

NO. X.—*A DESCRIPTIVE CATALOGUE of the recent ZOOPHYTES found on the Coast of North Durham.* By GEORGE JOHNSTON, M. D., Fellow of the Royal College of Surgeons, Edinburgh.

READ, APRIL 16, 1832.

* Mihi firme persuadeo, eum, qui plantas marinas et insecta marina perscrutari velit, magna perfusum iri voluptate: est enim hic novus Microcosmus, cujus incolæ parum innotuerunt, sed qui propter proprios propagandi modos, ritus, æconomiam, aliasque qualitates, attentione Naturæ Venatoris sunt dignissimi: Ea tamen voluptas non caret incommodis, quia per difficile est, piscatores docere, (licet laute remunerentur) quomodo conservare capta inventa possint, quæcumque in foro vendere nequeunt."

BASTERUS.

THE following Paper embraces an account of such Zoophytes as I have found in Berwick Bay, a portion of our coast about twenty five miles in extent, bounded by Holy Island on the south, and on the north by the bold promontory of St. Abbs' Head. The town of Berwick is situated almost exactly midway between these points, so that my position is very favourable for the investigation of the natural productions of the intermediate shores; and I should not have presumed to lay this Catalogue before the Natural History Society of Northumberland, did I not feel assured that it will be found to contain, not probably a complete, yet such a full list of their Zoophytes as will suffice to convey an accurate view of their number and variety; and may be of service to any one who shall in future attempt to illustrate their distribution on the shores of Britain.

The descriptions of the species have been invariably made from the specimens before me, and in almost every instance without previous reference to the descriptions of others; a circumstance which I have thought it proper to mention, because it may enhance the value of a local catalogue to know to what extent it may be relied on as affording data to determine how far peculiar situations affect the appearances

of species. Several of the descriptions are accompanied with figures, which, in general, illustrate Zoophytes either hitherto imperfectly figured, or not at all. For these figures I would bespeak the indulgence of the Society. They are the work of a lady very little practised in the art of etching, and whose domestic duties afford little leisure for improvement in it, but who willingly took up the graver when she found she could aid the pursuits of an other, and add value to his labours. They are intended for the eye of the naturalist only, and, to adopt the words of Mr. MONTAGU on a similar occasion, "if the representations are correct outlines of the objects, the design is accomplished; and, we trust, science will be considered as having reaped more advantage from such, than from highly-finished engravings devoid of correctness and character."

CATALOGUE.

Class. ZOOPHYTA.

(ZOOPHYTES POLYPES, CUVIER.)

Zoophytes are defined by Dr. Johnson to be "substances which partake of the nature both of vegetables and animals;" a definition which, while it avoids all delineation of character, expresses an opinion that has been indeed entertained by several naturalists in relation to some of them, but which is doubtful in what manner soever restricted, and is often manifestly erroneous. And LAMARCK, objecting to the name as calculated to foster this false hypothesis, has substituted for it that of *Polypes*, which had been previously used for the animalcules when considered separately from their corals, corallines, or polypidoms; but the older name is still retained by many naturalists, and is in such familiar use that it cannot well be displaced by any other. Nor does it seem objectionable in any way, for Zoophyta may, surely, without violence to the derivation of the word, and with strict propriety in reference to the subjects it embraces, be applied to such animal productions as assume the form and semblance of plants; and the greater number of our corallines do this so palpably that they were uniformly arranged among vegetables, until the discoveries of PEYSSONNEL, JUSSIEU, and more especially of ELLIS, assigned them to the province and study of the Zoologist. In the following catalogue, therefore, I apply the term Zoophyta in the same sense, and with the same latitude, that it was used by ELLIS and SOLANDER, to designate a class of inarticulate animals, or compound animalcules, which possess only one external aperture, placed in the centre of an expansile disk encircled with tentacula, always unarmed with teeth or proboscis, and serving both the purposes of mouth and anus. They have no circulating system; no separate respiratory organ (for the tentacula fulfil this function); no brain or nervous cords; no distinctions of sex; their stomach is a simple bag, sometimes furnished with an intestine, but apparently never with biliary nor cœcal appendages; and in only a few of them an ovarium has been detected. The class is not exactly the same as the *Polypi* of LAMARCK, or the *Zoophyta* of FLEMING, for theirs do not embrace the Actinæ, or Sea-anemones; but it is exactly synonymous with the *Polypes* of CUVIER, which constitute the fourth class of his Zoophytes. This most illustrious naturalist has so far extended the signification of the latter term as to make it include the Medusæ or Sea-jellies, the Echini or Sea-eggs, and even the intestinal worms,—which, we presume to think, cannot be justified either on the score of verbal accuracy, or of zoological or vulgar usage.

Ord. 1. CARNOSA.

Char. *Animals separate, fleshy, naked, voluntarily fixed by their base, and capable of changing their position: mouth superior, in the centre of a disk encircled with tentacula.*

1. ACTINIA. Body conoidal or cylindrical, adhering by a broad base; mouth terminal, dilatible, and retractile; tentacula numerous, surrounding uninterruptedly the oral disk.
2. LUCERNARIA. Body anomalous, adhering by a narrow stalk; mouth in the centre of an umbrellar expansion; tentacula on the margin disposed in tufts, the apices tipped with a gland.

Ord. 2. NATANTIA.

Char. *Polypes compound; the common body or polypidom nomade, fleshy, strengthened with an internal inorganic cartilaginous or osseous axis.*

3. PENNATULA. Polypidom plume-like, naked beneath, pinnate above; the axis osseous. Pinnæ two-ranked, spreading, flattened, plaited, and polypiferous on the upper margin.

Ord. 3. TUBULIFERA.

Char. *Polypes compound; polypidom fixed, coriaceous, internally fibroso-gelatinous; polype-cells subcutaneous.*

4. LOBULARIA. Polypidom with a coriaceous skin marked with stellated pores; interior perforated with longitudinal tubes terminating in polype-cells. Polypes entirely retractile, with eight tentacula.
5. ALCYONIUM. Polypidom with a sponge-like or fleshy skin; interior irregularly cellular. Polypes in prominent cells, entirely retractile, with more than eight tentacula.

Ord. 4. THECATA.

Char. *Polypidom plant-like, fixed, horny or calcareous, tubular, filled with a soft medulla connecting the polypes together. Polypes issuing from the ends of the branches, or placed in distinct cells.*

* *Polypidom horny.*

6. TUBULARIA. Polypidom simple or branched; the polypes proceeding from the end of the tubes, and crested with non-retractile filiform tentacula, circularly disposed.
7. CORYNE. Polypidom simple or branched, slender, the extremities of the branches swollen, and armed with non-retractile tentacula, irregularly disposed.
8. CAMPANULARIA. Polypidom simple or branched, slender, jointed. Polypes in bell-shaped cells supported on ringed or twisted footstalks. Ovaries vesicular.
9. SERTULARIA. Polypidom simple or branched, slender, jointed. Polypes in sessile prominent denticles or cells, disposed on the sides both of the stem and branches. Ovaries vesicular.
10. PLUMULARIA. Polypidom branched, jointed; stem smooth; branchlets pinnate, celled; the cells sessile, disposed on one side. Ovaries vesicular.
11. ANTENNULARIA. Polypidom simple or branched, jointed, clothed with hair-like branchlets arranged in whorls; polype cells prominent, sessile, disposed in a single series along the branchlets. Ovaries vesicular.

12. THUIARIA. Polypidom branched, continuous; stem naked of cells, which are depressed and disposed in two or more rows on the dichotomous branchlets. Ovaries vesicular.

** *Polypidom calcareous.*

13. CELLARIA. Polypidom slender, branched, jointed, celled throughout; cells sessile, in rows, united or single. Ovaries vesicular.

Ord. 5. CELLULIFERA.

Char. *Polypidom fixed, membranous or calcareous, without any central medulla; polypes aggregate (not compound), in distinct cells imperforate at the base.*

* *Polypidom membranous.*

14. FLUSTRA. Polypidom leaf-like or encrusting; cells contiguous, arranged in regular rows, forming mat-like expansions.

** *Polypidom calcareous.*

15. FARCIMIA. Polypidom erect, dichotomously branched, constricted at distant intervals; joints tubular; cells diverging from the axis, immersed.

16. CELLEPORA. Polypidom of various forms, encrusting or erect; cells agglomerated, urceolate, the mouths exerted.

17. BERENICEA. Polypidom crust-like, adherent throughout; cells contiguous, oblique, arranged in regular rows, the mouth at the distal extremity.

18. TUBULIPORA. Polypidom branched or simple; cells rising from the base, long, tubular, cylindrical.

Ord. 6. APOLYPA.

Char. *Polypidom destitute of polype cells or polypes.*

* *Soft and fibrous.*

19. HALICHONDRIA. Porous, spongy, of various forms; the fibrous skeleton strengthened by siliceous spicula.

20. GRANTIA. Porous, spongy, of various forms; the fibrous skeleton strengthened by calcareous spicula.

** *Hard and calcareous.*

21. MILLEPORA. Irregular, dilated, calcareous throughout, the surface perforated with minute perpendicular pores scattered irregularly.

22. CORALLINA. Fixed, plant-like, very much branched, jointed, solid; the axis continuous, corneous.

I. Z. CARNOSA.

1. ACTINIA.

* *Tentacula retractile.*

1. A. *equina*, body conical liver-brown, or olivaceous, smooth; tentacula numerous,

nearly the colour of the body; inner margin of the oral disk ornamented with a circle of azure-blue tubercles.

A. equina, *Linn.*; *Flem. Brit. Anim.* 497; *Cuv. Reg. Anim.* iii. 262.

A. mesembryanthemum, *Soland. Zooph.* 4; *Turt. Lin.* iv. 104; *Turt. Br. Faun.* 131; *Encyclop. Method.* tab. 73, fig. 3, copied from *Gærtner*.

A. hemispherica, *Pen. Brit. Zool.* iv. 104.

A. rufa, *Stew. Elem.* i. 393; *Lam. Hist. Nat.* iii. 67; *Encyclop. Method.* tab. 71, fig. 6—10.

Hydra disciflora, *tentaculis retractilibus, extimo disci margine tuberculato*, *Gærtner* in *Phil. Trans.* lii. 83, tab. 1, fig. 5.

Hab. On rocks between low and high water mark, very common.

Body one or one and a half inch in diameter, hemispherical when contracted. The base is generally of a uniform greenish colour encircled with an azure blue line, but frequently it is streaked with red, and the blue marginal line is wanting. GÆRTNER says that "the colour of its body is always red in the summer, but changes into a dusky green, or brown, towards the latter end of autumn," a remark which certainly does not hold good here; and the red and dusky green varieties may be found at all seasons. The following varieties are worthy of more particular notice:—

(a) Body olive brown, streaked with lines of a fine blueish colour; tentacula unvariegated.

(b) Body olive coloured, sub-cylindrical, spotted with numerous white dots; tentacula annulated with white.

(c) Body sub-cylindrical, greyish, with numerous white longitudinal lines; tentacula uniserial, annulated with white. This is the *Actinia viduata* of Muller. *Lam. Hist. Nat.* iii. 68. *Encyclop. Method.* tab. 72, figs. 4, 5; *bonæ. Turt. Lin.* iv. 101.

2. *A. senilis*, body conoidal, variously coloured, rough, with glandular warts; tentacula numerous, biserial, shorter than the diameter of the oral disk, thick, and generally variegated with red and white rings.

A. senilis, *Linn.*; *Lam. Nat. Hist.* iii. 68; *Flem. Brit. Anim.* 498; *Cuv. Reg. Anim.* iii. 291; *Penn. Br. Zool.* iv. 105.

A. gemmacea, *Soland. Zooph.* 3; *Turt. Lin.* iv. 104; *Turt. Br. Faun.* 130; *Wern. Mem.* i. 558.

A. verrucosa, *Penn. Br. Zool.* iv. 103; *Lam. Hist. Nat.* iii. 70; *Encyclop. Method.* tab. 70, fig. 1, copied from *Gærtner*.

A. crassicornis, *Turt. Lin.* iv. 100; *Turt. Br. Faun.* 131; *Stew. Elem.* i. 393; *Wern. Mem.* i. 558; *Lam. Hist. Nat.* iii. 67; *Penn. Br. Zool.* iv. 105.

A. coccinea, *Turt. Lin.* iv. 101; *Lam. Hist. Nat.* iii. 68.

A. felina, *Barb. Gen. Verm.* 53, tab. 5, fig. 6.

A. equina, *Turt. Br. Faun.* 131; *Sowerby, Brit. Misc.* tab. 4.

Hydra disciflora, *tentaculis retractilibus subdiaphanis; corpore cylindrico, miliaribus glandulis longitudinaliter striato*, *Gærtner* in *Phil. Trans.* lii. 82, tab. 1, fig. 4.

Hab. In crevices of rocks between tide marks, and on shells, &c., in deep water, common.

Body usually rather more than two inches in diameter, hemispherical when contracted, covered with glandular warts, arranged sometimes distinctly in regular lines, sometimes irregularly, and sometimes scarcely obvious. The tentacula are disposed within the circumference of the oral disk in two close rows; they are thick, short, obtuse, somewhat compressed, almost always annulated or variegated with white and red. The animal protrudes from the mouth at pleasure four or five vesicular, pellucid, scored lobes, which vary in size according to their degree of evolution. When kept a few days in a basin of seawater it becomes much larger in all its parts, paler, and almost diaphanous. In this state the tentacula elongate themselves, swell out, and are distinctly seen to be tubular. They adhere tenaciously to foreign bodies, for their apices act as suckers, and carry prey to the mouth in spite of all its struggles.

This species is liable to great variation in colour and size, as may be presumed from the number of synonymes which we have quoted as belonging undoubtedly to it. The more remarkable varieties on this coast, may be distinguished thus:—

† *Littoral.*

(a) Body smaller, orange coloured, clouded; warts large, arranged in regular vertical rows; tentacula rather slender. This is the variety described by GÆRTNER, but his figure represents it with only a single row of tentacula. The warts are placed in rows from the top to the base, and "each row is composed of three files of glandulæ, of which the middle one is remarkably bigger than the two others." It is found in the crevices of rocks, or attached to stones immersed in the sands, between tide marks; and it is always covered with a coating of broken shells and gravel adhering to the glandular warts, and is thus so completely concealed that it becomes difficult to recognise the creature, and to discern it from the rubbish surrounding it.

†† *Pelagic.*

- (b) Body of a uniform fine scarlet colour, with pale warts; tentacula variegated; remarkably beautiful, and not uncommon.
- (c) Body clouded with irregular scarlet and cream-coloured blotches; warts small and often obscure.
- (d) Body of a pale sulphur-yellow; glands equal, irregular; tentacula variegated; oral disk rose-coloured. This is a very beautiful variety, and seems to constitute the *A. equina* of Sowerby.
- (e) Body of a uniform flesh or pale cream colour, the tentacula of the same colour and without rings; warts small, equal, and obscure. This appears to be the *A. truncata* of British authors. *Turt. Lin.* iv. 101; *Wern. Mem.* i. 558; *Penn. Brit. Zool.* iv. 106.
- (f) Body smooth, irregularly clouded with scarlet and whitish; tentacula annulated with red and white. When large this is the *A. felina* of Barbut; when smaller it becomes the *A. coccinea* of Muller, of which there is a tolerable figure in the *Encyclop. Method.* tab. 72. fig. 1—3. A few minute warts are generally perceptible on the rim of the oral disk, but I have seen it perfectly smooth.

The pelagic varieties are never covered with the extraneous coat of the littoral, but are clean, more vividly coloured, and larger. The base is coloured like the body in all the varieties. The exterior margin of the oral disk is often tinted with a dirty green, as well as the vesicular lobes of the mouth; and the tentacula, when in a state of retraction, sometimes become grooved in a longitudinal direction. The glands are small, and never very evidently arranged in rows. When magnified, they are seen to be perfectly colourless: they appear to have a pore in the centre, and are seated under the true skin, which is hard, cartilaginous, and colourless, for the colour depends on a thin, mucous coat laid over the whole.

3. *A. plumosa*, body cylindraceous, cream-coloured, smooth; oral disk marked in the centre with clavate radiating bands; tentacula numerous, irregular, forming round the margin a thick filamentous fringe.

A. plumosa, *Turt.* Lin. iv. 100; *Turt.* Br. Faun. 130; *Lam.* Hist. Nat. iii. 68; *Cur.* Reg. Anim. iii, 291.

A. senilis, *Barb.* Gen. Verm. 53. tab 5. fig. 5.

Hab. Berwick Bay; not uncommon in deep water.

When contracted this Actinia is somewhat cylindrical, deeply wrinkled in two or three places, about three inches long, and one half of that in diameter, but when fully expanded, about five inches: it is quite smooth, and of a uniform whitish or cream colour. The centre of the oral disk is ornamented with a circle of white bands radiating from the mouth; and beyond them a number of lines, with narrow pellucid interspaces, run across to the circumference. From these interspaces the tentacula arise: they are tapered, the largest about one inch long, watery-white, simple, smooth, irregularly dispersed, and very numerous. They are all placed between the mouth and the margin, which is encircled with a dense fringe of inimitable beauty; it is composed of innumerable short tentacula or filaments forming an even, thick, furry border.

I have seen specimens of this species, which is by far the finest marine animal of our bay, from the size of a split pea to fully five inches in diameter, and have found it, in all these intermediate sizes, uniform in colour and in shape. Yet I agree with CUVIER in thinking it probable that the *Actinia dianthus* of ELLIS may be a variety, having the oral disk lobed from peculiarity of position, or from the the voluntary contractions of the animal.

** *Tentacula non-retractile.*

4. *A. Tuediæ*, body thick, somewhat cylindrical, smooth or wrinkled with circular folds; tentacula thick, numerous, conical, longitudinally striate, chesnut-coloured, shorter than the body.

A. tuediæ, *Johnston* in Loudon's Mag. Nat. Hist. v. p. 100, fig. 58.

Hab. Berwick Bay, in deep water.

The body, when relaxed, generally measures three inches in length, and about the same in diameter; it is of a uniform reddish or brownish orange colour, and either smooth or contracted at pleasure into circular folds. The base is smooth and orange-coloured, with a thin areolar skin. The mouth is ever varying in size and form; and there are often

protruded from it vesicular-like lobes of a reddish colour, scored with fainter lines. When fully expanded, the oral disk is not less than four inches across; there is a smooth space between the mouth and tentacula, which are very numerous, and placed in several rows around the circumference; those of the inner row are larger than the others, measuring frequently two inches in length, and they become gradually smaller in the exterior series. They are of a chesnut or reddish flesh colour, often darker-coloured towards the bases, but never variegated with rings of different hues; thick and clumsy, tapered to an obtuse point, marked longitudinally with distinct lines or impressed striæ, tubular, perforated at the end, and constricted at their insertions; the creature has no power of drawing them within the oral aperture, as the greater number of Actiniæ have, nor does it seem capable of shortening them in any considerable degree, but it twists them in a wreathed or spiral form, or gives the whole circle a greater or less degree of expansion.

ACTINIA TUEDIA.



The only British species of this genus to which the one before us has any relation, is the *Actinia sulcata*, described and figured by Dr. GÆRTNER, in the 52d volume of the *Philosophical Transactions*, p. 78, t. 1, f. 1. Both species correspond, or at least do not differ materially, in colour and size; and they are both equally incapable of retracting and concealing their tentacula within the oral aperture; but they differ in the relative proportions between these organs and the body, and in the sculpture of the latter, which in *A. sulcata* is grooved in a longitudinal direction.

The trivial name which I have bestowed on this species is intended to indicate the place of its first discovery, Tuedia being, according to SIR ROBERT SIBBALD, the ancient name of the maritime parts of Berwickshire. It is not uncommon on this coast, but is found only in deep water, whence it is dragged up by the fishermen. I have often found the tentacula, in a separate state, adhering to their lines; and as these retain their irritability and

motion for a long time, they are apt to be mistaken for independent and perfect worms, which they much resemble.

All the Actiniæ eject the remains of their food from the mouth, enveloped in a large quantity of a transparent jelly.

2. LUCERNARIA.

1. *L. auricula*, "peduncle of the body short; tufts of tentacula equi-distant, with one intervening oval vesicle."

L. auricula, *Turt. Lin.* iv. 121; *Montagu* in *Lin. Trans.* ix. 113, tab. 7. fig. 5; *Pen. Brit.*

Zool. iv. 110; *Flem. Br. Anim.* 499; *Johnston* in *Loud. Mag. Nat. Hist.* v. 97, fig. 29.

L. octo-radiata, *Lam. Hist. Nat.* ii. 474.

Hab. Berwick Bay, rare.

Peduncle short, sub-angular, dilating into eight equal oblong arms, each terminated by a globose tuft of filaments, tipped with a gland. The arms are mottled with two rows of spots, produced by the opacity and configuration of the internal viscera; and they are connected together by a transparent membrane. Between each of them there is an oval vesicle placed on the edge of this membrane. Within the stalk there is a tube which, prolonged, seems to form the mouth, of a square shape, projecting in the centre of the arms. The colour of our specimen was a clear, fine red: it was three-quarters of an inch in height, and, when expanded, the diameter was about one inch.

LUCERNARIA AURICULA.



II. Z. NATANTIA.

3. PENNATULA.

1. *P. phosphorea*, purplish-red; stalk cylindrical, smooth, the base pale-coloured; rachis roughened with short close-set papillæ, and furrowed down the middle; pinnæ close polype-cells uniserial, tubular, with spinous apertures. *British Sea-Pen* (tab. nost. 7.)
P. phosphorea, *Linn.*; *Ellis* in *Phil. Trans.* liii, 420, t. 19, f. 1, 5; *Turt. Lin.* iv. 688; *Turt. Br. Faun.* 217; *Stew. Elem.* ii. 450; *Lam. Hist. Nat.* ii. 426; *Bosc Vers.* iii. 62, t. 28, f. 34, pess.; *Flem. Br. Anim.* 507; *Stark Elem.* ii. 420.

P. Britannica, *Soland. Zooph.* 61.

Penna marina, *Sib. Scot.* ii. lib. tert. 28; *Petiv.* Plant. Ital. t. 1, f. 5, 8, pessimæ.

Hab. On submarine banks, in about 30 fathoms water, common.

Our fishermen call this polypidom the *Cock's-comb*, a name which is not unapt, but less expressive of the general form than that of *Sea-pen* conferred by naturalists. It is from two to three inches in length, and of a uniform purplish-red colour, except at the tip or base of the stalk, where it is pale orange-yellow. The skin is thickish, very tough, and of very anomalous structure, being composed of minute crystalline cylinders, densely arranged in straight lines, and held together by a firm gelatinous matter or membrane. These cylinders are about six times their diameter in length, straight and even, closely compacted yet distinct, and of a red colour, for the colour of the polypidom is derived from them, and they are consequently less numerous where the purple is faint or defective. They are apparently inorganic and calcareous, being dissolved, with effervescence, in the mineral acids.* Their form and arrangement is the same in every part of the skin; and the papillæ on the back of the rachis, as well as the polype cells are constructed of them, but none can be detected in the gelatinous uncoloured substance found in the interior of the polypidom.

The stalk is hollow in the centre, and contains a long slender bone, which is white, smooth, square, and tapered at each extremity to a fine point. It seems intended to stiffen the polypidom, but it does not extend the whole length of the stalk, for before it reaches either end, the point is bound down and bent backwards like a shepherd's crook. It consists, according to Sir E. HOME, of phosphate and carbonate of lime, making thus a near approach to the bone of vertebrate animals.—*Lect. on Comp. Anat.* i, 59.

The papillæ on the back of the rachis are disposed in close rows, and do not differ from the cells of the polyopes except in size. The latter are placed along the upper side of a flattened stalk, and are slightly arched: they are tubular, and have the apertures armed with eight spinous points which are moveable, and contract and expand at the will of the animated inmates. These appear to be fleshy and white, and are provided with eight rather long beautifully ciliated tentacula, protruded along the inner side of the spines just mentioned, so as to receive support and protection from them.

The ova lie between the membranes of the pinnæ or polype stalks at the base of the cells: they are globular, and of a yellowish colour.

Pennatula phosphorea floats at freedom in the bosom of the ocean, and can probably rise or sink in it, to some extent, by alternately dilating or contracting the hollow stalk. It is, as its name imports, a phosphorescent animal, but the fine blue light is emitted only under certain circumstances. I have never observed it to be phosphorescent when kept in sea water,

* Dr. COLDSTREAM, of Leith, on whose observations I place a greater reliance than on my own, writes me thus—"The spicula of the *Pennatula* appear to me to be *solid*. I have examined them with high powers, after having exposed them to a high temperature, and have not been able to see any evidence of a cavity within;—whether viewed with reflected or transmitted light they seemed to be opaque. When connected with the body of the animal they certainly seem to be red, but a slight degree of heat is sufficient to bleach them."

unless when irritated by mechanical means, and the light is of momentary duration. It is emitted by the polypes solely, for no irritation will elicit it from any part of the stalk.

III. Z. TUBULIFERA.

4. LOBULARIA.

1. *L. digitata*, polymorphous, greyish white or orange coloured, wrinkled, studded with stellated pores; polypes with pinnated tentacula. *Dead Man's Toes* (tab. nost. viii.).
L. digitata, *Lam. Hist. Nat. ii. 413*; *Flem. Br. Anim. 515*; *Stark Elem. ii. 421*.

Alcyonium manus marina, *Ellis in Phil. Trans. liii. 431, tab. xx. figs. 10, 13*.

Alcyonium digitatum, *Linn.*; *Soland. Zooph. 175*; *Turt. Lin. iv. 652*; *Turt. Br. Faun. 207*; *Stew. Elem. ii. 431*; *Fleming in Edin. Phil. Journ. ix. 251*; *Bosc Vers. iii. 156, t. 30, f. 4, 5*; a copy from *Ellis. Lamour. Corall. 243, t. 13 and t. 12, f. 4 and t. 14, f. 1*; *Hogg's Stockton 38*.

Alcyonium ramosa-digitatum molle, asteriscis undiquaque ornatum, Raii Syn. 31, no. 2.

Alcyon digité, Brug. Encyclop. Method. vi. 20, no 1.

Dead Man's Hand, Ellis Corall. 83, t. 32, f. a. A. A. 2.

Hab. On stones and old shells, in deep water, very common.

This is one of the most common marine productions, so that scarce a shell or stone can be dredged from the deep that does not serve as the support of one or more specimens.— It is often a mere crust about the eighth of an inch in thickness, but more commonly it rises in masses of various sizes and forms. Sometimes the polypidom is a simple obtuse process, very much resembling the teat of a cow's udder, whence our fishermen have happily named it *Cow's-paps*; other polipidoms are more or less divided into finger-like lobes, and assume figures that have suggested the names of *Dead Man's Toes* or *Dead Man's Hands*. The outer skin is tough and coriaceous, studded all over with stellate figures, which, if attentively examined, are seen to be divided into eight rays, indicating the number of the tentacula of the polypes, which issue here. The body of the polypes is fleshy and opaque, enclosed in a transparent vesicular membrane, dotted with many minute calcarious grains, and marked with eight white longitudinal lines, which are muscular bands, that not only extend to the base of the tentacula, but run across the oral disk, and terminate in the central mouth. The polype cells are oval, placed just under the skin, and are the terminations of long tubular canals, which run through the whole polypidom. These canals divide in their course, into branches that diverge towards the circumference where they dilate into the cells; they have strong cartilaginous, perhaps muscular, coats; and are filled with a much less consistent and dense matter than the body of the polype itself. It appears, from this disposition of the tubes, that many polypes communicate together and form a compound animal, but that all the polypes of the same polypidom do not communicate directly. The space between the tubes is occupied by a loose fibrous net-work, filled with a transparent gelatine, and in the meshes of which lie numerous crystalline bodies of various shapes, but most in

the form of a cross, and toothed on the sides. These curious and beautiful objects have no organic connection, either with the fibres among which they lie, or with the tubes, and are disposed without any regularity; they are calcareous, for if a portion of the Zoophyte is immersed in a mineral acid, a strong effervescence immediately takes place, and no crystalline spicula are longer discernible. Their use I am unable to conjecture.

The fibres of the net-work just described are, I think, tubular threads, anastomosing freely together; and, being a little more crowded at particular places, they form lozenge-shaped compartments filled up by smaller meshes. Our figures may elucidate, in some degree, this imperfect description of a structure I have often studied and admired, but it would require the hand of a practised engraver to convey an adequate idea of its beauty and intricacy.

The ova are placed in the polype-tubes; they are of a scarlet colour, opaque, smooth, and globular, about the size of a grain of sand. Each ovum is filled with a mass of extremely minute pellucid granules.

Dr. FLEMING is of opinion that the *Alcyonium lobatum* of LAMOUREUX, whose figure we have quoted without any doubt, is a perfectly distinct species, because its tentacula "are sub-cylindrical, rounded at the extremity, and covered above and on the margin with blunt tubercles;" whereas of our *Alcyonium* "the tentacula in ELLIS's figures (and, having compared these with nature, we can pronounce on their accuracy,) are pinnate and pointed." I will not dispute the accuracy of ELLIS, but the figure he has given of the tentacula, in his *Essay on Corallines*, is very unlike any thing I have seen, and has, probably, been taken from a specimen preserved in spirits.* His figure of the same parts in his *Nat. Hist. of Zoophytes* (t. 1, f. 7), is much better, and appears to have been drawn when the animal was active and fully expanded. It is very seldom, however, that we have an opportunity of seeing the animal in that state, for if we place a specimen in a glass of sea-water, the polypes will indeed protrude themselves, but it is only to die with their tentacula thick, contracted, and shortened, and like, in every respect, to the figures of LAMOUREUX, which do not much differ from some of our own. The figure I have given of the detached polype may be considered as almost intermediate between ELLIS's and LAMOUREUX's. It was taken from the dead polype, slightly compressed between plates of glass. The differences in the different figures, therefore, it appears to me, ought to be attributed to the animal being in different or opposite states when observed, and will not justify the establishment of a distinct species.

5. ALCYONIUM.

I. A. *hirsutum*, polypidom sponge-like, flattened, variously divided, the surface covered with minute close-set conical papillæ, or polype-cells; polypes with sixteen equal long filiform tentacula (tab. nost. ix. f. 1).

A. *hirsutum*, *Flem. Br. Anim.* 517; *Johnston*, in *Zool. Journ.* iv. 418.

* This conjecture is supported by some passages in his Introduction, p. xii.

Hab. Parasitical on various sea weeds, from deep water, very common on this coast.

Polypidom variously branched, often proliferous, sometimes sub-cylindrical, commonly flattened and palmate, of a dirty straw-yellow colour, often partially stained with red, and marked with numerous yellowish circular spots, irregularly disposed. It is thickish, somewhat cartilaginous, and to the naked eye resembles a compact sponge. When viewed through a common magnifier, the surface is seen to be covered with close-set conical transparent papillæ, each of which is a cell containing a polype, with sixteen equal long filiform tentacula, arranged in a circle.

The yellowish spots, mentioned in the above description, are produced by clusters of ova, lying embedded in the cellular texture of the polypidom. Each cluster is composed of about ten ova, which are globular, milk white, and opaque. Removed from the polypidom and placed in a watch glass filled with sea-water, I found them moving with great rapidity, and in all directions. The progressive motion is very obviously effected by the ceaseless play of a fine thick fringe of ciliæ, which surrounds two-thirds of their circumference. They have also a rotatory motion, and a globule may often be observed moving forward and whirling on its own axis at the same time.

2. *A. echinatum*, polypidom incrusting dead univalve shells; papillæ or polype-cells roughened; the polypes with twelve tentacula (tab. nost. ix. f. 2).

A. echinatum, *Flem. Br. Anim.* 517.

Hab. Parasitical on *Buccinum undatum* and other univalves, not common on this coast.

"This species incrusts dead univalve shells exclusively; and is about the $\frac{1}{20}$ of an inch in thickness. When first taken out of the water it is soft and spongy, but becomes rigid on drying."—*Fleming*. The surface, in this state, is muricated with rigid obtuse papillæ, somewhat less than a line high, and themselves roughened with minute prickles pointing upwards and arranged in rows. It seems to have been first observed by Mr. MONTAGU.

IV. Z. THECATA.

6. TUBULARIA.

1. *T. indivisa*, tubes clustered, simple, cylindrical, narrowed and interwoven at the base: head of the polype crested with two rows of tentacula.—*Oaten-pipe Coralline*.

T. indivisa, *Linn.*; *Soland. Zooph.* 31; *Turt. Lin.* iv. 666; *Turt. Brit. Faun.* 210; *Stew. Elem.* ii. 497; *Lam. Hist. Nat.* ii. 110; *Bosc. Vers.* iii. 89, t. 28, f. 5, a reduced copy of *Ellis's*; *Lamour. Corall.* 100; *Flem. Br. Anim.* 552.

T. Coralline, like oaten pipes, *Ellis Corall.* 31, t. 16, f. C.; *Phil. Trans.* xlviii. tab. 17, fig. D. *Adianti aurei minimi facie planta marina, Raii. Syn.* 31, No. 4.

Hab. On shells and stones from deep water, not uncommon.

The tubes are simple, or sometimes divided at the base, where they are twisted and flexuose, fistular, even, continuous, horn-coloured, 6 inches or upwards in height, and

about $\frac{1}{2}$ in diameter. They are filled with a soft reddish-pink matter, and tipped with the Polype, which is of a reddish colour, beautifully variegated, and adorned with two unequal rows of tentacula.

2. *T. ramosa*, solitary, much branched; branches irregularly alternate, slender, annulated at their insertions; tentacula more than 20, unvariegated, in a single row.—*Branched Pipe Coralline* (tab. nost. x.).

T. ramosa, *Linn.*; *Soland. Zooph.* 32; *Turt. Lin.* iv. 666; *Turt. Br. Faun.* 210; *Stew. Elem.* ii. 437; *Lam. Hist. Nat.* ii. 110; *Bosc Vers.* iii. 89; *Lamour. Corall.* 101; *Flem. Br. Anim.* 552; *Stark. Elem.* ii. 441, t. 8, f. 15, an imperfect copy of *Ellis's*; *Hogg's Stockton*, 34.

Small ramified tubular Coralline, *Ellis*, *Corall.* 31, t. xvi. f. a and t. xvii. f. a, A.

Hab. On stones in deep water.

Our figure represents a fine specimen of this coralline, which was brought up in Berwick Bay, on the lines of our fishermen. It is so perfectly like a tree, in miniature, deprived of its foliage, that persons, unacquainted with the nature of these Zoophytes, may be excused in supposing the artist to have taken some liberty with his subject, to give it more the dendroidal character, but the supposition, I can assure them, however natural, has no foundation, as the etching, for which I am indebted to the celebrated painter, Mr. T. S. GOOD, is very exact to nature. The coralline is the finest of those that grow on our shores, but specimens of this kind are rarely found, nor, indeed, does any naturalist appear to have seen one like it. Those represented by *ELLIS* are so vastly inferior in beauty, that, at first, I was inclined to consider our's as a distinct species, but the magnified figures are alike, and the polypes are similar to *ELLIS*'s. They have more than twenty filiform whitish tentacula, which, when magnified, appear roughish, but not ciliated, and arranged in one row round a broad oral disk. The mouth is encircled with a red-coloured band.

I have observed a small Tubularia which invests old specimens of *Murex antiquus* with a dense beard-like coat, and may, possibly, be a species, distinct from the above. It is only the quarter of an inch in height, slender, horny, wrinkled, slightly and irregularly branched, the branches without rings at their origins; polypes white, furnished with a single series of obtuse tentacula, that do not seem to exceed ten in number. In this respect, it agrees with the *T. ramosa*, as characterised by *Dr. FLEMING*, but differs from the specimens which I have seen, and also from *ELLIS*'s figure of it, in which the tentacula are much more numerous.

7. CORYNE.

1. *C. glandulosa*, stem irregularly branched, horny; tentacula with globular heads.

C. glandulosa, *Lam. Hist. Nat.* ii. 62; *Flem. Phil. Zool.* ii. 616, tab. v. fig. 2; *Flem. Br. Anim.* 553; *Fleming* in *Edin. Phil. Journ.* viii. 295; *Encyclop. Method.* tab. 69, fig. 15, 16.

Tubularia Coryna, *Turt. Lin.* iv. 668; *Turt. Br. Faun.* 210.; *Bosc Vers.* iii. 91.

Hab. On stones near low water-mark in Berwick Bay.

Stem scarcely an inch in height, horny, tubular, wrinkled, filiform, irregularly branched; branches simple, erecto-patent, terminated with a rather large oval head of a reddish colour, and studded round with prominent non-retractile tentacula, tipped with globular apices.

The stalk is annulated in the same manner as the pedicles of the cells in the genus *Campanularia* are, and the tube filled with a pulpy substance or medulla which, receiving a more complete development towards the ends of the branches, forms the enlarged heads. These have no *terminal mouth*, as LAMARCK and others say, and as delineated in the figure of the *Encyclopedie* but are completely covered by a continuation of the horny part of the stem. The tentacula have a motion independent of one another; and the whole head is sometimes slightly bent.

8. CAMPANULARIA.

1. *C. dumosa*, bushy, irregularly branched; branches erecto-patent, slightly tapered, unequal, hispid with the cells, which are long, tubular, patent, almost sessile, with wide entire apertures (tab. nost. xi. fig. 1.)

C. dumosa, *Flem. Brit. Anim.* 548.

Sertularia dumosa, *Fleming* in *Edin. Phil. Journ.* ii. 83.

Tubularia tubifera, *Johnston* in *Edin. Phil. Journ.* xiii. 222, tab. iii. fig. 2—3 (young).

Hab. Parasitical on corallines, crabs, stones, &c.; very common in an immature state, but perfect specimens are rare.

Height three inches, generally much smaller. The branches appear to be square. The cells arise on all sides directly from the stem and branches, and are irregularly alternate. They can rarely be observed to be twisted at their insertions.

2. *C. gelatinosa*, stem compound, dichotomously branched; cells on twisted footstalks, campanulate, with even margins.

C. gelatinosa, *Flem. Brit. Anim.* 549.

Sertularia gelatinosa, *Fleming* in *Edin. Phil. Journ.* ii. 84.

Corallina minor, *Ellis*, *Corall.* 23, t. xii. f. c. C.

Hab. On stones between low and high-water marks in Berwick Bay.

As met with on this coast, this coralline resembles exactly the figure of ELLIS, which on the authority of Dr. FLEMING, I refer to his *C. gelatinosa*, although I have seen no specimen like his own figure of the species in the *Philosophy of Zoology*, tab. v. fig. 3. It is attached to stones by long branched tubular roots, which send up short and numerous stalks, never exceeding an inch in height, branched, and jointed, with several rings at each joint. From these arise the little ringed stalks that support the transparent bell-shaped cells, in which the polypes are readily discernible. These have numerous filiform tentacula, roughened with minute warts placed in whorls. The ovarian vesicles, produced abundantly in spring, also arise from the joints, are placed on much shorter stalks, are much larger, of a tubular oval shape, and often half-filled with a mass of oviform bodies.

3. *C. dichotoma*, stem slender, filiform, wavy, branched, marked with annular joints; branches alternate, simple, sometimes compound, annular at their origins; cells campanulate, entire.—*Sea-thread Coralline*.

C. dichotoma, *Lam. Hist. Nat.* ii. 113; *Flem. Brit. Anim.* 548; *Stark, Elem.* ii. 441.

Sertularia dichotoma, *Linn.*; *Soland. Zooph.* 48; *Turt. Linn.* iv. 682; *Turt. Br. Faun.* 215; *Stew. Elem.* ii. 446; *Bosc, Vers,* iii. 118; *Hogg's Stockton*, 33.

Laomedea dichotoma, *Lamour. Corall.* 91.

Sea-thread Coralline, *Ellis, Corall.* 21, t. xii. No. 18, a.

Hab. On old shells in deep water, frequent.

Height 4 to 6 inches, smooth, blackish. The stem is zig-zag, and from each angle there sprouts a branch, above which the stem is marked with four or five rings, and a similar ringed joint is at the base of each branch. The cells are on annular shoots, and are frequently wanting. The polypes are reddish. Ovarian vesicles ovate.

4. *C. geniculata*, stem erect, zig-zag, simple or slightly branched; cells on annular stalks from the joints, alternate, urceolate, with a contracted entire aperture: height 1 inch.

Knotted Sea-thread Coralline.

C. geniculata, *Flem. Brit. Anim.* 548.

Sertularia geniculata, *Linn.*: *Soland. Zooph.* 49.; *Turt. Linn.* iv. 682; *Turt. Br. Faun.* 215; *Stew. Elem.* ii. 446; *Lam. Hist. Nat.* ii. 120; *Bosc, Vers,* iii. 117; *Hogg's Stockton*, 33.

Laomedea geniculata, *Lamour. Corall.* 91.

Knotted-thread Coralline, *Ellis, Corall.* 22, t. xii. No. 19, b. *Phil. Trans.* xlvi. 629, t. xxii. No. 1.

Hab. On the broad frond of *Laminaria digitata*, and on some other Fuci, common, the shoots connected by slender, creeping, tubular threads.

Ovarian vesicles large, tubular or vase-like, with a contracted tubulous mouth; oviform bodies arranged in a moniliform series, roundish, with a darker centre.

I have seen this species stained of a rose-red colour, which it appeared to have derived from a minute parasitical *Fucus* which infested its stalk and cells.

5. *C. volubilis*, stem creeping, tortuous, wrinkled, not jointed; cells campanulate with serrated margins, on long, slender, filiform annular stalks. *Climbing Bell-coralline*.

C. volubilis, *Lam. Hist. Nat.* ii. 113; *Flem. Br. Anim.* 548.

Sertularia volubilis, *Linn.*; *Soland. Zooph.* 51, tab. 4, fig. e. f.; *Turt. Linn.* iv. 680; *Turt. Br. Faun.* 214; *Stew. Elem.* ii. 444; *Bosc, Vers,* iii. 112; *Hogg's Stockton*, 34.

Clytia volubilis, *Lamour. Corall.* 88.

Small-climbing Coralline with bell-shaped cups, *Ellis, Corall.* 24, tab. xxiv. No. 21, a. *A. Phil. Trans.* xlvi. 629. tab. xxii. No. 2.

Hab. Attached to and creeping on other Corallines, frequent.

A minute species, and a beautiful object for the microscope. I have seen it investing the antennæ of a living crab (*Lithodes spinosa*), which then resembled a hairy brush. The

stalks of the cells are not, properly speaking, twisted. They are constricted at very short equal distances, and the central part, which is attached to the base of the Polype, is enveloped in a pellucid sheath or coat, of which the cell is merely an expansion.

6. *C. syringa*, stem creeping, slender, attached; cells tubular or vase-like with entire margins, on shorter twisted stalks.—*Creeping Coralline*.

C. syringa, *Lam. Hist. Nat.* ii. 113; *Flem. Br. Anim.*, 548.

Sertularia syringa, *Linn.*; *Turt. Lin.* iv. 680; *Turt. Br. Faun.* 214; *Stew. Elem.* ii. 444; *Bosc, Vers.* iii. 113.

Sertularia repens, *Soland. Zooph.* 52; *Hogg's Stockton*, 34; *Ellis, Coral.* 25, t. xiv. f. b. B.

Clytia syringa, *Lamour. Corall.* 89.

Hab. Parasitical on Corallines, less common than the preceding.

This is only to be distinguished from *C. volubilis* by the aid of the microscope. The two species frequently grow together, and their structure is the same. Polyypes campanulate, furnished with eight filiform equal tentacula, which are retractile within the cell, and can be shortened at will. The tentacula of the polyypes of *Tubularia*, on the contrary, are not retractile, neither do they seem capable of being shortened, but they can be rolled up in a spiral form.

9. SERTULARIA.

1 *S. polyzonias*, stem erect, scarcely ziz-zag, irregularly and loosely branched; branches patent; cells alternate, sessile, smooth, everted, somewhat flask-shaped, the margin uneven.—*Great Tooth Coralline*.

S. polyzonias, *Linn.*; *Soland. Zooph.* 37; *Turt. Lin.* iv. 683; *Turt. Br. Faun.* 216; *Stew. Elem.* ii. 447; *Lam. Hist. Nat.* ii. 117; *Bosc, Vers.* iii. 119; *Lamour. Corall.* 83; *Hogg's Stockton*, 31; *Flem. Br. Anim.* 542.

Great Tooth Coralline, *Ellis, Corall.* 5, t. ii. No. 3, f. a. A. b. B.

Hab. On shells and other Corallines from deep water.

Height about one inch: branches very few, often simple. Cells rather distant, tubular, but dilated at the base.

2. *S. abietina*, stem erect, rather stout, slightly ziz-zag, pinnate; pinnæ regularly alternate, patent, bifarious; cells nearly opposite, everted, bellied, the orifice narrowed and entire. *Sea Fir Coralline*.

S. abietina, *Linn.*; *Soland, Zooph.* 36; *Turt. Lin.* iv. 676; *Turt. Br. Faun.* 212; *Stew. Elem.* ii. 441; *Lam. Hist. Nat.* ii. 116; *Lamour. Corall.* 81; *Bosc, Vers.* iii. 106; *Stark, Elem.* ii. 440; *Hogg's Stockton*, 31; *Loud. Journ.* i. 278, f. 148, a.

Dynamena abietina, *Flem. Br. Anim.* 543.

Sea-Fir, *Ellis, Corall.* 4, t. ii. No. 2, f. b. B.

Abies marina, *Sib. Scot. Ill. lib. quart.* 55; *Ger. Herb.* 1574, cum fig. non laudatâ.

Corallina marina abietis forma, *Raii Syn.* 35, No. 12.

Hab. Common on all our shores.

About four inches high, stout, rigid. The polype-cells, in many specimens, are, at least, sub-alternate.

3. *S. filicula*, stem compound, slender, zig-zag, pinnate; pinnæ regularly alternate, patent, bifarious; cells opposite, bellied, with a very short narrow neck, and entire mouth.

Fern Coralline.

S. filicula, *Soland.* Zooph. 57, t. 6, f. c; *Turt.* Lin. iv. 681; *Turt.* Brit. Faun. 215; *Stew.* Elem. ii. 445; *Lam.* Hist. Nat. ii. 119; *Lamour.* Corall. 82; *Bosc,* Vers, iii. 114; *Hogg's* Stockton, 32.

Dynamena filicula, *Flem.* Brit. Anim. 544.

Hab. Parasitical on sea-weeds, particularly on the entangled roots of *Laminaria digitata*, common.

Our largest specimen is nearly four inches in height. It is "one of the most delicate species of our English vesicular Corallines," and, notwithstanding the similarity of their specific characters, is very distinct from the preceding.

4. *S. pumila*, stem simple, or bifariously branched; branches few and irregular; cells opposite, the aperture recurved, obtusely two-lipped, truncate. *Sea-Oak Coralline.*

S. pumila, *Linn.*; *Soland.* Zooph. 40; *Turt.* Lin. iv. 676; *Turt.* Br. Faun. 212; *Stew.* Elem. ii. 441, t. 12, f. 10, 11, copied from *Ellis*; *Lam.* Hist. Nat. ii. 119; *Bosc,* Vers, iii. 105; *Hogg's* Stockton, 32; *Stark,* Elem. ii. 449, t. viii. f. 14, copied from *Ellis*.

Dynamena pumila, *Lamour.* Corall. 79; *Flem.* Br. Anim. 544.

Corallina pumila repens, *Raii*, Syn. 37, No. 19.

Sea-Oak Coralline, *Ellis*, Corall. 9, t. v. No. 8, f. a; *Phil.* Trans. xlviii. 632, tab. xxiii. No. 6.

Hab. On the fronds of *Fucus vesiculosus et serratus*; also on slaty rocks near low water-mark, common.

The shoots are rarely more than half an inch in height, numerous, and connected at the base by a slender tubular thread, which creeps along the surface of the fucus, and adheres to it rather firmly. These fibres never bear any polypes. The ovarian vesicles are large, pear-shaped, swollen.

5. *S. rugosa*, stem erect or creeping, simple or slightly branched; branches irregular; cells alternate, oval, coarsely wrinkled across, the orifice narrow and puckered. *Snail-trefoil Coralline* (tab. nost. xi. fig. 3).

S. rugosa, *Linn.*; *Soland.* Zooph. 52; *Turt.* Lin. iv. 678; *Turt.* Br. Faun. 213; *Stew.* Elem. ii. 442; *Lam.* Hist. Nat. ii. 121; *Bosc,* Vers, iii. 108; *Hogg's* Stockton, 32; *Flem.* Br. Anim. 542.

Clytia rugosa, *Lamour.* Corall. 89.

Snail-trefoil Coralline, *Ellis*, Corall. 26, No. 23, t. 15, f. a.

Hab. Parasitical on *Flustræ*, Sponges, and *Fuci*.

A small species (from a half to an inch high), well distinguished by its strongly-wrinkled cells, which greatly resemble a barrel, in miniature.

6. *S. rosacea*, stem erect, thinly branched bifariously; branches alternate; cells opposite, tubular, everted; aperture not constricted, entire; ovarian vesicles crowned with little spines. *Lily-flowering Coralline*.

S. rosacea, *Linn.*; *Soland. Zooph.* 39; *Turt. Lin.* iv. 676; *Turt. Br. Faun.* 212; *Stew. Elem.* ii. 440; *Lam. Hist. Nat.* ii. 119; *Bosc, Vers.* iii. 105; *Hogg's Stockton* 32.

Dynamena rosacea, *Lamour. Corall.* 79; *Flem. Br. Anim.* 544.

Lily or Pomegranate-flowering Coralline, *Ellis, Corall.* 8, t. 4, No. 7.

Hab. Parasitical on corallines, rare on this coast.

An inch in height, white, pellucid; the cells are cylindrical with oblique apertures.—

“The vessicles, when magnified, are shaped like a Lily or Pomegranate flower, just opening; and appear more like a blossom, than any belonging to the whole tribe of corallines.”

—*Ellis*.

7. *S. operculata*, tufted; shoots slender, irregularly branched; branches erecto-patent, straight; cells opposite, inversely conical, the aperture obliquely truncate, acutely pointed, with two acute lateral teeth. *Sea-Hair Coralline* (tab. nost. xi. fig. 2.).

S. operculata, *Linn.*; *Soland. Zooph.* 39; *Turt. Lin.* iv. 676; *Turt. Br. Faun.* 212; *Stew. Elem.* ii. 441; *Lam. Hist. Nat.* ii. 118; *Bosc, Vers.* iii. 106; *Hogg's Stockton* 32.

Dynamena operculata, *Lamour. Corall.* 78; *Flem. Br. Anim.* 544.

Sea Hair, *Ellis Corall.* 8, t. iii. No. 6, f. b.

Corallina minus ramosa, *Raii Syn.* 35, No. 13, t. 2, f. 4.

Hab. Parasitical on Fuci, particularly on the stalks of *Laminaria digitata*.

Grows in tufts from two to four inches high. The shoots are slender and neat, bearing cells throughout, which are exactly opposite. The outer angle of the external edge of the aperture is produced into an acute point, and there is a sharp tooth on each side, which is omitted in the otherwise admirable figure of *Ellis*, although it could not escape his observation. See the *Nat. Hist. of Zoophytes*, p. 39. I find the ovarium vesicles very abundantly produced in winter; they are irregularly scattered on the branches, egg-shaped, the top being often covered with a sort of rounded operculum.

8. *S. argentea*, solitary; stem free, erect, straight, percurrent, compound; branches alternate, dichotomously divided, short and spreading; cells opposite or semi-alternate, flask shaped, everted, with an obliquely truncated aperture. *Squirrel's-tail Coralline* (tab. nost. xi. fig. 4).

S. argentea, *Linn.*; *Soland. Zooph.* 38; *Turt. Lin.* iv. 677; *Turt. Brit. Faun.* 213; *Stew. Elem.* ii. 442; *Lam. Hist. Nat.* ii. 117; *Lamour. Corall.* 84; *Bosc, Vers.* iii. 108;

Hogg's Stockton 32.

Dynamena argentea, *Flem. Brit. Anim.* 544.

Squirrel's-tail, *Ellis, Corall.* 6, t. ii. No. 4, f. c.

Corallina muscosa, *Raii Syn.* 36, No. 17.

Hab. In deep water. Among sea refuse, not uncommon.

This elegant coralline, when perfect, is a span in height, and the branches are so disposed as to make its comparison to a Squirrel's-tail by no means unappropriate. Stem simple,

jointed, clothed with compound branches, which come off in such a manner that four or five of them form a spiral whorl: they are short, spreading, and somewhat arched, paniced, and dichotomously divided. Cells semi-alternate, each pair generally separated from the others by the intervention of a joint. Vesicles scattered irregularly, urn-shaped, with two teeth at the extreme angles.

In small specimens the branches are simple and almost bifarious; and in these the cells on the stem are very distinct, but the stem of full grown specimens is perfectly smooth.

The specimens from which this description is taken resemble exactly the figure of ELLIS quoted among our synonymes, but the ovarian vesicles are like those of his *Sertularia cupressina*, t. iii. No. 5. This fact affords a strong argument in favour of the opinion of those naturalists who believe these species to be mere varieties.

9. *S. halecina*, stem compound, irregularly branched; branches bifarious, erecto-patent, pinnate; pinnæ spreading, alternate; cells unilateral, biserial, alternate, tubular, with a wide aperture; ovarian vesicles large, tubular, with a contracted neck and mouth. *Herring-bone Coralline* (tab. nost. xii. fig. 2).

S. halecina, Linn.—*Soland. Zooph.* 46; *Turt. Lin.* iv. 678; *Turt. Br. Faun.* 213; *Stew. Elem.* ii. 442; *Lam. Hist. Nat.* ii. 119; *Bosc, Vers.* iii. 109; *Hogg's Stockton*, 32; *Flem. Br. Anim.* 542.

Thoa halecina, *Lamour. Corall.* 93.

Herring-bone Coralline, *Ellis*, *Corall.* 17, t. x.—*Phil. Trans.* xlvi. 506, tab. xvii. fig. E. *Corallina scruposa pennata*, *Raii Syn.* 36, No. 15.

Hab. On old shells, particularly on *Buccinum undatum*.

Stem tapering, composed of several tubes adhering together, generally encrusted with foreign matter. The cells are not confined to the pinnæ, but are placed also on the branches; they are small and depressed. Our specimens from the Durham coast are regularly pinnated, and branched in a manner different from that represented by ELLIS, but the cells and ovarian vesicles are precisely the same. It might, with greater propriety, be placed in the genus *Plumularia*.

10. PLUMULARIA.

1. *P. falcata*, stem rising in wide spiral turns, cylindrical, simple or compound, branched; branches placed one above the other on the outer side, spreading, pinnate; pinnæ alternate, bifarious; cells small, unilateral, biserial, alternate, tubular with prominent mouths. *Sickle Coralline*.

P. falcata, *Lam. Hist. Nat.* ii. 125; *Flem. Br. Anim.* 546.

Sertularia falcata, Linn.—*Soland. Zooph.* 42; *Turt. Lin.* iv. 679; *Turt. Br. Faun.* 213; *Stew. Elem.* ii. 443; *Bosc, Vers.* iii. 110; *Hogg's Stockton*, 32.

Aglaophenia falcata, *Lamour. Corall.* 77.

Sickle Coralline, *Ellis*, *Corall.* 12, t. vii. No. 11, f. a. t. xxxviii. f. 6.

Corallina muscosa pennata, *Raii Syn.* 36, No. 16.

Hab. On shells, &c. in deep water.

A very common and very elegant species, generally about six inches in height. There are no polype-cells on the spiral stem, but they occur on the branches as well as on the pinnæ, and are arranged in two rows pointing alternately to opposite sides. There is a fine figure of it in the centre of the curious frontispiece to ELLIS's immortal *Essay on English Corallines*.

2. *P. pinnata*, stem simple, erect, plume-like, pinnate; pinnæ bifarious, slightly arched, alternate; cells unilateral, uniserial, rather distant, one on each joint, campanulate, leaning, the mouth wide and entire. *Jointed Sea-bristle Coralline*.

P. pinnata, *Lam. Hist. Nat. ii. 127*.

P. setacea, *Lam. Hist. Nat. ii. 129*; *Flem. Br. Anim. 547*; *Stark, Elem. ii. 440*.

Sertularia pinnata, *Linn.*; *Soland. Zooph. 47*; *Turt. Lin. iv. 683*; *Turt. Br. Faun. 215*.

Sertularia setacea, *Turt. Br. Faun. 216*; *Stew. Elem. ii. 446*; *Bosc, Vers, iii. 119*;

Hogg's Stockton, 33.

Aglaophenia pinnata, *Lamour. Corall. 76*.

Sea-bristles, *Ellis, Corall. 19, t. xi. No. 16, f. a, A*; *t. xxxviii. f. 4*.

Hab. On shells from deep water, not common.

Height one inch and a half, very delicate, white, and pretty. The cells are quite transparent, so that the polype is often detected within them. I have a specimen which is rather bushy, and very irregularly branched, the ultimate branchlets only presenting the pinnate character. The ovarian vesicles are egg-shaped, placed in the axils of the branchlets, either singly or in small clusters.

In ELLIS's figure *t. xii. f. a*, the branches are bent in the wrong direction, a trivial error which is corrected in the figure in *tab. 38, f. 4*; for I agree with Dr. FLEMING that these two figures represent the same polypidom, though LAMARCK and others have made two species of them.

11. ANTENNULARIA.

1. *A. antennina*, stem erect, cylindrical, simple or irregularly branched; branches few, elongate, erecto-patent, like the stem, all thickly beset with hair-like branchlets in whorls; branchlets jointed, celliferous; cells distant, small, alternate, unilateral, somewhat campanulate, with entire apertures. *Lobster's-horn Coralline*.

A. antennina, *Flem. Br. Anim. 546*.

Sertularia antennina, *Linn.*; *Soland. Zooph. 45*; *Turt. Lin. iv. 679*; *Turt. Br. Faun. 214*; *Stew. Elem. ii. 443*; *Bosc, Vers, iii. 111*.

Nemertesia Antennina, *Lamour. Corall. 71*.

Var. 1, with the stem simple, and the whorled ciliæ very short; *Antennularia indivisa*, *Lam. Hist. Nat. ii. 123*; *Sertularia antennina*, *Hogg's Stockton, 33*; *Corallina astaci corniculorum æmula*, *Raii, Syn. 34, No. 10*,

Var. 2, with the stem-branched, and the whorled ciliæ longer; *A. ramosa*, *Lam. Hist. Nat. ii. 123*; *Stark Elem. ii. 440*; *Sertularia seticornis*, *Hogg's Stockton, 33*; *Corallina ramosa cirris obsita*, *Raii, Syn. 35, No. 11*.

Lobster's-horn Coralline, or Sea-beard, *Ellis*, Corall. 15, t. ix. No. 14, f. a, b; Phil. Trans. xlviii. 630, t. xxii. No. 3.

Hab. On shells, &c. in deep water common.

12. THUIARIA.

1. T. *Thuia*, stem erect, cylindrical, rigid, zig-zag, knotted, bearing on the upper part a cylindrical tuft of dichotomous, short, equal branches; cells appressed, biserial, tubular, contracted at the orifice. *Bottle-brush Coralline*.

T. *Thuia*, *Flem. Brit. Anim.* 545.

Sertularia *thuia*, *Linn. Soland. Zooph.* 41; *Turt. Linn.* iv. 678; *Turt. Br. Faun.* 213; *Stew. Elem.* ii. 442; *Lamour. Corall.* 84.; *Bosc, Vers,* iii. 109; *Hogg's Stockton,* 32.

Cellaria Thuia, *Lam. Hist. Nat.* ii. 339; *Stark, Elem.* ii. 439.

Planta Marina equiseti facie, *Sib. Scot. Ill.* ii. lib. quart. 55, t. xii. f. 1; *Fucus equiseti facie*, *Raii, Syn.* 50, No. 47.

Bottle-brush Coralline, *Ellis*, Coral. 10, t. v. No. 9, f. b.

Hab. On shells from deep water, common.

This remarkable species is sometimes a foot in height, generally less. The branches are alternate, but so disposed that four complete the whole. The knots on the lower part are the remains of former branches. The stem has no cells, and neither it nor the branches are jointed. The ovarian vesicles are placed in close rows, on the upper side and towards the base of the branches: they are ovate and shortly stalked, produced most abundantly in the winter season.

13. CELLARIA.

1. C. *scruposa*, creeping, branched; branches plane, dichotomous; cells biserial, looking one way, sub-alternate, oval, with an obliquely truncate entire aperture. *Stony Angular-celled Coralline* (tab. nost. xi. fig. 6).

C. *scruposa*, *Soland, Zooph.* 23; *Lam. Hist. Nat.* ii. 141; *Bosc, Vers,* iii. 132.

Sertularia *scruposa*, *Linn.*; *Turt. Linn.* iv. 685; *Turt. Br. Faun.* 216; *Stew. Elem.* ii. 448.

Crisia scruposa, *Lamour. Corall.* 60.

Cellularia scruposa, *Flem. Brit. Anim.* 539.

Celliferous Coralline, with angular edges to its cells, *Ellis* in Phil. Trans. xlviii. tab. xiii. N.o 7.

Creeping stony Coralline, *Ellis*, Corall. 48. t. xx. No. 4, f. c.

Hab. On the roots of *Laminaria digitata*, and other sea-weeds, common.

This frequently covers a space about an inch in diameter, the branches diverging and creeping along the surface, or the entangled roots of sea-weed, to which they adhere by simple, root-like fibres. The branches are rather broad, and of a brownish colour: the ova are orange-coloured, nearly globular, one or two in each cell, for this species seems to produce no ovarian vesicles.

2. *C. reptans*, creeping, dichotomously branched; cells biserial, looking one way, semi-alternate, oval, the aperture oblique, armed with short obtuse spines at the top.
Creeping celliferous Coralline.
C. reptans, *Soland. Zooph.* 23; *Lam. Hist. Nat.* ii. 141; *Bosc. Vers.* iii. 132; *Stark Elem.* ii. 439.
Sertularia reptans, *Linn.*; *Turt. Linn.* iv. 685; *Turt. Brit. Faun.* 217; *Stew. Elem.* ii. 448.
Crisia reptans, *Lamour. Corall.* 60.
Cellularia reptans, *Flem. Br. Anim.* 540; *Hogg's Stockton*, 35.
Creeping Coralline, *Ellis Corall.* 37, t. xx. No. 3, f. b.
Hab. On Flustræ and roots of sea-weed, common.
Similar to the preceding in size and form. ELLIS represents only two spines to each aperture, but they are commonly more numerous.
3. *C. eburnea*, tufted, branched; branches short, spreading; cells tubular, adnate, frosted, the aperture circular, somewhat oblique, even and entire. *Ivory Celleferous Coralline* (tab. nost. xi. fig. 5).
C. eburnea, *Soland. Zooph.* 24; *Lam. Hist. Nat.* ii. 138; *Bosc. Vers.* iii. 133.
Sertularia eburnea, *Linn.*; *Turt. Linn.* iv. 686; *Turt. Br. Faun.* 217; *Stew. Elem.* ii. 449.
Crisia eburnea, *Lamour. Corall.* 60; *Flem. Br. Anim.* 540.
Cellularia eburnea, *Hogg's Stockton* 35.
Tufted Ivory Coralline, *Ellis, Corall.* 39, t. xx. no. 6, fig. a.
Hab. Common on sea-weeds.
Grows in little bushy tufts, a quarter or half an inch in height, of ivory whiteness. It is much branched, the principal divisions alternate and spreading; the secondary, however, come off from one side only, and bend inwards with a slight curve: cells in two rows, nearly opposite or semi-alternate. Ovarian vesicles obpyriform, roughened.
4. *C. loriculata*, bushy, much branched; branches erect, irregular, slender, jointed; cells in pairs, placed back to back, tubular, straight, adnate, with entire very oblique mouths.
Coat of mail celliferous Coralline.
C. loriculata, *Soland. Zooph.* 24; *Lam. Hist. Nat.* ii. 136; *Bosc. Vers.* iii. 133.
Sertularia loriculata, *Linn.*; *Turt. Linn.* iv. 684; *Turt. Br. Faun.* 216; *Stew. Elem.* ii. 447.
Crisia loriculata, *Lamour. Corall.* 61.
Cellularia loriculata, *Flem. Br. Anim.* 541; *Hogg's Stockton*, 35.
Coat of mail Coralline, *Ellis, Corall.* 40. t. xxi. No. 7, f. b.
Corallina geniculata mollis, *Raii Syn.* 34, no. 6.
Hab. Common on all this coast.
Height from two to four inches, white, flaccid.
5. *C. avicularia*, erect, bushy, much branched; branches dichotomous, jointed, each joint with two semi-alternate tubular cells, somewhat dilated at the top, and armed with a

long spine on the outer angle; the sides furnished with anomalous appendages.—
Bird's-head Coralline.

C. avicularia, *Soland.* Zooph. 22; *Lam.* Hist. Nat. ii. 141; *Bosc*, Vers, iii. 131.
Sertularia avicularia, *Linn.*; *Turt.* Lin. iv. 685; *Turt.* Br. Faun. 216; *Stew.* Elem. ii. 448.

Crisia avicularia, *Lamour.* Corall. 61.

Cellularia avicularia, *Hogg's* Stockton, 35.

Bird's-head Coralline, *Ellis*, Corall. 36, t. xx. no. 2, fig. *a*.

Hab. Attached to other Corallines in deep water.

About one and a half inch high, white, bushy, chiefly remarkable on account of the curious appendages which are articulated to the sides of the cells. *ELLIS* has delineated them with his usual accuracy, and has aptly compared them to a "bird's head, with a crooked beak, opening very wide." They are very small, about one-fourth the size of the cell, and, when the coralline is in a living state, are in continual motion, moving upwards and downwards with the regularity of a pendulum: their use is unknown. The polypes have twelve simple uniform tentacula, and lie concealed in their cells, which are disposed in two rows, with apertures that face one way. The spine at the outer angle is either frequently wanting or broken off. Within the polype-cells, a spot of a bright scarlet colour is often perceptible: it is probably produced by a cluster of ova.

The habit of this Coralline is so very different from that of *Flustra avicularis* described below, that it is difficult to believe they can be merely different states of the same species, as *Dr. FLEMING* and some others maintain.

V. Z. CELLULIFERA.

14. FLUSTRA.

* *Polypidom* free, branched.

1. *F. foliaceq*, polypidom thickish, spreading, deeply divided into numerous broad segments, rounded at the ends; cells on both sides, small, oblong, the margin armed with short blunt spines. *Broad-leaved Sea-mat.*

F. foliacea, *Linn.*; *Soland.* Zooph. ii. t. ii. f. 8; *Turt.* Lin. iv. 663; *Turt.* Br. Faun. 209; *Stew.* Elem. ii. 435; *Lam.* Hist. Nat. ii. 156; *Bosc*, Vers, iii. 140; *Lamour.* Corall. 44; *Flem.* Br. Anim. 535; *Hogg's* Stockton, 36; *Grant* in *Edin. New. Phil. Journ.* for Oct. 1827, p. 337, and for April, 1827, p. 111.

Eschara foliacea, *Lin.* Syst. 104, edit. 10th.

Fucus telam lineam sericeamve textura sua æmulans, *Raii* Syn. 42, No. 9.

Curious Sea-weed, *Hooke*, *Micrographia*, 140, t. 9, f. 2, and t. 14, f. 1.

Broad-leaved Hornwrack, *Ellis*, Corall. 70, t. xxix. No. 2, f. *a*, *A*, *B*, *E*.

Hab. Amongst sea refuse, common.

Height about four inches. The segments vary very much in their breadth, but are never proliferous. Cells small, narrowed at the base, dilated and rounded at the top.

HOOKER has given a very good description and magnified figure of this production in his celebrated *Micrographia*, where he says, "for curiosity and beauty, I have not among all the plants or vegetables I have yet observed, seen any one comparable to this sea weed;" and indeed, to those who amuse themselves with the microscope it forms a fine object, exceeded, however, in beauty, if not in regularity of design, by many similar productions. HOOKER himself seems to have been aware of this in some degree, for he adds, "and I doubt not, but that he that shall observe these several kinds of plants (as they were deemed to be in his day) that grow upon rocks, which the sea sometimes overflows, and those heaps of others which are vomited out of it upon the shore, may find multitudes of little plants, and other bodies, which, like this, will afford very beautiful objects for the microscope; and this specimen here is adjoined only to excite their curiosities who have opportunity of observing to examine and collect what they find worthy their notice."

2. *F. truncata*, polypidom bushy, divided dichotomously; segments rather narrow, strap-shaped, abruptly truncate; lateral segments wedge-shaped, bifid, narrow at the base; cells linear oblong with smooth margins. *Square-top'd Sea-matt* (tab. nost. xii. fig. 1).

F. truncata, *Soland. Zooph.* 11; *Turt. Lin.* iv. 663; *Turt. Brit. Faun.* 209; *Stew. Elem.* ii. 436; *Lam. Hist. Nat.* ii. 157; *Lamour. Corall.* 44; *Bosc, Vers.* iii. 140, t. xxx. f. 1, copied from *Ellis*; *Flem. Br. Anim.* 535; *Hogg's Stockton*, 36.

Fucus marinus scruposus albidus angustior compressus, extremitatibus quasi abscissis, Raii Syn. 43, No. 10.

Narrow-leaved Hornwrack, *Ellis, Corall.* 69, t. xxviii. f. 1, a, and t. xxxviii. f. 8.

Hab. In deep water on all the coast, still more common than the preceding.

This attains a height of four or five inches, is very bushy, of a straw colour, and rather thin texture. "The base is furnished with adhering root-like tubes;" the polypidom itself is divided, in a dichotomous manner, into numerous narrowish segments, and, from the edges of these originate, by a very short pedicle, wedge-shaped segments, at first simple, but afterwards deeply bifid. The apices of all the segments is abruptly truncate. The cells are placed on both sides, and are generally marked with a black dot, scarcely visible except under the magnifier. The polypidom is also commonly marked with some flesh-coloured spots or bands, which proceed from imbedded grains of that colour, and which we may presume to be the ova.

3. *F. carbacea*, polypidom thin, deeply divided; segments broad, rounded at the ends; cells on one side only, large, oblong, narrowed and truncate at the base, the margins toothless. *Lawn Sea-matt* (tab. nost. ix. fig. 4.)

F. carbacea, *Soland. Zooph.* 14, t. 3, f. 6, 7 (the figure of the natural size is not characteristic, yet copied by every subsequent compiler). *Turt. Lin.* iv. 663; *Turt. Br. Faun.* 209; *Stew. Elem.* ii. 436; *Lam. Hist. Nat.* ii. 157; *Lamour. Corall.* 45; *Bosc, Vers.* iii. 141; *Flem. Br. Anim.* 535; *Hogg's Stockton*, 36; *Stark Elem.* ii. 437. t. viii. f. 13, from *Ellis*; *Grant in Edin. New Phil. Journ.* for April, 1827. p. 111.

Hab. On Shells from deep water, frequent.

About two inches high, often less. Root a small disk; polypidom narrow at the base with thickened margins, dilating upwards.

4. *F. avicularis*, polypidom thin, deeply cut into narrow linear dichotomous segments; cells on one side only, oblong, the aperture armed with long unequal straight spines, and covered with a vesicular pearly lid. *Birds-head Sea matt.*

F. avicularis, *Turt. Br. Faun.* 210; *Flem. Br. Anim.* 536.

F. angustiloba, *Lam. Hist. Nat.* ii. 158.

F. capitata, *Hogg's Stockton*, 36.

Crisia flustroides, *Lamour. Corall.* 61.

Corallina cum appendiculis lateralibus avium capitum forma, *Ellis, Corall. t.* xxxviii. fig. 7.

Hab. Deep water, not common on this coast.

A neat species about one inch in height. The spines to the aperture are about four in number. On the sides of the polypidom are appendages exactly like those of the *Cellaria avicularia*.

** *Polypidom adnate, undivided.*

5. *F. pilosa*, polypidom encrusting, irregular; cells rather remote, round, the apertures ciliated with conical bristles, one of which is much longer than the others. *Hairy Sea-matt* (tab. nost. ix. fig. 5).

F. pilosa, *Soland. Zooph.* 13; *Turt. Lin.* iv. 663; *Turt. Br. Faun.* 209; *Stew. Elem.* ii. 436; *Lam. Hist. Nat.* ii. 159; *Lamour. Corall.* 46; *Bosc, Vers.* iii. 140; *Flem. Br. Anim.* 537; *Hogg's Stockton*, 36.

Irregular spongy foliaceous Coralline, *Ellis, Corall.* 73, t. xxxi.

Var. the long bristle abortive or destroyed.

F. dentata, *Soland. Zooph.* 15; *Turt. Br. Faun.* 209; *Stew. Elem.* ii. 436; *Lam. Hist. Nat.* ii. 158; *Lamour. Corall.* 48; *Bosc, Vers.* iii. 142; *Hogg's Stockton*, 36; *Stark, Elem.* ii. 437.; *Ellis, Corall. t.* xxix. fig. D.

Hab. Parasitical on the smaller sea weeds.

This is probably the most abundant Zoophyte on these coasts, and readily known by its hairy appearance. The small spines of the apertures, are omitted in the otherwise excellent figure of ELLIS.

When it grows on shells the crust is thinner and more calcareous than when on sea weed, and makes a near approach to the genus *Berenicea*. The surface of the cells is frosted, the margin of the mouth a little thickened; and the large spine appears to originate from a hollow base like a hair from its bulb, as is tolerably well represented in our figure.

6. *F. membranacea*, polypidom a thin expansion with the margin undivided; cells oblong, square, with very short blunt spines at the angles. *Chagrin Sea-matt.*

F. membranacea, *Linn.—Soland. Zooph.* 18; *Turt. Br. Faun.* 210; *Stew. Elem.* ii. 437; *Bosc, Vers.* iii. 144; *Hogg's Stockton*, 36.

F. telacea, *Lam. Hist. Nat.* ii. 158; *Stark, Elem.* ii. 437.

Hab. On the broad frond of *Laminaria digitata*, common.

The surface is commonly even and smooth, but I have a fine specimen over which there are scattered irregularly, many processes a quarter of an inch in height. They arise from within the cells, are simple, horny, and tubular, but closed at the top. ELLIS conjectured they were the ovaries, but this is not likely.

7. *F. unicornis*, crust thin, white and calcareous, the margin divided; cells oval, in rows, with a blunt hollow conical process at the summit of each. *One-toothed Sea-matt.*

F. unicornis, *Fleming* in *Edin. Phil. Journ.* ii. 87. *Flem. Br. Anim.* 536.

Hab. On stones at low water-mark.

Forms smaller patches than the preceding, from which it is otherwise readily distinguished by the form of the cells.

8. *F. spinifera*, crust thin, spreading irregularly, membranous, brown; cells oval, small, the margin encircled with numerous stout spinous processes as long as the breadth of the cell (tab. nost. ix. fig. 6).

Hab. On stones at low water mark.

The spines are straight, equal and rigid. It is a species hitherto unobserved, but possesses characters which, in my opinion, keep it quite distinct from every other.

9. *F. hispida*, polypidom fleshy, brown, spreading; cells remote, aperture circular, contracted, "armed at the top with spinous processes."

F. hispida, *Flem. Br. Anim.* 537: *Jameson* in *Wern. Mem.* i. 563.

Hab. On *Fucus serratus et vesiculosus* at low water mark.

This species is the most favourable for observing the structure of the polypes, which are very pretty and vivacious. They are perfectly white, and are furnished with numerous filiform tentacula arranged in a bell-shaped circle. The spines appear to me to arise from the body of the cells, and not from the aperture; they are conical and soft (tab. nost. ix. fig. 7).

15. FARCIMIA.

1. *F. fistulosa*, polypidom erect, regularly dichotomous; joints constricted, the intervening spaces long, cylindrical, with lozen-shaped immersed cells regularly disposed.

Bugle Coralline.

F. fistulosa, *Flem. Brit. Anim.* 534.

Tubularia fistulosa, *Linn. Turt. Lin.* iv. 666; *Turt. Br. Faun.* 210; *Stew. Elem.* ii. 438.

Cellaria farciminoidea, *Soland. Zooph.* 26.

C. salicornia, *Lam. Hist. Nat.* ii. 135; *Lamour. Corall.* 55; *Bosc, Vers.* iii. 129. t. 28, f. 6, copied from *Ellis*; *Stark, Elem.* ii. 439.

Bugle Coralline, *Ellis, Corall.* 43, t. xxi.

Hab. On Corallines from deep water, rare.

Height of our specimen a little more than one inch, white, fibrous at the base; branches erecto-patent, straight. One of the finest among British Zoophytes.

16. CELLEPORA.

1. *C. pumicosa*, irregular, dirty white, rough, porous; cells orbicular, the mouth round, with a produced marginal process. *Pumice Cellepore*.

C. pumicosa, *Turt. Lin.* iv. 640; *Turt. Br. Faun.* 206; *Stew. Elem.* ii. 428, t. xii. f. 16, 17, copied from *Ellis*; *Lam. Hist. Nat.* ii. 170; *Lamour. Corall.* 40; *Bosc, Vers.* iii. 147, t. 30, f. 3, copied from *Ellis*; *Flem. Br. Anim.* 532; *Hogg's Stockton*, 37; *Stark, Elem.* ii. 436.

Millepora pumicosa, *Soland. Zooph.* 135; *Stew. Elem.* ii. 428.

Porus Eschara, *Ellis, Corall.* 75, t. xxviii. f. f. also 72, t. xxx. f. d. D.

Cellepora spinosa, *Turt. Br. Faun.* 205.

Flustra bullata, *Stew. Elem.* ii. 436; *Soland. Zooph.* 16.

Hab. On sea-weeds and Zoophytes, common.

Forms a cellular calcareous brittle mass, variable in size, and of no definite form. I have seen young specimens of a purple colour. The aperture of the cells is often toothless, but when perfect they have a blunt tooth-like process on the superior margin.

2. *C. ramulosa*, dichotomously branched; branches cylindrical, very slightly tapered, rough; cells somewhat rowed, the superior margin of the aperture produced into a blunt tooth. *Little branched Cellepore* (tab. nost. xii. fig. 3 and 4).

C. ramulosa, *Flem. Brit. Anim.* 532; *Turt. Lin.* iv. 640.

Hab. Attached to Corallines from deep water, frequent.

The height of the largest specimen I have seen, and which is represented in our tab. xii. f. 4, is about one and a half inch, but generally it is not more than the half of this. The coralline is a pretty one, of a stony hardness, light, porous, and white. *ELLIS* considered it a variety of the preceding.—*Nat. Hist. of Zoophytes*, p. 136.

3. *C. Skenei*, much compressed, simple or slightly divided, rough; cells in rows, oblong, with a blunt tooth on the upper side of the round aperture.—*Skene's Cellapore*.

Millepora Skenei, *Soland. Zooph.* 135; *Turt. Linn.* iv. 635; *Turt. Br. Faun.* 204; *Stew. Elem.* ii. 427.

Hab. On Shells and Corallines from deep water, occasionally.

Height about half an inch, breadth rather less, much compressed, with cells on both sides, white, and when dry appears "as if covered over with a silver varnish." *ELLIS* suspected this was the "beginning of an elegant kind of Millepore;" and *Dr. ELEMING* considers it to be *Cellepora cervicornis* in its earliest state.

17. BERENICEA.

1. *B. coccinea*, crust flesh,—red or purplish, sub-circular; cells sub-cylindrical, frosted, the aperture contracted, sinuated on the upper side, and armed above with a strong blunt short tooth. (tab. nost. xii. fig. 5.)

Berenicea coccinea, *Flem. Br. Anim.* 533.

Cellepora coccinea, *Lamour. Corall.* 40.

Hab. On rocks near low water mark, and on the roots of *Laminaria digitata*, common.

The spots formed by this species are often an inch or upwards in diameter, every where closely adherent, thin, and rough to the naked eye. The cells are regularly disposed in adjacent rows, and lie on the crust. Their thin walls have a frosted appearance, and, when dry, appear to be perforated with minute holes. Above the aperture, and a little removed from the margin, there rises up a blunt white tooth, but the margin itself is not toothed: it is circular, and on each side of many of them there is a small triangular slit, which seems to be the aperture of an abortive cell. Many of the cells, in some specimens, are covered with a white conical operculum, which is grooved and opaque, and has been considered an ovary.

2. *B. trispinosa*, crust white, dotted with yellow, sub-circular, cells radiating from the centre; aperture closed by a membrane, and armed on the lower margin with three long spines.

Discopora trispinosa, *Johnston* in *Edin. Phil. Journ.* xiii. 222.

Hab. On the shell of *Lithodes spinosa*.

A thin, calcareous, sub-circular, layer three-quarters of an inch in diameter, affixed by its whole basis, but when dry easily removable; of a white silvery colour, with minute yellow dots. Cells in rows radiating from the centre, small, horizontal, with a raised round aperture, which is closed by a brown membrane, whence the dotted surface it presents to the naked eye: the cells are divided on the upper side, and on the lower armed with three long, stout, conical spines. *Dr. FLEMING* unites this with the preceding, but, as I think, erroneously. I regret that I cannot give a figure of it, for the specimen, from which the description was taken, was presented to *Mr. GRAY*, of the British Museum, nor have I since met with another.

3. *B. utriculata*, crust white, irregular; cells adjacent, almost globular, frosted, the aperture contracted, circular, armed with spines longer than its own diameter (tab. nost. xii. fig. 6).

B. utriculata, *Flem. Brit. Anim.* 533.

Cellepora ciliata, *Lamour. Corall.* 41.

Hab. On Shells from deep water. Our specimens are on *Mytilus modiolus*.

The crust is thin and closely adherent, so that it cannot be removed from its foreign base. The spines of the aperture are marginal, and are easily broken off, whence it is rare to find them perfect except near the margin of the crust, or when this lies protected by some inequality of the surface which it grows upon. They are about five in number, and almost equal the cell in length.

5. *B. flava*, crust yellow, glazed, irregular; cells immersed in the crust, with contracted slightly projecting circular apertures, armed with three spines on the under side.

Hab. On a piece of Limestone from deep water.

The crust is thickish and uneven, and, when dry, may be detached in pieces from the foreign base. The spines of the aperture are almost always broken off, but the species is otherwise well characterised.

18. TUBULIPORA.

1. *T. patina*, base a circular saucer with an even thin border; tubes in the disk crowded, oblique; central ones smaller; those towards the circumference larger, some erect; aperture circular, entire (tab. nost. ix. fig. 8).

T. patina, *Lam. Hist. Nat.* ii. 163.

Millepora verrucaria, *Soland. Zooph.* 137.

Madrepora verrucaria, *Turt. Br. Faun.* 204; *Stew. Elem.* ii. 426; *Hogg's Stockton*, 38.

Discopora verrucaria, *Flem. Br. Anim.* 530.

Hab. On Shells and Corallines from deep water.

A species of much beauty under the magnifier; white, calcareous, half an inch across; border of the circular base thin, plain, and scored with faint lines.

2. *T. transversa*, irregularly branched, depressed; tubes arranged in distinct transverse rows, apertures even; circular.

T. transversa, *Lam. Hist. Nat.* ii. 162; *Stark, Elem.* ii. 437.

T. serpens, *Flem. Brit. Anim.* 529.

Millepora tubulosa, *Soland. Zooph.* 136; *Turt. Brit. Faun.* 205; *Stew. Elem.* ii. 428;

Bosc, Vers. ii. 345; *Hogg's Stockton*, 37.

Tubipora serpens, *Turt. Lin.* iv. 614; *Stew. Elem.* ii. 426; *Bosc, Vers.* ii. 426.

Small purple Eschara, *Ellis, Corall.* 74, t. xxvii. No. 3, e, E.

Hab. On Corallines, &c., common.

This is generally of a faint purple colour, and rarely exceeds half an inch in length. The tubes are neatly arranged in rows which run across the base, and kept separate in the centre by a groove which winds along the branches. The walls of the tubes are minutely frosted.

VI. Z. APOLYPA.

19. HALICHONDRIA.

1. *H. palmata*, elastic, fibrous, reticulated, the meshes irregularly quadrangular; erect, irregularly branched; branches compressed; fecal orifices circular, dispersed all over the sponge, with entire and slightly raised margins; spicula straight or slightly curved, pointed at each end. *Palmated Sponge.*

H. palmata, *Flem. Br. Anim.* 523.

Spongia palmata, *Sib. Scot.* ii. lib. quart. 55; *Soland. Zooph.* 189. t. 58, fig. 6; *Turt.*

Brit. Faun. 209; *Lam. Hist. Nat.* ii. 379; *Lamour. Corall.* 181; *Montagu* in *Wern.*

Mem. ii. 80.

Hab. Deep water. On the coast at Holy Island.

My specimen of this species is eight inches in height. The fibres, as Dr. FLEMING remarks, have a centro-peripheral and distal direction, and form an irregular net-work at the

surface, the meshes bounded by threads that are somewhat toothed or spinous. The fecal orifices are numerous, and dispersed all over the sponge.

2. *H. papillaris*, encrusting, spreading irregularly; the surface porous, and studded over with large often papillary fecal orifices with smooth margins; spicula fusiform, slightly curved (tab. nost. ix. fig. 3.)

H. papillaris, *Flem. Brit. Anim.* 520.

Spongia informis durior, compressa, *Raii Syn.* 30.

Spongia urens, *Soland. Zooph.* 187.

S. tomentosa, *Montagu* in *Wern. Mem.* ii. 99.

S. papillaris, *Montagu* in *Wern. Mem.* ii. 90; *Grant* in *Edin. New Phil. Journ.* for Oct. 1826, p. 121, tab. ii. fig. 21, and fig. 2; also in the number for April, 1826, p. 343.

Sponge like crumb of bread, *Ellis*, *Corall.* 80. t. xvi. f. d.

Hab. On rocks and the stalks of the large Fuci, near low-water mark, very abundant.

Forms an irregular and often very extensive crust on rocks and sea-weed, from one-eighth to a quarter of an inch in thickness. The colour is in general a dirty orange-yellow, sometimes with a considerable mixture of green: in texture it is finely cellular, rather firm, and perforated with wide canals which open on the surface in the form of papillary tubercles, but sometimes even with it. The edges of the external orifices are simple and entire; and within them we can readily discover from two to five smaller and separate holes of unequal sizes. The spicula are very numerous, interlaced in every direction, but forming obscure stellated figures: they are siliceous, crystalline, slightly curved, and tapered at the ends.

20. GRANTIA.

1. *G. compressa*, compressed, tubular, with simple terminal and lateral orifices; spicula of two kinds, triradiate and clavate.

G. compressa, *Flem. Brit. Anim.* 524.

Spongia compressa, *Grant* in *Edin. New Phil. Journ.* for April 1826, p. 166, and for Oct. 1826, p. 127, tab. ii. f. 11, 12, 13, and 23.

S. foliacea, *Montagu* in *Wern. Mem.* ii. 92, tab. xii.

Hab. On sea-weeds and rocks near low-water-mark, common.

Sponge greatly compressed, compact, white, oval, generally about half an inch in height on our coast. MONTAGU says, this species "is always observed to be pendent," but this is not uniformly the case, and indeed we have found it in situations where to grow pendent was a physical impossibility.

2. *G. botryoides*, small, white, clustered, irregularly branched tubular, minutely tomentose; branches oblong, cylindrical, with a terminal simple orifice; spicula tri-radiate.

G. botryoides, *Flem. Brit. Anim.* 525.

Spongia botryoides, *Soland. Zooph.* 190, tab. 58, fig. 1, 4; *Turt. Lin.* iv. 660; *Lam. Hist. Nat.* ii. 382.

Sp. complicata, *Montagu* in Wern. Menr. ii. 97, tab. 9, fig. 2, 3.*

Hab. At the roots of the smaller sea-weeds.

This small species grows in a thickly clustered manner, so that it is often difficult to ascertain the exact height and limits of a single specimen. I have a specimen which appears to be nearly an inch in height; the branches are slender, about a line in diameter, and often inosculate.

3. *G. ciliata*, small, white, simple, sub-cylindrical, tubular, slightly contracted towards the terminal aperture which is encircled with a row of erect radiating spicula.

G. ciliata, *Flem.* Brit. Anim. 525.

Spongia coronata, *Soland.* Zooph. 190, tab. 58, fig. 8, 9; *Montagu* in Wern. Mem. ii. 88; *Lam.* Hist. Nat. ii. 370.

Hab. On the roots of the smaller sea-weeds.

I have once only met with this species on our coast; the specimen was half an inch in height. "The surface is closely covered with linear pointed spicula, having a terminal direction; in the substance of the sponge, besides those linear, there are other tri-radiated spicula. The internal surface is full of irregularly shaped pores."—*Fleming*.

21. MILLEPORA.

1. *M. polymorpha*, encrusting, irregular, surface very uneven and studded over with mammillary tubercles perforated on the top; or even and smooth.

M. polymorpha, *Linn.*; *Soland.* Zooph. 130; *Turt.* Brit. Faun. 205; *Stew.* Elem. ii. 428; *Hogg's* Stockton, 37; *Flem.* Br. Anim. 528.

Hab. On rocks, very common.

Crust of a dull purplish colour, adherent throughout, inclined to spread circularly, at first very thin, even, and smooth, but afterwards often studded over with close-set mammillary tubercles perforated on the top. When old, or when placed in favourable situations, it attains a quarter of an inch in thickness, and becomes very uneven and knobbed.

I have quoted the above synonymes without any mark of doubt because the authors agree that the species intended by them is common on all the British coast, and that described by us is the only one which is so. At the same time I must remark that the figure of *ELLIS* which they refer to (*Corall.* t. xxvii. f. c) is very unlike any thing I have seen on this coast, and is surely a different species. Were it not that *DR. FLEMING* seems to consider the *Millepora lichenoides* of *ELLIS* and *SOLANDER* as comparatively rare, and confined to the "English coast," I would have referred our Millepore to that species. The figure (*Soland.* Zooph. tab. 23, f. 10, 11, 12) is not uncharacteristic, and the description is at least as applicable as that of *M. polymorpha*.

22. CORALLINA.

1. *C. officinalis*, much branched, bushy, fastigate; branches dichotomous or trichotomous,

* This valuable essay of a very excellent naturalist *LAMOROUX* has ascribed, with culpable carelessness, to *MR. DONOVAN*.—*Encyclop. Meth.*, Vers. ii. 327, &c.

doubly pinnate; joints somewhat compressed, longer than their diameter, enlarged upwards; the short lateral shoots cylindrical, with longer joints, the ultimate pointed or capitate. *Officinal Coralline.*

C. officinalis, *Linn.*; *Soland. Zooph.* 118, t. 23, f. 14, 15; *Turt. Lin.* iv. 671; *Turt. Brit. Faun.* 211; *Stew. Elem.* ii. 439; *Lam. Hist. Nat.* ii. 328; *Lamour. Corall.* 127; *Bosc, Vers.* iii. 77, t. 28, f. 2, a bad copy of *Ellis's*; *Flem. Brit. Anim.* 514; *Hogg's Stockton*, 38; *Loud. Journ.* 1, 278, f. 148, *d*; *Stark, Elem.* ii. 426, t. viii. f. 4, a copy of *Ellis's*; *Grant*, in *Edin. Phil. Journ.* xiv. 183.

Coralline anglica, *Ger. Herb.* 1572, cum fig.; *Raii Syn.* 93, No. 1.

Muscus corallinus albus et purpureus, *Sib. Scot.* ii. lib. quart. 55.

Coralline of the shops, *Ellis*, *Corall.* 48, t. xxiv. No. 2, *a*.

Hab. On rocks in pools left by the recess of the tide, most abundant.

From one to four inches high, of a dull purplish colour when recent, but becoming very white when left to bleach on the shore. Many modern naturalists of eminence are of opinion that the *Corallinæ* belong to the vegetable kingdom (as BASTER always maintained in opposition to ELLIS), an opinion which has been much strengthened by the observations of Professor SCHWÄGGER of Königsberg.—See the *Edin. New Phil. Journal*, vol. i. p. 220. I have made many experiments on our species both when recent, and after being macerated in weak acids, but I could never detect the slightest vestige of any animal or polype.