

XXV.—*Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia, continued.* By H. J. CARTER, F.R.S. &c.

[Continued from p. 222.]

Remaining Groups of the Hircinida.

Referring to the tabular view (p. 215) we may observe that there are eleven groups still remaining in the family HIRCI-NIDA, beyond whose diagnosis ('Annals,' 1875, vol. xvi. p. 132), viz. "Solid fibre chiefly cored with foreign objects," there is nothing in their respective descriptions (*ib.* p. 136 *et seq.*) to lead to their determination, for I have already stated that *form alone* among the Spongida is of no value in this respect, and most of them are simply characterized by their forms, as may be learnt from the nomenclature.

Still all that I could do at the time, when a quantity of Psammonemata that would alone fill several square yards was presented to me for arrangement—in which, with very few exceptions, nothing but bare skeletons (beach specimens) remained for my guidance—was to heap them together hurriedly, and name the heaps chiefly in accordance with the forms they contained as preliminary to future distribution, when such time should arrive that they might be studied with their sarcode on as well as off. This "time" must, of course, be very long, as in all other branches of natural history; but still it will progress if advantage be taken of the opportunities offered for this purpose, such, I may instance, as those afforded by Mr. Wilson's collections. But it never can be done at a distance so well as on the spot, where the species, from its abundance and its varieties, may be studied under all its phases, and a multiplication of useless specific names thus avoided. Much therefore in this way may be hoped for from Dr. R. von Lendenfeld, now at Melbourne, who, educated under one of the best spongiologists of the present day, viz. Prof. E. Schulze, of Gratz, has already turned his attention most successfully in this direction.

Although, however, the skeletons of the Psammonematous sponges thus deprived of their sarcode are almost indispensable in classification, as may be learnt from Prof. Hyatt's beautiful photographs and careful descriptions (*op. et loc. cit.*), yet when we come to see many of them which have been skilfully preserved either in the dried or wet states *directly after having been dredged up from their natural abodes*, their

aspect is so different that, had the former not familiarized me with their character, the latter would hardly enable me to recognize the species. Thus Schmidt's genus *Stelospongos* would never have become known to me by his illustrated description of the arrangement of the fibre *alone*, if it had not been for Hyatt's photograph of an *entire* form, viz. *S. levis*, from South Australia (Mem. Bost. Soc. Nat. Hist. vol. ii. p. 530, pl. xv. fig. 16), of which form there is an abundance in the British Museum.

It is true that, in the "key" of illustrations to my classification ('Annals,' l. c. p. 192), I have also given some of Schmidt's species of *Hircinia*, Nardo, to illustrate the group "Hirciniosa;" but it will be found, by referring to Schmidt's arrangement (Spong. Adriatisch. Meeres, p. 30 &c.), that these, as well as others, are all placed under his Filifera, that is that the sarcode in all was more or less replaced by the presence of the parasite *Spongiophaga communis*, so that, as genuine illustrations of the "Hirciniosa," neither of these can be admitted. Again, *Halispungia choanoides*, Bk., = *Stelospongos*, Sdt., is not an illustration of the group Callhistia, as I had thought, whose skeleton is much finer, as will be more particularly noticed hereafter; while *Sarcotragus fetidus*, Sdt., which was adduced to illustrate the form of the fibre in the group "Platyfibra," is in the same condition as regards the sarcode as Schmidt's *Hirciniae*. This parasitic (?) transformation is so prevalent in the *Hirciniae* that it is difficult to find a specimen without it; and hence Lieberkühn made it a specific character, which of course was a mistake, especially as *it is not confined to the Hirciniae only*.

Thus, as I have just stated, there is absolutely nothing that has been hitherto laid down to lead the student to the recognition of any species contained in the groups in my classification to which I have alluded, and therefore it becomes desirable to see how far this want may be supplied by Mr. Wilson's specimens.

Setting aside then all attempt to interfere with these groups so far as their names are concerned, I would divide the whole into conulated and unconulated Psammonematous sponges, proposing to *retain* the term "HIRCINIDA" for the former, and *adding* that of "LIOCHROTIDA" for the latter family, with which we will begin.

Fam. Liochrotida*.

Char. Psammonematous sponges on which there are no

* λείωχος, smooth-skinned.

conuli, but in which the keratose fibre is strongly developed and more or less cored with sand and foreign microscopic objects.

Stelospongia levis, Hyatt (*op. et loc. cit.*).

Of this species, to which I have just alluded, there are several specimens in Mr. Wilson's spirit-preserved collection, while the great number of dried ones from the southern coast of Australia that have come under my notice indicates that it is not only abundantly plentiful, but that it is more so than any other species in that locality; yet, with the exception of Dr. Bowerbank's representations of a spirit-preserved specimen from Freemantle under the name of "*Halispongia choanoides*" (Proc. Zool. Soc. 1872, pl. vi.), and Mr. Stuart O. Ridley's observations on *Stelospongia excavatus* from Port Molle, in Queensland (Zool. Coll. of H.M.S. 'Alert,' Brit. Mus. pub. 1884, p. 383), viz. that "the colour in spirit is greyish white (putty colour)," and that "the dermis conceals all the skeleton but the ends of the primary fibres, which appear as low points over the whole of the outer surface and just inside the margins of the pits," there is no description of anything more than the dried skeleton, which Schmidt, who established the genus (Spong. Atlantisch. Gebiet. p. 29, Taf. iii. figs. 13 and 14), only illustrates by two fragments of the fibre, which Hyatt fortunately has identified with an *entire* form from Port Phillip Heads, Australia, under the name above mentioned (*op. et loc. cit.* pl. xv. fig. 16).

Returning then to Mr. Wilson's spirit-preserved specimens of this species, we find them pyriform, stipitate, smooth, consisting of a subglobular body presenting typically a single large vent on the summit, terminated by an attenuated stem and root-like expansion in the opposite direction. Consistence resilient. Colour, when fresh, "grey," as it is now. Surface smooth, covered uniformly by dermal sarcode charged with sand, which in its natural, that is unworn, state entirely conceals the subjacent fibre under a sieve-like structure, which is well represented by Dr. Bowerbank (*op. et loc. cit.* pl. vi. fig. 2), in which the reticulation is densely arenaceous, and the interstices, which are more or less uniformly circular, tympanized by the dermal sarcode alone. Pores in the interstices of the dermal reticulation. Vent very large, generally single, and situated a little excentrically on the summit of the body, supported on a tubular extension of the fibre, which is better seen in the dried skeleton than in the fresh specimen, where it is covered by a lip-like fleshy fold of the dermal sarcode, whose arenaceous and poriferous structure ceases at

the margin, after which it becomes homogeneous and smooth, as it lines a large cloacal cavity into which the great canals of the excretory systems empty themselves; oftentimes the vent is double, and sometimes accompanied by one or more subsidiary ones. Internally the fibrous structure radiates upwards and outwards from the stem, consisting of main and interuniting fibre, of which the former is cored with sand &c. and the latter simple, forming a reticulated mass whose interstices are tympanized by the parenchymatous sarcode, traversed by the branches of the excretory canal-systems, which finally open into the cloaca. Size variable, under 5 in. high and 3 in. in diameter horizontally in its widest part.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 19 fath.

Obs. When acquainted with the typical form of this species with its sarcode *off*, that is with the dried washed-out skeleton, it is not difficult to recognize it with the sarcode *on*; but the two are necessary for identification. Hence the necessity of knowing both, which, unfortunately, is the case with most of the Psammonemata, on account of the sameness of the fibre, the variety of structure even in the same species, and the absence of any particular form of "proper spicule" to characterize the individual. I say "unfortunately," because the species are so numerous, so very varied in their forms, and so seldom obtained in both the conditions above mentioned, that it will, as above stated, be a long time before they can be fully and faithfully recorded for practical utility.

In many of the dried skeletal specimens in the British Museum the walls, made up of the columnar fibre described by Schmidt, present a distinctly hexagonal or honeycomb structure, extending inwards towards the centre, and in some instances three or more pyriform individuals have grown together; the vents, too (as before stated), are by no means always single, and are sometimes supplemented by smaller ones; but the varieties in form and structure of the entire sponge, and even the state of its dermal surface, are so great that, if each has to be particularly described, I doubt whether Schmidt's description of the fibre *alone* will suffice for identification.

With reference to nomenclature, it might be observed that Dr. Bowerbank called his specimen "*Halispungia choanoides*" in 1872 (*l. c.*) after Schmidt had established the generic name "*Stelospongos*" in 1870 (*l. c.*); to which, however, it should be added that the former did this only provisionally, although, as the context shows, evidently without any allusion to, if acquainted with, what Schmidt had done previously,

which certainly, as I have before stated, would have been of very little use to *myself* without Hyatt's photograph.

Another species of this genus appears to be represented in Mr. Wilson's dried collection by *three* specimens, which may be named and described as follows:—

Stelospongia flabelliformis, n. sp.

Compressed, wide, fan-shaped, stipitate; ribbed radiatingly from the stem, which is long and terminated by a root-like expansion, to the circumference, which is comparatively thin; ribs or rather ridges bifurcating once or twice in their course to the circumference, corresponding to the divisions internally of the excretory canal-systems; interunited irregularly on both sides by sub-ridges, which thus give rise to a number of concave depressions such as might have been caused by the specimen having grown between two beds of small pebbles, ending at the circumference in a series of processes, which give the margin a denticulated form, each process being a tubular extension of a vent, and the whole arranged Pandean-pipe-like along the circumference. Consistence now hard, more or less resilient. Colour grey externally (that is the colour of the incrustation), dark sponge-colour immediately underneath, lighter within. Surface smooth, covered with a cribriform sandy incrustation, whose minute interstices present great uniformity. Pores in the dermal sarcode tympanizing the interstices of the incrustation. Vents in the position mentioned. Structure internally compact, consisting of massive fibro-reticulation, in which the interstices are tympanized by the parenchymatous sarcode; fibre of two kinds, viz. axiated or cored with foreign objects, and simply keratose, the former vertical and the latter interuniting or lateral; the whole traversed by the branches of the excretory canal-systems. Size of largest specimen 7 in. high by $8 \times \frac{1}{2}$ in. horizontally; stem $3\frac{1}{2}$ in. long.

Hab. Marine.

Loc. Port Phillip Heads, South Australia.

Obs. In one of the "three" specimens the body is much more inflated, being 3 in. thick; there are no ridges, and the denticulated margin is very irregular; in short the whole looks like a coarse clumsy form of the above description. The pebble-like impressions, to which I have above alluded, are well represented in Hyatt's photograph of his *Spongelia Farlovii*, which came from the same neighbourhood (*op. et loc. cit.* pl. xvii. fig. 14), and are the same as the "depressions" on the surface of *Taonura flabelliformis* ('Annals,' 1882, vol. x. p. 108). They appear to be produced by linear eleva-

tions of the structure *over* subjacent branches of the excretory canal-systems, like the radiating ridges; thus circumscribing the "depressions."

Finally, there is a spirit-preserved specimen of this species of a globular form, elongated laterally, which appears to be intermediate between the last-mentioned and *Stelospongia levis*, and in which there are nine unmarginated vents of different sizes, large and small, irregularly scattered over the upper part. It is 6 in. high, including the stem, by 5×3 in. horizontally; stem $2\frac{1}{2}$ in. long. Same locality, in 7 fath. This as a variety might be termed *Stelospongia latus* for convenience.

Stelospongia tuberculatus (provisional).

Specimen globular, tuberculated, stipitate, consisting of short dividing and interuniting branches, terminating in round knobs on the surface, which altogether assume a globular form; rising from a hard, cylindrical, truncated stem (? cut off by the dredge). Consistence firm. Colour, when fresh, "grey;" the same now, that is from the sandy exterior. Surface even, consisting of a thick arenaceous incrustation spread uniformly over the tuberculated head, concealing the subjacent fibre, and presenting a reticulated structure in low relief and of a white colour when dry, which arises from a heaping up together of the sand-grains &c. of which it is composed. Pores in the interstices of the reticulation. Vents numerous but *small*, chiefly confined to the more prominent parts respectively of the tuberculiform processes. Fibre of two kinds, viz. cored or axiated with foreign bodies, and simply keratose, the former vertical and the latter lateral. Size of specimen 5 in. high (including the stem, which is $1\frac{1}{2}$ in. long) by $3 \times 2\frac{1}{2}$ in. horizontally in its greatest dimensions.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 18 fath.

Obs. I am not certain of the proper location of this species in point of classification, for although it closely resembles *Stelospongia levis* in the structure of the sandy incrustation &c., the general form, like that of a knotted *Chalina*, is so different that I have thought it best only to name it "provisionally," chiefly to record its description. Then the general form of sponges is so little to be depended upon that, after all, the difference in form may go for nothing in a specific point of view.

Geelongia vasiformis, n. g. & sp.

Specimen vasiform, deep, conical, stipitate, wide at the

brim, narrowing gradually towards the stem; margin or brim undulating, round. Consistence firm, tough. Colour "brown-grey" when fresh, much the same now. Surface of the excavation a little smoother than that of the outside, which is slightly uneven, consisting of the dermal sarcode charged with sand, especially on the outside, which, together with the layer of subdermal cavities, is about 3-48ths in. thick. Pores plentifully scattered over the dermal incrustation outside. Vents uniformly scattered over the whole of the inner surface of the vase or only halfway down, also a few on the outer surface, but none on the margin. Structure consisting of sand-cored and clear keratose fibre of an amber colour, supporting in its reticulation the sarcodic elements of the parenchyma, traversed by the branches of the excretory systems, whose large canals are directed *across* the wall, that is from the subdermal pore-cavities on the outside to the vents on the inner side of the vase, giving off a number of small branches in their course in the opposite direction; while the main branches of the *fibre*, following the same course as the large canals, indicate a transverse structure generally, in contradistinction to that of another species (*viz. Hircinia intertexta*) that will be described presently, in which the structure is *longitudinal* or parallel to the wall. Size of specimens, total height 9 in., including the stem, which is $2\frac{1}{2}$ in. long and $1\frac{1}{4}$ thick; width across the brim 6 in.; wall near the stem $\frac{5}{8}$ in. thick, gradually diminishing upwards.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 20 fath.

Obs. Examined in the wet state. Generic name taken from that of the town near the place where Mr. Wilson's dredgings were carried on. There are two specimens of this species, in one of which the vents only extend halfway down the surface of the excavation, while in the other they are continued to the bottom; but otherwise they are much the same. Both specimens are in halves, which, by being doubled, enable me to give the dimensions above mentioned. This is the first species which I have briefly described in my observations on the "Circulation in the Spongida" (*antea*, p. 120) as affording an example of the opening of the pores through the subdermal cavities directly into a large excretory canal, &c.

Such vasiform Psammonematous sponges are not new to me, as there are five dry specimens in the British Museum, all of which belong to the same species, and, all being more or less alike, afford the most satisfactory instance that has come under my notice of the replacement of the natural sarcode by

Spongiophaga communis, for in three of these the *whole* of the soft parts are transformed into the filaments of this supposed parasite, and in the other two, which are almost exactly like them, the natural sarcode remains *intact* by it; the former bear my running no. "177" and the latter "547;" but being dry, and therefore much altered in appearance, I am unable to say with certainty that they are specimens of *Geelongia vasiformis*; at the same time for descriptive purposes it may be observed that they are all smooth internally, but ribbed externally by ridges which extend more or less parallelly although radiatingly from the base to the circumference, while they now average 9 in. high by 9 in. across the brim, which is about $\frac{1}{4}$ in. thick; so that, when fresh, they must have been very nearly double in all these measurements. All are said to have been brought from Australia, and being remarkable in shape have been mounted on wooden stands for exhibition; thus they are analogous to the great Suberite "Neptune's Cup," = *Rhaphiophora patera*, Gray, = *Poterion*, Harting.

Abnormally-developed Ova in situ in Geelongia vasiformis.

In both the specimens of *Geelongia vasiformis* there are a great number of isolated ova, scattered singly throughout the tissue in distinct cysts of the same shape, so loosely that, on breaking open a cyst, which is firmly attached to the surrounding tissue, they fall out in their entirety, when they appear to be in different stages of development, of which the earliest consists of a delicate spherical colourless envelope filled with granuliferous nucleated yelk-cells of a faint yellow colour, averaging 20-6000ths inch in diameter, while the entire envelope, which at this period is very thin and delicate, is about 1-20th in. in diameter; and the latest or most advanced development is of a subglobular tuberculated form, rendered more or less irregular by the budding-forth of several short processes, some of which may be once divided. While, however, the contents are the same, the envelope and the processes into which it has been prolonged have become transformed into a keratose laminated structure of an amber colour about 4-6000ths in. thick, having very much the appearance of the laminated keratose fibre of the sponge itself; thus between these extremes of sphericity and subglobularity there are ova of every degree of form and colour.

What the signification of this development may be I am unable to conceive further than that it may be a normal one of the ovum in an abnormal position; hence, provisionally, I have headed this "Abnormal development of the ovum *in*

situ," for the development of the ovum in the Psammonematous sponges beyond the ciliated stage—in which I observe the same kind of yelk-cells (see Schulze, Zeitschrift f. wiss. Zool. Bd. xxxii. Taf. xxxviii. figs. 2-4, 1879, for comparison)—has not been published, if indeed followed.

Here I might notice that similar kinds of ova exist in a specimen of *Hircinia*? in the same collection, wherein all the other soft parts have been transformed into the filaments of *Spongiophaga communis*, thus apparently indicating a protective power much greater than that of the sarcode, as I shall more particularly notice hereafter.

Dactylia chaliniformis, n. sp.

Caulescent, solid, digitiform branches, rising from a single stem; branches thick, irregularly cylindrical, more or less dichotomously divided, slightly enlarged, fig-like towards the ends. Consistence resilient. Colour, when fresh, "dark brown, buff at the tips." Surface even, minutely reticulated in low relief, with points passing into high relief at the extremities of the branches. Pores abundant, situated in the interstices of the dermal reticulation. Vents numerous, pustuliform, scattered unequally over the surface. Internal structure radiating obliquely upwards and outwards; main fibre sand-cored, interunited by clear but smaller fibre, all amber-coloured; supporting the sarcodic elements of the parenchyma; traversed by the branches of the excretory canal-system. Size of specimen 8 in. high, and the whole bunch 6 in. in diameter at its widest part; branches rather compressed, about 1 in. in diameter at their largest or swollen part.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 19 fath.

Obs. This is a distinctly digito-chalina-like sponge, simulating a *Chalina* in form as well as in structure as much as the material would allow, being otherwise skeletally Psammonematous. It is thus another instance of the same form being produced with totally different elements; pointing out the uniformity of plan in this part of the development of the Spongida.

Dactylia impar, n. sp.

Specimen caulescent, stems solid, cylindrical, branching off successively from one side of the largest and longest, which extends to the end of the specimen, like the barbs on one side of a feather; short and interunited pan-pipe-like below, becoming separated and more or less bifurcated upwards. Consistence firm. Colour white, from the abundance of

colourless foreign objects with which the specimen is incrustated. Surface even or indistinctly granulated, consisting of the incrustation just mentioned. Pores abundant between the granules, irregularly grouped. Vents small, scattered over the surface, chiefly on one side of the stems. Internal structure radiating from the axis upwards and outwards; main fibre sand-cored, interunited by clear but smaller fibre, all amber-coloured, supporting the sarcodic elements of the parenchyma, traversed by the branches of the excretory canal-systems. Size of specimens about 7 in. long by $3 \times \frac{1}{4}$ in., being very much compressed, and all the branches on the same level.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 6 fath.

Obs. The chief characters of this species are its "frosted" whiteness, arising from a thick incrustation of foreign objects, which appears exclusively to consist of hyaline grains of quartz, its digito-chaliniiform stems, and one-sided growth.

Dactylia palmata, n. sp.

Specimen stipitate, palmate, digitate, consisting of a bunch of compressed, solid branches proceeding from a short thick stem, becoming dichotomously divided into digito-chaliniiform processes. Consistence resilient. Colour, when fresh, "dull reddish orange," now grey. Surface even, slightly arenaeous. Pores plentifully scattered over the surface generally. Vents also scattered over the expanded portions, more in line along the cylindrical branches; main fibre sand-cored, lateral fibre clear. Size of specimen 9 in. high by 6×2 horizontally; hence the whole form is rather compressed.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 16 fath.

Obs. This appears to be only a more flattened, *i. e.* palmate, variety of *Dactylia chaliniiformis*.

Fam. **Hircinida.**

Char. Psammonematous sponges which are conulated on the surface. Otherwise the same as in the family Liochrotida.

Hircinia solida, n. sp.

Specimen long, thick, erect, compressed, tongue-shaped, sessile; margin obtuse, free end pointed, fixed end spreading or more or less contracted. Consistence, when wet, soft,

fleshy, resilient, firm. Colour, when fresh, "dark grey above, yellowish green below," now dark grey, almost black when dry, lighter internally. Surface uniformly consisting of obtuse conuli, in each of which there is a plurality of points corresponding to the ends of the subjacent sandy fibre, grouped together irregularly, about 1-8th inch apart; bound down by a soft, fleshy, fibro-reticulated dermis in which there are *no* foreign objects; dermal fibre made up of short, fusiform, graniferous cells or bodies, transparent fibrillæ, and a few elliptical pigmental cells; tympanized in its interstices by a thin transparent layer of sarcode in which the pores are situated. Vents small, but numerous and indistinct, scattered generally over the surface among the conuli. Internal structure dense, consisting of a mass of short-jointed, reticulated, keratose fibre, in which the foreign material predominates over the keratine, whose interstices are filled up by a fibro-reticulation like that of the dermis, in which also the interstices again are tympanized by thin sarcode pierced with holes for inhalent and exhalent purposes respectively (only seen in the dried fragment), the whole forming the parenchyma of the interior, whose sarcode, together with that of the fibrous dermis, is so inspissated that, on drying, it melts down into an almost corneous consistence of a dark colour, which is very characteristic of the species. Size of spirit-preserved specimen 12 in. high by about 4×1 in. horizontally in its greatest dimensions.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 20 fath.

Obs. Compactness of structure, prevalence of sandy fibre, soft, fleshy, fibro-reticulated dermis, and dark colour chiefly characterize this species. There are two other, but dry specimens, one of which is irregular in form and the other consists of two tongue-shaped erect pieces of nearly equal size, each of which is like that above described, but united together laterally for the greater part of their length. Both are intensely hard from the corneous character of the dermal tissue when dried; in both, too, the dermis is nearly black, while the interior is compact and of a ochreous yellow colour. Each individual of the double specimen is about 9 in. high by $2\frac{1}{4} \times \frac{1}{2}$ in. horizontally in its greatest dimensions; when fresh, they were probably nearly double this size. Under the microscope the *interstices* of the dark dermal fibro-reticulation, when dry, present a white appearance from their being tympanized by their dermal sarcode in which the pores are situated. The dry specimens are much lighter and harder than the wet one; but the characters of "consistence" generally

in this state are so relative that they are not of much value in a specific point of view.

Hircinia intertexta, n. sp.

Specimen wet. Oblong, erect, like a piece of board an inch thick, slightly thinning towards the sides and upper border, whose margins are rounded and irregularly undulated, sessile, spreading below. Consistence firm and resilient, very light when dry. Colour, when fresh, "grey," now brownish grey. Surface on both sides uniformly covered with monticular, single-pointed conuli averaging 1-24th inch apart and about the same in height above the sunken intervening dermis, which unites them together more or less linearly; dermis consisting of a beautifully reticulated, soft, grey fibre without foreign objects, which dries light brown, and whose interstices are tympanized by a thin transparent sarcode in which the pores are situated, supported by another subjacent reticulation of amber-coloured keratose fibre, which, resting on the ends of the arenaceous vertical filaments, thus together form the conuli and support the dermis. Vents large, chiefly on the upper margin. Internal structure consisting of a mass of reticulated fibre of three kinds, *like the dermis*, viz. :—1, large, scanty, cored with foreign objects, vertical; 2, middle-sized, exclusively amber-coloured keratine, lateral; 3, microscopic, soft when fresh, hard and transparent when dry, intertextural, whose interstices, tympanized by thin poriferous sarcode, occupy the rest of the space and, traversed by the branches of the excretory canal-system, complete the parenchyma. Size of specimen 12 in. high by $3\frac{1}{2} \times 1\frac{1}{2}$ in. horizontally in its greatest dimensions. As a slice has been cut off from one side perpendicularly, the probability is that this specimen was much wider, perhaps double the present width, when entire.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 18 fath.

Obs. The most striking feature in this specimen is the presence of the microscopic, intertextural fibre filling up the interstices of the skeleton, which can only be well seen in a dried fragment; in which the predominance also of the keratine over the mineral element shows that it is in the opposite state, in this respect, to that of *Hircinia solida*, whose weight is rendered much greater simply by the predominance of the mineral element, while that of *H. intertexta* is comparatively light, as above stated.

This is the second species which I have briefly described in

my observations on the "Circulation in the Spongida" (p.120) as affording an example of the opening of pores through the subdermal cavities *directly* into a large branch of the excretory canal-system, whereby the nutrient particles must be subsequently deflected through smaller or collateral branches to the ampullaceous sacs, and brought back by a similar set, as the large vessel goes on uninterruptedly increasing in size to its termination in the vent.

Hircinia flabellopalmata, n. sp.

Specimens dry. Compressed, expanded, thin, stipitate, flabelliform, palmate, irregularly and deeply denticulated above, even at the sides, passing downwards into an elongated round stem, which is terminated by a root-like expansion; denticulations thin, wide and compressed like the body, variable in shape and dimensions. Consistence hard now, being dry. Colour whitish grey, from the abundance of foreign spicules incrusting the dermis. Surface consisting of little, pointed, short conuli closely approximated, sometimes united laterally so as to form lines or a reticulation, supporting the dermis, which is densely charged with foreign bodies, chiefly fragmentary sponge-spicules of many kinds; furrowed at the margins on both body and denticulations, with smooth grooves branching inwards, indicating the presence of corresponding canals in the wet state. Pores in the interstices between the conuli. Vents scattered over the surface generally, sometimes arranged linearly on one side of the margin of the denticulation in connexion with the "grooves." Internal structure composed of a reticulate mass of coarse sand-cored or axiated and simple keratose fibre, ending towards the surface in points which form the axes of the conuli respectively; tympanized in the interstices by thin, transparent, flimsy sarcode. Size: there are two specimens of this species which are very much alike, but one much smaller than the other. The largest is 14 in. high (3 in. of which are stem), and 8 by $\frac{1}{3}$ in. in its largest horizontal dimensions.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth not given.

Obs. These specimens belong to Mr. Wilson's dry collection, which, although carefully prepared, are, from having undergone much contraction during desiccation, very different from what they would have been in the spirit-preserved state, of which there is none for comparison.

Hircinia communis, n. sp.

Specimen massive, lobed, sessile. Consistence soft. Colour, when fresh, "whitish buff," now light grey. Surface cactiform, uniformly covered with single-pointed conuli, which are comparatively prominent, averaging 3-16ths in. apart and about the same in height, held together by a soft, glutinous dermis which is permeated by an equally soft, fibrous, branching reticulation, *without foreign objects*. Pores in the sarcode tympanizing the interstices of the dermal reticulation. Vents scattered irregularly over the surface. Fibre sand-cored and simply keratose; the former, which is vertical and axiates the conuli, large and coarse, the latter, which is lateral, scanty, tympanized in its massive reticulated structure by the sarcode of the parenchyma, which, together with that of the dermis, shrinks up when dried to the consistence of hard glue. Size of specimen 4 in. high by 4 x 2 in. horizontally in its greatest dimensions.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 20 fath.

Obs. The scantiness of the fibre, soft, thick, glutinous nature of the sarcode, which is chiefly permeated throughout by the equally soft fibro-reticulation that characterizes the dermis, and large cancellation of the parenchyma, cause this species, on drying, to shrink up into a brown corneous mass, which not only obscures the structure generally, but brings the vertical sand-cored filaments into such close proximity as to give them an unnatural predominance; thus altogether rendering the dried fragment so different from the spirit-preserved specimen in its wet state, that one never could be understood by the other if studied separately. It is this kind of *Hircinia* which appears to me to be subject beyond all others to that transformation which is produced by the presence of *Spongio-phaga communis*.

Hircinia pulchra, n. sp.

Specimen wet. Consisting of several erect, subcylindrical, unbranched processes of different sizes, more or less united together laterally; compressed in the centre, becoming cylindrical towards the free end, which is obtusely pointed; all rising from a single contracted stem. Consistence firm, resilient. Colour, when fresh, "grey with purple tint," now all grey. Surface uniformly covered with small monticular conuli about 5-8ths in. apart and about the same in height, held together by a strong development of branched, reticulated, simple, keratose fibre supporting the dermal membrane, in

which there is *no* foreign material. Pores in the interstices of the dermal reticulation. Vents numerous and small, scattered over the surface in the intervals between the conuli. Fibre sand-cored and simply keratose, almost colourless; the mineral contents of the sand-cored fibre, which is scanty, predominating over the keratose envelope; structure compact; excretory canals numerous and small. Parenchyma more or less charged with ova in different stages of development below the more advanced segmental state. Size of specimen 7 in. high, 2×2 in. horizontally in its greatest dimensions; largest process about 1 in. in its greatest diameter; compressed.

Hab. Marine.

Loc Port Phillip Heads, South Australia. Depth 19 fath.

Obs. There is nothing strikingly specific in this specimen beyond the uniformity of its conulated surface, in which the conuli are comparatively small, mostly separate, well formed and striated laterally in the dried fragment by folds of the dermal membrane descending from their apices, the great number of vents and the scantiness of the sand-cored fibre, in which, as above stated, the mineral element far exceeds the envelope of keratine. The great number of vents indicates a great number of excretory canal-systems, and therefore correspondingly small canals, thus leading to the compact character of the parenchyma.

Spongiophaga communis.

Here is the place for me to say a few words on the "filament," which often replaces the whole of the sarcode or soft parts in both the largest and smallest specimens of the *cactiform Hirciniæ* with such fidelity that the pores and excretory canal-systems are left intact as much as they would be in their natural state; indeed, such is the exactness with which the sponge continues to be represented under this transformation, that even some of the best spongiologists have regarded it as a distinct species. For this filament I long since proposed the name of *Spongiophaga communis*, subsequently describing and figuring it among "The Parasites of the Spongida" ('Annals,' 1878, vol. ii. p. 168).

It is almost impossible, in the smallest collection of Psammonematous sponges, not to find some specimens in which the soft parts have been replaced by filaments of this enigmatical organism; so in Mr. Wilson's there are *nine*, of which six are *Hirciniæ*, one a specimen of my group *Euspongiosa* and the other two in the fibreless *Arenosa*. That this transformation should take place in different kinds of Psammonemata, although chiefly in the *cactiform Hirciniæ*, is

sufficient to show, as before stated, that it has *no specific value*, and that all that can be said of it in connexion with the specimens so transformed is to note its presence in one or the other, as the case may be.

One fact, however, to which I have casually alluded is more particularly worth noting here, viz. that in a specimen of *Hircinia*, whose naturally projecting points have been rounded or covered over by the abundance of the filament, there are several ova dispersed through the structure, in which otherwise there is not the smallest portion of the original sarcode or soft parts left. These ova, about 1-48th in. in diameter, are spherical in form, of a yellow colour, and consist of a mass of small nucleated granular cells surrounded by a very delicate membrane, supported by a tough capsule in which they are respectively contained; so that it would appear as if this capsule had protected them from the transforming power of the filament. I had thought that their contents might have thrown some light upon the development of the "filament" by the granular cells having presented it in an embryonic form; but not the slightest trace of any such connexion could be detected, so this organism remains, as before, an enigma for future observers to solve.

Fam. Bibulida.

We now come to the first family of my order Psammone-mata, viz. the Bibulida (see "tabular view," *antea*, p. 215), which in my original classification (*op. et loc. cit.* p. 132) is stated to be characterized by "solid fibre, chiefly *without* core of foreign objects," to which is added a footnote, stating that I had never failed to find here and there a fibre cored with foreign objects.

Possibly this may be the case, but practically it is of no use in a specific point of view; for if this can only be demonstrated by much searching with the microscope, it can hardly be considered more than accidental, as the species which I am about to describe will show, in which I have not been able to find foreign material in any part of the fibre, even "here and there."

Euspongia anfractuosa, n. sp.

Specimen dry, massive, convex, sessile, lobate, spreading irregularly. Consistence firm, light. Colour black on the surface, dark purple within. Surface most irregular, consisting of crevices, anfractuositities, circular holes, and irregular depressions ending in the openings of sinuous cavernous cavities internally, which are often bridged over on the sur-

face fenestrally by an extension of the dermal membrane; the latter, which is black, supported on the subjacent fibrous reticulations, whose knots here and there throw up a short point which becomes the axis respectively of microscopic conuli about 1-80th in. apart; this point, when projecting through the dermal membrane, may be seen under the microscope to consist of a simple pointed (? budding) end of the fibre, generally cored with the usual flocculent material, but *without* any foreign bodies. Pores in the dermal membrane over the interstices of the subjacent fibrous reticulation. Vents circular, generally large, but variable in size, scattered numerously over the surface among the anfractuositities. Fibre remarkable for the uniformity of its character in point of fineness and short branching, thus rendering the internal structure soft but very compact; the larger filaments cored with the usual flocculent substance, but *no* foreign bodies, and the whole supporting the sarcode of the parenchyma, in its interstices, traversed plentifully by the canals of the excretory systems, which present a black colour on their surface, from being lined with an extension inwards of the black dermis (?-ectodermic epithelial cells), and end in the vents mentioned, among the "openings" of the "sinuosities," which, also traversing the whole of the sponge, impart to it its anfractuons character both externally and internally. Size of specimen $1\frac{1}{2}$ in. high by 6×4 in. horizontally in its greatest dimensions.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 19 fath.

Obs. I have described this species from the dried specimen in Mr. Wilson's collection; but there is another spirit-preserved one about the same size, which, in colour, is grey now, but when taken is stated to have been "bright orange."

Also in my cabinet there is a dry specimen of the same species (apparently beach-worn) from the Mauritius, again about the same size, in which, from half an inch into the interior, the colouring-matter has been washed out, leaving the fibre yellowish or sponge-colour, while within this again it is all dark purple, like that of the dried specimen in Mr. Wilson's collection.

Moreover, there are two other dry specimens in Mr. Wilson's collection of a much larger size with the same characters as regards form, above given, but whitish, the sponge itself apparently having grown in the midst of fine sand, as there is as much sand as fibre in it; while in one of these specimens there is the addition of *Spongiophaga communis*, to which I have before alluded, whose filaments can be distinguished from the

fibres of the sponge by being *smaller*, together with the terminal bulbs which characterize the filament, but so abundant as to mask over, by a rounded form in the midst of the sand, the characteristic anfractuosities of the purer form, and thus give it a smooth papillated surface in which the papilliform elevations frequently run into linear ridges.

Euspongia anfractuosa resembles the representation of "*Spongia cavernosa*" (Duch. et Mich. Caribbean Sea Sponges, pl. iii. fig. 4), also Hyatt's photograph of his "*Spongia meandriniformis*" (*op. et loc. cit.* pl. xvi. fig. 2).

Coscinoderma lanuginosum.

Coscinoderma lanuginosum, Ann. 1883, vol. xii. p. 309.

There are two spirit-preserved specimens of this species, both of which are very much alike throughout, being stipitate, expanding from a round stem, terminated by a root-like extremity, into a subtriangular body, compressed, thinning to the margin, and bearing on its upper border, which forms one side of the triangle, a series of short, conical, truncated processes of different sizes. Consistence resilient. Colour, when fresh, "grey;" the same now, but faint yellow internally. Surface even, consisting of an arenaceous incrustation which is uniformly perforated by circular holes about 1-48th in. in diameter, and a little more than this apart. Pores in the dermal sarcode tympanizing the bottom of the circular holes. Vents on the conical processes which project from the upper border. Fibre very fine and uniform in calibre, scantily cored here and there with foreign objects, for the most part solid and clear, also scantily branched, but often united transversely by a short portion of the same calibre, which is perpendicular to the two filaments thus united; very abundant and compact, so as to give the parenchyma a felt-like appearance and consistence, traversed by the canals of the excretory system. Size of largest specimen $4\frac{1}{2}$ in. high including the stem, and $2\frac{1}{2} \times 1$ in. horizontally in the greatest dimensions.

Hab. Marine.

Loc. Port Phillip Heads, South Australia. Depth 19 fath.

Obs. The specimens, although much smaller, are precisely the same as that described under the above name in the 'Annals' (*loc. cit.*).

Paraspongia laxa, n. sp.

Specimens dry. Massive, much lobed, somewhat compressed now, sessile, contracted towards the base; lobes mamilliform, erect, and proliferous. Consistence now firm, but *very* light. Colour on the surface for the most part black, becoming

lighter on the less exposed parts, light sponge-colour internally. Surface uniformly covered with low conuli about 1-24th in. apart, consisting of a few grains of sand crowning a conical projection of the subjacent fibro-reticulation which supports the black dermal membrane. Pores in the dermal membrane opposite the interstices of the subjacent fibro-reticulation. Vents large and numerous at the ends respectively of the mamilliform lobes and on the margin of the more crested parts. Fibre internally small, solid, very uniform in size, without core, reticulated; traversed vertically by little tracks of sand, held together by a minimum of keratine, which is continuous with the rest of the fibre, and terminating in the conuli mentioned; interstices of the mass of reticulated fibre tympanized by thin transparent sarcode, which thus gives the parenchyma an unusually wide, cancellated, flimsy structure, which being traversed also by the branches of the excretory canal-systems, produces the very light structure which characterizes the species. Size of the largest specimen, for there are two, 11 in. high by 6×2 in. horizontally in its greatest dimensions.

Hab. Marine.

Loc. Port Phillip Heads, South Australia.

Obs. The scantiness of the fibre and its wide reticulation, accompanied by the flimsy transparent sarcode in its present dried state, which tympanizes the interstices, produces an extremely light and loose cancellous texture when dry, which, together with the black colour of the dermis which is equally thin, renders the species almost unmistakable.

Fam. Pseudohircinida.

Finally, we have to return to the last family in my original classification of the Psammonemata, viz. the Pseudohircinida (see Tabular View, *antè* p. 215), whose consideration, for reasons already given, was postponed for a more convenient opportunity, which has now arrived.

This family was intended for Psammonematous sponges whose sand-grains were accompanied by spicules of species belonging to one or other of the three following orders:—viz. the RHAPHIDONEMATA, ECHINONEMATA, and HOLORHAPHIDOTA; hence the three groups of which the family was composed were named Chalinohircinina, Armatohircinina, and Pseudorensa respectively.

But it now seems to me that the location of these groups should be determined by the state in which their spicules are, that is, whether they are *entire* or *fragmentary*, since, if the former, the groups may be relegated to the orders to which they respectively belong; and if the latter, viz. *fragmentary*,

they *must* form part of the foreign microscopic objects of a genuine Psammonematous sponge, for which the existence of a family Pseudohircinida is therefore no longer necessary.

This I have seen for some time past, and my attention was first called to it by finding two species of caulescent *Chalinida*, in which the fibre not only contained the spicules of the species *entire*, but also, in addition, sand-grains and other microscopic foreign objects; hence it may be remembered that, in the 'Annals' of 1882 (vol. ix. p. 280), I described these two species under the names respectively of "*Chalina digitata*, var. *arenosa*," and "*Cavochalina digitata*, var. *arenosa*," in a new family named "Pseudochalinida," which I proposed to add to the order RHAPHIDONEMATA.

And now it seems to me desirable that a similar transfer should be made to the order ECHINONEMATA.

At first I thought, from the abundance of foreign material and great thickness of the keratose envelope in the fibre of the skeletal specimens of this kind in the British Museum, that the echinating spicules had been appropriated by the Psammonematous sponge, and so made a group to receive them under the name of "Armatohircinina" (*loc. cit.*); but having had to examine a spirit-preserved specimen as well as a dried one, taken respectively from their natural habitat by Mr. Wilson, it seems to me much more reasonable to infer, from the following facts, that the Echinonematous rather than the Psammonematous fibre took in the foreign objects.

Thus in the species *Echinonema anchoratum* ('Annals,' 1881, vol. vii. p. 379) the spiculation consists of an acute skeletal, a spined clavate echinating, and an equianchorate flesh spicule, each of which has its fixed position in the sponge; that is, the acute spicule forms the core of the fibre; the echinating spicule is attached to the *outside* or surface of the fibre, and the equianchorate is restricted to the surrounding sarcode, which is precisely the case in the "Armatohircinina."

Now on examining the species in Mr. Wilson's collection to which I have alluded—which, from its large size, handsome flabellate growth, firm consistence, transparent, colourless, glass-like keratose fibre, and greyish-white colour generally, together with the presence of several dry specimens of the same sponge in the British Museum (under the no. 128), which came from the southern coast of Australia, indicating that it is not only a striking object but prevailing form there, I shall name "*Wilsonella australiensis*"—it is evident that a similar spiculation, in which the spicules are *entire*, with the same arrangement, exists in this species as in *Echinonema anchorata*; hence, in accordance with what I have above stated, *Wilsonella australiensis* will be more particularly

described at the end of the order ECHINONEMATA, under a new family, viz. "Pseudoechinonemata."

So the remaining group in the family Pseudohircinida, viz. the Pseudoarenosa, in which the spiculation of a *Halichondrina* or an *Esperia* may be often seen in a perfect or entire state, may, under the same circumstances, be added to the order HOLORHAPHIDOTA under the family name of "Pseudoholorhaphidota," to correspond in nomenclature and signification with those already proposed for the RHAPHIDONEMATA and ECHINONEMATA respectively.

[To be continued.]

XXVI.—*Remarks on the Variations of Elapomorphus lemniscatus.* By G. A. BOULENGER.

[Plate X.]

SIMULTANEOUSLY with the publication, in the last number of these 'Annals,' of my "List of Reptiles and Batrachians from the Province Rio Grande do Sul, sent to the Natural-History Museum by Dr. H. von Ihering," I received, through the kindness of Dr. A. Strauch, a separate copy of his contribution, "Bemerkungen über die Schlängengattung *Elapomorphus* aus der Familie der Calamariden"*. One species is described as new, viz. *E. Iheringi*, from Rio Grande do Sul, which is the form mentioned in my "List" as a hitherto unrecorded variety of *E. lemniscatus*, distinguished by the absence of the black vertebral band.

The fact that Dr. Strauch had only one specimen before him, and none of the allied forms for comparison, explains the error into which he has fallen. But I trust the illustrations appended to this note will convince the eminent herpetologist that the differences relied upon by him are not sufficiently constant to warrant a specific, or even subspecific, distinction.

We have at present in the Natural-History Museum eight specimens determined as *E. lemniscatus*, to which, for convenience, I will refer by letters:—

- | | |
|--------------------------------------|--|
| a. Adult. (Ventals 204, Caudals 22.) | Paraguay (Prof. Grant). |
| b. Adult. (V. 208, C. 22.) | } Uruguay. |
| c. Half-grown. (V. 185, C. 25.) | |
| d. Young. (V. 192, C. 26.) | } Rio Grande do Sul (Dr. von Ihering). |
| e. Adult. (V. 208, C. 25.) | |
| f. Adult. (V. 209, C. 26.) | } High Pampas of San Luis, Mendoza
(Mr. E. W. White). |
| g. Young. (V. 186, C. 28.) | |
| h. Adult. (V. 212, C. 24.) | |

* Mém. Biol. Ac. St. Pétersb. xii. pp. 141–211 (1835).