REPORT on the PORIFERA of the L. M. B. C. DISTRICT.

By Thos. Higgin, F. L. S.

The following classification will show the systematic position of the species discussed in this Report, while the right hand column will serve as a list of all the species collected.

PORIFERA (= Class **SPONGIDA**, Huxley).

Order I.—CARNOSA (Carter).

Family.	Group.	Genus.	Species.
Halisarcida....	..	...	*Halisarca dujardinii*, J.

Order III.—PSAMMONEMATA (Carter).

Family.	Group.	Genus.	Species.
Arenida.	... *Arenosa.*	...	*Dysidea fragilis*, J.

Order IV.—RHAPHIDONEMATA (Carter).

Family.	Group.	Genus.	Species.
Chalinida.	...*Digitata.*	...	*Chalina oculata*, Bk.
	Reptata.	...	*Chalina limbata*, Bk.

Order V.—ECHINONEMATA (Carter).

Family.	Group.	Genus.	Species.
Ectyonida.	*Dictyocylindrina.*		*Dictyocylindrus stuposus*, Bk.
	Plumohalichondrina.		*Plumohalichondria plumosa*, C.
	Echinoclathrina.	...*Ophlitaspongia seriata*,	Bk.

Order VI.—HOLORHAPHIDOTA (Carter).

Family.	Group.	Genus.	Species.
Renierida.	...*Amorphosa.*	...	*Amorphina panicea*, S.
			Amorphina coccinea, S.
			Amorphina albescens, S.
			Amorphina caruncula, S.

Family.	Group.	Genus. Species.
RENIERIDA.	...*Isodictyosa.* ...	*Isodictya varians*, Bk.
		Isodictya elegans, Bk.
		Isodictya simulans, Bk.
		Isodictya pallida, Bk.
		Isodictya densa, Bk.
		Isodictya fistulosa, Bk.
		Isodictya clava, Bk.
		Isodictya fucorum, Bk.
	Halichondrina.	*Halichondria incrustans*, J.
	Esperina. ...	*Esperia ægagropila*, C.
SUBERITIDA...	*Suberitina.* ...	*Cliona celata*, J.
		Raphyrus griffithsia, Bk.
		Suberites carnosa, S.
		Suberites suberea, S.
		Hymeniacidon sanguinea, Bk.
PACHYTRAGIDA.	*Geodina.*	*Pachymatisma johnstonia*, Bk.
	Stellettina. ...	*Ecionema ponderosa*, Bk.
		Stelletta grubii, Sdt.
PACHASTRELLIDA.	*Pachastrellina.*	*Dercitus niger*, C.

Order. VIII.—CALCAREA (Haeckel).

Family.	Group.	Genus. Species.
ASCONES.	...	*Ascetta coriacea*
		Ascaltis botryoides
LEUCONES.	...	*Leucandra fistulosa*
		Leucandra gossei
		Leucandra nivea
		Leucandra johnstonii
SYCONES.	...	*Sycandra ciliata*
		Sycandra compressa
		Aphroceras ramosa, n.sp.

The arrangement of all Sponges, excepting the Calcarea, followed in these notes is that published by Mr. Carter, in

his "Notes introductory to the study and classification of the Spongida,"* and corresponds with the "teaching collection," arranged by me in the Free Museum, Liverpool, in trays containing examples of all the groups.

The specimens obtained by Professor W. A. Herdman will be alluded to with the letters L. M. B. C., with locality and a number, being part of the collection of the Liverpool Marine Biology Committee, and those found by Mr. T. J. Moore and Mr. Higgin, under the letters L. F. M., being part of the collection of the Liverpool Free Museum.

The specimens in the L. F. M. collection of species, named by Dr. Bowerbank, to which the letter V is attached, were verified by him a few years before his death. This is of considerable importance, because the student finds it very difficult, and in many cases impossible, to recognise Bowerbank's species from his descriptions of them; whilst, in many instances, his illustrations afford no assistance.

Order I.—CARNOSA.

Family—Halisarcida.

Halisarca dujardinii, Johnston.

This interesting species, having no spicules or skeletal parts, was first observed by Dujardin on the coast of Normandy in 1838, and by him it was named *Halisarca*. In 1842 Dr. Johnston found it, and described it in "British Sponges" as *Halisarca dujardinii*. In 1862 Dr. Oscar Schmidt described a new species differing in form and colour from *H. dujardinii*, as *Halisarca lobularis*. In 1847 Nardo described another aspiculous sponge under the generic name of *Chondrosia*, and stated that it had for many years been known to the fishermen of the Mediterranean as *Carume di*

* *Annals and Mag. Nat. Hist.*, 1875; ser. 4, vol. xvi.

Mar, and since that time several other species have been described. The different varieties of Carnosa now known, including both aspiculous and spiculous species, have lately been grouped by Mr. H. J. Carter, F.R.S., in two families—Halisarcida and Gumminida (*Annals and Mag. Nat. Hist.*, October, 1881), embracing in all twenty-five species.*

The specimens of *H. dujardinii* found at Holyhead in March, 1873, contained ova in the first stage of development only, that is before any duplicate subdivision had taken place, but those obtained by Mr. Carter in July and August the following year contained ova as well as embryos in every stage of development. The Port Erin examples also, gathered in July and August last year, contained embryos in the later stages of development.

Dr. Bowerbank would not believe in the existence of sponges without any spicules, and assumed that Dr. Johnston was mistaken in not finding spicules in the sponge he described. He has figured a thin coating sponge amongst his Hymeniacidons as *Hymeniacidon dujardinii*, under the impression that this must have been the species Dr. Johnston had described (*Mon. Brit. Spon.*, vol. iii, pl. 38, fig. 1 to 4).†

L. M. B. C., No. 85. 1., near low-water mark, Bay-ny-Carrickey, between Port St. Mary and Poyllvaaish, Isle of Man, Aug. 8., 1885 ; from *Laminaria* roots on shore between Port St. Mary and Spanish Head, Isle of Man, Aug. 13, 1885; in rock-pools, near Port Erin, Isle of Man, Aug., 1885.

L. F. M., No. 22. 4. 74, 3. Collected at Holyhead.

* See also Carter's papers in 1874 in *Annals and Mag. Nat. Hist.*, "On the Spongozoa of *Halisarca dujardinii*," and "On the *Halisarca lobularis*," also "Development of Marine Sponges," &c., &c., 1874.

† For excellent work on *Halisarca*, with beautiful and faithful plates, see the papers by F. E. Schultze in *Zeitschrift f. wiss. Zoologie*, 1877, Bd. xxviii, and 1879, Bd. xxix.

Order III.—PSAMMONEMATA.

Family.—Arenida.

Dysidea fragilis, Johnston.

This sponge, which is found all round our coasts, and is widely distributed over other parts of the world, was called *fragilis* by Dr. Johnston* because when dried it is easily made to crumble away. This arises from the nature of its skeletal parts. The skeleton is composed of grains of sand taken up by the sponge from the wash of the tide, and worked into a network by being agglutinated together by a very small quantity of horny material. Consequently when the sponge is dried, the horny matter being in such small proportion, the grains of sand easily become separated and the skeleton breaks up. It is the *Spongelia* of Dr. O. Schmidt.† Only two British representatives of arenaceous sponges have been described. Mr. Carter has placed them in his order Psammonemata, which also contains the "Sponge of Commerce" or "bath sponge," whose skeleton is clear horny material, almost entirely, if not altogether, free from grains of sand. Mr. Carter, however, states that there are always some grains of sand to be found in some parts of the fibre of even the best specimens of "Turkey Sponge." The order, therefore, contains every variety of arenaceous fibre, from *Spongia officinalis* to such sponges as *Dysidea fragilis*.

L. F. M., No. 24. 5. 73. 14. Collected at Holyhead.

Order IV.—RHAPHIDONEMATA.

Family.—Chalinida.

Chalina oculata, Bk.

Halichondria oculata, J.

Chalina polychotoma, Carter.

Spongia polychotoma, Esper.

* *British Sponges*, p. 187; see also Bowerbank, *Mon. Brit. Spong.*, vol. i, pl. xiv., fig. 270; vol. ii, p. 381, and vol. iii, pl. lxix.

† *Spongienfauna Atlan.*, 1870, p. 77.

This digitate species is representative of Mr. Carter's family Chalinida, and of his order Rhaphidonemata, which embraces all sponges having a horny fibre cored with spicules produced by the sponge.*

L. F. M., No. 29. 12. 61. 1. Collected at Morecambe Bay.

Chalina limbata, Bk.

Spongia Limbata, Johnston.

This is a *Chalina* of quite different form and appearance from *C. oculata*, but it is distinctly a *Chalina*, a pretty network of horny matter enclosing the acerate spicules of the species. It is a sessile species.†

L. M. B. C., No. 85.2. Collected at Port Erin, Isle of Man.

L. F. M., No. 24. 9. 73. 1. Collected at Holyhead.

Order V.—ECHINONEMATA.

Family.—Ectyonida.

Dictyocylindrus stuposus, Bk.

This is a *Dictyocylindrus* with a stellate flesh spicule, and is most probably the *Raspalia stelligera* of Schmidt. Mr. Carter has lately broken up his group Pluriformia into three divisions, the last of which is Dictyocylindrina, to receive sponges of this type. The appearance of the stellate spicule in this species‡ is a noticeable feature, probably evidencing a relationship to some species in the next order, Holorhaphidota.

L. M. B. C., No. 85. 3. Collected at Port Erin, Isle of Man.

L. F. M., No. 29. 10. 73. 1. Collected at Holyhead.

* See fig. 262, pl. xiii, vol. i, Bowerbank's *Mon. Brit. Spong.*; Johnston's *Brit. Spong.*, fig. 94, pl. iii; *Mon. Brit. Spong.*, vol. iii, pl. lxvi; Esper., 1794, taf. xxxvi; *Annals and Mag. Nat. Hist.*, October, 1885.

† See *Mon. Brit. Sponges*, vol. ii, p. 373; vol. iii, pl. lxvii.

‡ *Mon. Brit. Spon.*, vol. iii, pl. xix, figs. 1–7; *Spongienf. Atlan.*, p. 60, taf. 5, fig. 14.

Plumohalichondria plumosa, C.

Hymeniacidon plumosa, Bk. = *Microciona plumosa*, Bk.
Halichondria plumosa, J.

This species, as well as *Ophlitaspongia seriata*, represents, with a few other species, the British examples of Mr. Carter's order Echinonemata, which embraces all sponges whose fibre is echinated with spicules.*

L. F. M., No. 32. 3. 73. 2. Collected at Holyhead.

Ophlitaspongia seriata, Bk.

Chalina seriata, Bk. = *Halichondria seriata*, J.

This species† is plentiful at Holyhead, surrounding in a layer about a quarter of an inch thick, the stems of *Laminaria*.

L. F. M., No. 25. 9. 73. 12. Collected at Holyhead.

Order VI.—HOLORHAPHIDOTA.

Family.—Renierida.

Group.—Amorphosa.

Amorphina panicea, S.

Halichondria panicea, J.

This is a species‡ without any fibrous skeletal structure, the spicules, which are simple acerate, being dispersed throughout the sponge substance, and loosely congregated together in support of the areolar mass, which, when cut through, has the appearance of a slice of bread (bread-

* For illustrations of this kind of fibre see figs. 287, 288, 289, 290 and 291, pl. xvii, *Mon. Brit. Spong.*, vol. i. For illustration of the fibre of this species, see fig. 13, pl. xxiv, vol. iii.

† For illustration of the fibre of this species, see fig. 287, pl. xvii, vol. i, *Mon. Brit. Spong.* For figure of sponge coating a piece of rock, see pl. lxv, vol. iii.

‡ For good illustrations of the usual forms of this sponge, see pl. xl, vol. iii, *Mon. Brit. Spong.* Johnston's *Brit. Spong.*, p. 114, pl. xxxi; *Mon. Brit. Spong.*, vol. i, pl. xix, fig. 300; vol. ii, p. 229; vol. iii, pl. xxxix and xl.

crumb). Sponges of this character come under Schmidt's genus *Amorphina*, and into Mr. Carter's group Amorphosa. Amorphosa is the first group in Mr. Carter's Order VI, which embraces the *Reniera* of Schmidt, the *Suberites* and the Pachytragida, or Corticata, as well as the Lithistina and *Spongilla*. It is a very large order, but the divisions of it are very marked, and easily distinguishable.

L. M. B. C., No. 85. 4. Collected at Hilbre Island, and also at Port Erin, Isle of Man.

L. F. M., No. 24. 5. 73, 4. From the Egremont shore and Holyhead.

Amorphina coccinea, S.

Hymeniacidon coccinea, Bk.

This species is, as its name implies, a scarlet coloured sponge, and having acerate spicules, I have placed it in the group Amorphosa. It is a sessile species. The specimen in the L. F. M. Collection is mentioned by Dr. Bowerbank in his third volume, page 353.

L. F. M., No. 24. 5. 73, 16. Collected in Belfast Lough. V.

Amorphina albescens, S.

Hymeniacidon albescens, Bk.

This is a sessile species, which puts out usually one, but sometimes more than one, branch, about a couple of inches in length, with a diameter of a quarter of an inch or less. It is yellow when living, but in the dried state is greyish white. Its spicules, like those of the preceding species, are acerate.

L. F. M., No. 22. 4. 9. 74, 5. Holyhead. V.

Amorphina caruncula, S.

Hymeniacidon caruncula, Bk.

Dr. Bowerbank makes this species to differ from its very near relative *Hymeniacidon sanguinea* in colour, and in the size of its spicules. In the living state it is " light to deep

orange," whilst the other is "blood red;" and its spicules are rather stout acuates, whilst those of *H. sanguinea* are of the same form but longer.

L. M. B. C., No. 85. 5. Collected in shore pools at Kitterland, near Port Erin, Isle of Man.

L. F. M., No. 32. 3. 73, 1. Collected at Holyhead. V.

Group Isodictyosa.

Isodictya varians, Bk.

This sponge, belonging to the group Isodictyosa, rather resembles *Chalina oculata* in appearance—compare plates lxvi and lxxxviii in Dr. Bowerbank's third volume—but it differs greatly under the microscope. The skeleton of *C. oculata* is a horny fibre cored with spicules, whilst that of *I. varians* is a structure made up of spicules merely held together, where they touch each other, with horny matter; the spicules are simply cemented together thus, and are not enclosed in horny fibre. This difference distinguishes the Chalinas from the Isodictyas, and these species, which resemble each other so much in form, are good examples of the two groups. The orders Rhaphidonemata and Holorhaphidota run together in *Isodictya*, and perhaps the group of Isodictyosa might without disadvantage be taken out of the latter order and placed in the same order with Chalinida. Dr. Bowerbank's plate lxxxviii in his third volume is from a specimen in the Liverpool Free Museum, one of a large number taken at low water near the old ferry slip at Egremont by myself, in company with Mr. T. J. Moore, in 1869. It was found flourishing in the bed of a stream of warm *fresh* water running from the engine-house connected with the slip. The fact that this marine species was found in brackish water growing luxuriantly within the influence of a fresh water stream, becomes of great interest when considered in relation to a fresh-

water sponge found in very deep pools in a South American river, more than two hundred miles from the sea (river Uruguay),* together with some others of like form from deep parts of an inland lake (Lake Baikal).† Dr. Bowerbank described this Uruguay species in his "Monograph of the Spongillidæ" (*Proc. Zool. Soc.*, Nov., 24, 1863), under the name *Spongilla coralloides*, but Mr. Carter (*Annals and Mag. Nat. Hist.*, Feby. 1881), created a new genus for it, *Uruguaya*, and grouped it with the other sponges of similar growth just alluded to, *Lubomirskia baicalensis*, and its varieties.

Isodictya varians, until the discovery of the sponge in the Mersey, was only known by "a small fragment surrounding two adjoining branches of a small *Fucus*, forming two parallel and united cylinders of sponge, an inch in length, and seven lines in width, and varying in thickness from one to two lines, sent to Dr. Johnston by Mr. Barlee, from Shetland." Whether this fragment was brought up by the dredge or was picked up on the shore does not appear. It is, however, clear that it is not common on our coasts as a marine species, whilst the great profusion in which it was found at Egremont under the circumstances already stated (for the bed of the stream was thickly covered with it), indicates that the conditions of life there were most favourable for its growth and development. It thus appears to form a link between marine and fresh water sponges. Marine sponges reproduce by means of ova and spermatozoa, and fresh water sponges can also reproduce in this way, as was shown by Lieberkühn in 1856 (*Beiträge zur Entwickelungsgechichte der Spongillen, Archiv f. Anat. u. Physiologie*, Heft i, u. ii, pp. 1–19, January), but all fresh water sponges, with

* *Proc. Lit. and Phil. Soc. Liverpool*, 1877–8, vol. 32, p. lvi—"On a fresh-water Sponge from Bahia," T. Higgin, F.L.S.

† *Annals and Mag. Nat. Hist.*, Feby., 1881, and July, 1884.

the exception of the one from the river Uruguay and those from Lake Baikal, have been proved to reproduce in addition by means of a seed-like body or "statoblast." The method of reproduction in the case of *Uruguaya coralloides*, and of *Lubomirskia baicalensis* with its varieties and allies, is not known, but the most diligent search by various observers has not resulted in finding the statoblast in any examples of the different species. In this respect, for the present, these fresh water species stand apart from the rest of the Spongillidæ which are classified according to the spicules of the statoblast, the body spicules of the various species not being sufficiently different from each other for the purpose. *Isodictya varians** in its form bears a very strong resemblance to *Uruguaya coralloides* and to *Lubomirskia baicalensis*, and it also contains in quantity in its spiculation the curved cylindrical form of spicule common to them. The points of resemblance, or, it may be, of relationship, therefore, between these marine and fresh water species seem well worth recording.

L. M. B. C., No. 85. 6. Collected at Hilbre Island.

L. F. M., No. 32. 12. 69. 40. Type specimen. Collected on the Mersey shore, at Egremont, in 1869.

Isodictya elegans, Bk.

Dr. Bowerbank figures three fragments, as type specimens of this species.† Professor Herdman obtained one specimen at Port Erin, of reptant growth; but in a shore pool where the sponge was protected and could grow freely, he obtained two nice complete specimens of erect growth, tubular and branched. The colour of these when taken was lilac pink, a colour which is seen in some species of *Chalina*, and which, coupled with other characters common to both, may be regarded as indicating a relationship between

* *Mon. Brit. Spong.*, vol i, pl. xx, fig. 309; for skeletal network of spicules, vol. ii., p. 281; vol. iii., pls. xlviii and lxxxviii.

† *Mon. Brit. Spong.*, vol. ii, p. 283, and vol. iii, pl. xlix, figs. 1–5.

the genera *Isodictya* and *Chalina*. Professor Herdman's specimens abound with ova in an advanced state of duplicate sub-division, and ciliated embryos. They were obtained in July and August.

L. M. B. C., No. 85. 7. In shore pool, Port Erin, Isle of Man; also dredged near Port Erin.

Isodictya simulans, Bk.*

This is a compact form of *Isodictya* of pretty well marked character, and, therefore, is more easily recognised than many species of the genus. Its spicules are short, rather stout, acerates. It is usually found of a branching growth, but it is polymorphous.

L. F. M., No. 24. 5. 73, 16. Collected at Douglas Bay. V.

Isodictya pallida, Bk. †

The colour of this sponge is pale grey, or cream. Its spicules are stout and very slender acerates. It is of massive coating growth, and is not difficult to recognise.

L. F. M., No. 24. 5. 73. 7. Collected at Douglas Bay. V.

Isodictya densa, Bk. ‡

This is a massive spreading growth with stout acerate spicules.

L. F. M., No. 24. 9. 73, 2. Collected at Holyhead. V.

L. M. B. C., No. 85. 19. Collected at Port Erin.

Isodictya fistulosa, Bk. §

This is a massive form throwing up thin-walled tubes or fistulæ. Its colour alive is white, with a pinkish tint. Its spicules are two kinds of acerates, the one fairly stout and the other very slender.

L. F. M., No. 4. 9. 74, 10. Collected at Holyhead. V.

* *Mon. Brit. Spong.*, vol. ii., p. 308; vol. iii, pl. 51.
† *Op. cit.*, vol. ii, p. 297; vol. iii, pl. 50.
‡ *Op. cit.*, vol. ii, p. 292; vol. iii, pl. 50.
§ *Op. cit.*, vol. ii, p. 299; vol. iii, pl. 53.

Isodictya clava, Bk. *

The examples collected at Douglas Bay were long slender stems, about a couple of inches long, with a diameter of a line or less, sometimes branched; the specimens figured by Dr. Bowerbank have the appearance of immature forms. The spicules are rather short stout acerates.

L. F. M., No. 2. 5. 9. 73, 8. Douglas Bay. V.

Isodictya fucorum, Bk. †

This is a pink or red coloured sponge, of amorphous growth, with acerate spicules and an equianchorate flesh spicule.

L. F. M., No. 24. 5. 73, 12. Douglas Bay. V.

Group Halichondrina.

Halichondria incrustans, Johnston.

In the preceding species of the orders IV, V, and VI, which produce spicules, we have been dealing generally with sponges having simple acerate or acuate spicules, but in *H. incrustans* ‡ we have a species supplied abundantly with flesh spicules, in addition to the spicules of the skeleton which consist of smooth or spined acuates and curved or straight cylindrical forms, sometimes inflated at the ends, sometimes pointed and microspined near the ends. The flesh spicules are C-shaped, bihamate and equianchorate. Mr. Carter has made this sponge representative of the group Halichondrina. It is of wide distribution, having been found in the West Indies, the Falkland Islands, and in other parts of the world. In one example, the spined acuate is

* *Mon. Brit. Spong.*, vol. ii, p. 316; vol. iii, pl. 53.

† *Op. cit.*, vol. ii, p. 322; vol. iii, pl. 56.

‡ See *Johnston's Brit. Spong.*, p. 122, pl. xii, fig. 3; *Mon. Brit. Spong.*, vol. ii, p. 249, and vol. iii, pl. xliv, fig. 7-12.

found echinating the skeleton fibre, thus bringing this variety into Mr. Carter's order Echinonemata.

L. M. B. C., No. 85. 8. Collected at Port Erin, Isle of Man.

L. F. M., No. 4. 9. 74, 5. Collected at Holyhead.

Esperia ægagropila, C.

Desmacidon ægagropila, Bk.
Halichondria ægagropila, Bk.

This species* is also the British representative of a large group of wide distribution, the genus *Esperia* of Nardo. The skeleton spicule is a sub-pin-like form, the inflated end of which is usually of less diameter than the shaft, and the flesh spicules are bihamate, tricurvate, and inequianchorate. A characteristic feature of the genus is a beautiful polygonal lace-like dermal reticulation covering the surface, by which examples are readily recognised.

L. F. M., No. 18. 10. 73. 4. Collected at Holyhead.

Family.—Suberitida.

Cliona celata, J.

Raphyrus griffithsia, Bowerbank.

Johnston described two varieties of this sponge, one "massive," the other "sinuous." The massive variety Dr. Bowerbank made a new genus for, and named it *Raphyrus griffithsia*; the sinuous variety, that found boring into shells, he placed in his genus *Hymeniacidon*, as *Hymeniacidon celata*. Mr. Carter has found Johnston's view more correct than that of Bowerbank, and asserts that the sinuous form becomes the massive form. In support of this view, from a large number of examples of this sponge (which is

* Johnston's *Brit. Spong.*, p. 119, pl. xi, fig. 1; *Mon. Brit. Spong.*, vol. ii, p. 352; vol. iii, pl. lxiii, figs. 8–14; pl. lxxxiii, fig. 23. *Spongienf. Atlan.*, Schmidt, 1852, pp. 53–57, pl. v, figs. 2–8, 14.

very abundant all around our coast), it is said that one may select gradations of every variety of form, from the shell bored with small circular holes, through various stages during which the shell becomes more and more perforated and the sponge grows over it, surrounds it and encloses it, until it reaches the massive free form christened by Dr. Bowerbank *Raphyrus griffithsia*. On the other hand, however, Schmidt makes *Raphyrus griffithsia* equal to his *Papillina suberea*.

This species* belongs to the large family Suberitida, which embraces another sponge (*Suberites suberea*, see below) common on our coasts surrounding shells of various sizes, and in fact, in some instances, converting the shell into sponge substance, whilst to some extent the form of the shell is retained. The characteristic form of spicule is "pin-like." The well-known "Neptune's Cup" sponge *Raphiophora patera* (Gray), also belongs to this group.

L. M. B. C., No. 85. 9. Collected at Port Erin.

L. F. M., No. 9. 2. 75. 6. Collected at Holyhead.

Suberites suberea, S.

Hymeniacidon suberea, Bk.

Halichondria suberea, J.

This is the species† alluded to in the notes on *Cliona celata* as surrounding shells. It is the *Suberites domuncula* of Schmidt, and is representative of the compact forms (group Compacta) of the family.

L. F. M., No. 15. 6. 62. Collected at Holyhead, Liverpool Bay, and Morecambe Bay.

Suberites carnosa, S.

Hymeniacidon carnosa, Bk.

Halichondria carnosa, J.

This is another Suberite of compact form. The spicules

* Johnston's *Brit. Sponges*, p. 125; *Mon. Brit. Spong.* vol. ii, p. 212; vol. iii, pl. xxxviii, and pl. lxiv; *Spongf. Atlan.*, p. 65.

† Johnston's *Brit. Spong.*, pp. 139–141, pl. xii, figs. 5, 6; *Mon. Brit. Spong*, vol. ii, p. 200; vol. iii, pl. xxxvi, figs. 1–4; *Spongf. Atlan.*, p. 67.

are very similar to those of *S. suberea*, but the growth of the sponge is different, and the surface is more hispid.*

L. M. B. C., No. 85. 10. Collected at Hilbre Island.

Hymeniacidon sanguinea, Bk.
Halichondria sanguinea, J.

This species† Schmidt places in his genus *Amorphina*, but Mr. Carter places it in the family Suberitida, though the spicules are acuate and not pin-like, with the remark that Bowerbank found on Johnston's type specimen in the the British Museum, No. 47. 9. 7. 19, flesh spicules (which, however, he does not appear to have regarded as belonging to the specimen) like those of *Vioa johnstonii*, Schmidt, a Suberite. Mr. Carter has placed it in his group Laxa, which also contains *Vioa johnstonii*.

L. M. B. C., No. 85. 11. Collected in tidal pools near Port Erin.

L. F. M., No. 24. 5. 73. 10. Collected at Holyhead and Douglas Bay. V.

Family.—Pachytragida.

Pachymatisma johnstonia, Bk.

This sponge belongs to a family quite different from any previously considered in these notes. It has a crustular surface,‡ and is embraced in Mr. Carter's family Pachytragida, which also contains the genera *Geodia* (Lamarck), *Tethya* (Johnston), and *Stelletta* (Schmidt). It corresponds with Schmidt's group Corticatæ. The pachytragous sponges possess the various forms of four rayed spicules (quadrira-

* See Johnston's *Brit. Spon.; Mon. Brit. Spong.*, vol. ii, p. 203; vol. iii, pl. xxxvi.

† Johnston's *Brit. Spong.*, p. 133, pl. xiv, fig. 3; *Mon. Brit. Spon.*, vol. i, p. 239, pl. iii, fig. 72; vol. ii, p. 168; vol. iii, pl. xxxii, fig. 5–8.

‡ See *Mon. Brit. Spong.*, vol. i, pl. xxvii, fig. 353; vol. ii, p. 51; vol. iii, pl. viii, figs. 1–7. *Annals*, 1869, vol. iv, p. 8, pl. ii, figs. 7, etc.

diate). The crust in the genus *Geodia* consists of globular or ellipsoidal siliceous bodies closely packed together, upheld by the short arms of the four rayed spicules. The species of *Stelletta* have no globular siliceous bodies on the surface, but have a thick dermal layer of cells charged with the stellates of the species, whilst the surface of the genus *Tethya* is hirsute with tufts of spicules projecting through the dermal layer.

L. F. M., No. 4. 9. 74, 2 (spirit). Collected at Holyhead.

Stelletta grubii, Schmidt.

This species is described by Schmidt in his Atlantic Sponges,* and has also been found by Mr. Carter at Budleigh Salterton.

L. F. M., No. 4. 9. 74, 6. Collected at Holyhead.

Ecionema ponderosa, Bk.

This is no doubt the same sponge which Mr. Carter described in 1871 as *Stelletta aspera*. It is undoubtedly a species allied to *Stelletta*.†

L. F. M., No. 4. 9. 74, 3. Collected at Holyhead.

Family.—Pachastrellida.

Dercitus niger, C.

Hymeniacidon bucklandi, Bk.
Battersbyia bucklandi, Bk.

Before issuing his third volume in 1874, Dr. Bowerbank removed this sponge from his genus *Hymeniacidon* and created a new genus for it, *Battersbyia*, and gave a section of it in one of his illustrations. It had been, however, more particularly described and figured by Mr. Carter in 1871 as

* *Spongf. Atlan.*, 1862, p. 46, pl. iv, fig. 2.

† *Mon. Brit. Spong.*, vol. ii, p. 56, and vol. iii, pl. viii, fig. 8–15; *Annals and Mag. Nat. Hist.*, 1871, vol. vii, p. 7, pl. iv, fig. 7, etc.

*Dercitus niger.** This is the sponge which Dr. Bowerbank likened in appearance to a piece of bullock's liver.

Mr. Carter has included it in his family Pachastrellida, which embraces Schmidt's genus *Pachastrella*, and the Lithistid, or stony sponges.

L. F. M., No. 4. 9. 74, 4. Collected at Holyhead.

Order VIII.—CALCAREA.

The only monograph of the Calcarea or sponges which have calcareous spicules is that published by Professor Haeckel† in 1872. Previous and subsequent writers have described a few species only, but Haeckel had a large number before him. There has been a general concurrence in his classification, though exceptions have been taken to some of his views and speculations. The Calcarea of the "Challenger" Expedition were examined and reported upon by Dr. N. Polejaeff,‡ of the University of Odessa, a distinguished pupil of Professor F. E. Schultze; and, at the present moment, Mr. H. J. Carter, F.R.S., of Budleigh Salterton, has under examination a very large collection from Australian waters. Dr. Polejaeff had only a few species to report upon.

Professor Haeckel divided the whole order into three families, Ascones, Leucones, and Sycones, according to the canal system, and these again into groups and genera, according to the prevailing forms of spicules. "The Ascones present the simplest form of the canal system. The thin wall of the sponge consists of three parallel layers, ectoderm, mesoderm, and endoderm. Here and there the cells separate, and thus give origin to the pores" (Vosmaer.) The

* *Mon. Brit. Spong.* vol. ii, p. 226; vol. iii, pl. xxxviii, fig. 9-12, and pl. xcii, fig. 8, p. 346. *Annals and Mag. Nat. Hist.*, 1871, vol. vii, p. 3, pl. iv, fig. 1, etc. *Proc. Zool. Soc*, 1867, p. 542.

† *Die Kalkschwämme*, Haeckel, 1872.

‡ *Report on the Calcarea*, by Dr. N. Polejaeff, M.A., Zool. Chall. Exp., part xxiv, 1883.

Leucones are those with branched canals, and the Sycones those with a radial canal system. Polejaeff does not agree with Haeckel's distinction of Leucones from Sycones, but proposes to group the Ascones in one order, Homocœla, and both the others in another order, Heterocœla, treating the Calcarea as a separate Class.

The Calcarea found on our coasts are usually very small. I have never found an example of *Sycandra compressa* more than one-and-a-half inches in length, but Dr. Bowerbank speaks of one from Ipswich River five inches long by three-and-a-quarter broad. *Sycandra ciliata* is generally a quarter to half an inch in length, but Ipswich River produced one for Dr. Bowerbank three inches long by three-quarters of an inch in diameter. The size evidently depends on the locality being favourable for growth or otherwise.

Family.—Ascones.

Ascaltis botryoides, H.

Leucosolenia botryoides, Bk.
Grantia botryoides, Fleming and Johnston.

The specific name is descriptive of the way in which a number of individuals of the species are found congregated together in branches or tufts.* Colour white.

L. F. M., No. 25. 9. 73. 3. Collected at Holyhead.

Ascetta coriacea, H.

Leucosolenia coriacea, Bk.
Grantia coriacea, Fleming and Johnston.

This is a pretty encrusting species.† Colour greyish white or dark crimson, or lemon yellow or nut brown.

* *Mon. Brit. Spong.*, vol. ii, p. 28; vol. iii, pl. iii, figs. 1–4. *Die Kalkschwämme*, vol. ii, p. 65; vol. iii, taf. 9, fig. 10.

† *Mon. Brit. Spong.*, vol. ii, p. 34; vol. iii, pl. iii, fig. 11–14. *Die Kalkschwämme*, vol. ii, p. 24; vol. iii, taf. 3.

L. M. B. C., No. 85. 12. Collected at Port Erin, Isle of Man. L. F. M., No. 22. 4. 74. 6. Collected at Holyhead.

Family.—Leucones.

Leucandra gossei, H.

Leucogypsia gossei, Bk.

This is a massive sessile species.*

It is readily recognised by the large acerate spicules lying longitudinally on its surface. Colour white.

L. M. B. C., No. 85. 13. Collected at Port Erin, Isle of Man.

L. F. M., No. 22. 4. 74. 3. Collected at Holyhead.

Leucandra nivea, H.

Leuconia nivea, Bk.

Grantia nivea, Fleming and Johnston.

Coating smooth or lobular.† Colour white.

L. M. B. C., No. 85. 14. Collected at Port Erin, Isle of Man.

L. F. M., No. 25. 9. 73. 4. Collected at Douglas Bay.

Leucandra johnstonii, H.

Leuconia johnstonii, C.

Mr Carter says, a good feature for recognising the species is the large four-rayed surface spicule with a dark centre, the dark centre being the fourth ray, or shaft, penetrating the sponge substance.‡ Colour white.

L. M. B. C., No. 85. 15. Collected at Port Erin, Isle of Man.

L. F. M., No. 26. 8. 82. 1. Collected at Holyhead.

* *Mon. Brit. Spong.*, vol. ii, p. 42 ; vol. iii. *Die Kalkschwämme*, vol. ii, p. 177 ; vol. iii, taf. 37.

† *Mon. Brit. Spong.*, vol. ii, p. 36 ; vol. iii, pl. v, fig. 1-8. *Die Kalkschwämme*, vol. ii, p. 211 ; vol. iii, taf. 39.

‡ *Annals and Mag. Nat. Hist.*, 1871, ser. iv, vol. viii, p. 3, pl. i, figs. 5-12. *Die Kalkschwämme*, Haeckel, vol. ii, p. 216, pl. 34.

Leucandra fistulosa, H. *
Grantia fistulosa, J.
Leuconia fistulosa, Bk.

L. M. B. C., No. 85. 16. Collected at Port Erin, Isle of Man.

Family.—Sycones.

Sycandra compressa, H.
Grantia compressa, Fleming.

This is a very easily recognised species from its hollow compressed form; it is found in quantity all round our coasts attached to seaweed. It is well figured both by Haeckel and Bowerbank.†

L. M. B. C., No. 85.17. Collected at Port Erin, Isle of Man.

L. F. M., No. 22. 4. 74. 2. Collected at Holyhead.

Sycandra ciliata, H. ‡
Grantia ciliata, H.

L. M. B. C., No. 85. 18. Collected at Port Erin, Isle of Man.

L. F. M., No. 22. 4. 74. 4. Collected at Holyhead.

DESCRIPTION OF A NEW SPECIES BY H. J. CARTER, F.R.S.

Aphroceras ramosa, n.sp.

Small, cylindrical, branched, sessile; branchlets more or less acuminated, horn-shaped; without peristome. Colour whitish-yellow. Surface even, consisting of long, large, fusiform acerates arranged parallel to each other and closely

* *Mon. Brit. Spong.*, vol. ii, p. 39; vol. iii, pl. v, figs. 9–16. *Die Kalkschwämme*, Haeckel, vol. ii, p. 197; vol. iii, pl. 31.

† *Mon. Brit. Spong.*, vol. ii, p. 17; vol. iii, pl. i. *Die Kalkschwämme*, vol. ii, p. 360; vol. iii, taf. 57.

‡ *Mon. Brit. Spong.*, vol. ii, p. 19; vol. iii, pl. ii, figs. 1–15. *Die Kalkschwämme*, vol. ii, p. 296; vol. iii, taf. 58, fig. 9.