. Shell of a beautiful light salmon color, ornamented near the suture and carina with alternate patches of light yellow and chestnut brown.

Alt. 1.1; maj. diam. .9 in.; defl. 62° ; angle of carina, 98° .

Habitat.—Soquel, north side of Monterey Bay, one large specimen, dead. Two fine adult perfect specimens were obtained and kindly presented to me by Mrs. Dr. Blankman, of Monterey, and were from that locality.

This elegant species was first referred by me to the *Calliostoma supragranosum*, of Carpenter, on account of the granulated sutural ribs. That species was described from very young shells, and no typical authentic specimens were at that time in California. Upon comparing the young of *gloriosum* with the type specimen of *supragranosum*, in the Smithsonian Collection, it was at once evident that they were quite distinct. Several of the Californian species have the sutural ribs more or less granulated, especially in young specimens. The nucleus of *gloriosum* is, however, very much larger than that of *supragranosum*. The adult of the latter has five whorls, with a major diameter of .42 and a total length of .38 in. The whorls have a peculiar inflated appearance and are not carinated. The last whorl loses the painting of brown and white and is of a dull brown, slightly concave above near the suture, with a deep chink, not a fissure, behind the umbilical fissure. The brown and yellow painting is very conspicuous on young specimens of *gloriosum*.

MARGARITA PUPILLA, Gld.

Margarita calostoma, A. Ad.

Margarita var. *salmonea*, Cpr., Proc. Cal. Acad. iii. 1866.

Margarita inflata, Cpr., Proc. Phil. Acad. Sci. p. 62, 1865.

The typical specimen of *M. inflata* differs from *M. pupilla* (with which Dr. Carpenter drew no comparisons in his descrip-

tion,) only in having the revolving ribs slightly less evident than in the typical *pupilla*. In the deep suture, inflated whorls, small internally striated umbilicus, depressed form and strong lines of increase, it is paralleled by many of the two hundred or more specimens of *pupilla* now before me. The ribs on the upper whorls of *inflata* are quite as strong as in *pupilla*, and the differences, though evident, are so slight and the variation in members of this genus is so great, that I am of the opinion that the two species are really extremes of one form and that the name *inflata* is at most entitled to no more than varietal rank. The variety *salmonae*, as shown long since by Dr. Cooper, is simply the southern form of *pupilla*, and hardly distinguishable from it, even by differences of degree.

The small amount of material upon which Dr. Carpenter has founded so many specific names, has been so largely reenforced of late that a considerable amount of consolidation is likely to ensue. There are other cases which I might have touched upon, but I have only done so when it seemed that no reasonable doubt could exist in regard to the matter, and never without a careful study and comparison of the original type specimens in connection with the large series of my own collecting.

MARGARITA LIRULATA, (Cpr.) Dall.

Margarita lirulata, Cpr., Suppl. Rep. Brit. As. p. 653, 1864.

Proc. Phil. Acad. Sci. p. 61, 1865.

Margarita var. *tenuisculpta*, Cpr., Rep. l. c. and Proc. Phil. Acad. Nat. Sci. p. 61, 1865.

Margarita var. *subelevata* + *obsoleta* + *conica*, Cpr., Proc. Phil. l. c. 1865. Rep. l. c. 1864.

Margarita lirulata, Cpr., Suppl. Rep. Br. As. p. 653, 1864.

Proc. Cal. Acad. Sci. iii, p. 157, 1866.

Gibbula optabilis, Cpr., Suppl. Rep. p. 653, Proc. Cal. Acad. Sci. iii, p. 214, 1865.

Gibbula parvipicta, Cpr., Suppl. Rep. p. 653, 1864.

Gibbula funiculata, Cpr., l. c.

Gibbula succincta, Cpr., l. c.

? *Gibbula lacunata*, Cpr., l. c.

San Diego to Sitka.

After a careful study of the types of the above species, preserved in the Smithsonian Museum, and a comparison of hundreds of specimens collected by Mr. Stearns and myself at Monterey and elsewhere, I am compelled to the belief that they are simply forms of one protean species. They are not even varieties capable of diagnosis; for, not only are the intermediate

specimens as abundant as the nominal species, but the characters, singly, are interchanged without limitation. With regard to *G. lacunata* alone I am in doubt, as I have not found a complete connecting series with the type, but it may very possibly be only an extreme individual variation. It is due to Dr. Carpenter to state that he worked from very few and often imperfect specimens, and I am inclined to think that he would agree with the present consolidation, from the labels which he has attached to the varieties which I forwarded for his inspection.

I have adopted *lirulata* as the name for the species in question, as it appears to be the earliest of the published names. The nominal forms graduate into and interchange characters with each other to a marvellous extent.

GIBBULA CANFIELDI, n. s.

? *Calliostoma Canfieldi*, Dall, MSS. 1866.

Shell of seven whorls, the last whorl comprising more than half the shell. Above, sutures small but deeply channelled; whorls smooth, with three revolving ribs close to the suture, also three or four on the lower part of the whorl.

Color pearly, with bronze yellow pencillings obliquely to the suture. Surface of the whorls rather flattened, semicarinated, convex. Shell umbilicated with nine basal revolving ribs. Umbilicus strongly carinate internally, smooth, narrow and small. Aperture rhomboidal, pearly, with grooves answering to the exterior ribs. Columella straight, with a slight callosity, but not reflected.

Min. diam. .3, maj. diam. .4, alt. .4 in. Defl. 70° 40'.

One specimen of this modest little shell was found dead on the beach at Monterey. I take pleasure in dedicating it to Dr. C. A. Canfield of Monterey, who has done much for science with very slender means. (Dall, MSS. 1866.) The typical and unique specimen of this species was forwarded, in 1866, to Dr. Carpenter, who pronounced it to be distinct, but has not returned it. I am therefore unable to institute comparisons with other species.

CHLOROSTOMA BRUNNEUM, Phil.

Trochus rusticus, Kiener ? not Gmelin.

Abundant at Monterey. This species is very variable. The surface is usually smooth, but in some specimens it is marked with fine revolving ribs as in *C. Pfeifferi*. The young and some adults have a rather strong basal rib outside of the umbilical region and bounding it.

The umbilicus is either smoothly covered with callus, or a small pit may exist.

The whorls of a variety (*fluctuatum*, Dall) are marked with oblique, prominent, rounded, short riblets. The shell may be produced, rugged and subcylindrical, or rather depressed and smooth.

PACHYPOMA GIBBEROSUM, Chemn.

On the sea beach outside of Point Pinos, Monterey. Alive on rocks, feeding on *Algæ* and *Laminaria*. Muzzle short, squarish; pointed bases covered by, but not connected with two small semilunar lobes, the rudiments of the "veil." Eye pedicles above and outside of tentacles, both being cylindrical, thick, and non-retractile. Cloak divided behind with a single posterior tentaculate filament on each side. Foot rounded, regularly granulated on the sides. Color red and purple mixed, lighter on top of head and edges of cloak. Mantle large, yellowish, as well as the upper part of the cloak. Edges of the mantle very brilliant yellow.

LEPTOTHYRA, Cpr.

Leptothyra, Cpr., MSS.

Leptonyx, Cpr. and A. Ad., Proc. Cal. Acad. iii, p. 175,
not of Swainson or Gray.

Homalopoma, Cpr., Suppl. Rep. Brit. As. for 1863, p. 537,
1864.

Type LEPTONYX (= LEPTOTHYRA) SANGUINEA, Cpr., p. 176, loc.
cit. as of Lin.

= *Turbo sanguineus*, Lin., Syst. Nat. xii, p. 1235, *teste* Cpr.
Hanl.

= *Turbo Bellicæi*, Mich., *teste* Hanl.

Hab., C. St. Lucas to Neeah Bay, Japan, Medit.

I have several small specimens of this species, collected by Capt. Christopher C. Dall at Cape St. Lucas. The variety *purpurea*, described by Dr. Carpenter, has, by the examination of many thousands of specimens, proved to graduate into the other forms so insensibly as to be hardly worthy of a separate varietal name. This, however, was not known at the time it was originally described. The species is of all shades of crimson and purple, some specimens being banded with white or having the red color of the ribs interrupted by oblique streaks of white, some specimens, excepting the dark apex, being pure white.

LEPTOTHYRA PAUCICOSTATA, n. s.

Leptothyra paucicostata, Dall, MSS. 1866.

Shell small, depressed, rounded, of three whorls. Sculpture consisting of seven revolving strong ridges, with the interstices deeply channelled, and marked by evident lines of growth. In a few specimens these are thickened at regular intervals, forming faint transverse riblets, which do not reach as high as, or pass over, the revolving ribs. Suture deep, channelled. Apical whorl smooth, translucent, the others solid and strong. Aperture rounded, peristome thickened, continuous with an internal groove for the operculum. Columella ending in a tooth-like knob or callosity, which is especially sharp and prominent in young shells. Throat pearly white. Operculum of few whorls, smooth, externally concave with thickened edges; circular, calcareous. Color of shell usually of a rusty brown, on the ribs alternating darker and lighter in spots, or reddish, in a similar way, or pure white. Interspaces usually light, but sometimes of the same color as the ribs. Alt. .12, lat. .2 in. Defl. 100°.

Habitat, Monterey, dead on beach, ten specimens, Dall, 1866. Catalina Island, Cooper, 60 fathoms.

This shell is more nearly allied to *L. sanguinea* than to *L. vacula*, which it more nearly resembles in size. It is uniformly smaller, when mature, than *L. sanguinea*, which has more than twice as many ribs, and an average width of .34 in., with the same number of whorls. It is well distinguished by its few prominent, strong ribs, small size, and usually also by its color, which, even when reddish, is lighter and more broken than in the normal *sanguinea*.

FISSURELLIDÆ.

LUCAPINA CRENULATA, Sby.

Mantle smooth and black like India-rubber, covering the shell in life, edges rounded, entire, without papillæ. Foot smaller, oval, with an impressed median line behind on the lower surface. Muzzle short, rounded-transverse, with an entire edge. Tentacles long, pointed, clavate. Eyes on prominent rounded tubercles behind the tentacles. A serrated frill passes in the commissure between the foot and the mantle, from behind one eye tubercle clear around to the same point on the other side. Anus prominent, elevated immediately below the hole in the shell. Gills curled inward at their tips. Jaw in two tridentate pieces;

dentition $\frac{1}{50 + (\frac{1}{2} + 3 \cdot 3 + \frac{1}{2}) + 50}$.

Monterey to San Diego, California.

Genus FISSURELLIDÆA, D'Orb.

FISSURELLIDÆA BIMACULATA, n. s.

Clypidella ? *bimaculata*, Dall, MSS. 1866.

Soft parts. Animal much larger than the shell, which is nearly covered by the mantle. Mantle thick, tough, almost coriaceous, covered with an infinite multitude of fine papillæ, closely crowded, giving the surface a velvety appearance. Small round tufts of longer papillæ are distributed in an irregular, radiating manner, rather sparsely. Circumference smooth, even; border around the visible part of the shell, smooth or papillose, differing in different individuals. Color marbled purplish, yellowish or pink; one or two specimens have a pair of broad, black, parallel streaks running longitudinally along the middle of the back. Mantle entirely covering and hiding the head, tentacles, foot, &c.

Foot oval, smaller than the circumference of the mantle, edges even, sides a little granular. Overhanging under surface of the mantle smooth. Around the foot between it and the mantle is a single row of papillæ, passing from one side of the head clear round the body to the other side, without interruption. Head, eyes, &c. as in *Patella*. On each side of the head is a round, prominent tubercle, from which a stout filament, as long as a tentacle, extends; these resemble a pair of accessory tentacles.

Length of animal, 2.7 in.; width, .9 in. Length of shell of do., .7 in.; width, .45.

The color is exceedingly variable.

It will be seen from the above description that the animal of this species differs strongly from that of *Clypidella*, to which genus this and another species have been referred by Dr. Carpenter. In *Clypidella*, the mantle does not cover the head and foot, and the lateral line of tubercles does not pass around the latter. The papillæ on the edge around the shell are of no differential value; and the shell of this species is very nearly covered, while in *Clypidella* it is usually more exposed.

While the present species does not exactly coincide in all its characters with figures of *Fissurellidæa*, yet it approximates more nearly to that genus than to any other, and I so refer it, provisionally, until further opportunities are afforded of working the subject up more thoroughly.

Shell ellipsoidal when young, subquadrangulate, and a little narrower in front than behind, when adult. Aperture the same shape as the shell, slightly encroached upon in some specimens by a point on each side. External surface furnished with radiating, rounded costæ, not bifurcating but widening slightly to-

ward the margin. These are crossed by evident but not very strong lines of growth, which, in some individuals, are rather strong. Anterior declivity of the shell concave, sides flattened, posterior declivity rounded convex. Color whitish, with numerous radiating rays of brown or slate color, usually with a broad fasciculus of darker rays in the middle of each side extending from the apex to the margin, and occasional dark dots on the ribs. Shell occasionally entirely brown or slate color, with two darker rays on the sides. Epidermis none.

Interior pure white, the two dark rays sometimes showing through the shell. Extreme outer edge finely denticulate or rounded and smooth according to the stage of growth. Margin as a whole broad, smooth, differentiated from the rest of the surface by a wide, shallow groove. Margin of the aperture similarly bordered. Muscular impressions distinct, surface marked by fine radiating lines; polished. Anterior and posterior margins internally concave or emarginated, so that when laid upon a flat surface in the natural position the ends of the shell do not touch it.

Adult, lon. .7; lat. .5; alt. .2 in. Lon. of aperture, .23; lat. of do., 12 in.

Habitat.—Monterey, California, dead on beach, ten specimens, Dall, 1866. Alive under stones at low water, Stearns, Cooper. Also at Baulinas Bay, Santa Barbara, Purissima and Lobitas, Cala., Stearns and Newcomb.

The dark lateral bands and markings are not invariable, though pretty constant, and had not the shell in question been published in several catalogues and become familiar to Californian conchologists for five years, under my MSS. name, I should have preferred to substitute another.

The nearest ally of this species is the *Olypidella callomarginata*, of Dr. Carpenter.

The hitherto unique type being in the Smithsonian Collection I have not failed to compare it carefully with a good series of the present species, and feel no doubt as to its specific and perhaps generic distinctness. In the *callomarginata* the relations of the margin are exactly reversed; the sides are slightly concave, and the ends are convex and produced. The aperture is much smaller and narrower than in a specimen of *bimaculata* half the size; the sculpture, though on the same plan, is sharp and rough, the lines of increase being prolonged into sharp, elevated scales, and the ribs nodulous; while the exterior is covered with a rather coarse epidermis and adherent annelid tubes, showing conclusively that it could not have been, like the present species, an internal or partially internal shell. The

color is obscured by the epidermis, but appears to consist of black rays on a whitish ground. It is also a much narrower and proportionally longer shell than the *bimaculata*.

The above notes are taken from a large number of alcoholic specimens. Mr. Stearns kindly furnishes the following notes upon a *Clypidella*, which may be the *callomarginata*, as the description hardly agrees with the animal of *bimaculata* in regard to the enclosure of the shell, though this may have been exceptional:

"Body of the animal larger than the shell, but not covering it except at the edges. Principal portion of body finely and granulously rough. The inner margin near the shell and around it ornamented with cream-white, radiating lines, not extending to the outer edge of the body, which is thin, whitish and ornamented with black spots, with white lines radiating toward the edge of the shell for a short distance. The white spots or portions of the mantle between the black spots are papillose, or a little produced toward the apex. Living at Monterey."

FISSURELLA VOLCANO, Rve.

Dentition $\frac{1}{30? (\frac{1}{4} + 4 \cdot 4 + \frac{1}{4}) 30?}$. Jaw single, entire, hooked or pointed in the median line. Mantle extending a little beyond the shell. Edge banded with black and colored spots corresponding to the colored rays of the shell; and with groups of papillæ separated by clear spaces, about eight on each side. Margin around the hole black, papillose. Gills curved to the left at their tips. Tentacles short, sub-cylindrical, pointed with the eyes behind on their swollen bases. Muzzle short, cylindrical. A row of papillæ passing round the body as in *Lucapina*. Anus as in the latter. Baulinas to San Diego, California.

CHITONIDÆ.

NUTTALLINA SCABRA, (Rve.) Cpr.

Abundant on the rocks at Mussel Point, Monterey, where they can hardly be sprinkled with spray except in storms. Inhabits holes and crevices, growing thus into irregular shapes. Also at Cypress Point, Carmel Bay, in similar situations. Not found on low rocks which are covered with water at high tide, but seems to delight in exposed headlands, where the breeze comes in damp and strong from the sea. Usually much eroded on the apices of the valves, but by what means I cannot determine. (Dall, MSS. 1866).

ISNORADSLIA TRIFIDA, Cpr., n. s.

This new and beautiful species was obtained at Sitka in 14 fathoms stony mud, off the fish-house. It will be described by Dr. Carpenter, who has made a special study of the Chitons.

ONCHIDIIDÆ.

ONCHIDELLA, Gray.*ONCHIDELLA BOREALIS*, n. s.

Animal small, black with dots and streaks of yellowish white, foot light-colored, also muzzle and tentacles. Back regularly rounded, but a little pointed in the middle; smooth or very finely granulose, tough and coriaceous. Eyes globular, blue, on very short constricted tentacles. Muzzle short, rounded-transverse. Head not produced beyond the anterior edge of the mantle. Sexual appendages on the right side, near the head. Foot ovate, narrow, rather roundly pointed behind. Lon. .3 in.

Habitat, Sitka, Alaska Territory, on the rocks near tide marks, especially on the small islets in the Bay. Dall, August, 1866.

LIMNÆIDÆ.

LIMNÆA PALMERI, n. s.

Shell, large, moderately thick, solid, of a rufous tint; rather polished outside, sculptured with incised lines visible without a lens and more crowded on the edges of the whorls than on their more convex portions; suture deeply canaliculated, whorls much inflated, four? in number (apex decollated), columella thin, very slightly reflected, furnished with a small but very evident plication, umbilical fissure nearly covered by the reflected columella; outer lip roundly arched, not reflected or thickened; aperture rounded ovate, less than half as long as the shell; last whorl much the largest, but not rapidly enlarging. Length of the last two whorls .86 in. in total length, probably about an inch, greatest width of last whorl .58 in.

Habitat, Taqui River, near Guaymas, Mexico, emptying into the Gulf of California. Collected by Dr. Edward Palmer.

I know of no species with which this can fairly be compared; indeed, had the case been otherwise, I should not have felt justified in describing it as new, from a single decollated specimen. It will be referred with propriety to the section *Bulimnæa*, Hald. The incised lines, very round whorls, and deeply channelled suture, are its distinguishing characters, and it has a slight

resemblance in general form to *Vivipara*, from which, however, the plicated columella and other characters at once distinguish it.

I take pleasure in dedicating it to Dr. Palmer, to whose unwearied exertions are due many rich additions to the National Museum.

ACTÆONIDÆ.

ACTÆON, Montfort.

Actæon, Montf., Conchyl. Syst. ii, p. 315, 1810.

Characters.—Aperture rounded, entire. A single plait on the columella. Shell imperforate, with an elevated spire.

Type *A. tornatilis*, Gmelin.

Subgenus RICTAXIS, Dall.

Shell like *Actæon*, but with the columella projecting beyond the line of the anterior margin, forming a small tooth-like projection, or truncate obliquely.

Type RICTAXIS PUNCTO-CÆLATA.

Tornatella puncto-cælata, Cpr., Suppl. Rep. 1863, p. 646.

Habitat, Catalina Island and San Diego, Cal., Cooper; Monterey, Dall.

This species, distinguished by its peculiar columella, which removes it from *Actæon*, is not uncommon, dead, on the beach at Monterey, and adhering to the tentaculæ of the immense *Actinæ* on the rocks at that locality, a position where many small and interesting shells were obtained by me among the small stones and fragments with which these creatures cover themselves. It presents some resemblance to *Bullina*, from which the columellar plait and imperforate axis distinguish it.

TORNATINA, A. Adams.

TORNATINA HARPA, n. s. (Dall, MSS. 1866.)

Shell small, white, of four and a half whorls; tabulate and sharply carinate above, characterized by sharp grooves and raised lines, parallel with the lines of growth, which extend half over the whorls and become obsolete anteriorly. Apex mammillated, minute, globular, prominent, suture canaliculated. Anterior portion of the last whorl smooth. Last whorl slightly narrower above. Aperture long, narrow, effuse below, with a deep narrow sinus at the suture. Columella thickened with a thin layer of white callus. Columellar plait obsolete in the adult,

rather prominent in young shells. Carina intersected by the grooves and slightly dentate. Lon. $\cdot 24$, lat. $\cdot 12$ in.

Habitat, Monterey, California; adhering to the tentaculæ of Actinias; three specimens.

This pretty and very distinct species is unlike any other from the coast, and is readily recognized by the characteristic grooves.

NUDIBRANCHIATA.

ALDERIA?? ALBOPAPILLOSA, n. s.

Body ovate, mantle larger than the foot, extending in front of and hiding the muzzle. Eyes black, sessile on the anterior surface of the body, near the mantle margin. Tentacles none. Muzzle under, and hidden by the mantle edge, slightly produced into two points at the corners, stout, wide, short. Foot thin, oval. Anus terminal under the edge of the mantle. Orifices at the right side near the muzzle. Mantle margin entire. Foot regularly oval, thin, smaller than the mantle. Back regularly rounded, smooth, and covered with a multitude of cylindrical, short, stout, branchial appendages, radiating rather irregularly from the top of the back to the edges of the mantle, and close set all over the surface of the latter; of an opaque white in life, the remainder of the animal except the eyes being translucent yellowish.

Length $\cdot 3$, breadth $\cdot 2$ in.

Habitat, Sitka, Alaska Territory, on fuci; three specimens, July, 1865. W. H. Dall.

I am almost certain that this cannot belong in the genus *Alderia*, but it comes nearest to that, and, for the present, I prefer to refer it with doubt to that place.

Doris Montereyensis and *Eolis opalescens*, Cpr., were found with this species.

PTEROPODA.

Family CYMBULIIDÆ.

Genus COROLLA, Dall.

Like *Tiedmannia*, but with the body pendant below, unattached to the pinnæ, ovoid, constricted above. Œsophagus produced, oral aperture trumpet-shaped, produced into two points. Pinnæ forming a single disk with reticulated muscular bands, separated by a deep sinus from the oral portion. Pelagic. Shell entirely absent.

This genus is related to *Tiedmannia*, from which it differs in the pendant body and absence of even an internal cartilaginous shell.

Type COROLLA SPECTABILIS, n. s.

Pinnæ broadly rounded, two small indentations in the upper portion, giving it a trilobed appearance, rather than transverse, translucent yellowish, speckled with black dots on the upper margin; crossed from one side to the other by arched, broad bands of muscular fibre, which are reticulated by similar radiating bands. A deep, broad sinus separates the pinnæ from the parts surrounding the mouth. The orifice of the latter is trumpet-shaped, situated in a transverse cleft of the membranes which surround it and which are roundly produced on each side of it like the lower portion of a pea-blossom. Œsophagus slender, bright yellow. The neck, by which the body hangs, is constricted, giving it a vase-like appearance. The intestines are variously tinted with brown, purple and green.

Lon. of body, .5; total lon., 2.0 in. Width of pinnæ, 1.8; height of do., 1.1 in.

Habitat.—North Pacific Ocean, in lat. 42° 50' and lon. 147° 25'. July 22, 1866, W. H. Dall, Coll. reg. No. 307.

This beautiful Pteropod is gregarious, as a number were taken together at one haul of the towing net, but not on any other occasion. A more detailed account of this and the other pelagic Mollusks, obtained in the North Pacific by me, is in course of preparation.

Judging by Rang's figures, *Cymbulia radiata* and *punctata*, Quoy and Gaimard, may possibly belong to this genus.

LIMACINIDÆ.

LIMACINA, Cuvier.

LIMACINA PACIFICA, n. s.

Limacina pacifica, Dall., MSS. 1866.

Pinnæ arched above, rounded at the ends and deeply, widely notched below. Pedal disk bilobed, rather large. These parts translucent whitish. Sides of oral aperture painted with pink, tentacles two, short, conical, obsolete. Viscera pink. Operculum absent. Shell with a band of brown following the suture, otherwise hyaline, depressed of seven whorls, rather inflated, especially the last, umbilicus small. Diam. Alt.

This I have also compared with Atlantic specimens; the shell is more depressed, has a larger number of whorls, is smaller,

with a narrow umbilicus. The shape of the pinnæ differs in the two.

Habitat.—Monterey, Cala., dead on beach, Dall, 1866. Neah Bay, W. T. Swan. Off the Peninsula of Aliaska, living, 1865, Dall.

It is worth note that no Pteropods appear, after several years exploration, to inhabit Bering Sea. I found none north of the Aleutian Islands, though they were common enough to the southward of them. I took several quarts in a disorganized condition from the stomach of a specimen of *Orthogoriscus analis*, Ayres.

Family CLIONIDÆ.

CLIONE, Pallas.

CLIONE ELEGANTISSIMA, n. s.

Pinnæ small, pink, with translucent margins, a ray of bright crimson in the center of each, subtriangular. Body pyriform, slender caudal end usually curved to one side; a patch of brownish crimson with well defined edges, on the back, ventral side and tail, brownish pink. Head well differentiated, longitudinally striped with carmine on a lighter ground. Tentacles two, short, cylindrical, brownish. Cephalic lobes six, thick, leaf-like, short, covered with fine granulations or pores on their anterior sides, which are flattened and of the most brilliant carmine. Disk cleft in the median line. Mouth with two broad carmine labia.

Length, .28; breadth of pinnæ, .22 in.

Habitat.—Pacific Ocean, in lat. 51° 50', lon. 161° 26'. August 2, 1866, Coll. reg. No. 309, W. H. Dall.

This exquisite little species is smaller and more brightly colored than any other yet described. It also differs in form from any other. In this and other species the notes on the color, &c., were taken from life.

PNEUMODEMIDÆ.

PNEUMODERMON, Cuvier.

PNEUMODERMON PACIFICUM, n. s.

Body subcylindrical, elongated, rounded behind, livid purple. Pinnæ subquadrate, arched at their inner anterior margin, deeply notched at their inner posterior edge. Anterior margin with a well marked band of white; remainder dull purple, lighter behind. Head indistinct, cylindrical. Oral aperture deeply

notched the median line below, entire above. Tentacles two, small, short, distant on the back of the head. Proboscis swollen at the extremity, furnished with two long, cylindrical, tentacular, retractile, appendages. Suckers in two small, compact bunches, like bunches of grapes. These parts whitish. Pedal disk cordiform, purple with a black spot. Foot long, slender, linguiform. Branchiæ short, inconspicuous.

Length, 1.0; diam. of body, .3; spread of pinnæ, 1.15 in.

Habitat.—North Pacific Ocean, lat. $37^{\circ} 8'$, lon. $136^{\circ} 10'$. July, 1866, Coll. reg. No. 301, W. H. Dall.

I can find no descriptions or figures which appear applicable to this species, which is rather abundant off the West Coast of the United States, from lat. 35° to 45° .

HYALIIDÆ.

CLEODORA, Peron and Leseur.

CLEODORA OCCIDENTALIS, n. s.

Pinnæ regularly rounded, broader at their distal extremities, yellowish white. A deep purple black spot on each side of the mouth; pedal disk brown, small, transversely rounded. A small white vermicular filament on each side of it. Viscera with the intestine spirally twisted, crimson; liver reflecting a metallic green; heart dark brown. Shell tricarinated, transversely striated, sides a little concave, tip straight. Lon. .6; lat. .45; lat. of pinnæ, .9 in.

Habitat.—North Pacific, off the coasts of California, in lat. 33° , lon. 130° W., and to the northward in abundance.

This species is nearest to the *C. pyramidata*, with authentic specimens of which I have compared both shell and animal. It is constantly smaller and more acuminate, and the animals differ widely. As before mentioned, more extended descriptions are in progress, and will be accompanied with anatomical details.

Class CONCHIFERA.

SOLENIIDÆ.

SILIQUA, Meg. v. Muhl.

Machæra, Gld., Cpr. *Aulus*, Oken.

SILIQUA PATULA, Dixon.

Solen patula, Dixon, Voyage round the World, p. 334, f. 2, 1789.

Solen maximus, Wood, Index, &c., not Gmelin.

Solecurtus Nuttallii, Conrad, Journ. Acad. Nat. Sci. Phil. vii, p. 232, pl. xvii, f. 9, 1837.

Solen grandis, Cpr., as of Gmelin.

Siliqua californica, Conr., Am. Journ. Conch. iii, p. 193, 1868.

This shell I am inclined to consider distinct from *S. lucida*, which bears to it the same relation that *S. costata* does to *S. squama*, Blainv., upon our eastern coast.

Why Mr. Conrad should locate it at the Sandwich Islands is incomprehensible; both his types were from California. Dixon's was from Cook's Inlet, and his figure is excellent. I can find no *Solen grandis* in Gmelin's ed. of the Syst. Naturæ. The obliquity of the rib varies, as also the shape of the sinus. The shell is nearly equally rounded at each end. *S. californica*, Conrad, is merely a young specimen. The purple ray from the beak is pretty constant; I find it in all perfect specimens. The epidermis of the old shells is dark brown; that of the young, a beautiful polished yellow green, with an olivaceous cast.

SILIQUEA LUCIDA, Conrad.

Solecurtus lucidus, Conrad, Journ. Acad. Nat. Sci. Phil. vii, p. 231, pl. xvii, f. 8, 1837.

This shell is small and hyaline; the rib shows through, and there are three yellow rays behind it. The purple is in concentric waves, interrupted by the rays, with the spaces between the waves also yellow. The epidermis is very thin and hyaline. The shell is truncated behind, and the sinus is shallower than in *S. patula*. The rib is straight.

SILIQUEA MEDIA, Gray.

Solen medius, Gray, Beechey's Voy. p. 153, pl. xlvi, f. 2, 1839.

Shell like *S. costata*, Say, but constantly higher and shorter, with a broader, stronger rib, and much stouter, larger teeth. Sinus more shallow. Exterior with stronger lines of growth, less polished, and with a longer ligament. Color lurid purple, suffused with white inside, a mixture of olive green, yellowish and purple outside; constantly darker than *S. costata*. Squarer at the posterior end, with obsolete irregular lighter rays in some specimens. Lon. 1.9, alt. 1.0, diam. .34 in.

Habitat, Norton Sound, Alaska Territory.

Mr. Conrad has applied the name *borealis*, in his catalogue of

the *Solenidae*, to a shell described by Middendorf (Sib. Reise, p. 269, Mal. Rossica, iii, p. 79, pl. xxii, f. 4—10, 1849) as *Machæra costata*. Middendorf's figures and descriptions, like his synonymy, include several species. Mr. Conrad selects Sitka from among Middendorf's localities, as the habitat of the species which would make his name (which included no differential or other description) a synonymy of *patula*, the only species found at Sitka.

Middendorf includes *patula*, *costata*, and *media* in his description, and part of his figures refer to one and part to another of these species. The shell in question is well represented by Gray's figure, though usually darker than that is colored, and is without doubt distinct from either *patula* or *costata*. It ranges throughout the northern and western part of Bering Sea, Bering Strait, and probably the Ochotsk Sea. It does not pass into the Pacific.

ANATINIDÆ.

ENTODESMA SCAMMONI, n. s.

Shell inequilateral, inequivalve, subovate. Left valve slightly the smaller. Shell tumid, umbones inconspicuous, nearly in the middle of the shell. Interior with a brilliantly pearly, white nacre; hinge margin narrow, nearly straight; interrupted under the beaks; right valve with a small rounded projecting process, fitting into an excavation in the opposite valve, which is thickened behind it. Ligament and ossicle moderate. Pallial line simple, continuous. Anterior margin evenly rounded; posterior ditto, a little more effuse; ventral margin with the faintest possible indication of flexuosity; shell gaping behind, but with no perceptible ventral gape. Exterior smooth except for lines of growth, which are more emphasized at intervals, forming three concentric waves from the umbo toward the margin. Shell covered with a thin yellowish brown pubescent epidermis, which is produced over the margins, and under a lens is seen to be very closely, finely, radiately striate. The pubescence is formed by little projecting points of the epidermis at the intersections of the striæ with the lines of growth. Shell solid. Lon. .9, alt. .44, diam. .33 in.

Habitat, Port Simpson, British Columbia, Capt. C. M. Scammon, U. S. Revenue Service.

This shell comes nearest to *Entodesma saxicola*, Baird, with which Dr. Carpenter would unite it; but it appears to me perfectly distinct. That species takes every imaginable form, nesting or boring in rocks and among the roots of fuci. I have ex-

amined a very large series, extending from Sitka to Monterey. In such cases the only satisfactory way of determining specific differences is to compare normal undistorted specimens of the same age.

E. saxicola is characterized by a straw yellow or dark brown, thick, strong epidermis, which always breaks the thin shell in drying. This epidermis is marked by a peculiar smoothness of its exterior, though puckered up, wrinkled and folded to a great extent. The pinched up wrinkles are characteristic. It is distantly radiately striate, especially toward the posterior end. These striæ are more properly raised folds. The substance of the shell has a characteristic porcellanous texture and appearance, but slightly nacreous, usually livid, though rarely white, but never brilliantly pearly. In normal specimens the shell is more or less truncate at each end, especially the anterior end, which is further marked by two more or less evident ridges, extending from the beaks. It always has a large ventral gape.

E. Scammoni can then be readily distinguished by its nacre, its characteristic epidermis, which does not contract and break the shell, and which is striated in a totally different way from that of *saxicola*. It has not the ridges or ventral gape alluded to. My specimens agree exactly with each other, in all respects, and are not distorted in the least.

ENTODESMA DIAPHANA, Cpr.

Some shells in the Smithsonian collection, thus marked, appear to be worn specimens of what I called (in MSS.) *Entodesma spongiophila*, in 1866. Mine were from Monterey. The others are from San Diego and Cape St. Lucas. Dr. Carpenter's type was from Mazatlan. He also unites with it *Lyonsia inflata*, Conr., a species from Guayaquil, of which the type has not been examined by either Dr. Carpenter or myself. Conrad's figure represents a very different looking shell. *L. californica*, Conrad, probably includes *bracteata*, Gld., and *nitida*, Gould. I should be inclined to include Conrad's *inflata* with it also, from the figure, if such a course were admissible. Conrad, in his catalogues, has it in both *Lyonsia* and *Entodesma*, with the same references.

If *E. diaphana*, Cpr., be the same as my MSS. species, it is undoubtedly perfectly distinct from the others. The practice of combining species, autoptically unknown to the combiner, is most pernicious, and produces far more confusion than the description of mere varieties as specifically distinct, though the latter is objectionable enough.

AMPHIDESMIDÆ.

Genus SEMELE, Schumacher.

Semele, Schum., Essai. pp. 53, 165, 1817.*Amphidesma*, Lam., Hist. An. s. Vert. v. p. 489, 1818.

SEMELE RUBROLINEATA, Conrad.

S. rubrolineata, Conr., Journ. Phil. Acad. Sci., vii, p. 239, pl. xviii, f. 11, 1837.*S. simplex*, Ad. and Rve., Moll. Samarang, p. 81, pl. xxiv, f. 11, 1850. Rve., Conch. Icon., sp. 53, teste Conrad.Not *S. rubrolineata* of California authors.

The shell which is above identified by Mr. Conrad and Geo. W. Tryon, Jr., in the catalogue of *Tellinidæ*, Am. Journ. Conch., iv, appendix, p. 122, is not the shell latterly known under that name by California naturalists, which appears, as follows, to be undescribed.

SEMELE RUBROPICTA, n. s.

Shell usually pure white and brilliantly polished within, but occasionally with a faint yellowish or pinkish flush when very deeply colored externally. Inner margin, except on the hinge-line, always pure white. Outside, covered with a thin yellowish green or olive, epidermis usually wanting, color yellowish white, with rose-pink and pure white rays, color stronger on the lines of growth. Sculpture consisting of incised lines radiating from the umbones where they become obsolete; crossed by rounded, smooth, concentric ridges rather sharply defined by concentric grooves. These ridges are usually regular but sometimes bifurcating. In perfect specimens the radiating lines and grooves are so sharp that their intersections appear as if punctured. Ligament pit deep and excavated, cardinal and lateral teeth moderate. Anterior end much produced, rounded, margin rounded below, posterior end very short, almost truncated; shell rather inflated. Lunule deeply impressed, narrow, lanceolate, short. General form subquadrate. Umbones inconspicuous, usually tinged with yellow. Hinge-line below the lunule with a purple spot. Interior marked with extremely faint radiating lines. Posterior portion of the inferior margin produced. Shell thick and solid. Alt. 1.35 in. Lon. 1.55 in. Diam. .7 in. Lunule .24 in.

Habitat. Beach at Soquel, Monterey Bay, two or three valves, Dall; San Pedro, Cooper; Neah Bay, one worn valve, Swan.

I hardly know with what species to compare this very distinct form. It is perhaps nearest to *S. flavicans*, Gld., from Panama, which wants the red lines, is more rounded and higher, with a shorter lunule, and much narrower and smaller pallial sinus, besides many other differences.

It has not the peculiar spongy surface of *decisa*, which is a very high round shell, with the interior strongly punctate and valves nearly equilateral. It wants the curious sculpture, color, and form of *S. rupium*, which has also a rounder shell and smaller mantle bend. It bears no resemblance to *S. incongrua*, Cpr., and has not the sculpture or painting of *S. pulchra*.

VENERIDÆ.

LIOCYMA, Dall.

Liocyma, Dall, Proc. Bost. Soc. Nat. Hist., xiii, p. 256, April, 1870.

1. Type LIOCYMA FLUCTUOSA, Gld.

Habitat. Ochotsk Sea; Grand Banks, Newfoundland, Nova Scotia; Mass. Bay.

Characters compressed, regularly waved, with faint radiating striæ; subovate waxen yellow. Animal pale yellowish white.

2. LIOCYMA BECKII, Dall.

Liocyma Beckii, Dall, Proc. Soc. Bost. Soc. Nat. Hist., xiii, p. 257, 1870.

Habitat. Plover Bay, E. Siberia; Kadiak; Unga Island, N. Pacific.

Characters. Inflated, subtrigonal, waves somewhat irregular, without striæ, straw yellow. Animal white with pink siphons.

3. LIOCYMA ? ARCTICA, Rve.

Tapes arctica, Rve., Conch. Icon., x. sp. 52, 1865.

Habitat. Arctic Seas. (Ubi.)

Characters. Compressed, cuneiform; slightly irregularly waved; ashy green; with radiating darker lines of color; without striæ. Animal?

This species probably belongs to this genus, but differs in shape and sculpture from the others.

4. LIOCYMA SCAMMONI, n. s.

Anaitis ? Scammoni, Dall, MSS., 1868.

Shell most resembling *L. fluctuosa*, but less compressed, much

stouter and thicker. Epidermis of a deep yellow brown, instead of waxy; shape more trigonal with the posterior ventral margin more produced; umbones dark umber brown; ligament longer, stouter and much more prominent; lunule almost obsolete, with the waves continued over it instead of smooth. Concentric sculpture in waves, not separated by grooves as in *L. fluctuosa* of the same size, but further apart, more irregular and rounded or sharp instead of flattened. Hinge line broader, teeth larger and much stouter than in any other species; pallial sinus shallower and rounder, and muscular impressions proportionately larger than in any other form of the genus. Animal dark brown. Lon. .8. Alt. .64. Diam. .36 in.

Habitat. Fort Simpson, British Columbia; Capt. C. M. Scammon, U. S. Revenue Service. Six specimens.

This species, differing from any in the collection of the British Museum, with which it was compared by Dr. Dawson, is readily recognized by its stout teeth, thick shell, dark color and large ligament. The umbones are more central and the pallial sinus shallower than in any of the others.

LIOCYMA VIRIDIS. n. s.

Habitat. Arctic Ocean, Capt. Rodgers, U. S. N.

Shell of a beautiful pea-green, covered with a beautifully polished epidermis; sculpture of very fine rather sharp concentric waves, very regular in outline. Epidermis between the waves raised in minute bubble-like globules. Numerous faint, rather distant impressed lines, not striæ or grooves, radiating from the umbones, which are rather small and acute. Shell thin but not compressed, waves not flattened. Hinge line very narrow, teeth slender but distinct, very close together. Umbones in the anterior third. Ventral margin produced and greatly arched. Anterior end rather pointed, short. Pallial sinus small, sharply angulated. Muscular scars small. Hinge line very slightly arched. Lon. 1.0. Alt. .66. Diam. .36 in. Lunule smooth, lanceolate, bounded by an impressed line. Ligament short, small, not prominent.

This exquisite shell was rather hastily referred to by me in my description of *L. fluctuosa* as a variety of it. Finding that there is very little variation in the different species of this group, of some of which I have examined several hundred specimens, I have come to the conclusion that it is distinct.

I have been unable to find any approach to it among the other species, of which I had but a small series at my first writing. The animal is of a fine pea-green color. The shell is readily

recognized by its beautiful color, very fine, regular ribs, much produced, ventral margin, slender anterior end, bubble-like elevations of the epidermis and narrow hinge line.

It is nearest *L. fluctuosa*, which has the anterior end broader and more rounded, is compressed, and flattened on the top of the ribs, which are less regular and coarser, the anterior muscular impression being further below the hinge line and the sinus less angulated and proportionately larger.

MERCENARIA, Schum.

Mercenaria, Schum., Essay, p. 1817.

MERCENARIA KENNICOTTII, n. s.

Mercenaria Kennicottii, Dall, MSS., 1868.

Shell cuneiform, dark ferruginous brown, ornamented with fine concentric, slightly elevated lamellæ. Valves rather inflated, thick; umbones prominent, rounded; within the anterior third; anterior end rounded from below to the lunule, which is broad, cordiform and impressed, bounded by a deeply incised line. Extreme anterior end of the valves rather pinched together. Anterior ventral margin arcuated. Posterior end thick, rather produced and pointed. Posterior dorsal side roundly arched from the umbones to the end; two obsolete carinæ pass from the umbones on each side posteriorly, the inner pair forming the boundary of the ligamentary area. Inner posterior and ventral margin finely crenulated. Hinge line strongly arched behind. Dental area broad, teeth strong. Posterior dental process rugose. Muscular impressions large; pallial sinus short, sharply angulated. Sculpture of fine concentric lamellæ, slightly elevated, more so on the anterior end; more distant on the umbones, thickly crowded near the margin especially anteriorly. Lines of growth prominent at intervals. Lamellæ passing over the ligamentary area and lunule. Interior white; the dark brown of the exterior may be a stain but looks natural. Lon. 2.64. Alt. 2.1. Diameter 1.56 in. Angle of the pallial sinus 45°. Lon. of do. .44 in.

Habitat.—Neah Bay, W. T., Capt. E. E. Smith.

I have much pleasure in dedicating this fine species to the memory of the late lamented Robert Kennicott. Two other MSS. names have been applied to it, but my own antedates them both. It is nearest to *Venus Stimpsoni*, Gould, from Yeddo, Japan, which is a larger species, chalky white, with a lanceolate lunule, long, nearly smooth ligamentary area; much more rounded ventral margin and proportionally much smaller pallial sinus.

It is also without the roughened dental process which distinguishes the genus *Mercenaria*.

This species has somewhat the shape, but not the coloration, of *V. alboradiata*, Shy., from the Gulf of Mexico. The latter is a blunter, rounder shell posteriorly.

A large worn valve obtained by me at Monterey, but not returned by Dr. Carpenter, may have been this species or *V. Stimpsoni*. It was erroneously referred, in the absence of types, to *V. Kennerleyi*, Cpr., at that time.

The dorsal margins of the valves of this species are a little flexuous.

CARDIIDÆ.

CARDIUM (? SERRIPES) LA-PEROUSII, Desh.

Cardium Laperousii, Desh., Rev. Zoöl. p. 360, 1839. Mag. Zoöl. 1840, pl. 48.

This species appears quite distinct from *Serripes grönlandicus*, in its much more transverse and equilateral shell. Were there any doubt upon the subject, however, it would be set at rest by the fact that this species has a rounded, geniculate foot, entirely destitute of the serrations which characterize the foot of *grönlandicus*, and gave the name to the subgenus.

I dredged it alive at Sitka, in 14 fathoms, mud and shell; obtained dead valves at Unga, North Harbor, in four fathoms, mud; on the beach near the mouth of the Avatcha River, Avatcha Bay, Kamtchatka; and at Plover Bay, Eastern Siberia, near Bering Strait.

CARDIUM ISLANDICUM.

Very large and fine specimens of this species were obtained at Sitka; Unga, Kodiak, Unalashka, Tongass, Norton Sound, Plover Bay, Bering Strait, St. George Island and Petropavloosk, also furnished examples. *Cardium Nuttallii*, Conrad, (= *corbis*, Desh., Cpr., not Martyn,) was found at Sitka, Unga, Kodiak and Avatcha Bay.

Cardium (Serripes) grönlandicum from all of the localities above noted for *C. Islandicum*, and especially large and fine from Kodiak. *Cardium blandum*, Gld., was obtained at Sitka and Unalashka.

CHAMIDÆ.

CHAMA, Lin.

CHAMA INERMIS, n. s.

Shell rugged, sinistral, obscurely three sided. Right valve

deep, obscurely carinate; umbo produced incurved, forming a nearly complete volution. Left valve nearly flat, but slightly vaulted at the umbo, which is incurved some distance from the margin, but not externally elevated; tooth wide and strong. Anterior tooth of the right valve large, corrugated on the outer side; posterior tooth small, corrugated on the inner side. Ligament stout, almost buried beneath the incurved umbones. Anterior muscular scars largest, shell channelled between the scars. Interior white; margins smooth, the posterior edge of the left valve with a narrow band of purple. Exterior without plications, smooth, except for the lines of growth, covered with a strong light yellow brown epidermis, which is only roughened by the lines of growth.

Alt. 3.1; lat. 2.1 in. Depth of right valve, 1.3 in.

Habitat.—Middle America. "Puget Sound," Rowell, in error.

This very singular shell is covered with parasitic *Vermeti*, &c., of Central American species. An anomaly appears in the fact that a large part of the shell, *outside of the epidermis*, is covered with a white, calcareous deposit, evidently a part of the shell itself, and marked only by coarse lines of growth. The edge of the epidermis appears on the margin some distance *within the actual edge*. This is the only instance known to me of an epidermis being secreted by the mantle beneath the external surface of the shell. It may be accounted for as follows: The edge of the epidermis may be secreted at one period, after which the edge of the mantle might secrete a calcareous layer extending beyond the epidermal margin. The mantle, contracted in a period of rest, would again add to the layer of epidermis, after which, expanding, another outreaching calcareous layer might be deposited, which would, of course, fall upon the previous one, and so on. This view is strengthened by the fact that a careful examination of the epidermis with a strong lens, in places where the external calcareous layer has been removed, shows that the continuity of the epidermis is frequently interrupted by a very thin layer of shelly matter. The outer calcareous layer does not cover the whole of the shell. In any case the fact is very curious and interesting. It is nearest *Chama iostoma*, Conrad, from the Sandwich Islands, which is a dextral shell with radiating plicæ and marginal produced laminae.

I find a note upon the label, by Dr. Carpenter, stating that he had written, but afterwards suppressed, a diagnosis of the shell under the name of *C. inermis*, and, therefore, have adopted his MSS. name, while incurring the responsibility of describing

it as new. It was sent by the Rev. I. Rowell, of San Francisco, to the Smithsonian Collection, of which it forms a part (No. 24108), and was erroneously labelled by him as from Puget Sound. The parasites show its true locality to have been from the coast of Middle America.

CYAMIIDÆ.

TURTONIA OCCIDENTALIS, n. s.

? *Turtonia minuta*, Gld., as from Bering Strait.

Shell subtrigonal, slightly inequilateral, small and smooth. Color purplish; lighter, with a yellowish epidermis, toward the margin, especially anteriorly. Interior dark purple in the middle of the valves, margins lighter, dark brown above and behind. Hinge-line and ventral margin roundly arcuate, ends rounded, anterior a little shorter and smaller. Epidermis yellowish brown, polished, with rather strong lines of growth at intervals. Umbones rather prominent, usually eroded. Shell a little tumid. Teeth strong, apparently three cardinals in the left valve, with the posterior dorsal hinge margin folded in making a strong tooth-like lamella. Right valve with one long and one triangular cardinal tooth, and a posterior lamella as in the other. Pallial line simple, lightly waved near the posterior muscular scar. Anterior scars two, perfectly separate and distinct, the upper triangular, slightly smaller.

Lon. .2. Alt. .16. Diam. .1 in.

Habitat. Plover Bay, Eastern Siberia, abundant in the roots of *fuci*. Dall., 1865 and 1866.

Although this species differed in its larger and more trigonal and shorter form from all the figures of *T. minuta*, I felt unwilling to describe it, until receiving some Atlantic specimens the matter was placed beyond a doubt by the comparison. It is four or five times the size of the *T. minuta*, much shorter proportionally and more equilateral, less compressed and darker colored. The teeth also differ slightly. I have not adopted the genus *Cyamium* as it seems to be in dispute. I am glad to be able to fully confirm the observations of Mr. Jeffreys (Brit. Conch., ii, p.) in regard to the siphon and foot. The ligament is wholly external. The double anterior scars are interesting.

CARDITIDÆ.

Genus ASTARTE, Sowerby.

Astarte, Sby., Min. Conch., t. 167, 1816. Type *A. Danmoniensis*. Mont.

Subgenus RICTOCYMA, Dall.*

Shell and hinge like *Astarte*. Sculpture consisting of broken, nodulous waves, irregularly concentric, covered with a thick epidermis. Equivalve and nearly equilateral.

The sculpture of this form is so very peculiar that I have thought it as worthy of a section to itself, as *Acila* and similar subgenera. It is externally like *Ptychomya*, Agassiz, from the lower oolite, but the sculpture is essentially different.

Type RICTOCYMA MIRABILIS, n. s.

Shell small, subtrigonal, olivaceous, moderately thick. Umbones nearly erect, prominent, pointed; exterior covered with a thick olive-green epidermis lightly marked with concentric lines of growth. Interior livid translucent greenish, smooth. Hinge as in *Astarte* but more equilateral than in most species of that group. Anterior margin more produced than the posterior, while the contrary is the case in the majority of species of *Astarte*. Sculpture similar in both valves, consisting of eight or nine ridges, arranged in a generally concentric manner, but having a squarish fluctuation in the middle of the valve toward the umbo, one on each side of this toward the margin, and recurved more or less toward the anterior and posterior margins. These ridges are broken and non-continuous toward the sides and are rudely nodulous toward their extremities, which do not reach the anterior and posterior margins in most cases.

Alt. .12, lon. .16, Diam. .04 in.

Habitat, North Harbor, Unga Island of the Shumagin group, in 8 fathoms, muddy bottom, one living specimen, September, 1865, Dall.

I have looked in vain for any species with which this might be compared. It is, as far as I am able to discover, unique in sculpture. A species of *Ptychomya*, referred by Agassiz to the *Myidæ*, described by Lycett (Ann. Mag. Nat. Hist. vi, p. 408, pl. xi, f. 6, 1850) has no teeth on the hinge, and has the ridges diverging from and forming a sharp angle, with a line passing from the umbo to the medio-anterior ventral margin. The fact of its having an edentulous hinge is sufficient to remove it from this family, to which it was referred by D'Orbigny, and to remove any suspicion of its identity with the present subgenus.

* From *Ρικτως*, broken, and *Κῶμα*, wave.

CARDITA, Lam.

Cardita, Lam., Syst. An. s. Vert. p. 118, 1801. Type *C. calyculata*, Lin.

Subgenus CEROPSIS, Dall.

Shell small, ribbed or sculptured; with a Λ -shaped cardinal tooth in the right valve; left valve with a stout anterior and slender posterior cardinal tooth, diverging, and a very slight groove in the posterior margin; no lateral teeth in either valve, and no groove in the right valve.

Umbones almost posterior, general form trapezoidal.

Habits, nestling. Byssiferous? Animal?

This small and very pretty subgenus differs from all the other sections of *Cardita* in its hinge. Its form suggested affinities with *Trapezium*, upon a cursory examination; but, having only two cardinal teeth, it is evident that it forms a section of *Cardita*.

Type CEROPSIS MINIMA, n. s.

Trapezium? *halioticola*, Dall, MSS. 1866.

Shell minute, trapeziform, white, with a thin brownish epidermis. Umbones prominent, nearly terminal. Anterior margin rather strongly angulated; basal margin straight, or a little concave; lower posterior extremity angulated; upper posterior angle rounded off; posterior margin rather oblique. Hinge line smooth, rather broad. Ligament conspicuous, moderately long. A rounded carina passes from the umbo to the lower posterior angle, above which are from two to five radiating ribs. General sculpture of sharp elevated lines of growth, which become vaulted scales on the ribs. Margin lightly crenulated. Interior polished; muscular and pallial impressions indistinct. Lon. .14, lat. .08, alt .075 in.

Habitat, nestling or burrowing in *Haliotis rufescens*, at Monterey, also dead on beach, Dall; nestling under stones at low water, Canfield, Stearns and Cooper.

As my habitat seems to have been exceptional, I have not retained the MSS. name which alluded to it. Some of the specimens since obtained were larger than the above dimensions, and there was one odd valve from the beach among my collections, which is now out of my possession, which measured nearly .25 in. I am inclined to think it byssiferous, though the valves do not gape.

LEDIDÆ.

YOLDIA, Mørch.

YOLDIA SEMINUDA, n. s.

Shell obscurely lozenge-shaped, elongate, covered with a polished, glossy, olivaceous epidermis.

Valves compressed, umbones inconspicuous; lunule long, narrow, just evident; escutcheon long, narrow, indented, well defined. Ventral margin arcuated, widest about the middle of the shell; a slight obsolete groove or channel anteriorly, bordered by two obscure ridges, terminates in a slight waved indentation in the anterior ventral margin, about the middle of the anterior fourth.

Posterior end rising obliquely, rounded truncate posteriorly, forming an angle of 90° with the hinge margin, and slightly upturned.

Posterior dorsal slope slightly concave, anterior slightly convex, evenly rounded to the anterior end. Ligament pit large, roundly triangular. Teeth (anterior) 37, (posterior) 17. Pallial sinus reaching before the umbones, which are $14\frac{35}{100}$ ths of the whole length from the posterior end.

Interior bluish white, with fine radiating lines. Exterior marked by lines of growth and obsolete radiating lines; sculptured by sharp grooves, which, beginning near the middle of the shell with a slight wave toward the umbones, pass backward and downward across the lines of growth, rising a little and ceasing abruptly at a distance of about $4\frac{35}{100}$ ths of the whole length from the posterior end. Lon. $1\frac{74}{100}$, alt. $\cdot 82$, diam. $\cdot 27$ in.

Habitat, St. Paul's Harbor, Radiak, 17 fms.

This shell is allied to *Y. lanceolata*, J. Sby., in which the sculpture passes clear forward to the anterior margin. The latter is also a smaller, more globose and anteriorly rounder shell. It is found in the same locality with the present species. *Y. Cooperi*, Gabb, is another allied species, of widely different shape. *Y. seminuda* is shaped much like *Y. amydalea*, Val., as figured in the Thes. Conch., but is wider behind and more upturned, and the anterior indentation is not conspicuous. That species is without sculpture, and occurs in the same localities.

Acila Lyalli, Baird, P. Z. S. 1863, has been referred to *A. castrensis*, but the sculpture and shape are quite distinct. I have been indebted to the kindness of Mr. Jeffreys for typical specimens from Vancouver, and have dredged it in 8 fathoms mud at Sitka.

Yoldia truncata, *siliqua* and *intermedia*, vars., were obtained

by me in Norton Sound; *Leda*, apparently *ventricosa*, Hinds, from the mouth of a sole, Bay of Yeddo, Japan; and a *Yoldia*, apparently *electa*, A. Ad., from the head of the Gulf of California, by Dr. Palmer. With the latter were valves of a very small undetermined species of *Nucula*. *Nucula expansa*, Rve., occurred from Bering Strait to Sitka, in five to thirty fathoms.

MYTILIDÆ.

MODIOLARIA DENTICULATA, n. s.

Shell with a thick blackish brown epidermis, furnished posteriorly with strong, fine, projecting beards, which entangle particles of sand, &c., and form a solid mass of regular form, which cannot be removed without crushing the shell. There is an obtusely rounded carina to the posterior end of the shell, and by the formation alluded to this carina is greatly exaggerated, sharpened, and made to terminate in a sharp point some distance beyond the end of the shell. The general form of the valve itself is elongate-ovate, with a not prominent umbone. Both ends of the margin are gently rounded, the anterior end being slightly the smaller. There is a slight gape and concavity in the middle of the ventral margin, otherwise both dorsal and ventral margins are nearly equally arched. The entire margin is denticulate, and the denticles are especially strong on the hinge margin, which is interrupted for the large and strong ligament. The beaks are deep and vaulted, and the valves inflated.

The color of the shell is pearly white, with a purple spot behind the posterior muscular impression, and the umbones tinged with purple. The epidermis is blackish brown, thick, and liable to peel off; it is marked with faint radiating lines, as nearly as the incrustation will admit of perceiving.

Lon. .7, alt. .4, diam. .4 in.

Habitat, Acapulco, Mexico, Dall, 1868.

This very curious species is unlike any other which I know of. In some respects it is approached by *Modiola opifex*, Say, which is a much more elongated shell, from Rio Janeiro, Brazil.

MODIOLA ATERRIMA, n. s.

Shell small, subtriangular, black. Umbones nearly terminal. Exterior smooth, covered with a polished epidermis, marked only by lines of growth; usually somewhat eroded. Ligamental callosus white, narrow. Dorsal margin angulated more or less at the end of the ligament behind. Posterior end broadly rounded. Anterior end narrow, bluntly rounded. Hinge line without

tooth-like crenulations. Interior with a purple black nacre. Ventral margin, when normally formed, straight, but usually arcuated by distortion. Lon. .4, alt. .26, diam. .2 in. Valves from the umbones to the posterior ventral end usually obscurely roundly carinated.

Habitat, Bay of Yeddo, Japan. Abundant.

This species, after examination and comparison, was pronounced new by the late H. Cuming. It has much the same general aspect as *Mytilus glomeratus*, Gld. Its solid growth, and the uniform size of a very large series, forbid the idea that it is immature.

PECTINIDÆ.

PECTEN, Brug.

PECTEN (PSEUDAMUSSIUM?) ALASKENSIS, n. s.

Shell nearly equilateral, inequivalve, flesh-color with a blush of salmon-color on the umbo of the superior valve. Internally white, the salmon-color showing through the valve. Shell sub-orbicular, barring the auricles, which are wide and prominent. Lower valve flattened, .1 in. smaller than the upper one; sculpture of fine, close, equal, concentric ridges, sharply defined and separated by narrow non-canalculated grooves. Valve covered with a fine velvety epidermis, ashy and very finely radiately striate. Surface of the valve, except for the ridges, smooth. Anterior auricle long, prominent, with a deep sinus. Posterior auricle small; both with strong elevated lines of growth, which rise into scales on the eight or nine fine ribs with which the anterior auricle is furnished. Hinge line straight, smooth. Inside of the valve polished, furnished with twenty-one rounded, radiating ribs, with traces of others intercalated near the margin: nodulous or swollen at the more prominent ridges of growth and at the margin.

Upper valve similar, inside; anterior auricle shorter, not so deeply sinuated. Valve more convex than the under one, and a little larger. Dorsal areas finely granulate. Umbo smooth; half way toward the margin the striae of increase become more conspicuous, and about thirty-five pseudo-ribs radiate toward the margin. These are formed by the elevation of the concentric lines of growth like ruffles, in such a way that the edge of one fluting of the ruffle overhangs the beginning of the next, and so on. These are very fragile, and when broken away show the nearly smooth surface of the valve underneath, without any true rib at all. Faint grooves are intercalated between the pseudo-

ribs toward the margin. Lon. .76, alt. .76, diam. .22 in., width of hinge line .34 in. Angle at the umbones, 100°.

Animal with the mantle margin profusely furnished with lemon yellow tentacular filaments, and on the upper side only with six pairs of black ocelli; inner smooth part of the mantle pencilled with dark brown, especially on the inner side. Foot cylindrical, terminating in a minute rounded knob; inner edge furnished with half a dozen small papillæ.

Body yellowish white, with a pointed sac filled with ova, occupying the greater part of the cavity. Byssus minute; liver greenish, muscles large, consolidated.

Habitat, One lower valve, North Harbor, Unga Island, six fathoms mud. Dall, 1865. One larger living specimen, exactly agreeing, Port Etches, Chugach Gulf. Dr. Minor, U. S. Rev. steamer, Wyanda.

This remarkable little species is apparently quite distinct from any described *Pecten*. It is, at present, impossible for me even to decide in which section of the genus it should be placed.

It differs from the young of *tenuicostatus*, Mighels, (= *Magellanicus*, Lam.) in its sculpture and internal ribs and more rounded shape. *P. granlandicus* is smooth and otherwise different. The internal ribs differ from those of *Pleuronectia* in being nodulous, the internal supports of the latter are wanting, and the auricles are notched. The valves close perfectly. Altogether, this is a very interesting species.

BRACHIOPODA.

TEREBRATULIDÆ.

1. *Terebratula unguiculus*, Cpr. Straits of Fuca to San Diego.

Perhaps this species will prove a *Terebratulina*.

2. *Waldheimia Grayi*, Dav. Monterey.
3. *Laqueus californicus* (Koch), Dall. Catalina Id.
4. *Terebratella transversa*, Sby. (= *T. caurina*, Gld.) Neah Bay to the Aleutian Islands.

LINGULIDÆ.

6. *Glottidia albida*, Dall. Santa Barbara to San Diego.

RHYNCHONELLIDÆ.

6. *Rhynchonella* ? two species, both differing from the *psittacea*, and probably described from Japan.

Spurious Species.

Discina Evansi, Dav., = *D. striata*, Schum., and is from West Africa, not Bodegas.

Terebratella pulvinata, Gould, is from Patagonia.

Terebratella Coreanica, Ad. and Rve., has not been found on the West Coast of America.

The above list comprises all the Californian species.

TUNICATA.**BOLTENIIDÆ.****BOLTENIA BERINGI, n. s.**

Test pale ashy gray, tough and hard, smooth, but wrinkled in a reticulated manner very closely and finely; smoother toward the distal extremity. Margins of the apertures bordered with a dark brown line, cleft into four rays. Shape ovate-pyriform; anal orifice near the distal extremity in the middle of the distal third. Oral orifice about the same size in the middle of the proximal third of the test, which is larger and most inflated between the two orifices. Dorsal side broadly arcuate. Stalk?

Lon. 1.36 in., lat. .42 in. Apertures .7 in. apart.

One specimen deprived of its peduncle was obtained on the shore of St. Paul's Island of the Pribyloff Group, Bering Sea.

This species differs in the proportional position of the apertures, in texture and in color from the Atlantic species with which I have compared it.

Cynthia pyriformis, of large size and brilliant coloring, was obtained at Plover Bay, E. Siberia, and at Petropavlovsk, Kamtchatka.

ASCIDIIDÆ.**CYNTHIA (?) MONTEREYENSIS, n. s.**

Test coriaceous, smooth; with about twelve deep longitudinal grooves, extending from the attachment four-fifths of the way to the distal end; these are crossed occasionally by circular wrinkles which are multiplied toward the distal end. Interspaces between the grooves horny, brownish, polished; of a deep purple brown when living. Distal end smooth, with a velvety feel, not polished, yellow in life. Test greatly produced, club-shaped, distal end irregularly rounded.

Branchial chamber lined with a finely latticed series of branchiæ, folded longitudinally at intervals into plicæ, of which there

are about ten ; stomach small, intestine passing upward beyond it on the right side three quarters of an inch before recurving. Between the branchial sheet and the wall of the tunic are multitudes of small round digit-shaped bodies attached to the tunic by a slender pedicel of their external covering, often knobbed or bifurcate at their inner end ; office unknown to me. Anal orifice small, five lobed, three of the lobes quite prominent ; oral orifice with a corrugated irregular comb-like crest above and overhanging it and extending around it, apparently also five lobed. Length three inches ; diameter at the distal extremity .64, at about the middle, .25, at the attached extremity .13 in.

Habitat. Monterey Bay, in 4—10 fathoms on shells, &c. Dall, 1866.

This is a very peculiar species, probably not a *Cynthia*, but I have not access at present to the works necessary to fully determine its generic place. Other ascidians of several species occur with it. It seems to be rather common, as my examples were brought up on the anchor of a schooner upon which I went to Monterey.

SALPIDÆ.

SALPA, Forsk.

SALPA HERCULEA, n. s.

Proles aggregata, ignota.

Proles solitaria. Form approximating to cylindrical. Dorsal surface studded with small conical elevations. Hæmal surface smooth. Sides somewhat ribbed, smooth. Oral opening wide, with thickened lips, not produced. Anal opening large, cylindrical, produced, with a circular aperture. Nucleus, or portion enclosing the visceral tract, globular, very prominent, projecting below the general line of the hæmal surface. Viscera brown and scarlet. Muscular bands nearly or quite encircling the body, corresponding to the ribbing of the sides, eleven in number, connected in the middle lines of the sides by a lateral band. Length eight inches. Diameter three or four inches.

Habitat. Near the Unimak Pass, Aleutian Islands, in Lat. 41°, Lon. 144° 33', July 20, 1866. Dall, several specimens. Coll. reg. No. 306.

This magnificent *Salpa*, by far the largest of the genus, and almost if not quite the largest single free tunicate known, is provisionally described as above and will form the subject of a future paper. Its size alone will distinguish it from any other species.

SALPA CYMBIOLA, n. s.

Proles aggregata, ignota.

Proles solitaria. Hæmal side boat-shaped, with one median and two nearly lateral non-elevated carinæ. Integument of this portion thickened, separated by an impressed line from the dorsal portion, and produced into a short, rather blunt point anteriorly; prolonged in a sub-cylindrical long, roundly pointed caudal termination behind. Dorsal portion nearly egg-shaped, resting as if in a boat, on the hæmal shield. Oral opening moderate, lips slightly thickened. Anal opening inconspicuous, not produced, semilunar, small. Nucleus brown, not prominent externally. Nervous centre in the anterior dorsal third. A broad transverse muscular band across the middle of the dorsal side, divides on each side into five principal branches. These are subdivided as follows: The first anterior branch sends one band above and two below the oral opening. These are continuous. The second, third and fourth continue simple and terminate abruptly at or near the lateral carinæ of the hæmal shield, where a blood vessel passes from one to the other, forming a continuous loop around the hæmal portion. The fifth branch sends one branch above and another below the efferent aperture, and a third branch terminates abruptly as in the three preceding.

Length .7. Diameter .3 in.

Habitat. North Pacific, near the Aleutian Islands, July 21, 1866. Lat. $42^{\circ} 13'$. Lon. $145^{\circ} 45'$. Coll. reg. No. 303. Dall.

This species was obtained in great abundance, always single and free, notwithstanding the appendages before and behind. Proles of aggregated salps, which may have been the immature form of this species, were also abundant.

LIST OF FIGURES.

PLATE 13.

1. Dentition of *Ocinebra lurida*, Midd.
2. " *Amphissa versicolor*, Dall.
3. " *Purpura crispata*, Chemn.
4. " *Chorus belcheri*, Hinds.
5. " *Macron lividus*, A. Adams.
6. " *Trochiscus Norrissii*, Sby.
7. " *Fissurella volcano*, Rve.
8. " *Lucapina crenulata*, Sby.; *a*, *b*, uncini; *c*, two pieces of jaw from below.

PLATE 14.

1. Operculum of *Nitidella cribraria*, Lin.
2. " *Amphissa versicolor*, Dall.
3. " *Astyris carinata*, Hinds.
4. " *Volutharpa ampullacea*, Midd.; *a*, first nucleus.
5. " *Nitidella Gouldii*, Cpr.
6. *Rictocyma mirabilis*, Dall.; greatly enlarged.
7. *Liocyma Beckii*, Dall.; nat. size.
8. " *viridis*, Dall.; nat. size.
9. " *Scammoni*, Dall.; nat. size.
10. *Semele rubropicta*, Dall.; nat. size.
11. *Siliqua media*, Gray; nat. size.
12. *Turtonia occidentalis*, Dall.
13. *Modiola aterrima*, Dall.

PLATE 15.

1. *Buccinum Kennicottii*, Dall.
- 2—3. *Lamellaria Stearnsii*, var. *orbiculata*, Dall.
- 4—5. " *rhombica*, Dall.
6. " *Stearnsii*, Dall.
7. *Fissurellidea bimaculata*, Dall.
8. "*Chypidella*" *callomarginata*, Cpr.
9. *Clathurella Canfieldi*, Dall.
10. *Leptothyra paucicostata*, Dall.
11. *Tornatina harpa*, Dall.
12. *Rictaxis punctocelata*, Cpr.
13. *Astyris aurantiaca*, Dall.
14. *Calliostoma affinis*, Dall.
15. " *Palmeri*, Dall.
16. *Amauropsis purpurea*, Dall.
17. *Persicula dubiosa*, Dall.

PLATE 16.

1. *Mercenaria Kennicottii*, Dall.; nat. size.
2. *Drillia Kennicottii*, Dall.
3. *Entodesma Scammoni*, Dall.
4. *Pecten alaskensis*, Dall.
5. Hinge of *Ceropsis minima*, Dall.; enlarged.
6. *Ceropsis minima*, Dall.; much enlarged.
7. *Bela* ? *laevigata*, Dall.
8. *Volutharpa ampullacea*, var. *acuminata*, Dall.
9. *Amphissa corrugata*, Rve.
10. *Amphissa versicolor*, Dall.
11. " " "
12. *Pedicularia Japonica*, Dall.
13. *Buccinum Fischerianum*, Dall.
- 14—15. *Anisothyris ledæformis*, Dall.

ON THE LINGUAL DENTITION OF LIMNÆA APPRESSA,
SAY, AND LIMNÆA MEGASOMA, SAY.

BY THOMAS BLAND AND W. G. BINNEY.

LIMNÆA APPRESSA.

We are indebted to Mr. J. G. Anthony for the specimen of *Limnæa appressa*, Say, from which we extracted the jaws and lingual membrane here described. The specimen was preserved in alcohol at the Museum of Comparative Zoology. It was received from Lake Champlain.

On page 28 of Part II of Land and Fresh-water Shells of North America, there is a description and figure of the lingual membrane of *Limnæa jugularis*, Say, which is synonymous with *Limnæa appressa*, both of these forms being identical with *Limnæa stagnalis* of Europe. On page 155 of the same work is a figure of the membrane of a specimen of *L. stagnalis*, from the Lake of Geneva.

The form of the teeth from several different parts of the membrane before us differ so widely that we see no specific distinction in the figures referred to, however much at first sight they may appear to differ from the figures we here give, or from each other.

Jaws three, as usual in the genus, one upper, long, narrow, arcuate; two lateral, long, narrow, curving inwards.

Lingual membrane long and broad, composed of numerous curving rows of about 40—1—40 teeth each.

Centrals subconical, long, narrow, excavated and sometimes bilobed at base, thence narrowing gradually upwards to the apex, which is bluntly rounded, and recurved into a simple, obtuse beak. Laterals shorter than the centrals, subtriangular, their outer side being somewhat parallel to the side of the centrals, while the inner side is rapidly cut away towards the base, which is very narrow and straight; their top horizontal, irregularly waved, bearing a decided stout blunt prominence near its inner extremity, the whole broadly recurved into a large, long, oblique beak; this beak is bifid, the divisions about equal in

breadth, both produced into acute points, the inner one twice as long as the outer one, and more decidedly curved outward.

Plate 12, fig. 1, gives a group of laterals such as we have now described. These come from what appears to be the most developed portion of the membrane. As the membrane advances in either direction from this point, the shape of the laterals is gradually modified, so that the above description will not apply to them. At one extremity of the lingual membrane, the laterals appear as figured in our fig. 4. From this it will be seen that the beak of the recurved apex is divided into two stout, short, straight, blunt points, instead of the sharply pointed, curving points described above.

At the opposite extremity of the lingual membrane we find laterals in which the recurved apex is decidedly trifid, the three divisions long, slender, acutely pointed, the central longest and straight, the outer ones curving inwards.

Besides the three prominent forms of laterals already described, there are numerous modifications of each, the laterals being very variable.

The laterals pass gradually into the marginals, as shown in our figure 5. The marginals are in obliquely curving rows. They are short, narrow, rounded, with irregular bulging sides, recurved into very long, rounded beaks, whose apices are bluntly bifid.

LIMNÆA MEGASOMA.

To Mr. Anthony also we are indebted for a specimen of this species from Lake Champlain. In mounting the lingual membrane a portion only was saved. From this we are able to give only the form of the lateral teeth and the marginals. The laterals (see fig. 6) are very much like those of *Limnæa appressa* described above. The recurved beak is, however, straighter, its larger point being sometimes bifid. The marginals (see fig. 3) are more widely separated, both in the rows and the individual teeth of each row. They are also of more nearly equal size throughout their length, have a longer recurved portion, and their apex is irregularly digitate, rather than bifid, there being three and sometimes four subdivisions.

The jaws of *Limnæa megasoma* are all shorter and stouter than in *L. appressa*.

Our figures are drawn from photographs taken directly from the microscope by our friend, Mr. Sam. Powel.

ON THE LINGUAL DENTITION OF VERONICELLA.

BY THOMAS BLAND AND W. G. BINNEY.

Having received from Mr. J. G. Anthony specimens in alcohol of two species of *Veronicella* collected by him near Rio Janeiro, we have compared their lingual dentition with that of *Veronicella Floridana*, and also a species from Jamaica. The lingual membranes of all four species are almost exactly alike, so much so that the description of one will apply to all. There is some slight variation in the development of the point on the central teeth, but this does not affect the general character of the teeth.

The lingual membrane is long and very broad, comprising (in the Florida species) about 60—1—60 teeth. The centrals are quite small, long and narrow, attenuated to a point above, gradually enlarging toward the base, above which are lateral, bluntly pointed, wing-like expansions; the base is broad, and has a deep, rounded excavation; in some cases the lateral expansions are so produced as to give an almost cruciform appearance to the tooth; below the centre of the tooth, on its anterior surface, is a stout, blunt, short, simple cusp, ending in a short, stout point.

The lateral teeth are very irregular in shape, but retain the bicusped character peculiar to the *Geophila*; they are longer and much wider than the centrals; the bases of attachment, or plates, are very irregular in shape, very unsymmetrical, sub-quadrate or irregularly excavated above, thence curve outwards and downwards, until at their lower extremity they exhibit the lateral expansions and basal excavation of the central tooth, but both these characters are much more developed than in the centrals, and from the want of symmetry in the teeth, are found only on the outer side of each tooth; the central cusp on the marginals is very large, extends quite to the base of the tooth, and is produced beyond that into a blunt point; the side cusps are almost obsolete, the inner one is much larger than the outer one.

The marginal teeth are a simple modification of the laterals, being reduced to a subquadrate shape, with the point of the cusp much more produced.

The figure (pl. 12, fig. 7) we have given, represents a group of centrals and laterals from the lingual membrane of a very long and slender Brazilian species. As already stated, the lingual membranes of all four of the species before us are so nearly alike that this figure would apply to all. It will be found much more satisfactory than those already published by us. (L. and Fr. w. Shells, Part I, p. 306, fig. 543, and Ann. N. Y. Lyc., IX, p. 385, fig. 5.)

The jaw of *V. Floridana* has already been figured by us (L. and Fr. w. Shells I, p. 305, fig. 542). It is long, low, slightly arcuate, with blunt ends; anterior surface with twenty-four ribs, crenellating either margin. The Brazilian *V. ———* has about thirty ribs; *V. ———* has about twenty broad ribs. The Jamaica species, which appears to be *Veronicella Sloanei*, has twenty broad ribs.

EXPLANATION TO PLATE 12.

- Fig. 1. A group of centrals and laterals of *Limnæa appressa*.
2. A still more magnified view of one central with the adjacent laterals of *Limnæa appressa*.
3. A marginal of *Limnæa megasoma*.
4. A group of centrals and laterals from another portion of the same membrane as fig. 1.
5. A group of laterals and marginals of *Limnæa appressa*.
6. A lateral of *Limnæa megasoma*.
7. A group of centrals and laterals of a Brazilian *Veronicella*.

AMERICAN JOURNAL OF CONCHOLOGY.

NEW SERIES.

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CONCHOLOGICAL SECTION of the Academy of Natural Sciences of Philadelphia

VOL. VII.

1871-72.

PART 3.

Meeting Oct. 5th, 1871.

Six members present.

DR. RUSCHENBERGER, Director, in the Chair.

Several donations to the Museum and Library were announced.

The following papers were offered for publication in the Journal:

"Notes on the Lingual Dentition and Jaws of Terrestrial Mollusca, No. 3." By W. G. Binney and Thomas Bland.

"Note on *Gadinia*." By W. H. Dall.

"Notices and Reviews of New Conchological Works." By Geo. W. Tryon, Jr.

The deaths of Wm. Harper Pease, of Honolulu, and Petit de la Saussaye, of Bordeaux, Correspondents, and Charles W. Peale, Member of the Conchological Section, were announced.

A letter was read from Wm. M. Gabb, of St. Domingo, stating that twenty-four of the *Littorinæ* collected by him were still living in his cabinet, although eleven and a half months had elapsed since they were removed from the water.

Meeting Nov. 2d, 1871.

DR. RUSCHENBERGER, Director, in the Chair.

Donations to the Museum and Library were read.

Mr. Tryon read a letter from Mr. Thomas Bland stating that the valuable Conchological Library and Museum of Mr. Schramm, of Guadeloupe, W. I., had been destroyed by fire. The destruction by fire also, of the Chicago Academy of Sciences, and the private collections of its director, Dr. Wm. Stimpson, were announced.

The following papers were offered for publication :

"On the Lingual Dentition of *Blandiella*, *Geomelania* and *Amphibulina*." By Thomas Bland and W. G. Binney.

"Synonymy of *Patella exarata*," Reeve. By Wm. Harper Pease.

"Descriptions of four species of Land Shells inhabiting the Papuan Islands." By Wm. Harper Pease.

"Polynesian *Chitonidæ*." By Wm. Harper Pease.

On motion it was

Resolved, That we tender our sympathies to the Chicago Academy of Sciences ; that we offer such assistance as may be in our power to render, and that the Director be requested to communicate the same to the Academy.

DESCRIPTION OF A NEW SPECIES OF MONOCEROS,
FROM CALIFORNIA, WITH REMARKS ON THE DISTRI-
BUTION OF THE NORTH AMERICAN SPECIES.

BY ROBERT E. C. STEARNS.

M. PAUCILIRATA, Stearns. Pl. 14, fig. 6.

M. paucilirata, Stearns, Prel. Descr. May 18, 1871.

Description. Shell small, ovate, spire moderately elevated, subacute; whorls four to six; body whorl four-fifths the length of the shell; upper portion of same angulated, and excavated between the angle and the suture, and anteriorly broadly but not deeply grooved; upper whorls rudely cancellated except the apex, which is nearly smooth; aperture ovate, purplish-brown; columella flattened, enameled, purple, brown, or blackish, sometimes showing all of these colors; outer lip simple, acute, internally denticulated, whitish or yellowish near the edge, with a single prominent tooth at its anterior margin; canal short, slightly recurved; umbilicus nearly concealed; body whorl traversed spirally by four to five narrow ribs placed nearly equidistant, and longitudinally marked by irregular varix and fine incremental lines; shell yellow or yellowish-white, with large angular spots of black; the transverse costæ and the more prominent of the longitudinal lines are of the lighter color, and the largest specimen exhibits faint transverse sculpture between the prominent ribs.

Length of largest specimen, .55. Width .33 inch.

Habitat, Coronado Islands, off San Diego, California.

Three specimens of this well-marked species, quite distinct from others of the genus, were collected by Mr. Hemphill.

A comparison of the above shell with *immature* specimens of *Monoceros lugubre*, Shy., shows the former to be a connecting link between the upper Californian and more southern forms. *M. lugubre* reaches northerly nearly to San Diego, being found

at Los Todos Santos Bay, where numbers of specimens were collected by Mr. Hemphill. Fossil specimens of the latter have been collected from the post-pliocene formation at Santa Barbara Island, Cal. (*vide* Geol. Survey of Cal., Paleon. Vol. II, p. 75).

The geographical range of the North American species of this genus, which has no representative upon the Atlantic coast of the continent, is as follows: Commencing at the north, we find *M. engonatum*, Conr., with its northern limit at Baulines (or Bolinas) Bay, which is about twelve miles north of the entrance to the Bay of San Francisco, where I have collected great numbers of specimens, generally of small size, upon the shales, between ordinary tide-marks; it extends southerly to San Diego, a range of nearly four hundred miles, where it is represented by a local varietal form, which is the *M. spiratum* of Blainville. *M. engonatum* is by far the most common of the northern species; in one instance I collected not less than two thousand specimens, and I find it quite generally distributed along the coast. The finest specimens, averaging twice the size of the Baulines shells, may be found at Lobitas, Point Año Nuevo, thence to Monterey and some distance southward. In the post-pliocene at San Pedro, Cal., it is found fossil, (Geol. Survey of Cal., Paleon. Vol. II, 75.) It is the *M. unicarinatum*, Sby. (*vide* Conch. Illustr. genus Monoc., fig. 5.). Sowerby's name would apply very well to the var. *spiratum*, but his figure distinctly represents the general form.

M. lapilloides, another of Mr. Conrad's species, a handsome and more globose shell than *M. engonatum*, is much less abundant and far more restricted in range; it equals *M. "punctatum*, Gray + *brevidens*, Conr." (*vide* Cpr. Supp. Rep. 1863), and *M. punctulatum*, Gray, *vide* Sby.'s Conch. Illustr. genus Monoc., fig. 3, where it is well figured. It has not, to my knowledge, been collected north of Monterey, which place, if numbers of individuals are to be considered, seems to be its specific centre. Cooper, in his Geog. Cat. credits it to Catalina Island, which is perhaps its southern limit, but neither of the collections made by Hepburn, Newcomb, Hemphill or Harford, contained a single specimen either from Santa Barbara or San Diego. All of the collections above referred to were examined and noted by me, as well as a collection made at Catalina Island by Mr. Cummings, of San Francisco, which contained many rarities, but not a specimen of this species. I therefore infer that, though reported from Catalina Island, it is seldom met with even there. This conclusion is further confirmed by the absence of the species from several parcels of shells from said island received by me at various times from my friend W. M. Cubery, Esq.

Next in order, and to the south, comes the species described by me in this paper, which, as suggested, connects the northern with the semitropical forms.

The form to which I have given the name of *pauciliratum* seems to have escaped the keen search of many experienced collectors, as not a single specimen of it was detected by either of the gentlemen above named, and it was not discovered until Mr. Hemphill visited the small islands off San Diego, known as the "Coronados." As the mainland has been pretty well examined along here, it is probably an insular species, and a thorough investigation of the islands may prove it to be quite common. Its distribution may be somewhat eccentric, like that of the fine *Purpura planospira*, Lam., which is seldom found upon the mainland, and confines itself, with aristocratic exclusiveness, to Socorro Island, one of the islands off the west coast of Mexico, known as the Revillagigedos.

In the third edition of Dr. Jay's catalogue (1839) a species of *Monoceros*, *M. plumbeum*, Kiener, is credited to Upper California; to what shell this refers I am not aware. (*Pseudoliva* [*Buccinum*] *plumbea*, Desh. W. H. Dall). Kiener's species does not appear in the fourth edition of said work, but "*M. plumbeum*, Chemn.," the habitat of which is given as "Africa Merid."

Inhabiting a long reach of coast, extending the entire length upon the ocean side of the peninsula of Lower California, a distance of nearly eight hundred miles, as well as at Cedros and other islands we find the next species in order, *Monoceros lugubre* of Sowerby; it is also found up the Gulf of California, and is reported from Guaymas on the eastern shore. In many places it is exceedingly numerous, and is perhaps the commonest species in collections; specimens from different points vary considerably, the outer coast or ocean side shells being the most robust, and the Gulf specimens more elongated. I did not obtain a specimen at Acapulco nor hear of its being found so far to the south.

It is not reported in the Mazatlan catalogue of Reigen's collection; in Kiener it is credited to "Peru and California," but as Kiener, Reeve, Sowerby and many others of the European authors seem, to use a California phrase, to have "gone it blind" on habitat, in questions of geographical distribution, their statements of localities must be taken with great caution. In the Tankerville catalogue it is referred to as *M. cymatum*, Sby., in H. and A. Ad. Genera, as *M. cymatium*, Soland., and neither of Conrad's names are given for the California species by the last named authors. *M. engonatum*, Conr., is enumerated in the list under Blainville's name "*spirata*" and *M. lapilloides*,

Conr., appear as the "*M. punctata*, Gray." It is highly improbable that *lugubre* occurs on the coast of Peru. In the large collection made by the late Thomas Bridges, upon the South American coast, it was not found, and is not mentioned in the Panama Catalogue by Prof. C. B. Adams; Kiener's "Peru" is undoubtedly an error.

The next species in order is the *Monoceros muricatum*, Rve., which is the *Purpura muricata*, Gray; it is also enumerated under the latter name as a *Purpura*, in Smithsonian check list, by Dr. Carpenter, who refers to it in his Mazatlan Cat., p. 476, as follows. "This shell rests its claim to a place in the genus *Monoceros* on a projecting wave in the labrum, between the canal and the first costal depression." The finely developed specimens in my own collection, as well as many that I have seen elsewhere, justify me in supporting the "claim" of this shell "to a place in the genus *Monoceros*," as the claim is well founded; the "projecting wave," to quote Dr. Carpenter, is in my specimens developed into a horn of sufficient prominence to enable the shell to enter the genus *Monoceros* on its own hook. I will state that, in many large specimens that have come under my observation, the horn can hardly be considered as anything more than a "projecting wave." Individuals of the same species, and in all of the species, vary exceedingly in this respect.

M. muricatum, though not a rare shell, is not common. In the Reigen collection it is reported as rare at Mazatlan; I have received many specimens at various times from different parties, generally immature, however, and their exact habitat, or that of the finely developed specimens above mentioned, I am unable to give. It was collected by Major William Rich, in Lower California, and in the collection made by Lieut. T. P. Green it is reported from San Juan, which is no doubt correct, though the small collection made there by Prof. Gabb did not contain it. This species appears in collections named as *Purpura* or *M. muricata*, *muricatum* and *tuberculatum*.

In Adams' genera it is catalogued as "*M. tuberculata*, Gray;" there is a good picture of it in Sby's. Conch. Illustr., fig. 9, and in Chenu's "Manuel," on p. 169, fig. 828, and *M. tuberculatum* fig. 831.

In the Mazatlan Cat., on the authority of Cuming, one habitat is given as "St. Elena," which is on the coast of Guayaquil, latitude about 2° south, but no mention is made of it in Prof. Adams' Panama shells, and I did not find it in the Bridges' collection. There is a long reach of coast extending from Aca-pulco to Panama which is, following the bends and curves of the shore line, not less than fourteen hundred miles in length, of

which, with the exception of a few places, but little is known; somewhere upon this long line of beach or rock, in some of the numerous bays, it may quite likely be abundant.

The last and most southern of the North American species, a shell plentifully distributed within certain limits, is the *M. brevidentatum* of Wood, which is catalogued by the Adams' in their Genera, Vol. I, p. 131, as "*cornigera*, Blainv.," though Wood's name has, according to Prof. C. B. Adams' dates, four years priority; the more common of the synonyms by which this species is known are *M. ocellata*, Kiener, and *M. maculata*, Gray.

Numerous blunders have been made in the habitat of this species, and it has been reported from San Francisco! and Monterey! also from Mazatlan, all of which are erroneous, as it is undoubtedly confined to the zoological province of Panama. Carpenter makes no mention of it in the Reigen collection and it is not reported by him in the Xantus list of Cape St. Lucas shells.

In the large quantities of material from the Gulf of California that I have overhauled and examined, I have never met with a specimen of it, and I have yet to learn from any authentic source of its occurrence north of San Juan del Sur Nicaragua.

I have not attempted a systematic synonymy of the species herein named; the original works not being accessible I could only quote them indirectly, and therefore the result at best would have been unsatisfactory. I have, however, given a sufficient reference to the more common synonyms, for the reader to understand me, and to recognize the shells to which I have had occasion to refer.

DESCRIPTIONS OF NEW CALIFORNIA SHELLS.

BY ROBERT E. C. STEARNS.

OCINEBRA, Leach.

O. GRACILLIMA, Stearns. Pl. 14, fig. 14.

O. gracillima, Stearns, Prel. Descr. May 18, 1871.

Description.—Shell small, solid, ovately fusiform, rather slender; spire elevated, subacute; whorls six—seven; body whorl about two-thirds of the length of the shell; upper portion of whorls more or less angulated; aperture ovate, about the same length as the spire; outer lip thickened, internally white, with four prominent denticles; columellar lip somewhat excavated, incrustated, with a purplish stain showing through the enamel; canal closed, moderately recurved; surface covered with a slight yellowish epidermis and numerous revolving costæ of a whitish hue, finely dotted with reddish brown, and the intercostal sulcations near the edge of the outer lip with linear markings of the same color; (one specimen shows brownish blotches upon the middle of the body whorl.) This shell is also longitudinally nodosely ribbed, the ribs decreasing in prominence as the whorls enlarge.

Length, .50; width, .25 inch.

Habitat, San Diego and vicinity, California.

One specimen, an adult, dredged in (10 fathoms) San Diego bay; one adult and five juniors ten miles above San Diego; also one adult specimen at Dead Man's Island, near San Pedro.

For this exceedingly pretty species we are indebted to Henry Hemphill, Esq.

O. CIRCUMTEXTA, Stearns. Plate 14, fig. 15.

O. circumtexta, Stearns, Prel. Descr. May 18, 1871.

Description.—Shell ovate, solid, spire subacute, in some specimens subturritated; whorls five, convex or moderately flattened above, upper whorls cancellated; body whorl nearly three-fourths of the length of the shell; outer lip thickened, internally denti-

culated, its external margin crenulated; columella excavated; aperture ovate, light purple to purplish brown; canal short, moderately curved, in some specimens closed, in others, of equal or larger size, open; umbilicus nearly obsolete; surface traversed by about fourteen roughly rounded revolving costæ, more or less varicose or tuberculated at the intersection of the longitudinal ribs and varical ridges; also marked with fine incremental striæ, the latter being more conspicuous in the intercostal sulcations; color white, somewhat dingy, with two interrupted zones of black or dark brown on the body whorl.

Number of specimens examined sixteen, mostly immature; the dimensions of the largest are respectively:

Length,	·85	·80	·75 inch.
Breadth,	·50	·47	·45 inch.

Habitat, Monterey, California, where it has been collected by Messrs. Hemphill, Harford, Gordon and myself.

This shell is *Ocenebra* var. δ of Carpenter (MSS.), and 762 (in part) of Cooper's Geog. Cat. Moll.

The above species varies considerably in robustness, length of spire and development of sculpture; it is exceedingly characteristic in its markings, and easily distinguished from all others belonging to the Californian group of the *Ocenebræ*; it is not numerous in individuals, and appears to be exceedingly limited in its distribution.

Since writing the above, additional specimens have been forwarded to me by Mr. Harford, collected by him at the Island of San Miguel, off Santa Barbara, Cal. These latter specimens show a much more prominent longitudinal sculpture than the Monterey specimens, are generally more rugose, and one specimen is ashen white and wants the interrupted color bands.

NOTES ON THE LINGUAL DENTITION AND JAWS OF TERRESTRIAL MOLLUSCA. NO. 3.

BY THOMAS BLAND AND W. G. BINNEY.

In the following pages we have not considered it necessary to describe fully the lingual dentition of those species which agree with the usual type of dentition in their respective genera. In the *Helicidae* we have given more particular notes on the marginal teeth, because they are not so constant in their characters as the central and lateral teeth.

ZONITES CAPSELLA, Gould.

Lingual membrane broad, not very long. Teeth as in the species of *Hyalina* figured by us in Land and Fresh-water Shells, Part 1. The laterals and centrals are about equal in size, the former very few in number, apparently three only. Marginals numerous, large, decreasing in size as they pass off laterally, and quite separated near the outer margin of the membrane.

Specimen from Lexington, W. Virginia, received from Professor McDonald.

ZONITES LIGERUS, Say.

Lingual membrane as usual in the genus *Hyalina*. The central teeth are small in proportion to the laterals.

Jaw already figured by Leidy (Terr. Moll. U. S. I., pl. XII. fig. 7.)

ZONITES GULARIS, Say.

Jaw highly arcuate, ends attenuated, anterior surface smooth, cutting edge with a well developed median projection.

The lingual membrane has been described by us on p. 293 of Land and Fr. W. Shells, Part I.

HYALINA (?) BAUDONI, Petit (*Mörchia*).

Lingual membrane long, broad, composed of numerous transverse rows of teeth arranged *en chevron*; central teeth not distinguishable on the membrane examined, but probably very small; lateral teeth absolutely wanting; marginals numerous, long, slender.

In the absence of the lateral teeth and general character of the membrane, this species resembles those of *Macrocyclus* alone of the *Helicidae*.

Specimen collected in Dominica, and membrane mounted by Mr. R. J. Lechmere Guppy, of Trinidad, from whom we received it.

MACROCYCLIS VOYANA, Newcomb.

Lingual membrane long and narrow, composed of numerous rows of teeth arranged *en chevron*. Centrals long, incurved at sides, their lower margins excavated; with three small, sharply pointed cusps. Laterals entirely wanting. Marginals in curving diagonal rows, simple, aculeate, decreasing rapidly in size at the outer margin of the membrane.

From this description it will be seen that *M. Voyana* agrees in the general character of its lingual dentition with *M. concava* and *M. Vancouverensis*, already described by us.

Specimen received from Mr. H. Hemphill.

SAGDA CONNECTENS, C. B. Adams (*Sagda* s. str.)

Number of teeth in the membrane, in each row, about 26—1—26, all of which are as usual in the genus *Helix*. Centrals tricuspid, laterals bicuspid; marginals broad, low, with one acute, oblong, inner denticle, and several shorter, acute side denticles.

Specimen received from Mr. Jas. Milligan, who collected it in Jamaica.

SAGDA HALDEMANIANA, C. B. Adams (*Hyalosagda*.)

Jaw slightly arcuate, of almost equal height throughout; ends blunt; no anterior ribs, and no median projection.

Lingual membrane with about 30—1—30 teeth in each row. Teeth as usual in the genus *Helix*. Centrals tricuspid; first laterals with an obsolete inner side cusp, other laterals bicuspid; marginals with one long, blunt, stout, oblique denticle, with a single short, stout, blunt side denticle; extreme marginals irregularly denticulated, the denticles slender and pointed, usually with one inner long and several side short denticles.

From the descriptions of this and the preceding membrane, it will be seen that both species have the lingual dentition of the *Helicinæ*, and not of the *Vitrininae*, in which they are placed by Albers and v. Martens.

The marginals which characterize the *Vitrininae* are wanting in both species, their place being supplied by marginal teeth of the form common to the genera *Helix*, *Bulimulus*, &c.

Several specimens collected in Jamaica by, and received from, Messrs. Gloyne and Vendryes.

S. Haldemaniana is viviparous.

PATULA SOLITARIA, Say.

Jaw long, low, slightly arcuate, ends but little attenuated; anterior surface striate, but without ribs.

Teeth about 40—1—40, as usual in the genus; the marginal teeth broad and short, with one long, blunt denticle, and several side short, small, blunt denticles.

HELIX YATESII, J. G. Cooper, not of Pfeiffer.

Jaw slightly arcuate, ends blunt; anterior surface with numerous broad ribs.

Lingual membrane as usual in the genus; centrals tricuspid, laterals bicuspid; marginals with two stout, oblique denticles, the inner one the longer.

Living specimens received from Dr. W. Newcomb.

This species is allied to *H. nautiliformis*, Porro, which is placed by Albers and v. Martens in Section *a* of *Gonostoma*, Held., as equivalent to *Drepanostoma*, Porro.

HELIX FASTIGANS, L. W. Say. (*Polygyra*.)

Jaw slightly arcuate, long, low, with about twenty ribs on the anterior surface, crenellating either margin.

Lingual membrane long and narrow; teeth as usual in the genus; centrals tricuspid, laterals bicuspid; marginals wide, low, with long, slender, acute denticles as in *H. auriculata*. (See fig. 158, p. 87, Land and Fresh Water Shells of N. Amer., Part I.)

HELIX SIMILARIS, Férussac. (*Dorcasia*.)

Jaw arched, of equal height throughout; ends blunt; with eight widely separated, well defined ribs crenellating either margin.

Lingual membrane long and broad; centrals tricuspid, laterals bicuspid; marginals long, low, irregularly denticulated, denticles long, oblique, usually one inner, long, and one outer, short, both bifurcate.

Specimen from Brazil, collected by Mr. J. G. Anthony.

HELIX RETICULATA, Pfr. (*Arionta*).

Jaw stout, strongly arcuate, dark horn color, transversely striate; ends but slightly attenuated, blunt; anterior surface with three stout, widely separated ribs, on the central third of the jaw; their ends projecting beyond either margin.

Lingual membrane long, wide; teeth as usual in the genus; the marginals irregularly denticulated, generally with two oblique, bifurcated denticles.

California.

HELIX NICKLINIANA, Lea. (*Arionta*).

Jaw thick, horn colored, with stout, anterior ribs.

Lingual membrane very broad; teeth as usual in the genus, the middle cusp of the centrals and inner cusp of the laterals being very long and pointed, the side cusps of each only slightly developed; marginal teeth with four or less irregular, long, pointed denticles.

A large, globose specimen from Mendocino County, California, furnished the jaw and lingual membrane here described.

HELIX GOSSEI, Adams. (*Coryda*).

Lingual membrane broad; teeth as usual in the genus; centrals and laterals with stout cusps, bearing short, bluntly rounded points; marginals with one inner, large, bluntly bifid, oblique, long cusp, and one or two small, blunt, rounded cusps at its sides.

Jamaica. From Messrs. Vendryes and Gloyne.

HELIX NOTABILIS, Shuttleworth. (*Thelidomus*).

Lingual membrane long and wide; teeth as usual in the genus; centrals and laterals subquadrate; marginals subquadrate, with two broad, oblique, blunt, slightly produced denticles, the inner one, as usual, the larger.

Tortola. Received mounted, from Mr. Robert Swift.

HELIX PEMPHIGODES, Pfr. (*Cysticopsis*).

Lingual membrane long and broad; teeth as usual in the genus, the marginals irregularly denticulated with one or two oblique, long, bluntly bifurcated denticles.

Cuba.

HELIX LOXODON, Pfr. (*Plagioptycha*).

Jaw thin, arcuate, very high, with transverse and perpendicular striæ; ends hardly attenuated, blunt; cutting edge with a median projection.

Lingual membrane long and narrow; teeth as usual in the genus; the long cusp of the centrals and laterals sharply pointed; marginals wide, low, irregularly denticulated; denticles usually long, oblique, trifold, the central point the longest.

San Domingo. Dr. W. Newcomb.

HELIX DIAPHANA, Lam. (*Plagioptycha*.)

Jaw thin, slightly arcuate, of almost equal height throughout; ends blunt, cutting edge with a slightly developed, blunt, median projection.

Lingual membrane as usual in the genus; marginal teeth with one broad, oblique, long, obtusely trifold denticle.

Puerto Rico. From Dr. Cleve.

HELIX MONODONTA, Lea. (*Plagioptycha*.)

Jaw thin, light horn colored, but slightly arcuate; ends but little attenuated, blunt; anterior surface without ribs; cutting edge with a slightly developed, median projection.

Lingual membrane as usual in the genus; marginal teeth usually with three oblique, long denticles, the inner the longest.

San Domingo. Dr. Newcomb.

HELIX GRAMINICOLA, Adams. (*Polymita*.)

Jaw strongly arcuate, stout, rough, high; ends scarcely attenuated, blunt; no anterior ribs; cutting edge with a decided, blunt, broad, median projection.

Lingual membrane with about 40—1—40 teeth in each row; teeth as usual in the genus; centrals tricuspid, laterals bicuspid, marginals broad, low, with two stout bifurcated denticles, or, at the extreme edge of the membrane, with simply three obtuse denticles, of which the central is the longest.

Jamaica. Messrs. Vendryes and Gloyne.

It will be seen from the above description that this species has a jaw similar to that of *Helix varians*, in the important characteristics of absence of ribs on its anterior surface, and presence of the median projection to the cutting edge. Both species belong to the Section *Polymita*. *Helix muscarum*, belonging to the same section, has already been described by us as having a rough, coarse jaw, without ribs on its anterior surface. It has, however, no median projection to its cutting edge. (See *Am. Journ. Conch.*, 1871. Pl. 16).

Pfeiffer places this species in the synonymy of *H. gilva*, Fér., as to the correctness of which we entertain some doubt.

HELIX MACROGLOSSA, Pfr., and HELIX ALBERSIANA, Pfr., have also the same style of jaw as *H. varians* and *H. graminicola*.

The first named is the species to which we refer in a foot note to p. 185 of Land and Fr. W. Shells, Part I, as *Helix microphysa*. The *H. disculus*, of the same note, proved to be a smooth variety of *H. Albersiana*, both from Inagua, Bahamas.

HELIX CRISPATA, Pfr. (*Eurycratera*.)

Jaw thick, arcuate, ends blunt; anterior surface with ten stout ribs.

Lingual membrane long and broad; teeth as usual in the genus; the middle cusp of the centrals and the inner cusp of the laterals produced into a long, acute point; as the teeth pass off laterally this cusp becomes stouter, shorter and more obtuse; the extreme marginals are subquadrate, with one broad, short, emarginate, oblique, inner denticle, and one small obtusely pointed side denticle, hardly projecting beyond the base of the teeth.

San Domingo. Dr. Newcomb.

HELIX ISABELLA, Pfr. (*Dentellaria*.)

Jaw stout, arcuate, not very long, high, striated both vertically and transversely, ends but slightly attenuated, blunt, with about eight stout, well defined ribs crenellating either margin.

Lingual membrane long, narrow. Teeth as usual in the genus; centrals tricuspid, laterals bicuspid; marginals with broad, oblique, stout, usually bluntly bifurcated denticles.

A specimen from Barbados, received from Governor Rawson, furnished the lingual membrane and jaw here described.

HELIX DENTIENS, Fér. (*Dentellaria*.)

Jaw stout, long, arched, strongly striate transversely, ends slightly attenuated, blunt; anterior surface with stout ribs (four in one individual, five in another) denticulating both margins.

Lingual membrane broad. Centrals and laterals as usual in the genus, the reflected cusps being stout and obtusely pointed; marginals with broadly rounded oblique cusps, usually bluntly bifid or trifid, sometimes with small rounded cusps at their sides.

Dominica. Mr. R. J. Lechmere Guppy.

HELIX SCHROETERIANA, Pfr. (*Pleurodonta*.)

Lingual membrane long and broad; teeth as usual in the genus; centrals and laterals subquadrate, the middle cusp of the former and inner cusp of the latter being stout and long, and bearing a short broad point, the side cusps very slightly developed; marginals wide and low, with a broad, oblique, long, bluntly tricuspid denticle, the middle cusp much the largest.

Jamaica. Mr. Vendryes.

HELIX EXCELLENS, Pfr. (*Caracolus*.)

Lingual membrane long and narrow. Teeth as usual in the genus; centrals and laterals tricuspid and bicuspid; marginals short, narrow, with two oblique, stout, blunt denticles, the inner one the longer.

San Domingo. Dr. Newcomb.

HELIX PHOENIX, Pfr. (*Acavus*.)

Jaw long, low, arcuate, ends but slightly attenuated, blunt; very thick and coarse; no anterior ribs; no median projection to the cutting edge.

Lingual membrane as usual in the genus; centrals and laterals long, narrow, tricuspid and bicuspid as usual, the middle cusp stout; marginals a simple modification of the laterals.

We are indebted to Mr. J. G. Anthony, of the Museum of Comparative Zoology, for the specimen from which we extracted the jaw and lingual membrane here described.

HELIX FUSCOCINCTA, Ad. (*Leptoloma*.)

Jaw thin, arcuate, high, ends bluntly truncated; with perpendicular striæ; cutting edge with a median projection.

Lingual membrane as usual in the genus. Marginal teeth with several oblique, short, blunt, stout denticles.

Jamaica.

COCHLOSTYLA FULGETRUM, Brod. (*Canistrum*.)

Jaw thick, wide, low, arcuate, ends but slightly attenuated, blunt; anterior surface with more than twelve stout, broad ribs, denticulating both margins.

Lingual membrane long and broad, composed of numerous rows of about 80-1-80 teeth each. Centrals and laterals as usual in the *Helicinae*, the side cusps of the reflected apex being but slightly developed, and the central cusp bearing a short, stout, blunt point; the lower margin of the base of attachment is strongly concave, with lateral pointed expansions. The marginal teeth are of the same form as the centrals and laterals, the basal margins being still more excavated and having still more strongly developed lateral expansions, the upper margin of the base of attachment is also greatly produced and bluntly pointed.

The specimen examined was preserved in the Museum of Comparative Zoology, at Cambridge.

BULIMUS OBLONGUS, Müll. var. ALBUS. (*Borus*.)

Jaw slightly arcuate, stout, low, of almost equal height throughout; ends but slightly attenuated, blunt; surface with

perpendicular and transverse striæ, and coarse perpendicular wrinkles, some of which are scarcely to be distinguished from the ribs, of which there are ten, well developed, crenellating either margin.

Lingual membrane similar to that of the typical *B. oblongus*, as figured by Heynemann, in Malac. Blatt., 1868.

A specimen from Tobago, received by Mr. Robt. Swift from Governor Rawson, furnished the jaw and lingual membrane here described.

BULIMUS PARDALIS, Fér. (*Dryptus*.)

Jaw thick, long, low, slightly arcuate, of almost equal height throughout; ends but slightly attenuated, blunt; whole anterior surface occupied by twelve stout, broad ribs, denticulating either margin.

Museum Comparative Zoology.

BULIMUS MARMORATUS, Dunker. (*Dryptus*.)

Lingual membrane long and broad; teeth as usual in the genus, the marginals a simple modification of the laterals, with two small, blunt denticles.

LIMICOLARIA NUMIDICA, Reeve.

Jaw thin, highly arcuate, smooth, ends attenuated.

The specimen examined is preserved in the Museum of Comparative Zoology, at Cambridge.

BULIMULUS AUREOLUS, Guppy. var. **RAWSONI**.

Lingual membrane similar to that of *B. laticinctus*, described in Ann. N. Y. Lyc., X, 81, Pl. ii., as follows:

"Lingual membrane long, and quite broad in comparison to its length, composed of numerous waving rows of teeth. Centrals subpyramidal, the base excavated, apex not pointed, but bluntly rounded and recurved into a stout, obtuse, long cusp, which is unequally divided into two blunt, stout lobes. Laterals very much longer and larger than the centrals, long, narrow, obliquely recurved into a greatly developed unequally trilobed cusp. Marginals but little modified from the laterals in shape, but narrow, denticulated on the outer side of their reflected cusp, which is bicuspid rather than trilobed."

Gov. Rawson, Tobago.

BULIMULUS ALTERNATUS, Say. (*Thamastus*.)

The lingual membrane of a Texan or Mexican specimen was described by us in L. & Fr. W. Shells, Part I, p. 203, fig. 351.

Jaw long, low, slightly arcuate, thin, semitransparent, composed of numerous plates, as in *Helix turbiniformis*, see *Annals N. Y. Lyc.*, X, Pl. ii. The membranous attachment at the upper margin is very stout in this specimen, apparently of the same color, consistency and material as the body of the jaw itself.

A specimen from the Isthmus of Tehuantepec furnished the jaw here described.

BULIMULUS MEMBRANACEUS, Phil. (*Mormus*.)

Jaw slightly arcuate, ends acuminate; apparently in twenty-four separate plates, of same character as in the last species.

Lingual membrane unsatisfactorily mounted. Teeth apparently of same type as in the last species, the centrals, however, distinctly tricuspid.

Brazil. Collected by Mr. J. G. Anthony.

BULIMULUS JONASI, Pfr. (*Mormus*.)

Jaw slightly arcuate, long; ends blunt, scarcely attenuated; apparently composed of numerous separate plates, as in the last species.

Lingual membrane unsatisfactorily mounted, the teeth, however, appear of the same type as those of *B. aureolus*, above.

BULIMULUS DEALBATUS, Say. (*Scutalus*.)

A jaw of this species lately received differs somewhat from the one figured in *Land and Freshwater Shells*, I, p. 209. It is not strongly arcuate, but only slightly so. It has but ten ribs, quite broad, on the anterior surface, crenellating either margin. The jaw is quite thin, of a light horn color.

BULIMULUS BERENDTI, Pfr. ?

Jaw slightly arcuate, long, low, ends slightly attenuated, apparently composed of fifteen separate plates, or folds, as in *B. alternatus*, above.

Lingual membrane long and narrow, composed of numerous rows of teeth. Centrals and laterals as usual in the genus, marginals irregularly denticulated or serrated.

Nicaragua. Mr. McNiel.

This species has not been determined, but is closely allied to *B. Berendti*, Pfr.

BULIMULUS DURUS, Spix. (*Rhinus*.)

Jaw long, slightly arcuate, low, ends but little attenuated; apparently composed of numerous separate plates, or folds, as in *B. alternatus*, above.

Lingual membrane with teeth as usual in the genus. Centrals

tricuspid, laterals bicuspid; marginals with one long and one short denticle.

Brazil. Collected by Mr. J. G. Anthony.

STENOGYRA DECOLLATA, Lin.

Lingual membrane long and narrow, composed of numerous rows of 36—1—36 teeth. Teeth of the same general character as described below in *Stenogyra octona*. The marginals, however, appear to have only one long denticle with an obsolete, short, side denticle.

Rome, Italy.

STENOGYRA GONOSTOMA, Gundl.

Lingual membrane as in *Stenogyra octona*, described below.

Cuba. D. Rafael Arango.

STENOGYRA OCTONA, Chemn.

Lingual membrane broad, not long, composed of numerous rows of about 30—1—30 teeth each. Centrals long, narrow, angularly widened at the centre, the apex recurved into a very small, bluntly trilobed cusp. Laterals very much larger than the centrals, distinctly separated; plate subquadrate, unsymmetrical, its recurved apex very large, tricuspid, central cusp very much stouter and longer than the side cusps. Marginal teeth long and low, irregularly denticulated, denticles short, stout, blunt.

This lingual membrane is peculiar from its very small, recurved apex in the central, and the proportionally large laterals, which are distinctly tricuspid, as much so as is usual in central teeth among the *Helicidæ*.

Bahia. J. G. Anthony.

CYLINDRELLA SUBULA, Fer.

Lingual membrane very long and narrow, composed of numerous rows of teeth arranged *en chevron*. Teeth 10—1—10 in each row, of the same character as those of *C. gracilis*, figured by Messrs. Crosse and Fischer (Journ. de Conch., 1870, pl. iv, fig. 1). Centrals long, slender, with a broad reflected cusp. Laterals two on either side of the central line; their basal margin delicately fringed or crimped; the small upper cusp is wanting in the inner laterals, and is represented in the outer lateral by a short blunt point projecting outward near the apex. Marginals 8, long, laminar, with irregularly recurved apices.

Jamaica. Mr. H. Vendryes.

CYLINDRELLA SEMINUDA, C. B. Adams.

Lingual membrane resembling that of the true *Cylindrella* (Group A), of Messrs. Crosse and Fischer. The inner lateral has an obsolete upper cusp, and the outer lateral has, instead of the usual cusp, a simple, short, obtuse point, thrown off laterally near its summit. Thus it will be seen that this lingual membrane resembles that of *C. gracilis*, figured by Messrs. Crosse and Fischer (l. c. pl. iv, p. 1).

Jamaica. Mr. Gloyne.

SUCCINEA SAGRA, D'Orb.?

Jaw as usual in the genus, its anterior surface simple; with a median projection to its cutting edge.

Lingual membrane as usual in the genus; teeth short, stout; marginals with one long and several short acute cusps.

Jamaica.

STOASTOMA PISUM, Ad.

Lingual membrane long and narrow. Teeth 000.5.1.5.000, resembling those of the genus *Helicina*.

Specimens received from Mr. Gloyne, collected in Jamaica, furnished the lingual membranes here described.

ON THE LINGUAL DENTITION OF BLANDIELLA, GEOMELANIA AND AMPHIBULIMA.

BY THOMAS BLAND AND W. G. BINNEY.

Blandiella was described by Mr. Guppy in the *American Journal of Conchology*, VI. 309. In speaking of its lingual membrane, Mr. Guppy says it is intermediate between *Cyclophoridae* and *Paludinidae*. Having received specimens of the animal, we have examined the membrane, and find it much more like that of *Truncatella* and the fluviatile *Rissoideae*, sharing with those genera the peculiarity of the basal denticles on the central tooth. The membrane (plate 17, fig. 5) is long and narrow; teeth 3. 1. 3, as usual in the *Pectinibranchiata*. Centrals somewhat conical, broadly truncated by the reflection of the apex, which is trilobed, the central lobe extended into a short, stout beak; the infero-lateral extremities are somewhat produced, and bear on their anterior surface four short, triangular denticles, pointing outwards. The first lateral is about the same height as the central, but much broader; the upper edge is recurved along its whole length, and bears five denticles, of which the second from the inner edge is the largest and acutely pointed. The second lateral is long, laminar, with a recurved and minutely denticulated upper edge. The third lateral is similar to the second, but somewhat more narrow. Fig. 5 gives one central tooth, with the adjacent laterals of one side only of the membrane.

B. reclusa, Guppy, the species referred to, is from Trinidad.

GEOMELANIA (pl. 17 fig. 7, 10) has the same characters of lingual dentition as already described in *Blandiella*. The central tooth has, however, less developed infero-lateral expansions; the basal denticles, two in number, are longer, and point downward rather than outward. Our figure 10 gives one central with the three laterals of one side only of the membrane. A more highly magnified view of a central is given in figure 7. These figures

are drawn from specimens of *Geomelania* from Jamaica, received from Messrs. Gloyne and Vendryes.

AMPHIBULIMA PATULA, Brug. Plate 17, fig. 1 & 2.

A mounted membrane from Dominica, received from Mr. R. J. Lechmere Guppy, furnishes the following notes: Lingual membrane long and broad, composed of numerous waving rows of teeth, of the form usual in the *Helicidæ*. Centrals subquadrate, extended at the basal angles, narrowing towards the centre, expanding towards the upper edge, which is reflected and tricuspid, extending quite to the base of the tooth; the cusps are stout, the median one bluntly pointed. The lateral teeth are of the same type as the centrals, but unsymmetrical. The marginals are long and narrow, rounded at base, narrowed at the apex, reflected and bicuspid; cusps short, stout, and generally a simple modification of those of the laterals. The extreme marginals have irregular teeth, like simple papillæ.

A group of central and lateral teeth is given in fig. 1, several marginals in fig. 2.

ON THE LINGUAL DENTITION OF MACROCERAMUS
GOSSEI, PFR.

BY THOMAS BLAND AND W. G. BINNEY.

We are indebted to Mr. Vendryes for numerous Jamaica specimens of this species, from which we extracted the jaw and lingual membrane here described.

Jaw arcuate, thin, light horn color, almost transparent, in numerous separate plates (over fifty), of the character peculiar to the species of *Cylindrellidæ*, as described by Messrs. Crosse and Fischer, in the *Journal de Conchyliologie*, Jan., 1870.

Lingual membrane long and narrow; teeth about 40—1—40, in scarcely oblique transverse rows, decidedly not *en chevron*. Centrals long, narrow, somewhat expanded at base, narrowing towards the apex, which is reflected and produced into a short, stout, bluntly-pointed beak. Laterals long, laminar, their outer edge often cut away irregularly towards the base; upper edge inclined obliquely toward the centrals, broadly reflected and bicuspid, the inner cusp the larger, and produced into a very long, narrow, acutely-pointed beak. Marginals of the same type as laterals, decreasing in size as they pass outward; those at the edge of the membrane having one large inner cusp, and several outer, irregular, small cusps.

Figure 11 gives the central and several laterals of two adjacent rows of teeth. Figure 9 gives a single lateral, more highly magnified. Figure 12 gives an extreme marginal. Plate 17.

From the above description and the figures, it will be seen that this species differs in its lingual dentition from *Macroceramus signatus*, already described and figured by one of us (Bland, Ann. N. Y. Lyc. VIII, 162). A reference to the paper of Messrs. Crosse and Fischer, quoted above, shows further that this lingual membrane differs entirely from that of any species of *Cylindrellidæ* as understood or adopted by them.

ON THE LINGUAL DENTITION OF NANINA.

BY THOMAS BLAND AND W. G. BINNEY.

An opportunity of examining the lingual membranes of two species of *Nanina* has brought to light several interesting points of difference from the characters supposed to belong to the genus.

Dr. Gray (Br. Mus. Cat. 74), referring to Troschel's figure of *Nanina retrorsa* (Arch. für Nat. xv. t. 4, f. 6), describes the central teeth as simple, the laterals as having a broad double base, the marginals with a narrow double base, each of the lobes being bifid. In the species described below, neither centrals, laterals or marginals agree with this description. In general terms, our species may be said to agree with the usual well-known characters of *Hyalina* or *Zonites*, with the exception of the marginals being bifid. Thus we find considerable variation in the lingual dentition of the genus *Nanina*.

NANINA CALIAS, Benson, (pl. 17, fig. 6, 8). Specimens in alcohol, received from the foot of the Himalayas, have been sent us by Mr. J. G. Anthony, of the Museum of Comparative Zoology. We have extracted the lingual membrane, which is long and broad. The centrals and laterals are arranged horizontally, the former have their reflected apex tricuspid, the latter bicuspid. In this and other respects, the centrals and laterals agree with the usual characters of the species of *Hyalina* and *Zonites*. (See Land and Fresh-water Shells of North America, Part I.) There are ten well marked laterals, beyond which the teeth change rapidly into the marginals. These last are much more numerous than the laterals, and are arranged in oblique rows; they are simple aculeate teeth, nearly resembling the marginals of *Zonites* and *Hyalina*. The recurved portion and the base, however, are both much more thick and less graceful than in those genera, and the recurved portion, instead of narrowing rapidly to an acute point, expands slightly, and is bluntly bifid.

Figure 6 gives one central with the first two laterals, one of the intermediate teeth, and the three extreme marginals. Figure 8 is drawn from a different part of the membrane, apparently its most developed portion. It gives a group of centrals and laterals in which an enormous development is seen of the median cusp of the central tooth.

NANINA CULTRATA, Gould, received from Mr. J. Harper Pease. The lingual of this species has the same general characteristics as that described above. The centrals and laterals, however, are more slender; there are six of the latter. The marginals are more numerous in this species; those on the extreme edge of the membrane are not only bluntly bifid at their extremity, like all the inner marginals, but also bear upon the lower edge of their recurved portions several blunt notches, giving the tooth a multifid appearance.

ON THE GENERIC POSITION OF *HELIX* NEWBERRYANA.

BY THOMAS BLAND AND W. G. BINNEY.

HELIX NEWBERRYANA (Terr. Moll. U. S. IV, pl. lxxvi, fig. 7), has, until now, been of doubtful generic position. In the Check Lists of Shells, published by the Smithsonian, it was placed by one of us in the genus *Macrocyelis*. Mr. Tryon, in his monograph, subsequently followed this suggestion. In Land and Fresh-water Shells of N. A., Part I, we placed the species in the genus *Zonites*, on account of its resemblance to the European group of *Z. algira*, &c. An opportunity of examining the jaw and lingual membrane of the species, extracted from a dried specimen, now enables us to decide its true position. We find the species to belong neither to *Macrocyelis* nor to *Zonites*, but to be a true *Helix*.

The jaw is decidedly costate. The lingual membrane has the arrangement of teeth usual to the *Helicidae*. The centrals are subquadrate, with a broad reflection, produced into the usual trilobed cusp. The laterals are the same as the centrals, but bicuspid and unsymmetrical. The marginals are but a modification of laterals; they are low, wide, subquadrate, bearing one long and one short, oblique, stout cusp.

Had the species been a true *Macrocyelis*, the jaw would have proved to be without ribs on its anterior surface, and furnished with a median, beak-like projection to its cutting edge. The central tooth of the lingual membrane would have been small, narrow, acutely pointed, the lateral teeth would have been entirely wanting, and the marginal teeth would have been replaced by very oblique rows of simply thorn-shaped teeth. (See L. & Fr. W. Shells, Part I, p. 55, fig. 92, p. 57, fig. 96.)

Had *Helix Newberryana* proved a true *Zonites*, we should have found the smooth jaw without anterior ribs, and with a decided beak-like median projection on its cutting edge. (See L.

& Fr. W. Shells, p. 281, fig. 502; p. 290, fig. 521.) The lingual membrane might have had the centrals and laterals actually existing in the species, but the marginal teeth would have been replaced by oblique rows of simple thorn-shaped teeth. (See *Ibid.*, p. 286, fig. 512; p. 290, fig. 521.)

Our figure 4 shows one central and one lateral tooth on the right of the membrane. Figure 3 shows three marginals on the opposite side of the membrane.

Since the above was written we have seen a living specimen of the species, and find no caudal mucus pore.

Explanation of Plate 17.

Figure 1. *Amphibulima patula*. Centrals and laterals.

Figure 2. The same. Marginals.

Figure 3. *Helix Newberryana*. Marginals from the left of the median line.

Figure 4. The same. One central and one lateral, the latter from the right of the central line.

Figure 5. *Blandiella reclusa*.

Figure 6. *Nanina Calias*. The central, first two laterals, one intermediate tooth, and three extreme marginals.

Figure 7. *Geomelania*. The central tooth.

Figure 8. Same as fig. 6, taken from another portion of the membrane.

Figure 9. *Macroceramus Gossei*. A lateral tooth.

Figure 10. *Geomelania*. Same as fig. 7.

Figure 11. Same as fig. 9. A group of centrals and laterals.

Figure 12. Same as last. An extreme marginal.

NOTE ON GADINIA.

BY W. H. DALL.

Dr. J. G. Cooper, in a late number of the Journal (VI, No. IV, p. 319), takes exception to the consolidation of *Gadinia* and *Rowellia*. In defending his so-called genus *Rowellia*, he has fallen still further into error. With regard to the main question, I am ready to admit that it is not absolutely *proved* that the two are identical, but it seems to me necessary, in order that a genus may be accepted, that the proof that it is *different* from those previously established should be brought forward; and no such proof has yet been made known, while it is almost absolutely certain that there is no difference either in shell or animal. Dr. Cooper is in error in stating that my description was founded wholly on the species which is the type of his *Rowellia*; on the contrary it is the result of an exhaustive examination of all the literature and descriptions relating to the genus *Gadinia*. The genus *Rowellia* was founded on the supposed pectinated tentacles of the type, and having shown that in the adult, at least, (as also in the youngest specimens I have seen), the pectination does not exist, it is hardly necessary for Dr. Cooper to fall back upon the possible indefiniteness of the figure in defiance of a plain statement. He then says that we may suppose Adams' figure to be original; but how we can suppose so when the reference to it shows that it is copied from Philippi, I cannot understand. He follows this by saying that, according to my table of synonyms, all names, except *Rowellia*, were founded on the Mediterranean species. If he will examine the paper with ordinary care, he will observe that the type of *Gadinia* is a West African species, and the types of *Mouretia* and *Muretia* are West American species; facts which I have taken care to state categorically.

Furthermore, in regard to the identity of his *G. radiata* with *stellata* of Sowerby, I have not only confirmed it by the examination of a series of specimens from all parts of the coast, and others named from the types in Mus. Cuning, but I have the complete concurrence of Dr. Carpenter in the identification, and no one will dispute his ability to judge in such a question. I would also inquire what is the essential difference between "reticulation" and "radiating ribs" crossed by "concentric lines of growth."

Far from considering it safest to keep things separated in the absence of differential characters, until they are shown to be identical, I am of the opinion that it is safest not to separate them until they are shown to be different.

It is extraordinary that Dr. Cooper should have found anything in my description of the animal, or in my alluding to the auriculate anterior extensions of the muzzle as "ears," to impress him with the idea that I considered them to be auditory organs.

It seems hardly necessary to state that I used the term in a colloquial sense, as "foot," "umbilicus," and other terms are constantly used in descriptions of mollusks. As to the possibility of the young (not embryonic) animal being branchiate and the adult pulmonate, no such case is known in the whole sub-kingdom of mollusca, and I prefer to await a more rational explanation of the fact that young specimens may have been found in deep water.

Furthermore, I may add, that information kindly communicated to me by Mr. J. Gwynn Jeffreys, F.R.S., confirms the identity in habits of the Mediterranean and Californian forms. There seems to be little doubt that the *G. Garnoti* is the *Patella mammillaris*, of Linnæus, and the name should therefore be corrected to read *Gadinia mammillaris*, L. sp.

POLYNESIAN CHITONIDÆ.

BY THE LATE W. HARPER PEASE.

The absence of Chitonidæ from Polynesia has been noticed by authors as a remarkable fact, abounding, as they do, in the surrounding provinces, especially on the west coast of America, at Australia and New Zealand.

The only species known as inhabiting Polynesia, so far as I can discover, are the following :

"LOPHYRUS PETALOIDES," Gld. Hawaiian Islands, collected by the Am. Expl. Exped.

"LOPHYRUS PERVIRIDIS AND ACANTHOPLEURA NIGROPUNCTATA," Cpr. Tahiti, both described in Proc. Zool. Soc., London, 1865. From my collection.

"LEPIDOPLEURUS? LUZONICUS, Sow. Tahiti, determined by Dr. Carpenter, from specimens in my Coll. I mark it doubtful, as it is, to say the least, a variety.

All of the above are quite small, the longest not over 6 mill. in length. I was therefore surprised on discovering the two species described below at a locality which has been searched over by numerous collectors, including myself.

One attains to the size of 40 mill., and probably larger.

The descriptions are merely provisional, as I have no perfect mature specimen of either species. Those of the largest are very much abraded or coated with lime, the description being taken from an immature specimen.

(?) ACANTHOCHITES VIRIDIS, Pse.

T. oblongo-ovata, vix elevata, viridis, medio pallida aut albidā; valvis semilunaris, aries lateralibus minute granulosis, centralibus non liratus aut elevatis, antice tenui striatis; ligamento coriaceo, spiculis brevibus dense induto, et spicularum vitreorum cristis densissimis perviridibus munito. Long. 40, diam. 14. mill. Hab., Insl. Kauai.

Shell oblong ovate, but slightly elevated, green with a pale or whitish line down the middle. The valves are semi-lunar in shape, the posterior side being straightly transverse or nearly so. They are without a ridge or umbonal elevation in the centre, where they are smooth; the sides minutely granulose. The valves of insertion are entire plates, on which the dorsal valves are set or imbedded. They extend from the sides of the dorsal valves, and produced anteriorly, the edges being smooth and rounded at their termination. On the posterior terminal valve, they are produced laterally, and are truncate at their termination. On the anterior terminal valve, they are produced at an equal distance around the front and sides. They are smooth and of a light bluish color. The ligamental border is covered with close-set, short spiculæ. The spiculæ of the tufts are dense, vitreous and dark green.

The above description will require to be revised and extended, when more perfect specimens are found.

(?) *ACANTHOCHITES ARMATUS*, Pse.

T. ovata, vix oblonga, elevato-convexa, viridescens, nigrescente irregulariter maculata, medio pallida, nigrescentibus longitudinaliter bilineata; areis lateralibus granulosis, centralibus, longitudinaliter striatis, non umbonatus; ligamento coriaceo, angusto, spiculis nitidis, albis, induto, et spicularum vitriorum cristis argentaceo-albis munito.

Long. 10, diam 6 mill. Hab. Insl. Oahu.

I have but a single specimen of this beautiful little species, the valves of which are very much broken. It is somewhat elongate in shape, elevately convex, light green, irregularly spotted with blackish, paler along the middle, with two longitudinal blackish lines. The lateral areas are distinctly granulose, central longitudinally striate, without any umbonal elevation. The ligamental border is narrow, and covered with shining white spiculæ, and furnished with a row of silvery white tufts of spiculæ.

DESCRIPTIONS OF FOUR SPECIES OF LAND SEHELLS INHABITING THE PAPUAN ISLANDS.

BY THE LATE W. HARPER PEASE.

PARTULA TURRICULA, Pse.

T. elongata, turricula, solida, sinistrorsa, rimato-perforata, nitida, lævigata, striis incrementis tenuiter notata, lutescens, strigis saturatioribus indistincte radiata; spira turricula, acutiuscula; anfr. $5\frac{1}{2}$, plano-convexi, ultimus spira brevior, oblique productus; columella verticalis, valde callosa, superne late dilatata, præcipue supra umbilicum, transverse subsulcata; apertura obliqua, oblonga, postice oblique truncata; perist album, callosum, expansum et reflexum, postice vix sinuatum.

Long. 20, diam. 10 mill. Hab. (?) N. Hebrides.

The habitat of the above species is doubtful. From its approaching *P. Macgillivrayi*, Pfr., and *Caledonica*, Pfr., inhabiting the New Hebrides, and having lately received specimens from Dr. Jas. C. Cox, with other species from that group of islands, there is little doubt but that locality is the correct one.

It differs from the species mentioned above in being smaller, more slender, "sinistral," smooth, without any trace of transverse striæ, and last whorl produced.

PARTULA CONCINNA, Pse.

T. compresse umbilicata, conico-ovata, tenuiscula, conferte et distincte spiraliter striata, pallide fulvescens, aut albescente, strigis saturatioribus radiata, apicem interdum rufescente; spira acutiuscula, brevis, conica; anfr. 5, convexiusculi; ultimus spiram æquans; sutura interdum submarginata, columella fere verticalis, nodosa, superne dilatata; apertura subverticalis, ovalis; perist album, incrassatum, convexum, expansum vix reflexum.

Long. 15, diam. $9\frac{1}{2}$ mill. Hab. Insl. Tanna. (N. Hebrides, Cox.)

The above is of the type of *P. repanda*, Pfr., inhabiting the same group of islands. It is smaller than that species, more abbreviate in shape, thinner, distinctly striate, columella nodose, and of different color.

BULIMUS (?*BORUS*) *COXI*, Pse.

T. crassa, ovata, perforata, dextrorsa, longitudinaliter striis incrementis rugosa, albescente, rosaceo suffusa, spira flavescente; anfr. 4, tumidiusculi, ultimus $\frac{3}{4}$ longitudinis testæ æquans; spira brevis, obtusiuscula; sutura bene impressa; apertura verticalis, ovalis, intus rufescente; perist. pallide aurantium, crassum, marginibus callo junctis, columellari perforationem fere occultante.

Long. 25, diam. 15 mill. Hab. Insl. Solomonis (Cox.)

The above, in shape and general proportions, as well as in color, is a miniature, "*B. rosaceus*" (King).

The last whorl is whitish, suffused with rose color, spire yellowish, aperture reddish, and margin of the peritreme light orange color. Its surface is not granulose, but roughened by incremental striæ.

I attach to this species the name of Dr. Jas. C. Cox, through whose active researches, during the past few years, we are indebted for an extended knowledge of the Molluscan Fauna of the Australian and Papuan provinces.

OMPHALOTROPIS NEBULOSA, Pse.

T. perforata, elongato-eonica, lævigata, indistincte transversim tenui striata, epidermide tenui induta, sordide fulva, rufescente fusco nebulosa, interdum irregulariter late strigata, anfr. ultimus plerumque, fusco bifasciata, sutura bene impressa; anfr. 7, convexusculi, ultimus rotundatus, circa umbilicum carinato-angulatus, albus; apertura fere verticalis, late pyriformis; perist. marginibus callo tenui junctis; columella arcuata.

Long. 10, diam. 5 mill. Hab. Insl. Solomonis.

I have lately discovered that "*Omphalotropis variabilis*," Pse., described from the Hervey Islands, also inhabits the Tongan Group.

SYNONYMY OF *PATELLA EXARATA*, RVE.

BY THE LATE W. HARPER PEASE.

In this Journal, Part 3, 1870-71, a paper is published from W. H. Dall, "On the Limpets,"

He remarks that he has made a careful examination of the species detailed, and proceeds to give his views as to the classification of the group.

The following is his synonymy of the above species, with his remarks.

HELICIONISCUS EXARATUS, Nutt.

Patella exarata, Nutt. Jay's Cat. p. 38. Rvc. Con. Icon. pl. 19, fig. 47, a, b, 1854.

Patella Sandwichensis, Pse., P. Z. S., 1860, p. 537.

Patella undato-lirata, Pse., [Ubi?] MSS. label, Cab. S. 1.

"The so-called species of Mr. Pease are not even distinguishable varieties, and have no characters by which they can be differentiated from the typical *exarata*. The description of the first is in English, without a figure. I have not been able to find a description of the second." (Dall.)

Had Mr. Dall examined and eaten as many of the animals of the above species as I have during the past twenty years, he would have been convinced from the taste, as well as sight, that they are distinct.

I decline the honor of being the author of "*P. undato-lirata*." In answer to "Ubi," I refer him to "Con. Iconica," a work he appears to be acquainted with. Whatever errors may exist in the Smithsonian Collection, a species so distinct and common as the above should be known to and be recognized by any person who has studied the *Patellidæ*.

Mr. Dall has also overlooked the variety of "*P. exarata*," figured on Pl. 24, of the above work.

It presents, in my opinion, a "distinguishable variation" from those of "*P. exarata*," Rve., on pl. 19, and its synonym "*P. undato-lirata*," Rve., on pl. 23.

Soon after I commenced collecting at the Hawaiian Islands, some twenty years or more past, I remarked that the natives, in speaking of the common limpet, made use of two specific names.* Inquiring whether they supposed the two were distinct species, they answered by bringing me specimens, and pointed out the difference, which proved they were correct.

The shell of "*P. Sandwichensis*," Pse., is thicker, more elevated, ribs generally larger, wider apart, more prominent, and crenate or scabrous and usually with a smaller intermediate rib. The color of the interior also differs. I find among my papers the drawing and description of the animal of but one species, and will not trust my memory to compare the two.

The description of the animal by Mr. Dall does not correspond with that of either species.

The two species differ also in their habits and station. "*P. Sandwichensis*" lives at low water mark, and is consequently usually coated with lime. I suspect it breeds there also, in the fissures and holes of the rocks.

"*P. exarata*" lives at high water mark, and breeds, where the locality admits of it, in shallow water.

Immature specimens of the latter vary much in color and somewhat in shape. They are spotted with green and black, or spotted and striped with various colors. "*P. opea*," Nutt. MSS., is one of the varieties. As they mature and pass out to the surf, their characters become more constant. From thence they go off into deep water, 5 to 10 fathoms, where they attain to a size twice that figured by Mr. Reeve. Specimens are seldom obtained, as our natives have given up the practice of diving in deep water. They assure me that they are the same species as those living on the reef, which, however, cannot be positively determined until the animals are compared.

Among the papers overlooked by Mr. Dall, is one by Prof. Edw.

*The natives of Polynesia, and probably those of other countries, make use of the binomial nomenclature for plants and animals, especially such as are made use of for food, &c. Transient collectors fall into error occasionally, when they adopt the name given them by the natives as a specific one, whereas the natives almost invariably give the generic name. An amusing error occurs in "Voy. au. Pol. Sud," where Mr. Hombron has named a species of *Helix* "*Vahine*," which means a "female," or grown up woman or other animal. His species, therefore, stands as the female *Helix*.

I note the above facts to prove the absurdity of adopting native names, in any branch of natural history.

Forbes, on the *Patellacea*, published in 1849, dividing that group into two families, viz., Patellidæ and Acmeadæ, under which the genera, so far as enumerated, are arranged the same as by Mr. Dall, with the exception that *Lepeta*, or its allied genera, are classified with the Acmeadæ, instead of being raised to a separate sub-order. Fam. Acmeidæ is credited by Mr. Dall to Dr. Carpenter, Maz. Cat., 1856.

The first descriptions published by me were, it is true, in English, and short, intended to be merely provisional, as I expected at that time to be able, from the Report of the several Surveying Expeditions that had visited Polynesia, together with my own researches and those of numerous other collectors, to make out a list of the genera and species of Polynesian mollusca and their distribution, in a few years.

From the numerous errors discovered, especially as to localities, I was forced, however, to re-commence the work from the foundation, and it is not yet complete, for I am working single-handed and without assistance.

As to species not being figured, I have given notice frequently, and editors for me, both in Europe and the United States, that the figures of Hawaiian species were reserved for a work in preparation, on the "Mollusca of the Hawaiian Islands."

NOTICES AND REVIEWS
OF
NEW CONCHOLOGICAL WORKS.

BY GEO. W. TRYON, JR.

I.—AMERICAN.

Report on the Brachiopoda obtained by the United States Coast Survey Expedition, with a Revision of the Craniidæ and Discinidæ. By W. H. DALL. (Bulletin of the Museum of Comparative Zoology, Cambridge, Mass., Vol. III, No. 1, 1871,) pp 45 and 2 plates.

The classification of the Terebratulidæ adopted in this paper corresponds with that of the author's recent article on this family contributed to *this Journal*. To this is now added studies of the Craniidæ and Discinidæ, and the descriptions and distinctive characters of all the species collected by the survey, together with very complete synonymical tables.

Craniopsis, Dall, s. g. nov.
of *Crania*.

Discinisca, Dall, s. g. nov.
of *Discina*.

Craniscus, Dall, nov. gen,

Memoirs of the Boston Society of Natural History. Vol. II, Part 1.
No. II.

On the early stages of Terebratulina septentrionalis. By
EDW. S. MORSE. 4to, 12 pp., with 2 steel plates. Boston, 1871.

The author remarks that while the anatomy and histology of the adult Brachiopods have been carefully studied, comparatively little is known concerning the early stages of the class. His memoir is therefore a contribution to conchological science of

much interest. The resemblance of the young *Terebratulina* (at the stage represented by fig. 3, Pl. 1) to *Lingula*, is remarkable. The subject appears to have been well studied.

Monograph of the Fresh-water Univalve Mollusca of the United States. By S. S. HALDEMAN. No. 9. With a colored plate of *Paludina magnifica* and portrait of the author. Phila. Conch. Section of Academy of Nat. Sciences, 1871.

This important work of Prof. Haldeman, which was discontinued twenty-five years ago, is now completed in accordance with the author's original plan. The No. embraces title page and preface to the entire work, index and contents; and the completion of the text, including the description and figure of *Paludina magnifica*.

P. bimonilifera, Lea, is made a synonym, its date of publication being assumed to be Sept., 1834, because Mr. Conrad has given that date to species of Unionidæ, published by Mr. Lea in the same paper that contains the description of his *Paludina*. In my "Continuation," noticed below, I have given priority to Dr. Lea's name, (in accordance with the report of a committee appointed to investigate the subject, printed in this Journal, Vol. V, p. 3, 1869.)

Monograph of the Fresh-water Univalve Mollusca of the United States. (In continuation of Prof. Haldeman's work.) By GEO. W. TRYON, JR. Parts 1, 2, 3. Philada. Conchological Section Acad. Nat. Sciences, 1871.

The above work, issued simultaneously with a republication, in Numbers, of Prof. Haldeman's book, contains all the species described during the period of 25 years intervening between the close of the latter and the present time, together with remarks on the older species and a full synonymy.

The parts enumerated above include the Turbidæ, *Physa* and *Limnea*, and are illustrated by 13 colored plates.

Preliminary Report of the United States Geological Survey of Wyoming, etc. By F. V. HAYDEN, U. S. Geologist. 8vo. Washington, 1871.

This valuable work contains two papers of interest to conchologists and paleontologists, namely:

"*Preliminary Paleontological Report, consisting of lists of Fossils, with descriptions of some new types.*" By F. B. MEEK.

"*Report on Mollusca.*" By S. R. ROBERTS.

Conchological Memoranda No. VI. May 18, 1871. Preliminary
Descriptions of New Species from the West Coast of America.
By R. E. C. STEARNS.

Monoceros paucilirata, *Ocenebra circumtexta*,
Ocenebra gracillima.

II.—FOREIGN.

Proceedings of the Zoological Society of London. 1870. Part I.
January—March.

*Descriptions of a New Genus, and of eighteen New Species
of Mollusks.* By HENRY ADAMS.

<i>Nesta</i> , n. g. allied to	<i>Perna fulgida</i> ,
<i>Emarginula</i> .	<i>Limopsis concinna</i> ,
<i>N. candida</i> ,	<i>Limcea pectinata</i> ,
<i>Corbula sulculosa</i> ,	<i>Melanoides Swinhœi</i> ,
<i>Tellina virgulata</i> ,	<i>Bythinia robusta</i> ,
<i>Tellidora pusilla</i> ,	<i>Rumina (Subulina) teres</i> ,
<i>Lucinopsis elegans</i> ,	<i>Helix (Camaena) Hainanensis</i> ,
<i>Semele Macandréæ</i> ,	<i>Pterocyclos Hainanensis</i> ,
<i>Chione pulchella</i> ,	<i>Bulimulus Damarensis</i> ,
<i>Loripes decussata</i> ,	<i>Bulimulus pygmæus</i> .

The marine species are from the Red Sea, the *Helix* and *Pterocyclos* from Hainan, and the two *Bulimi* from Damara Land.

*Description of a New Genus and Species of Shells from
Whydah, on the West Coast of Africa, with some remarks
on the Genus Proto of DeFrance.* By W. BAIRD.

Protoma, n. g., *P. Knockeri*.

*Descriptions of seventeen New Species of Land Shells from
the South Sea Islands, in the Cabinet of Mr. John
Brazier of Sydney.* By Dr. JAMES C. COX.

<i>Helix allecta</i> , Upolu.	<i>Helix tutuillæ</i> , Navigators I.
" <i>Wanganensis</i> , Solomon Is.	" <i>antelata</i> , N. Hebrides.
" <i>Quintalæ</i> , Norfolk I.	" <i>palescens</i> , Norfolk I.
" <i>helva</i> , N. Hebrides.	" <i>depsta</i> "
" <i>ardua</i> "	" <i>retardata</i> , N. Hebrides.
" <i>vannæ-lavæ</i> "	<i>Diplommatina Wisemani</i> , Solo-
" <i>sororia</i> , Ovalau.	mon Is.
" <i>sansitus</i> , Banks' Group.	" <i>Brazieri</i> , Solo-
" <i>exagitans</i> , Norfolk I.	mon Is.

Cyclostoma Brazieri, Upolu.

Descriptions of three New Species of Marine Shells from the Australian Coast. By JOHN BRAZIER.

Voluta Wisemani, *Conus Cooki,*
Conus Rossiteri.

Description of a New Species of Fusus. By HENRY ADAMS.
Fusus ventricosus. Cape of Good Hope.

Descriptions of eight New Species of Shells from Australia and the Solomon Islands. By JAMES C. COX, M. D.

<i>Helix Rainbirdi.</i>	<i>Helix Chancei.</i>
" <i>Thatcheri.</i>	" <i>convicta.</i>
" <i>Novæ-Georgiensis.</i>	<i>Bulimus San Christovalensis.</i>
" <i>Macgregori.</i>	<i>Recluzia Hargravesi.</i>

Part II. March—June.

Description of a new British Mollusk. By JONATHAN COUCH.
Aplysia melanopus.

Descriptions of Forty-eight New Species. By G. B. SOWERBY.

Crassatella subquadrata, South Africa.

" *foveolata*, China Seas.

" *crebrilirata*, South Africa.

Solenella subaequalis, Rio Janeiro.

Leda irradiata, China Seas.

Dolabrifera Brazieri, Botany Bay.

Helicina Mangoensis, Fiji Is.

Amathina trigona, Friendly Is.

Elenchus dilatatus, New Zealand.

Solariella undata, South Africa.

Cyllene rubro-lineata, Hab.—?.

Typhis duplicatus, China Seas.

Rapa bulbiformis, Friendly Is.

Fusus rubro-lineatus, South Africa.

Terebra tenuisculpta, China Seas.

Eburna perforata, Hab.—?.

Turritella excavata, South Africa.

" *puncticulata*, South Africa.

Pleurotoma latifasciata, Hong Kong.

" *laterculata*, China Seas.

" *albicarinata*, Manzanilla.

Clavatula tumida, South Africa.

" *gracilior*, Hab.—?.

Defrancia secta, China.

Mangelia clavata, China.

Metula trifasciata, Bay of Bengal.

Marginella obtusa, Hab.—?

Mitra mediomaculata, Mauritius.

“ *intersculpta*, Mauritius.

“ *prætexta*, Hab.—?

“ *corbicula*, Mauritius.

“ *interstriata*, China Seas.

“ *dimidiata*, Hab.—?

“ *umbonata*, Hab.—?

Conus laterculatus, Hab.—?

“ *submarginatus*, Hab.—?

“ *planiliratus*, Hab.—?

“ *suffusus*, N. Caledonia.

“ *mitræformis* var. *pupæformis*, Mauritius.

“ *turritus*, South Africa.

“ *Floridensis*, Florida.

“ *tegulatus*, China Seas.

“ *tenuisulcatus*, Hab.—?

“ *corrugatus*, Hab.—?

“ *Sowerbyi* var. *subæqualis*, China Seas.

“ *semisulcatus*, Hab.—?

“ *gemmulatus*, China Seas.

“ *rarinaculatus*, China Seas.

Strombus mirabilis, Ceylon.

List of Additional Species of Land and Fresh-water Shells collected by Mr. E. Bartlett in Eastern Peru, with descriptions of New Species. By HENRY ADAMS.

Aperostoma Bartletti,

Cyane, nov. gen. of *Proserpinidæ*,

Cyane Blandiana,

Monocondylæa semisulcata.

Descriptions of Ten New Species of Land and Fresh-water Shells collected by Robert Swinhoe in China and Formosa.

By HENRY ADAMS.

Helix Christineæ,

Helix albida,

“ *Mariella*,

Clausilia Bensoni,

“ *brevispira*,

Cyclotus Taivanus,

“ *nora*,

Melaniella brevicula,

“ *Constantiæ*,

Dreissena Swinhoei.

Descriptions of Two New Species of African Land Shells.

By HENRY ADAMS.

Helix Damarensis. Ennea ringens.

Part III. June—December.

Descriptions of Ten New Species of Land Shells, collected by Mr. W. F. Petterd, of Hobart Town, Tasmania. By JOHN BRAZIER.

<i>Helix Curacœ,</i>	<i>H. ammonitoides,</i>
" <i>Ricei,</i>	" <i>dispar,</i>
" <i>rotella,</i>	" <i>Nelsoniensis,</i>
" <i>Onslowi,</i>	" <i>Kingi,</i>
" <i>neglecta,</i>	" <i>Fordei.</i>

Notes on Two Australian Land Shells. By JOHN BRAZIER.

Helix Meadei, proposed instead of *H. Edwardsi*, Cox; the latter name being preoccupied by Mr. Bland for an American species.

H. stellata, instead of *H. similis*, Cox; the latter preoccupied by Prof. C. B. Adams for a Jamaica species.

Remarks on the Genus Triphorus (Desh.) with Descriptions of New Species. W. HARPER PEASE.

<i>T. similis</i> , Ins. Kauai,	<i>T. costatus</i> , Ins. Annaa,
" <i>minimus</i> , " et How-	" <i>robustus</i> , Makaimo,
land,	" <i>cylindricus</i> , Ins. Apaiang,
" <i>pallidus</i> , "	" <i>granosus</i> , " Tahiti,
" <i>sulcosus</i> , "	" <i>tuberculatus</i> , " Kauai,
" <i>gracilis</i> , "	" <i>oryza</i> , " "
" <i>perfectus</i> , "	" <i>pustulosus</i> , " "
" <i>punctatus</i> , Ins. Annaa.	" <i>maculatus</i> , " "
" <i>gracilis</i> , Ins. Kauai.	" <i>brunneus</i> , " Apaiang,

The latter specific name being previously occupied by Mr. Pease for another species published in the same paper, I propose for it the name *Triphorus Peasei*.

Descriptions of Twenty-six New Species of Shells collected by Robert M'Andrew in the Red Sea. BY HENRY ADAMS.

<i>Mitra Antonie,</i>	<i>Lucina Fieldingi,</i>
<i>Corbula Erythræensis,</i>	" <i>concinna,</i>
<i>Eucharis angulata,</i>	" <i>elegans,</i>
<i>Næera pulchella,</i>	" <i>Macandrea,</i>
<i>Tellina simplex,</i>	<i>Mysia tumida,</i>
" <i>pura,</i>	<i>Loripes picta,</i>
" <i>scitula,</i>	<i>Crenella viridula,</i>
" <i>Erythræensis,</i>	" <i>compta,</i>
" <i>triradiata,</i>	" <i>gibba,</i>
" <i>lactea,</i>	<i>Axincea Arabica,</i>
" <i>Isseli,</i>	<i>Nucula inconspicua,</i>
" <i>Savignyi,</i>	<i>Radula tenuis,</i>
<i>Coralliophaga striolata,</i>	" <i>pusilla.</i>

Turbonilla speciosa (P. Z. S., 1869), being preoccupied, the

name is changed to *T. Macandreae*. Also *T. virgulata* (P. Z. S., 1870), being preoccupied, the name is changed to *T. Erythræensis*.

Helix maacki, Gertsf., nov. var. *unizonalis*, China.

Descriptions of two New Genera and five New Species of Shells. By HENRY ADAMS.

Phaneta, nov. gen., *Valvatidae*, *Hargravesia*, nov. gen. allied to *P. Everetti*, Borneo, *Pupina*,
Macrochlamys Cutteri, Borneo, *H. polita*, Solomon Is.
Alycæus globosus, Borneo, *Pachycheilus Jansoni*, Nicaragua.

Conchologia Iconica. Parts 286, 287. London, 1871.

OSTREA. *Plates 6—16. January and February, 1871.*

Sp. 9, *O. rostrata*, Chemnitz. Under this name are ranged our two common species of Oyster, *O. virginiana*, Gmel, and *O. borealis*, Lam., although they are very distinct forms.

Sp. 18, *O. permollis*, Sowb., n. sp. Hab.—?

Sp. 19, *O. ochracea*, Sowb., n. sp. Mazatlan.

Sp. 27, *O. Angasi*, Sowb., n. sp. Port Jackson.

Sp. 28, *O. solida*, Sowb., n. sp. Bay of Panama.

Sp. 30, *O. radix*, Sowb., n. sp. Hab.—?

Sp. 33, *O. Chilensis*, Sowb., n. sp. Ins. Chiloe.

Sp. 35, *O. Mexicana*, Sowb., n. sp. Tehuantepec, Mexico.

YOLDIA. 2 plates. Feb., 1871.

Y. obtusa, n. sp. Hab.—?

LEDA. 2 plates. Feb., 1871.

L. dissimilis, Sowb., n. sp. Hab.—?

NUCULA. Pl. 5 (completing the monograph). Feb., 1871.

Record of Zoological Literature. Vol. VI. 1869. 8vo. London, 1870.

The usual review of conchological publications by Dr. E. von Martens occupies 89 pp. of this very useful work.

Thesaurus Conchyliorum. By G. B. Sowerby. Parts XXIX and XXX. Completing the Monograph of Oliva, by F. P. Marrat. 8vo, 24 colored plates. London, 1871.

This monograph, which is very carefully worked up by the principal authority on the subject, contains descriptions of two hundred and twenty-three species, of which a large number are herein first described by Mr. Marrat.

Perhaps some of these new species will not stand, as the characters are very confused and evanescent in this genus, requiring many specimens to ascertain the variations in some of the species.

Conchologia Indica; being illustrations of the Land and Fresh-water Shells of British India. Edited by Sylvanus Hanley and Wm. Theobald. 4to. Part 2. With 20 colored plates. London, 1870.

The present issue of this very useful work figures *Bulimus* 3 plates, *Clausilia* 1 plate, *Helix* 8 plates, *Cyclophorus* 2 plates, *Achatina* 2 plates, *Stenothyra* and *Bythinia* 2 plates, *Planorbis* 2 plates.

Proceedings of the Asiatic Society of Bengal. No. 11. Dec., 1870.

Note on Onchidium verruculatum, Cuv. By H. NEVILL.

Notes on Terrestrial Mollusca from the neighborhood of Moulmein (Tenasserim Provinces), with descriptions of new species. By Dr. F. Stoliczka. (Jour. Asiatic Soc. Bengal, xl, 143, 1871. 34 pp., 8vo, with lithographic plates.

<i>Cyclophorus Inglisianus</i> ,	<i>Pterocyclos ater</i> ,
<i>Diplommatina carneola</i> ,	<i>Georissa liratula</i> ,
“ (Palaina) <i>crispata</i> ,	“ <i>Blanfordiana</i> ,
<i>Streptaxis obtusus</i> ,	<i>Ennea cylindrilloidea</i> ,
“ <i>Hanleyanus</i> ,	<i>Pupa lignicola</i> ,
<i>Hypselostoma Dayanum</i> .	

GERMAN.

Malakozoologische Blätter. Conducted by Dr. Louis Pfeiffer, XVI. 8vo, 256 pp. and 2 plates. Cassel, 1869.

Die Binnenconchylien der Capverdischen Inseln. By Dr. H. DOHRN.

<i>Helix hypocrita</i> ,	<i>Helix Gorgonarum</i> ,
“ <i>leptostyla</i> ,	“ <i>Visgeriana</i> ,
“ <i>Fogoensis</i> ,	<i>Cæcilianella amænitatum</i> .
<i>Pupa Milleri</i> ,	<i>Pupa Gorgonica</i> ,
“ <i>molecula</i> ,	<i>Succinea Loweii</i> ,
<i>Succinea Wollastoni</i> ,	<i>Ancylus Milleri</i> .

Zur Kunde der Weichthiere Schleswig-Holsteins. By ERNST FRIEDEL.

Diagnoses molluscorum terrestrium et fluviatilium Peruano- rum. By DR. R. A. PHILIPPI.

<i>Bulimus lentiginosus,</i>	<i>Bulimus heterogyrus.</i>
“ <i>monticola,</i>	“ <i>elatus,</i>
“ <i>spretus,</i>	“ <i>Ulloæ,</i>
“ <i>subeffusus,</i>	“ <i>tæniatus,</i>
<i>Helix Incarum,</i>	“ <i>bifasciatus</i> var. <i>unicolor.</i>
“ <i>decaqyra,</i>	<i>Helix Cuzcana,</i>
<i>Planorbis Kaimondi,</i>	<i>Planorbis Lauricochæ,</i>
<i>Anodonta subrostrata,</i>	“ <i>trigyrus,</i>
“ <i>Incarum,</i>	“ <i>Ucayalensis,</i>
<i>Cyclas Lauricochæ,</i>	“ <i>subsinnuata,</i>
	<i>Cyclas Forbesii,</i>

Bemerkungen über die Chilenischen Unionen. By DR. R. A. PHILIPPI.

<i>Unio Jacobæus,</i>	<i>Unio longus,</i>
“ <i>Landbecki,</i>	“ <i>solidulus,</i>
“ <i>diplodon,</i>	“ <i>ianthinus,</i>
“ <i>Colchaguensis,</i>	“ <i>Valdivianus,</i>
“ <i>montanus,</i>	“ <i>Fonckii.</i>

Limacus Breckworthianus, Lehm; *L. bicolor,* Selenka; *L. variegatus,* Drp.; und *L. marginatus,* Drp. By DR. LEHMANN.

Conchologische Notizen. By DR. EDW. VON MARTENS.

1. G. Rohlf's West African Collections.
2. *Nanina Jacquemontii*, a New Himalaya Snail.
3. The Australian Group of *Helix pomum*.
4. The *Unios* of Mark, 1767.
5. Appendix to the Nile Mollusca. (Mal. Blatt. 1865—1866.)
6. On *Helix marginata*, Müll.

Bemerkungen zu R. A. Philippi's Aufsatz., "Diagnoses," etc. (Mal. Blat. xvi.); By DR. L. PFEIFFER.

Bulimus bisculptus, Pfr. *Bulimus subroseus,* Phil.

Bul. heterogyrus, Phil., is identical with *B. Alto-Peruvianus,* Rve.

Bemerkung über Cyliindrella Petiveriana, Fer.; By DR. L. PFEIFFER.

Bemerkungen über einige Arten des Geschlechts Cypræa. By A. SPORLEDER.

Diagnosen neuer Meeres-Konchylien von Japan. By DR. C. E. LISCHKE.

<i>Drillia Japonica,</i>	<i>Lampania multiformis,</i>
<i>Vermetus nodoso-rugosus,</i>	<i>Macha divaricata,</i>
<i>Ostrea denselamellosa,</i>	<i>Arca subcrenata.</i>

Nassa balteata is substituted for *N. Japonica*, Lke., Mal. Blatt. xv, the latter name being pre-occupied by A. Adams.

Arca decurvata, for *Arca obliquata* (not of Gray) Reeve, Conch. Icon.

Literatur.

Noch ein Wort über Limacus und Amalia. By D. F. HEYNEMANN.

Limax variegatus, Drap. = *L. bicolor*, Selenka. By DR. LEHMANN.

Die Gattung Iphigenia Schumacher. By DR. EDW. RÖMER.

I. rostrata, Römer. Upper Guinea.

Notiz über einige von Herrn Gustav Wallis aus dem nördlichen Südamerika zurückgebrachte Mollusken. By ALBERT MOUSSON.

<i>Helix subelliptica,</i>	<i>Helix Wallisiana,</i>
<i>Bulimus vaporeus,</i>	<i>Bulimus semifasciatus,</i>
<i>Stenogyra Wallisi,</i>	<i>Cyclophorus delphinulus,</i>
<i>Ampullaria rotula,</i>	<i>Castalia ecarinata,</i>
<i>Plagiodon rotundatus,</i>	<i>Anodonta Wallisi.</i>

Ueber die Gattung Clementia, Gray. By DR. L. PFEIFFER.

Helix rufescens, Penn., Stuttgart. By DR. LEHMAN.

Ueber einige Abyssinische Schnecken. By E. VON MARTENS.

<i>Vitrina mamillata,</i>	<i>Helix pilifera.</i>
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Ueber einige Conchylien aus Chile. By E. VON MARTENS.

Malakologische Mittheilungen. By E. VON MARTENS.

1. *Hydrocena* = *Georissa*.
2. *Philippinische Landschnecken* von Cuming.
3. *Böhmen's Mollusken*.
4. *Helbling's Namen*.
5. *Die Namen von Dacosta*.

Ueber Achatina tinctoria, Reeve. By DR. L. PFEIFFER.

Malakozologische Blätter. XVII. 8vo, 166 pages, 4 plates. Cassel, 1870.

Beschreibung neuer Arten von Dosinia und Tapes. By DR. EDW. RÖMER.

<i>Dosinia corculum.</i>	China.	<i>Tapes ducalis.</i>	China.
" <i>nuculoides.</i>	Indian O.	<i>Hemitapes Dohrni.</i>	Philippines.
" <i>cæscia.</i>	Hab.	<i>Dosinia physema.</i>	Japan.
" <i>cyclas.</i>	Brazil.	" <i>areolata.</i>	Australia.

Einige Fragen zur geneigten Prüfung. By DR. EDW. RÖMER.

This paper is an attempt to recognize some of the obscure species figured and described in Chemnitz's Conchylien Cabinet.

Literatur.

Diagnosen neuer Meeres-Conchylien von Japan. By DR. C. E. LISCHKE.

<i>Triton Loebbeckei,</i>	<i>Halotis supertexta,</i>
<i>Acmæa concinna,</i>	<i>Acmæa Schrenckii,</i>
<i>Soletellina Boeddinghanei,</i>	<i>Chama ambigua,</i>
<i>Chama Dunkeri,</i>	<i>Chama semipurpurata,</i>
<i>Chama retroversa,</i>	<i>Pecten quadrilibratus.</i>

Zwei neue Achatinen. By DR. L. PFEIFFER.

A. Dohrniana, Angola. *A. Dammarensis,* Dammara.

Conchylien aus dem obern Nilgebiet. By E VON MARTENS.

Planorbis Sudanicus.

Zur Kunde der Weichthiere Schleswig-Holsteins. By ERNST FRIEDEL. (Continued from Vol. XVI.)

Ueber Nassa reticulata, L. By E. VON MARTENS.

Zur Molluskenfauna von Cuba. By DR. L. PFEIFFER.

Chondropoma lætum, Gutierrez. *Helix Hillei,* Gundlach.

Pupa tenuilabris, Gundlach. *Cylindrella Clerchi,* Arango.
Cylindrella geminata, Pfr.

Diagnosen neuer Landschnecken. By DR. L. PFEIFFER.

Helix leucophthalma, Celebes? *Bulimus Dammarensis,* Dammara.

Die Mollusken Pommers. By DR. LEHMANN.

Uebersicht der von Lorentz Spengler beschriebenen Conchylien. By DR. O. A. L. MÖRCH.

Diagnosen neuer Landschnecken. By DR. L. PFEIFFER.

<i>Helix Kleciachi</i> ,	Parreyss.	Narenta.
“ <i>prætexta</i> ,	“	Dalmatia.
“ <i>verticillata</i> ,	“	Isl. Rhodes.
“ <i>turritella</i> ,	“	Dalmatia.
“ <i>gyroides</i> ,	“	Croatia.
“ <i>aranea</i> ,	“	Sicily.

Zur Kenntniss unserer Limnæen aus der Gruppe Gulnaria,
Leach (*Radix Montf.*); By W. KOBELT.

Martini und Chemnitz's Systematisches Conchylien-Cabinet. Continued by Dr. H. C. Küster. Parts 201—204, 1872.

These four parts contain the text and plates of a commencement of the monographs of *Tellina* and *Triton*, continuation of *Ranella*, and illustrate *Murex* (without text.)

Molluscorum Systema et Catalogus. System und Aufzählung Sammtlicher Conchylien der Sammlung von Fr. Paetet. Published by Dr. L. W. Schaufuss, Dresden, 1869.

This valuable little work contains

1. A catalogue, alphabetically arranged, of genera and synonyms.
2. A systematic catalogue of orders, families and genera.
3. A catalogue of the very large collection of shells belonging to the author.

Novitates Conchologicæ. Land Conchylien. By Dr. Louis Pfeiffer. Part 38, with three colored plates, 1871.

Novitates Conchologicæ. Supplement. Monographie der Molluskengattung *Venus*, Linne. By Dr. Edward Römer. Parts 30, 31. 6 colored plates. Cassel, 1871.

Continues the monograph of *Tapes*.

Zwanzigster Jahresbericht der Naturhistorischen Gesellschaft zu Hannover. 4to, 1871.

Die Wirbellosen Meeresthiere der Ostfriesischen Küste; ein beitrug zur fauna der deutschen Nordsee. By DR. A. METZGER.

Contains a list of Marine Mollusca.

Archiv des Vereins der Freunde der Naturgeschichte in Mecklenburg. 24th year, 8vo. Neubrandenburg, 1871.

The Astartes of the East Sea. By E. VON MARTENS.

Einige Bemerkungen über die Veränderlichkeit der Molluskenschalen und Verwandtes. By D. F. Heynemann. 8vo, 44 pp. Frankfurt a. M., 1870.

Auszug aus meinem Tagebuche. Bericht über das Auffinden der lebenden *Xylophaga dorsalis* Turton. By T. A. Verkrüzen. Pamphlet, 4 pp. Frankfurt a. M., 1871.

Notizen über Austern Cultur. Von Richard Ritter von Erco. 8vo., 57 pp. Plans and Plates, Trieste, 1869.

Contains an account of the methods of oyster culture pursued in the principal centres of this industry in the various European waters. The illustrations comprise principally the ground plans of the parks, etc.

Verhandlungen der K. K. Zoologisch-botanischen Gesellschaft in Wien. Vol. XX, 1870.

Die Fluss und Land-Conchylien Galiziens. By DR. J. JACHNO.

One hundred and thirty-nine species are enumerated.

Ueber Dreissenomya. By THEODOR FUCHS.

This paper describes a new fossil genus of *Mytilacea*.

Donum Bismarckianum. Eine sammlung von Sudsee-Conchylien, bearbeitet von Edward von Martels und Bernhard Langkavel. 4to. 74 pp. and 4 colored plates. Berlin, 1871.

This handsome work contains a list of a valuable collection of shells made by the Consul of the North German Confederation at Honolulu.

There are no new species described, but copious remarks on synonymy and an appendix on geographical distribution. The species were principally determined by W. H. Pease, and many of them were first described and figured in this Journal.

FRENCH.

Annales des Sciences Naturelles Zoologie. 5th Series, Vol. XIV. Paris, 1870.

Recherches anatomiques sur l'Ombrelle de la Méditerranée.
By M. G. MOQUIN-TANDON. (Illustrated by eight plates.)

Journal de Conchyliologie. 3d. Series, Vol. X, No. 4, 8vo. 96 pp. and 3 plates. Paris. October, 1870.

Brachiopodes des côtes océaniques de France. By P. FISCHER.

Note sur le Delphinula Arion, Meuschen. By H. C. ROETERS VAN LENNEP.

Note sur les Bulimes auriculiformes de la Nouvelle-Calédonie et dépendances. By E. MARIE.

This paper discusses the general characters, habitat, polymorphism, habits and utility of the Bulimi, besides a general description of the animals of the group. These mollusks constitute a considerable portion of the food of the native tribes, and are not unfrequently eaten with relish by the French colonists.

Diagnoses Molluscorum novorum. By A. D. BROWN.

Helix eustrophes. Ins. Salomon.

Helix ptychophora. "Bitter Root Mountains" and Nebraska, U. S. This is the "*H. Townsendiana*, Lea," var. "*Minor*" of my Monog. Terr. Moll., U. S. I believe it to be a distinct species.

Helix rhynchæna. Jamaica.

Pupa Moreleti. Ins. Labuan.

Remarques sur certaines espèces de Coquilles terrestres habitant la Polynésie, et description d'espèces nouvelles. By W. HARPER PEASE.

<i>Pittys rotellina</i> , Ins. Aitutake,	<i>Helicina Brazieri</i> , Ins. Niue,
" <i>imperforata</i> "	<i>Trochomorpha trochiformis</i> , var.
" <i>Atiensis</i> , Ins. Atiu,	<i>pallens</i> ,
" <i>paucicostata</i> , Ins. Kauai,	<i>T. nigrîtella</i> , var. <i>oppressa</i> , Pse.,
" <i>Roratongensis</i> , Rora-	<i>Partula faba</i> , Martyn, var. <i>sub-</i>
tonga,	<i>angulata</i> , Pse.,
" ? <i>celsa</i> , Raiatea,	<i>P. assimilis</i> , var. <i>virgulata</i> , Pse.,
" <i>analogica</i> , Marquisas,	<i>Carelia variabilis</i> , Ins. Kauai,
" <i>verecunda</i> , "	" <i>adusta</i> , Gould, var. <i>an-</i>
	<i>gulata</i> , Pse.

Description d'espèces inédites provenant de la Nouvelle-Calédonie. By H. CROSSE.

Contains more detailed descriptions and observations on species, the diagnoses of which appeared in previous numbers of the Journal.

Description d'un Helix de la Nouvelle Calédonie. By E. MARIE.

Helix abax, Marie.

Descriptions d'espèces nouvelles de l'Archipel Calédonien. By M. SOUVERBIE and R. P. MONTROUZIER.

Xenophora Australis.
Rissoina Lamberti,

Cancellaria Rougeyroni,
" *Lamberti*.

Variétés, L'inventeur de l'aquarium. By P. FISCHER.

Bibliographie. Nouvelles.

Journal de Conchyliologie. XIX, No. 1; 88 pp., 8vo. 2 colored plates.
Paris, January, 1871.

Faune malacologique terrestre et fluviatile des îles Tonga, d'après les envois de M. le docteur Ed. Graeffe. By ALBERT MOUSSON. (5th article.)

Nanina Futuncensis,

Tornatellina bacillaris,

Patula vicaria,

Pythia tortuosa,

" *radicalis*,

Melampus ornatus,

Partula subgonochila,

" *Tongaensis*,

Helicina culminans,

Helicina Uveana,

Truncatella Futunaensis,

Melania pluvialis.

Catalogue des Mollusques terrestres et fluviatiles de environs de Neuf-Brisach, Colmar et Belfort. By L. MORELET.

Descriptions d'espèces nouvelles. By H. CROSSE.

Helix nimbosa, *H. Eoa*, *H. votiva*, *Bul. Pluto*, *B. Prometheus*, *B. Kuhnoltzianus*, *Helicina miltochila*, *Truncatella cristata*, *Pterocyclos Eudædaleus*, *Murex Hidalgoi*, *Nassa Tryoni*, all previously described in the Journal, are here figured and described more fully.

Description d'espèces nouvelles provenant de l'île Maurice. By E. LIENARD.

Conus Julii. *Leptoconchus Robillardii*.

Description de deux espèces nouvelles de Voluta et observations sur le V. punctata, Swainson. By J. COX.

V. coniformis.

V. Kingi.

Description d'une espèce nouvelle de Voluta. By J. BRAZIER.
Voluta Wisemani.

Bibliographie :

Necrologie. Contains a notice of M. Petit de la Saussaye, the venerable founder of the Journal de Conchyliologie and excellent Conchologist, who died at Bordeaux, Dec. 7th, 1870, aged 78 years.

A M E R I C A N JOURNAL OF CONCHOLOGY.

NEW SERIES.

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CONCHOLOGICAL SECTION of the Academy of Natural Sciences of Philadelphia

VOL. VII.

1871-72.

PART 4.

Meeting December 7th, 1871.

DR. RUSCHENBERGER, Director, in the chair.

Eight members present.

Several donations to the Museum and Library were announced.

The following papers were offered for publication in the Journal and referred to committees:

"Catalogue of the Family Cyrenellidæ." By Temple Prime.

"Catalogue of the Family Cyprinidæ." By Geo. W. Tryon, Jr.

"Catalogue of the Family Glauconomyidæ." By Geo. W. Tryon, Jr.

"Catalogue of the Recent Species of the Family Petricolidæ." By Geo. W. Tryon, Jr.

"Catalogue of the Recent Species of the Family Cardiidæ." By Geo. W. Tryon, Jr.

"Notices and Reviews of New Conchological Works." By Geo. W. Tryon, Jr.

"Descriptions of New Species of Land and Fresh-water Shells." By Andrew J. Garrett, of Tahiti.

"List of Species of *Bulimus* Inhabiting the Viti Islands, with Notes on their Geographical Range, and Descriptions of New Species." By A. J. Garrett.

Dr. F. A. Hassler stated that the specimens of *Littorina muricata* collected by Mr. W. M. Gabb at San Domingo during the month of September, 1870, were still living, and one of them had enlarged its shell recently. A specimen of *L. irrorata*, Say, taken a month since, and one of *L. rudis*, Mont., collected a week ago by Dr. Hassler, were still living.

The annual reports of the Recorder, Secretary, Conservator, Treasurer, Librarian, and Publication Committee were read and referred.

The following Officers were elected for the year 1872:

DIRECTOR,	W. S. W. RUSCHENBERGER.
VICE-DIRECTOR,	GEO. W. TRYON, JR.
RECORDER,	S. R. ROBERTS.
SECRETARY,	E. R. BEADLE.
TREASURER,	WM. L. MACTIER.
LIBRARIAN AND CONSERVATOR,	EDW. J. NOLAN.

DESCRIPTIONS OF NEW SPECIES OF LAND AND FRESH-WATER SHELLS.

BY ANDREW J. GARRETT,

Of Tahiti, South Seas.

NERITINA HOLOSERICEA, Garrett. Plate 19, fig. 1.

Shell subglobose, transverse, rather thin, olive-gray under a brownish velvety epidermis; spire small, obtuse; whorls three, strongly convex, the last one large, subglobose, transverse, radiately plicate above, spirally lineated with fine elevated, closely-set, scabrous striæ, which are about the same width as their interspaces; aperture semi-circular, diagonal, bluish within, and the lips honey-yellow; peristome rounded, rather sharp, slightly labiate within; columella flattened, minutely granulated, the margin slightly oblique, sinuous, with 10—12 teeth: operculum pale corneous, stained with blue-black.

Length, 10 mill.; greatest diam., 12 mill.

Habitat, Vanna Lavu, Viti Isles.

Coll. Garrett and Philad. Academy.

Nearly 100 examples of this species were found on a half-decayed log on a mud flat on the north coast of Natawa Bay. Not a single specimen was found in any other part of the group. The spiral lines and velvety epidermis are its most obvious characters.

PLECOTREMA HIRSUTA, Grt. Plate 19, fig. 2.

Shell imperforate, solid, corneous; spire acute, convexly-conical, nearly half the length of the shell; whorls 8—9 (two embryonal), plano-convex, the last swollen, transversely sulcate, sulci deep, nearly as wide as the intervening ridges, 16—18 on the body, garnished with short curved hairs; sutures obsoletely

impressed; aperture subvertical, narrow, contracted, five-lobed, whitish; peristome with a stout external varix, inner margin labiate, rounded beneath, sinuous above, and furnished with two stout tubercular teeth on the middle of the inner lip; columella expanded, with an oblique compressed fold; parietal region thinly callosed, with two teeth, the upper small, tubercular, directed towards the opposite upper labial tooth, the lower one compressed, bifurcate and entering the aperture.

Length, 7 mill.; diam., 4.5 mill.

Habitat, Viti Isles. (Coll. Garrett and Philad Acad.)

Not uncommon under stones near high-water mark. It is about the same size as *P. clausa*, but differs in color, size of sulcations, and character of the labial teeth.

OPHICARDELUS PALUDOSUS, Garrett. Plate 19, fig. 3.

Shell imperforate, ovate, solid, whitish or brownish horn color; spire short, convexly conical; whorls 7—8, slightly convex, the last large, convexly rounded, decussated with fine longitudinal striae and transverse impressed lines, the latter minutely punctured and garnished with short hairs; base rounded and keeled; suture margined; aperture sub-vertical, auriform, contracted, white or brownish, little more than half the length of the shell; peristome obtuse, right margin stoutly ribbed, inner edge labiate, sinuate above, rounded beneath; columella expanded, with two oblique compressed folds, the upper the larger; parietal region slightly glazed, and furnished with a small tubercular tooth.

Length, 10 mill.; diam., 6 mill.

Habitat, Viti, Wallis and Samoa Islands (Coll. Garrett and Tryon.)

An abundant species found crawling over the black mud in Mangrove Swamps.

PYTHIA LENTIGINOSA, Garrett. Plate 19, fig. 4.

Shell perforate, solid, acute-ovate, compressed, yellowish-white, profusely mottled with small irregular light brownish spots, and dashes of deeper brown on the sides; spire convexly-conical, less than half the length of the shell; whorls nine, flatly convex, last one convexly-rounded, longitudinally coarsely striated, striae most conspicuous above; base rounded; aperture narrow, subvertical, honey yellow; peristome slightly expanded and a little reflected below, simple above, the inner margin garnished with from five to six tubercular teeth, two of which are much the larger; columella ex-

panded over but not closing the umbilicus, and furnished with a large compressed, obtuse, oblique fold; parietal region thinly callosed, with two stout teeth, the lower bilobed, transversely entering the aperture; the upper tooth subtrilobate.

Length, 29 mill.; diam., 16 mill.

Habitat, Tavinni Id., Viti Isles. (Coll. Garrett and Philad Acad.)

PYTHIA PEROVATA, Garrett. Plate 19, fig. 5.

Shell slightly perforate, or imperforate, solid, ovate, compressed, corneous or light chestnut-brown, often deep brown, mottled with darker, and generally with a dark sutural band; spire short, subacute, conical, with convex outline, a little more than a third the length of the shell; whorls 8—9, flatly convex, the last large, oval, longitudinally coarsely striated, striæ most developed above; suture rudely crenulate; aperture subvertical narrow, white, yellowish-white or tawny; peristome rounded and expanded anteriorly, slightly reflected, the inner margin copiously callosed, and furnished with four teeth, rarely five, two much the larger; columella expanded, with a stout somewhat oblique fold; parietal region glazed, with two stout, fold-like teeth, the lower double, compressed, entering the aperture, the upper vertical, compressed.

Length, 24 mill.; diam., $13\frac{1}{2}$ mill.

Habitat, Viti Isles. (Coll. Garrett and Philad. Acad.)

A very abundant species inhabiting the margins of the Mangrove Swamps. It only occurred to our notice in two locations; Natawa Bay and Na Viti Levu Bay.

NANINA HOYTI, Garrett. Plate 19, fig. 6.

Shell narrowly perforate, turbinately globose, rudely striated beneath the suture, shining, subpellucid, whitish or yellowish horn color, with a brown band beneath the suture; spire obtuse, depressly conoid; whorls six, convex, the last swollen, rounded; suture with or without a deep brown line; base paler, smoother and more polished than above; aperture diagonal lunate, circular, nearly equal in length and width, white or bluish-white within; peristome thin, simple and slightly sinuous; columella sub-reflected, nearly covering the small umbilicus, and generally of a tawny flesh color.

Greatest diam., 21 mill.; length, 15 mill.

Habitat, Tavinni Id., Viti Isles. (Coll. Garrett and Tryon.)

This species occurs abundantly on the ground in damp forests, and oviposits among dead leaves and under decayed wood. Its eggs are white and globular. The animal is pale cinereous, darker above, with microscopical dots of a dingy hue along the sides of the foot. During locomotion the foot equals in length two diameters of the shell, and is narrow, somewhat compressed and pointed behind.

The shape of the shell is very much like *N. casca*, Gld., but may be readily distinguished from that species by its constant sutural band, smoother surface and more swollen body. The locations are also remote. The colors and markings are like *N. Godeffroyana*, nobis.

This species is dedicated to Mr. Theodore Hoyt, whose valuable assistance in my researches in the Viti Group I most gratefully acknowledge.

NANINA TENELLA, Garrett. Plate 19, fig. 7.

Shell globosely depressed, thin, hyaline, glossy, pellucid, lines of growth obsolete, whitish horn-color; spire widely conical, obtuse; whorls $6\frac{1}{2}$, convex, the last swollen, large, subangulated at the periphery; suture margined; aperture oblique, roundly lunate, nearly as long as broad; peristome thin, simple, slightly sinuous; columella slightly expanded over the small umbilicus.

Height, 11 mill.; diam., 17 mill.

Habitat, Kioa Isl., Viti Isles. (Coll. Garrett and Philad. Acad.)

A delicate species, not uncommon at the above locality, where they were found lurking among dead leaves and under rotten wood. A few examples were gathered on the contiguous coast of Vanna Levu. It is more depressed, thinner and paler than *N. casca*.

NANINA OTAREÆ, Garrett. Plate 19, fig. 8.

Shell perforate, turbinately globose, rather thin, subpellucid, glossy, fulvous brown; spire obtuse, depressly conoid; whorls $6\frac{1}{2}$, convex, the last one large, swollen, somewhat flattened above the periphery, obliquely coarsely striated, striæ most conspicuous next the suture, rarely with spiral impressed lines; base smoother, more glossy than above, with a large round creamy-white patch surrounding the umbilicus; aperture diagonal, nearly as long as broad, lunately rounded, bluish-white within; peristome thin, simple, slightly sinuous; columella reflected, covering half of the umbilicus.

Length, 22 mill.; diam., 29 mill.

Habitat, N. E. part of Vanna Levu, Viti Isles. (Coll. Garrett and Philad. Acad.)

We obtained many examples of this species on the north coast of Natawa Bay, but did not detect it on any other part of the island. Like the preceding species, it lives on the ground in damp forests. Though about the same size as *N. Nouletii*, yet it is easily distinguished from that species by its more reddish color and the constant white basal patch. The locations are also remote.

NANINA GODEFFROYANA; Garrett. Plate 19, fig. 9.

Shell subperforate, depressed, rarely turbinate globose, moderately thick, subpellucid, shining, yellowish or light brownish horn color; sometimes the spire, and always the upper third of the body whorl, fulvous brown; spire obtuse depressed, or depressly conoid; whorls 7, convex, last one large, tumid, slightly depressed above, obliquely coarsely striated, striae most conspicuous near the suture; base nearly smooth, paler and more glabrous than above; aperture diagonal, broader than long, oblique, luniform, bluish-white or pearly within; peristome thin, simple, slightly sinuous; columella pinky-white, reflected so as nearly to close the small umbilicus.

Diam., 38 mill.; length, 25 mill.

Habitat, Interior of the N. E. part of Vanna Levu, Viti Isles. (Coll. Garrett and Philad. Acad.)

This is the largest species yet discovered in the group. It is very abundant, living on the ground in damp forests. Three examples were found which were adorned with basal bands.

HELIX TAVINNIENSIS, Garrett. Plate 19, fig. 10.

Shell umbilicate, sublenticular, rather thin, subpellucid, slightly glossy, tawny-yellow, with a narrow chestnut-brown intramarginal band above and beneath; spire obtuse, convex; whorls 5, strongly convex, obliquely striated, last one not descending, acutely carinate, keel whitish, base convex; suture margined with whitish; umbilicus large, perspective, one-fifth the greatest diameter of the shell; aperture oblique, subrhomboid-luniform; peristome simple, thin above, slightly thickened beneath; columella white, slightly reflected.

Diam., 17 mill.; height, 7 mill.

Habitat, Tavinni Isl., Viti Isles. (Coll. Garrett and Philad. Acad.)

A common species, found on the trunks and limbs of trees in damp forests. The two brown bands are constant characters.

PERSA MELANOSTOMA, Garrett. Plate 19, fig. 11.

Shell small, imperforate, oblong-ovate, rather thick, smooth, somewhat glossy, light tawny-brown, becoming brown-black on the back of the body whorl, and generally a transverse dark band beneath the suture; spire short, abbreviately conical, convex in outline, about one-third the length of the shell, and striated with fine spiral impressed lines, which become obsolete on the body; whorls 5, convex, last one large ovate, rounded at the base; aperture subvertical, elongate-oblong, auriform, contracted above, rounded below, black within; peristome more or less thickened, sinuous above, sometimes labiate within; columella callosed, with two rather large compressed transverse folds, and two smaller ones on the parietal region.

Length, $4\frac{1}{2}$ mill.; diameter, 3 mill.

Habitat, Viti Isles. (Coll. Garrett and Philad. Acad.)

An abundant gregarious species, found under stones in the upper region of the littoral zone, near high-water mark.

PALUDINELLA VITIANA, Garrett. Plate 19, fig. 12.

Shell minute, imperforate, globosely ovate, rather solid, shining, yellowish-horn color; spire obtuse, broadly conoid, little more than half the length of the shell; whorls 5, rounded, obsoletely obliquely striated; suture deeply impressed; aperture roundly ovate, angular above; peristome simple, gradually becoming much thickened at its junction with the columella; parietal region thinly callosed.

Length, $2\frac{1}{2}$ mill.; diam., 2 mill.

Habitat, Viti Isles. (Coll. Garrett and Philad. Acad.)

This species, like the preceding, is gregarious, and is found under stones a little below high-water mark.

NAVICELLA PICTURATA, Garrett. Plate 19, fig. 13.

Shell elongate-oval, rounded above, more or less laterally compressed, thin, subpellucid, concentrically finely striated, tawny-yellow, brown or blackish-brown, adorned with crowded small subtriangular white spots and rays under a light yellowish-horn colored epidermis; apex slightly projecting beyond the base; interior bluish-white or light tawny; columella region small, flat, subtriangular, with the anterior margin strongly concave.

Length, 18 mill.; diam., 11 mill.; height, $6\frac{1}{2}$ mill.

Habitat, Viti Isles. (Coll. Garrett and Philad. Acad.)

We obtained many examples of this pretty species at the island of Vanna Levu, where they inhabit the lower parts of the streams, within reach of the tides.

TRUNCATELLA GRANUM, Garrett.

Shell imperforate, cylindrical, solid, cinereous; spire cylindrical, slightly tapering, decollated; whorls persistent $4\frac{1}{2}$, convex, flattened on the middle, longitudinally ribbed, ribs small, vertical, compressed, 20 on the body, narrower than their interstices; suture deeply impressed; base carinate, the keel curving upward along the external margin of the peristome; aperture small, about one-fifth the length of the shell, somewhat oblique, ovate; peristome rather thick, slightly expanded, rounded; columella and parietal region copiously callosed and continuous with the peristome.

Length, $4\frac{1}{2}$ mill.

Habitat, Viti Isles. (Coll. Garrett and Philad. Acad.)

This species only occurred to my notice in one locality, the N. E. end of Tavinni Id. It is abundant and was found gregarious under stones a little below high-water mark.

ASSIMINEA VITIENSIS, Garrett. Plate 19, fig. 14.

Shell small, rimate, acutely ovate, solid, smooth, shining, brownish-horn color, with or without one or two transverse paler bands on the body whorl; spire subacute, conical, outline convex; whorls 6, rounded, last one large, roundly ovate, under the lens minutely striated, base slightly fissured; suture linear, impressed; aperture subvertical, subpyriform; peristome thin, simple; columella slightly reflected; parietal region thinly callosed.

Length, $4\frac{1}{2}$ mill.

Habitat, Viti Isles. (Coll. Garrett and Philad. Acad.)

We found this species plentiful, crawling on the black mud in mangrove swamps, where they were associated with *Neritimæ* and several species of *Auriculidæ*. Nearly all the adult examples are more or less corroded.

PITYS TUMULOIDES, Garrett. Plate 19, fig. 15.

Shell umbilicate, globosely conoid, rather thick, whitish, or

yellowish horn color, tessellated above with chestnut-brown, beneath radiately striped with the same hue; spire obtuse, roundly tumulose; whorls 7, flatly convex, the last one angular, acutely carinate on the periphery, obliquely striated, striæ more distant and plicate on the three upper whorls; suture linear, marginated above with a slight carina; umbilicus large, profound, cavernous, much constricted; base flat, convex; aperture transverse, subrhomboidal, fauces with two median approximating lamella; peristome thin, slightly sinuous, continuous with the acute margin of the umbilicus; columella subvertical, thin, sinuous, with a median obtuse fold, which sometimes is obsolete; parietal region with a median lamella.

Height, $4\frac{1}{2}$ mill.; diam., 7 mill.

Habitat, Rarotonga Id., Cook's Isles. (Coll. Garrett and Phila. Acad.)

This singular dome-like species we found abundantly in but one location, high up in a mountain ravine. They live under stones and among dead wood and decayed leaves.

The animal is cinereous, with dusky neck and tentacles. The foot is small, narrow and tapering behind. The upper tentacles are very long, the lower ones very small. It possesses the singular habit of ovipositing into its cavernous umbilicus. In fact, this habit is peculiar to all the species of this type, which comprises several species, all belonging to the Cook's and Tahiti group of islands. No doubt the sporadic islands south of Tahiti will produce other species.

The young shells found in the umbilicus are white, hyaline, and shaped like a Planorbis. Even at that early age the lamella in the fauces may be distinctly traced through the translucent shell. The whorls are distinctly plicately striated.

Helix Jacquinoti, Pfr., *H. bursatella*, Gld., *H. retunsa*, Pse., *H. fratercula*, Pse., are all Marsupial Helices; the three first inhabit Tahiti, and the last the Cook's Group.

PITYS CAVERNULA, Garrett. Plate 19, fig. 16.

Shell umbilicate, subglobose conoid, rather thick, cinereous, or brownish-horn color, sometimes deep brown, generally tessellated above with the latter color, beneath obscurely rayed; spire obtuse dome-shaped, some more elevated than others; whorls 7, convex, last one acutely carinate, finely ribbed, ribs closely set, oblique, curved, interstices minutely striated; base flattened, convex, striated, but not ribbed; suture corded above with the spiral keel; umbilicus large, deep, cavernous, contracted at the margin; aperture transverse, subrhomboidal, fauces with two, rarely three,

remote lamella, and two on the parietal region; peristome thin, sharp, slightly sinuous, continuous with the acute umbilical margin; columella with a single fold, sinuous.

Diam., 6 mill.; height, 4 mill.

Habitat, Rarotonga Isl., Cook's Isles. (Coll. Garrett and Phila. Acad.)

This is also a Marsupial species, which we gathered in abundance in the mountain ravines. It is more closely allied to *H. fratercula*, Pse., than the preceding species. The latter species never occurs inland, and is more stoutly ribbed, lighter colored, the carina stouter and beautifully corded.

PITYS CANALIS, Garrett. Plate 19, fig. 17.

Shell widely umbilicate, flatly discoid, thin, subpellucid, slightly glossy, closely and very finely ribbed, ribs oblique, sinuous, light brownish horn color, with darker radiating spots; spire very flat, not rising above the penultimate whorl; suture deeply channeled; whorls 5, strongly convex, regularly increasing, last one declivous above the periphery, rounded below; umbilicus deep, perspective, freely exposing all the whorls, nearly half the diameter of the shell; aperture oblique, sinuously rounded; peristome thin, simple, slightly sinuous.

Diam., 6 mill.; height, 2 mill.

Habitat, Rarotonga Id., Cook's Isles.

A somewhat rare species, found on the ground in damp forests, and confined to a single valley. Its flat spire, deeply channeled suture, and very wide umbilicus are its most important characters.

PITYS RUDIS, Garrett. Plate 19, fig. 18.

Shell umbilicate, subdiscoid, thin, subpellucid, very finely laminately ribbed, ribs rude, sinuous, more or less irregularly disposed, or even altogether wanting, interstices under the lens very finely striated, horn color, brownish, sometimes brownish-black, with or without reddish-brown rays; three upper whorls of the spire flat; suture channeled; whorls $4\frac{1}{2}$, strongly convex, rather rapidly increasing, last one rounded below, slanting above the periphery; umbilicus deep, about one-fourth the diameter of the shell; aperture sinuously circular; peristome thin, simple

Diam., $3\frac{1}{2}$ mill.; height, 2 mill.

Habitat, Rarotonga Id., Cook's Isles. (Coll. Garrett and Phila. Acad.)

A common species of a very rude aspect, easily distinguished by its rude, irregular lamellar ribs. We found examples in several different villages; all found on the ground in damp woods.

PITYS DECORTICATA, Garrett. Plate 19, fig. 19.

Shell subdiscoid, openly umbilicate, thin, subpellucid, cinereous, under a brownish horn-colored epidermis, adults decorticated, rarely with radiating dashes of reddish brown, arcuately ribbed, ribs lamellar, regular, rather closely set, continued on the base, interstices very finely striated; spire flatly convex; suture channeled; whorls 5, convex, slowly increasing, last one convexly declivous above, rounded beneath, obsoletely angular on the periphery; umbilicus deep, exposing the whorls, about a fourth the diameter of the shell; aperture oblique, orbicular luniform; peristome thin, simple; parietal region very thinly callosed.

Diam., 4 mill.; height, 2 mill.

Habitat, Rarotonga Id., Cook's Isles. (Coll. Garrett and Phila. Acad.)

A common species found on the ground in a mountain ravine.

PITYS HARVEYENSIS, Garrett. Plat 19, fig. 20.

Shell subdiscoid, umbilicate, thin, subpellucid, greenish-ash, with reddish-brown arcuate tessellations, closely and very finely plicately striated, striæ oblique, sinuous, less developed on the base; spire flatly convex; suture channeled; whorls 5, flatly convex, slowly and regularly increasing, last one obtusely angular, slanting above, convex beneath; umbilicus moderate, deep, exhibiting the whorls, one-fourth the diameter of the shell; aperture orbicular-luniform, oblique; peristome thin, simple.

Diam., $4\frac{1}{2}$ mill.; height, 2 mill.

Habitat, Rarotonga Id., Cook's Isles. (Coll. Garrett and Phila. Acad.)

A common species found under rotten wood.

PITYS OTAREÆ, Garrett. Plate 19, fig. 21.

Shell umbilicate, subdiscoid, thin, subpellucid, dark brown, plicately striated, striæ closely set, sinuous, oblique, finer and more crowded beneath; spire flatly convex, suture channeled; whorls 5, convex, regularly and moderately increasing, last one rounded; umbilicus large, perspective, rather freely showing the whorls, one-third the diameter of the shell; aperture oblique, roundly lunate; peristome thin, simple; columella thin, slightly expanded above.

Diam., 4 mill. ; height, 2 mill.

Habitat, Rarotonga Id., Cook's Isles. (Coll. Garrett and Phila. Acad.)

This species is confined to a single valley, where I found it abundantly, under dead wood on the banks of a stream. Living examples are uniform deep black.

PITYS YOUNGI, Garrett. Plate 19, fig. 22.

Shell umbilicate, discoid, thin, glossy, subpellucid, uniform deep brown, plicately striated, striæ crowded, oblique, curved, rather finer beneath; spire flatly convex; suture channeled; whorls $4\frac{1}{2}$, convex, rapidly increasing, last one convex beneath, declivous above; umbilicus large, perspective, freely exhibiting the whorls, one-third the diameter of the shell; aperture oblique, wider than deep, orbicular-luniform; peristome thin, simple, margins united by a very thin parietal callous.

Diam., 4 mill. ; height, 2 mill.

Habitat, Rarotonga Id., Cook's Isles. (Coll. Garrett and Phila. Acad.)

A somewhat rare species, easily known by its wide open umbilicus, few whorls, deep uniform brown color, and plicate striæ. On the ground in damp woods, and only noticed in a single valley.

PITYS TENUICOSTATA, Garrett. Plate 19, fig. 23.

Shell umbilicate, discoid, thin, pellucid, slightly shining, laminately ribbed, ribs small, thin, rather closely set, oblique, slightly sinuous, continued on the base; under the lens the interstices, closely striated, uniform pale horn color; spire flat; suture deeply impressed; whorls 4, flatly convex, rapidly increasing, last one convex beneath, slightly flattened above; umbilicus large, perspective, freely showing the whorls, about one-third the diameter of the shell; aperture oblique, wider than deep, ovate-luniform; peristome thin, simple.

Diam., $4\frac{1}{2}$ mill. ; height, 2 mill.

Habitat, Rarotonga Id., Cook's Isles. (Coll. Garrett and Phila. Acad.)

A very pretty and somewhat rare species, having a wide range on the island, and generally found on the ground on the sides of ravines.

PITYS PROXIMA, Garrett. Plate 19, fig. 24.

Shell umbilicate, thin, subdiscoid, subpellucid, coarsely and sharply striated, striæ crowded, oblique, sinuous, yellowish horn color, rarely cinereous, adorned with large reddish-brown tessellations, which are often luniform, and radiating stripes beneath; spire flatly convex; suture deeply impressed; whorls $4\frac{1}{2}$, convex, regularly and rather rapidly increasing, last one convex beneath, slightly flattened and declivous above the periphery; umbilicus rather small, deep, one-fifth the diameter of the shell; aperture diagonal, roundly-lunate; peristome thin, sinuous, the upper margin receding.

Diam., $3\frac{1}{2}$ mill.; height, 2 mill.

Habitat, Rarotonga Id., Cook's Isles. (Coll. Garret and Phila. Acad.)

A common species lurking under stones and among rotten wood. It was found in several villages.

PITYS MULTILAMELLATA, Garrett. Plate 19, fig. 25.

Shell umbilicate, subdiscoid, thin, subpellucid, closely and very finely ribbed, ribs lammelliform, closer and finer beneath, light or dark horn color, above tessellated with reddish brown, unicolorous beneath; spire flatly convex, apex flat; suture deeply impressed; whorls $6\frac{1}{2}$, convex, swollen above, regularly and slowly increasing, last one slanting inward from the shoulder; umbilicus deep, showing the whorls, about one-third the diameter of the shell; aperture vertical, narrowly luniform, fauces with five nearly equidistant lamella, two on the thin columella, and four on the parietal region; peristome thin, simple.

Diam., $3\frac{1}{2}$ mill.; height, $1\frac{1}{2}$ mill.

Habitat, Rarotonga Id., Cook's Isles. (Coll. Garrett and Phila. Acad.)

A somewhat rare species, found under dead wood in two remote valleys. It is of a different type from the preceding species, allied to *Pitya contorta*, Fer., *P. modicella*, Fer., and *P. sexlamellata*, Pfr.

LIST OF SPECIES OF *BULIMUS* INHABITING THE VITI ISLANDS, WITH NOTES ON THEIR GEOGRAPHICAL RANGE, AND DESCRIPTIONS OF NEW SPECIES.

BY ANDREW J. GARRETT,
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Having devoted over two years to a conchological exploration of the Viti Islands, I am enabled to give with more precision than hitherto known, the localities, station and range of the various species. They, like the *Partulæ* and *Achatinellæ*, may be divided into arboreal and terrestrial species; the former living on the trunks and foliage of various trees and bushes, and the latter on the ground, lurking among dead leaves, under decayed wood and under stones. All the species exhibit (in a greater or less degree), the peculiar rugose surface so well marked in *B. malleatus* and *B. fulguratus*. The markings are also peculiar, being more or less zigzag, and generally of a greenish hue; and all have a strong columella fold.

BULIMUS FULGURATUS, Jay. Plate 18, f. 1.

Rev. Zool. p. 80, 1842.

This arboreal species is abundant, and is confined to the island of Ovalau, and the eastern end of Viti Levu; the latter is its metropolis.

BULIMUS MALLEATUS, Jay.

Rev. Zool. p. 80, 1842.

This elegant species is also arboreal, and though less abundant, occupies the same locations as the preceding species. Specimens frequently occur of a pure uniform white, like most examples of *B. morosus*, Gld.

BULIMUS MOROSUS, Gld.

Exp. Shells, p. 72, fig. 82, 1851.

The metropolis of this species, is the large island of Vanna Levu, where it is very abundant on the trunks and foliage of trees. It ranges the whole length of the island, and occurs sparingly at the neighboring islands of Rambi, Tavinni, Koro, Kioa and Gomea; having in fact the widest range of any species in the group. Having gathered examples at all the various locations, I could not detect any difference between them and those found at its metropolis. About one example in a hundred exhibits the zigzag markings, a character unknown to Dr. Gould when he described the species.

BULIMUS ELOBATUS, Gld. Plate 18, fig. 2.

Exp. Shells, p. 72, fig. 84, 1851.

This fine species is found abundantly on the ground, and is confined to that part of Vanna Levu, laying to the northward and westward of Natawa Bay, and ranges the whole length of the island. The finest examples were procured in the interior. A variety occurs of a light olive color, with a bluish white aperture.

BULIMUS SEEMANNI, Dohrn.

Jour. de Conch. p. 123, 1864.

This is also a terrestrial species, and is abundant and peculiar to the island of Kandavu, where it was discovered by Dr. Seemann.

BULIMUS sp.

This, like the preceding species, lives on the ground, and is confined to the interior of Viti Levu, where it was discovered by Dr. Graffe, who sent the specimens to Prof. Mousson, of Zurich. The Professor erroneously determined it to be the *elobatus*, Gld. Having sent him examples of the latter species, he will no doubt describe the former as new.

It is about the same size as *elobatus*, but is much less rugose, the base less produced, and is of a yellowish olive color with a bluish white aperture.

BULIMUS OCHROSTOMA, Garrett. Plate 18, fig. 3.

Shell slightly perforate, ovate, rather thin, subtranslucent, rugose, with rude lines of growth and small transverse wrinkles,

ruddy horn color, with delicate greenish marblings; spire short, convexly conoid, obtuse, about two-fifths the length of the shell; whorls five and a half, strongly convex, last rather swollen, stoutly ovate; aperture subvertical, ovate, rich saffron yellow within; peristome rather thin, but slightly expanded, somewhat sinuous, deeper colored than the fauces; columella expanded, with a very oblique dark saffron compressed fold.

Length 29 mill., diam. 16 mill.

Habitat, Tavinni Island, Viti Islands.

(Coll. Garrett and Phila. Academy.)

This, the smallest known Viti *Bulimus*, is abundant on trees and low bushes. A few examples were gathered on the contiguous island of Gomea, but the above island is the metropolis of the species.

BULIMUS RAMBIENSIS, Garrett. Plate 18, fig. 4.

Shell narrowly perforate, oblong, ovate, rather thin, subpellucid, obsoletely rudely striated with lines of growth, rugose with small transverse wrinkles, whitish, yellowish or reddish-horn color, and more or less adorned with small olive green mottlings; spire moderately elevated, convexly conical, obtuse, decorticated, first two whorls minutely punctured; whorls five, convex, last one large, ovate; aperture subvertical, ovate, yellowish white, or bluish white within; peristome rather thin, slightly labiate within, more or less reflected, slightly sinuous toward the base, orange yellow; columella expanded, with a rather large spiral fold.

Length 38 mill., diam. 20 mill.

Habitat, Rambi Id., Viti Isles. (Coll. Garrett and Philada. Acad.)

The metropolis of this species is Rambi Island, where it is abundant on trees and bushes. It is more closely allied to *B. Guanensis*, nob., than to any other species inhabiting the same group. The locations are very remote. It differs from the latter in its more ventricose body, larger aperture, and the different character of the mottlings.

BULIMUS CRASSILABRUM, Garrett. Plate 18, fig. 5.

Shell narrowly perforate, solid, oblong-ovate, whitish, or ruddy white, under a yellowish horn colored epidermis, transversely minutely wrinkled; spire rather short, convexly conical,

obtuse, decorticated; whorls five to six, strongly convex, last one often decorticated, more or less adorned with small olive brown blotches; aperture oblong-ovate, subvertical, more or less rich saffron yellow within; peristome very thick, strongly reflected, white or creamy white; columella and parietal region copiously callosed, the former broadly expanded, and provided with a very strong, more or less compressed, white fold.

Length 41 mill., diam. 21 mill.

Habitat, Vanna Levu Id., Viti Isles. (Coll. Garrett and Philad. Acad.)

We received about 200 examples of this species, which were gathered in the interior of the island by the mountaineers. It is an arboreal species.

BULIMUS RUGATUS, Garrett. Plate 18, fig. 6.

Shell narrowly perforate, ovate, thin, slightly shining, subpellucid, under the lens striated, transversely rugose, white under a light olivaceous epidermis, ornamented with small delicate somewhat zigzag blotches of a darker olive green; spire short, convexly conoid, obtuse, decorticated; a little more than a third the length of the shell; whorls five and a half, rather strongly convex, the last swollen; aperture ovate, subvertical, bluish white within; peristome thin, very slightly labiate, reflected, regularly arched, whitish or bluish white; columella dilated, with a large compressed white fold.

Length, 43 mill.; diam., 24.5 mill.

Habitat, Vanna Levu Isl., Viti Isles. (Coll. Garrett and Philad. Acad.)

This species is confined to that part of Vanna Levu laying north of Natawa Bay, and ranges the whole length of that part of the island. It is less abundant than the other species, and is mostly found on the trunks of trees.

It differs from *fulguratus* in its thinner shell, shorter spire, more arched and thinner outer lip, less produced base, smaller blotches, and the localities are widely remote.

BULIMUS HOYTII, Garrett. Plate 18, fig. 7.

Shell perforate, widely ovate, rather thin, subtranslucent, slightly shining, lines of growth rude, rugose with small transverse wrinkles, tawny-red under a yellowish-horn colored epidermis, which is adorned with longitudinal zigzag olive-green streaks and blotches; spire very short, widely conical, obtuse,

decorticated, less than a third the length of the shell; whorls $5\frac{1}{2}$, strongly convex, last one large, ventricose, deeply umbilicate; suture rudely crenulate; aperture large, ovate, subvertical, yellowish or reddish horn color within; peristome orange-red, slightly labiate within, reflected; columella broadly expanded over the umbilicus, with a very oblique orange-red fold; parietal region more or less callosed, orange-red.

Length, 53 mill.; diam., 29 mill.

Habitat, Vanna Levu Isl., Viti Isls. (Coll. Garrett and Philad. Acad.)

This magnificent species is remarkable for its extremely short spire and rich orange-red lips. It is confined to that part of Vanna Levu lying to the southward of Natawa Bay, where it is abundant among decayed wood and under dead leaves. It differs from *clobatus*, Gld., in its much shorter spire, more ventricose body, more expanded and richer colored lips. There occurs, though very rarely, a pale variety with light green markings and whitish or greenish-white aperture.

BULIMUS GUANENSIS, Garrett. Plate 18, fig. 8.

Shell narrowly perforate, oblong-ovate or elongate-ovate, thin, subpellucid, somewhat glossy, obsoletely striated, transversely rugosely wrinkled, whitish, yellowish or reddish horn color, adorned with beautiful longitudinal zigzag olive-green or brownish-green stripes, which are often shaded off with white; spire convexly conical, obtuse, decorticated, little less than half the length of the shell; whorls 4—5, convex; last one but slightly swollen, somewhat attenuated at the base; aperture subvertical, more or less oblong-ovate, tawny-yellow or reddish, rarely white within; peristome slightly labiate within, more or less expanded, thin, varying from a rich tawny-yellow to a fine orange-red; columella considerably expanded, with a compressed whitish spiral fold.

Length, 41 mill.; diam., 20 mill.

Habitat, Guan Isl. Viti Isles. (Coll. Garrett and Phila. Acad.)

This elegant species is peculiar to the above location, where it is abundant on the trunks and foliage of trees and bushes.

It may be distinguished from *B. fulguratus*, by its thinner and more slender shell, smaller rugosities, more delicate markings, less reflected lip, more compressed columella fold, which is also more oblique. The localities are also remote.

BULIMUS KOROENSIS, Garrett. Plate 18, fig. 9.

Shell subperforate, solid, subcylindrical, coarsely and rudely striated, somewhat transversely rugose, cinereous or pale lutens, sometimes flesh red; spire conical, convex in outline, obtuse, about half the length of the shell; whorls 5, strongly convex, the last one narrow, contracted on the middle; suture rudely impressed; aperture subauriform, long, narrow, contracted opposite the columella fold, white or tawny-yellow; peristome white, labiate within, reflected, sinuous; columella with a stout white oblique fold; parietal region covered with a white callus.

Length, 53 mill.; diam., 18 mill.

Habitat, Koro Isl., Viti Isles. (Coll. Garrett and Phila. Acad.)

This singular species is peculiar to the Island of Koro, where it is very abundant in the central valleys. They were found lurking under loose stones, rotten wood, and among decayed leaves. About one example in a hundred exhibits slight traces of a brownish-horn colored epidermis, disposed in irregular longitudinal stripes. They are often much distorted, and some specimens are much more attenuated than the dimensions given above. Very old shells are frequently denticulated on the peristome. This species is closely allied to *B. Kantavuensis*, Crosse, Jour. de Conch. 1871, t. 5, f. 3, from the Island of Kantavu.

NOTICES AND REVIEWS
OF
NEW CONCHOLOGICAL WORKS.

BY GEO. W. TRYON, JR.

I.—AMERICAN.

American Naturalist. V., Nos. 8 and 9., Sept., 1871.

On the Relations of Anomia. By PROF. E. S. MORSE.

“In examining some sea-weed collected by a friend last spring, I found a lot of the young of *Anomia*. In these the sinus was not closed, but open towards the anterior margin. The nucleus presented an elongate oval shell larger behind; the beaks nearer the anterior, and no sign of a perforation. The shape was more like that of *Montacuta*, and the lines of growth were regular and distinct. On the right valve, at its lower margin, was seen a slight notch, and the few last incremental lines indicated that the notch was made in the last stages of the nucleus. It can only be conceived that the animal before this was a rover, that it then commenced to fix a byssus, the animal dropping to one side and the notch caused by the lowermost valve growing around it, the other valve showing no signs of this notch. So soon, however, as the shell rested upon one side a different growth took place; a loose textured, colorless deposit rapidly formed, the outline becoming gradually circular, and the lowermost or right valve growing rapidly behind and downward, then forward and upward, the byssal attachment soon became enclosed in a wide foramen, this extension ultimately reaching the umbones of the larvel shell to which it unites.”

American Naturalist. V., No. 11, Nov., 1871.

Land Shells of Western Massachusetts. By W. G. FREEDLEY.

Conchological Notes. By G. S. STEARNS.

In this article it is stated that the author had called the attention of the California Academy of Sciences to numerous errors of locality in the catalogues of shells published by the Conchological Section of the Philadelphia Academy. As the author has not, in his communication, specified the instances of supposed error, we are unable to judge whether or not his strictures are correct.

Mr. Stearns also states that beach-worn specimens of *Trivia Californica* are the *T. depauperata* of Sowerby.

Waldheimia septigera and *Terebratella septata* identical.

By J. G. JEFFREYS.

Proceedings of the California Academy of Sciences. IV. Part III. San Francisco, 1871.

On Shells of the West Slope of North America. By J. G. COOPER, M. D.

The species remarked upon were collected by Dr. Robert K. Reid, near Salt Lake, and by others in the adjoining regions.

This is a valuable paper to students of American Conchology, chiefly in reference to the geographical distribution of the land-shells. With regard to the locality of *Cochliopa Rowellii*, nob., I believe with Dr. Cooper that it is a Panama species. The first specimens received by me were said to have been collected in California, but I have since obtained Panama specimens through two collectors.

Annals of the Lyceum of Natural History of New York. X., Nos. 1-3, Feb.—March, 1871.

Notes on the genus Pineria, and on the lingual dentition of Pineria Viequensis, Pfeiffer. By THOMAS BLAND and W. G. BINNEY.

Helix Schrammi, Crosse, and *Pineria Viequensis* are said to be identical, the latter named having priority. The generic name *Pineria* is retained for the present, although it is uncertain whether the animal is possessed of inferior tentacles or not. The shell resembles *Macroceramus*, but the dentition resembles that of the typical *Cylindrellas*.

American Journal of Science and Arts. Dec., 1871.

Notice of the Invertebrata dredged in Lake Superior in 1871, by the U. S. Lake Survey. By S. I. SMITH and A. E. VERRILL.

A few species of mollusca are mentioned, including two undescribed new (?) *Corbiculadæ*.

Arrangement of the Families of Mollusks. Prepared for the Smithsonian Institution by Theodore Gill. Smithsonian Miscellaneous Collections. 8vo., 49 pp. Washington, D. C., Feb., 1871.

Although the author merely claims for this work that it is a compilation embracing the results of recent studies of malacologists throughout the world, yet a far higher rank must be awarded to it by those who can appreciate through being engaged in like studies, the immense amount of research and the careful judgment required in arranging the material; besides, there is much contained in this little book that is original with its author, being founded on his own careful researches into the history of the mollusca during many years. The preliminary pages include a discussion of the extent and value of the classes, orders and families. The systematic arrangement includes 356 families with their synonymic designations in the works of other systematists. This very useful work closes with a very complete descriptive catalogue of the papers and books consulted in its preparation, including a systematic index to Reeve's *Conchologia Iconica*.

II.—FOREIGN.

BRITISH.

Journal of the Asiatic Society of Bengal. Part II., No. 4. Calcutta. 1870.

Descriptions of some new Land Shells from the Shan States and Pegu. BY W. THEOBALD, JR.

<i>Jerdonia Phayrei</i> ,	<i>Spiraculum Gordoni</i> , Bens.?
<i>Alycæus bifrons</i> ,	<i>Pupa fartoidea</i> ,
“ <i>cucullatus</i> ,	“ <i>Salwiniana</i> ,
“ <i>Feddenianus</i> ,	<i>Vitrina venusta</i> ,
<i>Diplommatina Salwiniana</i>	“ <i>Ataranensis</i>
“ <i>pupæformis</i> ,	<i>Vanina</i> “
“ <i>affinis</i> ,	<i>Stenogyra terebralis</i> ,
“ <i>scalaroidea</i> ,	<i>Bithinia nassa</i> , Theobald,
	<i>Lithoglyphus Martabanensis</i> .

On the Land Shells of Bourbon, with Descriptions of a few New Species. By GEOFFREY NEVILL.

<i>Helix Salaziensis</i> ,	<i>Vertigo incerta</i> ,
<i>Nanina implicata</i> ,	<i>Succinea mascarensis</i> ,
“ <i>Cordemoyi</i> .	

Critical remarks are made upon many previously described species.

Proceedings of the Asiatic Society of Bengal. No. V., May, 1871.*Notes on the Anatomy of Chremnoconchus Syhadrensis.*

By DR. F. STOLICZKA.

Proceedings of the Zoological Society of London. 1871. Part I.*Descriptions of Thirty-four New Species of Shells from Australia.* By GEORGE FRENCH ANGAS.

<i>Triton speciosa.</i>	<i>Clathurella tenuilirata.</i>
<i>Olivella exquisita.</i>	“ <i>sculptilis.</i>
<i>Columbella bicincta.</i>	“ <i>bicolor.</i>
“ <i>attenuata.</i>	“ <i>Brazieri.</i>
<i>Hyalina mustelina.</i>	“ <i>albocincta.</i>
<i>Margarella ochracea.</i>	“ <i>bilineata.</i>
<i>Scala Mörcchi.</i>	<i>Fossarina Brazieri.</i>
<i>Mathilda elegantula.</i>	<i>Neritina pulcherrima.</i>
<i>Agatha Australis.</i>	<i>Liotia speciosa.</i>
<i>Odostomia simplex.</i>	<i>Buccinulus nivens.</i>
<i>Syrnola tineta.</i>	<i>Bulimus Brazieri.</i>
<i>Cerithiopsis clathrata.</i>	<i>Corbula venusta.</i>
“ <i>crocea.</i>	<i>Necera pura.</i>
<i>Leiostraca lesbia.</i>	<i>Mactra (Spisula) fluviatilis.</i>
<i>Terebra Brazieri.</i>	<i>Crassatella fulvida.</i>
<i>Rissoina crassa.</i>	<i>Perna confusa.</i>
<i>Clathurella Hayesiana.</i>	<i>Limopsis Brazieri.</i>

Descriptions of Seven New Species of Australian Land Shells. By JAMES C. COX, M. D.

<i>Helix gratiosa.</i>	<i>Helix sarda-labiata.</i>
“ <i>Coxeni.</i>	“ <i>O'Connellensis.</i>
<i>Vitrina superba.</i>	“ <i>Whartoni.</i>

*Helix Bellengerensis.**A List of Additional Species of Marine Mollusca to be included in the Fauna of Port Jackson and the adjacent Coasts of New South Wales.* By GEORGE FRENCH ANGAS.

This is in continuation of papers published by the same author in the Proceedings for 1867. One hundred and nine additional species are enumerated, and some remarks on synonymy and particular localities are added.

Report of the British Association for the Advancement of Science. Liverpool, 1870.*Report on the Testaceous Mollusca obtained during a Dredg-*

ing *Excursion in the Gulf of Suez during the months of February and March, 1869.* By ROBERT McANDREW.

On the Structure of the Shell in the Pearly Nautilus. By HENRY WOODWARD.

Conchologia Iconica. Parts 288, 289. London, 1871.

OSTRÆA. *Plates 17—27. September, 1871.*

- O. subtrigona*, Sowerby. Australia.
- O. retusa*, Pease MSS. Sandwich Isles.
- O. quercinus*, Sowerby. Hab.—?
- O. lima*, Sowerby. Sandwich Isles.
- O. lactea*, Sowerby. Hab.—?
- O. attenuata*, Sowerby. Hab.—?
- O. palmipes*, Sowerby. Philippines.
- O. reniformis*, Sowerby. Hab.—?
- O. lentiginosa*, Sowerby. Hab.—?
- O. multiradiata*, Sowerby. Hab.—?
- O. auriculata*, Sowerby. Japan.
- O. multicostata*, Sowerby. Japan.
- O. lugubris*, Sowerby. North America.
- O. Algoensis*, Sowerby. Algoa Bay.
- O. Sandwichensis*, Sowerby. Sandwich Isles.
- O. crenulifera*, Sowerby. Red Sea.

A genus like OSTRÆA affords unusual opportunities to species makers, but it may be doubted whether Mr. Sowerby has done good work in describing so many new forms, in most cases, doubtless, from single specimens in collections.

The collection of the Academy of Natural Sciences exhibits in its series of *Ostræa Virginica* forms quite as distinct as many of those which Mr. Sowerby has described, and it is safer to follow the rule of only describing new forms, provided that the material is abundant, conjoined with a thorough knowledge of the localities and extent of variation.

“*O. circumsutus*, Gould. U. S. Expedition. Massachusetts.” If Mr. Sowerby had taken the trouble to consult the work he refers to, he would have ascertained that this species inhabits the Fiji and Samoa Islands.

LEDA. *Plates 3—7. September, 1871.*

- L. arcuata*, Sowerby. Hab.—?
- L. planulata*, Sowerby. Patagonia.
- L. bicostata*, Sowerby. Panama.

FRENCH.

Memoires de la Societe des Sciences Physiques et Naturelles de Bordeaux. Vol. 6. 1868.

Recherches sur la génération des Mollusques Gastéropodes.
By J. M. PEREZ.

Mission Scientifique au Mexique et dans l'Amerique Centrale.
Ouvrage publie par ordre de S. M. l'Empereur. Septieme parte.
Etudes sur les Mollusques Terrestres et Fluviatiles. By P. Fischer
and H. Crosse. Folio, 150 pp. 4 colored and 2 plain plates. Paris, 1870.

The introductory portion of this volume gives a very complete resumé of the various scientific explorations of the countries included in the title, with lists of the papers published relating to their malacology. The descriptions and illustrations are very complete, leaving nothing to be desired on either point. The text embraces full descriptions and bibliography of the species of the genera *Streptostyla* and *Glandina*, and is rendered especially interesting on account of the numerous illustrations of species never before figured, thus, for the first time, rendering the identification of these shells satisfactory. Most of the new species have been described already in the *Journal de Conchyliologie*, but the following is diagnosed in this work for the first time.

Glandina longula, Crosse et Fischer, Mexico.

Strebelia (*Physella*) is treated of as a terrestrial genus allied to *Glandina*, as suggested by me in *this Journal*, not as a fluviatile mollusk, which Mr. Binney has supposed it to be. (See his "Land and Fresh-water Shells of North America.")

There are anatomical details of structure by the experienced pen of Dr. Fischer, and, as the volume comes to an end in the midst of his notes on the genus *Zonites*, it is to be presumed that in future numbers the same magnificent style of publication will be continued.

This work is creditable alike to its authors and to the French Government, which, amid the political and financial troubles following a disastrous war and change of administration, nobly continues its enlightened support of science.

Journal de Conchyliologie. Vol. XI, No. 2. 72 pp., 8vo. Paris, April, 1871. (3 colored plates.)

Note sur le genre Calliopæa; d'Orbigny. By P. FISCHER.

Synonymy de quelques genres et espèces de Coquilles terrestres habitant la Polynésie. By W. HARPER PEASE.

- TRUNCATELLA SCALARIFORMIS, Rve. HELIX JUGOSA, Mighels.
T. arcticostata, Mousson. *H. rubiginosa*, Gld.
 MELAMPUS MUCRONATUS, Gld. HELIX CONTORTA, Ferussac.
M. oryza, A. Adams. *H. intercarinata*, Mghls.
 HELICINA COLORATA, Pease. HELIX LAMELLOSA, Fer.
H. Annaensis, Mousson. *H. Fricki*, Pfr.
 OMPHALOTROPIS ELONGATA, Pease. LAIMODONTA CONICA, Pease.
Hydrocena Raiatensis, Mousson. *L. Annaensis*, Mousson.

The genera *Taheitia* and *Omphalotropis* are remarked upon.

Remarques sur le genre Dibaphus et sur quelques espèces du genre Conus. By W. HARPER PEASE.

C. parvus substituted for *C. fusiformis*, preoccupied.

Remarques sur quelques-unes des espèces énumérées, par M. G. P. Deshayes dans son Catalogue des Mollusques de l'île de la Réunion. By W. HARPER PEASE.

Brachiopodes des côtes océaniques de France—Supplement.
 By P. FISCHER.

Description d'un Bulimus nouveau de la section des Placostylus. By H. CROSSE.

B. Kantavuensis, Crosse. Archipel. Viti.

Variétés. Pendant le Siège et sous la Commune. By H. CROSSE.

Bibliographie :

Nouvelles. Habitat du Cypræa princeps, Gray.

This species, hitherto unique, supposed to come from the Persian Gulf, has been rediscovered by Mr. James C. Cox, of Sydney, and belongs to the Australian fauna.

No. 3. July, 1871. 100 pp. and 4 plates.

Sur l'anatomie des Bulimes Néo-Calédoniens du groupe Placostylus. By P. FISCHER.

Note sur le genre Bulimus. By P. FISCHER.

The author, on account of resemblances of lingual dentition, proposes to unite with the Helices, Pupidæ, etc., certain groups of Bulimi.

Des espèces terrestres et fluviatiles que l'on a considérées, à tort, comme appartenant à la Faune Malacologique de la Nouvelle-Calédonie. By H. CROSSE.

Helix Villandrei, Gassies. *H. Boydi*, Angas, is a synonym.
Pupina Moulinsiana, Fischer and Bern. *P. leucostoma*,
 Montr., is a synonym.

Monographie du genre Microtina et catalogue des espèces.
 By H. CROSSE.

Description d'espèces inédites provenant de la Nouvelle-Calédonie. By H. CROSSE.

These species were described in a former number of the *Journal*.

Diagnoses Molluscorum Novæ Caledoniæ incolarum. By
 H. CROSSE.

Helix Rossiteriana.

Diplommatina Perroquini.

Pupa Mariei.

Rimula Verrieri.

Ancylus Noumeensis.

Marginella Lefouana.

Planorbis Rossiteri.

Ovula Caledonica.

Description d'un Ampullaria nouveau, provenant du fleuve des Amazones. By DR. J. GONZALEZ HIDALGO.

A. Crosseana, Hidalgo.

Sur l'identité du Bulimus Juarezi, Pfeiffer, avec le B. sufflatus, Gould. By H. CROSSE.

Sur le Faune conchyliologique marine de la baie de Suez.
 (2d article). By P. FISCHER.

Dentalium subtorquatum.

Gena callosa.

Pectunculus Savignyi.

Description d'un Cassis nouveau. By J. G. HIDALGO.

Cassis Pfeifferi. Philippines?

Diagnoses Molluscorum novorum. By H. CROSSE.

Helix callizona. Japan. *Clausilia Japonica.* Japan.

" *Ortoni.* Rep. Equador. *Bulimus Ucayalensis.* Egr.
H. Napensis. Rep. Equador.

Note sur quelques fossiles de l'isthme de Suez. By P.
 FISCHER.

Description de Coquilles fossiles des terrains jurassiques.
 (Continued). By M. C. MAYER.

Bibliographie :

ITALIAN.

Società Reale di Napoli. Atti dell'Accademia delle Scienze Fisiche e Matematiche. Vols. III, IV. Naples, 1866—68. 1869.

Illustrazione di due Generi di Molluschi Nudibranchi. By A. COSTA.

Caliphylla Mediterranea. *Nemocephala marmorata.*

Gli Organi e la Secrezione dell'acido Solforico nei Gastropodi. By PAOLO PANCERI.

This is the most complete memoir yet published on this subject. The organs which secrete the acid have been carefully examined and described in several orders of mollusks. Four beautiful plates illustrate the paper.

Malacologia del Mare Rosso (Red Sea). By Arthur Issel. 385 pp., 8vo. 5 plates. Pisa, 1869.

The first part of this very important contribution from Italy to our Conchological literature, consists of general considerations of the fauna of the Red Sea with its relations to the Mollusca of subjacent zoological provinces. The second part enumerates, with bibliography and localities, five hundred and seventy-three recent species. Part third contains a list of two hundred and thirty-two fossil species. Part fourth supplies the much needed index to the Mollusks figured in Savigny's Egyptian work. Of the recent species the following are new:

Ervilia scaliola.

Syndosmya subrostrata.

Macoma Arsinoensis.

" *Erythræa.*

Tellinula fragillima.

Petricola Hemprichii.

Venus Ræmeriana.

Gouldia lamellosa.

Cardium Isthmicus.

" *Sueziensis.*

" *Arabicus.*

Lucina Semperiana.

" *Fischeriana.*

" *Erythræa.*

Elathia, n. g. *Lucinidæ.*

" *Arconatii.*

Kellia miliacea.

Crenella Vaillanti.

" *Ehrenbergi.*

Turbonilla nitidissima.

Odontostomia Clysmatica.

" *Sueziensis.*

" *craticulata.*

Chrysallida Rissoiformis.

" *lævis.*

Eulimella cingulata.

" *Arabica.*

Eulima Gentilomiana.

" *Manzoniana.*

Cyclostrema Philippii.

Tectaria armata.

Risella Isseli, Semper.

" *infracostata.*

Litiopa Savignyi.

Scaliola elata, Semper.

Cingula Villæ.

" *Tiberiana.*

" *Madreporica.*

<i>Marginella Savignyi.</i>	<i>Cingula Psammitica.</i>
“ <i>Sueziensis.</i>	“ <i>Waabitica.</i>
“ <i>pygmæa.</i>	<i>Rissoa Sismondiana.</i>
<i>Mitra Pharaonis</i> , Gén�.	<i>Alaba Martensi.</i>
<i>Cerithiopsis</i> ? <i>pulvis.</i>	<i>Rissoina Seguenziana.</i>
“ <i>bacillum.</i>	<i>Liostia atomus.</i>
<i>Triphoris perlatus.</i>	<i>Turbo Eroopolitanus.</i>
<i>Philine Vaillanti.</i>	“ <i>Arsinoensis.</i>
<i>Tornatina Olivæformis.</i>	<i>Trochus Hemprichii.</i>
“ <i>pusilla.</i>	“ <i>Bellardii.</i>
<i>Turbonilla tenuicosta.</i>	“ <i>Sismondæ.</i>
“ <i>venusta.</i>	<i>Stomatella Doricæ.</i>
“ <i>solidula.</i>	<i>Emarginula Arconatii.</i>
“ <i>crystallinula.</i>	<i>Chiton affinis.</i>

GERMAN.

Archiv fur Naturgeschichte, 26th year. Berlin, 1870.

Bericht über die Leistungen in der Naturgeschichte der Mollusken während des Jahres, 1869. By Dr. F. H. TROSCHEL.

The usual complete review of Conchological literature occupies 66 pages of the present issue.

Novitates Conchologicæ. Land Conchylien. By Dr. Louis Pfeiffer. Part 39, with three colored plates. Cassel, 1871.

Novitates Conchologicæ. Supplement III. Monographie der Molluskengattung *Venus*, Linne. By Dr. Edward Römer. Parts 32, 33. 6 colored plates. Cassel, 1871.

These issues continue the monography of the genus *Tapes*.

Kuster's Systematisches Conchylien-Cabinet. Part 205. Nürnberg, 1871.

The text and six plates illustrate the Linnean genus *Tellina*.

APPENDIX.

CONSERVATOR'S REPORT.

The Conservator of the Conchological Section respectfully reports that the donations to the Cabinet, during the past year, have been as follows :

From REV. E. R. BEADLE. Twenty-five species of shells, principally from Ceylon.

P. P. CARPENTER. A large lot of duplicate species in exchange for some of the publications of the Section.

T. A. CONRAD. Numerous specimens of *Unio viridis*, from Trenton, N. J.

GEO. DAVIDSON. Egg cases of *Chrysodomus liratus*, Mar.

DR. H. C. ECSTEIN. Three species of *Strombus*, from Central America.

ANDREW GARRETT, of Papeeti, Tahiti. One hundred and fifty-four species land, fresh water and marine shells of Polynesia, including types of many new species.

S. S. HALDEMANN. *Nautilus umbilicatus*, List.

J. GWYN JEFFREYS. *Fusus Bernicensis*, King, *Lima excavata*, Chem., and eighteen other species of rare marine Mollusca, from Norway and Great Britain.

DR. SAMUEL LEWIS (through W. L. Mactier). Eggs of *Bulimus hæmastomus*.

W. HARPER PEASE. Thirty-six species of land and marine shells, from the Pacific Islands.

SAMUEL POWEL. Egg-cases of *Fusus Islandicus*, from Newport, R. I.

J. H. REDFIELD. Eleven species of *Marginella*, mostly new to the collection; also twenty species of bivalve Mollusca, new to the collection.

S. R. ROBERTS. Four species of *Clausilia* and one species of *Bulimus*, from Greece.

T. HALE STREETS. *Bulimus Powisianus*, from Isthmus of Tehuantepec.

GEO. W. TRYON, JR. Twenty species of bivalve Mollusca, new to the collection.

DR. H. C. YARROW. Numerous specimens of *Lingula pyramidata*, Stimp., in alcohol. One hundred and fourteen species of shells, from Beaufort, N. C.

WILLIAM S. VAUX. Twenty-seven species *Cypræa*, *Ovulum* and *Solen*, new to the collection.

One hundred species, numerous specimens of shells from Panama, including a number of species in alcohol, and fifty-six species from the coast of Nicaragua, were presented by the subscribers to the McNeil Expedition to Central America.

Eighty-five species of Polynesian Mollusca, principally new, collected by the Godeffroy Natural History Expedition, were purchased, together with thirty species of bivalve Mollusca, new to the collection, and selected by the Rev. Dr. Beadle during his recent visit to London.

During the year the Committee on the Arrangement of the Cabinet, consisting of Messrs. Parker, Hassler, Roberts, Tryon and Nolan, has cleaned, mounted and labelled 6,881 specimens in 1,898 trays. This includes the Cardiidæ, Lucinidæ, Chamidæ, Petricolidæ, Melanidæ, Tridacnidæ, Terebratulidæ, North American *Helices* and Corbiculadæ in part. The current additions to the families already arranged have also been mounted and placed in the cases as soon as received.

The sale of duplicate specimens has furnished sufficient funds for the purchase of about sixty additional drawers, which have been procured and placed in the museum.

The total number of species mounted and arranged to date is 4,031; number of trays and labels prepared, 7,169; total number of specimens prepared and mounted, 20,941.

All of which is respectfully submitted,

EDWARD J. NOLAN, *Conservator*.

LIBRARIAN'S REPORT.

The Librarian respectfully reports that there have been presented, during the past year, to the library of the Conchological Section, 73 pamphlets and 7 volumes. Of these, 2 were received from Societies, 20 from Editors, 22 from authors, 5 from the Publication Committee, 2 from Isaac Lea, 2 from Geo. W. Tryon, Jr., 2 from H. Nevill, 1 from J. Gwyn Jeffreys, and 3 were purchased.

In addition, 3 volumes and 36 pamphlets have been presented during the same time to the Academy.

There are now in the Conchological library 668 volumes. There are 807 titles on the Catalogue.

During the year the transcription of the revised and numbered Catalogue of this department has been completed, and is herewith presented.

All of which is respectfully submitted.

EDWARD J. NOLAN, *Librarian*.

RECORDER'S REPORT FOR 1871.

The Recorder would respectfully report that during the past year there have been elected three Correspondents.

The deaths of the following members and correspondents have been announced: Charles W. Peale, member, Oct. 5th; M. Petit de la Saussaye, Bordeaux, correspondent, Oct. 5th; F. F. Cavada, Cuba, correspondent.

Twenty papers have been accepted for publication by the following authors: W. Harper Pease, 6; Geo. W. Tryon, Jr., 3; Wm. H. Dall, 4; R. E. C. Stearns, 2; Bland and Binney, 4; F. B. Meek, 1.

Appended is a list of the correspondents elected during 1871.

Respectfully submitted by

S. R. ROBERTS, *Recorder*.

CORRESPONDENTS ELECTED 1871.

Feb. 2d. H. E. Van Riggersma, St. Martens, W. I.

" G. Nevill, Calcutta, India.

Apl. 6th. Hugh Nevill, Point de Galle, Ceylon.

REPORT OF PUBLICATION COMMITTEE.

PHILADELPHIA, *Dec. 7th*, 1871.

The Publication Committee of the Conchological Section reports its transactions for the current year as follows :

Parts 3 and 4, Vol. SIXTH American Journal of Conchology, containing together 164 pages, with seven plain and six colored plates, were issued April 4th and June 1st respectively.

Of the SEVENTH Volume, two parts have been published, the dates of issue being August 1st and Nov. 2d. These two parts contain 164 pages, illustrated by seven colored and five plain plates. The aggregate number of pages of the Journal issued for the year is 328.

Vol. 7, Part 3, is now in the printer's hands, and Part 4, completing the volume, is intended to contain the papers and reports presented this evening.

The re-issue of Haldeman's Monograph of Fresh-water Univalve Mollusca of the United States, and the Continuation by Geo. W. Tryon, Jr., were completed and distributed to the subscribers during the year. This includes the publication of 156 pages of Mr. Tryon's work, with eleven colored plates.

GEO. W. TRYON, JR.,	} Committee.
S. R. ROBERTS,	
EDW. J. NOLAN,	

CATALOGUE OF THE FAMILY CYRENELLIDÆ.

BY TEMPLE PRIME.

The following Catalogue is reprinted from the Proceedings of the Boston Society of Natural History, vii, 345, 1860, and re-arranged in accordance with the plan of the Catalogues issued in this series.

G. W. T., JR.

Genus **CYRENELLA**, Deshayes.

Soc. Philom. 1833.

Cyrenoida, Joannis, Guerin's Mag. Zool. t. 64, 1835.

Cyrenoides, Sowerby, Conch. Man. 135, 1842.

1. **C. alata**, Adams and Reeve, Voy. Samarang, 80, t. 24, f. 12, 1850. *Hab. Corea.*

2. **C. Americana**, Morelet, Test. Nov. Cub. ii, 26, 1851. *Central America.*

3. **C. Coreensis**, Adams and Reeve, Voy. Samarang, 80, t. 24, f. 14, 1850. *Corea.*

4. **C. Cumingii**, Hanley, Desc. Cat. 353, t. 15, f. 5, 1854. *Philippines.*

5. **C. Dupontia**, Joannis, Guerin's Mag. Zool. t. 64, 1835. Hanley, Desc. Cat. 352, t. 15, f. 4, 1854. *Senegal.*

6. **C. lenticularis**, Deshayes, Zool. Proc. 341, 1854. *Hab.—?*

7. **C. Moretonensis**, Deshayes, Zool. Proc. 341, 1854. *Moreton Bay, Australia.*

8. **C. oblonga**, Sowerby, Zool. Proc. 341, 1854. Hanley, Desc. Cat. 353, t. 15, f. 4, 1854. *Philippines.*

9. **C. Philippinarum**, Sowerby, Proc. Zool. Soc. 340, 1854. *Philippines.*

10. **C. pisiformis**, Deshayes, Zool. Proc. 341, 1854. *Philippines.*

11. **C. Senegalensis**, Deshayes, Zool. Proc. 341, 1854. *Senegal.*

12. **C. sphæricula**, Deshayes, Zool. Proc. 340, 1854. *Moreton Bay, Australia.*

Undetermined.

C. tumida (Mysia), Nutt., Jay Cat. (*Cyrenoida*), edit. iv, 33, 1850. *Hab.—?*

CATALOGUE OF THE FAMILY CYPRINIDÆ.

BY GEO. W. TRYON, JR.

Family **CYPRINIDÆ**, H. and A. Adams.

Recent Mollusca, ii, 444, 1857.

Genus **CYPRINA**, Lamarck.

Extr. d'un Cours. 1812. Anim. sans Vert. v, 556, 1818.

Artica, Schum., Nov. Syst. 145, 1817.

1. **C. Islandica**, Linnæus, Syst. Nat. 12th edit. 1131, 1767.

Sowerby, Thes. Conch. ii, 784, t. 168, f. 1, 2, 3, 1855.

C. vulgaris, Brown, Ill. Brit. Conch. 93, t. 31, f. 1, 1844.*Pectunculus crassus*, Da Costa, Brit. Conch. 183, t. 14, f. 5, 1778.*Venus mercenaria*, Pennant (not Linn.), Brit. Zool. iv, 94, t. 53, f. 47, 1777.*Venus bucardium*, Born, Museum, t. 4, f. 11, 1780.*Cyprina arctica*, Bowdich, Elem. Conch. ii, f. 33, 1822.*Arctic and Northern Seas.*

CATALOGUE
OF THE RECENT SPECIES OF THE
FAMILY GLAUCONOMYIDÆ.

BY GEORGE W. TRYON, JR.

Family **GLAUCONOMYIDÆ**, H. & A. Adams.
Genera of Recent Mollusca, II, 442, 1857.

Genus **GLAUCONOMYA**, Bronn.

Lethea Geognos, 807, 1838.

Glaucanome Gray (not Goldfuss) Specil. Zool., 1828. Zool.
Jour., iv, 497, 1829.

1. **G. angulata**, Reeve, Zool. Proc., 1844.
Conch. Icon. sp. 5, 1844. *Philippines, Australia.*
2. **G. cerea**, Reeve, Zool. Proc., 1844. Icon. sp. 8, 1844.
Riv. Ganges.
3. **G. Chinensis**, Gray, Spécil. Zool. 6, t. 3, f. 13, 13 a, 1830.
Reeve, Icon. sp. 1, 1844. *Chinese Rivers.*
4. **G. corrugata**, Reeve, Zool. Proc. 1844, Icon. sp. 6, 1844.
Philippines.
5. **G. Cumingii**, Prime, Jour. Conch. x, 384, t. 14, f. 4, 1862.
Malacca.
6. **G. curta**, Hanley, Spec. of Shells, 1842.
Reeve, Icon. sp. 7, 1844. *Philippines.*
7. **G. Jayana**, Prime, Jour. Conch. ix, 354, 1861.
Jour. Conch. x, 383, t. 14, f. 5, 1862. *Australia.*
8. **G. oblonga**, Prime, Ann. N. Y. Lyc, viii, 107, 1865.
Singapore.

9. *G. psammotella*, Deshayes, Zool. Proc. 1, 1853. *Hab—?*
10. *G. Primeana*, Crosse and Debeaux, Jour. Conch. xi, 177, 256, t. 9, f. 1, 1863. *China.*
11. *G. radiata*, Reeve, Zool. Proc., 1844. Icon. sp. 3, 1844. *Philippines.*
12. *G. rostralis*, Deshayes, Zool. Proc. i, t. 18, f. 12, 1853. *Borneo.*
13. *G. rugosa*, Hanley, Wood, Index Test. suppl. t. 10, f. 24, 1828.
Ads. Genera, t. 110, f. 3, Reeve, Icon. sp. 4, 1844. *Philippines, Australia.*
14. *G. straminea*, Reeve, Zool. Proc., 1844.
Conch. Icon. sp. 2, 1844. *Manilla.*
15. *G. Sumatrensis*, Jay, Jour. Conch. x, 384, t. 14, f. 3, 1862. *Sumatra.*
16. *G. virens*, Linnæus (Solen).
Reeve, Icon. sp. 7, 1844. *Hab—?*

Genus **TANISIPHON**, Benson.

1. *T. rivalis*, Benson,
H. and A. Adams, Genera, iii, t. 138, f. 15, 1857.

CATALOGUE
OF THE RECENT SPECIES OF THE
FAMILY PETRICOLIDÆ.

BY GEORGE W. TRYON, JR.

Family **PETRICOLIDÆ**, H. and A. Adams.

Genera of Recent Moll., ii, 440, 1857.

Genus **PETRICOLA**, Lamarck.

Syst. Anim. sans Vert. 121, 1801.

Choristodon, Jonas (not H. and A. Adams), Zeit. für Malak.
185, 1844.

P. amygdalina Sowerby, Zool. Proc. 47, 1834.

Not identified by Sowerby, Jr., in Thes. Conch.

Gallapagos Islands.

1. **P. anachoreta**, de Folin. Les Meleagrinicoles, 18, 1868.

Hab. ?

P. arcuata, Deshayes = *P. Carditoides*.

P. bipartita, Deshayes = *P. lithophaga*.

P. bulbosa, Gould = *P. lithophaga*.

P. Californica, Conrad = *P. nivea*.

P. Carditoides, Conrad = *P. nivea*.

P. Chinensis, Desh. = *P. lithophaga*.

2. **P. Chiloensis**, Philippi, Archiv. für Naturg. 53, 1845.

P. cylindracea, Desh. = *P. nivea*.

Ins. Chiloe.

3. **P. cognata**, C. B. Adams, Panama Shells, 286, 1852.
Panama.
4. **P. concinna**, Sowerby, Zool. Proc. 46, 1834.
Thes. Conch. ii, 753, t. 166, f. 3, 1855.
Monte Christi.
P. costata, Phil. = *P. dactylus*, Sowb.
P. costellata, Lam. = *P. lithophaga*.
5. **P. cultellus**, Deshayes, Zool. Proc., 1853.
Sowb. Thes. Conch. ii, 772, t. 166, f. 2, 5, 1855.
Ceylon.
P. dactylus, Say = *P. pholadiformis*, Lam.
6. **P. dactylus**, Sowerby, Genera of Shells, f. 3, 1820—24.
Thes. Conch. ii, 772, t. 166, f. 4, 1855.
P. costata, Philippi, Zeit. Mal. 163, 1848.
Panama, So. America.
7. **P. denticulata**, Sowerby, Zool. Proc. 46, 1834.
Thes. Conch. ii, 773, t. 166, f. 6, 7, 1855.
P. ventricosa, Deshayes, Zool. Proc. 1853.
Payta, Peru; Mazatlan (Carpenter).
P. discors, Sowerby, Zool. Proc. 46, 1834.
(Not identified by Sowerby, Jr., in Thes. Conch.)
8. **P. elliptica**, Sowerby, Zool. Proc. 46, 1834.
Thes. Conch. ii, 774, t. 166, f. 10, 1855.
P. solida, Sowerby, Zool. Proc. 46, 1834. Thes. Conch. ii,
774, t. 166, f. 9, 1855. Payta, Peru.
9. **P. elegans**, Deshayes (*Venerupis*), Zool. Proc., 1853.
Sowerby, Thes. Conch. ii, 773, t. 166, f. 8, 1855.
Hab.—?
P. fornicata, Say = *P. pholadiformis*.
P. gibba, Middendorff = *P. nivea*.
P. gracilis, Deshayes = *P. pholadiformis*.
P. hyalina, Deshayes = *P. lithophaga*.
P. linguatella, Deshayes.
10. **P. lithophaga**, Retz. (Venus.) Trans. Turin. v, 11, f. 1, 2.
Sowerby, Thes. Conch. ii, 774, t. 166, f. 18, 19, 1855.
P. striata, Lamarek, Anim. sans Vert. v, 504, 1818.
P. costellata, “ “ “ “ 1818.
P. rocellaria, “ “ “ “ 1818.
P. ruperella, “ “ “ “ 1818.
Mya decussata, Dillwyn, Cat. 46, 1817.

- Venus petricola*, Blainville, Mal. t. 76, f. 2, 1825.
Sphæria decussata, Turton.
P. bicolor, Sowerby, Thes. Conch. ii, 776, t. 166, f. 22, 1855.
P. bipartita, Deshayes, Zool. Proc. 1853. Sowerby, Thes. Conch. ii, 775, t. 166, f. 20, 1855.
P. Chinensis, Deshayes, Zool. Proc. 1853. Sowerby, Thes. Conch. ii, 775, t. 166, f. 15, 1855.
P. hyalina, Deshayes, Expl. Sci. de l'Algerie, t. 66, f. 1, 1844—48. H. and A. Adams, Genera, iii t. 110, f. 1, 1858.
P. robusta, Sowerby, Zool. Proc. 47, 1834. Thes. Conch. ii, 775, t. 166, f. 16, 17, 1855. Philippi, Zeit. Mal. 163, 1848.
P. bulbosa, Gould, Mex. and Cal. Shells, 16, t. 15, f. 5.
P. sinuosa, Conrad, Jour., Philad. Acad. 1, t. 39, f. 2, 1850. Proc. Philad. Acad. iv, 155.
P. semilamellata, Lamarck, Anim. sans Vert. v, 503, 1818. Sowerby, Thes. Conch. ii, 776, t. 166, f. 23, 1855.
P. typica, Jonas, Zeit. für Malak. i, 185, 1844. Sowerby, Thes. Conch. ii, 774, t. 166, f. 21, 1855.
China, Europe, West Indies, W. Coast of America.
P. mirabilis, Deshayes.
- 11. P. nivea**, Chemnitz, Conch. Cab. viii, 154, t. 82, f. 734, 1785.
 Sowerby, Thes. Conch. ii, 773, t. 166, f. 13, 14, 1855.
P. rugosa, Sowerby, Zool. Proc. 47, 1834.
P. tenuis, Sowerby, Zool. Proc. 47, 1834.
P. Californica, Conrad, (Saxicava) Jour. Phil. Acad. vii, 256, t. 20, f. 9, 1837.
P. Carditoides, Conrad (Saxicava) Jour. Phil. Acad. vii, 255, t. 20, f. 8, 1837.
P. arcuata, Deshayes, Rev. Cuv. Zool. 358, 1839.
P. cylindracea, Deshayes, Rev. Cuv. Zool. 358, 1839.
P. gibba, Middendorff, Beitr. Mal. Ros. iii, 57, t. 18, f. 5—7, 1849. *West Coast of North America.*
- 12. P. pholadiformis**, Lamarck, Anim. sans Vert. v, 505, 1818.
 Sowerby, Thes. Conch. ii, 771, t. 166, f. 1, 1855.
P. fornicata, Say, Jour. Phil. Acad. ii, 319, 1822.
P. dactylus, Say, Am. Conch. t. 6, f. 2, 1834.
P. gracilis, Deshayes, Zool. Proc. 1853. Sowerby, Thes. Conch. ii, 772, t. 166, f. 12, 1855.
P. serrata, Deshayes, Zool. Proc. 1853. Sowerby, Thes. Conch. ii, 771, t. 166, f. 11, 1855 (*N. Zealand* ?).
E. Coast United States.

- 13. P. pseudolima**, Souverbie, Jour. Conch, x, 231, t. 9, f. 1, 1862.

New Caledonia.

P. rariflamma, Deshayes.

P. rocellaria, Lamarck = *P. lithophaga*.

P. robusta, Philippi, Zeit. Mal. 163, 1843.

P. robusta, Sowerby = *P. lithophaga*.

P. ruperella, Lamarck = *P. lithophaga*, Retz.

P. rugosa, Sowerby = *P. nivea*, Chemnitz.

P. semilamellata, Lamarck = *P. lithophaga*.

P. serrata, Deshayes = *P. pholadiformis*.

P. sinuosa, Conrad = *P. lithophaga*.

P. solida, Sowerby = *P. elliptica*.

P. tenuis, Sowerby = *P. nivea*.

P. typica, Jonas = *P. lithophaga*.

P. venusta, Folin, Meleagrinicoles, 18, 1868.

P. ventricosa, Deshayes = *P. denticulata*.

Genus **NARANIO**, Gray.

Annals and Mag. Nat. Hist. xi, 38, 1853.

Choristodon, H. and A. Adams (not Jonas), Genera ii, 441, 1857.

N. costata, Gray = *N. lapicida*.

N. divaricata, Chemn. = *N. lapicida*.

- 1. N. lapicida**, Chemnitz, Conch. Cab. x t. 172, f. 1664—1665, 1788.

Sowerby, Thes. Conch. ii, 776, t. 166, f. 26, 1855.

N. divaricata, Chemn. Conch. Cab. x, t. 172, f. 1666—1667, 1788. Sowerby, Thes. Conch, ii, 776, t. 166, f. 24, 25, 1855.

N. costata, Gray.

N. radiata, Gray, Ann. and Mag. xi, 38, 1853.

Red Sea, Indian Ocean, Japan, Australia.

- 2. N. rubiginosa**, Adams and Angas, Zool. Proc. 425, t. 37, f. 17, 1863. *Port Jackson, Australia.*

- 3. N. scobina**, Carpenter, Mazat. Cat. 529, 1857.

Mazatlan.

CATALOGUE
OF THE RECENT SPECIES OF THE
FAMILY CARDIIDÆ.

BY GEORGE W. TRYON, JR.

Family **CARDIIDÆ**, H. and A. Adams.

Genera of Recent Mollusca, ii, 453, 1857.

Genus **CARDIUM**, Linnæus.

Syst. Nat. edit. x, 1758.

1. **C. costatum**, Linnæus, Syst. Nat. edit. x, 678, 1758.
 Reeve, Conch. Icon. f. 11, 1845. *E. Coast Africa.*
2. **C. hians**, Brocchi, Conch. Foss. Subap. ii, 508, t. 13, f. 6,
 1814.
 C. Indicum, Lam., An. sans Vert. vi, 4, 1819. Reeve, Conch.
 Icon. f. 27, 1845.
 C. Darwini, Mayer, Jour. Conch. xiv, 69.
 C. diluvium, Lam., Anim. sans Vert. Edit. Desh. vi, 415.
Algiers.

Subgenus **PECTUNCULUS**, Adanson.

Hist. Nat. Senegal, 240, 1757.

3. **C. Asiaticum**, Bruguiere, Encyc. Meth. i, 224, 1789.
 Reeve, Conch. Icon. f. 90, 1845. Römer, Conch. Cab. 66,
 t. 2, f. 4, 5, 1869.
 C. lima, Gmelin, Syst. Nat. 3253, 1790.
Nicobar Is., Natal, Chinese Seas.

4. **C. Australe**, Sowerby, Zool. Proc. 105, 1840.
Reeve, Conch. Icon. sp. 97, 1845. Römer, Conch. Cab. 70,
t. 12, f. 8, 9, 1869.
C. pulchrum, Reeve, Conch. Icon. sp. 98, 1845.
Australia, China.
5. **C. coronatum**, Spengler, Römer, Conch. Cab. 68, t. 12, f.
3—5, 1869.
C. fimbriatum, Lamarck, Anim. s. Vert. Reeve, Conch. Icon.
sp. 91, 1845. *Indian Ocean.*
6. **C. incarnatum**, Reeve, Zool. Proc. 1844.
Conch. Icon. sp. 2, 1844. *Philippines.*
7. **C. multispinosum**, Sowerby, Zool. Proc. 106, 1840.
Reeve, Conch. Icon. sp. 10, 1844. Römer, Conch. Cab.
67, t. 12, f. 1, 2, 1869. *Philippines.*
8. **C. quadraginarium**, Conrad, Jour. Philad. Acad. vii, 230,
t. 17, f. 5, 1837.
C. luteolabrum, Gould, Mex. Cat. 28. *California.*
9. **C. pulchellum**, Reeve, Conch. Icon. ii, sp. 42, 1844.
C. striatulum (junior), Sowerby, Conch. Ill. f. 45. *Australia.*
10. **C. ringens**, Chemn., Conch. Cab. vi, 176, t. 16, f. 170.
Reeve, Conch. Icon. sp. 6, 1844. Römer, Conch. Cab. 71,
t. 4, f. 8, t. 12, f. 10, 1869.
Mouth of Gambia Riv., Africa.
11. **C. setosum**, Redfield, Ann. N. Y. Lyc. iv, 168, t. xi, f. 1,
1846.
China (Redfield), *Mazatlan* (Dr. Burt).
12. **C. Sinense**, Sowerby, Zool. Proc. 105, 1840.
Reeve, Conch. Icon. sp. 3, 1844. Römer, Conch. Cab. 73,
t. 12, f. 11, 12, 1869. *China, Philippines.*
13. **C. tenuicostatum**, Lamarck, Anim. sans Vert. vi, 5, 1819.
Reeve, Conch. Icon. sp. 50, 1845. Römer, Conch. Cab.
69, t. 12, f. 6, 7, 1869.
C. striatulum, Sowerby, Zool. Proc. 1840. Reeve, Conch.
Icon. sp. 60, 1845.
C. pallidum, Reeve, Zool. Proc. 1845. Conch. Icon. sp. 92,
1845.
C. radiatum, Reeve, Zool. Proc. 1845. Conch. Icon. sp. 89,
1845. *New Zealand, Australia, Philippines.*
14. **C. vertebratum**, Jonas, Zeit. für Malak. i, 33, 1844.
Australia.

Subgenus TRACHYCARDIUM, Mörch.

Pectunculus, Mart. (not Adanson), Verzeichn, 1773.

15. ? **C. alabastrum**, Carpenter, Mazat. Cat. 94, 1857.
Mazatlun.
16. **C. alternatum**, Sowerby, Zool. Proc. 108, 1840.
Reeve, Icon. sp. 65, 1845. *New Caledonia, Philippines.*
17. **C. angulatum**, Lamarck, Anim. sans Vert. vi, 9, 1819.
Reeve, Icon. sp. 70, 1845. *Hab.—?*
18. **C. assimile**, Reeve, Zool. Proc. 169, 1844.
Reeve, Conch. Icon. sp. 45, 1844. Römer, Conch. Cab. 61,
t. 11, f. 11, 1869. *Zanzibar.*
19. **C. Belcheri**, Brod. and Sowerby, Zool. Jour. iv, 336, t. 9,
f. 3.
Reeve, Conch. Icon. sp. 5, 1844. *Panama.*
20. **C. consors**, Sowerby, Zool. Proc. 85, 1833.
Reeve, Conch. Icon. sp. 86, 1845. Römer, Conch. Cab.
48, t. 10, f. 6, 7. *Panama to Cape St. Lucas.*
21. **C. cygnorum**, Deshayes, Zool. Proc. 331, 1854.
Angas, Zool. Proc. 651, 1865. *So. Australia.*
22. **C. Dupuchense**, Reeve, Zool. Proc. 1845.
Conch. Icon. sp. 67, 1845. *Torres Straits.*
23. **C. Egmontianum**, Shuttleworth, Jour. Conch. v, 172,
1856. *Tampa Bay, Fla.*
24. **C. elongatum**, Bruguiere, Encycl. Meth. i, 228.
Reeve, Icon. sp. 46, 1845. Römer, Conch. Cab. 53, t. 10,
f. 8, 9, 1869. *Philippines.*
25. **C. enode**, Sowerby, Zool. Proc. 108, 1840.
Reeve, Conch. Icon. sp. 73, 1845. Römer, Conch. Cab.
59, t. 11, f. 9, 1869. *New Caledonia, Ceylon.*
26. **C. flavum**, Linnæus, Syst. Nat. edit. x, 680.
Römer, Conch. Cab. 56, t. 5, f. 10, t. 7, f. 7, 8, 1869.
C. rugosum, Lamarck, Anim. sans Vert. Reeve, Conch. Icon.
sp. 68, 1845. *Indian Ocean.*
27. **C. foveolatum**, Sowerby, Zool. Proc. iii, 1840.
Reeve, Conch. Icon. sp. 87, 1845. Römer, Conch. Cab.
65, t. 11, f. 8, 1869. *Australia.*
28. **C. gratiosum**, Deshayes, Zool. Proc. 331, 1854.
Moluccas.

29. **C. impolitum**, Sowerby, Zool. Proc. 107, 1840.
Reeve, Conch. Icon. sp. 80, 1845. Römer, Conch. Cab.
62, t. 11, f. 12, 1869. *China.*
30. **C. Isocardia**, Linnæus, Syst. Nat. edit. x, 679.
Reeve, Conch. Icon. sp. 84, 1845. Römer, Conch. Cab.
47, t. 5, f. 5—7. *West Indies.*
31. **C. lacunosum**, Reeve, Zool. Proc. 1845.
Conch. Icon. sp. 81, 1845. *Hab.—?*
32. **C. leucostomum**, Born., Test. Mus. 46, t. 3, f. 6, 7.
Reeve, Conch. Icon. sp. 47, 1845. Römer, Conch. Cab. 52,
t. 5, f. 2, 1869.
C. magnum, Wood, Index Test. 25, t. 5, f. 20.
C. marmoreum, Lamarck, Anim. sans Vert. vi, 9, 1819.
C. elongatum, Sowerby, Genera, f. 1. *Singapore.*
33. **C. maculatum**, Reeve, Conch. Icon. sp. 58, 1844.
C. maculosum, Sowerby (not of Wood), Conch. Ill. sp. 56,
f. 18. Zool. Proc. 85, 1833.
Gulf of Mexico, Southern U. S.
34. **C. maculosum**, Wood, Gen. Conch. t. 52, f. 3, 1817.
Reeve, Icon. sp. 76, 1845.
C. multistriatum, Sowerby, Zool. Proc. 85, 1833.
C. arenicolum, Reeve, Conch. Icon. sp. 78, 1845.
W. Columbia.
35. **C. Mindanense**, Reeve, Zool. Proc. 1844.
Conch. Icon. sp. 19, 1844. *Philippines.*
36. **C. modestum**, Philippi, Zeit. Mal. 142, 1848.
37. **C. muricatum**, Linn., Syst. Nat. edit. x, 680.
Reeve, Conch. Icon. sp. 33, 1844. Römer, Conch. Cab.
49, t. 5, f. 8, 9, 1869.
C. Campechiense, Bolten, Mus. 191.
Southern U. S., West Indies, Brazil.
38. **C. nebulosum**, Reeve, Zool. Proc. 1845.
Conch. Icon. sp. 99, 1845. *Hab.—?*
39. **C. Orbita**, Sowerby, Zool. Proc. 83, 1833.
Reeve, Conch. Icon. sp. 85, 1845. Römer, Conch. Cab.
55, t. 11, f. 5, 6, 1869. *Isle Annaa.*
40. **C. oxygonum**, Sowerby, Zool. Proc. 83, 1840.
Reeve, Conch. Icon. sp. 77, 1845. *China, Philippines.*
41. **C. procerum**, Sowerby, Zool. Proc. 83, 1833.
Reeve, Icon. sp. 51, 1844. Römer, Conch. Cab. 58, t. 10,
f. 12, 13, 1869.

- C. laticostatum*, Sowerby, Zool. Proc. 85, 1833.
 41 *C. Panamense*, Sowerby, Zool. Proc., 85, 1833. Reeve,
 Conch. Icon. sp. 56, 1844. *Panama to Cape St. Lucas.*
42. *C. pulcarium*, Reeve, Zool. Proc. 1845.
 Conch. Icon. sp. 102, 1845. *Hab.—?*
43. *C. Reeveanum*, Dunker, Zeit. Mal. 54, 1852.
 Novit. Conch. Meeres Conch. 22, t. 6, f. 6—8, 1858.
Australia.
44. *C. rubicundum*, Reeve, Zool. Proc. 169, 1844.
 Conch. Icon. sp. 44, 1844. Römer, Conch. Cab. 60, t. 11,
 f. 10, 1869. *Zanzibar.*
- 45? *C. rotundatum*, Carpenter, Mazat. Cat. 531, 1857.
Mazatlan.
46. *C. senticosum*, Sowerby, Zool. Proc. 84, 1833.
 Conch. Illust. t. 47, f. 10. Römer, Conch. Cab. 51, t. 11,
 f. 3, 4, 1869.
C. muricatum, Menke (not Linn.), Zeit. Mal. iv, 188, 1847.
C. rastrum, Reeve, Conch. Icon. f. 82, 1845.
Panama to Cape St. Lucas.
47. *C. subelongatum*, Sowerby, Zool. Proc. 108, 1840.
 Reeve, Conch. Icon. sp. 57, 1844. Römer, Conch. Cab.
 54, t. 10, f. 10, 11, 1869. *West Indies.*
48. *C. subrugosum*, Sowerby, Zool. Proc. 108, 1840.
 Reeve, Icon. sp. 55, 1844. *Ceylon, Philippines, Zanzibar.*
 Probably only a variety of *C. flavum*.
49. *C. unicolor*, Sowerby, Zool. Proc. 107, 1840.
 Reeve, Conch. Icon. sp. 88, 1845. Römer, Conch. Cab.
 64, t. 9, f. 22—24, 1869. *Philippines.*
50. *C. variegatum*, Sowerby, Zool. Proc. 107, 1840.
 Conch. Illust. f. 57. Reeve, Conch. Icon. sp. 75, 1845.
 Römer, Conch. Cab. 63, t. 11, f. 7, 1869. *Philippines.*

Subgenus ISOCARDIA, Klein.

Ostracol. 138, 1753.

Acanthocardium, Römer, Conch. Cab. 17, 1869.

51. *C. aculeatum*, Linnæus, Syst. Nat. edit. 12, 1122.
 Reeve, Conch. Icon. sp. 17, 1844. Römer, Conch. Cab. 17,
 t. 2, f. 3—8, t. 8, f. 2, 1869.
C. parvum, Da Costa, Brit. Conch. 177.
C. ciliare, Montagu (not Linn.), Test. Brit. 79.
European Seas.

- 52. *C. corbis***, Martyn, Univ. Conch.
Chenu, Bibl. Conch. ii, t. 28, f. 2. Conrad, Amer. Journ.
Conch. v, 105. *Pulo Condore.*
- 53. *C. elegantulum***, Beck, Mörch. Faun. Grœn. 20, 1857.
Gould, Invert. Mass. 2d edit. 141, f. 451, 1870.
Greenland, Massachusetts.
- 54. *C. echinatum***, Linnæus, Syst. Nat. edit. x, 679.
Reeve, Conch. Icon. sp. 34, 1844. Römer, Conch. Cab.
20, t. 2, f. 6, t. 5, f. 3, 4, t. 8, f. 3, 4, 1869.
C. mucronatum, Poli, Test. Utr. Sicil. i, 59, t. 17, f. 7, 8.
C. paucicostatum, Sowerby, Zool. Proc. 106, 1840. Reeve,
Conch. Icon. sp. 18, 1844.
C. ciliare, Linn., Syst. Nat. edit. x, 679.
C. parvum, Da Costa.

VARIETY.

- 55. *C. Deshayesii***, Payraudeau, Moll. Corse, 56, t. 1, f. 33—
35.
Reeve, Icon. sp. 83, 1845. *Southern Europe.*
- 56. *C. exasperatum***, Sowerby, Zool. Proc. 106, 1840.
Reeve, Conch. Icon. sp. 107, 1845. Römer, Conch. Cab.
27, t. 9, f. 2, 3, 1869. *Australia.*
- 57. *C. erinaceum***, Lamarck, Anim. sans Vert. vi, 8.
Reeve, Icon. sp. 62, 1845. Römer, Conch. Cab. 23, t. 2,
f. 7, t. 8, f. 5, 6, 1869. *Mediterranean.*
- 58. *C. exile***, Dunker, Mal. Blatt. 35, 1862. *New Caledonia.*
- 59. *C. exiguum***, Gmelin, Syst. Nat. 3255.
Römer, Chemnitz, 36, t. 9, f. 9, 10, 1869.
C. pygmæum, Donovan, Brit. Shells, i, t. 32, f. 3.
C. subangulatum, Scacchi, Cat. 8.
C. Siculum, Sowerby, Zool. Proc. 106, 1840.
C. parvum, Philippi, Moll. Sicil. ii, 39, t. 14, f. 17.
C. stellatum, Reeve, Zool. Proc. 1845. Iconica, sp. 109, 121,
1845.
C. Helleri, Brusina. *European Seas.*
- 60. *C. fasciatum***, Montagu, Test. Brit. Suppl. 30, t. 27, f. 6.
Reeve, Conch. Icon. f. 118, 1845. Römer, Conch. Cab.
37, t. 9, f. 11—14, 1869.
C. elongatum, Montagu, Test. Brit. 82.
C. ovale, Sowerby, Conch. Ill. f. 24. Reeve, Conch. Icon. f.
119, 1845.
C. rubrum, Reeve, Conch. Icon. sp. 124, 1845.

- C. arcuatum*, Reeve, Conch. Icon. sp. 133, 1845.
C. zonatum, Leach.
C. exiguum, Macgillivray.
C. scabrum, Philippi, Moll. Sicil. ii, t. 14, f. 16.
C. ambiguum, Costa. *European Seas.*
- 61. *C. latum***, Born., Mus. 48, t. 3, f. 9.
 Reeve, Conch. Icon. sp. 21, 1844. Römer, Conch. Cab. 29, t. 7, f. 1, 2, 1869. *Tranquebar, Philippines.*
- 62. *C. nodosum***, Montagu, Test. Brit. 81.
 Reeve, Conch. Icon. sp. 128, 1845. Römer, Conch. Cab. 33, t. 9, f. 6—8, 1869.
C. roseum, Lamarck, Anim. sans Vert.
C. punctatum, Brocchi, Cat. Subapp. 666, t. 16, f. 1. *England, Norway.*
- 63. *C. Nuttallii***, Conrad, Jour. Philad. Acad. vii, 229, t. 17, f. 3, 1837.
 Reeve, Icon. sp. 66, 1845. Römer, Conch. Cab. 31, t. 9, f. 5, 1869. Conrad, Am. Jour. Conch. v, 105, 1869.
C. Californianum, Conrad, Jour. Phil. Acad. vii, 229, t. 17, f. 4, 1837. *California, Sitka.*
- 64. *C. papillosum***, Poli, Test. utr. Sicil. i, t. 16, f. 2—4.
 Reeve, Conch. Icon. sp. 111, 1845. Römer, Conch. Cab. 32, t. 11, f. 1, 1869.
C. Polii, Payraudeau, Moll. Corse, 57.
C. scobinutum, Lamarck, Anim. sans Vert.
C. planatum, Renier.
C. punctatum, Brocchi (not Phil.) *English Channel to Mediterranean.*
- 65. *C. pictum***, Dunker, Test. Mal. 37, 1862. *Antilles.*
- 66. *C. pseudolima***, Lamarck, Anim. sans Vert.
 Reeve, Conch. Icon. sp. 4, 1844. Römer, Conch. Cab. 28, t. 9, f. 4, 1869. *Red Sea.*
- 67. *C. tuberculatum***, Linnæus, Syst. Nat. edit. x, 673.
 Römer, Conch. Cab. 24, t. 5, f. 1, t. 9, f. 1, 1869.
C. ciliare, Donovan.
C. nodosum, Montagu (not Turton), Test. Brit.
C. rusticum, Linn., Syst. Nat. edit. x, 681. Reeve, Conch. Icon. sp. 16, 1844. *European Seas.*
- 68. *C. Suecicum***, Loven, Moll. Scand. 189.
 Reeve, Icon. sp. 132, 1845. Römer, 39, t. 9, f. 15, 16, 1869.
C. Loveni, Thompson, Ann. Mag. N. Hist. xx, 317, t. 19, f. 7. *Northern Europe.*

Subgenus CERASTODERMA, Mörch.

Cerastes and *Cerastoderma*, Poli, Test. utr. Sicil. 163, 1791.**69. C. Californiense**, Deshayes, Guérin's Mag. de Zool. t. 47, 1841.*C. pseudofossile*, Reeve, Icon. sp. 52, 1844.*C. blandum*, Gould. Bost. Proc. iii, 276, 1850.*N. Pacific Ocean, United States to Japan.***70. C. Ciliatum**, Fabricius, Faun. Grœn., 410.

Römer, Conch. Cab. 43, t. 7, f. 5, 6, t. 10, f. 1-3, 1869.

C. Islandicum, Chemn., Conch. Cab., vi, 200, t. 19, f. 195, 196.*C. Arcticum*, Sowb., Zool. Proc. 106, 1840.*C. pubescens*, Couthuoy, Bost. Jour. Nat. Hist., ii. 60, t. 3, f. 6.*Northern Atlantic Ocean.***71. C. edule**, Linnæus, Syst. Nat. Edit. x, 681.

Reeve, Icon. sp. 22, Römer 40, t. 7, f. 3, 4, t. 9, f. 17-21.

C. glaucum, Brug., Encyc. Meth. i, 220.*C. vulgare*, Da Costa, Brit. Conch. 180, t. 11, f. 1.*C. rusticum*, Chemn., Conch. Cab. vi. 201, t. 19, f. 197.*C. Balticum*, Beck. Reeve, Icon. sp. 113, 1845.*C. Eichvaldi*, Reeve, Icon. sp. 94, 1845.*C. pectinatum*, Lam., (not Linn.), Anim. s. Vert.*C. crenulatum*, Lam., Anim. s. Vert.*C. zonatum*, Brown, Rec. Conch. 88, t. 35, f. 8.*C. Lamarckii*, Reeve, Icon. sp. 93, 1845.*Europe, Caspian Sea.***72. Hayesii**, Stimpson, Proc. Phil. Acad. 142, 1863.*Disco Isld., Nova Scotia.***73. C. magnum**, Born., Test. Mus. 46, t. 3, f. 5.

Reeve, Icon. sp. 20, Römer, Conch. 45, t. 10, f. 4, 5.

C. maculatum, Gmelin, Syst. Nat. 3255.*C. ventricosum*, Brug., Encyc. Meth. 228. *West Indies.***74. C. pinnulatum**, Conrad, Jour. Phil. Acad. vi, 260, t. 11, f. 8, 1831. *Northern United States.*

Subgenus SERRIPES, Beck.

Verzeichn. d. Deutsch. Naturf. in Kiel, 217.

Aphrodite, Lea, Am. Philos. Trans. iv.*Acardo*, Swains, Malac. 374, 1840.**75. C. Fabricii**, Deshayes, Zool. Proc. 333, 1854.*C. Grœnlandicum*, Var. Middendorff, Mal. Ross. 16, f. 6, 7.

Römer, Conch. Cab. 99, 1869.

Siberia.

76. Grœnlandicum, Chemnitz, Conch. Cab. vi, 202, t. 19, f. 198.

Reeve, Icon. sp. 53, 1845.

C. edentulum, Montagu, Test. Brit. Suppl., 29.

Maetra radiata, Donovan, Brit. Shells v, t. 161.

Aphrodite Columba, Lea, Am. Philos. Trans. iv. 5, t. 18, f. 54, 1834.

C. boreale, Reeve, Icon. sp. 131, 1845.

Arctic Ocean, Europe, America south to Massachusetts.

77. C. Adamsi, Tryon.

C. modestum, Adams and Reeve (not Philippi), Voy. Samarang 77, t. 22, f. 6, 1850. *Eastern Seas.*

Genus **PAPYRIDEA**, Swainson.

Malacol. 374, 1810.

1. P. aperta, Chemnitz, Conch. Cab. vi, 189, t. 18, f. 181-3.

C. Virgineum, B. Gmelin, Syst. Nat., 3253.

C. rugatum, Reeve, Icon. sp. 63, 1845.

Römer, Conch. Cab. 77, t. 3, f. 1-3, 1869. *Philippines.*

2. P. bullata, Linnæus, Syst. Nat. Edit. x, 673.

Reeve, Icon. sp. 8. Römer, Conch. Cab. 74, t. 12, f. 13-16.

C. Soleniforme, Brug. Encyc. Meth. i. 235, 1789.

C. spinosum, Muschen, Naturf. 1782.

Adams' Genera iii, t. 112, f. 1, 1 a.

C. aspersum, Sowerby, Zool. Proc. 85, 1833. *West Indies.*

3. P. Cumingii, Sowerby, Zool. Proc. 82, 1833.

Reeve, Icon. Sp. 59, 1845.

Gulf of Dulce, Central Am.

4. P. Fornasiniana, Bianconi, Mem. Acad. Bologn. vii, t. 25, f. 1. *Mozambique.*

5. P. hiulca, Reeve, Zool. Proc., 1845.

Icon. sp. 123, 1845.

Hab. —?

6. P. papyracea, Chemnitz, Conch. Cab. vi, 190, t. 18, f. 184, 1782.

Reeve, Icon. sp. 9. Römer, Conch. Cab. 78, t. 3, f. 4, t. 12, f. 19, 20.

C. Natalense, Krauss' Süd Afric. Moll. 12, t. 1, f. 9.

C. Japonica, Dunker, Mal. Blatt. vi, 223.

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C. muticum, Reeve, Icon. f. 32, 1844.

Moll. Japan. 28, t. 3, f. 16. *China, Japan, Philippines.*

7. **P. ringicula**, Sowerby, Zool. Proc. 106, 1840.
 Reeve, Icon. sp. 115. Römer, Conch. Cab. 76, t. 12, f. 17, 18. *West Indies.*

Genus **LÆVICARDIUM**, Swainson.

Man. Malacol. 373, 1840.

Liocardium, Mörch, (not Agassiz.)

1. **L. attenuatum**, Sowerby, Zool. Proc., 1840.
 Reeve, Icon. 72. Roemer, Conch. Cab. 81, t. 13, f. 1, 2.
C. alternatum, Sowerby, Adams' genera ii, 456 (misprint).
C. biradiatum, Wood (not Brug.). Gen. Conch. t. 54, f. 2, 1817.
2. **L. apicinum**, Carpenter, Ann. and Mag. Nat. Hist. xi, 309, 1863. *Lower California.*
3. **L. biradiatum**, Bruguiere, Encyc. Meth. i, 231, 1789.
 Reeve, Icon. sp. 49. Roemer, Conch. Cab. 87, t. 3, f. 5, 6, 1869.
C. lævigatum, Chemnitz (not Gmelin), Conch. Cab. vi, t. 18, f. 185, 186. *Indian Ocean, Philippines.*
4. **L. Beechei**, Adams and Reeve, Zool. Proc. 25, 1847.
 Voy. Samarang, 78, t. 22, f. 12, 1848. *Sooloo Seas and Korean Archipelago.*
5. **L. Brasilianum**, Lamarek, Anim. s. Vert.
 Reeve, Icon. sp. 61. Roemer, Chemnitz 89, t. 14, f. 2, 3.
C. Lamarekii, D'Orbigny, Amer. Merid. 591. *Brazil.*
6. **L. dulce**, Deshayes, Conch. Bourbon 12, t. 2, f. 4, 5, 1863. *Isle Bourbon.*
7. **L. elatum**, Sowerby, Zool. Proc. 84, 1833.
 Reeve, Icon. sp. 41. Roemer, Conch. Cab. 93, t. 13, f. 7. *California.*
8. **L. Elenense**, Sowerby, Zool. Proc. 108, 1840.
 Conch. Illust. f. 58. Reeve, Icon. sp. 104. *W. Columbia.*
9. **L. fragile**, Reeve, Zool. Proc. 1845.
 Conch. Icon. sp. 108, 1845. *Hab.—?*
10. **L. glabratum**, Roemer, Chemnitz 91, t. 13, f. 8, 9, 1869.
C. lævigatum, Reeve (not Linn.), Conch. Icon. f. 69, 1845. *West Indies.*
11. **L. læve**, Gray, Jardine's Annals, 1, 2, 8. *Sierra Leone.*
12. **L. Loroisii**, Huppé, Rev. et Mag. Zool. 470, t. 19, f. 1, 1856. *Hab.—?*

13. **L. lyratum**, Sowerby, Zool. Proc. 109, 1840.
Reeve, Icon. sp. 12. Roemer, Conch. Cab. 96, t. 14, f. 4-6, 1869. *New Caledonia, Philippines.*
14. **L. Mortoni**, Conrad, Jour. Phil. Acad. vi, 259, t. 11, f. 5-7, 1837.
Reeve, Icon. sp. 101. Roemer, Conch. Cab. 99, t. 14, f. 10, 11. *Atlantic Coast, United States.*
15. **L. multipunctatum**, Sowerby, Zool. Proc. 84, 1833.
Reeve, Icon. sp. 12, Roemer, Conch. Cab. 88, t. 14, f. 1. *China, Philippines.*
16. **L. Norvegicum**, Spengler, Skrivt. Nat. Selsk. i, 42.
Roemer, Conch. Cab. 83, t. 13, f. 3-6.
C. crassum, Gmelin.
C. lævigatum, Pennant (not Linn.), Brit. Zool. iv, 91, t. 51, f. 40.
C. serratum, Bruguière (not Linn.), Encyc. Meth. i, 229, 1789.
C. oblongum, Reeve (not Chemn.), Icon. sp. 71, 1845.
C. vitellinum, Reeve, Icon. sp. 37, 1845.
C. Pennnatii, Beck, Reeve, Icon. sp. 48, 1844.
C. medium, Turton (not Linn). *European Seas.*
17. **L. oblongum**, Chemnitz, Conch. Cab. vi, 195, t. 19, f. 190.
Roemer, Conch. Cab. 85, t. 7, f. 9, 1869.
C. flavum, Born., Mus. 47, t. 3, f. 8.
C. sulcatum, Lam., Anim. s. Vert.
Southern Europe, Devonshire, England.
18. **L. pectinatum**, Linn., Mus. Ulric.
Reeve. Icon. sp. 14. 1844.
C. Æolicum, Born., Mus. 48, 1780. Roemer, Chemnitz, 94, t. 3, f. 9, 10. 1869.
C. aurantiacum, Adams and Reeve, Voy. Samarang. 77, t. 22, f. 4. 1848.
C. Kalamantinum, Adams and Reeve, Voy. Samarang 77, t. 22. f. 7, 1848.
Indian Ocean, Chinese Seas, Cape Verde Isles.
19. **L. pictum**, Ravenel, Philad. Proc. 44, 1861.
South Carolina.
20. **L. substriatum**, Conrad, Jour. Philad. Acad. vii, 228, t. 17, f. 2, 1837.
L. cruentatum, Gould, Carpenter, Zool. Proc. 201. 1856.
California.
21. **L. serratum**, Linnæus, Syst. Nat. edit. x, 680.
Römer, Conch. Cab. 80, t. 3, f. 7, 8.

C. lævigatum, Gmelin, Syst. Nat. 3251.

C. citrinum, Wood, Gen. Conch. t. 54, f. 3, 1817.

C. oviputamen, Reeve, Zool. Proc. 168, 1844. Conch. Icon.
sp. 36. Römer, Conch. Cab. 91.

West Indies to Rio Janeiro.

Genus **HEMICARDIA**, Klein.

Ostracol. 137, 1753.

Corculum (pars), Hebenstreit, Dissert. Conch. 1728.

“ Bolten, Mus. 188.

Cardissa, Muhlfeldt, Entwurf. 52, 1811.

Isocardia, Oken (non Lam. nec Klein), Zool. 234, 1815.

Hemicardium, Cuvier, Regne Anim. 479, 1817.

1. **H. cardissa**, Linnæus, Syst. Nat. edit. x, 678.

Reeve, Icon. sp. 15. Römer, Conch. Cab. 113, t. 6, f. 11,
1869. *Indian Ocean, Philippines.*

2. **H. Dionæa**, Brod. and Sowb., Zool. Jour. iv, 367, 1828.

Reeve, Icon. sp. 122. *Isl. Annaa.*

3. **H. humana**, Chemnitz, Conch. Cab. vi, 153, t. 14, f. 145,
146.

Reeve, Icon. f. 15 a. Römer, Conch. Cab. 116, t. 6, f. 5,
6, 9, 10.

C. Junonia, Lamarck, Anim. s. Vert.

C. roseum, Chemnitz, Conch. Cab. vi, 154, t. 14, f. 147, 148.

Reeve, Icon. f. 15 b.

C. unimaculatum, Sowerby, Zool. Proc. 84, 1833. Reeve,
Icon. sp. 114. *Indian Ocean, Chinese Sea.*

4. **H. monstrosa**, Chemnitz, Conch. Cab. vi, 155, t. 14, f.
149, 150.

Reeve, Icon. sp. 15. Römer, Conch. Cab. 117, t. 6, f.
7, 8.

C. inversum, Lamarck, Anim. s. Vert. *East Indian Seas.*

Subgenus **FRAGUM**, Bolten.

Museum, edit. i, 189, 1789.

Hemicardium, Swainson (not Cuvier), Malacol. Man. 373,
1840.

5. **H. Adamsii**, Reeve, Voy. Samarang, 77, t. 22, f. 2, 1848.

Borneo.

6. **H. biangulata**, Broderip and Sowerby, Zool. Jour. iv, 307.

Reeve, Icon. sp. 29. Römer, Conch. Cab. 104, t. 14, f.
12, 13.

- C. planicostatum*, Sowerby, Zool. Proc. 83, 1833. Reeve, Icon. sp. 31, 1844. *W. Columbia to Cape St. Lucas.*
7. **H. Carditæforme**, Reeve, Zool. Proc. 1845.
Conch. Icon. sp. 127. *Hab.—?*
8. **H. distorta**, Philippi, Archiv. für Naturg. 55, 1845.
Friendly Islands.
9. **H. Donaciforme**, Spengler.
Römer, Conch. Cab. 109, t. 4, f. 13, t. 14, f. 16, 17. Reeve, Icon. sp. 25.
C. Australiensis, Reeve, Zool. Proc. 168, 1844. Reeve, Icon. sp. 24. *Philippines, Australia.*
10. **H. fornicata**, Sowerby, Zool. Proc. 110, 1840.
Conch. Illust. f. 50. Conch. Icon. sp. 110. *Hab.—?*
11. **H. Fragum**, Linnæus, Syst. Nat. edit. x, 679.
Reeve, Icon. sp. 23. Römer, Conch. Cab. 105, t. 4, f. 9, 10.
C. imbricatum, Born (not Sowb.), Mus. 42, t. 3, f. 3, 4, 1798.
China, Philippines, Pacific Isles.
12. **H. Hemicardia**, Linnæus, Syst. Nat. edit. x, 678.
Reeve, Icon. sp. 38. Römer, Conch. Cab. 197, t. 4, f. 2, 4.
Philippines.
13. **H. Hystrix**, Reeve, Zool. Proc. 168, 1844.
Conch. Icon. sp. 40. *Philippines.*
14. **H. granifera**, Brod. et Sowb., Zool. Jour. iv, 367.
Reeve, Icon. sp. 43. Römer, Conch. Cab. iii, t. 14, f. 20, 21.
Pacific Coast, Central America.
15. **H. imbricata**, Sowerby, Zool. Proc. 110, 1840.
Reeve, Icon. sp. 28. *Swan River Colony, Australia.*
16. **H. media**, Linnæus, Syst. Nat. edit. xii, 1122.
Reeve, Icon. sp. 30. Römer, Conch. Cab. 102, t. 4, f. 5, 7. *West Indies.*
17. **H. munda**, Reeve, Zool. Proc. 1845.
Conch. Icon. sp. 125. *Lord Hood's Island.*
18. **H. nivalis**, Reeve, Zool. Proc. 1845.
Icon. sp. 95, 1845. *Philippines.*
19. **H. obovale**, Brod. and Sowerby, Zool. Proc. 84, 1833.
Reeve, Conch. Icon. sp. 117, 1845. *West Columbia.*
20. **H. ovuloides**, Reeve, Zool. Proc. 145, 1845.
Conch. Icon. sp. 126, 1845. *Hab.—?*

- 21. *H. speciosa***, Adams and Reeve, Voy. Samarang, 77, t. 22, f. 9, 1848. *China Sea.*
- 22. *H. tumorifera***, Lamarck, Anim. s. Vert. Delessert, Recueil, t. 11, f. 7.
C. Guichardi, Bernardi, Jour. Conch. vi, 53, t. 2, f. 4, 1857.
 Römer, Conch. Cab. 109, t. 14, f. 14, 15.
New Caledonia, Australia.
- 23. *H. unedo***, Linnæus, Syst. Nat. edit. x, 680.
 Reeve, Icon. sp. 13. Roemer, Conch. Cab. 101, t. 4, f. 11, 12.
Ceylon, Philippines, Australia.
- 24. *H. venusta***, Dunker, Zeit. Mal. 32, 1862. *Antilles.*
- 25. *H. virgo***, Reeve, Zool. Proc. 1845.
 Icon. sp. 120. *Hab.—?*

Subgenus **LUNULICARDIA**, Gray.

Annals and Mag. Nat. Hist. xi, 40, 1853.

- 26. *H. auricula***, Forskal, Faun. Arab. 122.
 Reeve, Icon. sp. 39. Roemer, Conch. Cab. 120, t. 14, f. 18, 19.
C. retusum, var. 2, Lamarck, Anim. s. Vert. *Red Sea.*
- 27. *H. retusa***, Linnæus, Syst. Nat. edit. xii, 1121.
 Reeve, Icon. sp. 103. Roemer, Conch. Cab. 118, t. 6, f. 1—4.
C. subretusum, Sowerby, Zool. Proc. 110, 1840. Reeve, Icon. sp. 100, 1845. *Indian Ocean, China.*

Genus **ADACNA**, Eichwald.

Br. Jahrbuch, 734, 1838.

Hypanis, Pander, Beitr. Geogn. Russ. 1830.

Pholadomya, Agass. et Middendorff (not Sowerby).

- 1. *A. colorata***, Eichwald, Zool. Spec. i, 279, t. 5, f. 4, 1829.
Caspian Sea.
- 2. *A. edentula***, Pallas, Reise, i, No. 93, 1771. *Caspian Sea.*
- 3. *A. læviuscula***, Eichwald, Zool. Spec. i, 279, t. 5, f. 1, 1829.
 Adams, Genera, iii, t. 112, f. 4. *Caspian Sea.*
- 4. *A. plicata***, Eichwald, Zool. Spec. i, 279, t. 5, f. 2, 1829.
Caspian Sea.
- 5. *A. vitrea***, Eichwald, Zool. Spec. i, 279, t. 5, f. 3, 1829.
Amphidesma Caspia, Kryn. Caspian Sea.

Spurious Species.

A. parvula, Dunker, Zeit. Mal. 36, 1862.

Ins. Chiloe, Magellan's Straits.

This is an immature shell, probably, and certainly not an *Adacna*.

Subgenus MONODACNA, Eichwald.

Faun. Casp. Mar. 1838.

6. *A. Caspia*, Eichwald, Faun. Casp. 274, t. 39, f. 4.

Reeve, Conch. Icon. sp. 96, 1845.

Caspian Sea.

7. *A. pseudocardia*, Deshayes, Mem. Soc. Geol. Franc. iii, 59, t. 1, f. 1, 2, 1838.

A. Pontica, Eichwald, Faun. Casp. 219, 1841. *Caspian Sea.*

Subgenus DIDACNA, Eichwald.

Faun. Casp. Mar. 1838.

8. *A. crassa*, Eichwald, Zool. Spec. i, 283, 1829.

Faun. Caspio-Caucasica, 218, t. 39, f. 6, 1841.

Cardium Eichwaldi, Kryn, Bullet. Moscow, 61, 1837.

Caspian Sea.

9. *A. trigonoides*, Pallas, Reise, i, 478, 1771.

Eichwald, Faun. Caucas. 217, t. 39, f. 5, 1841.

C. trilaterum, Gmelin, Reise Russl. pt. iii, 248, 1774.

C. lineatum, Gmelin.

Caspian Sea.

Undetermined Species of Cardium.

M. Deshayes has published in the Zool. Proc. 330 et seq., 1854, short Latin diagnoses of the following species. Having no specimens, figures or comparative characters to assist me, I will not attempt to classify them:

C. SERRULATUM, Guinea.

" *GOSSEI*, W. Indies.

" *BICOLOR*, Hab.—?

" *HUDSONIENSE*, Hudson's Bay.

" *TUMIDUM*, Moluccas.

" *MAURITIANUM*, Mauritius.

" *FESTIVUM*, New Ireland.

C. ÆQUALE, Hab.—?

" *MIRABILE*, Philippines.

" *DEBILE*, Chinese Seas.

" *TRANSVERSALE*, Alboran.

" *PRODUCTUM*, Torres Straits.

" *SCRUPULOSUM*, Malacca.

" *LOBULATUM*, Philippines.

Genus **BUCARDIUM**, Mühlfeldt.

Entwurf, 52, 1811.

Isocardia, Lamarek (not Klein), Prod. Syst. 86, 1799.

Glossus and *Glossoderma*, Poli, Test. utr. Sicil. ii, 114, 1795.

1. **B. cor**, Linnæus, Syst. Nat. edit. xii, 1137.

Reeve, Icon. sp. 3, 1845.

I. lunulata, Nyst., Coq. Foss. Anvers. 13, t. 3, f. 53.

I. globosa, DeFrance, Dict. Sc. Nat. xxiv, 180, f. 2.

Bucardia communis, Schumacher, Essai Nov. Syst.

Kelliella abyssicola, Sars.

Variety.

2. **B. Hibernicum**, Reeve, Icon. sp. 4, 1845.

Norway to Mediterranean.

Subgenus MEIOCARDIA, H. and A. Adams.

Genera, ii, 461, 1857.

3. **B. Cumingii**, A. Adams, Ann. and Mag. N. Hist. xiii, 309, 1864. *China.*

4. **B. Moltkianum**, Spengler, Berl. Gesellsch. Naturf. iv, 321, t. 14.

Reeve, Icon. sp. 1, 1845.

Philippines.

5. **B. tetragonum**, Adams & Reeve, Voy. Samarang, 76, t. 22, f. 1, 1848. *Japan.*

6. **B. vulgaris**, Reeve, Conch. Icon. sp. 2, 1845.

Cardita Moltkiana, Bruguiere (not Spengler), Encyc. Meth. i, 404, 1789.

Isocardia Moltkiana, Lam. Anim. s. Vert.

Variety.

7. **B. Lamarckii**, Reeve, Icon. sp. 5, 1845.

China.

Genus **CARDILIA**, Deshayes.

Lamarck, Anim. sans Vert. edit. ii, vi, 448, 1835.

1. **C. gemmulata**, Gould, Bost. Proc. *China Seas.*

2. **C. inermis**, Deshayes, Mag. Zool. 100, 1844.

Sumatra, Philippines.

3. **C. Martinii**, Deshayes, Mag. Zool. t. 101, 1844.

Malacca, Philippines.

4. **C. semisulcata**, Lamarck.

Deshayes, Mag. Zool. t. 99, 1844.

Australia, Malacca.

Genus **VERTICORDIA**, S. Wood.

Sowerby, Min. Conch. t. 639, 1844.

1. **V. Deshayesiana**, Fischer, Jour. de Conch. 35, t. 5, f. 10, 11, 1862. *China.*

2. **V. Japonica**, A. Adams, Ann. and Mag. N. Hist. 224, 1863.
Japan.
3. **V. multicostata**, A. Adams, Ann. and Mag. Nat. Hist.
224, 1863. *Japan.*
4. **V. novemcostata**, Adams & Reeve, Voy. Samarang, t. 24,
f. 1, 1850. *Chinese Seas.*
5. **V. ornata**, d'Orbigny, Moll. Cuba, t. 27, f. 30—33, 1846.
West Indies.

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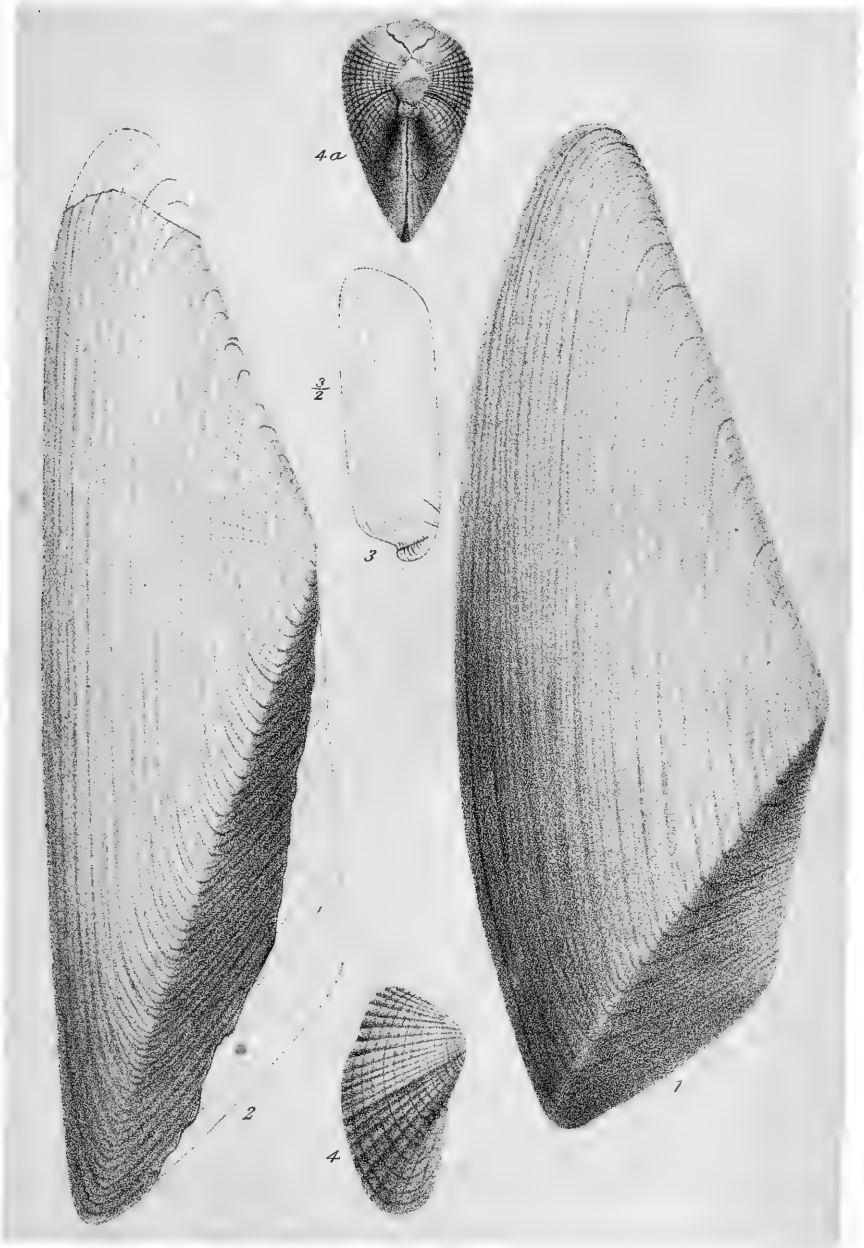
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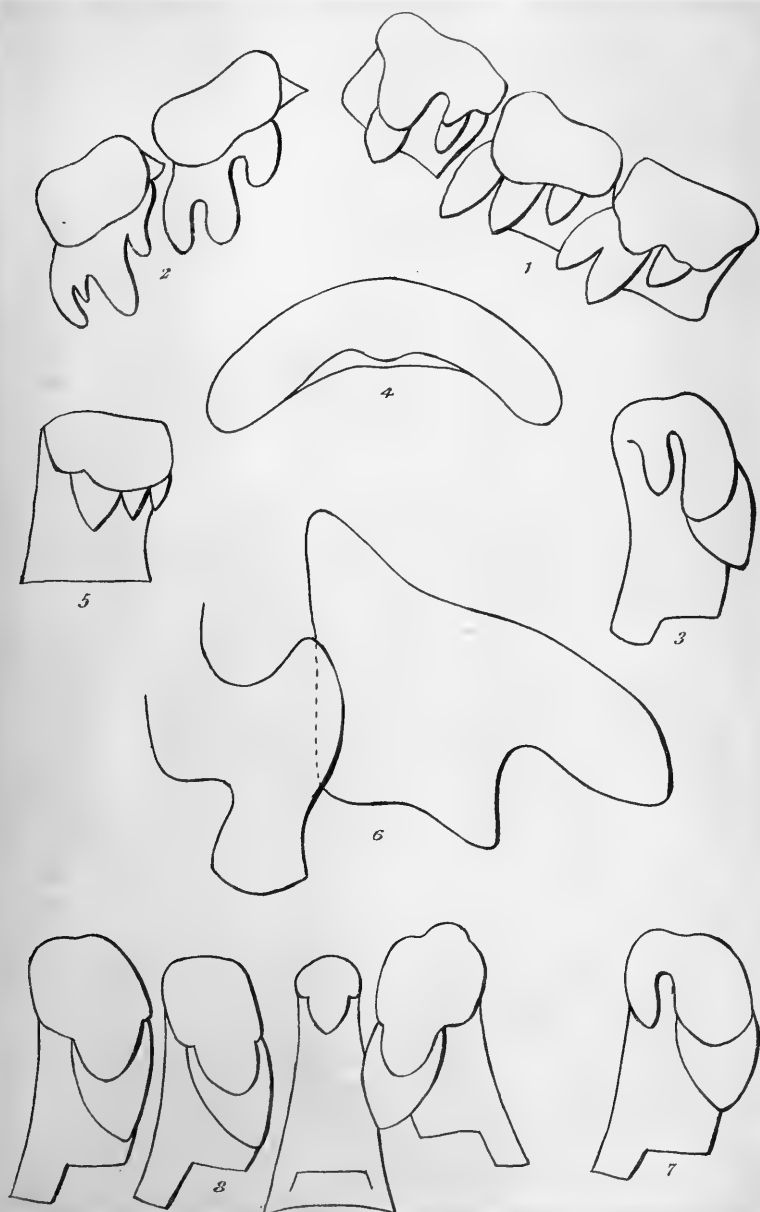
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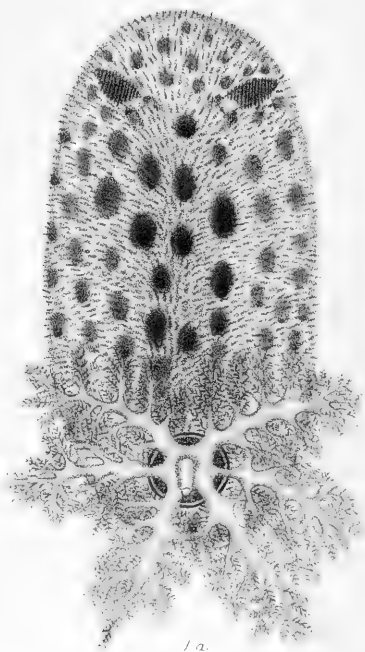
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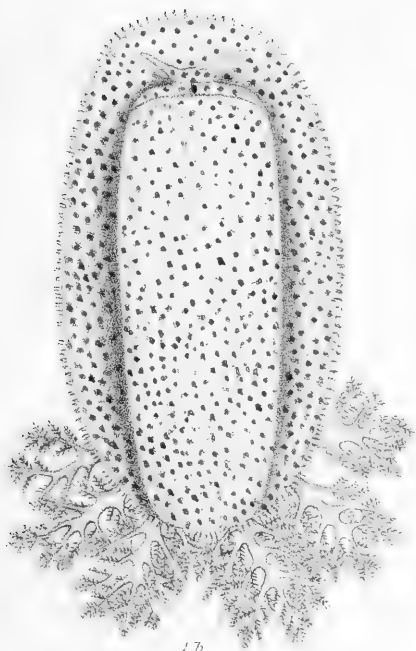




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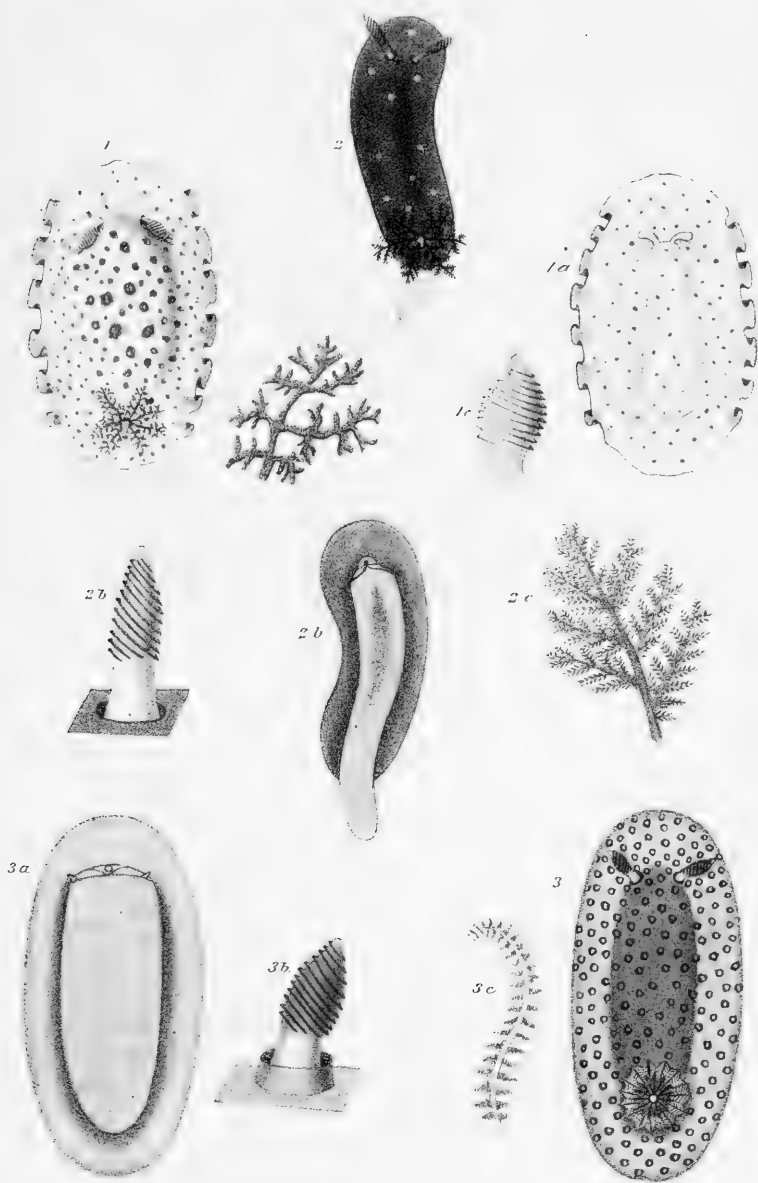
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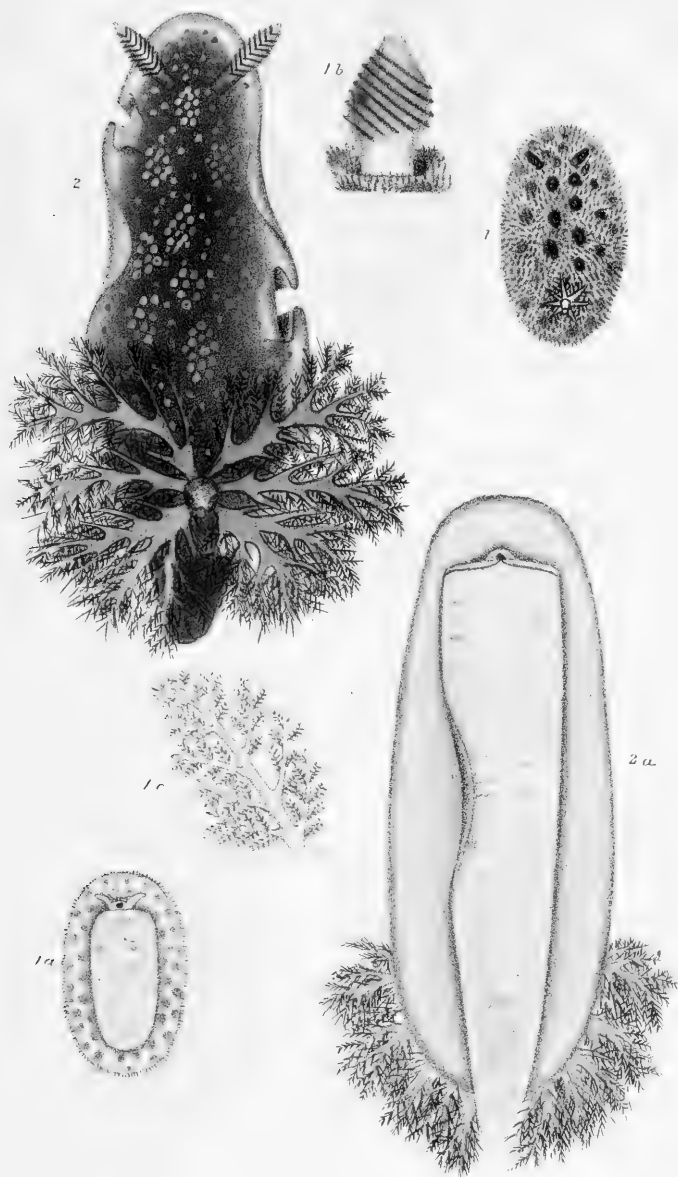


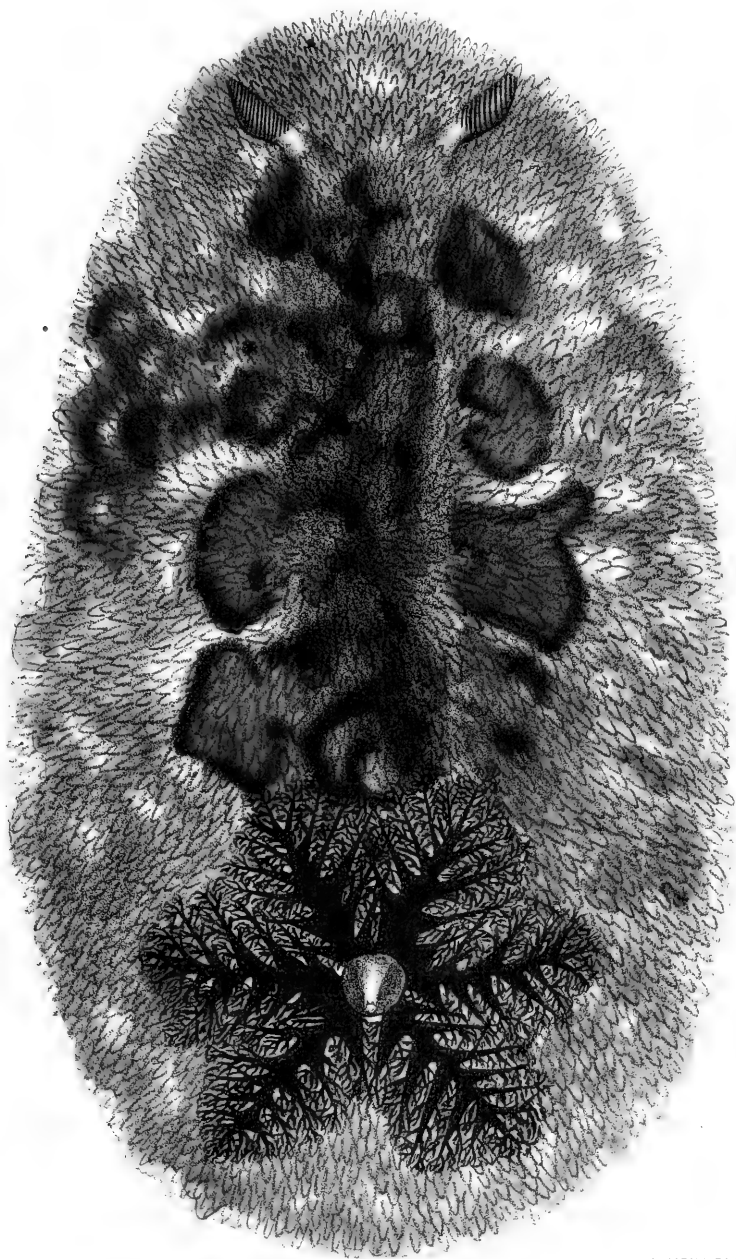
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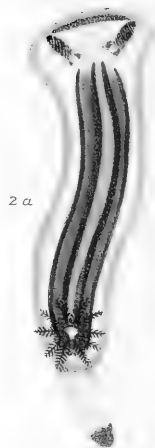
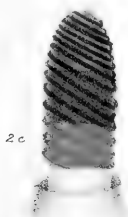
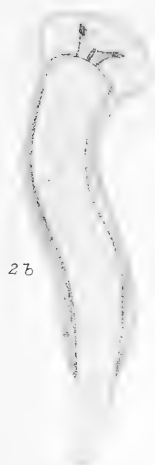
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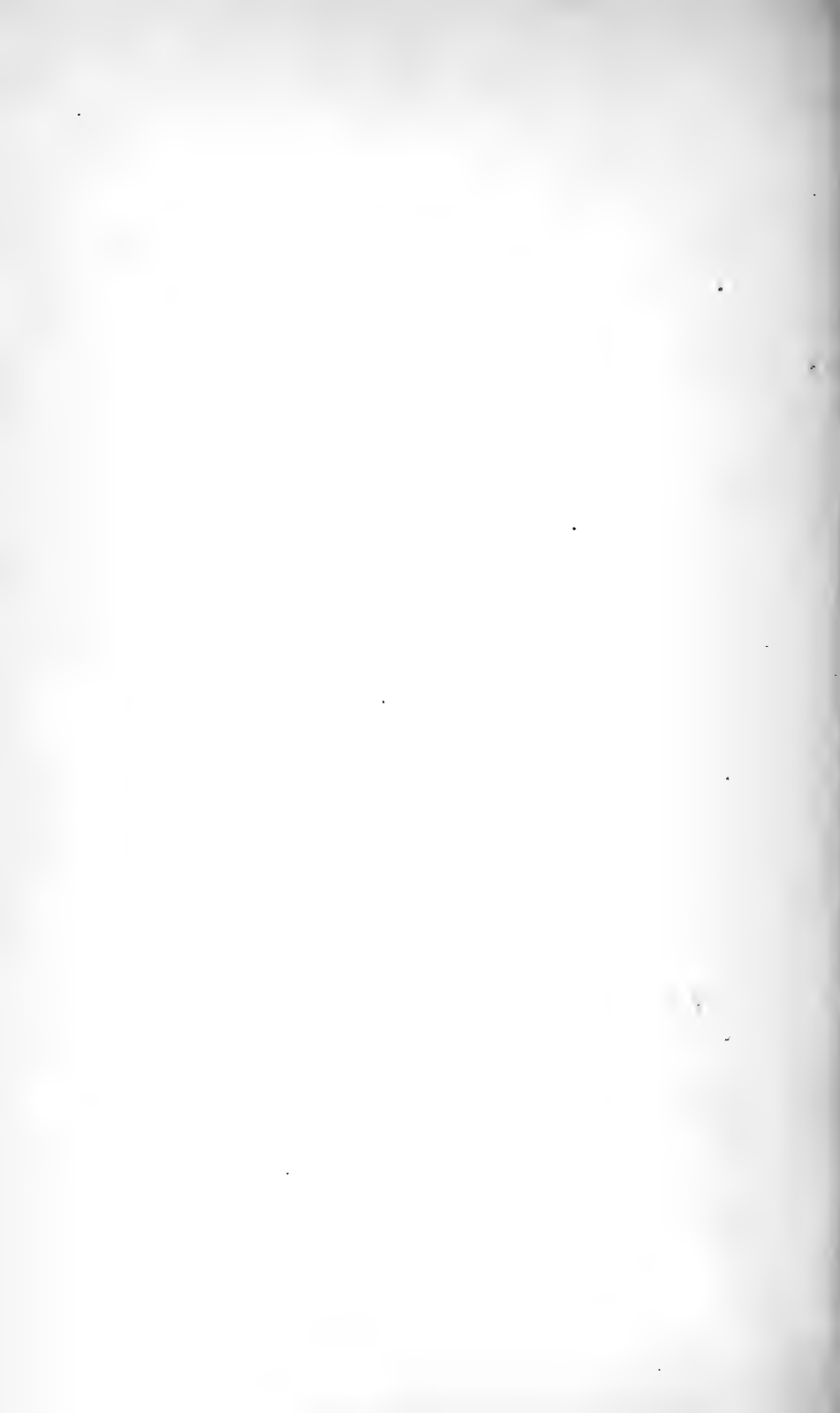


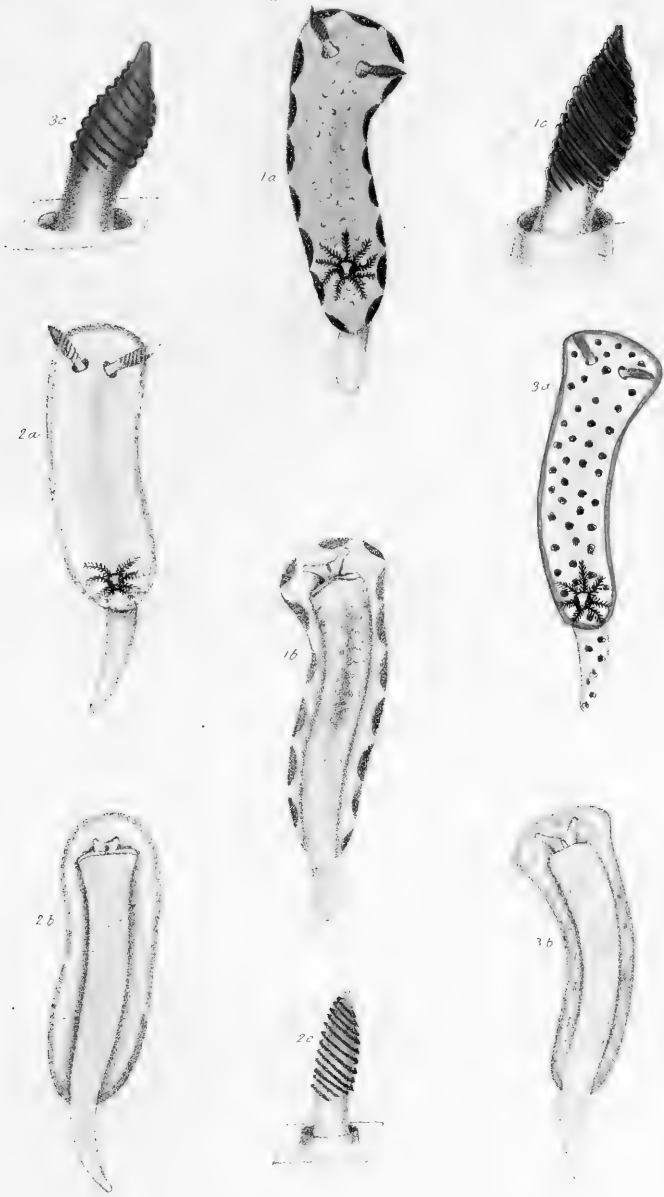




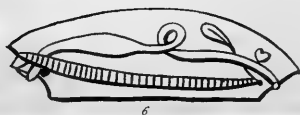
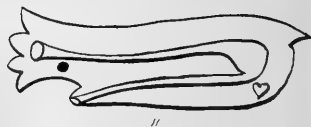
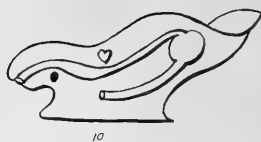
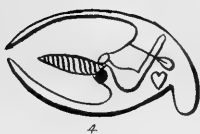
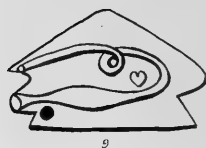
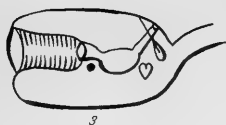
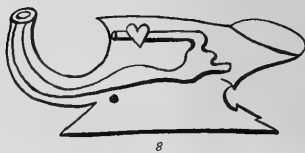
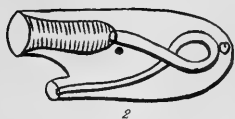
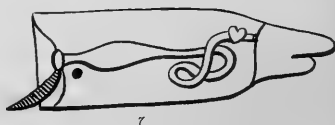
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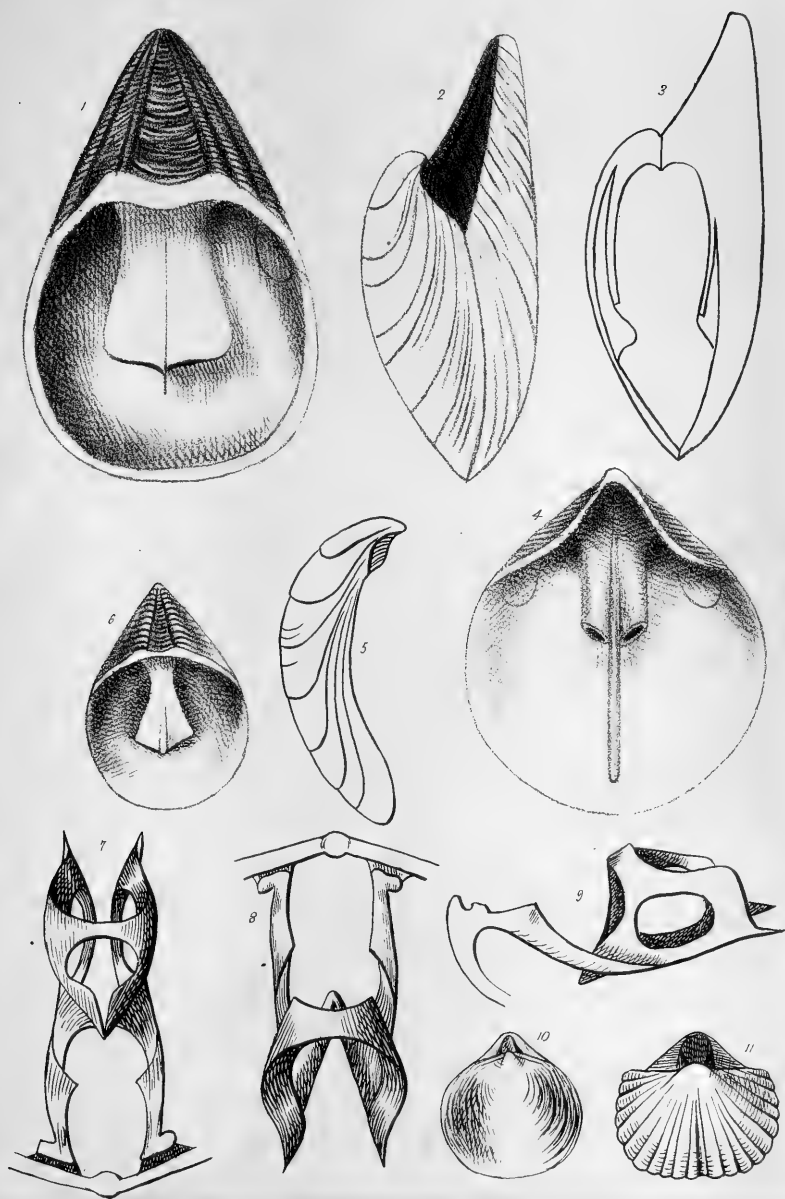




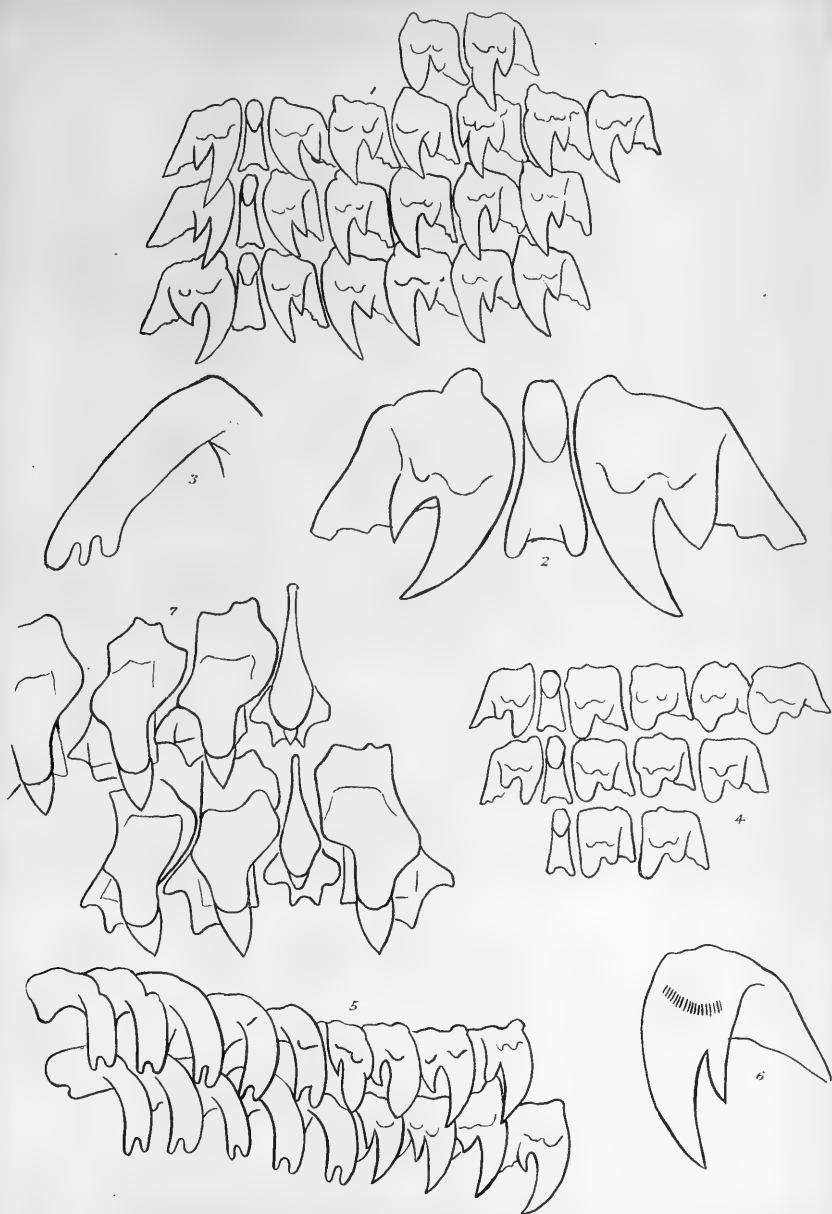




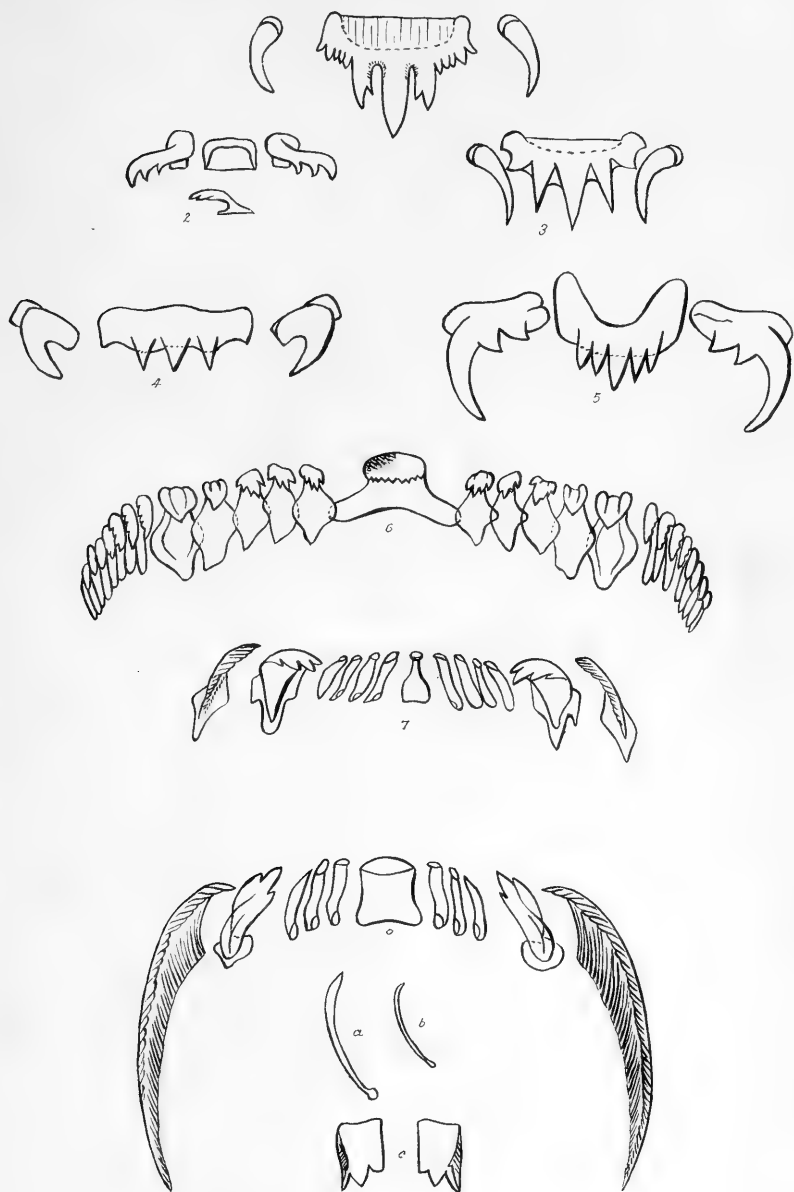
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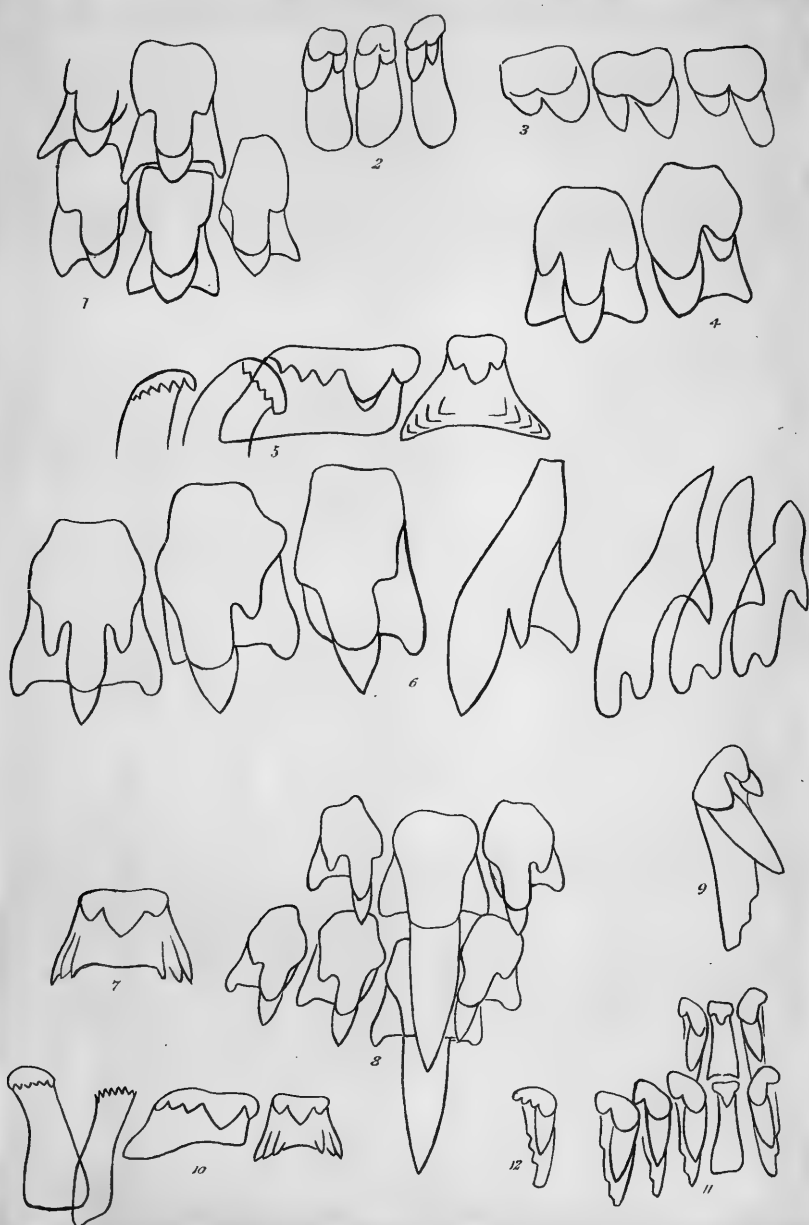


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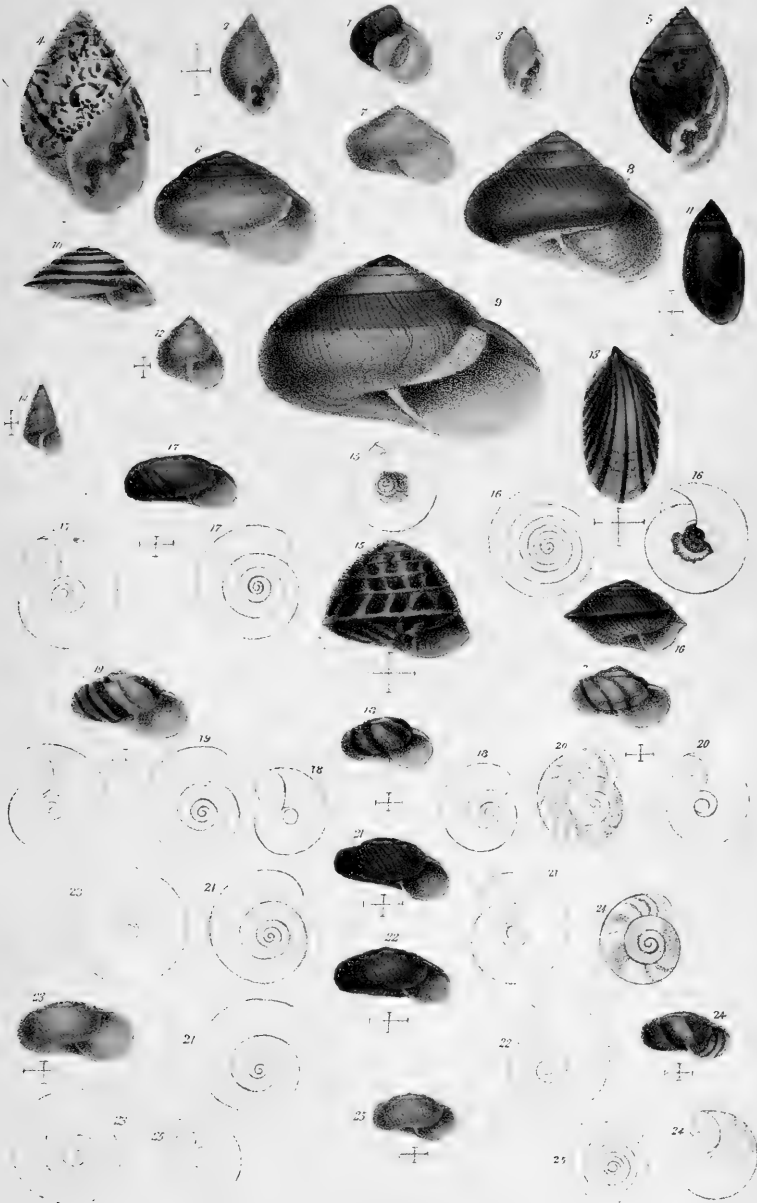


Dall. On New Mollusca of West Coast of N. America









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