

91

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ON SOME TASMANIAN *TROCHIDÆ*.

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[Read 12th August, 1879.]

In the Proceedings for 1877 this Society did me the honor to publish in its pages a Census of the Marine Shells of the Tasmanian coasts. In that list I discussed some of the claims of certain species, but a great many questions connected with the classification I was obliged to leave untouched. I now propose to deal with the names of some of the *Trochidæ*, and the validity of certain genera as regards those Tasmanian species which are included in them. It will be observed that in many cases I have remarked in the Census that I did not consider certain genera as very reliable. I do not know any family to which this is so applicable as to the *Trochidæ*, and for the present I shall confine my remarks to them.

The family of *Trochidæ*, as defined by Messrs. H. and A. Adams, and whose divisions I shall follow, is meant to include animals with an elongate tongue, median teeth broad, laterals five, denticulated; uncini very numerous, slender with hooked points; head probosciform; tentacles subulate, somewhat ciliated; eyes on free peduncles on their outer base, two more or less developed head-lobes between the tentacles, gill single, long, linear. Sides of the foot with a large neck-lappet near the eye peduncle, continuous with a conspicuous side membrane bearing on its free margin, from three to five tapering filaments. Operculigenous lobe often ornamented with cirrhi. Operculum horny, spiral, with a solid convex calcareous coat, which is rarely wanting. Shell pyramidal, turbinate or em-shaped. Aperture pearly within.

I subjoin the remarks of Messrs. Adams, which have a special interest and value to all who observe the habits of the animal. They say that the Trochoid scutibranches embrace an extensive series of herbivorous littoral mollusca characterised by the fringe lobes and tentacular cirrhi of the head and sides, their pedunculated eyes, and by the pearly nature of their shells, which exhibit a brilliant color when the periostraca and outer coat are removed. They are invariably marine, feeding among the seaweeds which abound along the shore, and are distributed universally over

all parts of the globe, being most numerous, of larger growth, and more beautiful color in tropical seas. The shells of the *Trochidae*, though formed on one type, assume a great variety of contour and sculpture, being turbate and provided with stony opercula in some (*Phasianella*), cancellated and discoidal with horny calcareous opercula, in *Liotia* conical or pyramidal with horny multispiral opercula in *Trochinae*, with the opercula uniting in *Stomatellinae*, which section gradually leads to the *Haliotidae*, in which the branchial plumes are symmetrical, the muscle of attachment is central, and the mouth is fissured in front.

Sub-family EUTROPINÆ.—This family is erected for one genus of which our *Phasianella* is the type. Messrs. Adams insist on giving the name of *Eutropia*, because that was the one first applied by Humphrey. In answer to this it must be noticed that Humphrey is not entitled to priority, as he published no definition of his genus. Secondly, Lamarck's name is generally received and adopted by conchologists and by geologists. It is not at all likely that the latter would ever consent to the change, and Continental naturalists have refused to receive it. Confusion, therefore, would only result from following Messrs. Adams or Mr. G. F. Angas in this matter.

The second sub-family is *Turbininae*, including turbate shells with the last whorl ventricose, aperture sub-circular, inner lip smooth and simple. Operculum horny, with a solid, convex, calcareous coat.

Genus *Turbo*, Linnæus.—This is one of the oldest genera, dating back as far or as early as Rondel (*Universæ aquatiliæ historiæ, pars altera* II., Lyons 1554), but has undergone so many changes and revisions that even the definition of Linne in his revision of the genus he first made would no longer apply to it. It is restricted by Messrs. Adams to those turbate shells with a smooth or granular operculum, but without spiral ridges. *Senectus* and *Lunella* are made into separate genera, together with *Ninella*. The first is distinguished by the variegated colors and ribbed whorls. It is a genus of Humphreys, which is adopted by Swainson, and is said to be the equivalent of Bolten's *Lunatica* (*Museum Boltenianum*? 1798*) and Schumacher's *Batillus*. Chenu only admits it as a sub-genus, and as such only I think it should be retained in our only species (*T. Senectus*) *circularis*, Reeve.

Lunella is a genus of Bolten's. Messrs. Adams include our *Turbo undulatus* Chemnitz in this genus, but it has a

*A second edition of this work by J. Noodt was published in Hamburgh 1819, with two plates.

smooth operculum. If the species is what Messrs. Adams consider a true *Lunella* it is at best only a sub-genus like *Senectus*, according to Chenu.

Ninella is a genus proposed by Gray in 1850, for two species especially distinguished by two spiral raised ribs on the operculum. It does not seem admissible to found a genus on the shape of the operculum alone, and this one would if admitted be found very inconvenient. The other features referred to by Messrs. Adams would be included in several genera. We have amongst the two enumerated *Turbo straminea*, but only very rarely seen upon the north coast.

Our next genus is CARINIDEA, which was proposed by W. Swainson as a sub-division of *Canthorbis*. He thus defines it:—"Imperforate, spire pyramidal, acute, basal whorl concave beneath, carinated round its circumference, aperture oval entire, slightly angular at the base of the pillar, which turns inwards." Chenu in his "Manual" gives quite another definition, making it a sub-genus of *Polydonta*. By some it has been identified with *Uvanilla*, a genus of Gray's (*Sys. Arr. Moll.*, p. 144); but Gray distinctly says shell top-shaped, imperforate with marginal spines. The mistake may have arisen from the fact that Gray included in his genus Lamarck's *Trochus fimbriatus* (*Animal. s. vert.*, vol. IX. p. 125.) But Swainson gave his name quite independently for what he considered a new species (*Proc. Roy. Soc. Tas.*, vol. III, p. 39.) Lamarck's definition is *T. testa orbiculato-conica, longitudinaliter obsolete costulata, transversim striata, albido lucescente; anfractibus margine crenulato-fimbriatis, inferne facie planulata, imperforata*. He adds that it was from the seas of New Holland. Its fringes or borders (*franges*) are short, and, as it were, spotted with yellow. Diameter of the base, 13 lines. This description nearly corresponds with Swainson's shell, and who says he had never met with it before. He had doubtless seen Lamarck's types in Paris, because the copy of the work from which I have taken this description is the very one Swainson had with him in Tasmania, now in the museum library, Sydney, and which is full of his manuscript notes on Lamarck's species.* Moreover, Swainson says it was destitute of color or any distinct markings. The shells must be very near each other, and it is a strange coincidence that Swainson gave the same name. His figure is not a very good one, but recognizable. He

*Lamarck's private collection became, at his death, the property of Prince Massena, who sold them to Baron Delessert. They formed part of his celebrated museum, of which M. Chenu, the learned conchologist, was the curator. All the types are labelled in Lamarck's handwriting.

says:—Shell higher than broad, marked with narrow, uniform longitudinal ribs, crossed by delicate imbricated striæ, suture dilated into a thin, prominent, undulated fringe, plaited into large and regular folds; shell about one and a quarter inches broad, and one inch high, of a uniform fibrous white or bright fawn color, destitute, like the other species of this group, of any bright colors or distinct markings. The transverse striæ on the upper surface are slender, very irregular, or rather undulated, imbricated by lines of growth, which are very near each other; equally irregular are the striæ on the under surface of the body whorl occupied by the fringe, but the centre ones are 5 or 6 in number, regular and concentric; umbilicus concave, but quite closed; the plaitings of the sutural fringe only half as many as the longitudinal ridges.

With this genus must be associated *Carinidæ aurea*, Jonas, who places the species in Oken's genus of *Labio*. Messrs. Adams place the same shell in Risso's genus *Bolma*. It cannot be *Labio*, which has a tubercle on the columella, while the general habit is that of our *Trochocochlea*. Neither can it be placed with *Bolma*, whose type is *Trochus rugosus*, Linn,* and whose whorls are rounded, and the inner lip with a thick callosity. The proper position is surely with *C. fimbriata*, where Swainson placed it, and where he figured and described it anew under the name of *C. granulata* (*loc. cit.*).

Astele is a genus erected by Swainson as remarked in my "CENSUS," and for which A. Adams subsequently proposed the name of *Eutrochus*. It is a conical trochus with a wide perspective umbilicus. Sub-family *Liotianæ*. Operculum horny, with an external calcareous coat, formed of separate pearl-like shelly particles, placed in spiral lines; shell more or less discoidal, whorls sulcate or cancellate, aperture orbicular, scarcely pearly within.

LIOTIA is a genus proposed by Gray, with the characters of the sub-family, but the whorls are never spiny, and have an expanded entire border round the mouth. The division is an exceedingly good one, but I think that in the young states some which rightly belong to it have been included in *Cyclostrema*, and this may apply to some of the species described by me. Mr. Petterd writes to me to say that he thinks that my *Liotia incerta* (see Proc. 1876) is an undeveloped form of *Carinidea Tasmanica*.† I have not been able to examine the type specimen, which, however, Mr.

*See Risso Hist. Nat. des principales produc. de l'Europe, merid. Paris, 1826, 4 vols., Chiaje's Poli, 3 pl. 52, fig. 45.

†Which I now regard as the young of *C. aurea*.

Legrand has re-examined for me, and gives it as his opinion that it is a decided species of *Liotia*.

CYCLOSTREMA, Marryat. *Messrs. Adams restrict the genus to non-nacreous shells, with an acute entire aperture, otherwise like *Liotia*. The type species is cancellate, though many are smooth.

ADEORBIS, Searles Wood, 1842 (Mag. Nat. Hist., vol. IX., p. 530). The principal difference between this genus and the last, according to Messrs. Adams, is in the non-discoid trochiform shape, and the non-continuous labrum.

Sub-family, *Umboniinæ*.—Operculum horny, thin, of many whorls, gradually enlarging, outer edge finely ciliated; shell orbicular, depressed porcellaneous, the umbilical region often callous.

UMBONIUM, Link, 1807 (Besch. Rost. Samml. 3, p. 136.) Thus Hermannssen, who regards this genus as synonymous with Schumacher's (not Sowerby's) *Globulus*, which has a host of other names, dating back as far as Klein. The shell I described as *Ethalia tasmanica*, should certainly be an *Umbonium*.

Sub-family—*Trochinae*. Operculum horny, of numerous narrow whorls, nucleus central shell. Conoidal or pyramidal, last whorl more or less angular at periphery, usually flat beneath, aperture transverse, wider than long.

The genus *Trochus*, as restricted by Messrs. Adams, would not include any Tasmanian form. I formerly placed two species in this division, which I shall now for reasons to be stated further on, arrange with *Trochocochlea*.

CLANCULUS.—A genus of Montfort (Conch. system, vol. II., p. 190.) synonymous with *Fragella*, Swainson, *Clangulus*, Blainville, and *Otavia* Risso. It is a very good genus, and as restricted by Messrs. Adams, is perfectly recognizable. The shell is solid, turbinate, granular, last whorl rounded, aperture thick and both lips have conspicuous teeth, often many. It is well represented in Tasmania.

EUCHELUS.—Philippi. Zeitschr. f. Malak. Feb., 1847, p. 20 (from Gr. εὐ well and χηλή a pier, whatever that may

*Messrs. Adams spell the name Marryat, and give no reference. On referring to Dr. Hermannssen's Indicis Genera Malacoz, I find the following reference:—"Marryat teste Montague, 1817, Trans. Linn. Soc., XI., p. 194." He adds that he had not verified the reference, but took it from Fleming. He also adds:—"1818, Trans. Linn. Soc., XII sec., Agass." I don't understand the meaning of this last, but the true reference is:—"F. Marryat, descript. of two new shells, *Mitra zonata* and *Cyclostrema cancellata*, Trans. Linn. Soc., vol. XII., p. 338." I presume that Hermannssen took his second reference from Agassiz's, Nomenclator.

signify). These shells are usually umbilicate (the Australian specimens almost obsoletely) the whorls round with deep spiral sulcations and granular keels. The throat is also grooved, there is a tooth on the columella. Operculum ovate, of comparatively few whorls. All the Tasmanian species are well marked.

DILOMA.—Philippi, (Abbild. u. Beschreibungen neuer oder wenig gekannter Conchylien, Cassel vol. 1. Heft., 8 p. 188. Figures and descriptions of new or little known shells). This was only intended as a subgenus by its author, but Messrs. Adams have given it generic value. The distinction is, that the columellar margin does not extend to the outer edge of the labrum, but forms an elevated border or second lip within and parallel to it. But I maintain that this distinction is not of any importance and is shown in many different genera, especially in *Trochocochlea*, *Chlorostoma*, *Chrysostoma*. There is nothing in fact to separate the species from Adams' *Trochocochlea*, and I cannot see even a single feature on which a division would rest. It is said that the common Australian and Tasmanian species, *D. odontis*, Wood, is a smooth shell, but Adams' definition of *Trochocochlea* is made to include smooth forms. Besides, in this *T. odontis* varies. Few can be found without distinct spiral grooves, and there is every gradation to a regular carinate form. *Diloma ingerrima* Chemnitz (the type of the genus?) might easily pass as a small variety of *D. odontis*, and the same may be said of *D. æthiops*. Gmelin.* Both are from New Zealand. I am of opinion that the names should stand *Trochocochlea odontis*, and *T. æthiops*. The opercula of all the *Trochocochlea* have a peculiar silvery margin which is very characteristic, in this and in the animal *T. odontis* exactly corresponds with the genus.

THALOTIA.—Gray, 1840 (Synopsis Brit. Mus. Ed. 1842, p. 57, 89, Etymolog. *θαλλός* Wreath *οὖς* ear. Ita. Hermannsen, who had taken the quotation secondhand from Agassiz, viz., Gray himself refers in Guide to Sys. Dist. Moll. to Adams' Genera, showing that he adopts their definition.) The shells of this genus are elongately conoidal, with quadrangular apertures. Columella, straight truncated, tubercular, whorls transversely grooved and granular. It is a well marked Australasian form.

ZIZIPHINUS.—Gray 1840 (loc. cit., but Messrs Adams give Leach as the author, which is probably the case, as Gray suc-

*I think that a variety of *D. æthiops*, has been mistaken for *Trochus nigerrimus* of S. America, and this is Von Marten's opinion.

ceeded Leach in the British Museum, and published many of his predecessor's genera with due acknowledgment.) Shell nearly always conical, last whorl angular, no umbilicus, columella simple, aperture quadrate. I do not see how these shells can be distinguished from *Thalotia* except by the more elongate form of the latter. The animals of *Thalotia* have not been examined. In *Ziziphinus* the branchial plume is acutely pointed in front, long, tapering like a leaf, and composed of one or more rows of short close-set strands. The male organ is a narrow white, tough, gently arcuate and subulate filament lining or attached from base to point to one side of the branchial leaf. The orifice of the ovary is placed below the rectum. *Radula* central, laminaceous, lanceolate, three parts of the base oval, suddenly wider) tip recurved, sharp, serrulated on both sides; lateral teeth on each side five, imbricated, and shaped like the half of the central one, the last somewhat different in shape, lateral series of teeth, 60 and upwards on each side, the first by far the stoutest, the base dilated behind, the hook toothed below with tubercles, the remaining teeth slender, with a compressed hook pointed; in the inner one, toothed below, serrulated on both sides; in the middle ones, pectinated on each side; in the last, obsolete, scape slender, simple, furnished before the base with an external, spur-shaped; lingual membrane long, linear, transparent (curled?) Gray, loc. cit.

ELENCHUS, Humphrey, 1797 (Museum Calonnianum, Specification of the various articles which compose the magnificent museum of natural history collected by M. de Colonne in France. Anonymous, but known to be by Geo. Humphrey, F.L.S.), see Swainson's "Shells and Shell-fish," p. 15. We must accept Swainson as the real author of this genus, as he was the first to define it. It is called *Eleuchus* and *Heleuchus*, see Hermannsen, vol. I, p. 416. Swainson says loc. cit., p. 219. These splendid shells, although mostly of a small size, have a brilliancy in the emerald green of their apertures, which is perfectly unrivalled in this family; the basal whorl is convex; the spire is also produced; the base of the pillar in some forms an angle, and in others a small but very distinct tooth. The exterior is always smooth. "This beautiful group," he adds in a note, "was well known to Humphrey, whose name imposed near 40 years ago (Swainson was writing in 1835) we have of course retained instead of some others recently given by the French nomenclators." The group is well defined geographically as well as naturally, for the species are all Australasian, and more common on the south than on the east or west coasts.

BANKIVIA, Beck, 1848 (Krauss, Sudafr. Moll.)* The retention of this shell (for there is only one very variable species) in a distinct genus from *Elenchus* is hardly desirable. Messrs. Adams rely on the twisted columella, and the non-nacreous shell; but the shell is nacreous, though only faintly perceptible, and the nacre has a rosy tint.

TROCHOCOCHLEA, Klein, 1753 (Tentamen methodi ostracologica 4 B., p. 43). I have given a notice of the genus in the Proc. Linn. Soc., N.S.W., vol. 2, p. 89. I do not think that Klein should have the credit of this genus, as Messrs. Adams' definition in no way agrees with his, which would include nearly all our *Trochidae*. The following is Klein's definition:—*Trocho-cochlea est cochlea per modum trochi, conice turbinata sed in ultima spira ventricosa, os laterale deducens nec cochlea sine magna inclinatione queat inniti*. Wheel-shell—a shell which is like a wheel, turbinately conical, but in the lower part of the spire ventricose, causing a lateral mouth, so that the shell cannot stand without being greatly inclined. This definition would apply to one-fourth the known univalves, and cannot be said to apply to one more than another of our Australian turbinated genera.† The authors of the "Genera" give a good many synonyms, but only some of them, or perhaps none of them, agree with their definition. Take, for instance, Gray's (not Oken's) *Labio*. In this the axis is perforate. The fact is the name—a very awkward name—is Klein's, and the genus is that of Messrs. Adams. They define it thus:—"Shell solid, conoidal, imperforate in the adult, whorls smooth, or transversely lirate, the last rounded at the periphery aperture nearly rhomboidal, columella thick and rounded, ending anteriorly in a slightly prominent tubercle." Limited thus, I think the genus is a good one for Australian forms.

MONILEA, Swainson, 1840 (Shells and Shell-fish, part 2, p. 352) "umbilicus deep and wide, but the edges quite smooth, with a thickened half margin formed by the inner lip, which terminates abruptly." In this genus the umbilicus is furnished with a thick spiral callus dilated anteriorly where it joins the excavated columella, and with another striated spiral callus more external, which ends anteriorly in a pointed tooth. The Australian species seem

*So Carpenter in Maz-shells. I have not Krauss' work by me now to refer to for Beck's definition.

†The whole system of Klein is curiously clumsy, and often leads to two or three appellatives. I regret not being able here to give a more lengthened notice of its peculiarities.

to me to come very near to *Astele*, but the form is more turbinate.

GIBBULA, Risso, 1826 (Hist. Nat., vol. iv., p. 136.) The species are numerous, and are found, says Messrs. Adams, in every part of the world. The gibbosity of the whorls, the perforated axis, and simple termination of the columella characterise the genus.

MINOLIA, A. Adams, 1860 (Annals of Nat. Hist., vol. 6, 3 ser., p. 336, November, 1860.) As this genus is little known I append the definition and remarks. Shell globose conoidal, widely and deeply umbilicate, whorls rounded latticed, suture channelled, last whorl almost detached, aperture entire, lip thin, acute. *Minolia* is very like *Torinia* in form and sculpture, but the aperture is pearly within. It also resembles in form some southern species of *Margarita*, but the texture marking and sculpture of the shell are different. In sculpture it also resembles the species of *Euchelus*, especially the sub-genus *Perrinia*, which was dredged from deep water in the same locality. The shell was named from the little island of Mino-sima, near Nippon, in the Japanese Archipelago, off which it was obtained. This genus is another modification of the hollow spiral cone of the trochoid family. The whorls are somewhat loosely rolled upon themselves, which causes the sutures to be very deep, and the last whorl to be almost disunited at the peritreme. Half a dozen species are known in Australian waters, but it seems very difficult to separate them from *Cyclostrema*.

Sub-family, *Stomatellinae*. Foot very thick and fleshy, developed posteriorly; operculum wanting, or thin, horny, ovate, of few rapidly increasing whorls; shell more or less ear-shaped, of few whorls; aperture very wide.

STOMATELLA, Lamarck, 1809, Phil. Zool. This genus is distinguished by the possession of an operculum, with an orbicular shell spirally grooved; spire conical; whorls round.

GENA, Gray, 1840 (Synop. Brit. Mus.) This is distinguished from the preceding by the oblong elongate form, ear-shaped sub-spiral aperture longer than wide, spire obsolete, surface coloured, and granular. The radula of *Gena* is linear, transparent, rather dilated in front. Teeth, 00.5.1.5.00, in rather an arched series; central narrow elongate, contracted very narrow in upper part; apex small, triangular, reflexed denticulate on the edge; inner

lateral teeth 5.5., linear, elongate, placed obliquely; apex small, triangular, reflexed, denticulate on the edge; outer lateral teeth very numerous, hair-like, curved at the end. Gray, loc. cit.

The sub-family of *Stomatellinae* is very sparingly represented in Australia. Having gone through the whole of the genera of Trochidae as far as they are known to me in Tasmania, I append a list of how the species enumerated in the census should be arranged.

Family TROCHIDÆ, Sub-family EUTROPINÆ.

Phasianella tritonis, Chem.
P. sanguinea, Reeve.
P. Angasi, Crosse.
P. rosea, Angas.
P. delicatula, nobis.

Sub-family TURBININÆ.

Turbo undulatus, Chem.
T. (Senectus) circularis, Reeve.
T. cucullata, nobis.
T. straminea, Martyn.
Carinidea fimbriata, Lam. or Sw.
C. aurea, Jonas.
Astele subcarinatus, Swainson.

Sub-family LIOTIINÆ.

Liotia tasmanica, nobis.
L. annulata, nobis.
L. incerta, nobis.
L. discoidea, Reeve.
L. australis, Kiener.
L. Angasi, Crosse.
Cyclostrema Kingii, Brazier.
C. Josephi, nobis.
C. micra, nobis.
C. Weldii, nobis.
C. Susonis, nobis.
C. spinosa, nobis.
C. immaculata, nobis.
Adeorbis picta, nobis.

Sub-family UMBONIINÆ.

Umbonium tasmanicum, nobis—*Ethalia* t.

Sub-family TROCHINÆ.

Clanculus nodulosus, A. Adams.
C. Aloysii, nobis.
C. Philomenæ, nobis.
C. Dominicanæ, nobis.
C. Raphaëli, nobis.
C. Angeli, nobis.
C. conspersus, A. Adams.
C. rubens, A. Adams.
C. undatus, Lam.
C. Maugeri, Adams.
C. variegatus, A. Adams.
C. gibbosus, A. Adams.
C. nodo-liratus, A. Adams.
Euchelus canaliculatus, Lam.
E. tasmanicus, nobis.
E. scabriusculus, Ad. and Angas.
Thalotia conica, Gray.
T. picta, Wood.
T. Mariæ, nobis.
T. dolorosa, nobis.
Ziziphinus granulatus, Born.
Z. armillatus, Wood.
Z. fragum, Philippi.
Z. incertus, Reeve.
Elenchus badius, Wood.
E. bellulus, Dunker.
E. irisodontes, Quoy.
E. nitidulus, Phil. Kust.
Bankivia varians, Beck.
Trochocochlea australis, Favanne.
T. constricta, Lam.
T. tæniata, Quoy. Query—Var. of above?
T. odontis, Wood=Diloma odontis.
T. compta, nobis, M.S.
Stomatella imbricata, Lam.
Gena strigosa, A. Adams.

All the species enumerated in the "Census" and not occurring in the list, I have discarded as varieties, or identical with species already named.

Note.—I beg to correct in this place some of the names of other genera and species contained in the Census.

Siphonalia castanea, nobis, is probably a worn and dead

form of *Trophon Brazieri*, nobis. *Siphonalia pulchra*, nobis, is an immature state of *Clathurella philomenæ*, nobis.

In describing *Rissoa* (*Setia*) *siennæ*, it should have been added that this shell had been previously described as *Assimineæ tasmanica*, nobis.

Gibbula multicaudata=*Clanculus nodo-liratus*, Angas, an immature specimen. *Fossarus tasmanicus*, nobis—a young state of *Euchelus tasmanicus*.

Conus Macleayana, nobis, is probably a variety of *C. rutila*, differing in color and twice as large as the S. A. specimens.

I have to thank Mr. W. F. Petterd and W. Legrand, for having carefully gone over the whole of the type specimens for me to ascertain the above corrections. In the description of several hundred species there must surely be other alterations and amendments to make, but this, I fear, must be left to other hands.

I should mention also that Mr. Petterd considers that *Auricula Dyeriana*, nobis=*Cassidula zonata*, H. and A. Adams, also that *Murex zonata*, nobis, is only a small and peculiar variety of *Murex triformis*. In these opinions I cannot at present concur.