

VI. *Some Account of the Insect called the Fresh-water POLYPUS, before-mentioned in these Transactions* *, *as the same was delivered at a Meeting of the ROYAL SOCIETY, by the President, on Thursday, March 24. 1742-3.*

GENTLEMEN,

THOUGH I can no-ways expect to add any thing of Consequence, to the very curious Account already † given you by Monsieur *Trembley*, of his Observations on the little Insects, I had the Pleasure of producing before you at your last Meeting; and though I am very sensible the Truth and Exactness of those Observations no ways want the Addition of any new Attestation, after those very full ones already given, by those worthy Members of this SOCIETY, both at the *Hague* and at *Paris*; the Honourable Mr. *Bentinck*, in his Letter to me, which I communicated to you, and Monsieur *Reaumur*, in the Preface to the Sixth Volume of his admirable History of Insects; and though both those Gentlemen have had the Advantage of seeing and making many more Experiments, than I can possibly have done in so short a time: yet, as I apprehend it is expected from me, that I should give some Account, how imperfect soever, of what I have already seen and taken notice of; and as I in some sort also owe my own Testi-

* N^o 466. p. 218.

† *Philosophical Transactions*, N^o 467.

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mony as a Debt to the Truth, I shall without further Difficulty proceed to give it: And this I the more readily do, as Monsieur *Trembley* has favoured me with the Present of these small Bodies, and has taken care to have them conveyed over to me with the greatest Care, on purpose that I should examine them with Strictness, that I might truly report what I did really see; and that I might have it in my Power to shew them to others also, who should be willing to give any Attention to them, and convince themselves with their own Eyes of the very remarkable *Phænomena* they afford.

I received the Insects in Question, on *Thursday* the 10th of this instant *March*, in the Afternoon; the Water in which they were contained was grown foul at Sea, so that I immediately poured some of it off, and supplied it with fresh: After which going out presently to attend the Meeting of this SOCIETY, I could give them no further Attention till the next Morning; since which time I have missed as few Opportunities as possible, either of observing them myself, or of shewing them to such other of my Friends, as have done me the Honour of calling at my House.

I have found, that most of those I have particularly viewed, and that seem pretty well grown, have Ten Horns or Arms; but I have seen a few with Eleven, some others with no more than Nine, and one I have taken notice of, that had Fourteen: The lesser ones have frequently but Six of these Arms, and those have the fewest I have yet observed.

The Structure of the Arms, when looked at with the Microscope, is very curious: Each seems to con-

sist of several Rows of Knots or small *Papillæ*, joined together by a transparent Membranous Substance, and which is endued with a most exquisite Power of Extension and Contraction; so as thereby to bring any of those Knots nearer together, or set them further asunder, and that in every possible Direction; whereby the Animal is able to bend any of these Arms in any Part, and all sorts of ways: Besides which, these Arms are also capable in the Whole of so great an Extension and Contraction, that I have frequently seen some of those of the same Creature extended, at one Moment, to more than Ten times the Length they were of at another.

The Body of the Insect is not much less capable of lengthening and shortening itself than the Arms. When most contracted, it looks like a little Ball, from one Part of which rises a small Knob, not unlike what is commonly seen at the Head of a Lemon: This is the Tail, and upon this the Insect in this Case generally rests: Opposite to this is the Mouth, round which the Arms appear regularly extended, and resemble a little Star, as usually represented, all whose Points seem to proceed from the same Centre. But, when extended, the same *Polyypus*, which, in the Position just described, scarce appeared One-tenth of an Inch in Diameter, has drawn itself out to full Three-quarters of an Inch in Length; in which State the Mouth does, for the most Part, project like a small and sharp Snout in the midst of the Arms.

Together with the Insects, Monsieur *Trembley* sent me over some very small Water-worms, which he informed me they readily preyed upon; and these
Worms

Worms I have several times had the Pleasure of seeing them seize with great Dexterity and Eagerness; soon after which they have sucked them in, and swallowed them completely down, though apparently several times larger than themselves.

Mr. *Trembley* has, in the Fifth Page of his Relation just published in the last *Philosophical Transactions*, given a very exact and curious Description of what concerns this last Particular, of their taking and devouring their Prey: To which I shall only add, that it appears to me, that the little *Papillæ* above described on the Surface of the Arms assist them like so many Hooks or Tenters to hold their Worms barely by touching them; for I have more than once seen a *Polypus* draw a Worm to him, and nimbly turn it about with a single Arm, only laid over it, without folding or clasping it; which last Method, however, he makes use of also, when the Worm comes to struggle and strive hard to be disengaged.

Generally before the *Polypus* fixes on the Worm with his Mouth, the Mouth and his whole Fore-part begins to extend itself; and after fastening upon it, which is frequently near the Middle, the whole Body swells, the Worm commonly appears bloody, and the *Polypus* sucks down a great deal of the Blood and Juice, before he begins to swallow the Worm itself: During all this Time he continues to extend and stretch his Mouth, and that to such a Degree, that I have seen its Breadth, when in the Act of first bending in a Worm seized by the Middle, not less than the whole Length of the Animal when in a mean State of Extension.

In the Scituation just mentioned, the Mouth resembles an open Cup; and there is a conspicuous Neck between that and the Belly, which then swells out like that of a *Florence* Flask; beyond which again appears the Tail, not stretched in proportion to the rest, but whose Cavity, when the Insect is made transparent, appears to the Microscope as a Gut running from the Stomach, but which has seemed to be a *Cacum**, and not open at the lower Extremity; nor have I ever yet seen any thing like an Evacuation that Way.

As the *Polypus* gets the Worm to double, and draws it further in, the Neck, just mentioned, swells, and the Mouth somewhat contracts again, so that the whole Body puts on the Appearance of a sort of Purse or Pouch; but the Tail never intirely disappears, though it shortens remarkably, on the Swelling of the Gut with the Juice drawn from the Worm: But into this Gut I have never seen any of the solid Part of the Worm to penetrate, though I have often seen its whole Body lie coiled up in what I have looked upon as the Stomach of the Insect.

He lies for the most part pretty still during the latter Part of his Meal, like a Creature gorged with too much Food, drawing in the Worm slowly at last: But after it is all got in, he again contracts his Mouth, and stretches his Neck-part in Length, as it were, to compose the Posture of the Worm in his Stomach,

* This has since appeared to be a Mistake; the Gut is also open at the lower End, and though the larger *Fæces* are all thrown up again by the Mouth, I have since seen a thinner Slime evacuated that Way.

where it continues to lie till digested; it soon loses its Distinctness, and its Shape becomes in a little time undiscernible; the *Fæces*, however, are not thrown off till several Hours after, when they come away by the Mouth in the Form of small Pellets of Cobweb, which I have not yet actually seen thrown out, though I have several times seen them before they were thoroughly disengaged from that Part.

A *Polypus*, when in a middling State of Contraction, shews to the Microscope, much like a Slug or long Snail: His Sides are wrinkled, and he then appears as if made up of Rings, like a Grub or Earthworm; but these Rings all disappear when the Insect is more extended, his whole Skin then looking as beset with little *Papillæ*, like those of his Horns or Arms, except that they are smaller.

When he hangs fixed to any thing by the Tail, his most usual Posture, he will turn his Body in all Ways, coiling and writhing it about, so as sometimes to stroke, as it were, his Tail with his Arms, and rub it with his Mouth, as if to remove some Uneasiness, possibly given him by lesser Water-insects, which I have often observed like Lice crawling upon his Body. A progressive Motion I have also sometimes seen, when he helps himself alternately with his Arms and Tail, but this sort of Motion is less frequent than his others.

I fear I have dwelt too long on these little Particulars, which I was however willing to take notice of, as they may serve to shew the *Polypus* is really and truly a living Creature, and, like other small Insects, provided with proper Parts and Organs for the catching, eating, and digesting, of his Food: For though the
Pro-

Production of the young ones from the Sides of the Parent has a near Resemblance to the shooting of the Branches from the Trunks of Vegetables, and though some other of his Properties are so very singular and surprizing; yet all those above-mentioned and described, are without all Doubt Animal Operations.

This Sprouting of the Young Ones from the Sides of the others, is already so fully described by Monsieur *Trembley* himself, that I have very little to add to that Description, farther than to observe, that the young ones I have seen shoot out, had no Arms till they had acquired some Length: Those I have had the Beginning of before me, have not shewed them till about the Fifth Day from the first Appearance, but this might probably vary in a warmer Season.

As soon as the little ones have Arms, they will themselves take and eat Worms while fixed; and it appears, that during that Time, the Gut of the little one opens into and joins the Gut of the Parent: This I hope indeed to confirm by some further Experiments; but it has constantly appeared to me, that upon the little ones eating, the Stomach and Gut of the Parent has become extended also, and *vice versa*.

I have had one *Polypus*, that had Three young ones dependent from him at the same time, and one of these young ones has begun to put out a young one itself, so that they formed a Cluster of Five of these Insects hanging together: But one of the young ones separated itself, and dropt off Yesterday Morning; and this Morning I perceive another little one just breaking out.

I shall now proceed to what I have tried with regard to the dividing of these Animals, and the Reproduction of their Parts.

On *Sunday* the 13th of this Instant *March*, I chose a long slender *Polypus*, that appeared lively, but that had not been fed since I received it; and putting it with a Drop of Water in the Palm of my Left Hand, I watched the Time of its extending itself, and then with my Scissars cut it asunder into Two Parts, near the Middle; both which Parts I put separately into Two Phials of *New-River-water*. This was done about Two o'Clock in the Afternoon.

On *Monday* the 14th, I observed the Arms on the Head-part to play; the Tail-part lay along on the Bottom of the Phial, but looked plump, and from time to time alternately extended and contracted itself: The Wounds of both Parts appeared contracted and drawn together.

On *Tuesday* the 15th, the Head-part seeming active and busy with its Arms, I gave it, about Nine in the Morning, a small Piece of a Worm; it very readily seized it, and presently after eat it: I viewed this Part carefully with a Magnifying-glass, and found the Wound no-ways affected by the Extension of the Stomach. The Wound of the Tail-piece appeared well rounded off.

On *Wednesday* the 16th, the Head-piece seemed very well. The Tail-piece stirred very remarkably, and its wounded End shewed in Shape like that of a little turned Nine-Pin.

On *Thursday* the 17th, I saw the Head-piece raised up and resting on its posterior End, as before it was hurt. The Tail-piece discovered a very remarkable

able Rounding off at the wounded End, which looked also somewhat extended, and more pellucid than the rest. It both extended and contracted itself very sensibly, moved more frequently than it had yet done, and I observed a small Protrusion towards the Middle of its Length, which I fancied like the Beginning of a young one just putting out from that Part.

On *Friday* the 18th, about Seven in the Morning, I perceived little Horns or Arms putting out from the wounded End of the Tail-part: They were yet very short, but shewed themselves distinctly all round, and I could see them play very clearly. The Protrusion on the Side was enlarged, so as now to be known evidently for a new *Polypus*. The Head-part seemed very well; and in the Afternoon the Arms of the other Part were sensibly lengthened.

On *Saturday* the 19th, I found the new Arms yet longer: I now gave a Piece of a Worm to this Part. It readily hooked it, and eat it. The little one was very conspicuous, but that it yet wanted Arms.

On *Sunday* the 20th, every thing was improved, and small Arms began to discover themselves, on the little one sprung from the Side of the Tail-piece.

On *Monday* the 21st, both Pieces appeared perfectly well, they had all the Appearance of perfect intire Insects, the same as before they were cut, and continue as fair and as good as any I have. The little one is not yet dropt off.

I have been very particular in this Account, from the Minutes I took down every Day; and I shall further observe, that I cut Three more transversely in the same Manner, on the same Day, *Sunday* the 13th Instant, and that I had so cut one on the Day before:

before: They all went on nearly in the same Manner, and all shewed the new Arms on their Tail-parts on the same *Friday* the 18th; but I must also take Notice, that *Thursday* last the 17th was a fine warm Day, to which I impute it, that the Insects cut on *Sunday* were just as forward as that cut on the Day before. One other of the Tail-pieces of these also put forth a young one, during the time that it lay without a Head. All these Four last-mentioned had eat about 36 Hours before they underwent the Operation.

On *Tuesday* the 15th Instant, I took a *Polypus* that had eat a Worm on the *Saturday*, and, placing it as before in the Hollow of my Left Hand, I attempted, when it was most contracted, to divide it longitudinally; but my Scissars not being very good, I mis'd my Stroke, was forced to give a Second, and even then divided it very unequally; the Head was however split, and of Ten Horns that it had, Six came off with the lesser Piece that was only a Slip of the Body, and the Four others remained with the rest, which was at least Seven-eighths of that Body. I had very small Expectation from this Experiment, I nevertheless put both the Pieces with some Water into a Phial; and both this Day in the Afternoon and the next, I saw both Parts playing their Arms.

On *Thursday* the 17th, in the Forenoon, perceiving both these Parts to move their Horns pretty briskly, I gave to each a Piece of a Worm: Each readily seized it, eat it, and kept it as usual; and the same Day in the Afternoon, I took Notice, that a little one was putting out from the Side of the larger Piece.

On *Saturday* the 19th, I saw both the Pieces resting on their posterior Ends, and stretching out their Bodies in the usual way.

On *Monday* the 21st, both Parts seemed well, each was like an intire *Polypus*, except that one of them was, and is still, very small. I discovered some little Arms putting out in the room of those each Part had lost: There appeared also little Arms coming out all round the Head of the little one fixed to the Tail of the larger Piece.

On *Tuesday* last the 22d, I viewed both these Pieces with the Microscope, and each seemed perfectly formed like a whole *Polypus*. The larger Piece had Four new Arms, and the lesser Two, like their others, but shorter, as yet; and they are now in all other respects, as complete as any others I have.

This same Experiment I again attempted on another *Polypus*, on *Saturday* last; but I again made the Parts unequal; they are however both alive, and promise very fairly.

I the same Day cut a fine long *Polypus* into Three Pieces, transversely, at Five in the Afternoon. I left the Middle-piece the longest of the Three.

On *Monday* the 21st, the Head-piece seemed well formed again, excepting that it was yet very short; the other Pieces looked plump and well. On *Tuesday* the Head-piece eat and kept Part of a Worm: It seized it very vigorously with its Arms, mastered it, and swallowed it eagerly. The Middle-piece moved pretty much, and the last looked fresh and well. This *Thursday* Morning, the Arms begin to shew themselves on the anterior Extremity of the Middle-piece.

What

What I have related is a faithful Account of all the Experiments I have yet had Time to make on the *Polypus*. Those above-mentioned are all that I have cut; by which it appears, that I have yet had no unsuccessful Operation; and I am not conscious, that I have yet lost one *Polypus* by any Accident, though the Weather has been very severe, excepting one Day, ever since they came over; and this has probably made things go on slower, and the Reproductions require longer Time than it is reasonable to think they would have done, in a more favourable and milder Season.

All I can say for my Experiments, is, that I have made them with as much Care and Circumspection as I was Master of; and that, in this Relation of them, I have in the strictest manner adhered to the exact Truth, in the most minute Particulars: I must also add, that the Insects which have been cut, or upon which I have made any sort of Experiment, have never been out of my own private keeping, and have never been so much as seen by any Person whatsoever but in my own Presence.

I should now, GENTLEMEN, make an End, and ask your Excuses for troubling you with so long an Account, were I not in some sort obliged, before I conclude, to return my Thanks to a very worthy Member of our SOCIETY, Dr. *Parsons*, whose extreme Curiosity, and earnest Desire to promote the Knowledge of Nature, has prompted him to favour me with his Company and Assistance in several of my Experiments; besides which he has also furnished me with some very exact and curious Drawings of these minute Bodies, as they have appeared to the

Microscope in various Altitudes, and under different Circumstances; an Assistance I could hardly have received from any other Hand, as this Gentleman joins the greatest Accuracy in observing the true Structure of the Works of Nature, with a peculiar Happiness in representing them. And these Drawings I have brought with me, for the Entertainment of the GENTLEMEN present; and to whom I am persuaded they will not be less pleasing and satisfactory, than they have been to myself.

After which Mr. *Cuff*, who has at my Request brought hither an excellent Microscope, will be so kind as to endeavour at shewing the Insect itself to such GENTLEMEN, as not having yet seen it, may now be willing to take a View of it in that Manner. But as it may be found difficult for the whole Company to satisfy their Curiosity here sufficiently at the same time: I must again repeat what I had the Honour of saying to you the last *Thursday*, that so long as I shall have any of these little Animals in my Possession, I shall always be ready and desirous to shew them, at my own House, and give the best Satisfaction I am able, to any GENTLEMEN disposed to take further Notice of them.

References to the Figures above-mentioned.

TAB. V.

Fig. 1. *Represents a Polypus as seen in the Microscope, when in a State of Extension, the Arms spread as when feeling for their Prey, and the Mouth sharp and prominent.*

Fig. 2. and 3. *Represents the same Insect in its most contracted State.*

- Fig. 4. and 5. *Shews the Insect when in a middle State of Contraction; the Body is then wrinkled, so as to appear somewhat like a Grub or Earth-worm.*
- Fig. 6. *Is a Polypus with a young one growing from its Side, and another from that again: This is not so much extended as that in Fig. 1. and is to be supposed to have taken lately some Food, whereby the Cavity of the Inside is made more conspicuous, and the Communication of the Guts of the young ones with those of the Parents becomes sensible.*
- Fig. 7. *Shews the Appearance of a Polypus, that has already swallowed the best Part of a Worm endways. He is grasping the remaining Part to draw that in also.*
- Fig. 8. *Represents a Polypus, whose Mouth is greatly extended: He has just taken in the middle Part of a Worm; the Opening of the Mouth is there remarkable; the Arms seem somewhat contracted from the Effort in stretching the Mouth so wide; the Neck also may be there observed between the Mouth and the Stomach, but which will soon disappear as the Worm is sucked further in.*
- Fig. 9. *Is another Polypus, nearly in the same State as the last; but the Worm is omitted in the Figure, to shew the Form of the Mouth more distinctly.*
- Fig. 10. *Shews the same Polypus when the Worm is drawn quite double into his Stomach; here the Neck intirely disappears, and the Whole is like an open Bag or Purse.*
- Fig. 11. *The same Polypus, after he has intirely swallowed his Worm; the Mouth is now again closed*
and

and contracted, and the Worm may be discovered through the Skin, as it lies coiled in his Stomach. In these Five last Figures it may be noted, that, however extended and swelled the Stomach of the Insect appears, the posterior Part is not stretched in Proportion, but discovers itself every-where as a small Tail, in which is contained a Gut, with which the Stomach communicates.

Fig. 12. Shews one of the Horns or Arms of a Polypus very much magnified, for the giving some imperfect Idea of the Knots or Papillæ in the transparent membranous Substance, of which it is composed.

TAB. VI.

Represents a Polypus that had several Young growing from him at once, some of which had also others springing out from them again. This was the same Polypus mentioned in the foregoing Paper to have had Three young ones dependent from him at the same time, but which, becoming still more fruitful, was drawn a few Days after as he appears in this Figure, and when, besides those here represented, Eight other young ones had at several times separated themselves from him, since I received the Insects.

Fig. 4.

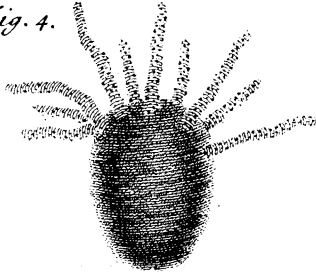


Fig. 5.

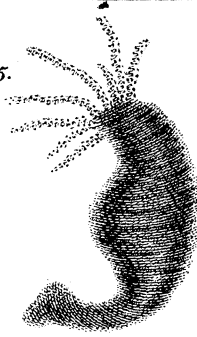


Fig. 6.

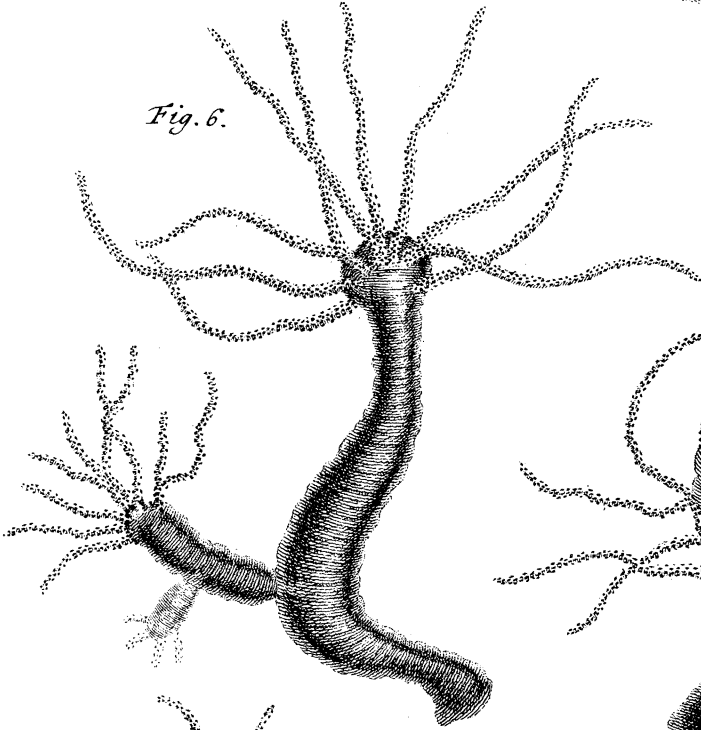


Fig. 7.

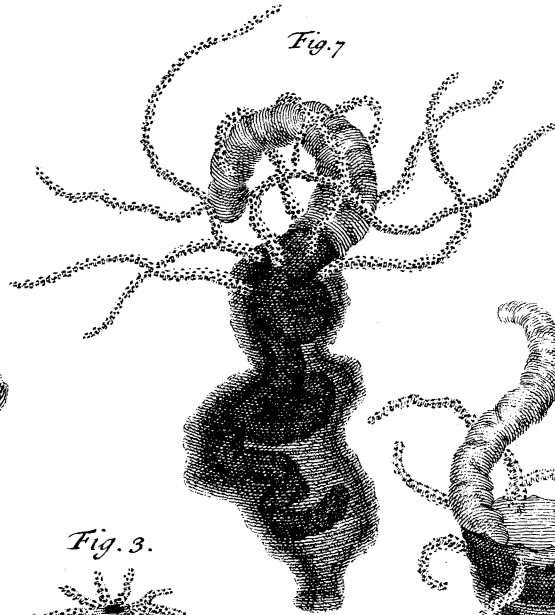


Fig. 11.

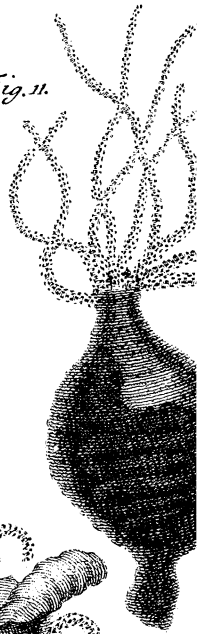


Fig. 9.

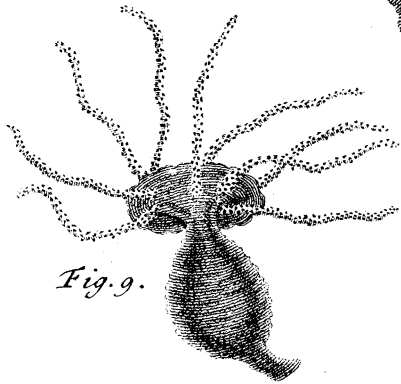


Fig. 3.

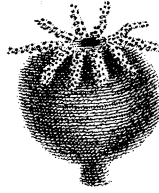


Fig. 8.

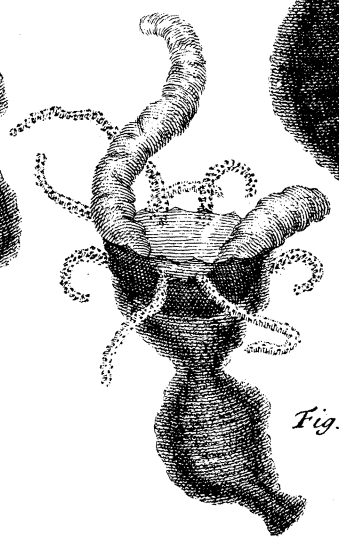


Fig. 1.

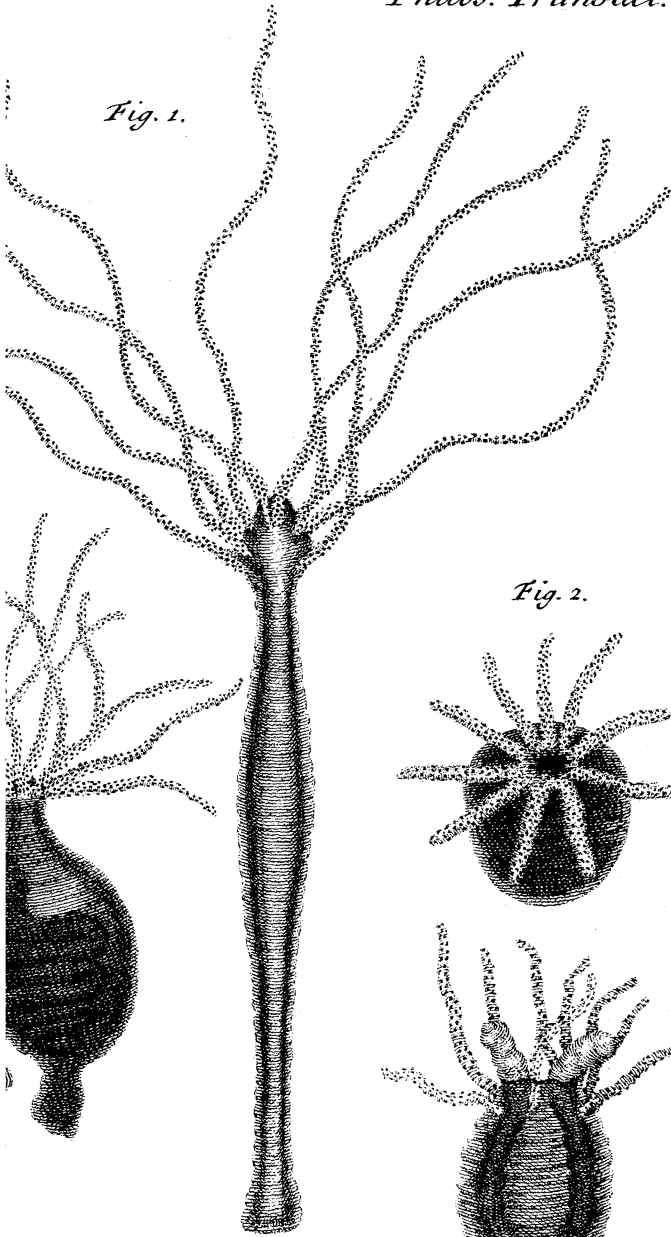


Fig. 2.

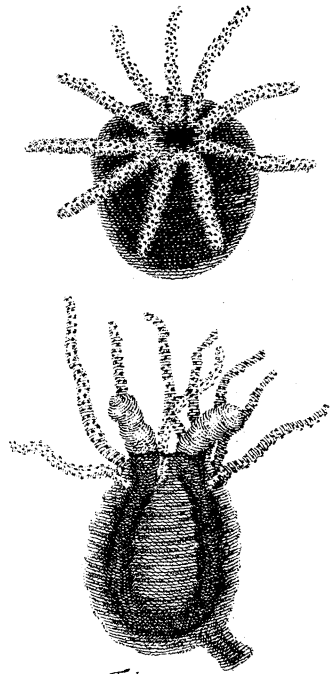


Fig. 12.

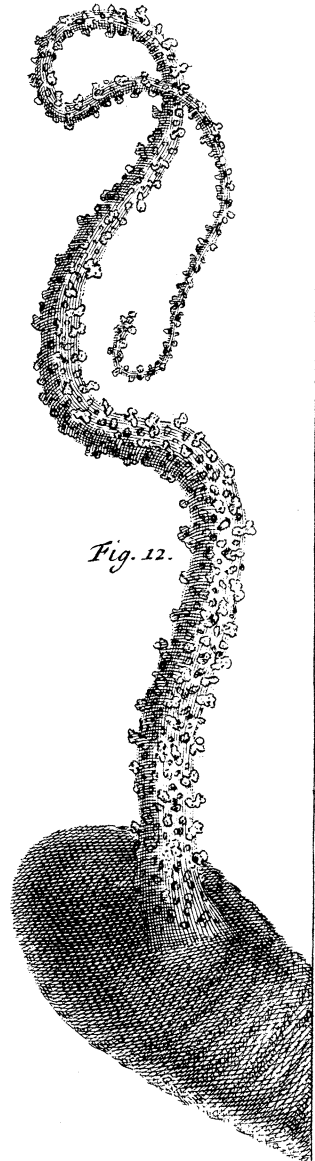
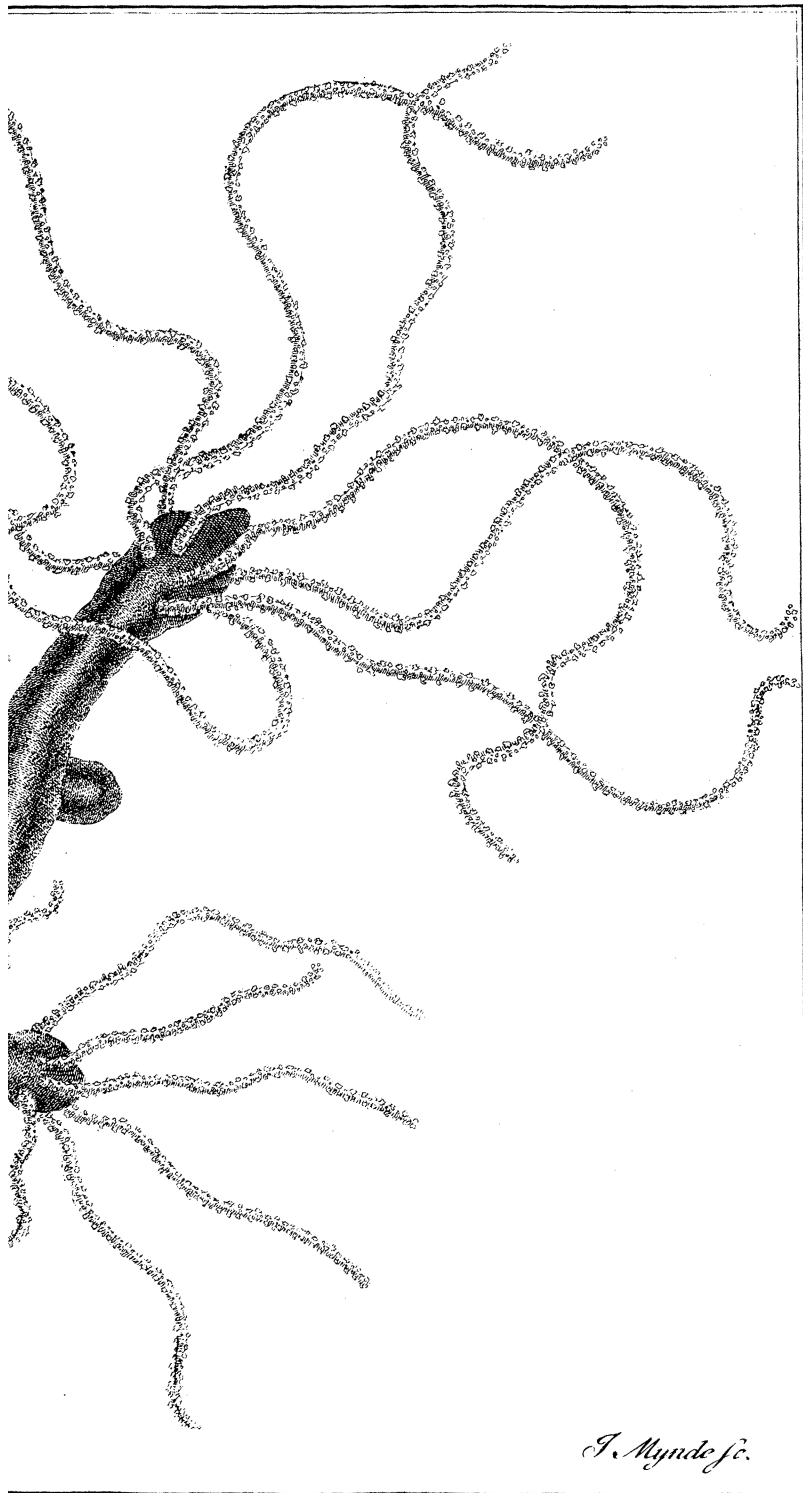


Fig. 8.

Fig. 10.



Harfons MD. del.



J. Mynde sc.

