ZOOPHYTOLOGY.

In the 'Dublin Natural History Review,' for July, 1858, Professor Wyville Thomson has described several new genera and species of Marine Polyzoa, collected for the most part by Professor W. B. Harvey in the Australian seas, but with which, with a view to the important subject of geographical distribution, Professor W. Thomson has incorporated one or two smaller collections sent to Professor Harvey with Algæ from various parts of the world.

Of this valuable contribution to Zoophytology we proceed to give the following abstract, containing the description of the new genera and species established by Professor Thomson; premising that the arrangement followed by him is pretty nearly the same as that adopted by ourselves in the British Museum Catalogue.

The new species are all figured, and of them we hope shortly to be able also to give representations from original drawings from specimens kindly furnished by Professor W. Thomson.

Class.—POLYZOA.

Order 1. P. INFUNDIBULATA.

Sub-order 1. CHEILOSTOMATA.

Sect. 1. Articulata.

Subsect. 1. Uniserialaria.

1. Fam. CATENICELLIDÆ, Busk.

1. Gen. *Catenicella*, Blainville.

As usual in collections from the other side of the equator, the Catenicellæ are prominent and abundant. Most of the species in the "Rattlesnake" collection are repeated, and seven undescribed forms occur. One new species belongs to the fenestrate division; the second differs so completely from every described form as scarcely to be referable to any of the formerly characterised groups, though occupying a position to a certain extent intermediate between the two

first: four are vittate; and the seventh, though distinctly a Catenicella, and closely allied to *C. aurita* (Busk), simulates to a certain extent the structure of the remarkable genus *Calpidium*.

In this genus, notwithstanding the numerous additions to it, Mr. Busk's original subdivisions retain their natural integrity. *C. alata* fraternises with the typical Fenestratæ. Busk's specimen of *C. aurita* must have been poor. A good example differs so much from the Fenestrate group, and so closely approaches *C. geminata*, which could not possibly be associated with them, that it has been deemed advisable to put the two species provisionally at the end of the list, thus indicating the tendency of *C. geminata* towards the structure of the next genus.

C. Harveyi stands alone a representative of the "Fasciatæ." The position of the ovicell is very characteristic.

The new "Vittatæ" are all normal. In this group there are two modifications of the ovicell: in the greater number it is galeriform and superior, encroaching on the cavity of the cell above it, which is sessile, by a broad base on the ovicelligerous one. Two, *C. taurina* and *C. perforata*, have a globular vesicle sessile on the older cell of a geminate pair.

a.—Catenicellæ fenestratæ, Busk.

1. *C. lorica*, Busk.
2. *C. ventricosa*, Busk.
3. *C. hastata*, Busk.
4. *C. cribraria*, Busk.
5. *C. alata*, n. sp.

Cells pyriform. Fenestræ 5—7.

Irregular grooves pass inwards from the fenestræ, giving the space within a somewhat granular appearance. Lateral processes enormous, consisting of a large hollow conical ascending process, with a pyriform opening in front, a nearly tubular "avicularian chamber" passing outwards opposite the upper third of the cell-mouth, and ending in a minute avicularium; and a wide hollow fringe continued down to the base of the cell, and iregularly perforated in front. Ovicell (?).

The specimen figured is somewhat smaller and more delicate than usual. The cœnœcium does not appear to attain a great size. All the specimens in the collection are parasitical on other Polyzoa, and on red Algæ. Old specimens have often lost their large ascending processes, which gives them a very different appearance.

Bass's Strait; Dr. Harvey. Port Fairy; J. Dawson, Esq.

6. *C. plagiostoma*, Busk.
7. *C. margaritacea*, Busk.

β.—Catenicellæ fasciatæ, Wyv. T.

8. *C. Harveyi*, n. sp.

Cœnœcium forming loose, handsome, curling, brown tufts. Cells large, purely horny, vase-shaped; expanded superiorly by moderately large lateral processes, usually bearing large sublateral avicularia. External membrane thin, loosely investing the inner, and raised into conical papillæ on the front of the cell. Inner membrane strengthened by a raised strap of chitine, continuous with the thickened rim of the cell-mouth, dividing immediately below the lower lip, and forming a ring, again uniting and passing down the middle of the front of its cell to its base; and by similar straps spreading, apparently irregularly, over the avicularian processes, and over the back of the cell. Ovicell calyptriform; sessile by a broad base in the position of one of the avicularian processes of a cell, which it replaces. Back of ovicell furnished with a very large sessile avicularium.

Bass's Strait; Dr. Harvey. A single tuft. This is a remarkable and most distinct species. The cells are nearly as large as, and resemble in form, those of *C. amphora*.

The cell-walls are very evidently formed of two membranes, which remain distinct.

In dried specimens the inner and stronger coat retains its form, while the outer appears to invest it in loose, wrinkled folds, expanding into an irregular projecting frill round the mouth. When the cœnœcium is boiled, to expel the air and expand the tissues, the water passes freely between the two layers, raising the outer wall into distinct papillæ, and showing it loosely hung round the cell.

The true avicularian chamber is a continuation of the inner cell-wall, but the hollow lateral processes, whether cups or spines, are formed of the thin outer membrane alone.

γ.—Catenicellæ vittatæ, Busk.

9. *C. formosa*, Busk.
10. *C. elegans*, Busk.
11. *C. Dawsoni*, n. sp.

Cells rounded, gibbous; lateral processes large, curved forwards and outwards, blunt, with usually a little depression, apparently an abortive avicularium at the apex. Cell-mouth rather small, rounded; operculum prominent. Surface of cell irregularly dotted with minute papillæ. Vittæ broad and short, sublateral near the base of the cell. Ovicell (?).

This species does not seem to attain a large size. There appear to be two varieties, a broader and a narrower, but agreeing in all essential characters.

The broad form occurs of a fine yellow-brown colour, and in great beauty on Algæ from the Freemantle district, Western Australia (Harvey); and the narrower is abundant, of a cinereous gray, on *Ballia* sent from Port Fairy by James Dawson, Esq., of Kangatong, to whom I am indebted for

many Australian rarities, and for much curious information.

12. *C. castanea*, n. sp.

Cells ovate, elongated. Superior lateral processes small and rounded; united above the cell-aperture by a *smooth* prominent ridge; the lateral processes continued round the lower angles of the mouth, so as almost to form a corresponding ridge beneath.

Cell-mouth small and round. Operculum very thick. Avicularia small, lateral; vittæ linear, lateral, extending nearly the whole length of the cell. Ovicell (?).

Cœnœcium forming graceful curling tufts. Cells of a rich chestnut hue, contrasting well with the bright red of the fibrous compound stem. Allied to *C. gibbosa* (Busk), which does not occur in the collection.

Bass's Strait; Dr. Harvey.

13. *C. umbonata*, Busk.
14. *C. crystallina*, n. sp.

Cells subglobular, pyriform, fringed on either side by a wide hollow border, spreading upwards, outwards, and slightly forwards, into large lateral processes, frequently furnished with small lateral avicularia, seated in cup-like depressions.

Two arched markings, very constant in form, traverse this wide portion of the lateral process, which is continued downwards in a hollow fringe to the base of the cell.

Cell-aperture large; rim slightly prominent. Vittæ long and well marked, sublateral, and extending nearly to the level of the lower lip. Front of cell studded with elevated papillæ, and whole surface ornamented with delicate diverging lines, which give the cœnœcium a beautiful glistening appearance. An elevated ridge runs down the middle of the back, the lateral portions falling off like the roof of a house, giving the transverse section of the cell a somewhat triangular outline. Ovicell unknown.

Parasitical in delicate glassy tufts on Polyzoa.

Bass's Strait; Dr. Harvey.

A very distinct and beautiful form. The arches in the hollow wings seem to be lines along whose course the membranes of which the opposite walls of the wings are composed are in contact. In the Vittatæ generally the double cell-wall is by no means so distinct as in the fenestrate group. There are, however, frequent indications that the structure is the same.

The vittæ seem to be rows of bead-like spaces between the layers.

15. *C. Buskii*, n. sp.

Cells almost cylindrical, slightly contracted towards the truncated base. Connecting horny tube very short. Superior lateral avicularian processes represented by longer or shorter slightly retrocedent spines, or by open lacerated cups usually bearing small avicularia at the base. Spines longer

in the newer cells towards the ends of the branches. Cell-mouth small and round. Vittæ linear, sublateral, extending nearly the whole length of the cell. Front of cell slightly tubercular. Ovicell galeriform, superior; anterior surface slightly concave, bordered above by a projecting crescentic beaded rim; posterior surface convex, encroaching on the cavity of the next cell, against which it is cemented, and which is sessile on the ovicelligerous cell.

Probably allied in habit to *C. taurina* (*Busk*), as its resemblance to *Thuiaria thuia* is remarkable. Cœnœcium very calcareous.

Bass's Strait; abundant; Dr. Harvey.

16. *C. perforata*, Busk.

Bass's Strait; abundant; Dr. Harvey.

The ovicell of this pretty species resembles that of *C. taurina* (Busk). It is galeate, tuberculate, sessile on the apex of one of the cells of a germinate pair.

δ.—Catenicellæ simplices, Busk.

17. *C. carinata*, Busk.

New Zealand; Dr. Joliffe.

ε.—Catenicellæ auritæ, Wyv. T.

18. *C. aurita*, Busk.

Bass's Strait and Fremantle; Dr. Harvey. Port Fairy; J. Dawson, Esq. New Zealand; Dr. Joliffe.

Fine specimens have the front richly tuberculated. Three or four tubercles below the mouth are perforate; but there is no approach to the true fenestrate character.

19. *C. geminata*, n. sp.

Axial cell geminate. The secondary cell developed alternately on either side of the axis. Axial cells pyriform; a large gaping avicularium on the angle opposite the secondary cell. Secondary cell giving off by a terminal horny tube a single wedge-shaped peripheral cell. Cell-mouth large; a deep notch in the centre of the lower lip. In the primary and secondary axial cell four or five blunt spines surround the upper margin of the mouth, which is surmounted in the peripheral cells by two longer ear-like processes. Front of cell tuberculated. Ovicell unknown.

A small species, apparently generally distributed in the Australian seas. Epiphytic on red Algæ.

Bass's Strait and Fremantle; Dr. Harvey. Port Fairy; Mr. Dawson. New Zealand; Mr. Joliffe.

Had it not been for its close resemblance to *C. aurita* (Busk), evidently a true Catenicella, and with which it often grows associated, one might have almost been inclined to consider this curious little form the type of a new generic

group, or an aberrant species of the genus Calpidium. As in Calpidium, the cells have two "key-holes;" but a single glance must satisfy us that the cell consists of a primary and a secondary chamber, bearing the same relation to one another that the two cells of a germinate cell bear at a bifurcation in any of the other species of the genus. *C. geminata* bifurcates at every cell, so that all the axial cells are germinate. The septum between the cells is traced on the back of the cell by a deep groove in the usual position. The back of the primary cell, both in this species and in *C. aurita*, is frequently perforated to give origin to a horny, tubular tendril. The secondary cell sometimes gives off a secondary axis, but more usually only a single wedge-shaped cell, apparently partially abortive. The cœnœcium is very calcareous, and becomes very thick with age, a calcareous deposit obliterating all the markings. The horny connecting tubes between the cells are unusually long.

2.—COTHURNICELLA, n. g.

Cells in simple rows, each row arising from the side of a joint of an articulated stem, each cell springing from the upper and back part of another by a short horny tube. Cells all facing the same way.

Cell-mouth provided with a moveable operculum. Ovicell an ordinary cell of a series, much enlarged, but scarcely modified in form.

C. dædala, n. sp.

The only known species.

This genus seems to have a sufficient number of characters in common with Catenicella to warrant its admission into the same family. It is, however, at once distinguished from the rest of the Catenicellidæ by its simple rows of cells arising regularly from the joints of an articulated stem. The joints of this stem appear to be abortive cells. The last joint of one branch is often dilated into a cell, while the other branch ends in a single or double tendril of narrow joints, and the final cell of a row is frequently capped by a similar tendril, representing a continuation of the series. In *C. dædala* the stem is at first simple, then makes a single bifurcation, and the cells start in straight rows, a row from the inner aspect of each joint of each branch, so that the triangular space within the fork is closely strung, like a harp, with parallel strings of cells. The anterior aspect of the cell is narrow and slipper-shaped.

The mouth is placed near the top of the cell, large and crescentic, with a thin projecting upper rim. A movable semicircular operculum, with a raised edge, covers, or hangs below, the cell-mouth. The operculum has at its base on

either side a projecting triangular catch, which fits into a notch in the lip. One would almost expect this apparatus to shut with a snap like the clasp of a purse, it is so nicely fitted, and so eminently mechanical-looking.

Below the cell-aperture a long, depressed area stretches nearly to the base of the cell. The cell is much compressed laterally; the side view is much broader, and almost reniform. The cell-wall is double throughout, with a wide space between the layers, thus forming two distinct chambers, the inner not even resembling the outer in form. The anterior depressed area is formed by the outer layer alone, so that beneath there is still another space before reaching the inner wall. In the centre of the area a tube passes through this space, uniting two corresponding apertures, one in either membrane, and thus communicating directly with the interior of the cell. The side view shows the inner chamber as a doubly bent expansion of the common tube of the cœnœcium.

Here and there one of the cells of a row is about double the size of the rest. These large cells have their opercula always closely shut. They are slightly more gibbous than the others, but scarcely differ from them in form. They are, doubtless, the ovicells.

The cœnœcium is small and delicate, very calcareous, with a beautiful pearly lustre. Parasitical on Fucoids.

Fremantle District, Western Australia (Dr. Harvey).

Subsect. 2 Bi-Multiserialaria.

2. Fam. SALICORNARIADÆ, Busk.

1. *Salicornaria*, Cuv.
   1. *S. tenuirostris*, Busk.
2. *Nellia*, Busk.
   1. *N. oculata*, Busk.
3. *Onchopora*, Busk.
   1. *O. hirsuta*, Lamx. sp.?

3. Fam. CELLULARIADÆ, Busk.

1. *Cellularia*, Pallas.
   1. *C. cuspidata*, Busk.

Abundant; Bass's Strait; Dr. Harvey. New Zealand; Dr. Joliffe.

A very variable species. In one form the spine on the median cell at the bifurcation is absent, and in another there are two to three orifices in the back of the cell.

2. *Menipea*, Lamx.

Cells oblong, abbreviated, or elongated and attenuated downwards; imperforate behind with a sessile lateral avicularium (frequently absent), and with one or two sessile avicularia (also frequently absent) on the front of the cell. Ovicell globular, immersed in the internode.

This genus requires careful revision. It is said to be distinguished from Emma (Gray) by the structure of the cell-mouth, which is subtriangular in the latter genus, the opening being partially filled up by a tubercular calcareous plate; and by the position of the lateral avicularium, which in Emma is entirely below the cell-aperture; while in Menipea it is seated, when present, on the upper and outer angle of the cell.

The two new species are so completely intermediate that I believe I am justified in uniting the Emmæ with the true Menipeæ into what I conceive to be a most natural generic group. *M. ternata* (Ellis) may be taken as a type of the genus thus constituted. *M. Fuegensis* (Busk) approaches it closely. The avicularia are still at the upper angle of the cell, and the cell-lip is still simple. The operculum, however, is reduced to a curved spine. In *M. Buskii* the lip is more projecting, and the calcareous plate which partially covers the cell-mouth is tuberculated. The lateral avicularium is slightly depressed, though still opposite the upper third of the aperture. The opercular spine is again expanded.

M. tricellota closely resembles the last in habit, but the tuberculated plate round the mouth is still more fully developed, the lip is more elevated, and the much smaller lateral avicularium is below the cell-mouth. The operculum is again reduced to a rudimentary spine.

M. cyathus is binate, the cell-mouth large and simple, as in *M. ternata;* the lateral avicularium very large half way down the cell-mouth. The operculum once more expanded and branched. It almost requires a microscope to distinguish *M. crystallina* (Gray) from the last—they are so similar in habit and general appearance; but in *M. crystallina* the expanded operculum is again absent, the lateral avicularia are reduced in size, and seated near the base of the cell, and the cell-mouth is again contracted by a granular calcareous plate.

The right of this genus to the name of Menipea depends upon the retention in it of the six-celled species, *M. cirrata* (Lamx.), of the propriety of which I think there can be little doubt. The general character is still remarkably the same. In *M. cirrata* a smooth plate covers the cell aperture, the lower part calcareous and fixed, the upper portion a movable, crescentic, horny operculum, closing over the true

opening. I have not seen *M. Patagonica* (Busk), and from the figure I am more doubtful as to its position. All the species are distinguished by the presence of one or more sessile avicularia on the front of the cells, and by the remarkable hollow curved spines attached round the upper lip of the cell-mouth by horny joints.

This group does not seem to "fruit" freely. I do not know the ovicell even in our common British species, *M. ternata* (Ellis); but fortunately Dr. Harvey's collection contains a branch of *M. Buskii* from Bass's Strait, bearing several; globular, the surface granulated, immersed among the cells in the middle of the internode. One can scarcely doubt that all these closely allied forms have similar reproductive organs, and, if so, the ovicells will give an excellent generic character.

M. triseriata (Busk) and *M. multiseriata* (Busk), which have their ovicells galeate and superior, like those of Scrupocellaria, must seek other congeners.

I do not consider it necessary to subdivide the genus.

1. *M. cyathus*, n. sp.

Cells very short and round; two in each internode, one a little above the other; cell-mouth large, oval, oblique; rim slightly thickened, five to six spines round the upper and outer margin; the lower three, large, curved, hollow, and pod-like, attached by a horny joint to the thickened lip. Opercular spine expanded, branched, spreading downwards and outwards from the upper and inner lip of the cell-mouth. A large sessile lateral avicularium opposite the centre of the cell-aperture. Frequently an anterior sessile avicularium between the two cells of the internode. Internodes distant, a connecting horny tube extending from the apex of a pair of cells, upwards and backwards, and slightly dilating as it enters the lower cell of the succeeding pair by its anterior aspect.

There is constantly on the front of the upper of the two cells a ring-like marking, usually filled up with a calcareous plate, but frequently giving off a horny, tubular tendril. At a bifurcation of the cœnœcium a third cell is introduced into the primary internode between the two secondary branches. Ovicell unknown.

A delicate parasitical species, twining its long tendril-like branches round zoophytes and red sea-weeds.

Bass's Strait; Dr. Harvey. Port Fairy; Mr. Dawson.

2. *M. crystallina*, Gray.
3. *M. Fuegensis*, Busk.
4. *M. Buskii*, n. sp.

Cells elongated, attenuated downwards, three in each internode. Cell-mouth large, oval, oblique, the lower third filled up by a tuberculated calcareous plate; upper lip prolonged, and fringed with from four to five spines, attached to the lip by horny joints, and one of them, usually the second from the outer edge, very long, curved, and pod-like. There is often an additional spine on the upper and inner margin of the cell-mouth. Oper-

culum spine strong and clavate, stretching upwards and outwards from the lower and inner lip of the cell-aperture. Connecting horny tube between the internodes double. Ovicell spherical, with a richly granular surface, imbedded among the cells, on the cavities of two of which it encroaches.

Van Dieman's Land; rather abundant, and in fine condition: Dr. Harvey. New Zealand; abundant; Dr. Joliffe.

5. *M. tricellata*, Busk.

3. *Scrupocellaria*, Van Beneden.

α.—Operculatæ.

1. *S. scrupea*, Busk.

Frequent on Algæ and Polyzoa.
Bass's Strait; Dr. Harvey. New Zealand; Dr. Joliffe.

2. *S. ornithorhyncus*, n. sp.

Cell-mouth rather small, oblique, a tuberculated crescentic plate below the lower lip. Upper margin fringed with four to five long spines; pedunculate operculum prolonged upwards into a spine, which, with the superior spines, almost completes the circle round the true opening of the cell. Lateral avicularia very large. Vibracula small and obscure. Ovicell smooth.

A delicate transparent species, frequent, in small tufts, on sea-weeds and Polyzoa.
Bass's Strait; Dr. Harvey.

4. *Canda*, Lamouroux.

1. *C. arachnoides*, Lamx.

Sect. 2. Continua.

Subsect. 1. Uniserialaria.

4. Fam. SCRUPARIADÆ, Gray.

1. *Scruparia*, Oken.
   1. *S. chelata*, L.
2. *Hippothoa*, Lamouroux.
   1. *H. Patagonica*, Busk.
3. *Ætea*, Lamouroux.
   1. *A. anguina*, L.
   2. *A. ligulata*, Busk.

Subsect. 2. Bi-Multiserialaria.

5. Fam. FARCIMINARIADÆ, Busk.

1. *Farciminaria*, Busk.
   2. *F. aculeata*, Busk.

6. Fam. GEMELLARIADÆ, Busk.

1. *Didymia*, Busk.
   1. *D. simplex*, Busk.
2. *Dimetopia*, Busk.
   1. *D. spicata*, Busk.
   2. *D. cornuta*, Busk.
3. *Calvellia*, n. g.

Cells in pairs, joined back to back. Each pair of cells arising by tubular prolongations from the pair next but one below it. Each pair having a direction at right angles to the next. At a bifurcation each cell of the primary pair giving off a secondary pair. Ovicell subglobular, placed immediately above and behind the posterior margin of the cell-aperture.

1. *C. bicornis*, n. sp.

The only known species.

This genus supplies another link in the beautiful chain of modifications in the arrangement of cells in pairs furnished by the Gemellariadæ. By combining one of the peculiar characters of Notamia with a genera, appearance closely resembling Dimetopia, it affords another reason for retaining Notamia in the group, bearing, in fact, with the exception of the total absence of avicularia, the same structural relation to Notamia which Dimetopia bears to Gemellaria. The lower half of each pair is contracted and tube-like, the two lobes of which it is composed separating and curving over the walls of the inflated triangular upper half of the pair immediately beneath it. The cœnœcium is thus formed of two incorporated, independent rows of pairs of cells, all the cells of each row being in the same plane, but at right angles to all the cells of the other row. This somewhat complicated structure might be better understood, as the author states, if the reader would imagine another exactly similar double-stem incorporated at right angles with fig. 2*a*, Plate IX of the original memoir.

The cell-mouth is small, nearly horizontal on the upper surface of the cell. The margin is thickened, rising at the outer angles of the nearly straight lower lip into a pair of strong, incurved, blunt spines. The cell-wall seems to consist of two membranes, and round the lower lip and at the base of the spines there are a few small, oval and round, fenestræ, passing apparently through one layer only. A small, granular, perforated papilla rises immediately below the cell-mouth, the oval aperture passing right through the cell-wall.

The ovicell is immediately above and behind the m oh of the cell, cemented against the triangular side of the pair of

cells above, subspherical, slightly compressed, and beautifully marked, as if stamped with a miniature clam-shell.

The cœnœcium is very calcareous, forming delicate pure white, bushy tufts, about half an inch high.

It occurs sparingly with *Cellularia cuspidata* and *Dimetopia cornuta*, parasitical on *Catenicella ventricosa*.

Bass's Strait; Dr. Harvey. And on *Catenicella hastata*. New Zealand; Dr. Joliffe.