

OBSERVATIONS ON THE SPONGES  
OF CORNWALL.

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By R. Q. COUCH, M.R.C.S.L., &c.

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In the Essay on the Zoophytes of the county, presented to the society at its ninth annual meeting, the family of *Alcyonidula* was omitted. At that time, the species, though few in number, were not satisfactorily ascertained; since then they have been re-examined and identified with the descriptions and figures of authors. The study of *synonymes* is at all times a far more difficult and tedious task, than the study of the things themselves; but tedious as it is, it is necessary to be undergone by all who desire to know what has already been said upon the subject.

In the early history of these creatures, the term *Zoophyte* was unknown, nor was their nature, which gave rise to the word, even suspected. All the old writers who described them were botanists, and they included them among the vegetable productions; this need not excite our wonder, since their forms so closely resemble plants, that it is not easy even now, to persuade a person unacquainted with the subject, but that they belong to the vegetable kingdom.

The general appearance of the species of the family now under consideration, is such, that they may be taken for true sponges; and many of them in times past, have been taken for *Fuci*, and the spawn of fish. In a dead state, they were very closely resemble the sponges, both in form and texture, having like them, the lobulated form, cellular texture, and large openings resembling the fœcal orifices; these openings, however, in a living state, are occupied by active and voracious polypes; the whole family in fact,

appears to be a gradation from the zoophytes towards the sponges, the interval being occupied by the *Cydonium*, *Tethea*, &c.

One species of this family, was considered by our illustrious countryman Ray, as a fucus, and even Ellis and Lamouroux were at first deceived, but afterwards discovered the true nature.

But though the animal nature of these creatures was so warmly disputed a few years since, at the present time, no doubt can be entertained on the subject.

#### ALCYONIDULE.

*Fam. Ch.*—Polypidoms sponge-like, fleshy, polymorphous; the cells irregular in disposition, immersed, and concealed with a contractile non-operculate aperture.

#### ALCYONIDIUM.

*Gen. Ch.*—“Polypidom fleshy, lobed, or crustaceous; cells immersed, pentagonal, with fibro-corneous parieties, the aperture terminal, simple, contractile. Polypes Ascidian.”

#### SEA RAGGED STAFF. (*A. GELATINOSUM*.)

*Sp. Ch.*—Polypidom fleshy, cylindrical, slightly compressed, irregularly branched or lobed, smooth.

*Fucus Spongiosus nodosus*, Raii Syn., vol. 1, p. 49, no. 42. *Alcyonium, seu fucus nodosus et spongiosus*, Ellis' Cor., p. 87, no. 5, pl. 32, fig. d D. *Alcyonium Gelatinosum*, Ellis and Solander's Zooph., p. 176; Turton's Lin., vol. 4, p. 653; Fleming's British An., p. 517; Lamouroux's Cor. Flex., p. 350; Stewarts Elem., vol. 2, p. 432; Johnson's Brit. Zooph., p. 300, pl. 41, figs. 1—3.

*Habit.*—On shells and stones from deep water, not rare on the south and south-west coast.

This species varies in height to sixteen inches, and is said sometimes to grow as high as “several feet;” in its texture it is spongy or fleshy, semi-opaque, dotted, and of an amber colour, varying from the light yellow, to the brown tint; the surface is even, smooth, polished, lobulated, and dotted; the polypes lie beneath the surface in the substance of the polypidom, with which they are very intimately connected. The tentacula, though of very unequal length, are long, ciliated, and capable of being folded up, and so withdrawn into the cell; in the earliest state of growth,

it is a simple incrustation, but soon assumes a finger-like prolongation, from which lobes afterward sprout on all sides.

This was considered a vegetable by the older botanists; Ray thought it a *Fucus*; Ellis appears to be among the first to discover its true character.

A. HIRSUTUM.

*Sp. Ch.*—Polypidom fleshy, simple or lobed, compressed, surface granular.

A. Hirsutum, Fleming's Brit. Anim., p. 517; Johnston's Brit. Zooph., p. 303, pl. 42, figs. 1, 2.

*Habit.*—On *fuci* about low water mark, and on a *pinna ingens* from deep water; Polperro. Tallandsand bay.

All the specimens of this species which I have found in the Cornish seas, were long, slender, very much compressed, semi-transparent, and fleshy, with a slightly granular surface, clouded with brown, and marked with black specks; but it is said to be sometimes sub-cylindrical and palmate. It is soft and flexible. Its structure is cellular, the cells delicate and compactly arranged. The granulations of the surface are formed by minute conoidal papillæ, which are closely crowded together. The tentacula vary in number from sixteen to eighteen.

ALCYONIDIUM. (SUBVIRIDE, R. Q. C.)

*Sp. Ch.*—Massive, lobulated, of a brownish green colour; surface irregular, covered with small pores, intersperced with larger ones of very irregular shape.

*Habit.*—From deep water, off the Deadman point; rare. I have hitherto procured but a single specimen of this species, but have seen another in the collection of Mr. Peach, of Gorran, obtained from the same locality, off the Deadman.

When recent and living, it is of an olive brown or green colour, with a shining polished surface; it is filled with a gelatinous slime and covered with minute punctures. The polype orifices are large, distant, and of very irregular shape. The polypes though seen, in consequence of other engagements, were not examined. Height ten inches, thickness six. This I have failed to identify with any described by the authors to which I have access.

## A. ECHINATUM.

*Sp. Ch*—Encrusting, thin; surface granular when living, roughened with papillæ when dead.

A. Echinatum, Fleming's Brit. Brit. Anim., p. 517; Johnston's Brit. Zooph., p. 304.

*Habit.*—On dead specimens of the *Buccinum undatum*, and other dead univalve shells, common; Polperro, Mevagissey, Goran, and Whitsand bay.

This species is always found encrusting dead univalve shells, is very thin, and of a brown colour. When living, it is fleshy, slightly diaphanous, and the mouths of the cells are but slightly prominent; when dry, it becomes hard, shrivelled, and the apertures of the cells prominent and stiff. The points or prickles, which are distributed over the surface, have no permanent regularity, sometimes being arranged in rows, as Dr. Johnston has figured them, and at others distributed in a very irregular manner.

Montagu first discovered it as a zoophyte, on the Devonshire coast, and communicated it to Fleming; he says the polypes have twelve tentacula.

## A. PARASITICUM.

*Sp. Ch.*—Parasitical on corallines, arenaceous; cells distant, round, or substance porous.

A. Parasiticum, Fleming's Brit. An., p. 518; Johnston's Brit. Zooph., p. 304, pl. 41, figs. 4, 5.

Dr. Fleming first placed this among the zoophytes, but was apparently undecided to what genus it belonged, not having an opportunity of examining it in a living state. It is found encrusting the stems of the *Sertulariadae*, as *S. Abietina*, *Polyzonias*, *Plumularia*, *falcata*, &c. In appearance it is sandy, porous, and is about the tenth of an inch in thickness. The cells externally, appear as minute distant tubes, which perforate the substance throughout. The polypidom, in fact, instead of being secreted or formed by the animal as a part of its own character, as the polypidoms of all the others, is formed of fine sand and mud, cemented together by a glairy substance, as is observed in many worms, as in the *Sabella*, &c.; the whole appearance so closely approaches to what is

observed in worms, that I am inclined to think it the work of an *annulated* animal, though I have not succeeded in detecting it, rather than of a zoophyte.

CLIONA; DR. GRANT.

*Gen. Ch.*—Polypidom spongy, cellular, yellowish, with numerous straight speculæ, with globular heads.

*Cliona celata*, Grant's *Edin. New Phil. Jour.*, l, p. 78, ii., p. 183, pl. 2, fig. 7; Fleming's *Brit. An.*, p. 516; Johnston's *Brit. Zooph.*, p. 305, pl. 42, figs. 5, 6.

*Habit.*—In the crevices and perforations of the oyster, in deep water, and in oyster beds, and most shells with a rough uneven surface. Polperro.

There is only one species of this genus known. It is of a yellowish colour, spongy and cellular. Its substance is traversed by numerous spiculæ, which are stout, straight, and with globular pin-like heads. It is found in the perforations of the oyster slightly projecting beyond the surface. The polype orifices are tubular and conoidal, and very closely resemble the fæcal orifices of sponges. Dr. Grant saw the polypes and describes them as being so minute as to be invisible to the naked eye, unless there is a great light, "but by suspending the *cliona* in a crystal jar with clear water, and placing it between the eye and candle, or the sun, they are seen like filaments of silk or asbestos constantly rising and sinking on the margin of the papilea." The tentacula were cut off and examined and the whole minutely described, yet but for the authority of Grant and Johnston, I should have placed it among the sponges, as an apolypus zoophyte. After many examinations I have never seen a true polype, and Grant himself could never detect one in specimens from Newhaven. In all or most sponges, especially the minute ones, there will be found minute worms, with tentaculated heads, residing in canals, and such I believe was the character of the polype described above by Grant.

## SPONGES.

Having thus brought the Cornish list of the true Zoophytes of Johnston's system, to a conclusion, the *Sponges*, which by most authors are classed with them, next present themselves for investigation.

The sponges of this country have suffered a very general neglect since the time of Montagu. Dr. Grant has however made many valuable observations on them, and Fleming has made a new arrangement, describing their generic and specific differences; but though his system is an improvement, yet the species are left in a state of confusion and uncertainty from his not having an opportunity of examining all of them. But they offer less enticement to their study than almost any other productions of our shores. Their general form and character are very much alike; they are few in number; and neither remarkable for usefulness nor beauty. But they are so far interesting, as possessing a nature which has been a stumbling-block to all naturalists, from Aristotle to the present time; occupying a very debatable position in the animal and vegetable kingdoms. Notwithstanding the researches of Grant and others, the opinions concerning them are in a very unsettled state, and the history of these opinions is curious as well as contradictory. Aristotle considered them rooted animals; Pliny as having a third nature, or a mixture of animal and vegetable; Ray as marine vegetables; Linnæus, in the different editions of his *Systema Naturæ*, altered his opinions several times, but finally thought them animal; Ellis as fixed flexible animals, in which he evidently expected to discover polypes; Pallas as animals; Mr. Grey first thought them vegetable, afterwards that their animality was proved, but at the present time that it is doubtful; Fleming and Hogg that they are animal, though the latter thinks the river kind a vegetable; Lamouroux and Johnston, that all are vegetable; Grant that they are animal; while Professor Owen, in his lectures before the College of Surgeons in 1840, agrees with Ehrenberg, Müller, Brown, &c., "That if a line could be drawn between the animal and vegetable kingdoms, the sponges would be placed

upon the vegetable side of that line." Professor Jones on the other hand, looks on them as the lowest form of animal life. Such have been, and are the conflicting opinions of our most eminent men. For my own part I regard them as animal, some are undoubtedly so, others have a more doubtful character, and some very closely resemble vegetables, and there appears to be every gradation between the two extremes; so that probably they would oscillate in a line drawn between the two kingdoms.

It would be out of place here to enter at length on the structure and physiology of sponges, as it would occupy too much space in your society's report. It may however be briefly stated that a sponge is composed of a soft elastic frame work, more or less complex in its nature; and that the interstices of the frame work, as well as the frame itself, are occupied by pointed spicula, which have I think been erroneously considered as an effect of crystalization rather than of vital action. I say this with all respect for the authority of Johnston, but I differ from him, not only in this, but in considering the polypidom of the other Zoophytes as organic and vital, instead of extravascular and inorganic. This frame work of the sponges is, beside, enveloped by a semi-fluid glutenous substance, which in some instances is in great excess, and in others nearly wanting.

The arrangement which has been followed, is the one proposed by Dr. Fleming in his work on British animals, which principally depends on the chemical character and form of the spicula. This however is not an unerring test in the identification of species; for though the siliceous and calcareous spicula are never found co-existent in the same kind, and though always of the same shape in the same species, yet they vary a great deal in size, in different individuals, and the same shape is common to several sorts. In some species the spicula are absent or are so minute as not to be discovered, and these I have found some difficulty to refer to Fleming's genera. But as the object of these notes is to ascertain our native species and not to make a system, I shall refer them all to one or other of his genera, as convenient niches for them till a better arrangement is proposed. I have made some alteration in the definition of the genera so as to include these doubtful kinds.

## CLASS. SPONGIADÆ.

*Character.*—Organized matter, rooted, of various forms, encrusting, lobulated, ovoid or branched; unirritable, passive, more or less cellular, elastic, porous, and fleshy. Structure reticular, fibro-corneous, interspersed with siliceous or calcareous spicula of various shapes, which are sometimes indistinct or absent; the whole more or less interspersed with a semi-fluid, glairy gelatinous substance. Aquatic—marine or fluviatile.

## TETHEA.

*Gen. Ch.*—Sponge hemispherical, compact, fleshy, encircled with a distinct rind; interior fibrous and filled with a gelatinous semi-fluid substance. Spicula silicious radiating.

## T. CRANEUM.

*Sp. Ch.*—Hemispherical, yellow, or yellowish brown, surface even, rough with pointed spiculæ.

Aleyonium Craneum, Turton's Lin., vol. 4, p. 654; Lamouroux's Cor. Flex., p. 347; Tethya Craneum, Fleming's British Anim., p. 519.

*Habit.*—On stones in deep water. Polperro; Gorran, Peach.

Globular, from one to two inches in diameter, slightly pedunculated or flattened at the base; the surface even, but rough from the spiculæ pointing beyond the surface; colour yellowish sometimes inclining to brown, and at others to a green.

## T. SPHERICA.

*Sp. Ch.*—Globular, slightly pedunculated; upper surface warted, fleshy, under surface striated; of a yellowish or brownish colour.

Aleyonium Lyncurium, Turton's Lin., vol. 4, p. 653; Lamouroux's Cor. Flexibles, p. 343. Tethea Spherica, Fleming's British Anim., p. 520; Bellamy's Nat. Hist. of S. Devon, p. 268.

*Habit.*—On the under surface of stones, or the sloping sides of rocks, between tide marks in sandy or muddy bays, common.

This species varies a great deal in size, but is generally found from half an inch to one inch in diameter; is globular above and pedunculated below. The upper surface is warted or tuberculated. The tubercles are closely arranged and without pores. The sides to the base are striated and fibrous, without warts. In a longitu-

dinal section, the cut is divided into radiating chambers, which are filled with a thick fleshy gelatine, interspersed with numerous radiating spicula. The surface is composed of a thick investing rind or skin and occupied by spicula. The spicula are slender, needle-shaped, and curved.

This is common on all our shores, in muddy and sandy bays, under shelving rocks. If the spot be much encrusted with mud, conservæ, or corallines, it grows pedunculated; but where the surface is clean I have observed it to spread along the surface for the space of two inches as a mere incrustation, similar to the *Botryllus* of Fleming.

#### HALICHONDRIA: FLEMING.

*Gen. Ch.*—Sponges of a variety of forms, encrusting, lobed or branched, more or less elastic, bibulous; surface covered with minute pores which permeate the whole substance, and terminate in other larger ones, opening on the surface and which constitute the oscula or fœcal orifices; texture fibro-corneous, meshed, elastic, occupied by siliceous spicula and a glairy gelatine, which in some instances is in excess. Marine.

#### H. PANICEA.

*Sp. Ch.*—Encrusting, thick, nearly inelastic; surface uneven; orifices large, irregular, and imbedded; spicula stout, fusiform, curved.

H. Panicea, Fleming's British Anim, p. 520. Sp. Tomentosa, Turton's Lin., vol. 4, page 659; Stewart's Elem., vol. 2, p. 434. Spongia informis durior compressa, Raii Syn Stirp, vol. 1, p. 30, no. 7. Spongelike Crumb-of-bread, Ellis' Coral., page 80, no. 2, plate 16, d. Sp. Panicea, Turton's Lin., vol. 4, p. 660; Stewart's Elements, vol. 2, page 435.

*Habit.*—On rocks between and beyond tide-marks, not uncommon on all our shores.

There has been a great deal of confusion respecting this and the following species; by some they are considered distinct, and by others as varieties of one another. To the opinion that they are varieties of the same, I, at present, hesitate to give consent. Fleming has applied the English name of "Crumb-of-bread sponge"

to the next, the *H. Papillaris*, and has quoted Ellis's figure in his Essay on Corallines as belonging to that species, while I consider it a very characteristic one of the present.

It varies a great deal in thickness, from half an inch to one inch and half, the surface is rough and uneven, reticulated and porous, with large, irregular, and distant fœcal orifices, which are somewhat imbedded. The mass is rather inelastic, highly cellular, and when dry very friable, being easily reduced to powder by the fingers. The spicula are pointed at both ends, curved, and somewhat fusiform. Fleming observes that they are pointed at one end and rounded at the other, but this I have not seen. When the substance is dry and rubbed smartly over the skin, it produces a painful and intolerable itching, similar to what is produced by the cow-itch, *Dolichos pruriens*; to me it seemed more like the tingling produced by the *Medusa*. When recent and living it is of a yellowish colour, but is also frequently pinkish and white.

#### H. PAPILLARIS.

*Sp. Ch.*—Encrusting, surface finely porous; oscula large and elevated, or crater-like prominencies; spicula fusiform, curved, and pointed at both extremities.

*H. Papillaris*, Fleming's Brit. Anim., p. 520; *Halina Papillaris*, Grant's Cyclop. Anat. and Phys., vol. 1, p. 108, fig. 29; *Outlines of Comp. Anatomy*, page 311., fig. 108. *Sp. Papillaris*, Roget's Bridgewater Treat., vol. 1, page 149, fig. 53.

*Habit.*—On rocks between and beyond tide marks; on the backs and sides of crabs, every where abundant.

This is the commonest of all the sponges. It grows in a great variety of situations, but is found most abundantly on the sloping surfaces of rocks. It is encrusting, soft, and rather inelastic, so that any impression made on it, is not immediately effaced. It is generally about quarter of an inch in thickness. The surface is minutely porous, frequently veined or ridged, the fœcal orifices are more or less elevated on tubular papillary eminences. In this species, I have frequently found the remarkable phenomena described by Grant, of the vomiting out of water like a volcano; this has been so apparent, that I have distinctly seen it at the distance of ten feet.

It varies a great deal in colour from a light yellow to a pea-green; on rocks it appears as a simple incrustation, of various thickness, but generally about quarter and half an inch, with the crater-like prominences mentioned above; on *fuci* and stones, its surface is more even, and more circumscribed in extent; on the *Corallina officinalis*, it hangs down very frequently in a single teat-like prolongation; it constantly varies in shape, depending on its place of growth. I have seen this and the last species growing close to each other, but not intermingling or uniting. Dr. Fleming appears to have intermingled the names of the two species; and others have considered them as one; but as I consider them distinct, I have separated the names to the best of my judgment.

#### II. PARASITICA.

*Sp. Ch.*—Small; shape various, globular or columnar, sometimes branched; firm, and when dry, very friable; spicula short, stout, slightly curved, or waved, pointed at one end, and rounded at the other.

H. Parasitica, Fleming's Brit. Anim., p. 521; Bellamy's Nat. Hist. of South Devon, p. 268.

*Habit.*—On the flexible corallines from deep water, and on *fuci*, not rare.

The shape of this species is very inconstant, in shape no two specimens being found alike. In texture it is homogeneous, netted, fibrous, and of a yellowish brown or ash colour, very soft and inelastic, but resisting. The *æcal* orifices are always very minute, obscure, and frequently wanting. The spicula are short, stout, curved, or waved, round at one end, and pointed at the other.

#### H. CINEREA.

*Sp. Ch.*—Encrusting, pores obscure, *æcal* orifices distant, small and few; spicula fusiform, sharper at one end than the other.

*Halichondria Cinerea*, Fleming's Brit. Anim., p. 521.

*Habit.*—On a shell one league from the shore, very rare. Polperro.

Encrusting, soft, and of a very close texture. It is of an irregular shape, of a dark ash colour, generally, but in one instance, of a dark brown colour, and about half an inch in thickness. Its sur-

face is smooth, even, and apparently poreless. In structure it is reticulated, and formed chiefly of the spicula; when dry, it is very friable. This species is very rare.

#### H. SANGUINEA.

*Sp. Ch.*—Encrusting, of a deep vermilion colour; surface generally rugose, sometimes plain; pores obscure; fæcal orifices rather small, immersed, sometimes slightly elevated; spicula long, slightly tapering, curved.

*Halichondria Sanguinea*, Fleming's Brit. Anim., p. 521.

*Habit.*—On the sides of exposed rocks, and in crevices, between tide marks, common. Whitsand Bay, Tallandsand, Polperro, Lantivet, and Mevagissey Bay. On the sides of the spider crabs.

This species is almost as common as the *H. Papillaris*, and is found abundantly between tide marks, in patches, varying from one to several inches in diameter, and of about half an inch in thickness. It is of a red or vermilion colour; its surface is uneven or rugose, resisting and inelastic; the pores are very minute; the fæcal orifices are small, irregular in size, and immersed. The spicula are numerous, rather stout, tapering, and curved. When torn from the rock, it is rather slimy, much more so than the *H. Papillaris*, with which it is frequently found. When it grows in crevices of the rocks, it becomes very thick, very much resembling the *H. Panicea*, with which however it cannot be confounded.

#### H. SUBERICA.

*Sp. Ch.*—Always detached; surface even, minutely porous; no fæcal orifices; spicula so minute that they can be seen only with a high magnifier, pine-like.

*Halichondria Suberica*, Fleming's Brit. An., p. 522; Bellamy's Nat. Hist. of South Devon, p. 268; *Spongia Suberica*, Johnston in Mag. Nat. Hist., vol. 7, p. 491, fig. 60.

*Habit.*—Encrusting dead univalve shells. Polperro: R. Q. C. Gorran Haven: Mr. Peach. On the stems of sea-weed, very rare.

The texture and appearance of this curious production very closely resembles a piece of fine cork. Dr. Johnston in the magazine quoted above says, this "sponge is apparently composed of fine particles of sand closely compacted," which is I suppose a

misprint, as the substance is very soft and like velvet to the touch. Its surface is even, compact, inelastic, smooth, without branch, process, or elevation. It varies in shape, depending on the shape of the shell it encrusts. It is generally found on dead univalve shells which it envelopes. In the shell there is so commonly a hermit crab, that it might almost be taken as a specific character for the sponge. In a fine specimen now before me, there appears to have been a struggle between the crab and sponge for possession of the shell. The sponge has encrusted the shell on every part and has greatly encroached on the opening, which the crab has managed to keep open by a continued passing and re-passing through it. But it seemed probable that the sponge would finally have enclosed both the shell and crab. The spicula are so small that they are detected but with difficulty, and then only with a good microscope; they are numerous, pointed at one end, with an enlarged globular head at the other.

#### H. FRUTICOSA.

*Sp. Ch.*—Texture loosely reticular, fœcal orifices ovoid, large, and distant; spicula linear obtuse.

*Halichondria fruticosa*, Fleming's Brit. An., p. 522. *H. fruticosa*, Bellamy's Natural History of South Devon, p. 268. *Spongia Licheniformis*, Lamouroux's Cor. Flexibles, p. 22.

*Habit.*—On stones and shells from deep water, not uncommon. Polperro,

This is generally found washed on shore after a storm, from deep water; but I have not unfrequently procured it from deep water on stones drawn up with the hook, these specimens were of a brown colour, flaccid, and gelatinous. The texture is loose and hollow, towards its root it is more solid and compact than at any other part. When washed on shore the whole of the fleshy gelatine is washed out and the elastic frame work alone remains, which is then seen to be distantly reticulate with imbedded spicula. When recent it is brownish, but soon becomes white by exposure on the beaches from the influence of the sun and moisture. The spicula are linear and obtusely pointed. Not uncommon.

## H. HISPIDA.

*Sp. Ch.*—Dichotomously branched; branches compressed, covered with stiff prominent hairs; spicula long, slender, and pointed at both ends.

*Halichondria hispida*, Fleming's British An., p. 522; Bellamy's Nat. History of South Devon, p. 268.

*Habit.*—On stones and shells from deep water, not uncommon. Polperro.

This appears to be the *spongia hispida* of Montagu judging from the description of Fleming. It is by no means uncommon in deep water south-west of the Eddystone, to deep water south and west of the Deadman Point, as far as I have had an opportunity of examining. I have sometimes found so many as six specimens on a single stone, and very frequently two or three. Its base is not spreading. From the base it rises in a round or slightly compressed stem for about the length of one inch, differing however in different specimens; it then branches dichotomously. The branches are short and compressed and arise from each other at acute angles. Sometimes specimens branch immediately from the base, and at others, several individuals appear to rise together from the same base, but most frequently they branch in the manner described above.

When living it is slimy and of a yellowish brown, which in drying changes to a deep brown colour and becomes hard and stiff. The surface is without faecal orifices and is clothed in numerous straight, stiff long hairs. The spicula are long, slender, slightly curved, and arranged parallel to each other in the axis of growth. I have never found a specimen exceed three inches in height.

## H. PALMATA.

*Sp. Ch.*—Erect, branched; branches compressed, frequently hollow; faecal orifices raised, scattered, and of irregular shape; structure coarsely reticular; spicula short, curved, and pointed at both ends.

*Halichondria Palmata*, Fleming's Brit. An., p. 523; Bellamy's Nat. History of South Devon, p. 268. *Spongia Palmata*, Ellis and Solander's Zooph., p. 189, pl. 58, fig. 6; Turton's Lin., vol. 4, p. 659; Stew.'s Elem., vol. 2, p. 434; Lamouroux's Cor. Flex., p. 75.

*Habit.*—In moderately deep water near the shores, attached to stones and rocks, common. Polperro, Gorran, Mevagissey, Whitsand bay.

This is the largest of all our native sponges, and more closely approaches to the popular idea of a sponge than any other. It varies a great deal in height to two feet, but is most commonly found about six or ten inches. It rises from a spreading base by a single stem, or several congregated together. The branches arise very irregularly, are stout, much distorted, and frequently inoscuate. The whole mass presents no regularity of shape, but there is frequently a disposition to a palmate form. The branches are frequently hollow, and the internal surface is lined with a smooth gelatinous membrane. When recent it is flexible and filled with a thick gelatinous slime, and is of a brown or greenish brown colour; when dry it is very stiff, and if the slime has not been entirely removed it is very brittle. The structure or frame work is coarsely and strongly reticular, and the cells have a diverging disposition from a median line, and are more densely arranged at the base than in the branches. The fibres of the net work are of unequal size, being thicker at the edges than in the centre.

I have followed Fleming in quoting the *spongia palmata* of Ellis, as belonging to this species, though there is a considerable difference in the form to any I have yet seen. It seems to approach almost as closely to the *H. Oculata*, and may perhaps hereafter prove a distinct species.

#### H. OCVLATA.

*Sp. Ch.*—Erect, dichotomously branched; branches round, soft; faecal orifices marginal; spicula short, slightly curved, and pointed at both ends.

*Spongia ramosa* Brittanica, Branched English Sponge, Ellis' Cor., p. 80, pl. 32, fig. *f F*. *Spongia Oculata*, Ellis and Solander's Zooph., p. 184; Turton's Lin., vol. 4, p. 658; Stewart's Elements, vol. 2, page 434; Lamouroux's Coral. Flex. p. 74. *Halichondria ramosa*, Fleming's Brit. Anim., p. 523; Bellamy's Natural History of South Devon, p. 268. Figure in Magazine Nat. History, vol. 1, p. 278. *Haliclona Oculata*, Grant's Outlines of Comp. Anat., p. 5. fig. 2.

*Habit.*—On rocks in deep water, not common, on the back of a corwich, *M. Verrucosa*. Polperro.

This is a very soft and elegant species. It is of a light brown or straw colour, and about six or eight inches in height, and very compact. In drying it is sometimes hard, but when properly prepared, is of a beautiful velvet softness. The branches are erectopotent, compressed, smooth, and very frequently inosculate. Its frame is fibro-reticular, elastic; the net work delicate, close, and very small. Fœcal orifices small, and generally arranged on one side near the margins. The spicula are short, slightly curved and pointed at both ends.

#### H. INFUNDIBULIFORMIS.

*Sp. Ch.* — Funnel-shaped, of equal consistence throughout; spicula slender, sometimes slightly curved, pointed.

*Halichondria Infundibuliformis*, Fleming's *British Anim.*, p. 524. *Spongia Infundibuliformis*, Turton's *Lin.*, vol. 4, p. 657; Stewart's *Elem.*, vol. 2, p. 433. *Spongia Pocillum*, Lamouroux's *Cor. Flex.*, page 45.

*Habit.*—I have procured a single specimen on a stone off the Deadman point.

The individual procured did not exceed three-quarters of an inch in height. It is of a light brown colour, deeper below than above, and of an equal spongy consistence throughout. The base is contracted, the stalk short, round, or slightly compressed; the superior part greatly enlarged and much compressed; the upper surface is cup-shaped, but not deeply, and the edges inverted. From the appearance of the cupped portion, it seems that in the earliest state, the depression is either absent or minute, and that it increases in size with age. It has not much gelatinous slime, but is pervaded by an earthy substance, which is readily washed out in water. After cleaning and squeezing it, it readily regains its original size and shape; and though in drying it shrinks, yet a little water will re-produce its original appearance.

#### H. (CANALICULATA, R. Q. C.)

*Sp. Ch.*—Encrusting circularly, tubiform, or the segment of a tube, surface of a velvet appearance; fœcal orifices numerous,

well defined, generally circular; spicula small, slightly curved, and pointed at one end.

*Habit.*—On the stems of the larger fuci; frequently washed on shore after storms, common. Whitsand, Polperro, Mevagissey.

This species is not described by any authority to which I have access, but is so common, that I can hardly tell how it escaped the diligent researches of Montagu.

It encrusts the stems of fuci in deep water, and hence grows in a circular manner, which, when it is detached, gives it a tube-like form; but if detached before it completely encircles the stem, it is found as segments of a tube. The surface is of a velvet softness, very porous; the fœcal orifices are numerous, well defined, not large, on a level with the surface, or but slightly elevated above it, irregular in shape, but most commonly circular. Very frequently three or four large tubes open into them near the surface and the orifice, at the surface is the one common to the whole. When living it is of a bright vermillion colour, but this changes to a bistre or brown in death. Very tough.

#### H. (PYRAMIDITA, R.Q.C.)

*Sp. Ch.*—Small, pear-shaped, or pyramidal, delicately fibro-reticular, soft; surface porous; fœcal orifices large, round, few; spicula small, curved, and pointed at both ends.

*Habit.*—On a stone from deep water six leagues south of the Deadman.

This species, like the last, I have not found described by any authors I have examined. Some specimens were pear-shaped, others waved and conoidal. It is of a light fawn colour; the surface is very finely vellous and soft, the fœcal orifices are large in proportion to the size of the sponge, few in number, and one terminal: I have never seen more than three. The spicula are small, curved, and pointed at both ends.

#### H. (ARGENTEA, R.Q.C.)

*Sp. Ch.*—Pedunculated, slender, silvery white, porous, without fœcal orifices; spicula small, straight, of nearly equal thickness throughout.

*Habit.*—On a shell in fifty fathoms water, off Polperro.

Of this kind I have only procured a single specimen from deep water, on a *pinna ingens*. It is about one inch and a quarter in height, and about the fourteenth of an inch in thickness. Superiorly it is of a silverly white colour and very porous, below of a brown colour and more solid consistence.

The gelatinous matter is not abundant, and the spicula are distributed equally in all directions in a reticulate manner, they are very numerous, of equal length and of equal thickness.

#### SPONGIA.

*Gen. Ch.*—Form various, porous, with a soft, elastic, reteform frame; traversed by canals, which by inosculating increase in size till they open on the surface; destitute of spicula.

The difference between this and *Halichondria* is the absence of spicula.

#### SPONGIA PULCHELLA.

*Sp. Ch.*—Homogeneous, irregular, consisting of finely reticulated simple fibres.

*Spongia Pulchella*, Fleming's *British Anim.*, p. 524; *Templeton Mag. of Nat. History*, vol. 9, page 471; *Bellamy's Nat. History of South Devon*, page 268.

*Habit.*—On a stone from deep water. Polperro.

This sponge is soft and pliable, though naturally it stands in good relief. It rises from a stout, short, solid base, but above it is very variable in shape, sometimes being elevated into irregular prominences, sometimes fan-like, and at others palmate or plane-like, twisted into various folds. It is of a light brown or fawn colour, porous, and beautifully reticular. The meshes are generally quadrangular, but are sometimes rather irregular. The fæcal orifices are irregularly scattered, but are on a level with the surface both within and without the folds. Although it is not transparent, yet it is so loose in texture that light readily passes through the meshes.

#### GRANTIA.

*Gen. Ch.*—Generally small and white; texture rather firm, sometimes very firm and close; form various; spicula numerous, calcareous, effervescing with acids, triradiate, sometimes quadri-radiate or simple. Fæcal orifices distinct, distant, and round.

This genus was formed by Dr. Fleming in honour of Dr. Grant, for his valuable observations on the physiology of these productions.

G. COMPRESSA.

*Sp. Ch.*—Yellowish white, tubular, exceedingly compressed, generally ovoid with a terminal orifice, frequently irregular with the orifices lateral. Spicula of two kinds, one triradiate, the other smaller and pointed at one end.

*Grantia Compressa*, Fleming's *Brit. Anim.*, p. 524; Bellamy's *Nat. Hist. S. Devon.* *Spongia Compressa*, Turton's *Lin.*, vol. 4, p. 661; Lamouroux's *Cor. Flex.*, p. 48. *Leuconia Compressa*, Grant's *Outline of Comp. Anatomy*, p. 7, fig. 3.

*Habit.*—On fuci, on the shelving sides of rocks exposed to the sea near low water mark; very common.

This is amongst the most common of our native sponges. The whole length of our shores, wherever a favourable site is found, affords an abundant supply of specimens. It generally grows in large clusters attached to seaweed by a narrow pedunculated base. It varies in length from a quarter to two inches; is oval, or if different, are variations of an oval, having ovoid projections on the sides. It is very much compressed of a straw or whitish yellow colour, hollow, with terminal or lateral fœcal orifices. The surface is slightly rough, reticulated. It is inelastic and when dry the sides of the tube are in contact, but when hanging in the water, separated. Most of the spicula are triradiate, others are simple, blunt at one end and pointed at the other.

G. BOTRYOIDES.

*Sp. Ch.*—Small, tubular, branched; branches irregularly given off, short, with a simple orifice at the terminations; spicula triradiate.

*Spongia Botryoides*, Ellis and Solander's *Zooph.*, p. 190, pl. 58, figs. 1—4; Turton's *Lin.*, vol. 4, p. 660; Stewart's *Elem.*, vol. 2, p. 434; Lamouroux's *Cor. Flexibles*, p. 81. *Grantia Botryoides*, Fleming's *British Anim.*, p. 525; Bellamy's *Nat. Hist. of South Devon*, p. 268. *Spongia Confervicula*, Templeton *Mag. Natural History*, vol. 9, p. 470, fig. 67.

*Habit.*—On the lesser fuci about low water mark and under stones, common.

This is a very common species, growing abundantly on all parts of our shores, on the shelving surfaces of rocks exposed to the sea.

It is quite as common as the last species, it is known by being much smaller, whiter, softer, not so much compressed. Sometimes it is crowded so that the terminations of the branches are alone seen; at others the branches are distant and distinctly seen; they have all a plain terminal fœcal orifice; the surface is slightly roughened by the projection of the spicula. It is of a white colour but varies a little in different localities. When growing beneath stones it appears to be changed in what may be considered an essential form, when growing at liberty; it then creeps along the stones sending off lateral branches like a conferva.

Though I have doubted, from the appearance, the *Spongia Confervicula* of Templeton, whether to make it synonymous with *G. Botryoides*, yet anatomically they are alike, and I have therefore placed them together as the same.

#### G. CILIATA.

*Sp. Ch.*—Ovoid, tubular; surface villous; fœcal orifices terminal surrounded with a coronet of delicate spines.

*Spongia Coronata*, Ellis and Solander's *Zooph.*, p. 190, plate 58, figs. 8, 9; *Turton's Lin.*, vol. 4, p. 657; *Stewart's Elem.*, vol. 2, p. 433; *Lamouroux's Cor. Flex.*, p. 54. *Spongia Ciliata*, *Turton's Lin.*, vol. 4, page 657; *Lamouroux's Cor. Flex.*, p. 55. *Grantia Ciliata*, *Fleming's British An.*, p. 525; *Bellamy's Nat. History of South Devon*, p. 269.

*Habit.*—On fuci, *Corallina Officinalis*, on stones, in pools between tide marks, common. Polperro.

This is a pretty little species, and though more constant in form than many others, yet is liable to much variation. It is of an elongated oval form generally, but is sometimes stout, and egg-shaped. It varies in length to one inch and three quarters, but is most commonly met with about half an inch. Its surface is rough or villous, its fœcal orifice is plain, terminal, and surrounded with a coronet of pearly spines. The roughness of the spines is sometimes pro-

duced by the spicula standing prominently from the surface, pointing towards the orifice, at others, by minute scales which overlap each other, or by minute round glandular-looking bodies which are thickly studded over the surface; but sometimes the surface is nearly smooth. The terminal coronet is also liable to great variations, sometimes being long and well-defined, at others short and irregular, and in another may be absent or very nearly so. This most probably arises, from the force of the sea and from growing in bad situations. When free from impurities it is of a beautiful white colour, but about the base is sometimes yellow and even occasionally brown. The spicula are of two kinds, one linear and pointed, and the other triradiate.

#### ENCRUSTING.

##### G. NIVEA.

*Sp. Ch.*—Encrusting, white, hard, and slightly flexible, porous; faecal orifices circular, on a level with the surface, or but slightly elevated; spicula triradiate, or quadriradiate.

*Grantia Nivea*, Fleming's Brit. Anim., p. 525.

*Habit.*—On the under surface of sheltered rocks, about low water mark. Polperro, West Coombe Bay, Lansallos.

As sponges are liable to such variations of form, I have supposed the present species to be the *Grantia Nivea* of Fleming, though so different in form from what he describes. Those specimens I have procured from the shelving sides of sheltered rocks, near low water mark. It is white, and formed of a large number of spicula united by a small quantity of animal matter. When dry, it is hard, and slightly flexible; immediately above the base it rises into tortuous folds or ridges, irregularly uniting with each other; on these ridges, at irregular intervals, are small prominences, in which are the faecal orifices, and which are consequently slightly elevated above the surrounding surface, but in some specimens they are on a level with the surrounding surface. The surface is rough and reticular, and the interior cellular. The spicula are triradiate and quadriradiate; the cones of the triradiate are large, equal to each other, and arise equidistantly; the quadriradiate are much smaller than the others, and are formed of long double pointed spicula,

with smaller ones about midway between, one on either side, which deviate a little from a right line. Both kinds are very brittle, and on examining a specimen, it appears as if another blunt kind of spicula was present *different* from the fragments of the larger kind.

G. (ALBESCENS, R. Q. C.)

*Sp. Ch.*—Encrusting, thick, entirely calcareous, white; surface irregular, rough with spicula; orifices of moderate size, plain, slightly elevated, or on a level with the surface; spicula triradiate.

*Habit.*—On the roots of the *Laminaria digitata*, common. Polperro.

This is a very common species, but I have never observed it but on the roots of the larger fuci. It appears to be formed almost entirely of triradiate calcareous spicula. It is of a pure white colour; the surface is uneven, rough, and formed by large triradiate spicula, which are distributed irregularly on its plane. Though the spicula are all triradiate, they are of two kinds, one kind being about three times the size of the other, but in other respects are alike. The spines of the spicula rise irregularly with regard to each other; sometimes two form a right line, and the third rises at right angles, at others they rise equidistantly, and again at others, in a very irregular manner; they are generally straight and pointed, but are sometimes waved, like the pictorial representations of a flame of fire. This does not appear to be the *Grantia Nivea* of Fleming, nor have I found it described, I have, therefore, until a better name be offered, called it *G. Albescens*.