

LIII. *An Account of the Sea Pen, or Pennatula Phosphorea of Linnæus; likewise a Description of a new Species of Sea Pen, found on the Coast of South-Carolina, with Observations on Sea-Pens in general. In a Letter to the Honourable Cote Moleworth, Esq; M. D. and F. R. S. from John Ellis, Esq; F. R. S. and Member of the Royal Academy at Upsal.*

Dear Sir,

Read Dec. 22, 1763. I Should make some apology for deferring so long the account I promised you of the Animal you were so kind to send me in February 1762, which was taken in a trawl in 72 fathoms water near the harbour of Brest in France; but a new species coming to my hand occasioned this delay. This curious sea-production, I find, by your letter, you took for a new kind of coralline, and not without reason, when upon examining it (as it was not long taken out of the sea) there were still remaining several of the suckers like heads of Polypes disposed along its sickle-shaped Pinnulæ. But when you hear of more of its properties, you will agree with me, that it belongs to another class of Animals; I shall mention only one at present, till I come to describe it more particularly, and that is, that it floats or swims about freely in the sea; whereas Corals, Corallines, Alcyonia, and all

all that order of beings, adhere firmly by their bases to submarine substances.

This Animal was well known to the ancients by the name of the Sea-Pen; many of the old authors took it for a Fucus or Sea-Plant.

This species of yours has been found in the Ocean from the coast of Norway to the most remote parts of the Mediterranean Sea, and not only dragged up in trawls from great depths of the sea, but often found floating near the surface.

Dr. Shaw, in his History of Algiers, remarks that they afford so great a light in the night to the fishermen, that they can plainly discover the fish swimming about in various depths of the sea. From this extraordinary property Doctor Linnæus calls this species of Sea-Pen, *Pennatula Phosphorea*, and remarks, after giving the synonyms of other authors, *Habitat in Oceano fundum illuminans*.

In order to attempt a description of it; the outward appearance of this Animal is not unlike one of the quill feathers of a bird's wing, but they are found of different sizes from 4 to 8 inches in length; this of yours is about 4 inches long; the lower half of it, is naked round and white, not unlike the quill part of a writing pen; the upper part represents that of the feathered part of the pen, and is of a reddish colour, but faded by soaking it often in water in order to examine it more minutely. This upper half (which arises from the quill and is feathered on both sides) is a little compressed and becomes smaller and smaller till it ends in a point at the top; along the back of this, in the same manner as in the inner side of a common writing pen, there is a groove in the middle from
the

the quill to the extremity: from each side of this upper part of the stem proceed little parallel feather-like fins; these begin at the top of the quill part, very small on each side at first, but lengthen as they advance towards the middle; from hence they shorten gradually on each side, till they end at a point at the top; their terminations preserving on each side the figure of the segment of a circle. I come now to consider more minutely those Pinnulæ, or feather-like fins, that project on each side and form the upper part of this animal. These are evidently designed by nature to move the animal backward or forward in the sea, consequently to do the office of fins, while at the same time, by the appearance of the suckers or mouths furnished with filaments or claws, they were certainly intended to provide food for its support; for notwithstanding what Dr. Linnæus has said in regard to its mouth in his system of nature, viz. *Os baseos commune rotundum*, I could not, with the help of the best glasses, discover that the point of the base was penetrated in the least, so that I am clearly of opinion, that this animal, like the Hydra Arctica or Greenland Polype, which I have described in my Essay on Corallines, nourishes and supports itself by these suckers or Polype-like figures; that by these, both kinds take in their food, and have no other visible means of discharging the exuvie of the animals they feed upon, than by the same way which they take them in; and that, from attentively considering the structure and manner of living of both these animals, I shall make no doubt in classing them in the same genus of Pennatula, though they vary

very much in their exterior form and size, and consequently are of very different species.

The stem of the suckers of this animal is of a cylindrical form; from the upper part proceed 8 fine white filaments or claws to catch their food: when they retreat on the alarm of danger they draw themselves into their cases, which are formed like the denticles of the Corallines; but here each denticle is furnished with spiculæ, which close together round the entrance of the denticle, and protect this tender part from external injuries.

Some time after I had made my remarks on this very extraordinary animal, the Royal Society did me the honour to recommend to me, for my opinion, some very curious observations lately published by Dr. Bohadsch of Prague, a book of great merit, which shews that the author has taken a good deal of pains, in examining very minutely into those animals called by the old authors Zoophytes: but as many of them have not the least resemblance to vegetables, I shall beg leave to pass over such, and only confine myself to this class of the *Penna marina*, which he seems to have been happy in observing; and therefore shall take the liberty to add such of his observations, as the opportunity of his seeing this animal alive in sea-water afforded him, without which it would have been impossible for me to have had the pleasure of gratifying you, and the rest of the Royal Society, so fully on the subject.

Some of the most curious remarks of Doctor Bohadsch on the anatomy of this animal, as also on the appearance of it while alive in sea-water, are as follows.

“ When the trunk is opened lengthways, a salt-
 “ ish liquor flows out of it, so viscid as to hang
 “ down an inch; the whole trunk of the stem is
 “ hollow, its outward coriaceous membrane is more
 “ than a line thick, and forms a strong covering
 “ to it: between this and another thinner membrane
 “ of the pinnated part of the trunk are innumerable
 “ little yellowish eggs, floating in a whitish liquor,
 “ about the size of a white poppy seed; these are
 “ best seen, when the trunk is cut across: This
 “ thin membrane lines the whole inside of the
 “ trunk, in which we observe nothing but a
 “ kind of yellowish bone, which takes up three
 “ parts of the cavity.

“ This bone in some of these animals is above
 “ $2\frac{1}{2}$ inches long and about half a line thick; in
 “ the middle part of it, it is four square or quad-
 “ rangular; towards each end of it, it grows round
 “ and very taper: that end is smallest, which is
 “ nearest the top of the pinnated trunk. The
 “ whole bone is covered with a yellowish clear
 “ skin, which at each end changes into a liga-
 “ ment; one of which is inserted in the top of
 “ the pinnated trunk, the other in the top of the
 “ naked trunk; by the help of this upper liga-
 “ ment, the end of this little bone is either con-
 “ tracted into a very narrow arch, or dis-
 “ posed into a straight line, according to the
 “ motion of the trunk.

“ The fins likewise are composed of two skins;
 “ the outward one strong and leathery and covered
 “ over with an infinite number of crimson streaks,
 “ the inner skin is thin and clear: The cylindrical

“ part of the suckers are in the same manner, only
 “ with this difference, their outward skins may be
 “ softer.

“ Both the fins and suckers are hollow, so that
 “ the cavity of the suckers may communicate with
 “ the fins, as their cavity does with the trunk.

“ We now come to the appearance which this
 “ animal makes when alive in sea-water.

“ The trunk then was contracted circularly at
 “ the bottom of the naked part of the stem, and
 “ by this contraction formed a zone of the most
 “ intense purple, which moved upwards and
 “ downwards successively: When it moved up-
 “ wards through the length of the pinnated trunk,
 “ it there became paler, and at length terminated
 “ at the top: the motion being scarce finished, a
 “ like zone appeared at the end of the naked trunk,
 “ which finished its motion in the same manner
 “ as the former.

“ When this zone becomes very much con-
 “ stricted on every side, the trunk above it swells
 “ and acquires the form of an onion; and then
 “ it appears, as if a compressed globe moved along
 “ through the whole space of the trunk; this con-
 “ striction of the trunk gives that fine red colour
 “ to the zone; for when the skin of the trunk
 “ is outwardly full of purple papillæ, the interme-
 “ diate spaces are of a whitish colour. In this
 “ constriction then of the skin the intermediate
 “ spaces are obliterated and the papillæ are
 “ brought nearer together; consequently only the
 “ purple colour presents itself to the eyes and ap-
 “ pears more bright.

“ More-

“ Moreover the end or apex of the naked trunk
 “ is sometimes curved like a hook, and sometimes
 “ extended in a right line; both these motions
 “ then must be directed by the little bone in the
 “ inside, and from this motion of this little in-
 “ ternal bone, that sinus or cavity at the lower end
 “ of the trunk (thought by authors heretofore to
 “ be the mouth) seems plainly to be formed; for
 “ sometimes it is deeper, sometimes shallower;
 “ it is deeper while the moveable globe appears
 “ in the middle of the pinnated part of the trunk,
 “ and shallower when it is in the bottom of the
 “ naked trunk, at which time the bone is most
 “ extended.

“ The fins or pinnulæ have four different motions;
 “ they are moved both towards the naked stem,
 “ and towards the pinnated stem; sometimes they
 “ are drawn in very much to the belly, a little af-
 “ ter they are inclined to the back; further, the
 “ fleshy filaments or claws move in all directions,
 “ and the cylindrical part with the filaments is
 “ either extended out or drawn in and hid in
 “ the fins.” Doctor Bohadsch concludes this
 chapter by observing, that there are some varieties
 to be met with in these red Sea-Pens: some, he says,
 are paler and inclining to a rose colour, others of an
 intense deep red: in the first kind he remarks that
 there are fewer denticles or tentacula (from whence
 the suckers proceed) in the fins, and that these are
 placed in one row within half a line of one another;
 but in the latter, he says, the tentacula are placed in
 a double row and as near as they can be together:
 this is the Pennatula of which I have just now given
 you his account, and which he saw alive in sea-
 water.

water. The other seems to be the same with yours, and is, no doubt on it, Linnæus's *Pennatula Phosphorea*, so that he concludes them to be two distinct species, and calls them by the following names, viz.

Penna (Rubra) pinnis falciformibus, tentaculis in pinnarum facie concava densissime dispositis.

Penna (Rosea) pinnis falciformibus, tentaculis in pinnarum facie concava laxè dispositis.

In the three following chapters Dr. Bo- hadsch describes three other kinds of Sea-Pens. One he calls *Penna Grisea* or the Grey Sea-Pen with crenated fins; this is figured and described from a dry specimen in Seba's Museum, Tom. III.

The next is a very singular one without fins, having a square bony stem 2 feet 10 inches long, covered with a skin, and furnished on 3 sides with tentacula or suckers: but this was unfortunately broken off at the bottom before he received it: he says, the fishermen call it *Penna del Pesche de Pavone*, or the Feather of the Peacock-fish. To these he has added the Alcyonium called, *Manus marina*; he calls it *Penna ramosa pinnis carens, tentaculis in ramis positis*, and in another place, *Penna Exos*. In order to give you and the rest of the Royal Society some idea of these extraordinary Animals, I have copied his figures, and also the figures of the three last species of Linnæus's *Pennatula*, viz. his *Pennatula (Filosa)* *Pennatula (Sagitta)* and *Pennatula (Mirabilis)* from the authors which he refers us to, and have added an exact delineation of our *Alcyonium (Manus marina)* or Dead mans hand, with some microscopical drawings of different sections of it, to shew that although the substance of it is fleshy, yet that it approaches much nearer to the

Madre-

Madrepora Corals, than to any known species of the genus of Animals called Pennatula. — At the same time I allow his remark to be very just, where he observes that the *Hydra Arctica* or Great Greenland Polype, which I have described in the Philosophical Transactions, and in my Essay on Corallines, is certainly a species of Pennatula; but he will find, from both the drawing and description, which I have given of it, that it is not fixt by its base, but floats freely about in the sea; whereas this Alcyonium as well as his (which differs in colour from ours) are always found fixt by their base to some solid submarine body, and consequently cannot be admitted among the Pennatulæ.

I must now conclude this letter with a short account of a new discovered species of Pennatula, which my ingenious friend John Greg Esq; of Charles Town in South-Carolina, discovered on that coast and presented to me some time ago. This beautiful purple animal is of a compressed kidney shape. The body is about an inch long, and half an inch across the narrowest part, it has a small roundish tail of an inch long proceeding from the middle of the body, its tail is full of rings from one end to the other like an Earth-Worm, and along the middle of the upper and under part of it there is a small groove which runs from one end to the other. I examined carefully the point of the tail and could find no perforation in it, which is agreeable to what I have observed in the rest of this genus.

The upper part of the body is convex and near a quarter of an inch thick; the whole surface of it is covered over with minute yellow starry openings, through

through which are protruded little suckers like polypes each furnished with 6 tentacles or filaments, like what we observe on some of the Corals, and seem to be the proper mouths of the animal. The under part of the body is quite flat, this surface is full of the ramifications of fleshy fibres, which, proceeding from the insertion of the tail, as their common center, branch themselves out, so as to communicate with the starry openings on the exterior edge and upper surface of this uncommon animal: for a clearer idea I must refer you to the figure of this, as well as that of your own Pennantula, and am,

Dear Sir,

London, Dec. 15, 1763.

Your much obliged

Humble Servant,

John Ellis.

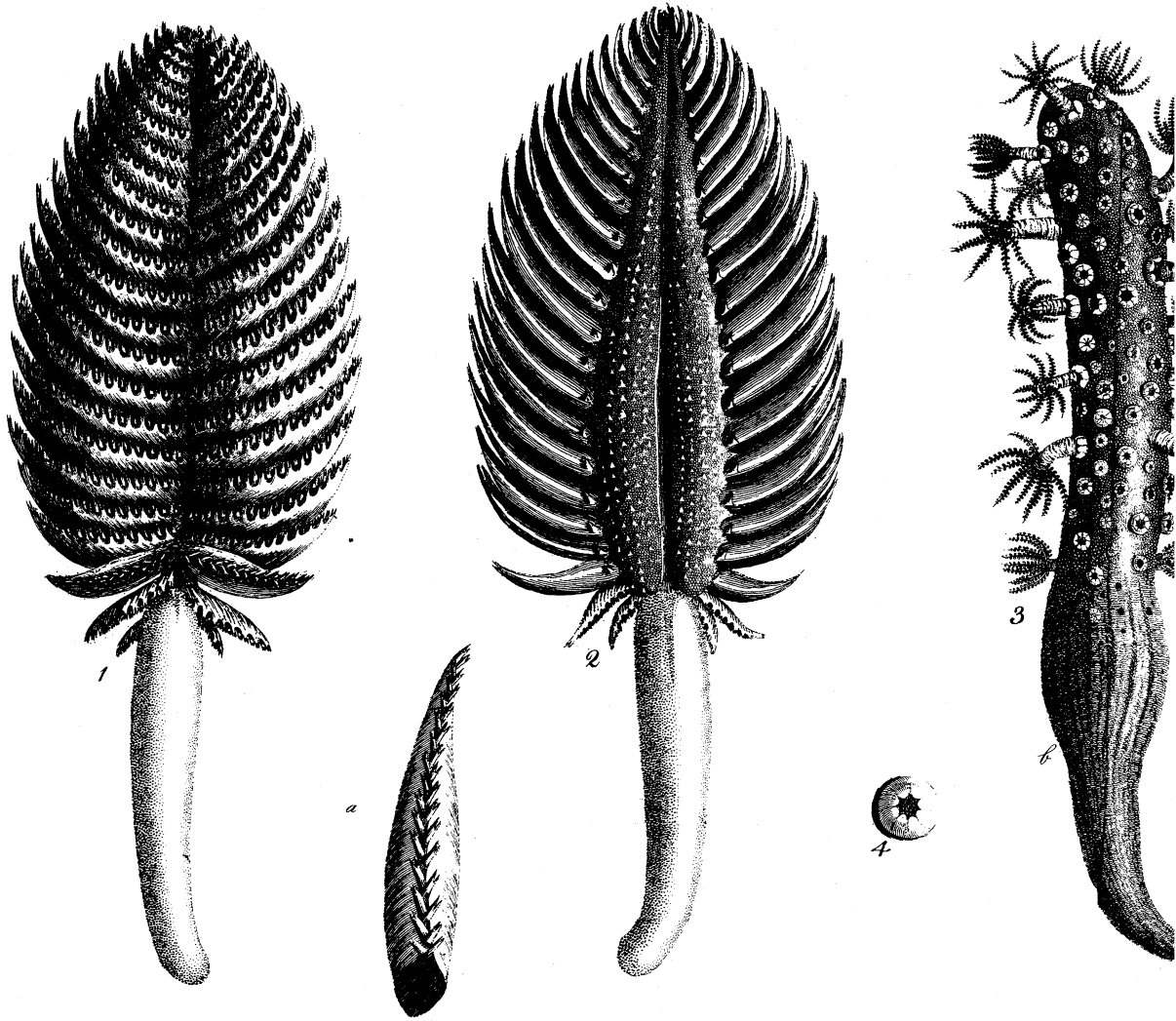


FIG 1. *The front of the red Sea Pen.*

2. *The back of the same.*

a. *One of the Fins showing the Order in which the Denticles are placed.*

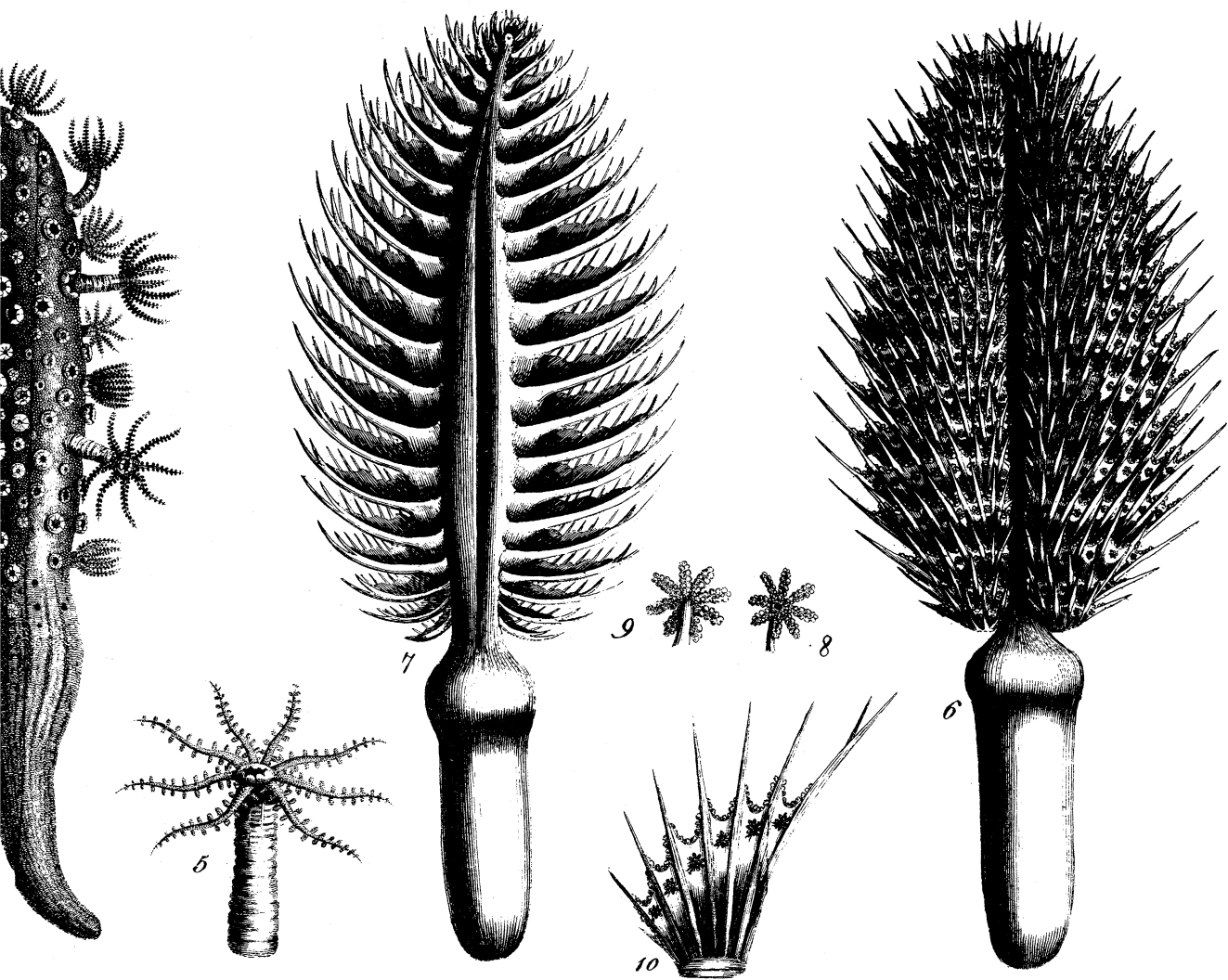
3. *The Finger shaped Sea Pen, or Cynomorion.*

b. *The Furrows show, that the Animal can extend, or contract this Part.*

4. *The Papilla or C...*

Polype like Sucker,

5. *The Sucker magn...*



itta' or Cell, from whence the
 Sucker proceeds.
 or magnified.

6. The front of the Thorny Sea Pen.
 7. The back of the same.

8. The front of one of the Suckers.
 9. The back of the same.
 10. One of the lower Fins magnified.



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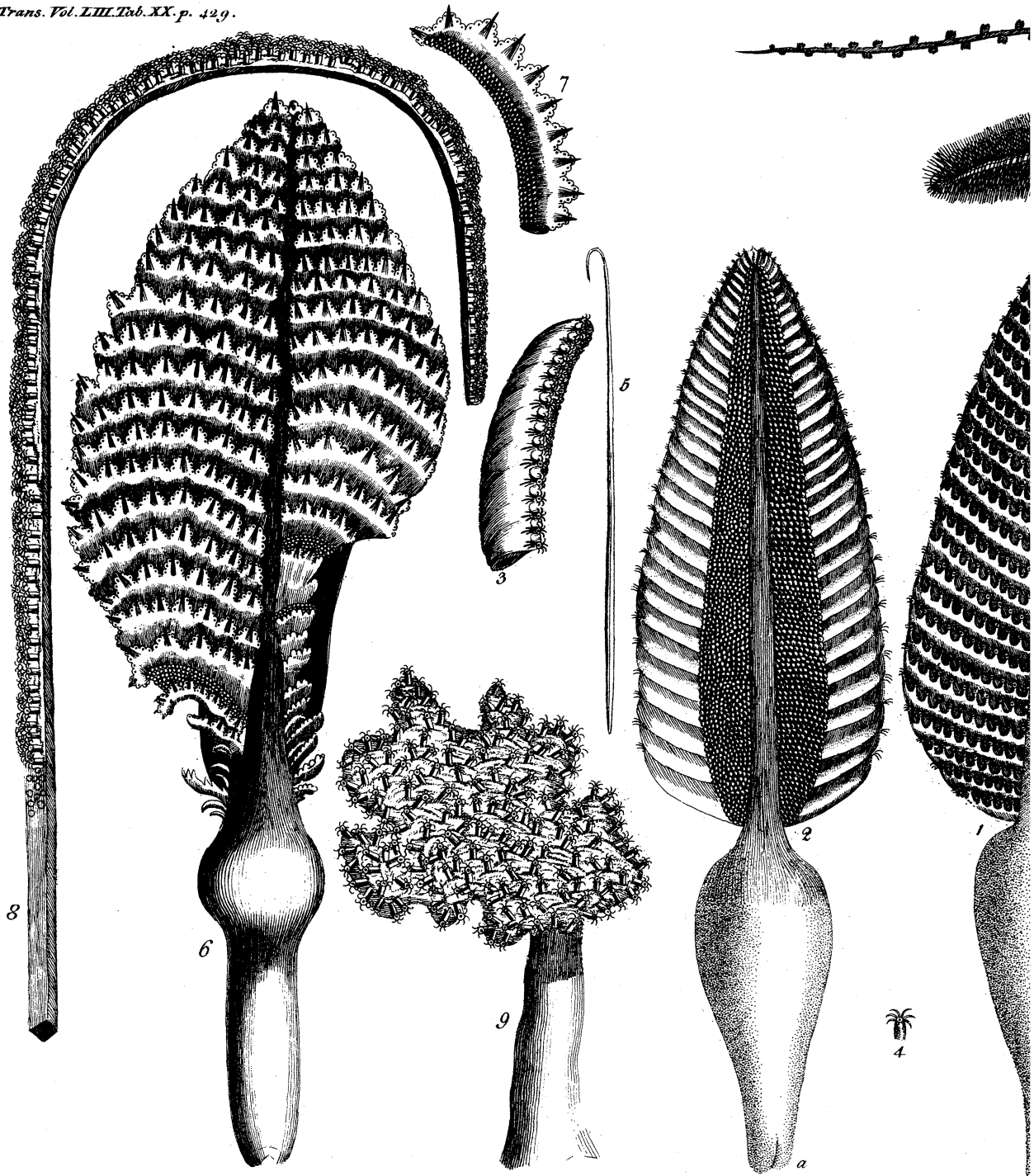
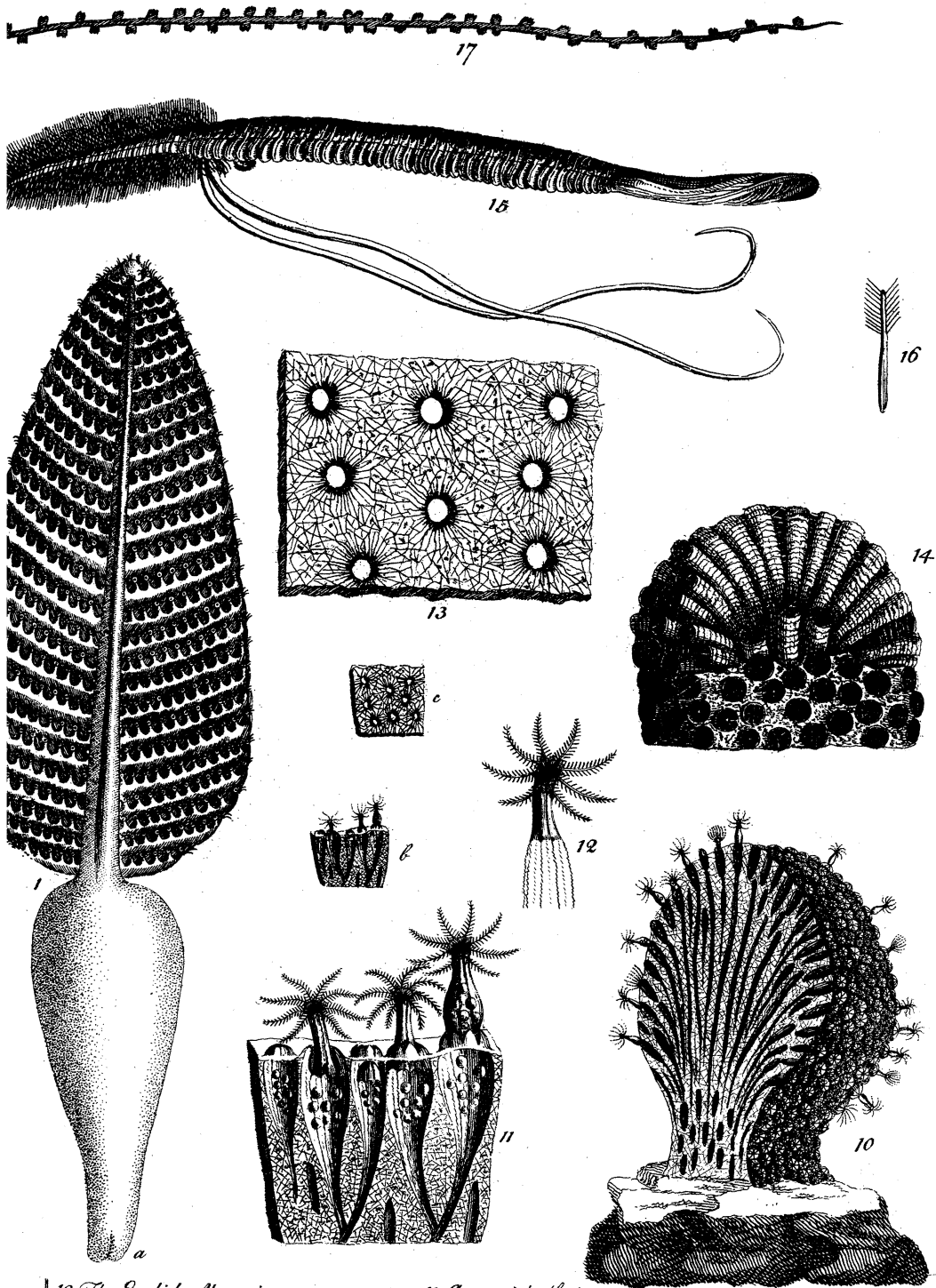


FIG. 1 and 2 The front & back of D. Bohadsch's red Sea Pen. a a The hollow or Sinus at the bottom of it.
 3. One of the Sinus magnified. 4. One of the Suckers separated. 5. The bone taken out of the middle part of the penneated stem.
 6. The gray Sea Pen. 7. One of its crenated Sinus. 8. The Sea Pen call'd the Pen of the Peacock Fish.
 9. The *Steyonium manus marina*, or dead man's hand call'd by D. Bohadsch *Penna Eros*.

10. 6
 m
 13. 5
 14. 6



10. The English *Alcyonium maritimum*. 11. An upright Section of it magnified. *b* The natural size. 12. The Polype like Hooker taken out of its Cells. 13. Across Section magnified. *c* The natural Size. 14. A Madrepore Coral formed like the *Alcyonium*.

15. Linnæus's *Pennatulula filosa*.
 16. *D*^o *Pennatulula lugens*.
 17. *D*^o *Pennatulula mirabilis*.

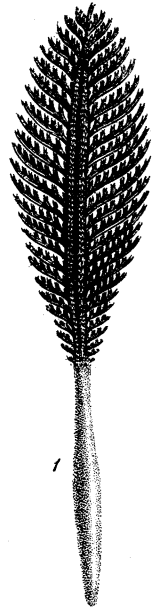
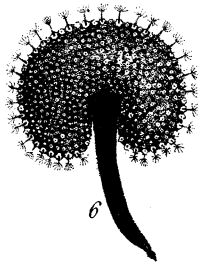
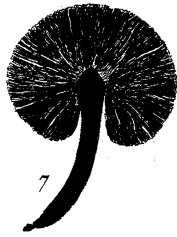
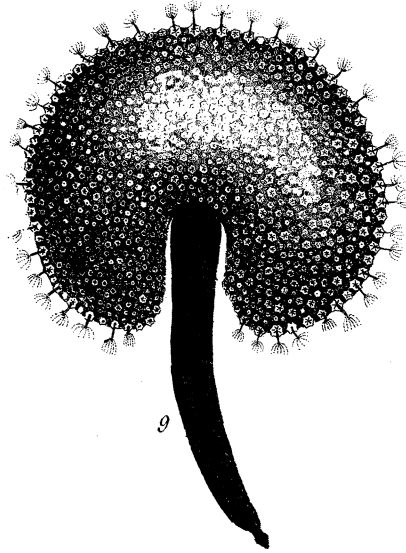
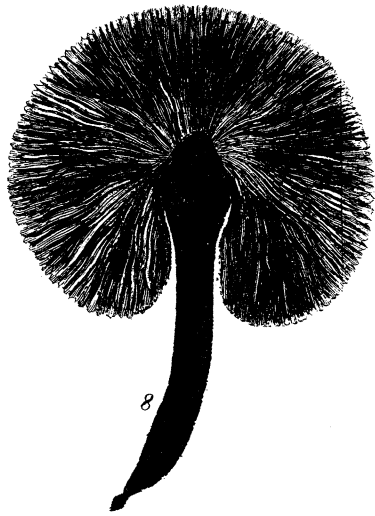


FIG. 1. The back of the Sea Pen or Pennatulid Phosphorea of Linnæus, from the Coast of Brest. 2 The fore part of the same. 3 and 4. Both Sides magnified. 5. One of the Fins highly magnified to show the Polypo-like Suckers.

6. The Kidney shaped purple Sea Pen from S. Carolina, w. openings on the Back. 7. The under Part of the same showing the Branch'd Fibres on rays from the insertion of the Stem.



colina, with the Starry
Fibres coming out like

8 and 9. Both Sides of the Kidney shaped Sea Pen magnified.
10. A part of the edge of the upper Surface highly magnified to shew the Suckers &
openings of the Cells.

P. S. Just when the two plates XIX and XX of the Pennatula were finished, and sent to the Printer, I received three kinds of Sea-Pens, finely preserved in spirits, from my learned friend Thomas Pennant Esq; of Bychton in Flintshire, which he informs me were sent him from the Mediterranean-Sea. One of them is intirely new to me, and, I believe, not yet described; the other two, which are the Red and the Gray Sea-Pens of Dr. Bohadsch, are so very indifferently designed by the Doctor's painter, and which I have copied in Plate XX, that I thought a better drawing would give you a clearer idea of these strange animals, and be more agreeable to the Royal Society in general.

An Explanation of the Plates.

Plate XIX.

- FIG. 1. The back part of the Red-Sea-Pen, or *Pennatula Phosphorea* of Linnæus. This was found on the coast of France, they are frequently met with on the coasts of Norway and Sweden.
2. The front of the same.
 3. and 4. Both sides of the same magnified.
 5. One of the fins more highly magnified, to shew the Polype-like suckers by which it takes in its nourishment.
 6. The kidney-shap'd purple Sea-Pen from South-Carolina in its natural size; this upper part is full

of starry openings, which send out small suckers like polypes by which it feeds.

7. The under part of the same, with its ramifying fibres, that lead from the insertion of the stem as from a center to the circumference, and correspond with all the starry openings on the edge and back of it.

8 and 9. Both sides of this animal magnified.

10. A part of the exterior edge higher magnified, to shew the form of the starry openings and suckers, which consist of 6 rays and claws.

Plate XX.

The four following Sea-Pens were found by Dr. Bohadsch, in the Sea, near Naples.

- Fig. 1. Represents the forepart of the Red-Sea-Pen with many rows of suckers on its fins.
2. The back part, the middle of which is covered with the appearance of small papillæ.
3. One of the fins magnified.
4. One of the suckers separated.
5. The bone taken from the internal part of the pinnated trunk; this is fastened to ligaments at both ends which are likewise inserted in both ends of the animal. When the ligament at the base is contracted, it forms that sinus at *aa*, that has been taken for a mouth by most authors.
- . The Grey-Sea-Pen.
- One of its crenated fins. *N. B.* There is a figure of this Sea-Pen taken from a dried specimen in the third tome of Seba's Museum.

8. The

8. The Sea-Pen called by the Italian Fishermen *Penna del pesce Pavone*, or the Pen of Peacock Fish; this appears to be broken off, and is described to be yet 2 feet ten inches long, the square bony part of this is not so hard as that in the Red-Sea-Pen.
9. This last of Dr. Bohadsch's four Sea-Pens is the *Alcyonium* called by authors *Manus marina*, or vulgarly Dead-man's Hand: he calls it *Penna Exos* and the branched Sea-Pen without fins having suckers placed on its branches: but it by no means belongs to this class of animals, which float freely about in the sea; whereas this adheres to Rocks, Shells, or other marine substances. I have introduced our *Alcyonium Manus marina* or Dead-man's Hand, which is found in great plenty all round the coasts of the British Islands, to shew its internal structure, and how near it comes to the Madrepora Coral, which appears by its growth and form to be produced by animals of the same shape.
10. A piece of the *Alcyonium Manus marina*, cut perpendicularly through the middle, to shew that it is formed of tubes, which branch out into others, each ending on the surface in a starry opening of 8 rays; in each of these openings is a polype-like figure or sucker with eight claws, fastened to the inside of the tube at its lower part by 8 fine tender filaments, by which it can raise or sink itself at pleasure in its tube: all these tubes that compose this *Alcyonium* are connected together by minute reticulated fibres; these inclose a kind of stiff gelatinous substance, which
seems

seems to be the flesh of this compound animal, and these fibres with their inclosed contents to be the muscles; for by the exertion of these it assists in opening or closing the stars on the surface, while the suckers or polype-like figures are pushing themselves out in search of food, or when they are retreating to secure themselves from danger.

11. Is the magnified part of an upright section of this Alcyonium represented in its natural size at *b*. Here the polype like suckers appear in different attitudes; one has extended itself through the starry opening, and is sending forth it's spawn or eggs; at the base of the next sucker you may observe some of the tender filaments by which it is fixt to the bottom of the tube; the sucker next to this is contracted and its starry opening is closed over it; the cell or star next to this is cut in half to shew the manner that the sucker is placed in it.
12. Represents one of these suckers taken out of its cell.
13. Is a cross or horizontal section of a piece of this Alcyonium, the natural size is expressed at *c**.
14. The Madrepora coral is introduced here to shew how near it approaches to this Alcyonium in its external appearance and in the ramification of its tubes.

The

* The reticulated fleshy part of this Alcyonium approaches very near to the nature of sponges; for sponges, when first taken out of the sea, are filled with a gelatinous or mucous matter of a strong

The other 3 figures in this plate are introduced to shew the form of the Pennatula referred to by Dr. Linnæus, in his Syft. Nat. 10 Ed. p. 819.

15. Is the *Pennatula Filosa*, and is figured in Boccone's Recherches, pl. 287, pag. 287. This animal infests the Xiphias or Sword-fish in the Mediterranean-Sea by sucking their blood, and is called by Boccone, *Hirudo cauda utrinque pennata*.
16. Is the *Pennatula Sagitta*; it is described in Linnæi Amœnit's Vol. v. Chin. Lagerstr, p. 14. f. 3. and said to infest the *Lophius Histrion* or Sea-Bat, in the Chinese Sea.
17. Is the *Pennatula Mirabilis*. This is called the *Polypus Mirabilis*, and is described in the Museum of Adolphus Frederick King of Sweden, p. 96. t 19. f. 4.

strong fishy smell: Yet I much doubt whether Sponges have such polype-like suckers as the Corals, Alcyonia, and Pennatulæ, or are even produced by Worms, as the late ingenious Dr. Peysonel informs us; for in the title to the second part of his manuscript on this subject, which he dedicates to the Royal Society, he says, that Sponges, as well as Corals, Madreporas, &c. are produced by animals that are of a particular species of *Urtica marina* or *Purpura*; but I am inclined to believe he took this for granted from the similitude they bear to Corals, Alcyonia, &c. rather than from actual experiment. I rather take those holes, which I have observed in them, to be so many mouths upon the surface of the animal; and I am the more inclined to believe it, from a remark I made with Dr. Solander at the Sea-Coast of Suffex in the summer 1762; on the *Spongia Medullam Panis referens*, while it was in a glass vessel of Sea-Water; where we observed, that the Mamillæ that were on the surface opened and shut, but that no sucker or animal-like figure appeared to come out.

Explanation of Plate XXI.

Fig. 1. Represents the front of the Red-Sea-Pen a little larger than life, as are the figures of the two following Sea-Pens.

- a. One of the fins shewing, the alternate order in which the denticles incline like the teeth in a saw.
2. The back of the Red-Sea-Pen, with the rachis or middle part between the fins covered over with a rough skin like shagreen.
3. The finger-shaped Sea-Pen, or *Cynomorion*, called so from its likeness to the shape of the *Fungus Melitenfis*.

The upper part of this animal is covered over with circular cells, one of which is represented at Fig. 4, from whence proceed Polype-like suckers, having eight pennated arms or claws, one of which suckers is figured at 5.

The Rugæ or Furrows in the swelling part at *b*, shew that this animal can extend and contract this part, perhaps to raise or fall itself in the sea.

6. The front of the thorny Sea-Pen, called by Dr. Bohadsch *Penna grisea*.
7. The back part of it.
8. Shews the front of one of the suckers magnified.
9. — the back view of the same.
10. One of the lower fins a little magnified, which shews the position of the suckers, and the

the insertion of the spines; These spines are combined of many fine spiculæ, which unite and form one spine. When these spines open at top, each forms a star of small spiculæ, which nature seems to have pointed out as a protection for the mouths or suckers underneath, which have no other covering to defend them, whereas in the Red-Sea-Pen there is a circle of spiculæ to each sucker.

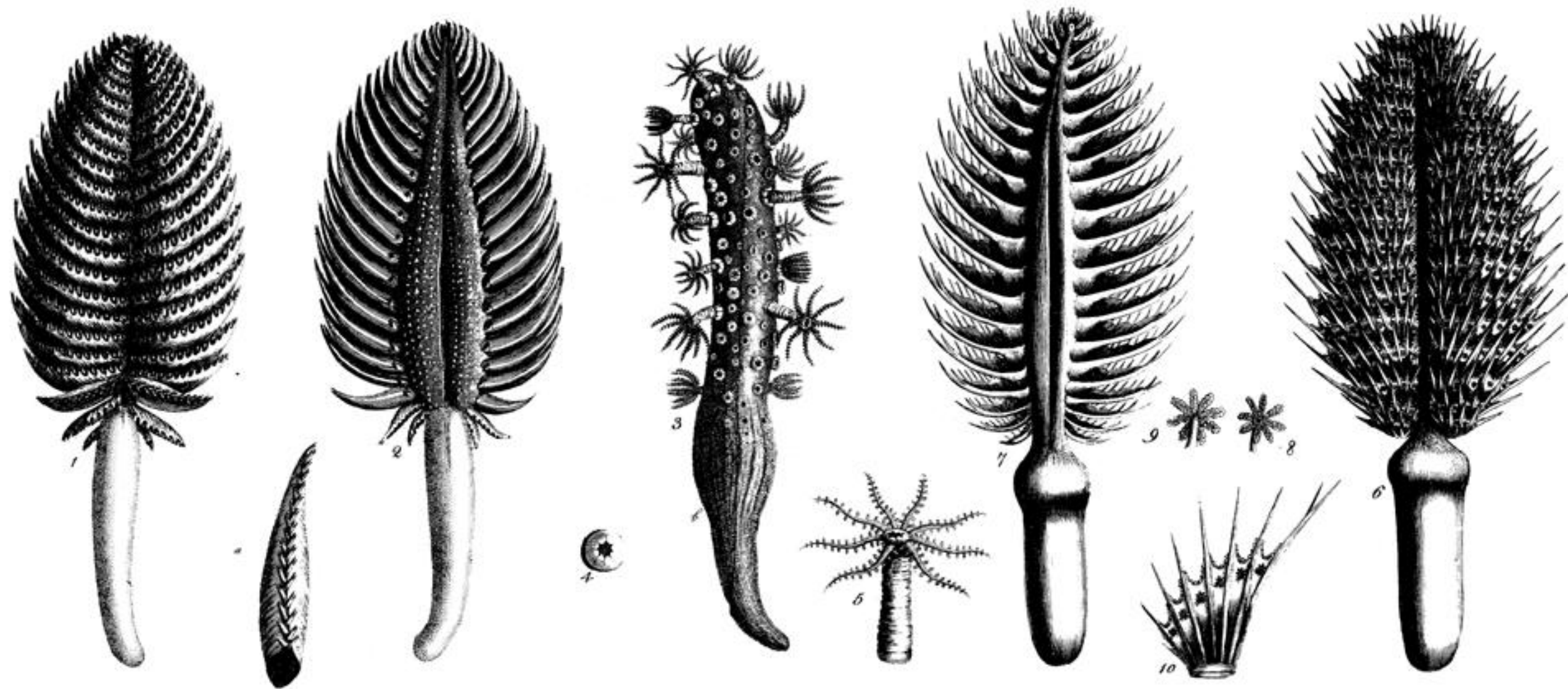


FIG. 1. The front of the red Sea Pen.

2. The back of the same.

a. One of the Fins showing the Order in which the Particles are placed.

3. The Finger shaped Sea Pen, or *Cynonion*.

b. The Furrows show, that the Animal can extend, or contract this Part.

4. The Papilla, or Cell, from whence the

Polype like Sucker proceeds.

5. The Sucker magnified.

6. The front of the Thorny Sea Pen.

7. The back of the same.

8. The front of one of the Suckers.

9. The back of the same.

10. One of the lower Fins magnified.

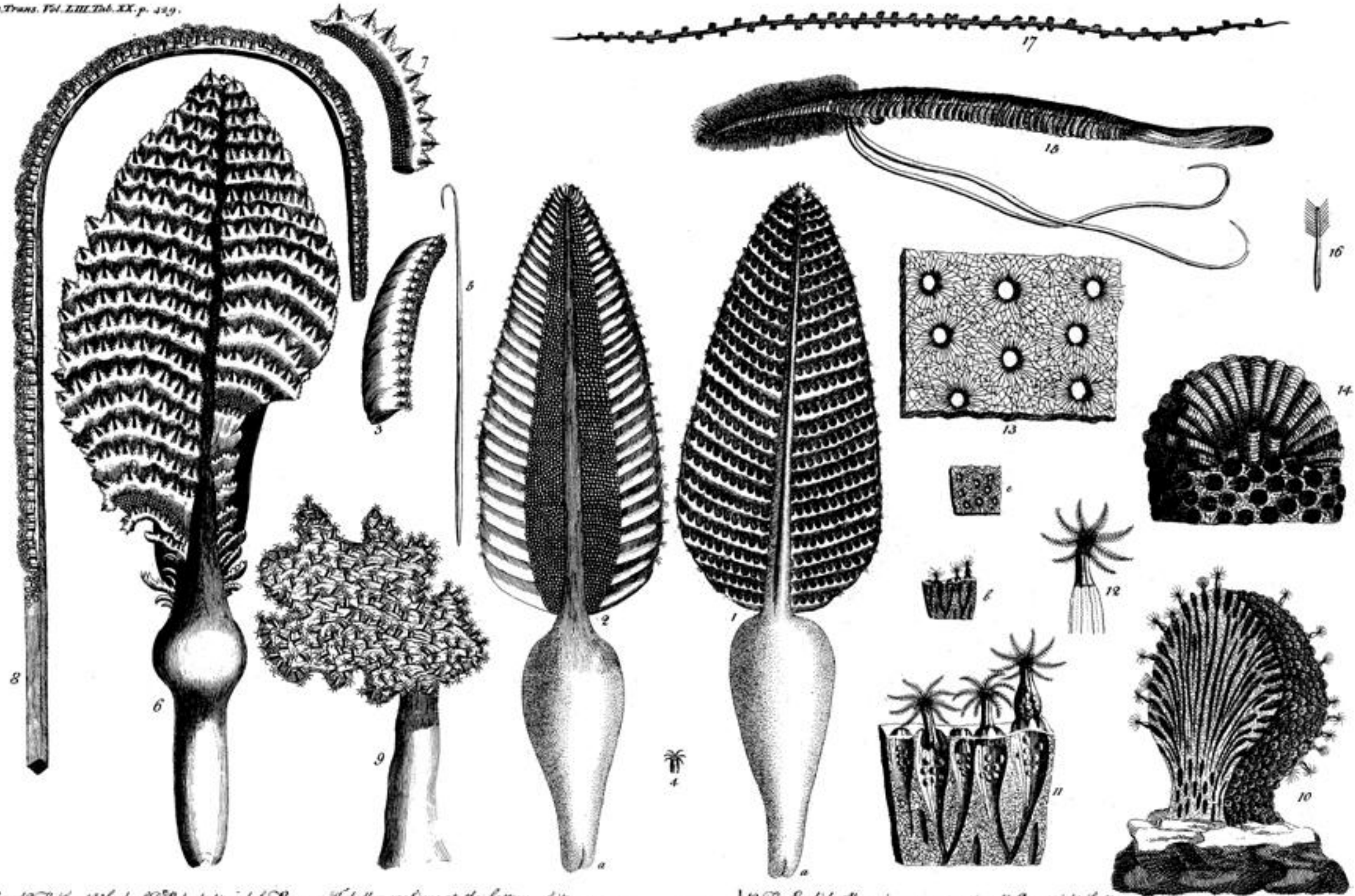


FIG. 1 and 2. The front & back of *S. Bohadichis* red Sea Pen. a. The hollow or stigma at the bottom of it.
 3. One of the Pins magnified. 4. One of the Suckers separated. 5. The base taken out of the middle part of the pennate stem.
 6. The gray Sea Pen. 7. One of its crenated Stems. 8. This Sea Pen called the Pen of the Porcupine Fish.
 9. The *Alcyonium maritimum*, or dead man's head called by *S. D.* Bohadich *Penna* Coes.

10. The English *Alcyonium maritimum*. 11. An upright Section of it magnified. 12. The sucker taken out of its Stigma.
 13. A cross Section magnified. 14. The natural size.
 15. A *Madrepora* Coral form'd like the *Alcyonium*.

16. *Livonius* *Pennatula* *felixa*.
 17. *Pennatula* *lappacea*.
 18. *Pennatula* *virabilis*.

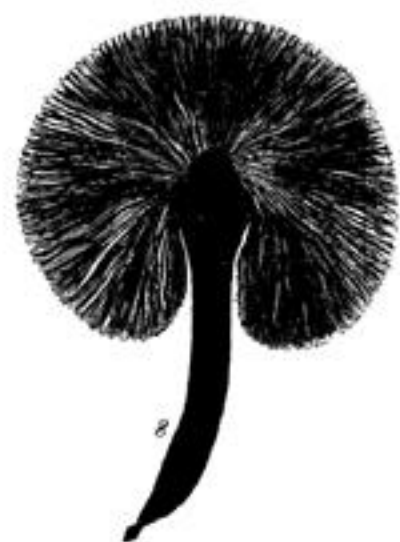


FIG. 1. The back of the Sea Pen or Pennatulidæ Phosphorea of Louisiana, from the Coast of Brazil. 2. The fore part of the same. 3 and 4. Both sides magnified. 5. One of the Pens highly magnified to show the Polyp-like suckers.

6. The kidney shaped purple Sea Pen from S. Carolina, with the lateral openings on the back. 7. The under part of the same showing the branchid tubes coming out like rays from the insertion of the stem.

8 and 9. Both sides of the kidney shaped Sea Pen, magnified. 10. A part of the upper surface highly magnified to show the suckers or openings of the cells.