V.—*Notes on the Natural History of East Finmark.* By Canon A. M. Norman, M.A., D.C.L., LL.D., F.R.S., F.L.S.

[Continued from vol. xi. p. 598.]

[Plates VIII. & IX.]

POLYZOA (*continued*).

Genus Larnacicus *, gen. nov.

Type, *Larnacicus corniger*, Busk. (Pl. VIII. fig. 3.)

Membranipora cornigera, Hincks, Hist. Brit. Marine Polyzoa, p. 164, pl. xxi. fig. 4, and pl. xxii. fig. 3.

Differs from *Amphiblestrum*: 1st, in the avicularia being situated in distinct and separate cells from the zoœcia (in the type species they vary greatly in size: the larger are long, ovate, contracted near the middle in the position of the complete but easily broken bar; in the smaller the anterior portion is loop-shaped and the posterior a mere slit); 2nd, in the absence of pore-chambers (at any rate, I have not succeeded in seeing any); 3rd, in the remarkable character of the distal end of the zoœcium, which is divided into chambers by a transverse and usually one or two vertical connecting-bars. These chambers most probably are in connexion with the oœcium, which is well raised, globose, and situated over the chamber just described. There are two or three pair of spines, the lower pair forked at their extremity. I illustrate the oœcium, which has not hitherto been figured.

Specimens of this species from 100 fathoms off Shetland, and from the Hardanger Fiord, Norway, are in my collection.

Genus Antropora †, gen. nov.

Type, *Antropora* (*Membranipora*) *granulifera* (Hincks). (Pl. VIII. fig. 4.)

Membranipora granulifera, Hincks, "General History Marine Polyzoa," Ann. & Mag. Nat. Hist. ser. 5, vol. vi. (1880) p. 72, pl. ix. fig. 4.

Zoœcia triangular or subtriangular, but very irregular in form. Calcareous portion of the area similar to that of *Am-*

* λάρναξ, a chest or coffer, in allusion to the structure of the anterior part of the zoœcium.

† ἄντρον, a cave or hollow, with reference to the hollow in which the oral opening lies.

phiblestrum behind, but here also extending up the sides and round the front, so that the membranous portion is completely surrounded by it, and the calcareous portion sloping inwards and downwards; the membranous portion with the oral opening is situated in a deep hollow. On the distal margin, in the place usually occupied by the oral spines, a pair of avicularia, with their pointed mandibles directed inwards in such a way so that their tips nearly meet in the middle. There are three pair of lateral pore-chambers and several (four usually) lucid spots in the hind wall.

Antropora is remarkable on account of the most unusual position of the avicularia transversely situated above the oral opening. Avicularia occur on the sides of the oral opening and sometimes appear above it (as in *Amphiblestrum Flemingii*), but in this latter case they belong to the bottom of the zoœcium above; here they are in the extreme upper part of the zoœcium. The back of the zoœcium is characterized by three pair of conspicuous pore-chambers, and on the anterior part of the back wall, which is more thickened than the portion posterior to it, are at the front two transparent bays, and behind these a pair of round lucid spots, behind which again are sometimes seen two others of much smaller size (fig. 4).

The types were described by Hincks from specimens sent to him from Madeira by Mr. J. Y. Johnson. In 1896 I dredged it not rarely off that island in 70–100 fathoms, encrusting small shells such as young *Pectens, Venus mediterranea*, *Dentalium*, &c., and it especially affected fragments of the coral *Madracis asperula*. The polyzoon most commonly associated with it was *Onychocella antiqua*, Busk. These species often grew over each other, and were so curiously alike in general form and appearance that the avicularia of *Antropora* were the available character for separating them with a hand-lens.

Genus Ammatophora*, gen. nov. (Pl. VIII. figs. 5, 6, 7.)

Type, *Ammatophora* (*Membranipora*) *nodulosa* (Hincks).

Membranipora nodulosa, Hincks, Hist. Brit. Marine Polyzoa, p. 170, pl. xx. fig. 9.

Zoœcia and oœcia depressed and flattened. Zoœcia subovate; a calcareous crest occupying about two-thirds of the area. Oral opening at distal end of the membranous portion. Walls thin, terminating at the oœcium in a knob. Oœcium entirely separable from the zoœcium, resting on the knobs just mentioned; of unusual and varied form (see figures).

* ἄμμα, a knot, and φέρω.

Surface of zoarium with raised nodulous processes. No avicularia. No pore-chambers.

Ammatophora nodulosa is a rare species which I have only seen from two localities—in deep water off the Antrim coast, and in about 15 fathoms at Guernsey; in the former case on a stone, in the latter on small valves of *Pecten opercularis*. The living zoarium is covered with a glistening yellowish epitheca, which conceals much of the real structure. The operculum in the Guernsey specimens is simple and the margin but slightly thickened; in the Antrim specimen it is more highly chitinized, in form of half a circle, with the lower corners slightly turned out. The nodulous processes consist generally of one at the bottom of the zoœcium or of two at the angles of the bottom. The oœcium rests upon, but is not firmly united with, the knob which terminates the side wall of the zoœcium. It is very difficult to understand the different forms which the oœcium assumes, and which will be better understood from the figures (figs. 5, 6, 7) than from any description. The figures and generic characters are drawn from specimens which have been boiled in liquor potassæ, and thus the epitheca have been removed. Hincks's drawing represents the zoarium in its natural condition. This is a very curious species; in the process of boiling some of the oœcia entirely separated themselves from the zoœcia, and that without any fracture. The granulated knob at the summit of the side walls, and the knobs of the oœcium which rests upon it, forcibly reminded me of the limb-joints in the human body!

Genus Rosseliana, Jullien.

Rosseliana, Jullien, 'Mission Scientifique du Cap Horn, 1882–1883,' 1888, p. 79.

Type, *Rosseliana* (*Flustra*) *Rosselii* (Audouin).

Membranipora Rosselii, Hincks, Hist. Brit. Marine Polyzoa, p. 166, pl. xxii. fig. 4.

There are two, more rarely three, pair of lateral pore-chambers and one large distal one—this last sometimes divided into two or three; but the chambers do not project beyond the breadth of the walls. In a specimen coating the inside of a shell of *Pecten opercularis*, in that part which was attached to the wavy portion near the edge of the *Pecten*, the back wall of the zoarium was much thickened and every zoœcium was separately marked out (*i. e.* higher in the middle and sloping at the sides); and each bore about three pustules

(? rosette-plates), the appearance of which was exactly that of those figured as characteristic of the genus *Steganopora* (see d'Orbigny, Paléont. Franç., Terr. Crét. pl. dccxxi. figs. 3, 7, 11; and Jullien, "Les Costulides," Bull. Soc. Zool. de France, 1886, pl. xvii. fig. 2 and pl. xix. fig. 2).

The Zoœcium-building in Cribrilinidæ.

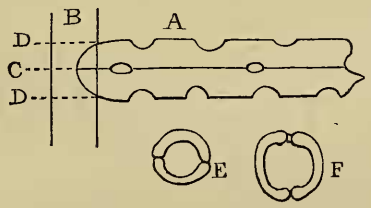
In describing the structure of *Lepralia* (*Membraniporella*) *nitida*, Hincks wrote that "in its earlier condition it closely resembles one of the spiniferous *Membraniporæ*. The ribs of the adult state are represented by suberect spines set round the margin. As growth proceeds the spines bend inwards and increase in size, and gradually take on the flattened rib-like appearance. After a time the opposite rows meet in the centre of the cell-area, and the extremities, which are often enlarged, are soldered together, so as to form a well-marked median line. In some instances the ribs unite laterally to a great extent, and the front becomes a solid wall. In others they continue quite separate." In his account of *Cribrilina annulata* he writes:—"In its earliest stage the zoœcium exhibits the simple Membraniporidan form—the area occupying the entire front and being closed by a membranous covering. The ribs which compose the frontal wall in the adult are given off on each side as tubular processes from the edge of the nascent cell, and, gradually lengthening, meet in the centre and unite, the line of junction giving the subcarinate appearance of the zoœcium. These tubular girders, which are probably the equivalent of the marginal spines on many of the *Membraniporæ*, are connected at intervals by lateral outgrowths of calcareous matter; and in this way the porous structure of the furrows is produced. The mode of formation may be well studied in the thickened anterior margin of the orifice, which is composed of two tubular pieces, the pointed extremities of which in meeting often bend outwards and give rise to the central mucro. Sometimes they are not closely welded together, but overlap one another or remain partially separate, so as to give a bifid appearance to the mucro. Occasionally they do not unite at all, but continue permanently free and detached."

All this is in every particular correct as regards the two species referred to; and the description of *Cribrilina annulata*, of course, was intended to be applicable in a general sense to the whole of the species which he placed in Gray's genus *Cribrilina*. My object in the following notes is to go into the question more minutely, for the purpose of showing

how the process of modification takes place and the various forms are developed. As all the species cannot, in my opinion, remain in the two genera to which Hincks assigned them, I prefer to refer to them simply by their specific names.

The majority of the Cribrilinidæ are furnished with pore-chambers, but the following are without them:—*melolontha*, no pore-chamber and only two rosette-plates on the whole side; *nitido-punctata* and *figulina*. *Nitida* has two pair of large lateral pore-chambers and one distal, the last sometimes being divided into two. In *annulata* Levinsen has figured (Zool. Dan. pl. v. fig. 24) the pore-chambers as very irregular, one lateral pair and one or two distal, or two pair lateral, the former of which meet in the middle of the distal margin, and I have seen the same variations in British specimens; but in the var. *spitsbergensis* I have not seen any pore-chambers in the example treated with liquor potassæ, the side walls are narrow and possibly the underlying pore-chambers have been destroyed in the preparation: *radiata* and the form *innominata* have four pair of lateral pore-chambers and one (or two) distal; *punctata* has three pair lateral (and two distal?); *cryptoœcium* has three or four pair lateral and two distal; *Balzaci* has four pair lateral and *Gattyæ* three pair lateral.

The cribriline portion of the front wall in Cribrilinidæ is built up by bars, which would seem to represent the spines of the so-called "Membraniporidæ." The diagrams annexed indicate the process of development. The *bar* A always has



its proximal end rounded, and this rounded end I shall call the *loop*, C: in most cases the loop has its origin in the *side wall*, B, in the same manner as a spine; but in certain species, as *Gattyæ*, *Balzaci*, and *figulina*, in which the areolated or cribriliform portion only occupies the central part of the front wall, and is separated from the side wall by a considerable unsculptured interval, the "loops" have their origin in the front wall and not in the side. The bar is hollow, and in

such a species as *nitida* this hollow or *lumen* is very manifest; but in most cases the lumen is only indicated by a line seen along the centre of the bar, which, whether actually visible or not, may be called the *lumen-line*. On this lumen-line there are often openings into the lumen, which may be called *lumen-pores* (see woodcut, line of C), at other times calcareous matter is heaped up along the lumen-line, so that a strong *rib* is formed. The side of the bar may be called the *lateral line*, and the poral openings usually developed upon it may be styled *lateral lacunes**, and those at its extremity *median lacunes*.

The great peculiarity in the structure of this group consists in the curious fact that, while the openings along the centre of the bars are simple pores or openings into the lumen, no *lacune, whether lateral or distal, is ever formed without the combined assistance of two adjacent bars*; and indeed in the posterior portion of such a species as *Gattyæ*, where several bars meet at one point, at that point three, or even four, bars seem sometimes to contribute to the building up of the circle of a single very small lacune. In the woodcut the semicircular hollows which break the lateral lines indicate the portion of as many lacunes which that line contributes to form, and similarly the two distal hollows indicate the share which this bar takes towards the structure of two of the median lacunes, the remaining portion of which will be supplied by a bar or bars which have their origin in the opposite wall of the zoœcium. A lateral lacune therefore consists of two parts divided horizontally (see E), owing its origin to the lateral walls of two adjacent bars; while a median lacune consists of two vertical portions contributed by the distal extremities of two opposite bars F.

The Cribrilinidan zoœcia which are figured and described here were thus treated :—After being boiled in liquor potassæ they were again boiled in water, the water poured off, and the shell or stone dropped into cold water, when the zoarium often at once detaches itself; and if it should not a slight pressure with a scalpel at its edge will often suffice to dislodge it. If this does not succeed the shell is held against the side of the flame of a spirit-lamp in such a way that the surface opposite to that to which the zoarium is attached is in contact with the flame, and the shell, when it is extremely heated, is suddenly dropped into cold water, when the zoarium is usually liberated; in obstinate cases the heating has to be repeated.

I undertook the following investigations from the desire

* *Lacuna*, a space not filled up.

to thoroughly understand the way in which *C. nitido-punctata* assumed its unusual form, and this led on to the examination of the entire family.

Nitida (Pl. VIII. fig. 8).—Three bars are here represented. It will be observed that they are of irregular form, the exact character of which is decided by the necessity of forming distal junction with their collateral and opposite neighbours: the line of junction in this particular species has a waved zigzag character. *The bar at its commencement in the side wall is a rounded loop.* This is the first point of great importance to note because the *existence of such a loop in the side or front wall of* ALL *Cribrilinæ* leads us to understand the building up of the zoœcium in some obscure cases. The second point of primary importance is the presence of a very large lumen, which here occupies the whole of the interior of the bar. In some forms we find that this lumen is only indicated by a fine central line, or by the presence in that line of a minute pore; or all trace of it may be obliterated by the overgrowth of a rib, which is raised over the lumen-line.

Melolontha (Pl. VIII. fig. 9).—The character of the bars is similar to that of *nitida*. In the first bar which is drawn there will be noticed a tendency of the lumen to divide and form a fork. In other species it will be found that this is carried further.

Annulata (Pl. VIII. fig. 10).—The figure given is drawn from an unusually simple form of the species * living on a frond of *Laminaria*, but has some special characteristics. The bars are only loosely attached and not cemented together; and on boiling in liquor potassæ the zoœcium in many cases broke up, the bars separating. The lacunes between the bars in the zoœcium illustrated are the result of the simple contact of two bars here and there, and each bar retains its own strongly marked margin; and thus we have the earliest and *simplest mode of formation of these lacunes, in the producing of which two bars always take part.* The bars themselves, which in this specimen are more flattened than usual, have the appearance, at first sight, from their opacity and brownish colour, of being solid; but closer inspection reveals a pellucid circle in the loop of the bar within the marginal line of the zoœcium which indicates the end of the lumen, while at the distal end of many of the bars there is a small pore, and the conviction becomes almost a certainty that a lumen fills the whole bar except the narrow marginal line. The ordinary

* Kindly given me by Dr. Harmer; he procured it at Godösand, off Tysnäsö in Björne Fiord, Norway.

British forms of this species, as will be seen by reference to the figures of Hincks (pl. xxv. figs. 11, 12), come much nearer to the following Arctic variety, except as regards certain points which will be referred to when I come to describe that variety.

Annulata, var. *spitsbergensis* (Pl. VIII. fig. 11).—Here the bars are closely consolidated together, the elevated ribs indicate the bars, and along their middle a faint line may be noticed with occasionally a very minute pore which makes known the existence of the lumen below; lines of lateral lacunes occupy the junction of the two adjacent bars, and are formed, as always, by their joint participation in the manner which has been already described.

Nitido-punctata (Smitt) (Pl. VIII. figs. 12, 13).—This beautiful species possesses some very distinctive characters and variations from the more normal forms, which are of much interest. The bars (see fig. 13, which represents some bars in the middle of the zoœcium) are at first narrow and widely separated, so that, instead of ordinary lacunes, there are entirely open spaces between them; at about three-fifths of the distance to the middle line the bar widens and forms half an arch on each side to be met by half an arch from the neighbouring bar to complete its formation at *b* and *c*, from the points indicated by these letters the bar is projected straight forward until it meets the median line of the zoœcium *d*, forming on its way, with the assistance of the adjoining bar, a lacune; the figure given represents a pair of completed lacunes, which are divided by the median line, and belong the one to two bars proceeding from the left, and the other from two bars proceeding from the right side of the zoœcium, and below these is seen a pair not fully formed. It might have been supposed, at first sight of their position in the middle of the zoœcium, that these were median lacunes, but that is not so—they are lateral lacunes, horizontally divided. A line is over the lumen at *a*, and has usually two small pores, one of which is in the loop and the other beyond the division into the half-arches. Fig. 12 represents the building up of the bridge and the oral lip. The bar *a* bifurcates and the lumen shares the bifurcation and has three pores, one at the base in the loop and the other at the end of the lumen in each branch of the fork; the lower branch of the fork is on the same level as the rest of the zoœcium, the upper branch of the opposite bars is projected upwards and outwards, and joining leave below them a large open foramen, which they overhang, and on them the solid outspread bars *b* are attached, forming in front the lower lip of the oral

opening and leaving at the sides behind large lateral foramina, *d*. The foramen *c* is ordinarily so much overhung by the arch formed by the upper portions of the forked bars *a* that it is hidden when the zoœcium is viewed from the front (see the figure of Smitt), but, so far as my observations go, it is never closed; and doubtless serves some special function.

Punctata.—The lacunes are ordinarily unusually large, and they are all lateral lacunes: for median lacunes are rarely present, the median line being occupied by a ridge running down the centre of the zoœcium and developed on the distal meeting-line of the bars. The lumen seems always to have a pore of somewhat larger size than usual just beyond the expansion in breadth in the loop; and sometimes a second minute pore much further in. Sometimes the lumen-line is occupied by an elevated ridge (see Hincks, pl. xxvi. fig. 4), and these bar-ridges unite with the central longitudinal ridge as in Hincks's figure, but in other cases they die out before they reach that ridge. One pair of bars takes part in the formation of the lower lip, and while its hinder margin contributes its share to the formation of the foremost row of lacunes, its front margin constitutes the lower lip, and the lumen-line is usually raised in the form of a rib; the inner front corners of the bars are either cemented together and produce a simple rostrum, or they remain ununited at the tips and constitute a bifid rostrum; both these forms of the rostrum are shown in Hincks's pl. xxvi. fig. 1. In this species the oœcium is globose and somewhat elongated; it remains permanently exposed, but is subject to nodulous outgrowths, and frequently bears an avicularium on its summit (see Hincks, pl. xxvi. fig. 4). I have in my collection an interesting specimen in which many of the zoœcia, as well as the tuberculated oœcium with its avicularium, closely agree with the figure just referred to with the following important additions: there is a pair of lateral oral avicularia the direction of which is perfectly horizontal and the raised lumen-rib has at its base a large pore (as in *Cribrilina hippocrepis*, Hincks, "Polyzoa Queen Charlotte Islands," Ann. & Mag. Nat. Hist. ser. 5, vol. x. 1882, pl. xx. fig. 6) and often a second more distal smaller pore; in some zoœcia there is only one lateral lacune (as in the figure of Hincks, Brit. Pol. pl. xxvi. fig. 4), but in other zoœcia there are two.

Cryptoœcium, sp. n. (Pl. IX. figs. 1, 2).—The building up of the zoœcium is of the same character as in *punctata*. There are usually not more than four large lacunes on the whole breadth of the zoœcium, nor more than five bars on a side;

and as the posterior rows never have so many lacunes, fourteen may be considered the usual full number.

Radiata and the species or variety *innominata* (Pl. IX. fig. 3, *innominata*).—In these forms the bars in the youngest state have a pore in the loop, but soon afterwards the lumen-line is raised into a more or less prominent ridge, and the pore is commonly obliterated. The lateral lacunes are generally three or four in number: there are usually no median lacunes, their place being occupied by a longitudinal central rib, which is evident at an early stage of development, and to the sides of which the lumen-ribs commonly afterwards unite themselves. The oral opening is formed much in the same way as in *nitido-punctata*, but in a more simple manner: the lower bar does not fork as in that species, but its front margin is outspread at the sides until it unites with the oral bar, but leaves in the middle a single large lacune. The form *radiata* differs from the *innominata* which I have just described in having more numerous bars, more numerous lacunes, with a few median lacunes occasionally to be seen; the lumen-ribs are only slight, the longitudinal rib seldom developed. The junction of the oral and suboral ribs, instead of leaving only one large central lacune, is indicated by from one to seven lacunes; though it is seldom that the number is confined to the single lacune characteristic of *innominata*, and I have only seen such instances of single lacunes in this position in the case of a zoœcium here and there in a zoarium. The *radiata* forms which I have examined are from Birturbuy Bay, Ireland, Guernsey, Naples, and Madeira. A very beautiful form of the variety *innominata* occurs at Guernsey, all the ribs are very much raised, the central longitudinal rib rises in front to a much elevated process; but the chief peculiarity consists in spine-formed hollow processes which rise above the base of the lumen-ribs just over the place where in the young is seen the lumen-pore, and from which they doubtless take their origin. I have now described the ordinary cribriline structure in these two forms. But an entirely new feature appears here. Hincks described a "very delicate setiform appendage" as developed on each side of the lower margin of the orifice, and in his description of the plate called these organs "vibraculoid setæ." Dr. Harmer has recently ("On the Morphology of the Cheilostoma," Quart. Journ. Micr. Sci. vol. xlvi. n. s. 1902, p. 326, pl. xv. fig. 7) traced the matter further, and found these appendages in reduced size present also at regular intervals along the side of the zoœcium. Dr. Harmer is of opinion that they not only represent the spines of the ancestrula, which he figures, and that "the

base of each papilla is a pore in the calcareous front wall"; but he adds: "It has usually been assumed that the radiating series of pores correspond with slits between the bars; but in *C. radiata* there can be no doubt that the pores are in the same radii as the membranous marginal spines." "The lateral junctions of the frontal bars are indicated by prominent radial ridges, each of which rises to a small tubercle just inside the line of the membranous papillæ above described. The pores consequently lie, as described by other observers, in radiating furrows. That the union between the bars has not been complete is indicated by the fact that a thin line of air in some cases underlies the ridge." Thus Dr. Harmer considers that this particular form totally differs from ordinary Cribrilinidæ in that the line of lacunes is here the centre of the bar, and that the ribs are its sides. My own conclusion is different. I regard these papillæ as really in the line of junction of the bars. It is my endeavour to show in these notes that all the different Cribrilinidan forms depend upon the different structural building up of the bars which we first meet with in their simplest form in *Lepralia nitida*, and that the *bars may be invariably recognized by their basal loop, which usually has its origin in the side wall; but in cases where the Cribrilinidan structure occupies only the central part of the front wall the loop of the bar will be found buried in that front wall.* If the illustration (Pl. IX. fig. 3) which I have given of a portion of the front wall of *innominata* be now referred to, it will be seen that three bars are represented with their basal loops situated in the side wall, that at the inner end of the loop there is a minute pore, and a line passes down the centre of the bar indicating the lumen beneath *. Between the bars (that is, at their junction) is the usual line of lacunes; between the loops of the bars, and excluded from the normal Cribrilinidan structure by the fact that the arch which connects the bars *passes inside them*, are the papillæ (*a*, *b*, &c.), which are thus in the line of, but really outside of the junction of the bars which form, the lacunes. If an opening (*c*), from which the papilla has been removed, be examined it will be found to be inside of the side wall, and that it is directed inwards and downwards so as to pass into the body-cavity. Now if the bars and their lumen represent the spines of what have been called Membraniporidæ, and if the lacunes with the line which passes through them be the junction-line of two adjacent bars, then these papillæ cannot represent the spines. What are they then? Their resistance in boiling liquor potassæ

* The "thin line of air" which Dr. Harmer observed was, in my opinion, in this lumen.

seems to prove that they are of chitinous structure, which does not militate against the view entertained of them by Smitt, who, writing of what he termed the "pair of movable bristles," says: "as to their use, they seem to represent sensorial vibracula. Very often they are laid down along the side of the zoœcium" ('Floridan Bryozoa,' pt. ii. 1873, p. 22). They, at any rate, appear to be entirely independent structures; and I trust that Dr. Harmer may have an opportunity before long of throwing further light upon them. These organs are not confined to *radiata* and its variety *innominata*; they are present also in *M. Gattyæ*, and also in *figulina*, where they are represented in a similar position between the loops of the bars by small slits; but though I have seen these openings, I have only seen the papillæ themselves in *radiata* and its variety and the frontal pair only in *Gattyæ*.

Gattyæ.—The figure given (Pl. IX. fig. 4) will by itself, after what has been already written, explain the structure in the form which is usually found on red seaweed. Pl. IX. fig. 5 is taken from a form encrusting a shell taken in Guernsey. In this the papillæ-holes can be made out down the sides, while in the red weed specimen it was only the first which I could distinguish plainly. The former has a remarkable peculiarity, the minute lacunes on the marginal line are in pairs, which is a unique feature; the margin of each bar appears to make a loop and then the interval between them is filled in. The number of lacunes from the margin to the centre is, moreover, double that of the other and more usual form of *Gattyæ*. It may prove to be a distinct species.

Balzaci (Audouin), Waters, = *cribrosa*, Waters *olim*, from Madeira (Pl. IX. fig. 6), has usually only one large lacune on the marginal line and some minute lacunes round the middle.

Figulina (Pl. IX. fig. 7) has a very simple structure. A row of comparatively small lacunes occupies the lateral line and runs right up to the median line, and there is a total absence of median lacunes. The lumen-line has a remarkably large pore in the loop, and between these large pores and a little exterior to them there is a small, elongated, narrow pore. I have figured this last pore as exterior to the Cribrilinidan system, and in the place of the papillæ-pores of *radiata*, and I think that I have done right in doing so; but I do not feel quite certain upon the point, the thickness of the shell in this species makes it difficult to trace the exact outline of the loops of the bars; but, as well as I have been able

to determine, that margin passes inside and not outside of these little elongate pores.

This species is, I think, entitled to generic rank; the character of the front wall, with the Cribrilinidan portion not extending to its margin, and the peculiar facies of that portion, the vicarious avicularia, the well-developed operculum, and perhaps, above all, the processes on the side of the oral opening for the hingement of the operculum, seem to point to the reasonableness of adopting Jullien's genus *Figularia* to receive it; and the same author's genus *Puellina* (type *P. Gattyæ*) might be adopted for those species which are furnished with lateral papillæ.

"Lepralia."

When Johnston (Brit. Zooph. edit. i. 1838, p. 277) instituted the genus *Lepralia*, after stating that *Berenicea*, Fleming, had been previously employed, he added: "Milne-Edwards names the genus '*Escharoides*,' but neither this nor *Escharina*, another of his names, can be adopted, since some naturalists use the terminations *-oides* and *-ina* as family appellations. Moreover, what saith Linnæus? 'Generic names including other generic names are unworthy of a scientific nomenclature.' And, again, 'Generic names in *-oides* are prohibited' (see Young's Med. Literature, p. 28)." Here is his reason for giving a new name to his genus. It was a valid reason at the time, though not according to more recent usage. *Lepralia* is a name so old and so familiar that it can hardly be dropped as a synonym; and it would scarcely be justice to Johnston to omit its use. In what sense, then, must it be employed? Here comes in no small difficulty. It is a primary law of nomenclature that some species which Johnston placed in it when he instituted the genus must be the type. The species thus included were as follows:—*L. hyalina* (Linn.), *nitida* (Fleming), *coccinea* (Lamk.), Johnston, *variolosa*, Johnston, *ciliata* (Pallas), *trispinosa*, Johnston, and *immersa* (Fleming). The name used as Smitt and Hincks employed it is not *Lepralia*, Johnston; and the definition of Hincks excludes from it all Johnston's species. As Jullien has written*: "Genre *Lepralia*, Th. Hincks (not Johnston, 1838), 1880.—Cet ancien genre de Johnston a été entièrement bouleversé par Th. Hincks, et ne devrait plus exister aujourd'hui." Of the species which Johnston placed in his *Lepralia, hyalina*

* Miss. Scient. Cap Horn, Bryozoaires, 1888, vol i. p. 57.

belongs to the earlier genus *Hippothoa*, Lamarck, and *coccinea* is the type of the earlier genus *Escharoides*, Lamarck, as settled by Gray. Gray instituted a genus *Escharella*, to which he removed *variolosa* and *immersa*; and Hincks established three new genera, in which he placed the three remaining species *Membraniporella nitida*, *Microporella ciliata*, and *Smittia trispinosa*. We have seen that Johnston's *L. hyalina* has its place in the earlier described genus *Hippothoa*; the second species in his work was *Lepralia nitida*, and I would suggest that that species be regarded as the type of his genus.

Genus Lepralia, Johnston.

=*Membraniporella*, Hincks (nec *Lepralia*, Smitt, nec *Lepralia*, Hincks).

Type, *Lepralia nitida*, Johnston.

39. *Lepralia nitida*, Johnston. (Pl. VIII. fig. 8.)

Nordkyn (*Nordgaard*). I have not myself seen any specimen of this species from Norwegian or Arctic seas; nor would it appear that Smitt had met with it, since the only localities he gives are Britain and Bahusia. The record of this species, therefore, in East Finmark extends our knowledge of its range very considerably.

Genus Gephyrotes *.

Type, *Gephyrotes* (*Cribrilina*) *nitido-punctata*, Smitt.

Bars narrow, and widely separated more than halfway to the central line, leaving broad open intervals between them, then bending to either side they unite with the adjoining bars forming thus a regular arch, beyond this are large lateral lacunes, few in number, no median lacunes usually developed. The foremost bar but one is forked, the lower limbs of the opposite forks uniting transversely across the zoœcium, the upper limbs directed upwards and forwards and then uniting, thus leaving a large opening below. Oral bars large and solid, resting, as regards their central portion, on the upper limbs of the fork behind, and in front forming the lower lip of the oral opening, and at their sides below two large openings, but these are not equal in size to the central opening already mentioned; the bridge thus formed by the foremost bar and the front members of the second bar is projected outwards and overhangs the rest of the zoœcium in such a way that the large central opening is often concealed from sight when the zoœcium is viewed from the front.

* γεφῦρωτής, a bridge-builder.

A pair of avicularia with mandible pointing upwards are often developed on the side walls of the oral opening. Oœcia subglobose and imperforated. No pore-chambers.

Gephyrotes nitido-punctata (Smitt). (Pl. VIII. figs. 12, 13.)

1868. *Escharipora figularis*, forma *nitido-punctata*, Smitt, "Kritisk Förteckning, &c." p. 4, pl. xxiv. figs. 2, 3.
1873. *Cribrilina nitido-punctata*, Smitt, Floridan Bryozoa, pt. 2, p. 22.
1895. *Cribrilina nitido-punctata*, Nordgaard, Bergen Mus. Aarbog, 1894–95, p. 19, pl. iv. fig. 3.

The type specimens of this fine species described by Smitt were taken by Lovén in 40–60 fathoms at Hammerfest. Examples in my own collection are from the Bergen Fiord, where I found it to be not uncommon in 1878, and West Greenland, 'Valorous,' 1875 *. Nordgaard has also recorded it from the Trondhjem Fiord.

Genus Cribrilina, Gray.

Type, *Cribrilina punctata* (Hassall).

Gray in instituting this genus placed only one species in it, namely *Lepralia punctata*, Hassall, which, therefore, must be the type of the genus. Yet, notwithstanding this, Hincks, in his paper "On the Classification of the British Polyzoa" (Ann. & Mag. Nat. Hist., Feb. 1879), substituted "*Cribrilina*, Gray. Type, *C. radiata*." The next step to confusion was taken by Jullien, who, in his paper on "Costulides" (=Cribrilinidæ), instituted a large number of genera, and, describing *Cribrilina*, followed Hincks in making *C. radiata* the type, and then gave to that genus characters which would exclude the true type, *C. punctata*, from it! Such is the unfortunate result here, as in so many other instances among the Polyzoa, of the disregard of the simplest laws of nomenclature!

Cribrilina punctata, Hassall.—I have already noticed some of the variations in the structure of the zoœcium of this species. The zoaria are of small size, rarely reaching as much as half an inch in diameter. The avicularia, when developed, are usually only on one side of the oral opening, rarely on both sides. Oral opening with lower lip not greatly thickened but generally centrally produced, often acutely so. Oral spines four. In cells bearing oœcia two lateral spines often remain and attain a great size, arching forwards and upwards. Oœcium large, globose (see Hincks,

* On the same stone with a specimen of this species was also *Rhabdopleura Normani*, Allman, a genus which is an interesting addition to the fauna of Greenland.

pl. xxvi. fig. 1), and frequently carrying an avicularium at its summit.

Specimens of *C. punctata* as here restricted are in my collection from Naples; Salcombe, Devon; Birturbuy Bay, Ireland; Wick, 40 fathoms; Shetland, including the largest zoœcia I have seen of the species, from 120 fathoms; and Nantucket, N.E. America.

40. *Cribrilina cryptoœcium*, sp. n. (Pl. IX. figs. 1, 2.)

1867. *Escharipora punctata*, Smitt, "Kritisk Förteckning, &c." p. 4, pl. xxiv. figs. 4–7.
1880. *Cribrilina punctata*, Hincks, Hist. Brit. Marine Polyzoa, p. 190 (*partim*), pl. xxiv. fig. 3, and pl. xxvi. fig. 3.
1894. *Cribrilina punctata*, Levinsen, Zool. Dan., Mosdyr, p. 61, pl. v. figs. 13–18, &c.
1900. *Cribrilina punctata*, Waters, "Bryozoa Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 62, pl. viii. fig. 22.

Front wall with lacunes of considerable size, arranged in transverse rows, not usually more than four in a row, between the marginal lacunes riblets may or may not be developed in young zoœcia on the lumen-line of the bars; lower lip of oral aperture considerably pouting outwards and unusually thick; in the centre at the junction of the bars the mucro may be single or double. No central longitudinal keel. Oœcia in quite young cells with a strong frontal arched rib, behind which the oœcium itself lies at a lower level. Lateral avicularia with mandible pointing upwards and slightly outwards, almost invariably present on both sides of the oral opening.

Such is the character of zoœcia just built up at the edge of the zoarium. Only a few cells further in it will be found that the whole oœcium, except the front arched rib, has been hidden and buried under the nodulous growth of what Levinsen would call a "kenozoœcium," and which seems to be representative here of the avicularium often developed in the same situation in *C. punctata*.

In old zooaria overgrowth has taken place in a very remarkable manner, which, when fully developed, is only faintly realized in such a drawing as my fig. 2. The appearance assumed is extraordinary. The most prominent feature is the great massive under lip, above this is the strongly developed front rib of the oœcium, above this again another transverse rib (sometimes divided across the middle into two), which is the outgrowth of the kenozoœcium over the oœcium concealed below. Then all the lumen-lines of the bars have been raised into ribs of such a size that the lacunes are almost entirely hidden between them.

The very different characters of the oœcium and the remarkable overgrowth are the most prominent of the distinguishing characters of this species, when compared with *C. punctata*, with which it has hitherto been confused. It is of much more vigorous growth than *C. punctata*; zoaria usually exceeding half an inch in diameter and in some cases one inch. It would seem to be essentially a littoral form. In East Finmark I found it between tide-marks, at Vadsö on stones and on the shell of *Buccinum grœnlandicum*, var. *nuda*, Norman; and it is no doubt this form which Nordgaard has recorded as *C. punctata* from Nordkyn. I have the species also from Guernsey (tide-marks); Birturbuy Bay, Ireland (tide-marks), Hebrides and Shetland (both tide-marks); Bergen Fiord, Norway, 1878, and Svolvær, Lofoten Islands, 1890.

41. *Cribrilina annulata* (Fabricius). (Pl. VIII. fig. 10.)

Mehavn, East Finmark (*Nordgaard*).

Figures 8 and 9 of Smitt represent a simple form of this species; although not so primitive a variety as that of which I have represented some bars. The labial mucro is sometimes present, sometimes absent; when it is present it appears, usually at any rate, to be the termination of a central longitudinal keel of the zoœcium, which keel may be entirely absent or more or less prominent. Smitt figures only a pair of lateral oral spines, but besides these there are ordinarily one or two distal spines (see Hincks, pl. xxxv. fig. 11); the lateral lumen-ribs are either well pronounced, as in the figure just referred to, or very conspicuous, as in Hincks's fig. 12. I have not seen any specimen in which they are so few in number, so strongly developed, and all converging forwards as in Smitt's fig. 10. The ordinary oœcium is represented in Hincks's fig. 12, having the lateral spines uniting and forming an arch in front of the oœcium, but these spines are often taken up by and built more completely into the frontal wall of the oœcium.

Var. *spitsbergensis*, nom. nov. (Pl. VIII. fig. 11.)

1900. *Cribrilina annulata*, Waters, "Bryozoa Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 64, pl. viii. fig. 21.

The form which Waters has figured in the paper quoted above as occurring in Franz-Josef Land is a very marked one, and worthy of a distinctive name. The zoœcia are about double the usual size, rather flat, without central keel; the series of riblets and pores eight or nine; the oral

spines are replaced by short flattened plates; the oœcium is much larger than in the type, semiglobose, sparingly punctate, with a longitudinal keel; in fertile zoœcia the flattened plates just referred to do not nearly meet in the centre of the oœcium, but form two outspread wings overhanging the oral opening.

I am not sure that this should not be regarded as a species rather than a variety; Mr. Waters gives the locality of the Jackson-Harmsworth specimen as off a glacier between Cape Flora and Cape Gertrude, Franz-Josef Land, in about 30 fathoms. The specimens in my own collection are from Gray Hook, Spitsbergen, 90 fathoms (*Smitt*), and off Holsteinborg, Greenland, 57 fathoms ('Valorous,' 1875). It would thus seem not only to be a high Arctic but also a deep-water form, since I also possess the ordinary typical form on shore-weed from both Greenland and Spitsbergen.

J. E. Gray (Cat. Brit. Anim. B. M. pl. i., Centroninæ, p. 148) appears to suggest a generic name, *Microstoma*, for this species. This name can never, however, be employed, since it had previously three times been used for other genera.

Genus Reptadeonella, Busk, 1884.

In his 'Challenger' Report, Polyzoa, pl. i. 1884, Busk instituted a genus *Reptadeonella*, for the reception of the Adeonean form *Lepralia violacea*, Johnston (=*Microporella violacea*, Hincks). Three years later Macgillivray (Cat. Marine Polyzoa of Victoria, 1887, p. 110) instituted a genus *Adeonellopsis* with *Adeonella distoma* (= ? *Eschara coscinopora*, Reuss) as its type; and this last genus J. W. Gregory ("British Palæogene Bryozoa," Trans. Zool. Soc. vol. xiii. 1893) united with *Reptadeonella*, Busk. But *Adeonellopsis* has a distinct frontal area containing many fimbriated pores, and is a group for which Levinsen, doubtless not remembering Macgillivray's genus, has recently suggested another name, *Lobopora* ("Studies on Bryozoa," Vid. Medd. fra den Nat. Fören. i Kjöbenhavn, 1902, p. 24, separate copy).

The dorsal view of the zoœcium of *Reptadeonella violacea* is very pretty and of unusual interest, for there are not less than twenty-eight radii of alternating colour, darker or lighter, arranged all round the cell, which indicate many passages of communication between the zoœcia.

Of the other British species which Hincks placed in *Microporella*, *Microporella Malusii*, Audouin, has been made by Jullien the type of a genus *Fenestrulina* (Miss. Scient. Cap

Horn, vol. vi. Bryozoaires, i. p. 37), and Levinsen has in his "Studies on Bryozoa" mentioned a new genus *Haplopoma*, to which he proposes to transfer *Microporella impressa*, Audouin.

Genus Microporella, Hincks, 1877.

Type, *Microporella ciliata* (Pallas).

42. *Microporella ciliata* (Pallas).

Sværholt (*Nordgaard*).

43. *Microporella arctica*, sp. n.

1869. *Microporella ciliata*, Smitt (partim), "Kritisk Förteckning, &c.," Œfvers. Kongl. Vet.-Akad. Förhand. p. 6, pl. xxiv. figs. 13–16.

Zoœcia of considerably larger size than is usual in *M. ciliata*. In a young condition the whole front wall is brightly glistening and covered with large pores (Smitt, fig. 13); the crescentic suboral pore is scarcely, if at all, larger than the other pores, and often cannot be seen at all. The form of the oral opening is as in *M. ciliata*, and closest examination generally fails to give the slightest evidence of oral spines; yet in the case of a few zoœcia which were situated in a very sheltered position, I have found four or five very delicate spines. The oœcium is globose, and in this early stage of growth is ornamented with radiating riblets; lateral avicularia are very sparingly developed, a large portion of the polyzoary often not exhibiting any at all. The description just given is that of the young zoœcia of a thoroughly healthy colony, but in zoœcia at a little distance from the margin overgrowth rapidly takes place, choking up all the pores and even the crescentic pore, and smoothing over the oœcium in such a way that the polyzoary assumes the aspect of Smitt's fig. 14.

Another form is that represented in Smitt's fig. 16. The adult zoœcia have the surface granulated more or less roughly, the crescentic pore remains open, and the lateral avicularium is very rarely developed.

The first form I have seen only on stones between tide-marks at Vadsö, where it is accompanied by *Cribrilina cryptoœcium*, *Harmeria scutulata*, *Porella minuta*, &c.

The second form was taken by the 'Valorous,' 1875, off Holsteinborg, Greenland, in 57 fathoms, and was also sent to me by Smitt very soon after the publication of his works as "*Porina ciliana forma dura*, Spitsbergen"*.

* It must be understood that these specimens were received thus named before the publication of the last part (pt. v.) of his "Kritisk

Genus Doryporella, gen. nov.*

Zoœcia with front wall punctated, furnished with a median pore, in front of which is a spine with spatulate or pear-shaped head. Orifice somewhat horseshoe-shaped, being slightly contracted at the sides and the proximal margin quite straight, distal margin spined. Oœcia globose, punctate. Avicularia at the sides of the oral opening.

Type, *Doryporella spatulifera* (Smitt).

44. *Doryporella spatulifera* (Smitt).

1867. *Lepralia spatulifera*, Smitt, "Kritisk Förteckning, &c.," Œfvers. Kongl. Vet.-Akad. Förhand. p. 20, pl. xxvi. figs. 94–98.
1900. *Microporella spatulifera*, Waters, "Bryozoa from Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 87, pl. xii. fig. 6.

This is a very remarkable little species. The mother-cell is short, ovate, with spined margins. In young zoœcia the pore is much larger in proportion than it is at subsequent periods of growth; it is wide open, and the spine rises from its anterior margin; in one instance I have seen this spatulate spine forked at the extremity and of excessive length. At a later period of growth the pore is often covered over, sometimes with a yellow membrane, sometimes with a calcareous lid. The oral opening has four spines, often of great length; in one case the lower spines were forked at the extremity. In older zoœcia an avicularium with oval mandible is placed high up on each side of the oral opening; and in mature specimens the surface of the zoœcium is granulated.

On *Hypothyris psittacea* in Lang Fiord. Other specimens in my collection are from Gray Hook, Spitsbergen, 90 fathoms, on stone (*F. A. Smitt*); "Finmark" (*F. A. Smitt*); Greenland, off Holsteinborg, 57 fathoms, on *Hypothyris* and *Pecten islandicus* ('Valorous,' 1875); Greenland, on *Hypothyris* (from Copenhagen Museum); Gulf of St. Lawrence, on shell (*Whiteaves*). The species would seem to be especially fond of the shell of *Hypothyris psittacea* as its dwelling-place.

Förteckning, &c." in 1874. In that paper he restricted the term "*forma dura*" to his figure 17, and called it *Discopora cruenta* (Norman). It was not, however, my *Lepralia cruenta*, and Hincks subsequently described it under the name *Monoporella spinulifera* (Ann. & Mag. Nat. Hist. ser. 6, vol. iii. 1889, p. 431, pl. xxi. fig. 3, and vol. ix. p. 152, *but not* var. *præclara*).

* δόρυ, a spear.

Genus Harmeria, gen. nov.*

Zoœcia ovate, thin, glassy, hyaline, with a scutiform or ovate space on the front, distinctly circumscribed by a raised line, within which the surface is punctate. Oral aperture semielliptic; lip straight in the younger stage, but afterwards overhung by a suboral collar-like process with more or less developed rostrum. No visible oœcia. No avicularia.

Type, *Harmeria scutulata* = *Lepralia scutulata*, Busk.

The mode of development in this genus is very remarkable. The zoœcia radiate from a centre, and the polyzoary is in the form of a round patch. It is only at the centre that the zoœcia attain their complete development and are fully exposed, so that their unpunctured bases are entirely visible; with succeeding growth additional zoœcia are continually interposed laterally, and each zoœcium is smaller in size than the one which precedes it, and at the same time overlaps its successor, so that at the circumference of the zoarium they are seen to be heaped up one upon another. The suboral rostrum differs much in size and sometimes assumes great development.

45. *Harmeria scutulata* (Busk).

1855. *Lepralia scutulata*, Busk, "Zoophytology," Quart. Journ. Mic. Sci. vol. iii. p. 255, pl. ii. figs. 1, 2.
1867. *Discopora scutulata*, Smitt, Œfvers. Kongl. Vet.-Akad. Förhand. p. 25, pl. xxvii. figs. 160, 161.
1895. *Cribrilina scutulata*, Nordgaard, Bergens Museums Aarbog, 1894–95, p. 20.
1900. *Cribrilina scutulata*, Bidenkap, Fauna Arctica, vol. i. p. 512.

On stones and shells of *Buccinum* between tide-marks at Vadsö, and Nordgaard records it from the Laminarian zone at Nordkyn. I also have it in my collection from 0–1 fathom, Smeerenberg Bay, Spitsbergen (*F. A. Smitt*). These last specimens are on *Laminaria*, and it would seem to be essentially a tide-mark or very shallow-water species. Busk's West Greenland types were "on fucus"; Smitt speaks of the specimens he has seen as being "in regione algarum haud frequentem," and as "Laminariæ affixam," but Bidenkap gives 16–20 metres.

*** From this point I do not propose to attempt any rearrangement of the rest of the Cheilostomata, and shall only refer to existing genera. I had already written the greater

* Dedicated to my friend, Dr. S. F. Harmer, who is doing such admirable work in the study of the Polyzoa.

part of that which precedes as relates to new genera, and also contemplated the formation of some others relating to groups further on, when I received from Herr G. M. R. Levinsen his "Studies on Bryozoa." From that short paper I learnt that he was engaged on the rearrangement of the Polyzoa, and that he had made very extensive observations, and was thus in an excellent position to undertake the task. To him, therefore, I leave it as regards the rest of the Cheilostomata. But as I feel that I cannot use, as though they were my own, many associations of generic and specific names which have been employed, I shall signify my doubts as to the allocation of the species by printing the generic name within commas; at the same time I would have it to be understood that this only implies doubt, as in many cases I have not subjected the species to special critical examination.

Genus Hippothoa, Lamouroux, 1821.

= *Celleporella*, Gray, 1848,=*Diazeuxia*, Jullien, 1888.

Type, *H. divaricata*, Lamouroux.

The genera of Gray and Jullien were founded on the same type, *Cellepora hyalina*, Linné.

In my paper, "A Month on the Trondhjem Fiord" (Ann. & Mag. Nat. Hist. ser. 6, vol. xiii. 1894, p. 130), I wrote:—"Since Jullien declines even to place them [i. e. *Celleporella* (*Diazeuxia*) and *Hippothoa*] in the same family, it is better to wait for his further views rather than at once merge *Celleporella* in the earlier genus *Hippothoa*." Death has deprived us of Jullien's further opinion, and, for the reasons stated in my paper referred to, I now employ the genus *Hippothoa*. Levinsen has expressed the same opinion, though he "puts the cart before the horse" when he writes "the species of the genus *Hippothoa*, I think, must be merged in *Diazeuxia*" ("Studies on Bryozoa," Videns. Medd. Naturh. Fören. 1902, p. 23, separate copy); and Waters has (Journ. Linn. Soc., Zool. vol. xxviii. p. 70) placed *C. hyalina* in *Hippothoa*.

46. *Hippothoa hyalina* (Linné).

On shells of *Buccinum*, *Neptunea*, &c. throughout the district *.

* In my Shetland Report of 1868 I recorded two Polyzoa of very small size and little character under the name *Celleporella lepralioides* and *Celleporella pygmæa*. The former is the same species which Hincks subsequently described under the name *Lagenipora socialis*, the latter may, I think, perhaps be placed in the genus *Phylactella*.

Escharina, H. Milne-Edwards, 1836.

= *Herentia*, Gray, 1848 (first species *H. Hyndmanni*), = *Mastigophora*, Hincks, 1877 (type *M. Hyndmanni*).

Type, *E. vulgaris*, Moll.

Levinsen ("Studies of Bryozoa," p. 26) removes *Alderi* into *Mastigophora*, and I have now heard from him that he would also place in it *vulgaris*, which, with its keyhole-shaped oral opening and vibraculoid avicularia, which are situated unusually low down on the zoœcium, comes very near *Hyndmanni*. When Hincks made his genera he ought to have employed *Herentia* and *Escharina*, instead of establishing *Mastigophora* and *Schizoporella*; but the taking *vulgaris* into the same genus with *Hyndmanni* will throw them all into the old genus *Escharina* (*cf.* Lamarck, Hist. ed. 2, p. 231, and Gray, List Brit. Radiata Brit. Mus. 1848, p. 123).

47. *Escharina Alderi*, Busk (= *Schizoporella Alderi*, Hincks).

Sværholt (*Nordgaard*).

Genus Schizoporella, Hincks, 1877.

Type, *Schizoporella unicornis*, Johnston.

Schizoporella embraces an extraordinary assemblage of species, as Levinsen has said the same form of oral opening occurs "within a number of different families, and it is impossible to put up sharply separated types of orifice. So, for instance, the forms of orifice regarded as characteristic for the genera *Lepralia* and *Schizoporella* are connected by a number of transitional forms not only with each other, but also with the orbicular and suborbicular orifice." The only species I have to record here will doubtless be removed by Levinsen from association with *Schizoporella unicornis*.

48. "*Schizoporella*" *sinuosa* (Busk).

Sværholt (*Nordgaard*).

The following British *Schizoporellæ* have already been removed into other genera:—

hyalina into *Hippothoa*.

Alderi and *spinifera* by Levinsen into *Mastigophora*; and as I have now heard from him that he would also remove *vulgaris* with the above, the genus will become, as I have already pointed out, *Escharina*.

venusta into *Trypostega*, Levinsen, MS.

Genus Leieschara, M. Sars.

["Beskr. over nogle norske Polyzoer," Videns.-Selskab. Förhand. 1862, p. 17 (separate copy).]

Type, *Leieschara coarctata*, M. Sars.

I do not think that this genus, with its entirely different oral opening and its avicularia, can be united with the previously described *Myriozoon* (Donati), of which the type is the common Mediterranean species *M. truncatum*, Pallas.

49. *Leieschara plana* (Dawson).

1860. *Lepralia plana*, J. W. Dawson, in Durban (W. S. M.) and Bell (R.), "Contributions to Canadian Natural History" (from Report Geological Survey for 1858), Montreal, p. 33.
1867. *Myriozoon crustaceum*, Smitt, "Kritisk Förteckning, &c." p. 18, pl. xxv. figs. 88–91.
1878. *Leieschara crustacea*, Smitt, "Recensio Bryozoarium ad insulas Novaja Semlya, &c.," Œfvers. K. Vet.-Akad. Förhand. p. 20.
1886. *Schizoporella crustacea*, Lorenz, Bryozoën von Jan Mayen, p. 5, pl. vii. fig. 2.
1887. *Leieschara crustacea*, Levinsen, Dijmphna-Togtets zool.-bot. Udbytte, p. 317.
1892. *Myriozoon planum*, Hincks, "Polyzoa of the St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. ix. p. 157.
1900. *Schizoporella crustacea*, Waters, "Bryozoa of Franz-Josef Land," Linn. Soc. Journ., Zool. vol. xxviii. p. 64, pl. viii. figs. 11–13.
1901. *Myriozoon planum*, Whiteaves, "Cat. Marine Invert. of Eastern Canada" (Geol. Surv. Canada), Ottawa, p. 99.

It will be seen that Smitt, who had first placed this species and its allies in the genus *Myriozoon*, subsequently transferred them to *Leieschara*. Dawson's description of *Lepralia plana* was very inadequate; but I have seen specimens named by him, and there can be no doubt as to the species which he intended.

Varanger Fiord, 120–150 fathoms. I also have specimens from Parry's Island, Spitsbergen, and Beeren Eiland Banks, 15–40 fathoms (*F. A. Smitt*); and Greenland, 'Valorous,' 1875.

The Genus Eschara.

In 1724 John Ray described, in his 'Synopsis methodica stirpium Brittanicarum,' p. 31, *Eschara retiformis* from the south-east coast. He thought that it was vegetable, yet the few words of description make it clear that he meant the species described by Pallas. Ray, as pre-Linnean, cannot be the authority for the specific name.

Ellis ('Nat. Hist. Corallines,' 1745, p. 71, pl. xxx. figs. *a*, A, B, C) describes and figures our "*Eschara foliacea*," those

two words being merely the pre-Linnean commencement of his diagnosis; he gives also a figure *b*, "a piece of an Italian coral." Ellis refers to Ray as above.

Linné, in the tenth edition of the 'Systema Naturæ,' 1758, has an "*Eschara foliacea*," but this is what we now know as *Flustra foliacea*, and at p. 790 Ray and Ellis's species appears under the name *Millepora cellulosa*. In his 'Fauna Suecica,' edit. altera, 1761, he drops the genus *Eschara* altogether, and substitutes *Flustra* for certain species.

Pallas, in his admirable 'Elenchus Zoophytorum,' 1766, restores *Eschara*, blaming Linné for having substituted *Flustra*: "*Escharæ* nomen nuper ab Ill. Linnæo, sine nulla necessitate, cum *Flustræ* nova appellatione commutatum est (Faun. Suec. ed. ii.). Ego vero idem servare malui, cum antiquitate et communi autorum consensu ita innotuisse videatur, ut nulla confusio inde oriri possit, saltem non tanta, ut ad molestam et damnosam nominum arbitrariam commutationem ideo confugiendum esse credam." In Pallas's work we have Ellis's species under the name *Eschara fascialis*, with two varieties, (*a*) the Mediterranean *fascialis*, (*b*) the broad-lobed British form *lamellosa*.

Linné, in Syst. Nat. ed. xii. 1768, gives us the name *Millepora fascialis*.

In Solander and Ellis, 1786, we find *Millepora foliacea*, and *Millepora fascialis*, Linn., as a synonym.

Lamarck ('Système des Animaux sans vertèbres,' 1801, p. 375) re-established *Eschara*, giving as his first species *Eschara foliacea*, with references to Ellis and Solander and Ellis.

Moll, in 'Eschara' (or 'Die Seerinde'), 1803, gives us on pl. i. excellent figures of what he names *Eschara fascialis* and its variety *lamellosa*.

From the time of publication of Lamarck's work of 1801 our largest British Cheilostomous Polyzoon has been known as the type of the genus *Eschara* (a genus dating back to 1724, when it was supposed to be of vegetable origin). But as used by Pallas in company with *Cellularia* these two genera included almost all the Cheilostomous Polyzoa known to him, and *Eschara* embraced such creeping forms as *Eschara* (*Electra*) *pilosa* and *Eschara* (*Microporella*) *ciliata*. The genus was restricted by Lamarck, and if, in his characters, he inserted one which was not in accordance with our present existing ideas, the characters should have been emended, not the genus destroyed; if genera were so treated none would exist after some years. Two forms described by Pallas of his *Eschara fascialis* I believe to be really varieties, and not

species. The Mediterranean form generally assumes a different mode of growth, that of narrow thongs instead of broad fronds, and the sides of the oral opening incline inwards in the middle (see Milne-Edwards, 'Recherches sur les *Eschares*,' pl. i. fig. 1 *a*; Waters, Ann. & Mag. Nat. Hist. ser. 5, vol. iii. pl. xv. fig. 8; Hincks, pl. lxvii. fig. 4= *Eschara bidentata*, M.-Edwards, *l. c.* pl. iii. fig. 2 *a*). I felt some doubt whether the Mediterranean and British forms should be regarded as one species, but that doubt was removed when an examination of their respective opercula proved them to be absolutely identical, showing that the difference in the oral opening was entirely superficial. It would appear therefore that our British form must be called

Eschara fascialis, Pallas.

Var. *foliacea*, Ell. & Sol. (=var. *lamellosa* of Pallas and Moll),

and such of the species of Hincks's *Lepralia* as may be regarded as congeneric with this species must be styled *Eschara*.

But had there been no genus *Eschara* to claim precedence, could the name *Lepralia* have been employed in the sense in which Hincks used it, for reasons which I have already given under *Lepralia*, Johnston,=*Membraniporella*, Hincks?

Genus Discopora, Lamarck.

= *Umbonula*, Hincks.

Type, *Discopora verrucosa*, Lamarck.

Harmer has investigated the organization of this species (Quart. Journ. Micr. Sci. n. s. vol. xlvi. p. 293, pl. xv. figs. 11, 12), and has placed *Mucronella pavonella*, Alder, in the same genus. He does not refer to the rosette-plates, so I may mention that there are only two in *pavonella*, but four which are multipored in *verrucosa*.

Genus Porella, Gray, 1848.

Type, *Porella compressa* (Sowerby).

50. *Porella concinna* (Busk).

Varanger Fiord, 120–150 fathoms.

51. *Porella aperta* (Boeck).

1861. *Lepralia aperta*, Boeck, Förh. Vid.-Selsk. Christiania, p. 50 (*fide* Smitt).

1868. *Porella lævis*, Smitt, partim, "Kritisk Förteckning, &c." pt. iv. p. 21, and in description of plate "*Lepralia aperta*, Boeck," figs. 112–113.
1900. *Porella inflata*, Waters, "Bryozoa Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 83, pl. x. figs. 6, 7.

Waters appears to have overlooked the fact that this species had been described by Boeck, whose type Smitt had figured.

Lang Fiord. I have also in my collection specimens from Spitsbergen given me by Smitt under the name "*Porella lævis*," and others collected by Principal Dawson in Gaspé Bay, Gulf of St. Lawrence.

52. *Porella struma* (Norman).

Sværholt (*Nordgaard*). I did not myself meet with this species in East Finmark. Specimens in my collection are from Shetland, Greenland, Gulf of St. Lawrence; "Cashes Ledge," N.E. America, as "*Eschara verrucosa* (*cervicornis*)?," from U.S. Nat. Mus.; and Bergen and Hardanger Fiords, Norway, where I found it to be not uncommon.

53. *Porella minuta* (Norman).

On stones between tide-marks at Vadsö in company with *Cribrilina cryptoœcium*, Norman, and *Harmeria scutulata*, Busk; also in Bög and Lang Fiords, 0–3 fathoms.

Porella minuta has very small zoœcia, which are arranged in unusually regular lines radiating from the centre of the colony. Zoœcia imperforate, more or less minutely granular, moderately raised; oral opening rounded above, straight at the sides, and straight lower lip (unless, as sometimes is the case, interrupted by the avicularium); the avicularium with rounded mandibles either within the oral opening, when a tooth-like process appears in front of it, or situated on the lip itself, and in the latter case more markedly there is a swelling on the zoœcia below the lip indicative of the avicularian cell. Oœcium semiglobose, imperforate. In old specimens there is some filling up of the spaces between the parallel lines of zoœcia, which are often bridged over by bars of calcareous growth (see Hincks, pl. xxix. fig. 1).

The Vadsö specimens, which agree in every other respect, differ from those previously in my collection in having the surface of the zoœcia ornamented with slightly raised lines converging from the sides; similar to the common condition of the zoœcia in *Escharella immersa*.

54. *Porella proboscidea*, Hincks.

1888. *Porella proboscidea*, Hincks, "The Polyzoa of the St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. i. p. 223, pl. xiv. fig. 4.
1895. *Porella proboscidea*, Nordgaard, "Systemat. förteg. Norge Marine Polyzoa," Bergens Mus. Aarbog, 1894-95, no. 2, p. 25, pl. i. fig. 4.

Nordgaard records this species from Mehavn and Nordkyn.

55. *Porella lævis* (Fleming).

Mehavn (*Nordgaard*).

I take the opportunity of describing a Greenland *Porella*.

Porella princeps, sp. n. (Pl. IX. figs. 8–11.)

1892. *Monoporella spinulifera*, var. *præclara*, Hincks, "The Polyzoa of the St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. ix. p. 152, pl. viii. fig. 3.

Zoœcia of immense size, the largest known to me, measuring 1 millim. long and 0·6 to 0·7 broad, ovate or oblong, moderately convex, with deep separating sutures; shell-substance very massive and surrounding the oral opening like a collar; no oral spines; frontal surface punctate all over; origelles of slightly larger size are round the base. Oral opening well arched above, truncate below, but in old zoœcia sometimes subrotund. A large round avicularium within the lip and not rising quite to its level, so that it might be overlooked. The operculum (Pl. IX. fig. 10) has the form of three fifths of an oval, being rather longer than broad, abruptly truncate below, the angles slightly rounded off; from the angles proceeds a bar, for the attachment of the muscles, which bends a little inwards and then passes two thirds of the length of the operculum upwards, at some little distance from the margin. Colour rich rosy red.

A peculiarity of this species is the frequent presence of many aborted cells; in one case two zoœcia unite with one oral opening; but the usual abnormality consists in zoœcia having no room to grow among their large surrounding brethren, and consequently reduced in size, squeezed into all sorts of irregular shapes; many of these have an oral opening, many are quite "blind"; there may be as many as seven to ten blind zoœcia around and including the primary zoœcium (Pl. IX. fig. 9), as well as many others scattered throughout the zoarium. Oœcium buried below the surface (Pl. IX. fig. 11).

I have given Hincks's *Monoporella spinulifera*, var. *præclara*, as a synonym, under the assumption that he overlooked a deep-seated avicularium, the presence of which, however, appears to be indicated by the umbo-like swelling below the oral opening which he described and figured.

Taken by the 'Valorous,' 1875, off Holsteinborg, W. Greenland, in 57 fathoms.

Genus Monoporella, Hincks, 1881.

Type, *Monoporella nodulifera*, Hincks.

Monoporella spinulifera, Hincks.

1889. *Mucronella spinulifera*, Hincks, "The Polyzoa of the St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. iii. p. 431, pl. xxi. fig. 3, and *Monoporella spinulifera*, vol. ix. p. 152 (but not var. *præclara*).

Hincks was quite right in making *Discopora cruenta*, Smitt (but not *Schizoporella cruenta* (Norman)), a synonym of this species, which I have in my collection from the Gulf of St. Lawrence (*Whiteaves*); Greenland, off Holsteinborg, 57 fathoms ('Valorous,' 1875); and Spitsbergen, lat. 76° 41′ N., long. 10° E., in 100–120 fathoms, as "*Discopora cruenta*," from Smitt; and other specimens from Spitsbergen named "*Porina ciliata*, forma *dura*," from Smitt. I cannot understand how Mr. Waters ("Bryozoa Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. 1900, p. 73) can have reverted again to Smitt's mistaken name, and included *Monoporella spinulifera* under *Lepralia cruenta*; apart from all other differences, the front wall of the former is always entire and imperforated, the latter at all ages of growth has the front wall punctate, its oral opening is quite different, and it never has the little spine-point on the lower lip, which, though so insignificant in size, is a very marked characteristic of *spinulifera*.

Cryptic Oœcia.

I have in this paper described an oœcium in *Cribrilina cryptoœcium* which becomes completely covered with overgrowth except the frontal arch, and Levinsen ("Studies of Bryozoa," p. 12) refers to other species which have what he terms "oœcia covered by kenozooœcia"; but in all these cases the oœcia are in the early stage on the surface of the zoarium and clearly seen. The character of the oœcia I am about to call attention to is entirely different. They belong to species of which no oœcia were previously known, and can only be found by partial decalcification of the frontal wall, when they

are discovered to be buried beneath it. The avicularium of *Porella princeps* cannot be seen from the front, and in order to have it revealed more clearly I decalcified the upper layers of this very strongly walled massive species. The result was that I not only laid bare the avicularium, but also an oœcium of normal form over a zoœcium (Pl. IX. fig. 11). This led me to treat in a similar manner two other species remarkable for the massiveness of their front wall, and of which no oœcia were known; the result was the revelation of a very similar buried oœcium in *Schizoporella cruenta* (Norman) (Pl. IX. fig. 13) and in *Monoporella spinulifera*, Hincks (Pl. IX. fig. 12). These oœcia cannot be rare in these species, inasmuch as in each case the treatment of a single small fragment of the species sufficed to make known their existence.

"Escharoides," "Escharella," "Mucronella."

Escharoides, H. M.-Edwards (Lamarck, ed. 1836, pp. 218 & 259), embraced many species. Of these species Gray, 1848, made *Cellepora coccinea*, Abildgaard, the type (Cat. Brit. Radiata, p. 124). Authors are not agreed as to the species which Abildgaard described, some supposing it to be *ventricosa*, Hassall, or *immersa*, Fleming (=*Peachii*, Johnston), while others regard it, as English authors have done, as the *appensa* of Hassall. But there can be no doubt as to the species intended by both Milne-Edwards and Gray, since both give references to the *coccinea* of Fleming and of Johnston. Therefore in any division of the genus *Mucronella*, Hincks, which removes *coccinea* (=*appensa*) from it, that species should be placed in the genus *Escharoides*.

Escharella, Gray, 1848 (not *Escharella*, d'Orbigny, 1850, nor *Escharella*, Smitt), contained three species—*immersa*, Fleming (=*Peachii*, Johnston), *violacea*, Johnston, and *variolosa*, Johnston; the first and third of these point to this genus as another which had claim to have been used by Hincks when he instituted the genus *Mucronella*, which thus at the time of its creation was a synonym of two other genera which he included within it. *Mucronella* is a peculiarly appropriate name for the *immersa* section, but unfortunately it must yield to the earlier *Escharella*.

As long ago as 1879 Verrill saw the necessity of breaking up the genus *Mucronella* (Proc. U.S. Nat. Mus. 1879, p. 195), and proposed to use *Escharoides* for the *ventricosa* section and *Mucronella* for *appensa* (*coccinea*) and allies; but such a use of Hincks's genus *Mucronella* cannot be made, since he

specially placed all the species of the *ventricosa* section first, both in his original creation of the genus in 1879 and in his work; and we have seen that *Escharoides* can be used for the *appensa* section, but could not be used for the other.

Genus Escharella, Gray, 1848.

=*Mucronella*, Hincks, 1879.

Type, *Escharella immersa* (Fleming) (=*L. Peachii* Johnston).

Zoœcia convex or somewhat flattened; front wall strongly calcareous and granulated, generally imperforated on all the central portion; round the base a row of pores. Oral opening semicircular or nearly so, a mucro on the lower lip, and within it a simple or bifid denticle and a "well-developed oral bow" (*Levinsen*). Operculum membranous. Oœcium semiglobose, imperforated. No avicularia. Rosette-plates very numerous (about 18–24) and carried round the distal margin, of the same character as those of the lateral margins.

The passages of communication between the walls of the zoœcium in this genus make a pretty appearance on the back. Levinsen's figure of the back of *E. immersa* (Zool. Dan. pl. vi. fig. 3) is illustrative of all the species, though each has a character of its own. As regards the number, I shall count the number of the upper half of a side of the zoœcium to the centre of the distal margin, and the rosette-plates for a whole side will therefore be double that of the number given: *ventricosa*, 8–10; *immersa*, 5–7; *variolosa*, 10–12, the wall very thin; *abyssicola*, about 10.

Of species which should be excluded from *Escharella*—

appensa, Hassall (=*coccinea* auct., but ? Abildgaard).—The back as well as the front of the zoœcium is utterly different from that of the true *Escharellæ*. It is like that of a *Callopora* or *Lepralia* (=*Membraniporella*), for there are one distal and two lateral pore-chambers exactly as in those genera. This species should, I think, be regarded as the type of Milne-Edwards's genus *Escharoides*. Levinsen ("Studies of Bryozoa," p. 26) has created a genus *Peristomella* for it.

pavonella, Alder, is equally removed as the last from *ventricosa*; for the whole side of the zoœcium there are only two rosette-plates. Harmer would place it with *verrucosa* in the genus *Umbonula*, or, as I should say, *Discopora*.

microstoma, Norman.—I have not satisfied myself as to the position which this species should take; the semierect mouth, which is very small and round, and the oœcium tilted back off the zoœcium, seem to point to alliance with such a species as *sincera*.

56. *Escharella immersa* (Fleming).

1828. *Berenicea immersa*, Fleming, Hist. Brit. Animals, p. 533.
1847. *Lepralia Peachii*, Johnston, Hist. Brit. Zoophytes, edit. ii. p. 315, pl. lv. figs. 5, 6.

To remove any doubt as to this synonymy, I may state that I have examined Johnston's specimens of *Lepralia immersa* in the British Museum, and they are undoubtedly the same as his *L. Peachii*.

Taken at Nordkyn (*Nordgaard*).

57. *Escharella abyssicola* (Norman).

Sværholt (*Nordgaard*).

58. "*Mucronella*" *sincera* (Smitt).

1867. *Discopora sincera*, Smitt, "Kritisk Förteckning, &c." p. 28, pl. xxvii. figs. 178–180.
1876. *Discopora sincera*, Norman, 'Valorous' Report, Proc. Roy. Soc. vol. xxv. p. 208.
1877. *Lepralia sincera*, Hincks, "Polyzoa Iceland and Labrador," Ann. & Mag. Nat. Hist. ser. 4, vol. xix. p. 102, pl. xi. fig. 2.
1880. *Hemeschara sincera*, Busk, "Polyzoa North Polar Exped.," Journ. Linn. Soc., Zool. vol. xv. p. 237.
1880. *Mucronella simplex*, Hincks, "Hydrozoa and Polyzoa of Barents Sea," Ann. & Mag. Nat. Hist. ser. 5, vol. vi. p. 280, pl. xv. fig. 7.
1900. *Mucronella sincera*, Nordgaard, Norwegian N. Atlan. Exped. xxviii. Polyzoa, p. 14, pl. i. figs. 13–15.

Bög Fiord, East Finmark, in 120 fathoms (*A. M. N.*); Sværholt (*Nordgaard*). Other specimens in my collection are from Spitsbergen (*Smitt*); off Hare Island, Waigat Strait, Greenland, 175 fathoms ('Valorous,' 1875); also Greenland (Copenhagen Museum), and Proven, Greenland (*Smitt*); and the form *Mucronella prælucida*, Hincks, Gulf of St. Lawrence (*Whiteaves*).

The oral opening is subject to considerable variation; the lower lip is often more or less produced, commonly evenly (see Nordgaard's figure 15), more rarely acutely (as Nordgaard, figs. 13, 14), and the last condition seems to be the *Mucronella simplex*, Hincks, and hence it has been placed by himself and Nordgaard in the genus *Mucronella*; but with this genus it has no connexion, for the oral point is a mere projection of the margin, and, as Hincks himself wrote, "the oral denticle is wanting." The form of the oral opening is also subject to considerable variation. In zoœcia without oœcia the outline is circular or subcircular, but in other cases (Spitsbergen examples) it is nearly of the form assigned by Hincks to his genus *Lepralia*. Oral spines are unknown.

Avicularia I have seen sparingly developed, but only on Spitsbergen specimens and on one side of the zoœcium, as figured by Smitt. Nordgaard, however, illustrates a zoœcium with two avicularia, which were developed on a specimen from a "place unknown."

Nordgaard has referred the *Mucronella prælucida* of Hincks * with a ? to this species. With respect to the Queen Charlotte Islands type specimens I think that there may be some doubt, but I am very much inclined to refer the St. Lawrence form to *M. sincera*. I have a specimen from that locality the zoœcia of which exactly correspond with the left-hand zoœcium of Hincks's illustration; but the oral lip processes are none of them truncate as drawn on the other three oœcia. I consider my specimen to be *M. prælucida* (of St. Lawrence), a variety of *M. sincera* in which the zoœcia are shorter than usual.

59. "*Mucronella*" *labiata* (Boeck).

1867. *Discopora coccinea*, forma *labiata*, Boeck MS., Smitt, "Kritisk Förteckning, &c." p. 27, pl. xxvii. fig. 176.
1878. *Discopora labiata*, Smitt, Œfvers. Kongl. Vet.-Akad. Förhand. p. 23.
1880. *Phylactella* (?) *grandis*, Hincks, "Hydrozoa and Polyzoa Barents Sea," Ann. & Mag. Nat. Hist. ser. 5, vol. vi. p. 280, pl. xv. figs. 4, 5.
1887. *Mucronella labiata*, Levinsen, Dijmphna-Togtets zool.-botan. Udbytte, p. 323.
1900. *Phylactella* (?) *labiata*, Waters, "Bryozoa from Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 90, pl. xii. figs. 3, 4 (illustrations of the larva).

Varanger Fiord, in 120–150 fathoms, on shell of *Astarte*, and Nordgaard has kindly sent me a specimen from Sværholt. This last specimen is developed on *Hornera lichenoides*, a habitat which the species seems especially to affect, as fine examples were dredged upon it in 175 fathoms off Hare Island, Disco, Greenland, by the 'Valorous' in 1875.

It would seem that Smitt at first included more than one form under the term "forma *labiata*," since a specimen received from him just after he had finished his work is undoubtedly a variety of *Escharella ventricosa* with produced lip; but I think that there can be no doubt that his figure 176 represents the species which was subsequently named by Hincks *Phylactella* (?) *grandis*.

It would be quite possible that *Escharella abyssicola* might be mistaken for this species. There is a very general resem-

* "Polyzoa Queen Charlotte Islands," Ann. & Mag. Nat. Hist. ser. 5, vol. xiii. p. 26, pl. iv. fig. 1; and "Polyzoa St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. i. p. 225, pl. xv. fig. 3.

blance, especially when the oral lip is more than usually produced, as in the specimen figured by Hincks (pl. xxxviii. fig. 1); but that species may be at once distinguished by the presence of a bifid denticle within the mouth; this denticle is deeply seated and is not shown in the figures given by Hincks, though his description is entirely accurate.

Genus Palmicellaria, Alder.

60. *Palmicellaria Skenei* (Ellis & Solander).

The variety *bicornis* (Busk, Crag Polyz. pl. viii. figs. 6, 7) has been recorded by Nordgaard from Sværholt.

Genus Smittina, nov. nom.

= *Smittia*, Hincks, 1879 (partim), nec *Smittia*, Holmgren, 1874 (Diptera), = *Escharella*, Smith (partim, nec *Escharella*, Gray).

Type, *Smittina Landsborovii*, Johnston.

Some of the following species, as well as others which have been described, will not be allowed to remain, in my opinion, in this genus, which no doubt Levinsen will revise; such species are those in which there is an absence of the "lyrula" or tooth-like process behind the avicularium (which is a product of the primary orifice), and there is an absence of the "origelles" at the base of the zoœcium, and other material differences.

61. *Smittina Jeffreysi*, Norman.

1876. *Lepralia Jeffreysi*, Norman, "Biology of 'Valorous' Cruise," Proc. Roy. Soc. vol. xxv. p. 208.
1877. *Lepralia trispinosa*, var., Hincks, "Polyzoa of Iceland and Labrador," Ann. & Mag. Nat. Hist. ser. 4, vol. xix. p. 160, pl. xi. fig. 1.
1887. *Escharella trispinosa*, var. *arborea*, Levinsen, Dijmphna-Togtets zool.-bot. Udbytte, p. 320, pl. xxvii. figs. 7, 8.
1897. *Smittia trispinosa*, var. *arborea*, Bidenkap, "Bryozoen von Ost-Spitsbergen," Zool. Jahrbücher, vol. x. p. 619.
1900. *Smittia trispinosa*, var. *arborea*, Nordgaard, Norweg. N. Atl. Exped., Polyzoa, p. 13, pl. i. fig. 9.
1900. *Smittia trispinosa*, var. *lamellosa*, Smitt, Waters, "Bryozoa Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 88, pl. xii. figs. 19–21.

This form or species has has been recorded from the Porsanger Fiord by Nordgaard.

It is a common form in the Arctic seas, and very generally rises in free hollow cups or tubes, often branching. Among other characters, this northern form is remarkable for the abundant distribution of oval avicularia on the zoœcia, as

well as one of larger size and acute mandible; but the most important difference is the form of the oral opening, which in this northern form, whether it be tubular or encrusting, is wider below than above and has a straight underlip.

In my cabinet are specimens from off Disco, Greenland, 100 fathoms ('Valorous,' 1875); Gulf of St. Lawrence (*Whiteaves*); Cashes Ledge, N.E. America (*Verrill*, as "*Escharella Jacotini*").

I am indebted to Smitt for a specimen of his var. *lamellosa* from Spitsbergen, which certainly has not the characters of the foregoing form, nor does d'Orbigny's figure (Pal. Franç. Crét. pl. dccxxii. fig. 1) of his *Semieschara lamellosa*, to which Smitt refers, bear any resemblance to it; it is wholly without avicularia.

62. *Smittina arctica*, Norman.

1869. *Escharella porifera*, forma *majuscula*, Smitt, "Krit. Förteck. &c." pt. iv. p. 9, pl. xxiv. figs. 36–38, and forma *minuscula*, figs. 33–35.
1888. *Smittia Landsborovii*, form *porifera*, Hincks, "Polyzoa St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. i. p. 225, pl. xiv. fig. 2.
1894. *Smittia arctica*, Norman, "A Month on the Trondhjem Fiord," Ann. & Mag. Nat. Hist, ser. 6, vol. xiii. p. 128.
1895. *Smittia arctica*, Nordgaard, "System. förtegn. Norge Marine Polyzoa," Bergens Mus. Aarbog, no. 2, p. 27, pl. i. fig. 2.
1900. *Smittia Landsborovii*, var., Waters, "Bryozoa Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 90, pl. xii. fig. 7.

This is a very pretty form, the front wall regularly punctate all over; the avicularium on or just below the lower lip of the oral opening with round mandible and a very slender lyrula behind it, which, however, can seldom be seen except on young specimens; sides and upper lip of oral opening raised; the oœcium, which is imperforated, generally but not always falls back from the raised upper margin of the oral opening.

I do not understand the transverse and circular lines which Nordgaard represents on the oœcium; Waters's figure is characteristic, but the upper lip and the attachment of oœcium are rather more marked in their special character than usual.

On an annelid tube in Bög Fiord in 100–120 fathoms.

63. "*Smittia*" *porifera* (Smitt).

1867. *Escharella porifera* (typica), Smitt, "Kritisk Förteckning, &c." p. 9, pl. xxiv. figs. 30–32.
1877. *Lepralia porifera*, Hincks, "Polyzoa of Iceland and Labrador," Ann. & Mag. Nat. Hist. ser. 4, vol. xix. p. 102, pl. x. figs. 1, 2.

1895. *Smittia porifera*, Nordgaard, "System. förtegn. i Norge Marine Polyzoa," Bergens Mus. Aarbog, 1894–95, p. 26, pl. ii. fig. 1.
1900. *Lepralia porifera*, Waters, "Bryozoa Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 75, pl. viii. figs. 14, 15.

Waters has figured the operculum, which I have not myself examined.

Mehavn, East Finmark (*Nordgaard*).

Specimens in my collection are from Spitsbergen (*Smitt*), Gulf of St. Lawrence (*Principal Dawson*), and West Greenland ('Valorous,' 1875).

Smitt, in his work on the Floridan Bryozoa, separated his formæ *majuscula* and *minuscula* from *porifera*, and regarded his typical *porifera* as more nearly related to *palmata* and the other forms to *Landsborovii*.

64. "*Smittia*" *lineata*, Nordgaard. (Pl. IX. figs. 14, 15.)

1895. *Smittia lineata*, Nordgaard, "System. förtegn. i Norge Marine Polyzoa," Bergens Mus. Aarbog, 1894–95, no. 2, p. 27, pl. ii. fig. 2.

This recently described species has been known to me for years, and has been regarded as an undescribed form.

The types of Nordgaard were taken by him off Nordkyn, and I am indebted to him for a specimen which enables me to be certain of its identification; and I also found the species in another East Finmark locality—namely, encrusting *Escharopsis rosacea* dredged off Vadsö.

Other specimens in my collection are one received from Smitt taken at Spitsbergen, and named *Escharella auriculata*; others from the Gulf of St. Lawrence (*Whiteaves*), and off Holsteinborg, Greenland, in 57 fathoms ('Valorous,' 1875).

This, in my opinion, cannot remain in the present genus, and is more nearly related to *auriculata*, as Smitt considered it. I have figured the operculum of *auriculata* (Pl. IX. fig. 16) for comparison with that of *lineata* (fig. 15).

65. "*Lepralia*" *reticulato-punctata*, Hincks.

1867. *Escharella porifera*, forma *edentata*, Smitt, "Krit. Förteck., &c." pt. iv. p. 9, pl. xxiv. fig. 39.
1877. *Lepralia reticulato-punctata*, Hincks, "Polyzoa Iceland and Labrador," Ann. & Mag. Nat. Hist. ser. 4, vol. xix. p. 103, pl. x. figs. 3, 4.
1887. *Escharella reticulato-punctata*, Levinsen, Dijmphna-Togtets zool.-bot. Udbytte, p. 318, pl. xxvii. fig. 4 (the operculum).

I dredged this species in 100–120 fathoms in Bög Fiord, and Nordgaard records it from Sværholt. I have it also from Spitsbergen (*Smitt*), Jan Mayen (Austro-Hungarian

Exped.), Gaspé, Gulf of St. Lawrence (*Principal Dawson*), and West Greenland ('Valorous,' 1875).

It is probable that Smitt's figure of "forma *cancellata*" (figs. 40, 41) may also belong to this species, but I have not seen any specimens identical, that is, having the projecting point on the under lip. Kirchenpauer, in 1874, named this last form *Hemeschara* (?) *contorta* ('Die zweite deutsche Nordpolarfahrt,' vol. ii. p. 422).

Levinsen, who figures the operculum, says rightly of the avicularia: "avicularia in plurimis desunt; ubi adsunt, paulo sub peristomia varie deposita."

I may mention here another species which has been often described and would appear to be allied to some of the preceding forms.

"*Lepralia*" *Smitti*, Kirchenpauer.

1867. *Escharella Legentilii*, forma *prototypa*, Smitt, "Kritisk Förteck., &c." p. 10, pl. xxiv. figs. 47–49.
1874. *Lepralia Smitti*, Kirchenpauer, Die zweite deutsche Nordpolarfahrt, vol. ii. p. 420.
1887. *Escharella reticulata*, Levinsen, Dijmphna-Togtets zool.-bot. Udbytte, p. 319, pl. xxvii. figs. 5 & 6.
1892. *Schizoporella cincta*, var., Hincks, "Polyzoa St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. ix. p. 154, pl. viii. fig. 2.
1897. *Smittia reticulata*, Bidenkap, "Bryozoen von Ost-Spitsbergen," Zool. Jahrbücher, vol. x. p. 622, pl. xxv. fig. 3.
1900. *Schizoporella Harmsworthii*, Waters, "Bryozoa Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 65, pl. ix. figs. 10–12.

The known localities of this species are Spitsbergen (*Smitt*), East Greenland (*Kirchenpauer*), Gulf of St. Lawrence (*Hincks*), Kara Sea (*Levinsen*), and Franz-Josef Land (*Waters*) *.

Genus Escharopsis, Verrill †.

= *Escharoides*, Smitt, Hincks, &c. (nec H. Milne-Edwards).

Type, *Escharopsis lobata*, Lamouroux, = *E. Sarsii*, Smitt.

66. *Escharopsis rosacea* (Busk).

Not uncommon near Vadsö and in the middle of the Varanger Fiord down to 100–120 fathoms; also recorded by Nordgaard from Sværholt in 30–40 fathoms.

Other localities from which examples are in my cabinet

* Since this paper was sent to the printer, *Lepralia Smitti* has received yet another name, viz. *Smittia Levinseni*, Nordgaard, 'Die Bryozoen des westlichen Norwegens,' 1903, p. 92.

† Verrill, Proc. U.S. Nat. Mus. 1879, p. 196.

are Greenland, off Holsteinborg, 57 fathoms ('Valorous,' 1875); Brandewyne Bay, Spitsbergen (*Smitt*); Orphan Bank, Gulf of St. Lawrence (*Smitt*); Loch Fyne, Scotland (*A. M. N.*).

Genus Pseudoflustra, Bidenkap *.

Type, *Pseudoflustra solida*, Stimpson.

67. *Pseudoflustra solida* (Stimpson).

1853. *Flustra solida*, Stimpson, Invert. of Grand Manan, p. 19, pl. i. figs. 12 *a*, *b*.
1862. *Eschara palmata*, M. Sars, "Beskr. over nogle norske Polyzoer," Vidensk. Selsk. Förhand. 1862, p. 8 (separate copy).
1867. *Escharella palmata*, Smitt, "Krit. Förteck., &c." Œfvers. K. Vet.-Akad. Förhand. p. 10 (separate copy), pl. xxiv. figs. 42–46.
1879. *Flustrimorpha solida*, Verrill, Proc. U.S. Nat. Mus. p. 191.
1880. *Flustra solida*, Hincks, "Hydroida and Polyzoa from Barents Sea," Ann. & Mag. Nat. Hist. ser. 5, vol. vi. p. 282, pl. xv. figs. 2, 3.
1882. *Eschara solida*, Vigelius, "Cat. Polyzoa of 'Willem Barents' in 1878 and 1879," Niederl. Archiv f. Zoologie, p. 15, figs. 2 & 3 *a*, *b*.
1887. *Escharella palmata*, Levinsen, Dijmphna-Togtets zool.-bot. Udbytte, p. 318, pl. xxvii. fig. 3.
1892. *Flustra solida*, Hincks, "Polyzoa of the St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. ix. p. 149, pl. viii. figs. 1 & 1 *a–c*.
1897. *Pseudoflustra solida*, Bidenkap, "Bryozoen von Ost-Spitsbergen," Zool. Jahrbücher, vol. x. p. 618.
1900. *Smittia palmata*, Nordgaard, Norweg. N. Atl. Exped., Polyzoa, p. 12.
1900. *Pseudoflustra palmata*, Waters, "Bryozoa from Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 71, pl. viii. figs. 7–8 (operculum and avicularium).

I have given this list of references, only omitting those which relate solely to the record of a locality, to show how this unfortunate species has been thrown from genus to genus. Let us hope that it will now find a resting-place in a genus of which it is made, and, I think, rightly made, the type. In the latest paper in the list above given Mr. Waters discards Stimpson's specific name *solida*, and uses the later *palmata*. He does this upon the ground that it is not clear that Stimpson's description refers to this species, and then he proceeds not only to give a reference to Stimpson without any mark of interrogation, but also inserts Stimpson's locality as one of the habitats of the species. That the European Arctic species belongs to the same genus, and is apparently only a slight variation of the species described by Stimpson, is, I think, quite clear from the fact that the description and figure in the 'Invertebrata of Grand Manan,'

* Bidenkap, "Bryozoen von Ost-Spitsbergen," Zoolog. Jahrbücher, vol. x. 1897, p. 618.

though not minutely accurate, can apply to no other genus; and, secondly, because Stimpson's form is well known in the district where he found it and also in the Gulf of St. Lawrence. *Pseudoflustra* is perhaps hardly a happy name to have given to the genus, but becomes expressive when the specific name *solida* is added to it.

The following differences are seen in the specimens in my collection:—

a. Cashes Ledge, N.E. America, 70 fathoms (*Prof. Verrill*). —The form described by Hincks in his St. Lawrence paper, p. 150. The growth is in narrow strips, which at the same time are somewhat thicker and more solid-looking than the other varieties. The avicularium is nearly round (see Hincks, fig. 1); a slight sinus is more or less evident on the lower margin of the oral opening, but this sinus is not evident on oœcium-bearing zoœcia. Length of a frond 25 millim., greatest breadth 4 millim.

b. "*Escharella palmata*, Sars, Spitsbergen," from F. A. Smitt.—Zoœcia narrow and greatly elongated; avicularium linguiform (as Smitt, fig. 43).

c. Varanger Fiord, 100–150 fathoms.—Frond very thin and broad, 18 millim. long, 13 millim. broad. Zoœcia of much larger size than from the other localities, not much produced; avicularia linguiform (as Smitt, fig. 44).

It was also taken by the Norwegian North-Atlantic Expedition off Vardö (Stat. 262).

Genus Rhamphostomella, Lorenz.

Type, *Rhamphostomella scabra* (Fabricius), Smitt.

68. *Rhamphostomella costata*, Lorenz.

1867. *Cellepora scabra*, Smitt (*partim*), "Krit. Förteckning, &c." p. 30, pl. xxviii. figs. 186–188.
1886. *Rhamphostomella costata*, Lorenz, Bryozoen von Jan Mayen, p. 12, pl. vii. fig. 11.
1892. *Rhamphostomella costata*, Hincks, "Polyzoa St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. iii. p. 426, pl. xxi. figs. 6–8.

Varanger Fiord, in 120–150 fathoms, and Nordgaard records it from Mehavn, and it was dredged by the Norwegian North Atlantic Expedition off Porsanger Fiord (Stat. 260).

69. *Rhamphostomella plicata*, Smitt.

1867. *Cellepora scabra*, forma *plicata*, Smitt, *l. c.* p. 30, pl. xxviii. figs. 189–191, 195.

1877. *Cellepora plicata*, Hincks, "Polyzoa Iceland and Labrador," Ann. & Mag. Nat. Hist. ser. 4, vol. xix. p. 106, pl. xi. figs. 3, 4.
1886. *Rhamphostomella plicata*, Lorenz, *l. c.* p. 12.

I dredged this form in 120–150 fathoms in the Varanger Fiord; also found at Nordkyn (*Nordgaard*).

Genus Cellepora, Fabricius.

Type, *Cellepora pumicosa* (Pallas), Linné.

70. *Cellepora pumicosa*, Pallas.

Varanger and Lang Fiords and Vardö. Nordgaard records it from Sværholt.

71. *Cellepora ramulosa*, Linné.

Mehavn (*Nordgaard*).

Genus Retepora, Lamarck.

Type, *Retepora reticulata* (Imperato), Lamarck.

Retepora Beaniana, King.

Bög Fiord, in 120 fathoms; also Sværholt (*Nordgaard*) and Vadsö (*Danielssen*).

72. *Retepora cellulosa*, Linné.

1867. *Retepora cellulosa*, Smitt, "Krit. Förteck., &c." p. 35, pl. xxviii. figs. 222–225.
1895. *Retepora cellulosa*, Waters, "Mediterranean and New Zealand *Reteporæ*," Journ. Linn. Soc., Zool. vol. xxv. p. 259, pl. vi. figs. 17 & 19, pl. vii. fig. 12.

In Bög Fiord, 120 fathoms, and also in Lang Fiord, in 20–30 fathoms (*A. M. N.*); Mehavn and Nordkyn (*Nordgaard*).

73. *Retepora Wallichiana*, Busk.

1867. *Retepora cellulosa*, forma *notopachys*, var. *elongata*, Smitt, "Kritisk. Förteckning, &c." p. 36, pl. xxviii. figs. 226–232.
1877. *Retepora Wallichiana*, Busk MS., Hincks, "Polyzoa from Iceland and Labrador," Ann. & Mag. Nat. Hist. ser. 4, vol. xix. p. 107, pl. xi. figs. 9–13.
1878. *Discopora elongata*, Smitt, "Recensio Bryoz. Nov. Semlya," Œfvers. K. Vet.-Akad. Förhand. p. 25 (separate copy).
1887. *Retepora elongata*, Levinsen, Dijmphna-Togtets zool.-bot. Udbytte, p. 323, pl. xxvii. fig. 12.

Lang Fiord.

In examining this species the descriptions of Hincks and of Levinsen should be consulted in addition to Smitt's work.

EXPLANATION OF THE PLATES.

N.B.—The description of figures 1 and 2 in this Plate, *Callopora nigrans*, will be found in the preceding part of these papers, vol. xi. p. 593.

Plate VIII.

Fig. 1. *Callopora nigrans*, Hincks. *a*, young zoœcium; *b*, with avicularia; *c*, an unusual form of oœcium in a part where growth is very rapid and there are no avicularia. These zoœcia, and also those of fig. 2, not developed side by side, but brought here together for illustration. Fig. *b* resembles state illustrated by Waters from Franz-Josef Land.

Fig. 2. *Callopora nigrans*, Hincks. *a*, early stage of development of oœcium; *b*, the usual form of oœcium; *c*, a form of which I have only seen two or three examples (it is this form which is figured by Hincks).

Fig. 3. *Larnacicus corniger*, Busk, with oœcium, and the chambers in the situation usually occupied by an oœcium.

Fig. 4. *Antropora granulifera*, Hincks. View of the back of a zoœcium: *a*, openings resulting from the avicularia; below these are seen the pair of lucid bays, and below again the lucid spots.

Fig. 5. *Ammatophora nodulosa*, Hincks. This and the following two figures have been taken from specimens in which the epitheca has been removed in order to show the structure. The form of the oœcium represented in fig. 5 is seldom seen.

Figs. 6 & 7. *Ammatophora nodulosa*, Hincks. The more usual forms of the oœcium: fig. 6 the younger, fig. 7 the mature condition.

Fig. 8. *Lepralia nitida*, Fabricius. Three bars of the zoœcium, to show their structure.

Fig. 9. *Lepralia melolontha*, Landsborough. Three front bars, to show the structure.

Fig. 10. *Cribrilina annulata*, Fabricius. Three bars of the zoœcium of a very simple form of this species.

Fig. 11. *Cribrilina annulata*, var. *spitsbergensis*, Norman. Anterior portion of a zoœcium.

Fig. 12. *Gephyrotes nitido-punctata*, Smitt. The anterior portion of a zoœcium, to show the structure of the bridge and oral opening.

Fig. 13. *Gephyrotes nitido-punctata*, Smitt. Middle bars of the zoœcium.

Plate IX.

Fig. 1. *Cribrilina cryptoœcium*, Norman. Zoœcium with oœcium in earliest stage of development as seen at the edge of a zoarium.

Fig. 2. The same. An older zoœcium, with the oœcium except the front arch concealed beneath overgrowth, and a transverse rib developed over it.

Fig. 3. *Cribrilina innominata*, Couch. Three bars of zoœcium: *a*, *b*, lateral papillæ: *c*, the opening outside the arch of the bars and into the body of the Polyzoon, which a papilla has occupied.

Fig. 4. *Cribrilina Gattyæ*, Busk. Anterior portion of a zoœcium of the ordinary form.

Fig. 5. *Cribrilina Gattyæ*. Variety on shell from Guernsey, with interesting duplicated lateral lacunes.

Fig. 6. *Cribrilina Balzaci* (Audouin), Waters, from Madeira.

Fig. 7. *Cribrilina figularis*, Johnston, showing the very large lumen-pore on the base of the bars, the small lateral lacunes, and narrow chinks (? openings for papillæ) between the loops of the bars.

Fig. 8. *Porella princeps*, Norman.
Fig. 9. The same, to show the number of blind zoœcia ("kenozoœcia," Levinsen) and irregularly shaped zoœcia around the ancestrula.
Fig. 10. The same, operculum.
Fig. 11. The same, in which the thick outer calcareous wall has been removed by acid, and a previously entirely concealed oœcium and the oral avicularium have been exposed to view.
Fig. 12. *Monoporella spinulifera*, Hincks. A zoœcium which has, like the last, been partially decalcified, and an oœcium has been brought to view.
Fig. 13. *Schizoporella cruenta*, Norman. A zoœcium which has been similarly treated, as the two previous species, with nitric acid, and an oœcium of which the existence was previously unknown has been brought to light.
Fig. 14. *Smittia lineata*, Nordgaard.
Fig. 15. The same. Operculum and outline of margin more magnified.
Fig. 16. *Schizoporella auriculata*, Hassall. Operculum, for comparison with the preceding.

VI.—*Notes from the Gatty Marine Laboratory, St. Andrews.* No. XXV. By Prof. M'Intosh, M.D., LL.D., F.R S., &c.

[Plates X.-XIII.]

1. On the *Eunicidæ* dredged by H.M.S. 'Porcupine' in 1869 and 1870.
2. On Canadian *Eunicidæ* dredged by Dr. Whiteaves, of the Canadian Geological Survey, in 1871–1873.
3. On Norwegian *Eunicidæ* collected by Canon Norman, D.C.L., F.R.S.

1. *On the* Eunicidæ *dredged by H.M.S. 'Porcupine' in* 1869 *and* 1870.

A species of *Diopatra* was procured in the Expedition of 1870, at Station 50, off the Algerine coast, near Cape Tenez, in 7–51 fathoms, which most closely approaches *Diopatra neapolitana*, Delle Chiaje.

It consisted only of a fragment of a small example, about half an inch long, and comprising the head and about thirty of the anterior segments. The head is characterized by the great size of the tentacles, their enlarged ringed ceratophores, and the presence of two short, spindle-shaped, frontal tentacles. The palpi have a tuberculated anterior border. The eyes have disappeared, whereas in the Neapolitan examples they are present. The body is rounded in front, the first segment—which is no wider than the succeeding—being devoid of feet. From its anterior border project the