

PHILOSOPHICAL
TRANSACTIONS:

**Extract of a Letter from John
Ellis, Esquire, F. R. S. to Dr.
Linnaeus, of Upsal, F. R. S. on
the Animal Nature of the Genus
of Zoophytes, Called Corallina**

John Ellis and Peter Woulfe

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XL. *Extract of a Letter from John Ellis, Esquire, F. R. S. to Dr. Linnæus, of Upsal, F. R. S. on the Animal Nature of the Genus of Zoophytes, called Corallina.*

Read July 9, 1767. **I** HAVE now finished a collection of that genus of Zoophytes, which you call Corallina; and, with the assistance of our learned friend Dr. Solander, have made a description of each species: to do this with more exactness, I have taken care to dissect them minutely, and to pass them in review under his eye in the microscope, in order to establish a true general character of this genus.

I have attended more particularly to examine the nature of these bodies, in order to confute the opinions of some late writers on Zoophytes, who, for want of good microscopes, and a proper care in chemically analysing them, have asserted that they were mere vegetables.

The first of these is Dr. Job Baster, of Zeeland, who, in the Philosophical Transactions, Vol. LII. p. 111, asserts that the Corallines of Linnæus, which he says he has accurately examined, are most evidently true plants of the genus of Conferva; because there are no polypes coming out of their tops, and that they have seed inclosed in their cells like other marine

rine plants *. But, as another part of this letter is intended for an inquiry into this new discovery of Dr. Baster's, that Corallines are Confervas; a thing never known even to the great Mr. Ray, Dr. Dillenius, or any other botanist, I shall now proceed to his ingenious friend Dr. Pallas of Berlin, who has lately resided in Holland, and who has taken great pains in collecting every thing that has been wrote on the subject of Zoophytes, from whence he has compiled a book called *Elenchus Zoophytorum*, where he has ranged the several genera and species of this class of beings in a systematical order.

When he comes to the genus of *Corallina*, he says (vide *Pallas Elenchus*, p. 418.) †, “ They are to be left to the botanists, as they belong to the vegetable kingdom; but makes this apology for inserting them, lest his book should be thought imperfect, as Linnæus and Ellis have ranked them as Zoophytes in their works.”

* *Corallinas*, non *Zoophyta*, quamvis Linnæus iisdem adnumeret, sed veras e confervarum genere plantas esse, luculentissime perspexi. Nunquam in earum apicibus polypi inveniuntur: semen contra cellulis inclusum eodem quo aliæ plantæ marinæ modo produunt. *Phil. Trans.* Vol. LII. p. 3.

† *Corallinas* ad vegetabilia referendas esse. Mihi vero totum hocce genus botanicis relinquendum videtur. Nec enim structurâ, nec chymicis principiis ad *Zoophytorum* ullum genus accedunt, et pleræque species etiam habitum prorsus peculiarem habent, aliquæ ad fucos potius accedentes, plurimæ confervis comparabiles, quamvis lapidescenti substantia ab iisdem et omnibus vegetabilibus distinctissimæ. *Pallas Elenchus Zoophyt.* p. 418.

He begins with observing, that they don't come near to any one genus of Zoophytes, neither in their structure nor chemical principles; that some species have a peculiar appearance, some approach to *Fucus's*, many are like *Confervas*; but that all of them are very distinct from them, and from all vegetables, on account of their lapidescent substance.

That they differ in their chemical principles from Zoophytes; for when they are burnt, they smell like vegetables: and that, according to Count Marfigli's Experiments (*Hist. Mar. p. 73.*) they neither contain a volatile salt, or animal oil.

That the pores, in their calcareous substance, are too small for polypes to inhabit them; and that the pores of *Fucus's* prove them to be as much animals as the *Corallines*, even when their pores are rendered more visible, by having the calcareous substance, that surrounds them, dissolved by an acid.

That the great *Jussieu*, in his diligent researches after marine productions could see no visible token of life in them.

That *Mr. Meese*, who has lately wrote a *Flora Frisca*, has found a *Coralline* growing upon a heath in *Frieland*; which, *Dr. Pallas* says, is a strong proof of their vegetable origin.

Lastly, that their fructification is so nearly analogous to those of *Fucuses* and *Confervas*, that he likewise takes that to be a proof of their belonging to the vegetable kingdom.

To proceed then. — *Dr. Pallas*, after telling us that *Corallines* are vegetables, says, that some of them are like *Fucuses*.

In

In this I must agree with him; because his first Coralline, which he calls *Corallina Pavonia*, is truly of that genus of plants: this most elegant *Fucus* I have particularly described and figured (Essay on Corall. p. 88. T. 33. fig. *c, d, e,*); it is well known by the name of Turkey-feather *Fucus*, and is called, in the *Species Plant.* p. 1630, *Fucus Pavonius*. What could have led Dr. Pallas into this mistake? most probably those beautiful farinaceous semi-circular stripes on it, which he must have taken for a lapidescent or calcareous substance*, one of the most distinguishing characters of a Coralline, even according to his own description of this genus. If he had tried this farinaceous substance with an acid, he might observe, that it would not ferment; it is of the same nature with the farina that covers many plants, for instance the *Primula Auricula*, and almost all the *Lichenes foliacei* and *fruticulosi*, or Liverworts. As to their similitude to the *Conserva*, the contrary will appear, as soon as I come to give the proper definitions to both these, and the Corallines. In the same paragraph he says, that the Corallines do not come near to any genus of Zoophytes.

How far he is mistaken in this assertion, I will endeavour to prove from the following experiments.

Break a thin piece from the *Corallium Anglicum*, Essay on Corall. T. 27. N. 1. *c.* (*Millepora Calcareo*, Pallas Elench. p. 265.) or of the *Corallium Lichenoides*, Essay on Corall. T. 27. N. 2. *d.*; both

* *Quamvis lapidescenti substantia ab omnibus vegetabilibus distinctissimæ.* Pallas, Elench. 418.

which, Dr. Pallas, in his Elench. p. 265. has confounded together under the name of *Millepora Calcareæ* (but which he confesses to be animal); and when you examine them in the microscope, you will find in them both regular series of cells, as figured in Essay on Cor. Tab. 27. Fig. D. Split at the same time one of the joints of the *Corallina Officinalis* of Linnæus lengthways, and you will find the series of cells * correspond in shape exactly with both the former; which I think proves the organization of these bodies to be the same, and consequently animal.

Besides these, compare the structure of the *Mi-riozoon* of Donati, Phil. Transf. Vol. XLVII. p. 107. Tab. 5. (*Millepora truncata*, Pallas Elench. p. 249.) with those of the *Corallina Rosarium*, and *Corallina incrassata*, both which I have carefully dissected and figured in Tab. XVII. Fig. 15, 20, &c. and there appears so great an affinity between their cells (and even in the opercula of the *Corallina incrassata*), that it affords us reason to conclude with great probability, that their mouths, or suckers, are the same. It cannot be amiss to mention the similitude there is between the stony-jointed Corallines, and the *Isis Hippuris*, or jointed black and white East Indian Coral, and the *Cellularia Salicornia*, Pallas Zooph. p. 61. or Bugle Coralline, Essay on Coral. T. 23. which two last are universally allowed to be animals: in all these are found the same kind of fibres that connect their joints, and exactly in the same manner.

In order to prove that these Corallines have a smell very different from vegetables, I must appeal to

* See Tab. XVII. fig. 12 and 13.

an experiment made publickly before the Society of Arts, Commerce, &c. and which gave them a satisfactory demonstration of the great difference in nature between Corallines and vegetable substances. It happened upon the following occasion. A gentleman of Wales had sent the society a parcel of Lichen tartareus, of Linn. Ed. 2. Sp. Pl. 1608. as a proper material for dying a red colour, to answer the same purpose of that expensive article among the dyers, called Orchell, or Canary weed, which is the Lichen Roccella of Linn. Sp. Pl. 1622.

As the object was of consequence, the society was very desirous of being fully informed of the nature and appearance of this useful dye; and therefore, several curious gentlemen of the society were desired, against the next meeting, to bring some specimens of true Orchell. Accordingly some specimens were obtained from the Orchell dyers in Southwark, and laid before the society.

At the same time Dr. Maningham, a member of that society, produced before the society a specimen, in a paper with Orchell wrote upon it, from Mr. Miller of Chelsea, likewise as the true Orchell: but, upon examining it, it proved to be the *Corallina nervo tenuiori fragiliorique internodia nectente* of Sir Hans Sloane's History of Jamaica, Vol. I. Tab. 20. Fig. 4. Some disputes arising on the different appearance of the specimens, I took the liberty to inform the gentlemen present, that, having lately made some experiments on Corallines, I believed that Mr. Miller's specimen was a Coralline, or animal substance, and the Lichen Roccella, or Dyers Orchell, was a vegetable; and in order to convince the society of the

difference, I called for a lighted candle, and having first set fire to the Lichen Roccella, it yielded the same smell that burnt vegetables usually do; but when the Coralline (which was Mr. Miller's specimen) was burnt, it filled the room with such an offensive smell like that of burnt bones, or hair, that the door was obliged to be opened, to dissipate the disagreeable scent, and let in fresh air.

Another argument that Dr. Pallas offers the world of the vegetable nature of Corallines, or rather a proof of their not being of an animal nature, are Count Marfigli's Chemical experiments on the *Corallina Officinalis* (Hist. Mar. p. 73.) where he says it neither contains animal oil nor volatile salts.

But, to prevent such plausible arguments from misleading mankind, I determined to have fair and accurate experiments made on this substance. Accordingly I applied to Mr. Peter Woulfe, F. R. S. a gentleman distinguished for his great knowledge in chemistry; and in order to have the specimens fresh from the sea, I applied to a worthy member of this Society, the Right Honourable the Earl of Hillsborough, for Mr. Potts, the Secretary to the Post-Office, to procure me a sufficient quantity of the *Corallina Officinalis* from the sea-coast near Harwich: this parcel, about two months ago, I sent to Mr. Woulfe; and in answer have received the following letter, with an account of his experiments made on it.

Clerkenwell,

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Clerkenwell, May 5, 1767.

S I R,

I TOOK twelve ounces troy of the *Corallina* *Officinalis* (which you sent me) picked clean from every extraneous substance, and put it into a clean stone-coated retort; the retort was set in a reverberatory furnace, and an adopter and quilled receiver luted to it: the fire was very gentle for the first eight hours; in which time, half an ounce and eighteen grains of a transparent and almost colourless liquor came over, which was set aside for examination. The fire was then increased, and in six hours time there were distilled two drams and three grains of a turbid liquor, which had some appearance of oiliness on its surface; this was likewise set a-part to be examined. The fire was then increased for six hours longer, and during the last two hours the retort was quite red hot all over, which ended the distillation. In this third and last process the portion of liquor that came over was more turbid than the second, and some of it from the redundancy of its volatile alkaly was crystallized; it also contained rather more than a dram of light empyreumatic oil, very much resembling the smell of hartshorn; in the recipient there was also some crystals of a volatile alkali. The whole of this last product weighed three drams and an half. The caput mortuum was quite black, and weighed ten ounces, one dram, and one scruple; so that there was a loss of four drams and forty-nine grains out of the twelve ounces of *Coralline*.

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The first liquor that distilled slightly effervesced with spirit of salt, and changed syrup of violets green, certain proofs of a volatile alkali.

The second and third portion effervesced strongly with spirit of salt, as did also the volatile salt that came over into the receiver, evident marks of its being a concentrated alkali.

Here I must observe, that had this distillation been conducted in a hurry, there would have been no concrete volatile alkali; for then this would have been confounded and dissolved in the first liquor that came over.

Had there been a sufficient quantity of this Coraline, I should first have proposed to have taken off the calcareous substance, by an acid menstruum, and afterwards washed the membranaceous part so clean from the acid, as not to change the syrup of violets red.

Then the distillation of this part alone would have afforded a much larger proportion of empyreumatic oil, and volatile alkali, and but a very small quantity of caput mortuum.

If you think these experiments of any use, you have my free leave to lay them before the Royal Society.

I am, Sir, yours, &c.

To John Ellis, Esq;
in Grays Inn.

Peter Woulfe.

Doctor Pallas proceeds to prove that Corallines cannot be animals, as the * pores of their calcareous

* Pori autem calcareæ substantiæ ita sunt minuti, ut polypi in iis hospitari nequeant. Pall. Elench, p. 419.

substances

substances are too minute for any polypes to harbour in. These words of the Doctor's seem to imply, as if the Coralline substances were only habitations for detached polypes, and not part of the animals themselves. How this affair stands, I hope to have clearly demonstrated long before this, for I have plainly seen, and endeavoured to shew mankind, that the softer and harder parts of zoophytes are so closely connected with one another, that they cannot separately exist; and therefore have not hesitated to call them constituent parts of the same body, and that the polype-like suckers are so many mouths belonging thereto.

Now, for the smallness of the pores, which the Doctor has mentioned here (among the Corallines) to be a contradiction to animal life; he certainly has forgot one circumstance, when he introduces the *Corallium pumilum album* (Essay Cor. T. 27. f. c.) or his *Millepora calcarea* (Pall. Elench. p. 265.) as an animal, which is, that he there says, it has absolutely no pores at all †.

As there can be no doubt, but every part of what is called Coralline is necessary to make out such an animal, or being, it will be very difficult, if not almost impossible, to determine the proportion there ought to be between softer and harder parts; and therefore it cannot be thought unreasonable to say, that in some of this tribe the stony parts are by much the greater part of the whole, especially as Doctor Pallas's objection can be only against the crust, or lapidescent part, as the inside of many of them is far from being hard, being

† Pori omnino nulli. Pall. Elench. p. 266.

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exactly like a *Sertularia*, so that I do not know if it would not be a good definition to one well acquainted with that tribe to say, a *Coralline* is a *Sertularia* covered with a stony or calcareous crust; if the mouths should happen to be very small, their number may make up that deficiency. We see in the greatest number of *Corallines* their surface full of holes; we saw the same in *Eseharas* and *Milleporas* thirty years ago; since that time magnifying glasses have been improved, so as to shew us, that they are all orifices, for polype-like suckers; why should not we now admit that glasses may be still more improved, so as even to make us able to see what may be the intention and use of these minute orifices, which according to all rules of reasoning, we must suppose to approach in nature to them they are most alike. From this extreme minuteness then of the pores of these *Millepora*, confessed to be zoophytes, as well as those of *Corallina officinalis* as before mentioned, it is no great matter of surprize, that Doctor *Jussieu* could not perceive any animal life in the *Corallines*, nor Doctor *Schloffer* in the *Millepora calcarea*. As these experiments ought to be attended with many convenient coinciding circumstances that do not often happen to persons who only go to the sea-side, perhaps for a few days, or hours, so that it is unreasonable to conclude, because they have been unsuccessful, that more accurate observers may not be more fortunate at another time.

I believe I shall be justified in this, by many essays that have been made, by persons of judgment, to observe the polype-like suckers in many, even of the *Sertulariæ*, which they have several times attempted
in

in vain; I must own it has often happened to me in many species, and yet I have not the least doubt of their being true *Sertulariæ* from the similarity there is in their habit and form to others of the same genus; and of this fact I am sure Doctor Pallas is fully convinced.

Another argument made use of by Doctor Pallas, to overthrow the animal existence of Corallines, is taken from Mr. Meese's assertion, that he had found on Bergummer Heath in Friesland, a substance of the same nature with the Corallines. Meese, in his *Flora Frisica*, p. 75. calls it a Lichen; but Doctor Pallas has ventured in his *Elench.* p. 427. to rank it among the Corallines, under the name of *Corallina terrestris* *. In this Doctor Pallas is in the right, as I have had an opportunity of examining a small specimen, that my worthy and learned friend Doctor Schloffer of Amsterdam was so kind to procure me: but how such a nice and accurate philosopher as Doctor Pallas could let it escape him to consider the nature and quality of this subject, and how much it differs from any thing else growing on the land, is a thing that surprises me. It only being mentioned by Mr. Meese, as found on Bergummer Heath, ought not to have satisfied him so far, as to declare a body with a calcareous crust to be a land production, when no such thing in the whole vegetable kingdom has ever been found; it has always been thought quite the contrary, that a stony or hard substance of that nature, could not be produced, but from an animal, and chiefly those that live under water †.

* See the figure of it in Tab. XVII. fig. 28.

† 'Tis worthy of our notice how easily this ingenious Natural Historian reconciles it to himself, that this inhabitant of the
This

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This should certainly have made him minutely inquire in what manner it was found, if buried under moss, loose on the ground, or perhaps near some of the canals, which communicate with the sea. Many accidents might have brought it thither, which is more probable than to imagine nature to go out of her usual track.

It is not improbable that that part of Holland has been overflowed by the sea, and this production left there when the water subsided, or blown there by a storm, which I beg leave to believe till I am better informed. I do not in the least doubt of Mr. Meese's veracity; but as that gentleman was more intent on discovering vegetables than animals, and thinking this very like a dry *Lichen fruticulosus*, he did not scruple to believe it to be one of that tribe; and therefore, perhaps, neglected to observe all those circumstances, that we now wish to be informed of.

The irregular pedunculated figures or fructifications (as Doctor Pallas pleases to call what is represented in Tab. XVII. fig. 29.) seem to be rather a defect in the growth of the ramifications, especially as they differ from one another in shape, and some of them appear beginning to form other branches.

In fig. *a* the whole consists of two opposite curled processes, with a small cavity between them at the top; this cavity is filled up at fig. *b*. so that the top becomes rounded; in fig. *c. c.* there seems to be a beginning of a continuation lengthways; and in fig. *d.* it is still more plain the beginning of a branch.

sea can grow on dry land. See Pallas Zoophyt. p. 427. *Nec magis miror Corallinam in sicco crescentem, quam Lichenum cum Fucis summam analogiam.*

If

If the inside of these processes had been hollow, and the outside of a regular figure, I should not have hesitated to consider them to be the ovaries of the Coralline; but as they are solid, and of the same structure with the rest of Corallines, I shall rather call them defective branches.

Doctor Pallas's last argument to prove that Corallines are vegetables is, that the nodules, or tubercles, which he has observed in Corallines, contain little seeds subanalogous, or somewhat resembling those we find in the fructification of the Fucus's and Con-fervas.

If this method of reasoning should hold good, what will become of the Cellularias, Sertularias, and Millepora calcarea & agariciformis, with many other zoophytes, that have such roundish ovaries; they must be recalled to the vegetable kingdom, notwithstanding all doubt about their being living animals has long been laid aside.

I come now to his ingenious friend Doctor Baister, who carries this matter still farther, and says positively, in Phil. Transf. Vol. LII. p. 111. that the Corallines are true Con-fervas; and in his Opuscula Subseciva, Vol. I. Tab. I. fig. 3. A. and B. he refers us to the figure of the Corallina rubens in seed; which, he says, is a true Con-ferva; but the figure is so bad, that I am perswaded nobody can find out what he means to represent by it.

I shall therefore conclude this letter, with recommending to these ingenious gentlemen, to analyse these bodies chemically, and with care; and likewise to view them with the same attention, that I have done, in the microscope; if so, I am

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perswaded they will be of our opinion. I must defer the sequel of what I intended to another day, which was to give you an account of the discoveries I have made in the fructification of the *Confervas*; these, I flatter myself, will fully convince Doctor Bafter of the great difference between these two bodies, and that they belong to two different kingdoms of Nature.

I am,

S I R,

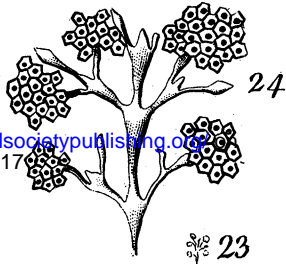
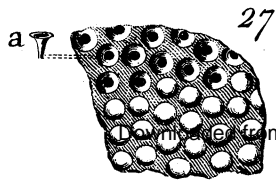
Your most obedient Servant,

Gray's-Inn, June 2,
1767.

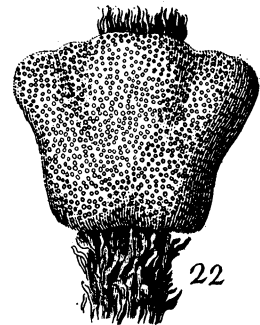
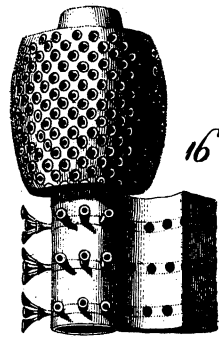
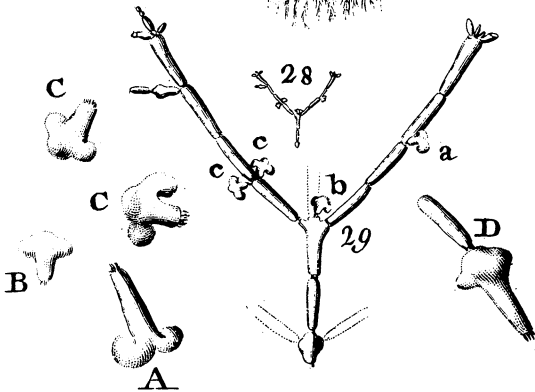
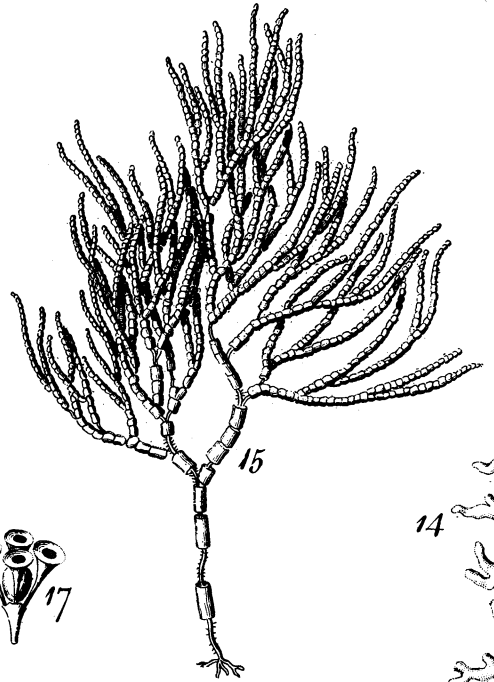
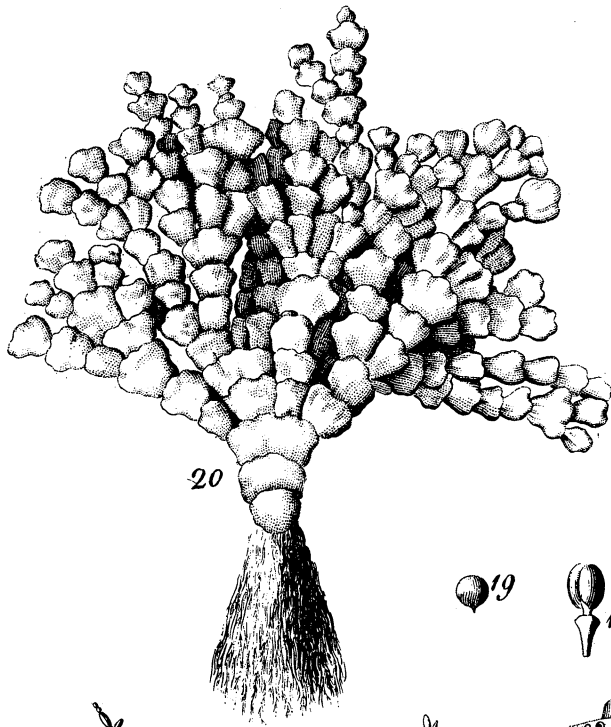
John Ellis.

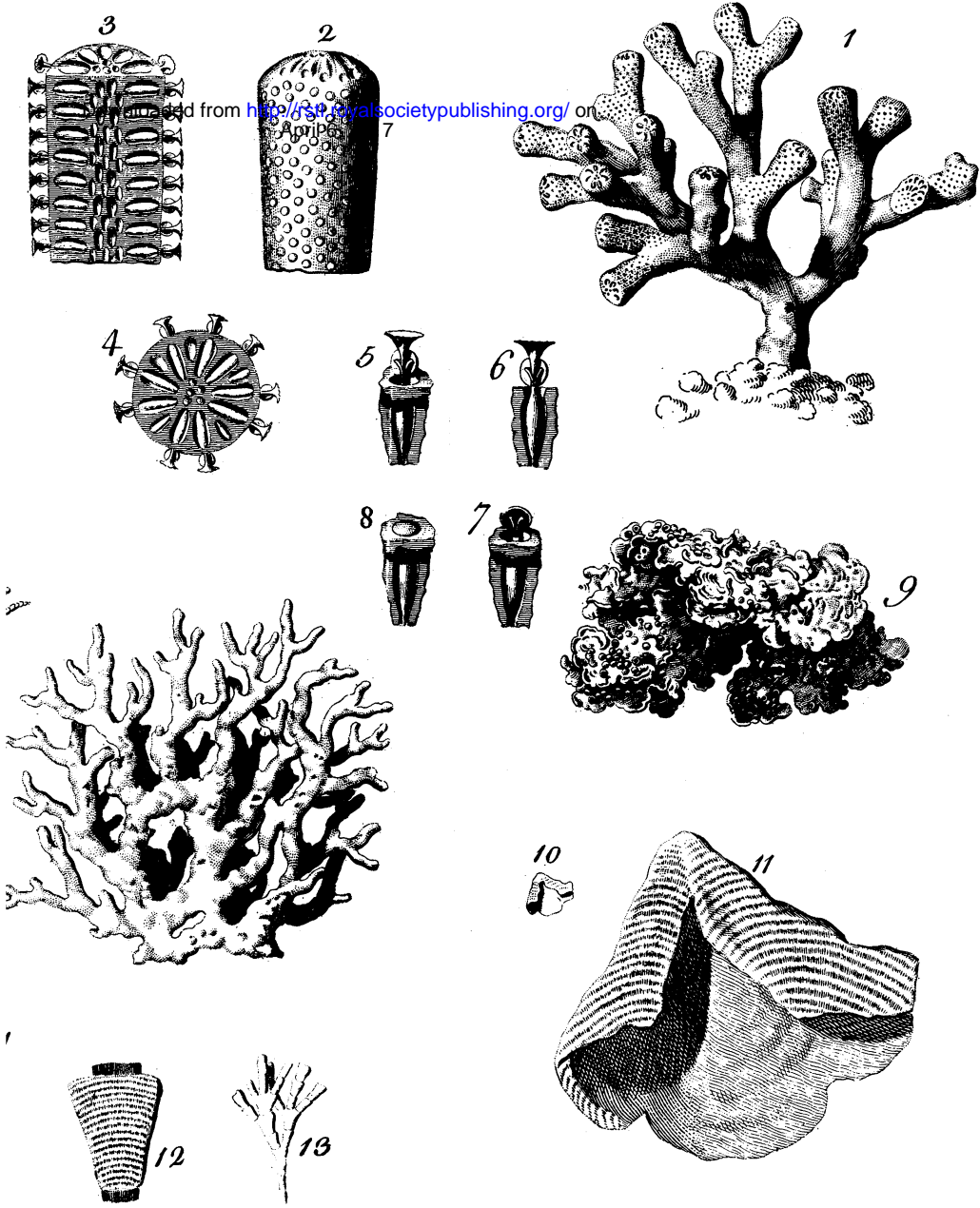
The Description of Plate XVII.

- Fig. 1. The *Miriozoon* of Donati, or *Millepora truncata* of Pallas.
2. The end of a branch magnified, to shew the situation of the pores.
3. The same cut perpendicularly through, to shew the Trumpet-like suckers in their cells connected with the middle tubes.
4. The horizontal section of the same, with the suckers extended.
5. The magnified drawing of one of the suckers, with its cell and operculum.
6. The



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- Fig. 6. The oblique view of the opening of the cell with the sucker and operculum.
7. The cell with the operculum open.
8. The cell covered with its operculum.
9. The *Corallium Lichenoides* of Ellis's Corallines, with ovaries upon it.
10. The natural and magnified size of a piece
and 11. of this Coral, to shew the arrangement of the inside of the cells, which are just the same as in the following.
12. The order of the cells, in a joint of the *Corallina Officinalis*, to shew the great affinity between them.
13. The natural size of a small piece of the *Corallina Officinalis*.
14. The milk-white *Millepora calcarea*, from the Mediterranean, where, though the pores are not visible on the outside, the arrangement of the cells in the inside are the same with the *Corallium Lichenoides*, and *Corallina Officinalis*.
15. The *Corallina Rosarium*, or White-bead band-string of Sloan's Hist. of Jamaica, Tab. XX. fig. 3.
16. Two joints magnified, one to shew the situation and figure of the pores, and the other to shew how the suckers pass from the middle cartilaginous tube through the calcareous covering to the surface.

- Fig. 17. Shews four of the suckers, and the ovary between them, magnified highly.
18. The Ovary.
19. One of the eggs taken out of the ovary.
20. The *Corallina incrassata*, from the West-Indies.
21. One of the joints of its natural size.
22. The same magnified a little, to shew its pores in its calcareous surface.
23. Part of the inside tubes of the joint, of their natural size.
24. The same magnified, to shew the openings of the cells on the surface, connected together.
25. A perpendicular section of half of one of these joints.
26. The same magnified, to shew the figure of the vessels leading to the suckers in the calcareous surface.
27. A piece of the calcareous surface highly magnified, to shew some of the pores open, and others covered with their convex opercula; letter *a* shews the figure of one of the trumpet-shaped suckers highly magnified.
28. A small branch of Meese's Coralline supposed to grow on a heath, called by Dr. Pallas *Corallina terrestris*.
29. The same magnified, to shew the disposition and figures of its supposed fructification at *a. b. c c.* and *d.* which are higher magnified at *A. B. C C.* and *D.* to shew how unlike they are to fructifications.

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S E Q U E L.

Title read December 17, 1767.

Read Jan. 14, 1768. **I** COME now to answer Doctor Baſter, who asserts poſitively, in his memoir published in the Tranſactions of the Royal Society, Vol. LII. p. 111, that all the Corallines, which you and I have deſcribed, are plants of the genus of Conferva.

In order to explain myſelf, it will be neceſſary to let him know what I mean by a Conferva, and what I would be underſtood by a Coralline, according to your ſystem.

By a Conferva I mean a plant with jointed filaments, either ſingle or branched, bearing fruit, which are diſpoſed in different ways: in Latin, thus,

Conferva eſt planta, cui ſunt filamenta articulata, vel ſimplicia vel ramoſa, fruſtificationes vario modo diſpoſitæ habentia.

By a Coralline I mean an animal growing in the form of a plant, whoſe ſtem is fixed to other bodies. The ſtem is compoſed of capillary tubes, whoſe extremities,

tremities pass through a calcareous crust, and open into pores on the surface. The branches are often jointed, and always sub-divided into smaller branches, which are either loose and unconnected, or joined, as if they were glued together: in Latin, thus,

Corallina est animal crescens habitu plantæ.

Stirps fixa, e tubis capillaribus per crustam calcaream porosam sese exerentibus composita.

Rami sæpe articulati, semper ramulosi, vel divaricati liberi, vel conglutinati et connexi.

This difference then will evidently appear by putting each kind into an acid liquor. The Coralline will immediately discover the nature of its * calcareous surface, by a strong fermentation; when the Conferva will not appear in the least affected. This acid liquor will likewise soon dissolve the calcareous substance in the Coralline, by which means the minute vessels that lead to the pores on the surface will become visible; whereas the Conferva will unalterably remain the same, and be rather preserved than corroded by the acid.

When Doctor Pallas, who supports the opinion of Doctor Baister, comes to the chemical analysis of the Corallines, he tells us † that he had not time nor opportunity to try them; but depends on the report of other authors.

* Lin. Syst. Nat. Ed. 12. p. 1304. “Corallinas ad regnum animale pertinere ex substantia earum calcarea constat, cum omnem calcem animalium esse productum verissimum fit.”

† Pallas Zooph. p. 418. “Temporis angustia et opportunitas impediverit ne in Corallarum naturam accuratius igne inquirerem.”

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This dependance on the authority of others, to overturn what I think we have established with very strong evidence, will, I am in hopes, convince him of the propriety of that well-chosen motto of the Royal Society. "Nullius in verba;" which I find he has adopted as the common seal of his epistles to his literary correspondents: and he will now have a further opportunity of * complimenting Doctor Bafter on making a second apology for what he has advanced against me in the Phil. Transf. Vol. LII. p. 111. by shewing him, that they have both been mistaken in blending two very different genera of the animal and vegetable kingdoms of nature together.

To make this difference appear still more evident, I come now to lay before you a new scene of nature; which an accurate examination into the fructification, as well as the articulations, of some of the Confervas, afforded me. Indeed the minuteness of these objects would scarce seem worth while to examine into so critically, if my reputation had not engaged me to shew the wide difference between them and Corallines. This, joined to some remarkable discoveries, which I made in the year 1754 on the coast of Suffex (in company with Mr. G. D. Ehret, F. R. S.) in the fructification of this class of plants, which

* Pallas Zooph. p. 20. "Candidissimus Bafterus, qui hucusque contra Ellisium reliquosque prioris sententiæ patronos steterat, alterius evidentiae victas dedit manus, et gloriosissimo exemplo, repudiata priori sua opinione, veram theoriam acriter defendere cœpit."

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before that time were esteemed by * botanical writers to have no fructification at all, has induced me to lay a few specimens of them with their magnified drawings before the Royal Society.

In examining these plants I was amazed to find two species of them evidently of your class of Diœcia; that is, male parts of fructification on one, and female on the other.

The first of these is the *Conferva polymorpha*, where in Tab. XVIII. at fig. *a.* is represented a very small branch of the female in its natural size, and at fig. *A.* the same is magnified: in the transparent capsules of this specimen, we can easily discover the seed as it lies expanded in a watch-glass in water. Letter *b.* represents the natural size of a small branch of the male. Letter *B.* the same branch magnified, shewing its amentaceous flowers, or catkins, with its minute male seed in spikes. *B 1.* shews one of them highly magnified.

The other *Conferva* is the *Plumosa*, and is one of our most elegant sub-marine plants. Fig. *c.* represents the natural size of a minute sprig of the female. At fig. *C.* the same is magnified, where the seeds appear in their capsules. The fig. *d.* shews the natural size of a sprig of the male *Conferva plumosa*; and fig. *D.* the same sprig magnified, shewing the spikes of male seed.

* Ray, Synop. Ed. 3. p. 57. “ *Conferva est Musci genus sterile et capitulis floridis destitutum, immo nec peltis & tuberculis, quæ horum loco aliqui gerunt, donatum, ex meris foliis teretibus et uniformibus seu mavis cauliculis, in tenuia capillamenta divisis, constans.*”

The next is the *Conferva flosculosa*, and is represented at fig. *e.* in a branch of the natural size. Fig. *E.* is the same magnified. This is one of those remarkable *Confervas* that has footstalks to its flowers or fructification. It appears to have fruit like a strawberry, or raspberry, surrounded by a leafy calyx.

This was found on the sea-coast, near Yarmouth in Norfolk, by my worthy friend George Whatley, Esquire, in the year 1764. When it was fresh, it was of a most vivid carmine colour. The other with flowers, at fig. *f.* is the *Conferva geniculata*. Fig. *F.* shews the same branch more distinctly, being magnified with flowers surrounding the joints; this, with one which I have called in my catalogue of *Confervas*, *Conferva florifera*, I discovered in the year 1754 near Brightelmstone in Sussex, when Mr. Ehret was so kind as to make drawings of them while recent. The colour of this, when fresh, is a fine scarlet.

The *Conferva plumula*, at fig. *g.* is one of the smallest of the tribe, but most elegantly feathered; it is of a pale red colour. The same is magnified at fig. *G.* which shews the order that the fruit and branches are disposed in. *G 1* shews the fruit or seeds, which are of a red colour, surrounded by a clear gelatinous pulp.

The *Conferva* at fig. *b.* I have called *Ciliata*, from the circle of small fibres at the top of each joint. The magnified drawing at fig. *H.* shews these fibres like a crown on each joint. This was inserted here to shew, with the rest, some of the infinite variety of beautiful forms, which the great Author of nature has impressed even upon one of the lowest classes of the vegetable tribe.

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Before I conclude, I must observe;

That as Doctor Pallas has likewise introduced among his arguments, that the fruit of the Fucus's are subanalogous to those of the Corallines, I could introduce an infinite variety to shew the great difference there is between them; but this part of natural history, too long neglected, requires a volume by itself, to shew the amazing variety of vegetables, that lie hid from us in the great deep; I may make some observations on them the subject of a future letter, especially as many of them are of the class of Diœcia, as well as those which I have already shewn in the Confervas; which I believe will be new to the botanists.

I am,

Dear Sir,

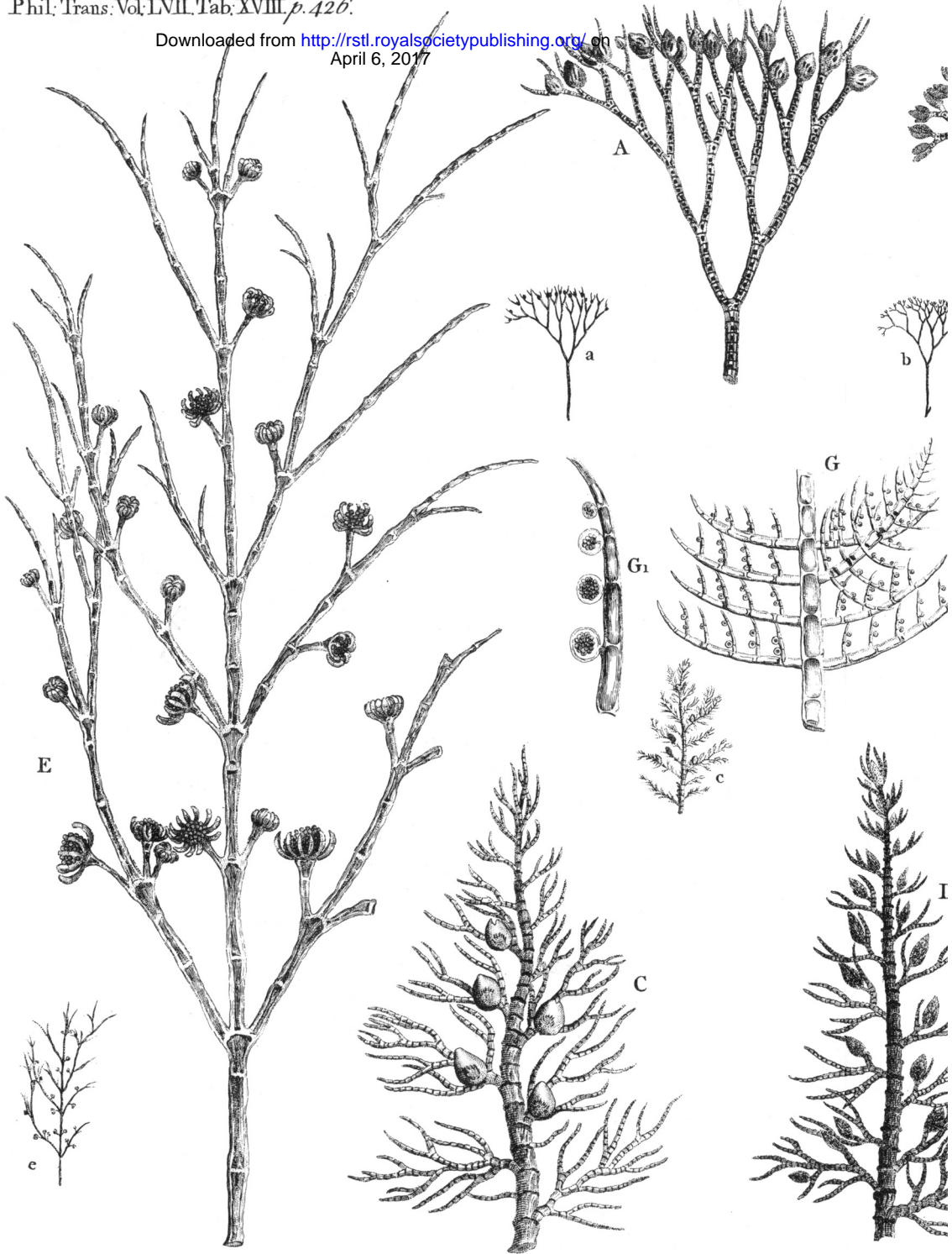
Your most obedient servant,

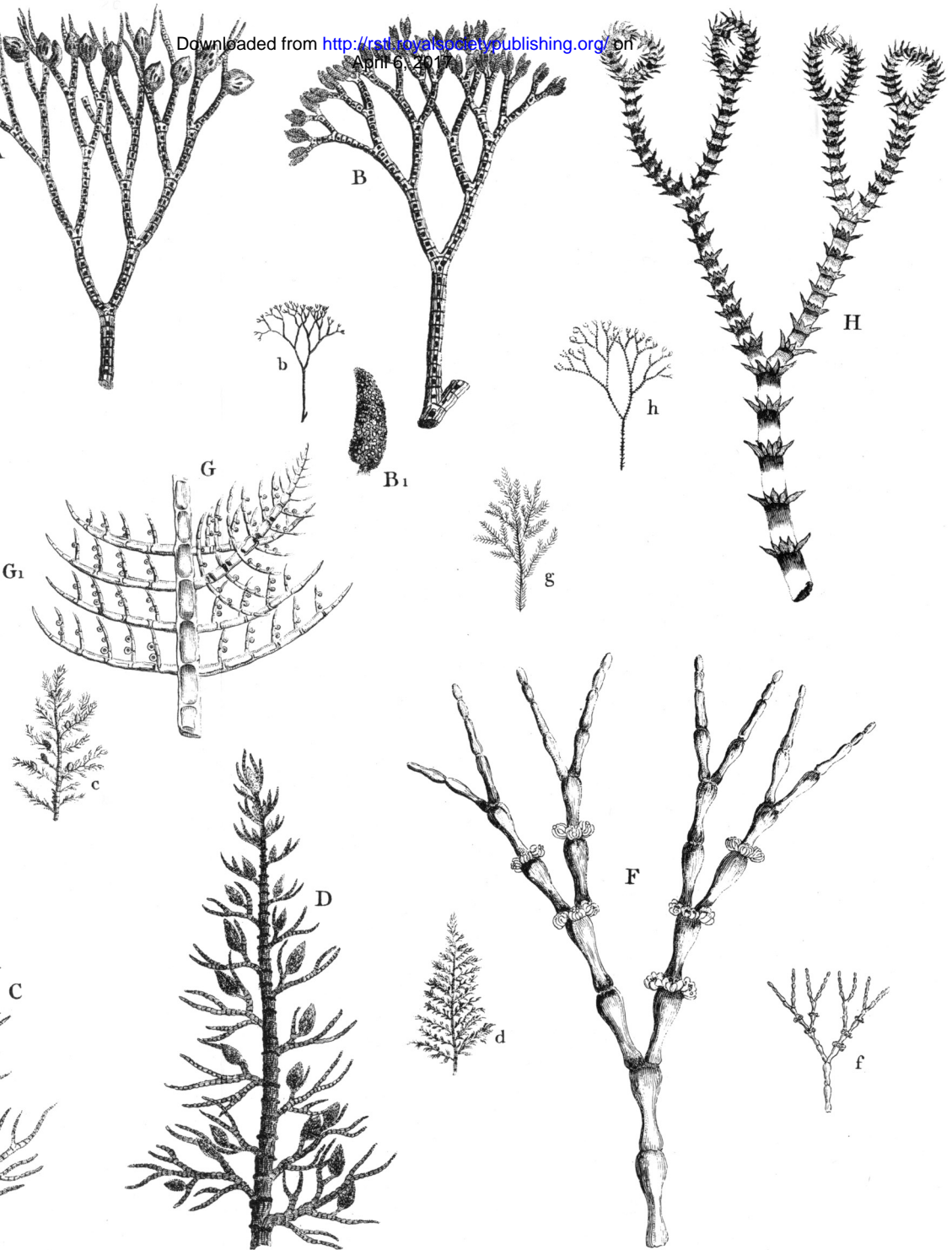
John Ellis.

The Description of Plate XVIII.

- Fig. *a.* The female Conferva polymorpha.
A. The same magnified, to shew the seeds in the Capsules.
b. The male Conferva polymorpha.
B. The same magnified, with its male flowers.
B 1. One of the catkins, or male flowers, highly magnified.
c. The female Conferva plumosa.

The

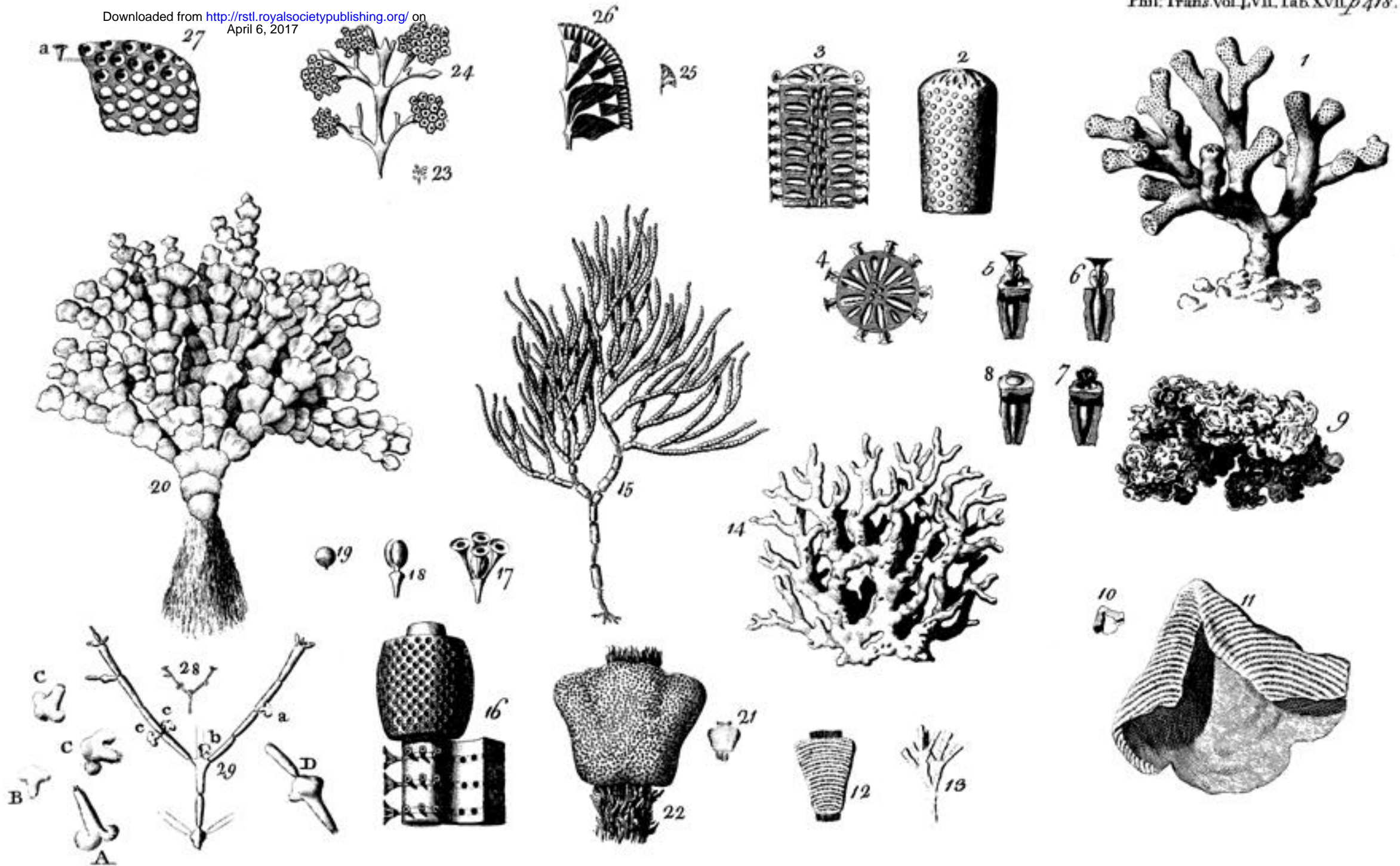




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- Fig. C. The same magnified, to shew its fructification.
- d. The male *Conferva plumosa*.
- D. The same magnified, shewing its catkins, or male flowers.
- e. *Conferva flosculosa*.
- E. The same magnified, shewing its pedunculated flowers, or fruit, with their polypetalous cups.
- f. *Conferva geniculata*.
- F. The same magnified, to shew its flowers surrounding the joints.
- g. *Conferva plumula*.
- G. Part of it magnified, to shew the disposition of its branches.
- G 1. Some of the fruit highly magnified, to shew its seeds, surrounded by a clear viscid pulp.
- b. *Conferva ciliata*.
- H. The same magnified, to shew the little coronets on the joints.

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