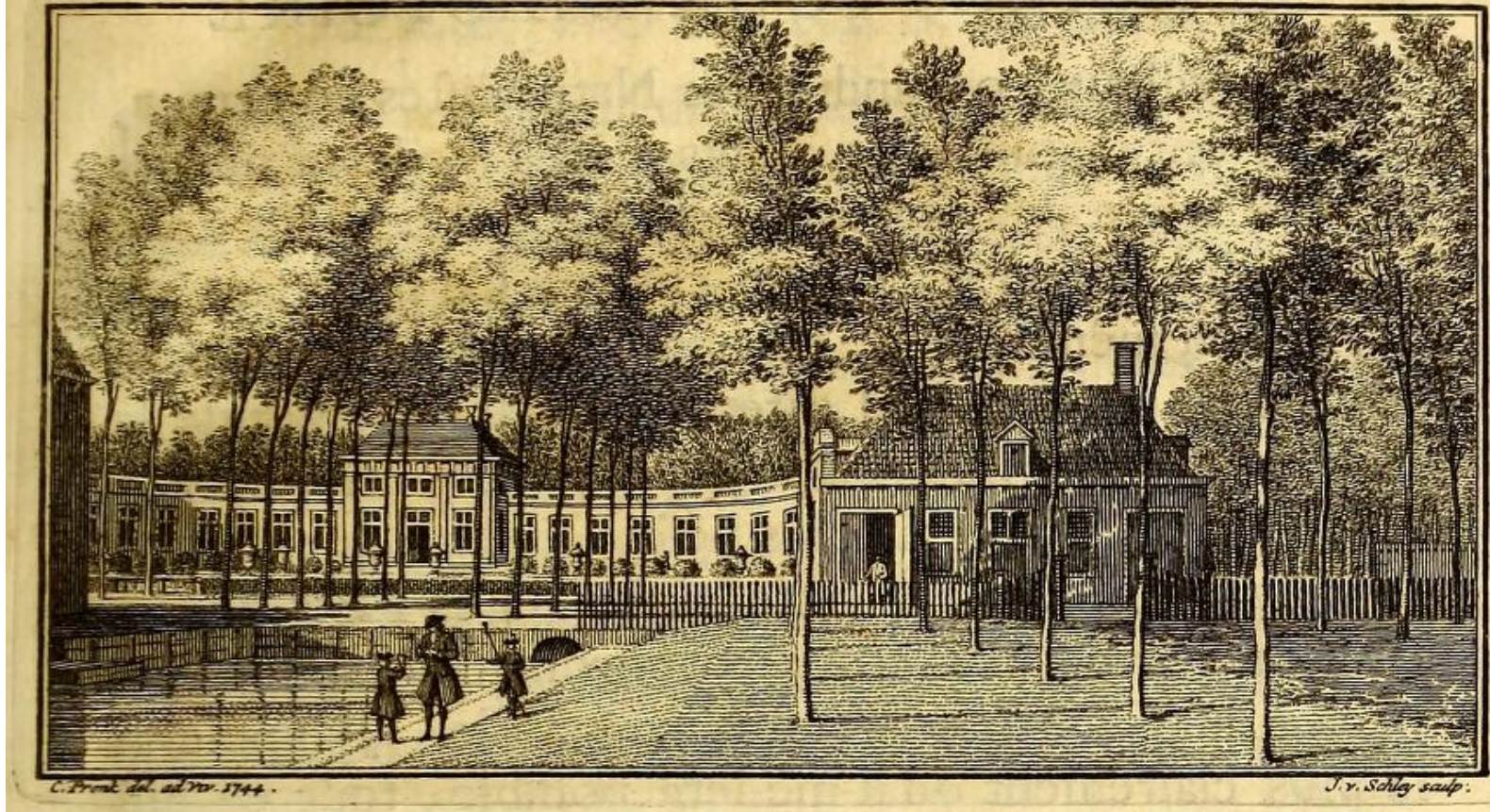
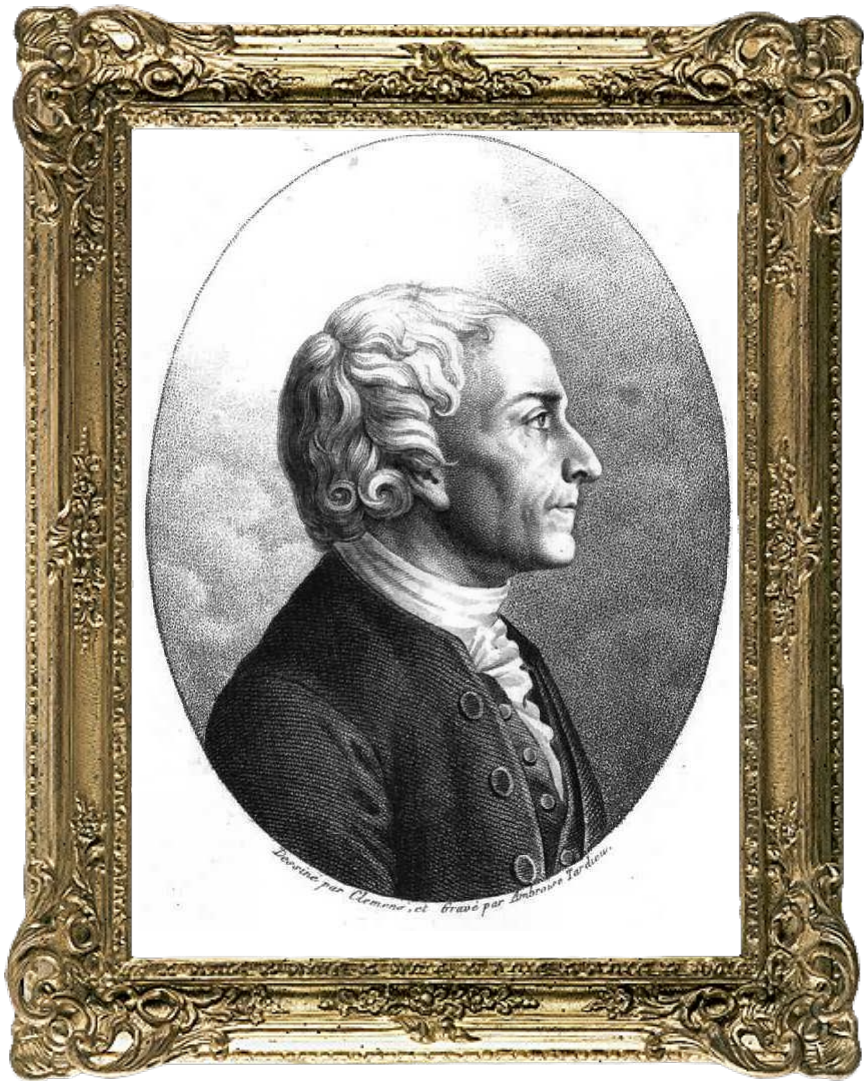


Abraham Trembley and the creature that defies classification

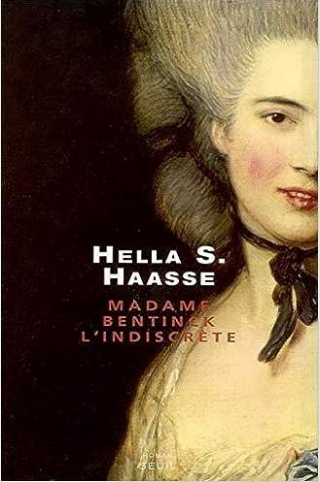
Filipe Faria Berçot
&
Maria Elice de Brzezinski Prestes



Abraham Trembley and the boys Anthony and Albert Bentick, collecting and observing organisms in the pond in front of the country house at Sorgvliet, illustrated in his book, *Mémoires pour servir à l'histoire d'un genre de polypes d'eau douce* (1744).

Abraham Trembley

(1710-1784)



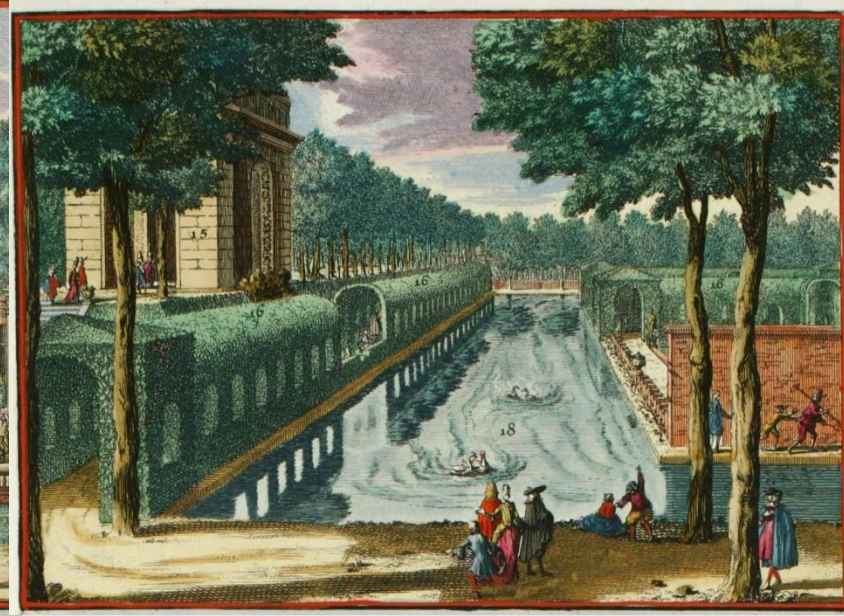
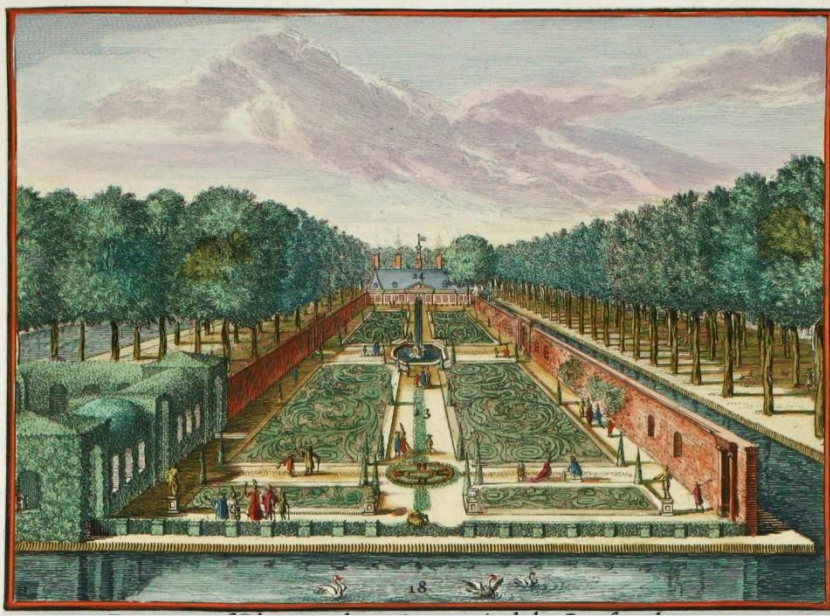
Publicity image of the 1996 Dutch film *Charlotte Sophie Bentick*, screenplay based on the book *The Marriage Contract*, by the Dutch novelist, essayist and poet Hella S. Haasse.

Portrait of Charlotte Sophie van Aldenburg
(1715-1800)

The house named Sorgvliet, literary "care flies", by its owner, the statesman and poet Jacob Cats, was built in the late 1640s. All its ground-floor rooms overlook the garden, with native and exotic plants and herbs.

The state came into the possession of the Bentick Family in 1675.

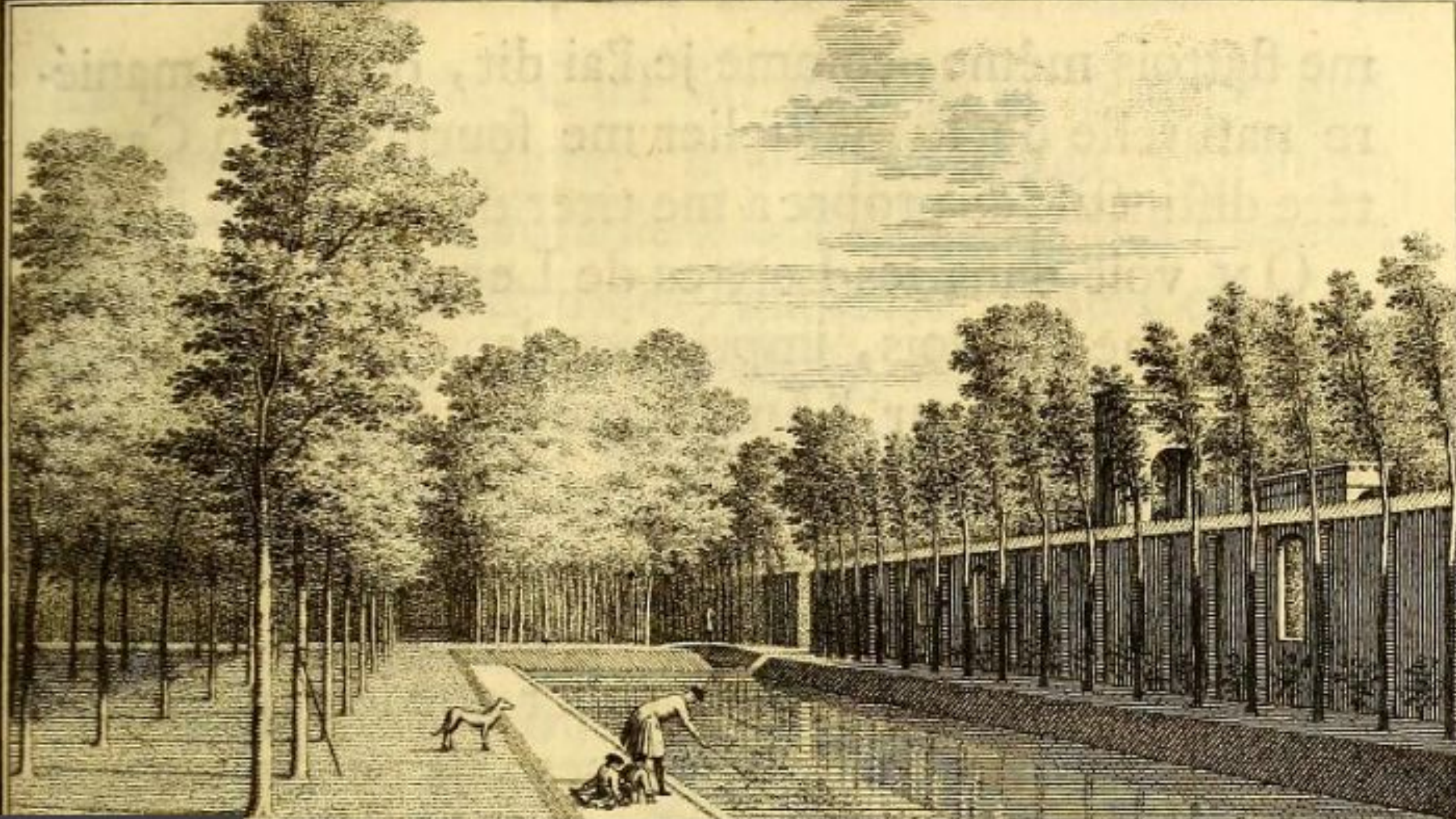


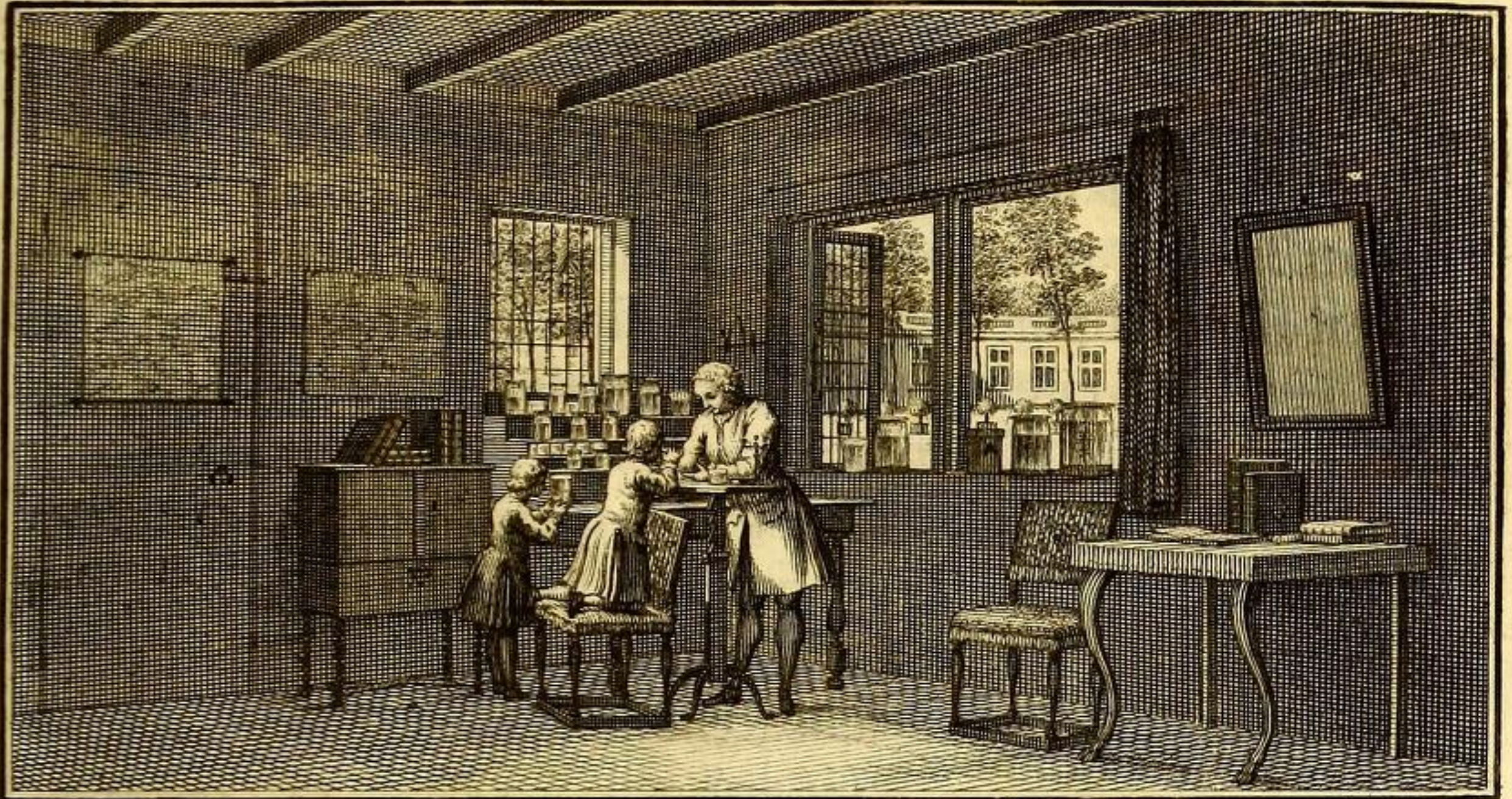


Preserved drawings show the land as a lush place, composed of a series of well-designed gardens, with many trees trimmed in conical shapes, hedge-covered tunnels, a symmetrical system of interconnected paths from one part of the gardens to another and an elegant ornamental system of ponds containing several species of exotic fish. Over the centuries, it has gone through several owners and renovations.



Today, the Catshuis, a National Monument inside the Sorgvliet Park, is a reception centre for the Netherlands government.





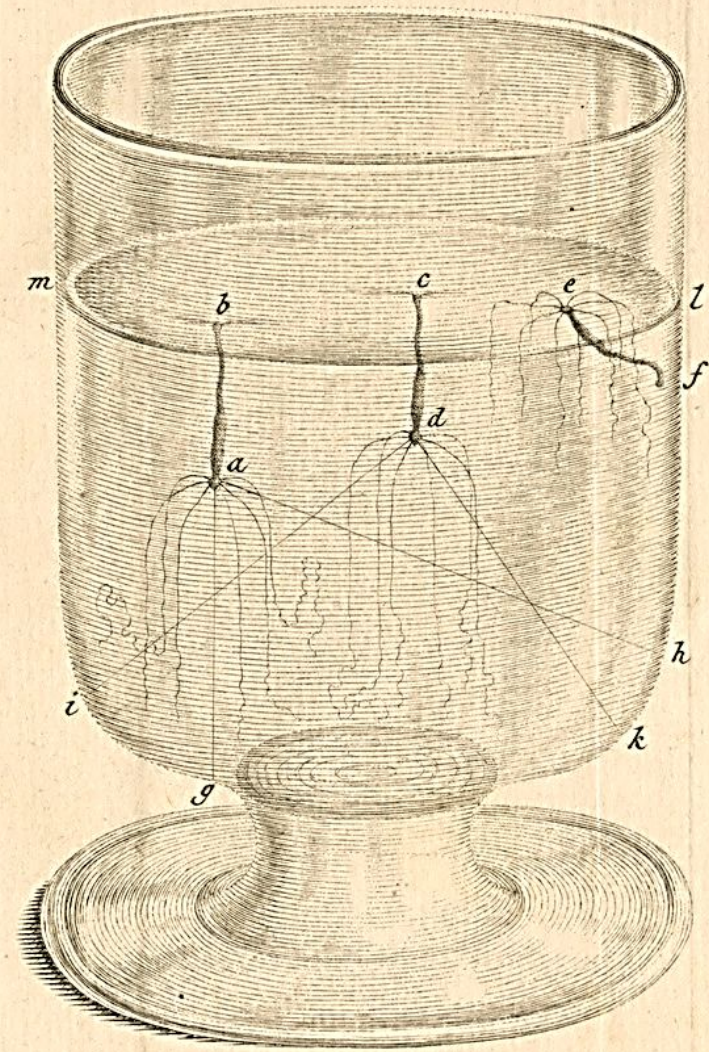


Fig. 1.



Fig. 1.

Three green polyps (ab; dk; ig) attached in a leaf of water lentil (ef).
In "c", the "arms" of a polyp (ab).

THE CREATURE

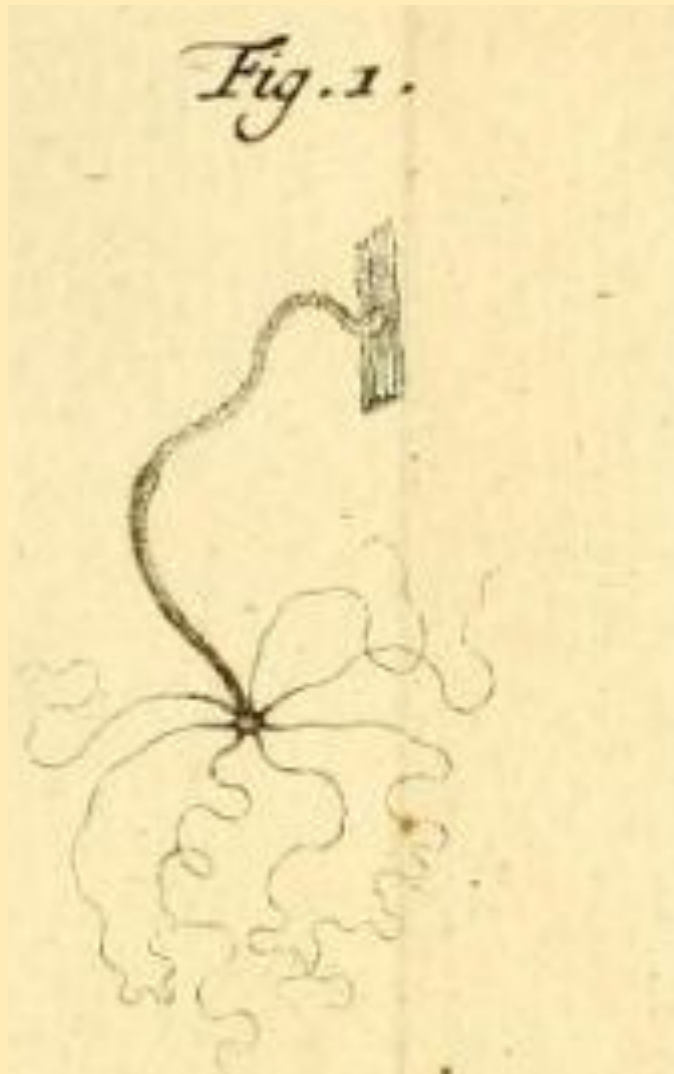


Fig. 1.

A polyp apparently moving its “arms” voluntarily.

M
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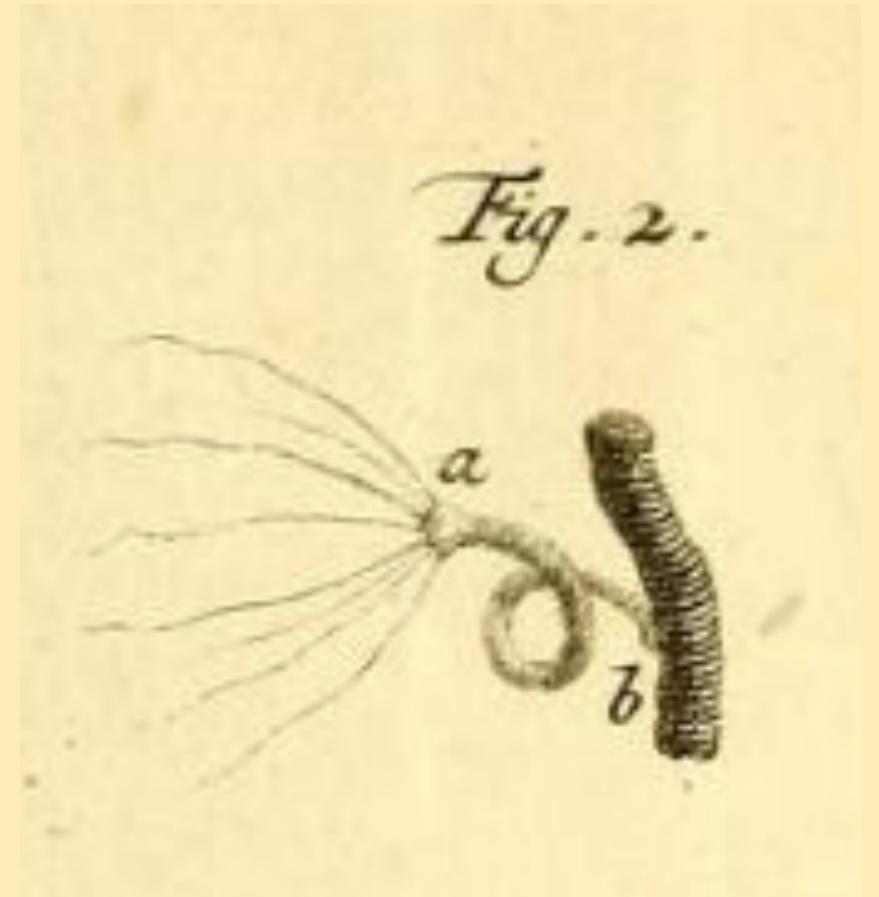


Fig. 2.

A polyp performing “body” contortion movement (ab).



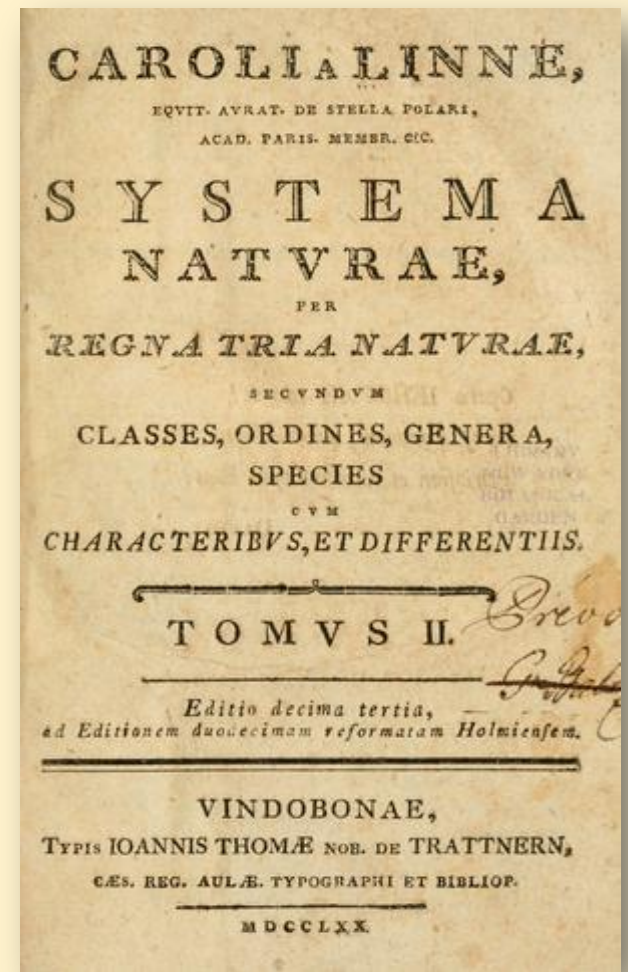
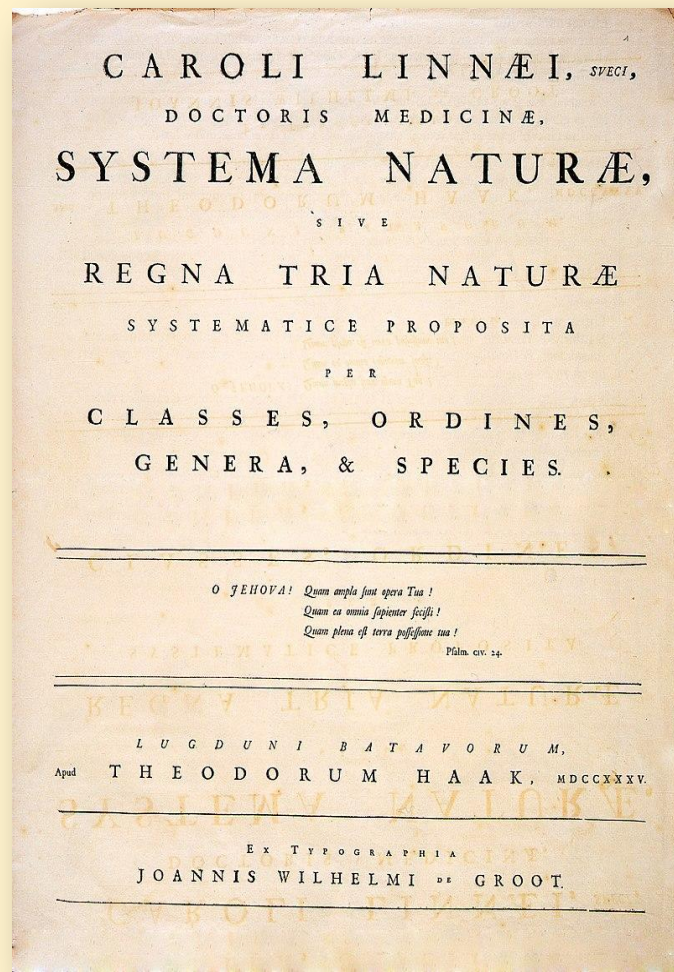
***Scala naturae* (1305).**

A medieval scale of “beings” showing levels of progress .

Great Chain of beings (1579).



Carl von Linné



Systema Naturae.

The first edition published in 1735 and the 13th edition, in 1770..

Wether's Lib T34
1813

THE
NATURAL HISTORY

OF MANY CURIOUS AND UNCOMMON

ZOOPLYTES,

COLLECTED FROM VARIOUS PARTS OF THE GLOBE

By THE LATE JOHN ELLIS, Esq. F. R. S.
SOC. REG. UPSAL. SOC.

AUTHOR OF THE NATURAL HISTORY OF ENGLISH CORALLINES,
AND OTHER WORKS.

SYSTEMATICALLY ARRANGED AND DESCRIBED

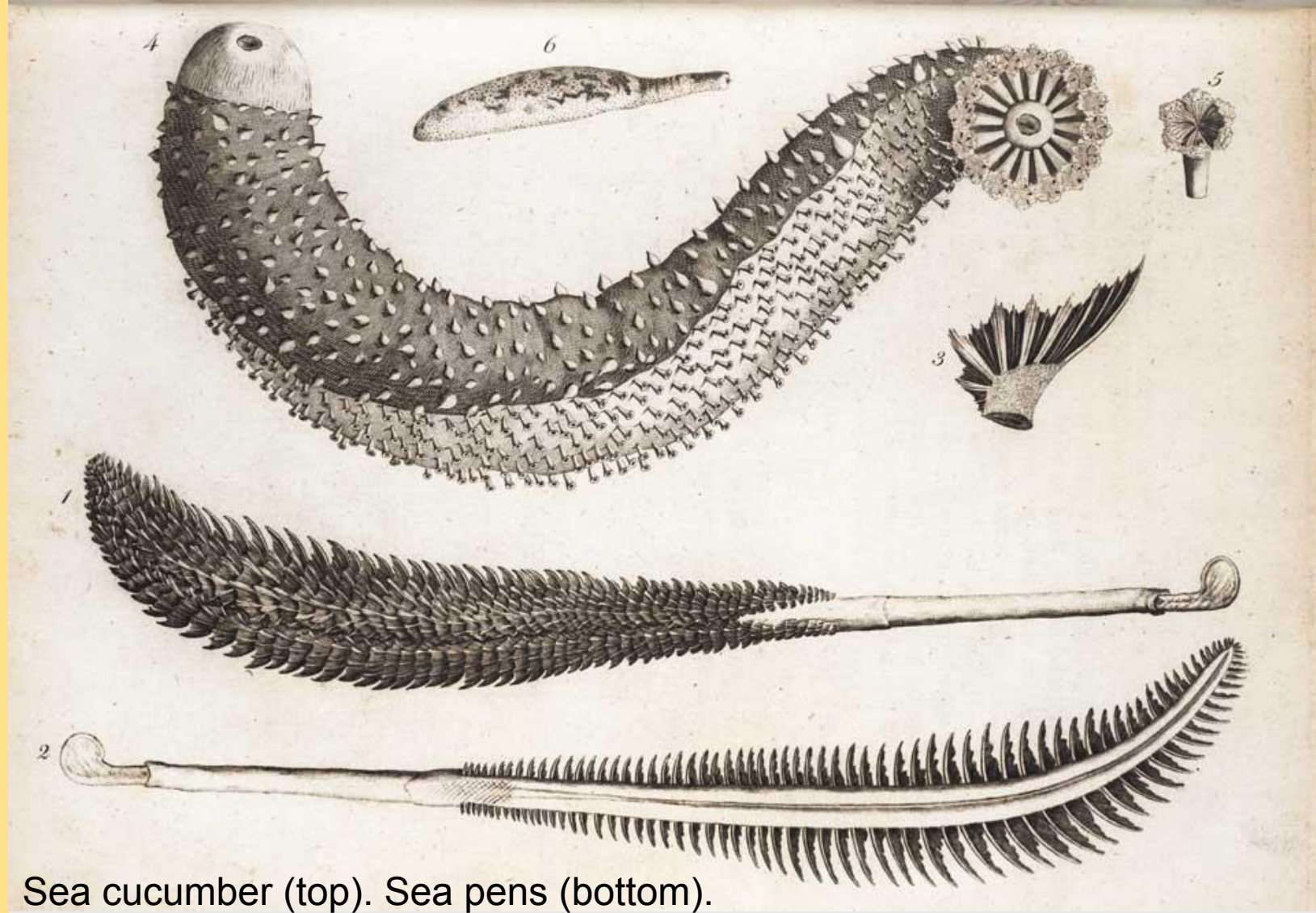
By THE LATE DANIEL SOLANDER, M. D. F. R. S. &c.

WITH SIXTY-TWO PLATES ENGRAVEN BY PRINCIPAL ARTISTS

L O N D O N :

PRINTED FOR BENJAMIN WHITE AND SON, AT HORACE'S HEAD, FLEET-STREET;
AND PETER ELSLEY, IN THE STRAND.

M.DCC.LXXXVI.



Sea cucumber (top). Sea pens (bottom).

Natural History of Many Curious and Uncommon Zoophytes.

John Ellis, 1786.

LOCOMOTION

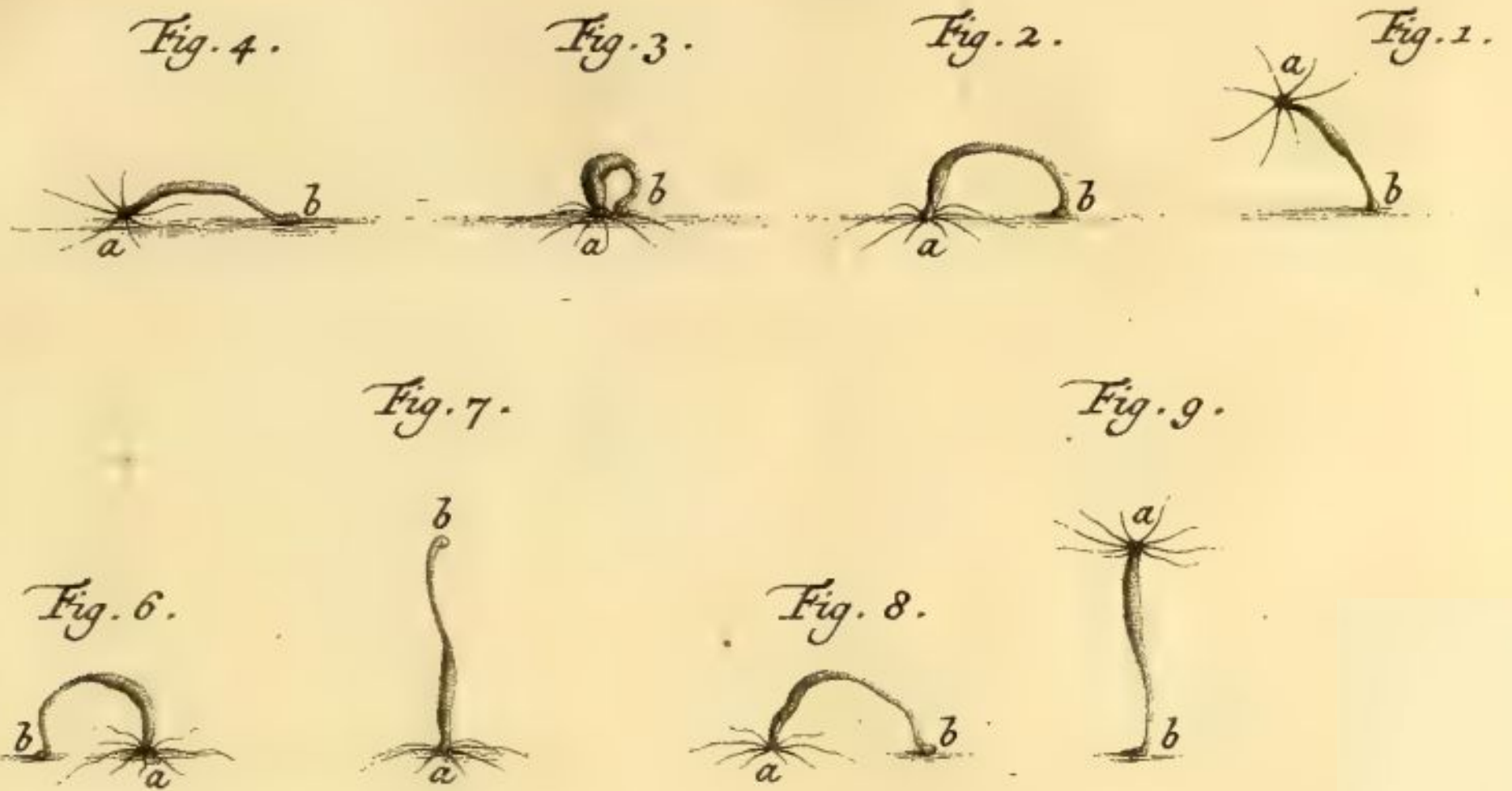


Fig. 1-9.

Modes of locomotion of the polyps: worm-like movement represented in the top line, from the right to the left (Fig. 1-4), and by somersaults, in the bottom line, from the left to the right (Fig. 5-9).

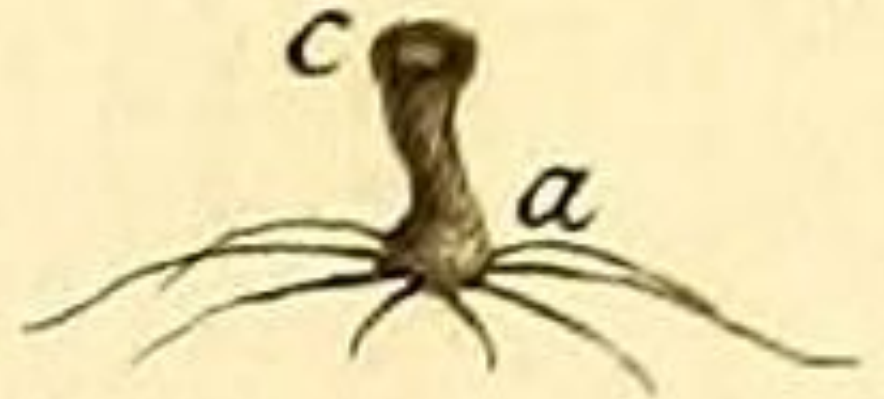
THINK 11

[Think 1] Based on these observations, what would justify the choice in favor of one classification or the other? Which traits seem most important and “carry more weight”?

Fig. 2.



Fig. 1.



CUT OFF

Fig. 1-2.

A polyp cut into two parts. Fig 1. represents the upper part with the "horns" (a). Fig 2. the lower part (bc) or the "body" of the organism.

[Think 2] How should the results of the cutting experiment help in making a decision on classification?

[THINK 2]

[Think 3] What should you conclude in the face of this new result? How should this new evidence about mode of reproduction be interpreted with respect to the criteria of voluntary movement and locomotion used earlier?

[THINK 3]

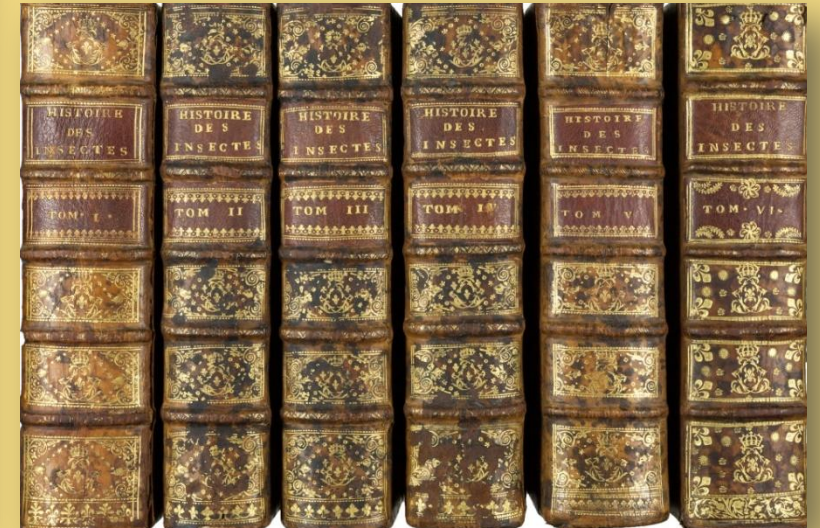
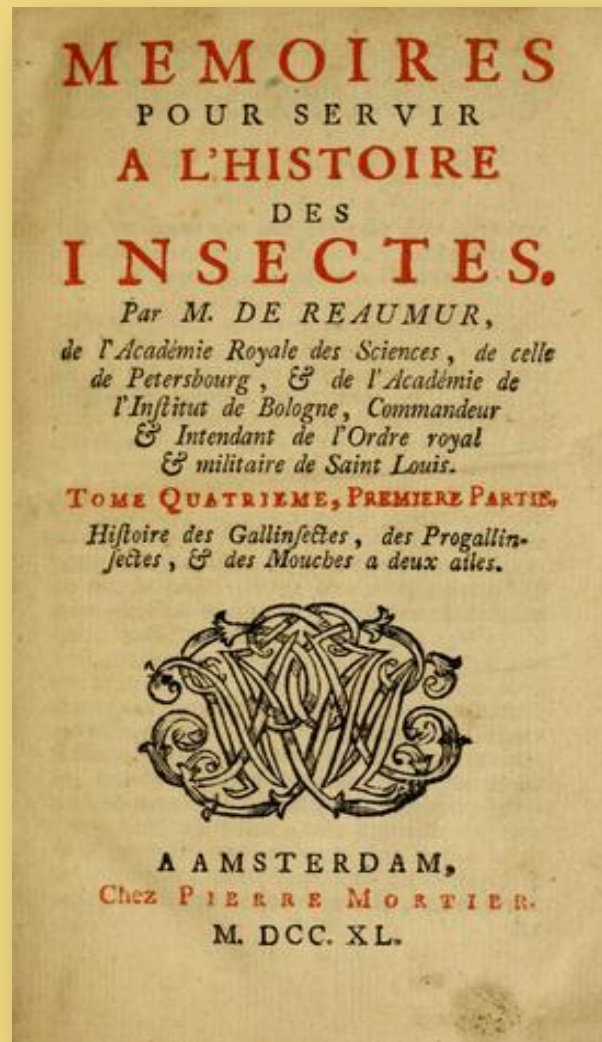


THINK 4

[Think 4] Facing this dilemma again, is it necessary to conduct more experiments and make more observations, or should you reassess the criteria used to classify organisms as either animals or plants?



René Antoine
Ferchault de Réaumur



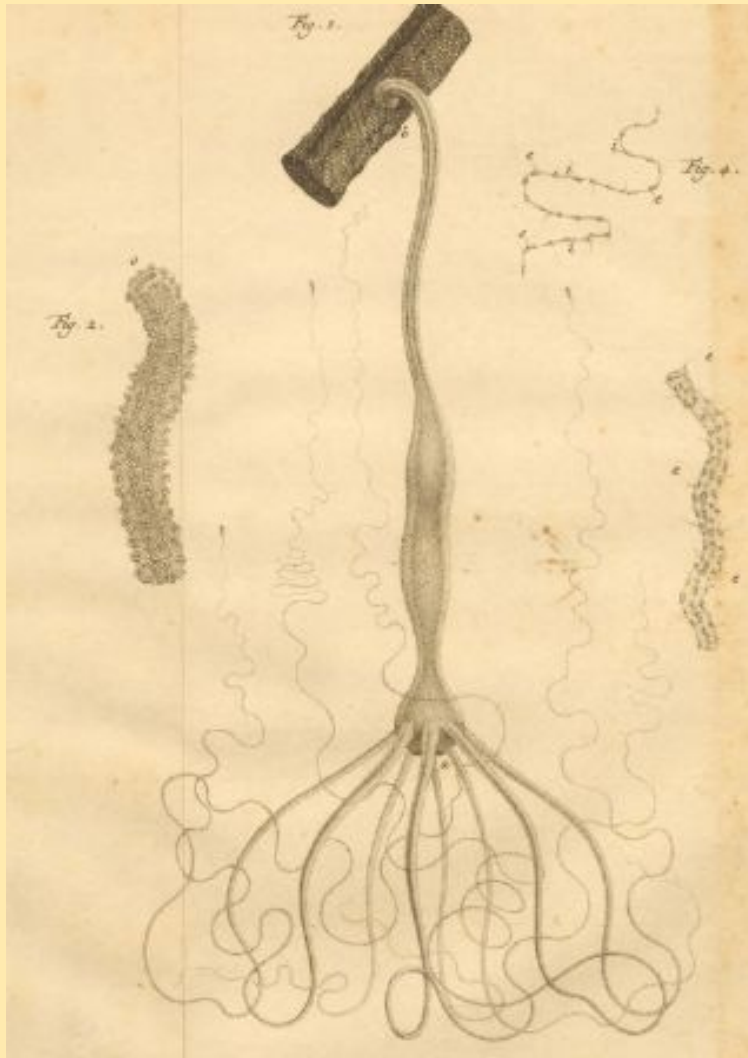
Memoires...

Memory to serve the history of insects.

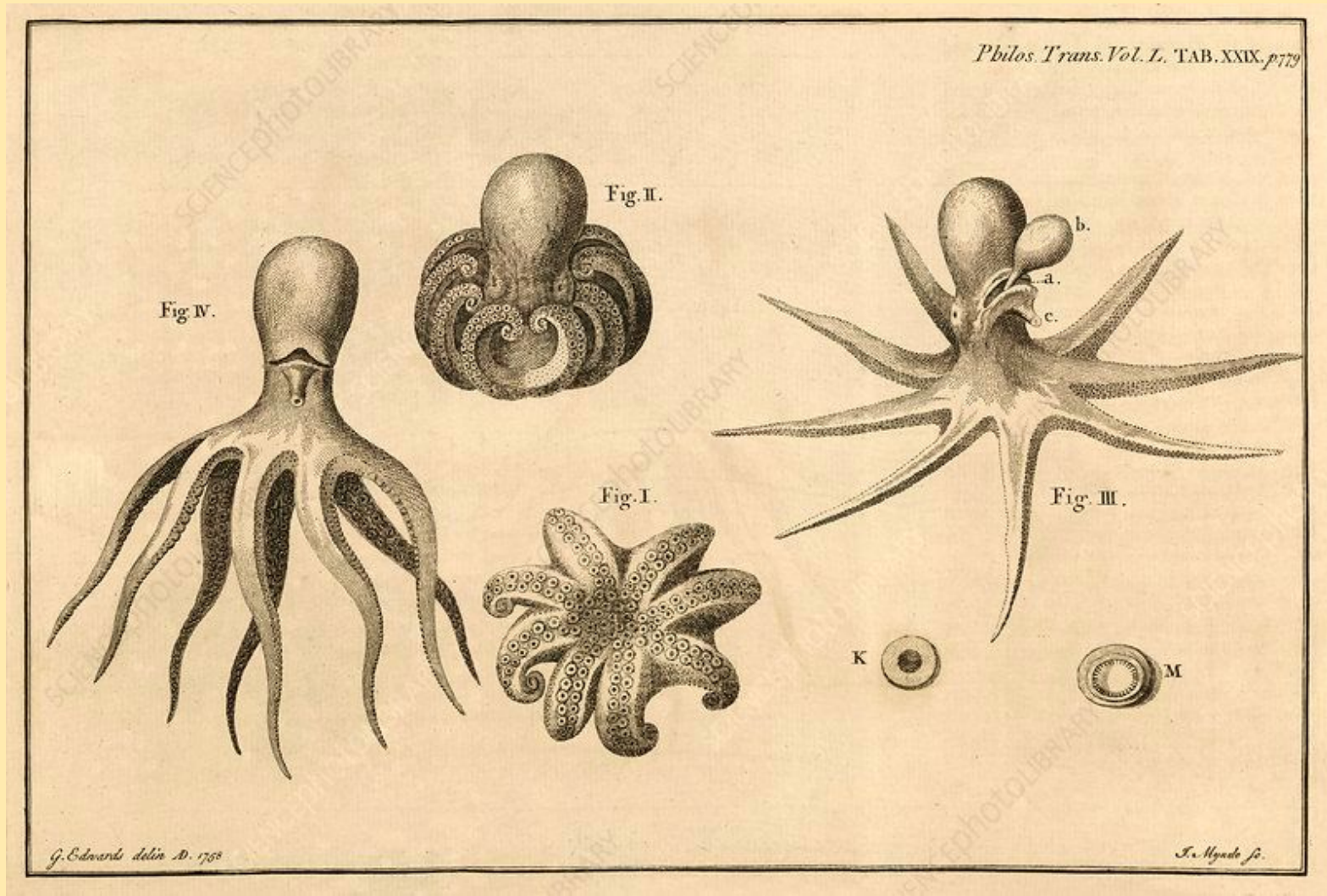
Six volumes published between 1737 and 1742.

[Think 5] Remembering you are handling small aquatic creatures. Why do you think they did not survive the trip? What procedures and care do you think are necessary to ensure the survival of these organisms during a several-day trip by horse or carriage from The Hague to Paris?

[THINK 5]



Polyps, named by Réaumur.



Octopus anatomy..

POLYPS

Fig. 2.

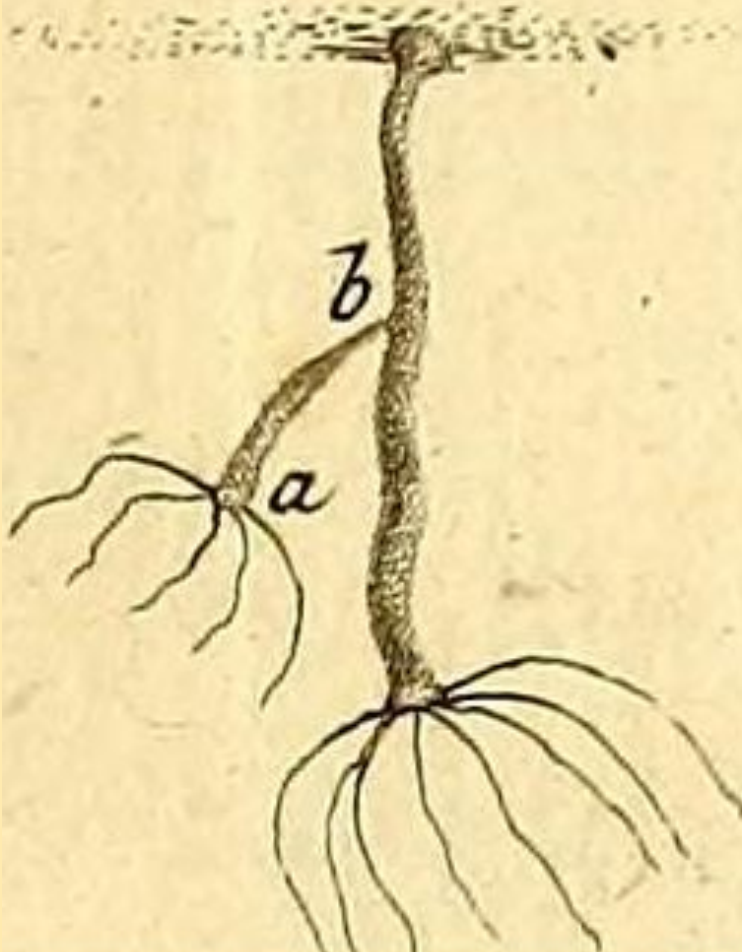


Fig. 1.

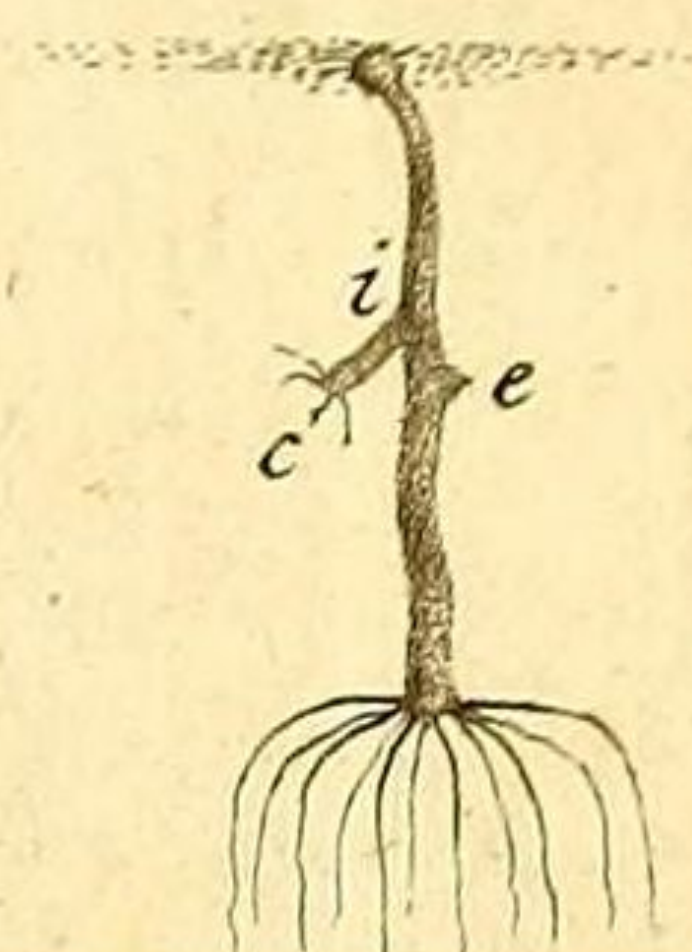


Fig. 1-2.

Fig. 1. A polyp with a bud (e) and a young growing polyp (ic).

Fig. 2. A polyp (ab) about to break free from the mother's body.

REPRODUCTION...?

[Think 6] Once again, how should we interpret the unexpected outcome? How does this new observation help characterize how you classify the creature? Again, should you change your position on the animal/plant distinction? Explain.



Female lobster

The eggs “hidden” at the bottom of the abdomen.

[Think 7] What are some possible reasons for skepticism (like Reaumur's) about generation by budding in polyps? As Trembley, how would you try to persuade him about the reliability of the new observations?

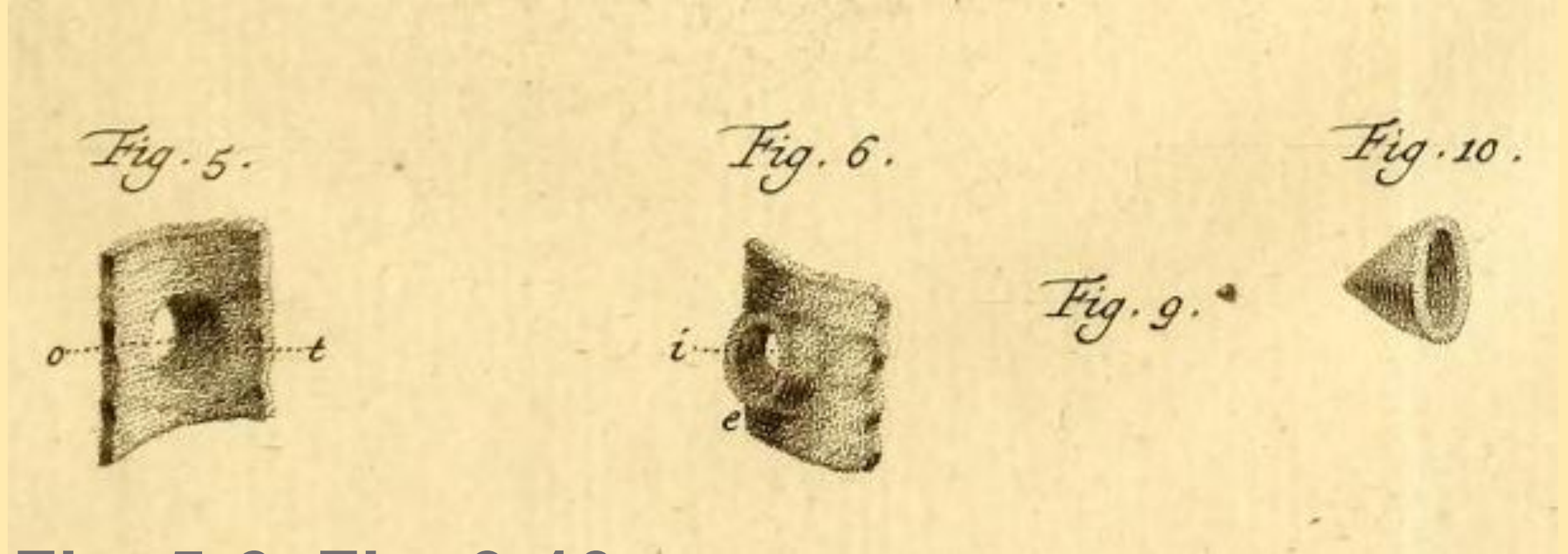


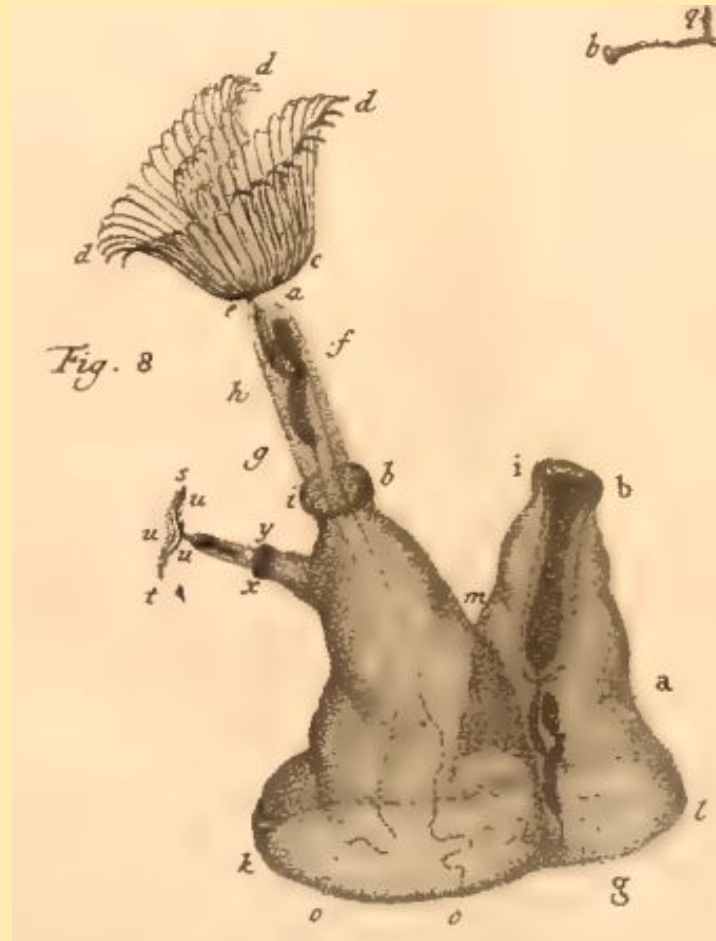
Fig. 5-6. Fig. 9-10.

Fig. 5-6. represents the inner side of part of the wall of a polyp and a communication (t) between the skin of the mother polyp and the bud and the letter "o" represents part of the skin of the removed bud that remained on the body of the mother polyp. **Fig. 10.** Indicates the bud (fig. 9.) extracted and seen under the microscope.

EGGS...?



Bernard de Jussieu



A specimen of a “feather polyp” that Réaumur and Jussieu believe to have found eggs.



A glass jar containing a ‘feather polyp’

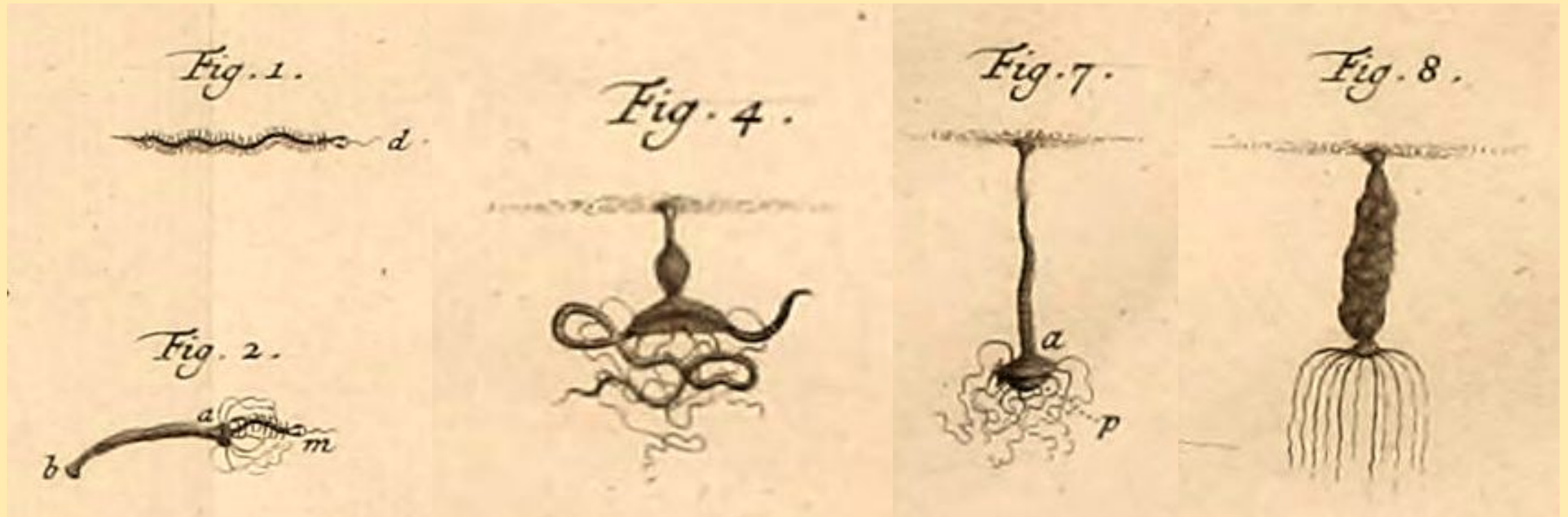
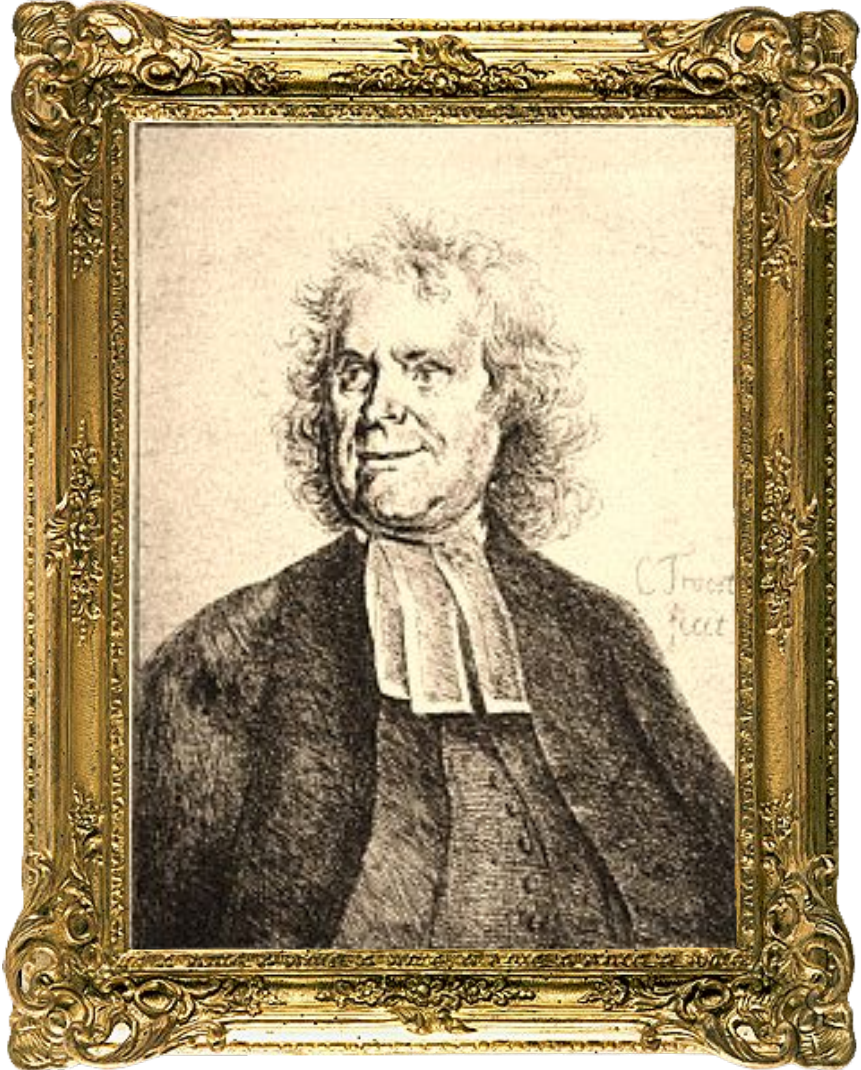


Fig. 1. A millipede worm less than 2mm long. **Fig. 2.** The arms of a polyp (ab) grasp a millipede worm (m) and direct it towards its "mouth". **Fig. 4.** A polyp grabbing a worm and preparing to swallow it. The polyp's "mouth" is extended and the worm is entwined in the polyp's arms. **Fig. 7.** A polyp with its "mouth" extended and apparently "ingesting" an aphid (p). **Fig. 8.** A polyp with its "stomach" full of aphids.

CAPTURING PREY...?

[Think 8] Do you think that just the action of trapping a supposed prey is sufficient to classify an organism as an animal? If so, how should we deal with apparently carnivorous plants (such as the Venus fly trap, sundews, or pitcher plants)? What further information, if any, would help resolve this dilemma?



Herman Boerhaave

ELEMENTA
CHEMIAE,

QUAE

ANNIVERSARIO LABORE DOCUIT,
IN PUBLICIS, PRIVATISQUE,
SCHOLIS,

HERMANNUS BOERHAAVE.

TOMUS SECUNDUS.

QUI CONTINET OPERATIONES CHEMICAS.



LUGDUNI BATAVORUM,
Apud ISAAGUM SEVERINUM.
M. D. CCXXXII.

Elementa Chemiae (1732)

Elements of chemistry

Fig. 7.

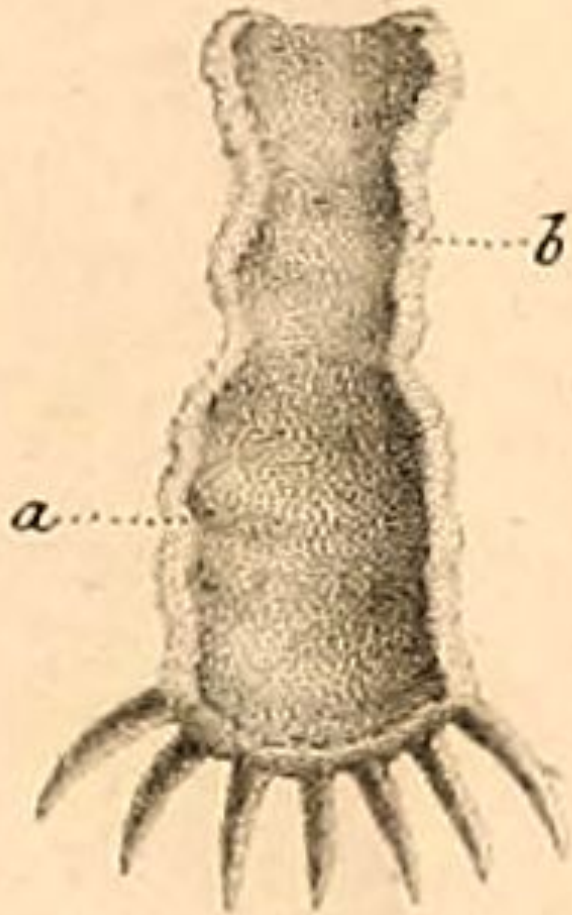
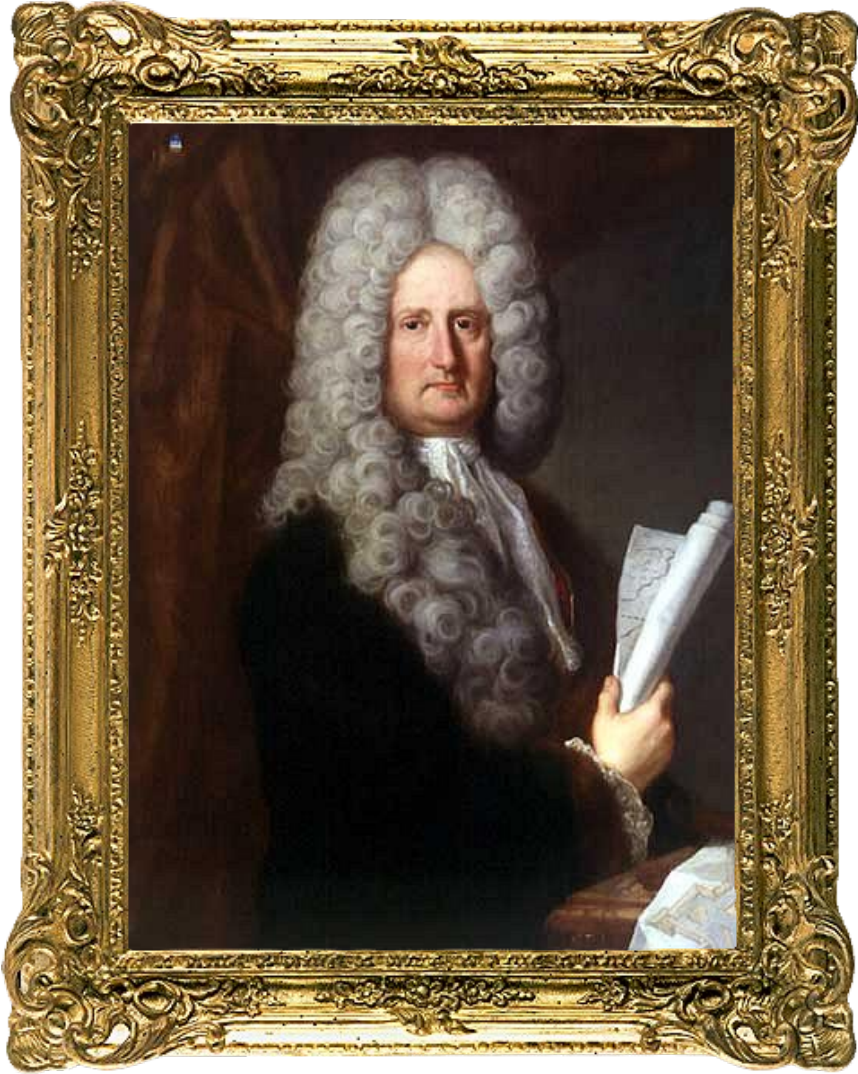


Fig. 7.

A polyp under microscope with cross-section: opened along its length from one end to the other. In (a) the inner part or walls of the "stomach". In (b), the skin slice.

NOURISHMENT...?



Luigi Ferdinando
Marsigli

HISTOIRE
PHYSIQUE
DE LA MER.

Ouvrage enrichi de figures
dessinées d'après le Naturel.

PAR

LOUIS FERDINAND
COMTE DE MARSILLI,

MEMBRE DE L'ACADEMIE ROYALE DES
SCIENCES DE PARIS.



A AMSTERDAM,
Aux DE'PENS DE LA COMPAGNIE.

M. DCC. XXV.

***Histoire physique
de la mer (1725)***

(Physical history of the sea)

[Think 9] How would you characterize the contributions of this knowledge to his research?

[THINK 9]

Fig. 12.



Fig. 13.

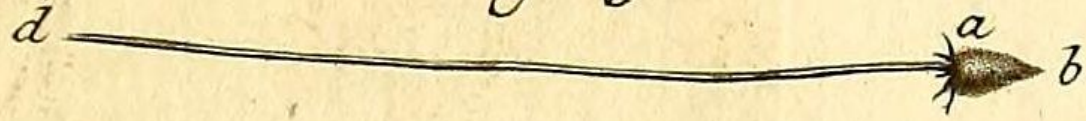


Fig. 14.

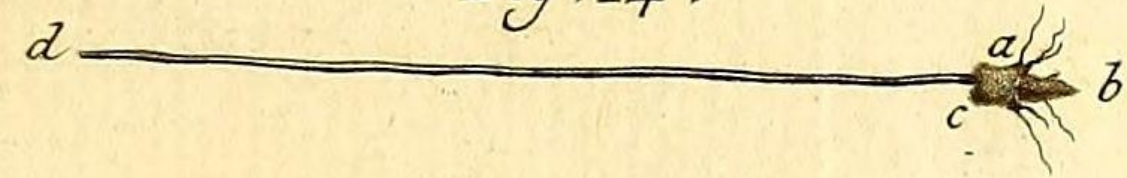


Fig. 15.



Fig. 16.

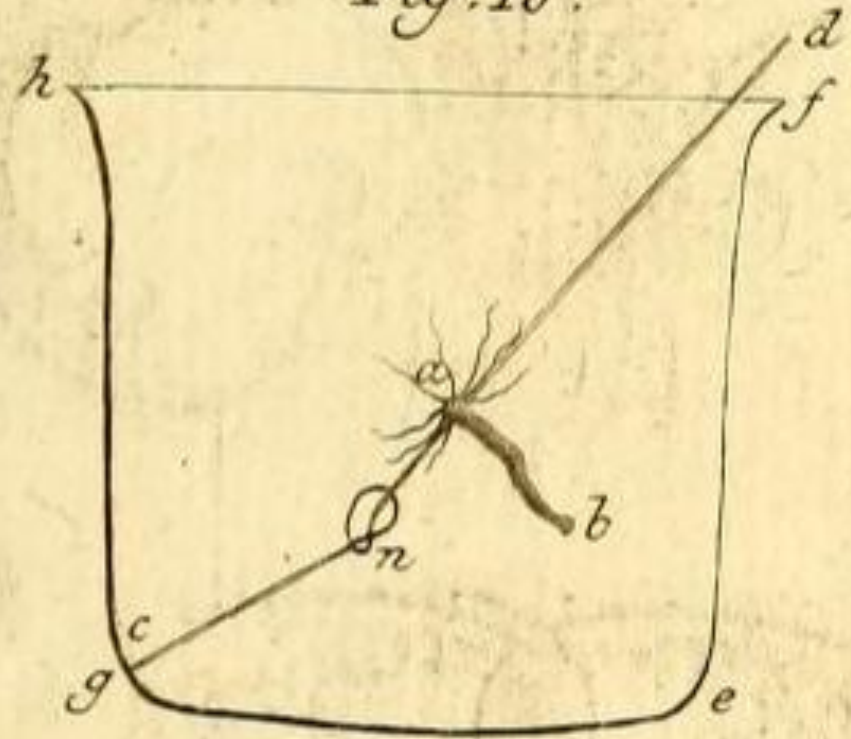
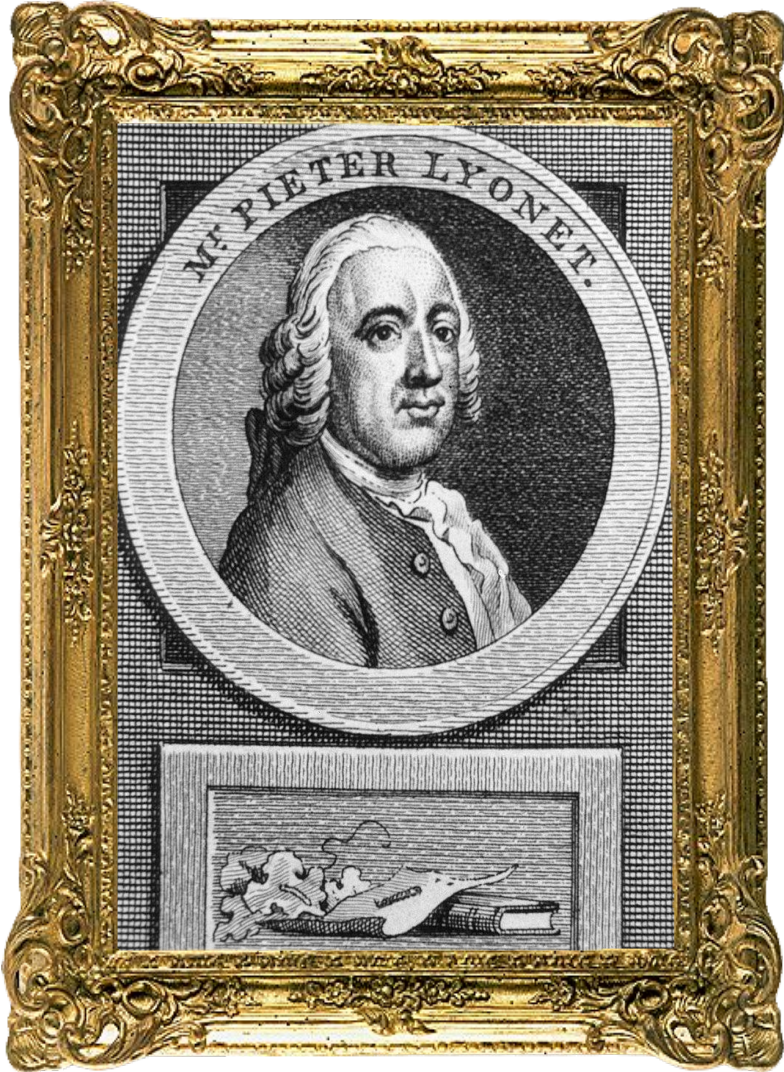


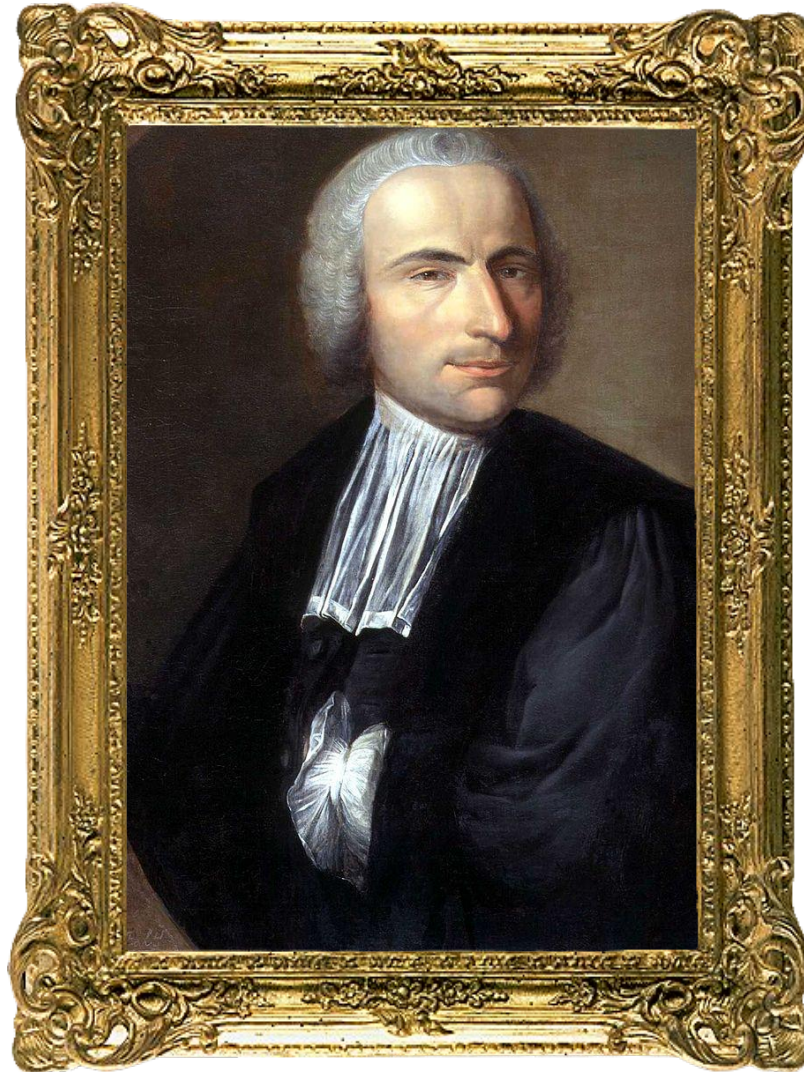
Fig. 12-16.

Using only a boar bristle (d), the palm of his hand (several attempts and a lot of patience, of course) Trembley managed to turn a polyp inside out (fig. 15), loop it around and trap it in a glass container (fig.16)!

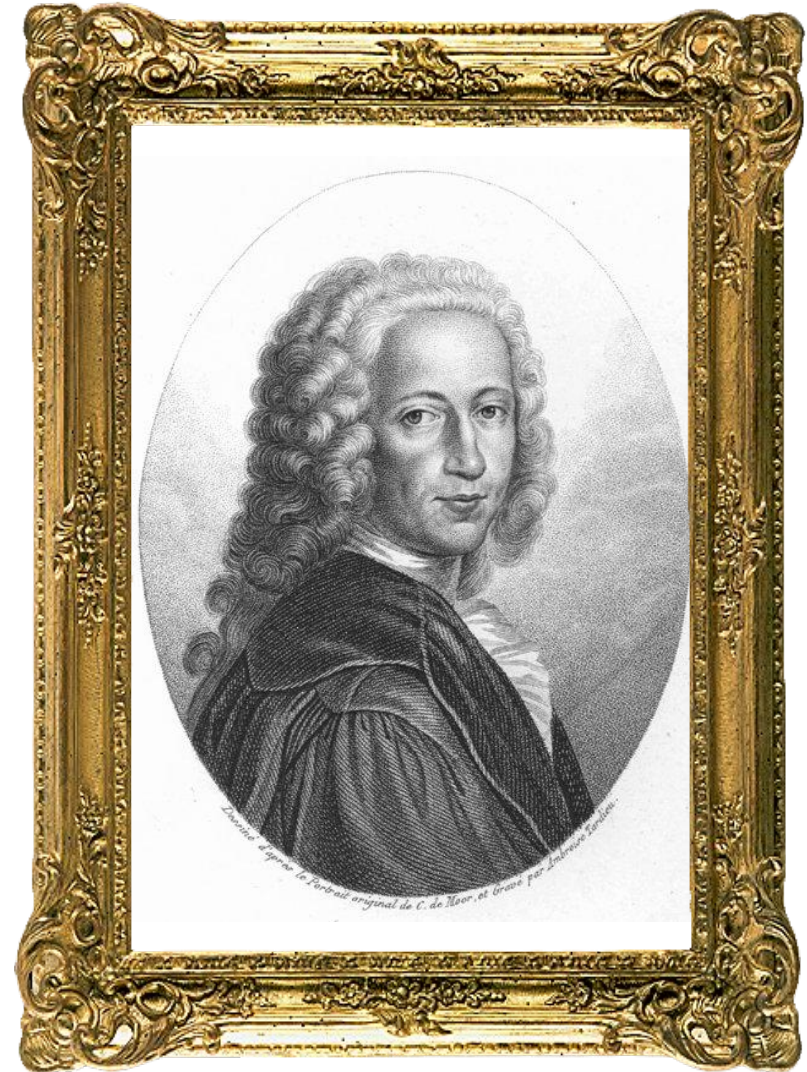
THE INVERTED POLYP!



Pierre Lyonnet



Jean-Nicolas
Sébastien Allamand



Bernhard Siegfried
Albinus

PHILOSOPHICAL
TRANSACTIONS.

For *Thursday*, January 13. and *Thursday*, January
21. 1742-3.

The CONTENTS.

*Several Papers relating to the Fresh-water
POLYPUS, an Insect, which has this surpris-
ing Property, that being cut into several
Pieces, each Piece lives, and in a short time
becomes as perfect an Insect, as that of which
it was originally only a Part.*

[a]

Abstract

*Abstract of Part of a Letter from the Honour-
able William Bentinck, Esq; F.R.S. to
Martin Folkes, Esq; Pr. R.S. communicat-
ing the following Paper from Mons. Trem-
bley, of the Hague.*

S I R, *Hague, Jan. 15. N.S. 1743.*
W HAT I here send you inclos'd will, I hope,
answer the Queries of your last Letter.
Mr. *Trembley*, the Gentleman who has
made the Observations on the Insects, has drawn this
Extract from his Journal: And I can answer for the
Truth of the Facts therein contained, as there is not
one of them but what I have seen repeated above
Twenty times. I send you the Paper in *French*, not
having had Time to translate it. I wish others may
be encouraged to try the Experiments over-again,
and satisfy themselves of the Truth, by their own
Eyes. The Insects may certainly be found in *Eng-
land*, if carefully lookt for, especially by such as
are accustomed to such Enquiries. However, if that
should be found difficult, it may be easy to send
some over to you: And Mr. *Trembley* will give Di-
rections how to keep and feed them; for he makes
himself a *Point d'honneur* of being communicative,
and concealing nothing of what he knows about
them. If therefore you have any Doubt, or want
any further Information, please only to write to me,
or to him, and you shall be sure of an Answer, by the
first Opportunity. I pray to be kindly remem-
bered— &c.

Philosophical Transactions

Trembley's work is published in the prestigious
British journal in 1743.

THE FAMOUS POLYP!

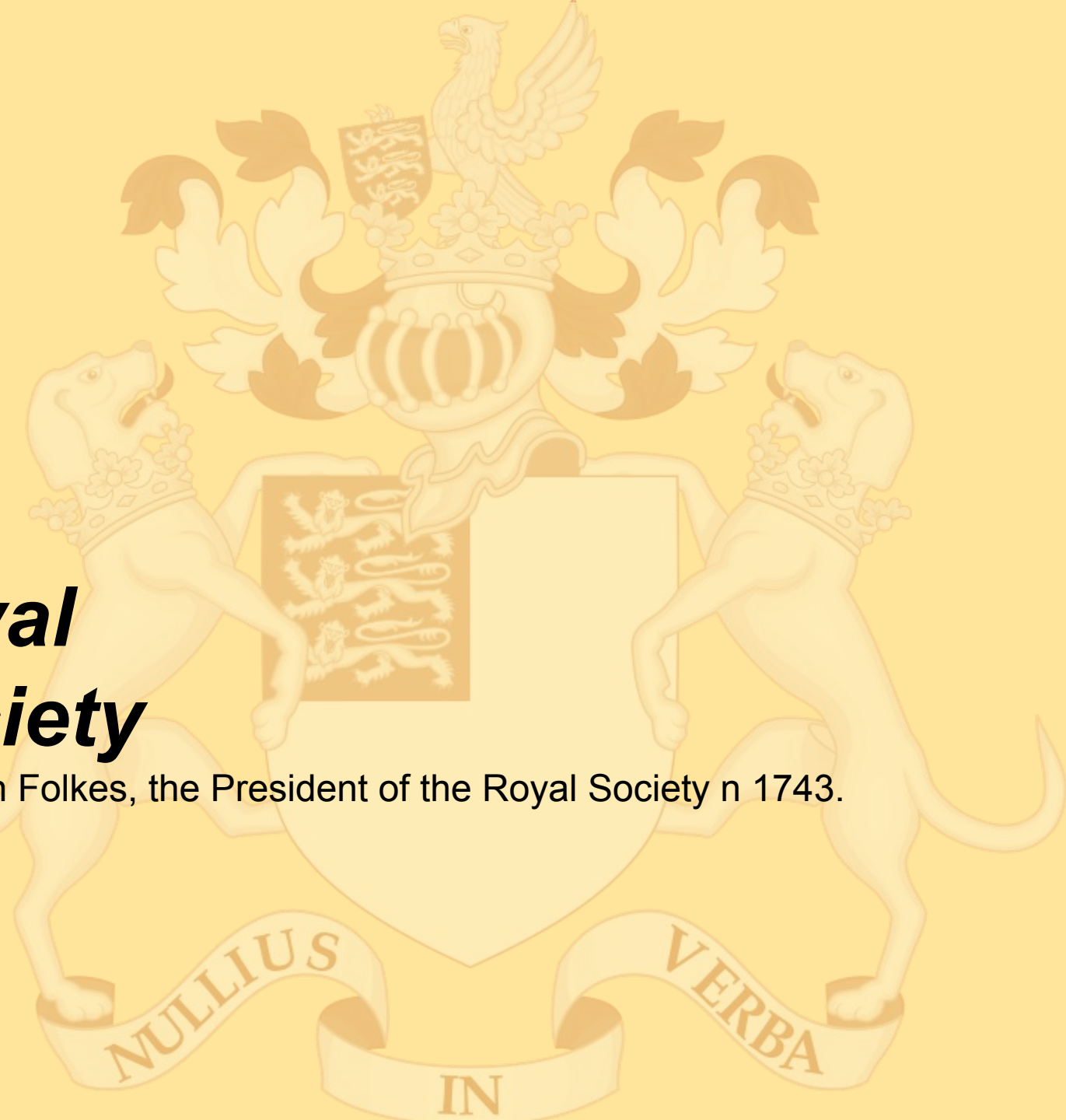
[Think 10] Why, even after several public presentations witnessed by many people, might some people reject the complete regenerative ability of polyps? How might you respond to such skeptics?



Sir Martin Folkes

Royal Society

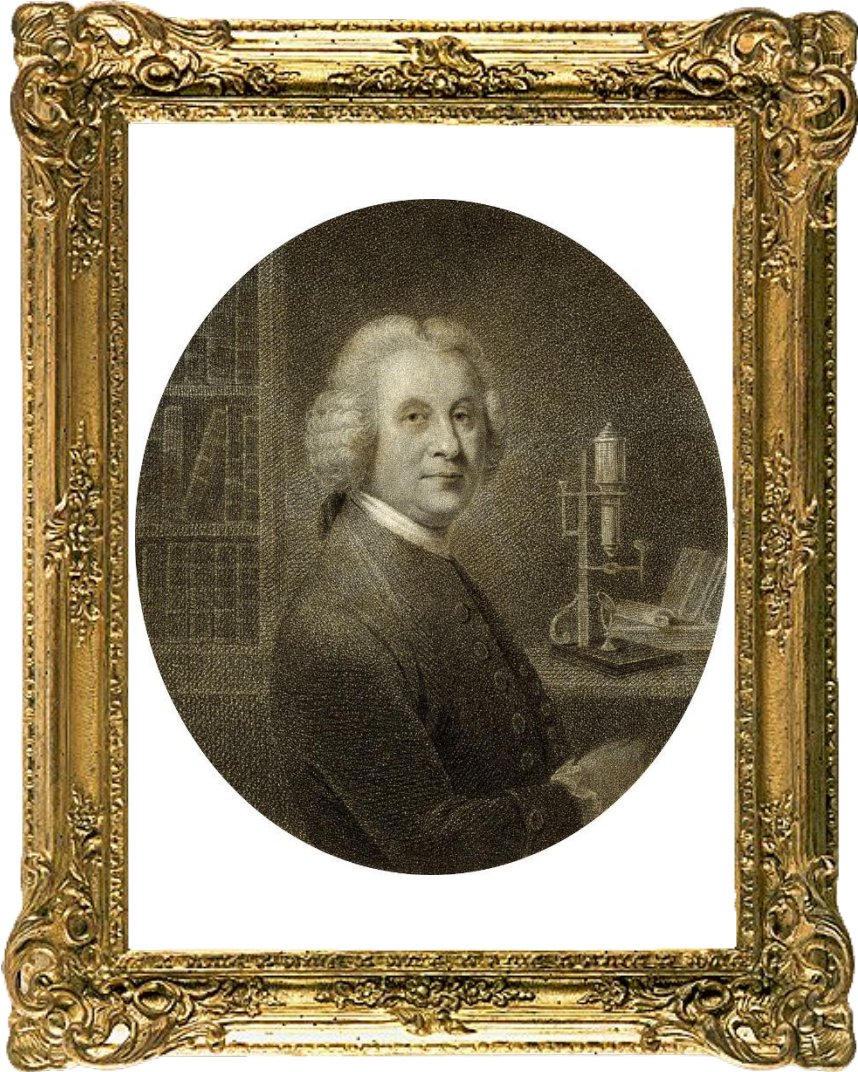
Sir Martin Folkes, the President of the Royal Society n 1743.



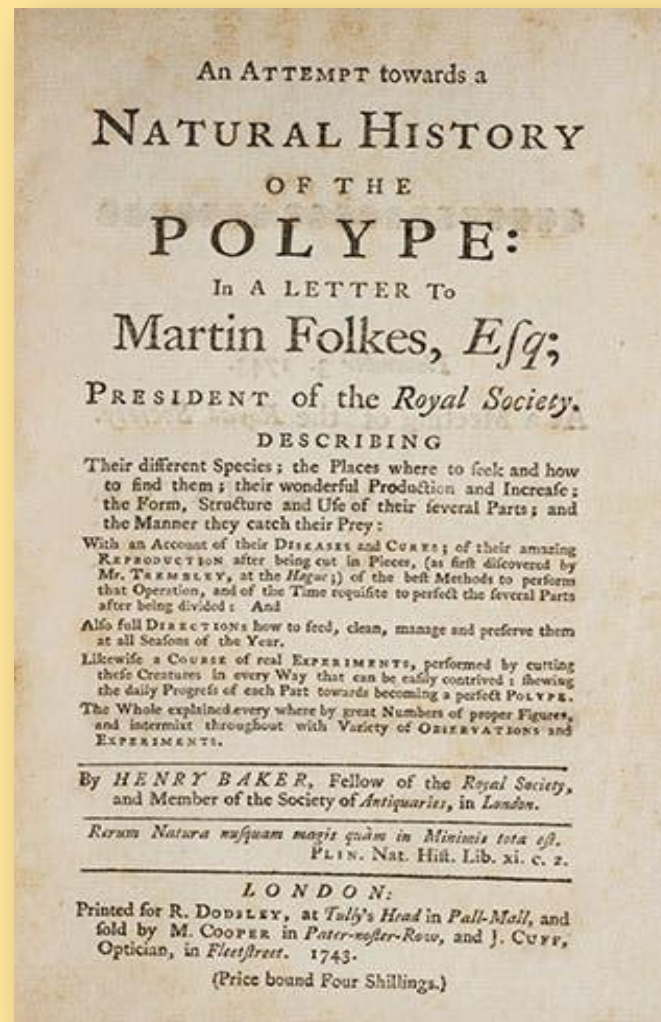


“ The Copley Medal is the Society’s oldest and most prestigious award. The medal is awarded for sustained, outstanding achievements in any field of science. ”

(Royal Society)



Henri Baker



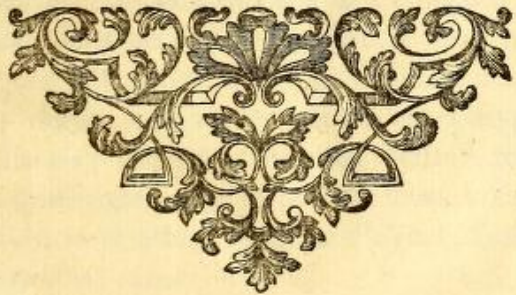
Natural history of the polype (1743)

[Think 11] Is this fair? Is this plagiarism?
Given his social status as a “mere” tutor, what can Trembley do? Was Trembley’s “strategy of generosity” a mistake? What might be the consequences for Baker?

[THINK 11]

MÉMOIRES,
POUR SERVIR À
L'HISTOIRE
D'UN GENRE DE
POLYPEES
D'EAU DOUCE,
À BRAS EN FORME DE CORNES:

Par A. TREMBLEY, de la Société Royale.



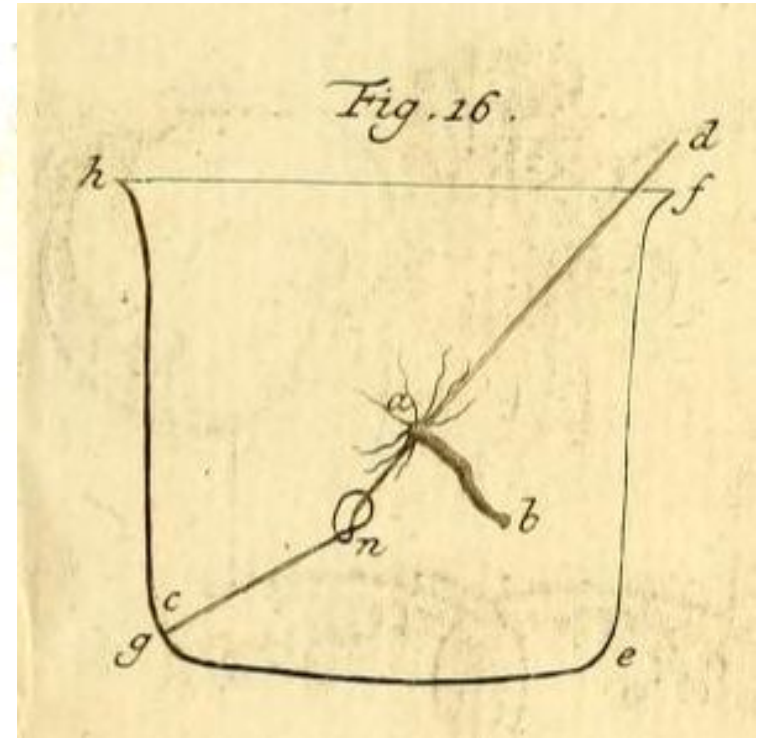
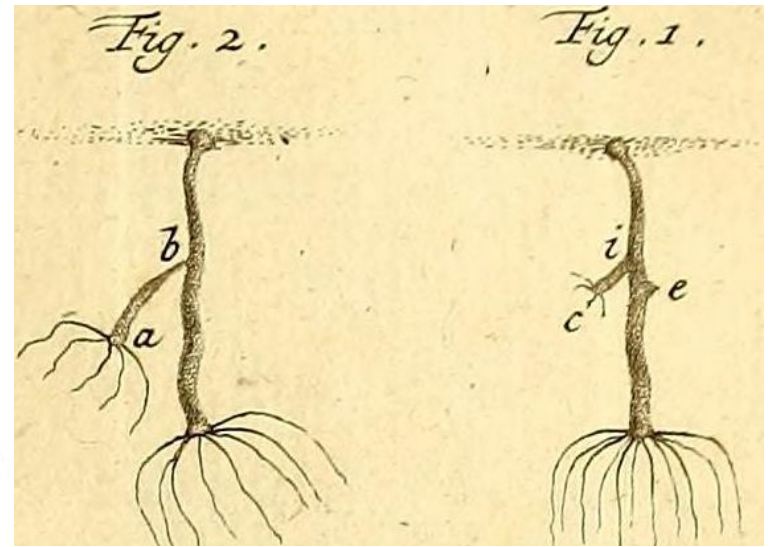
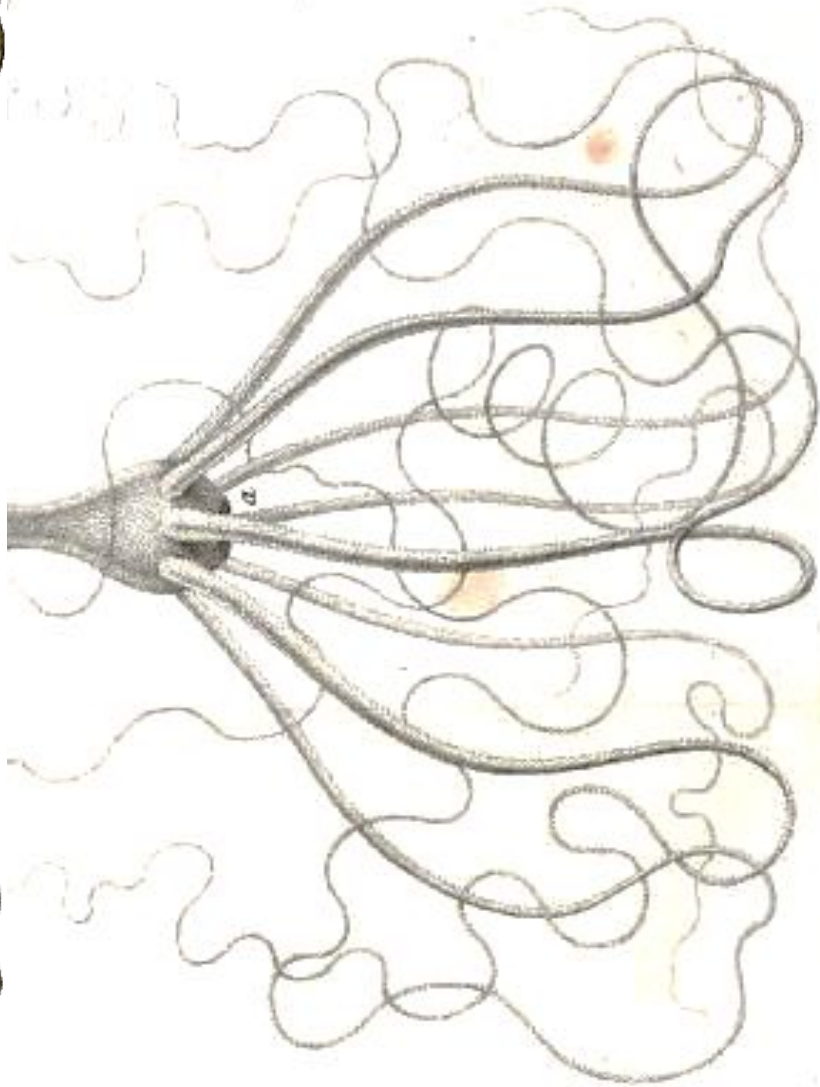
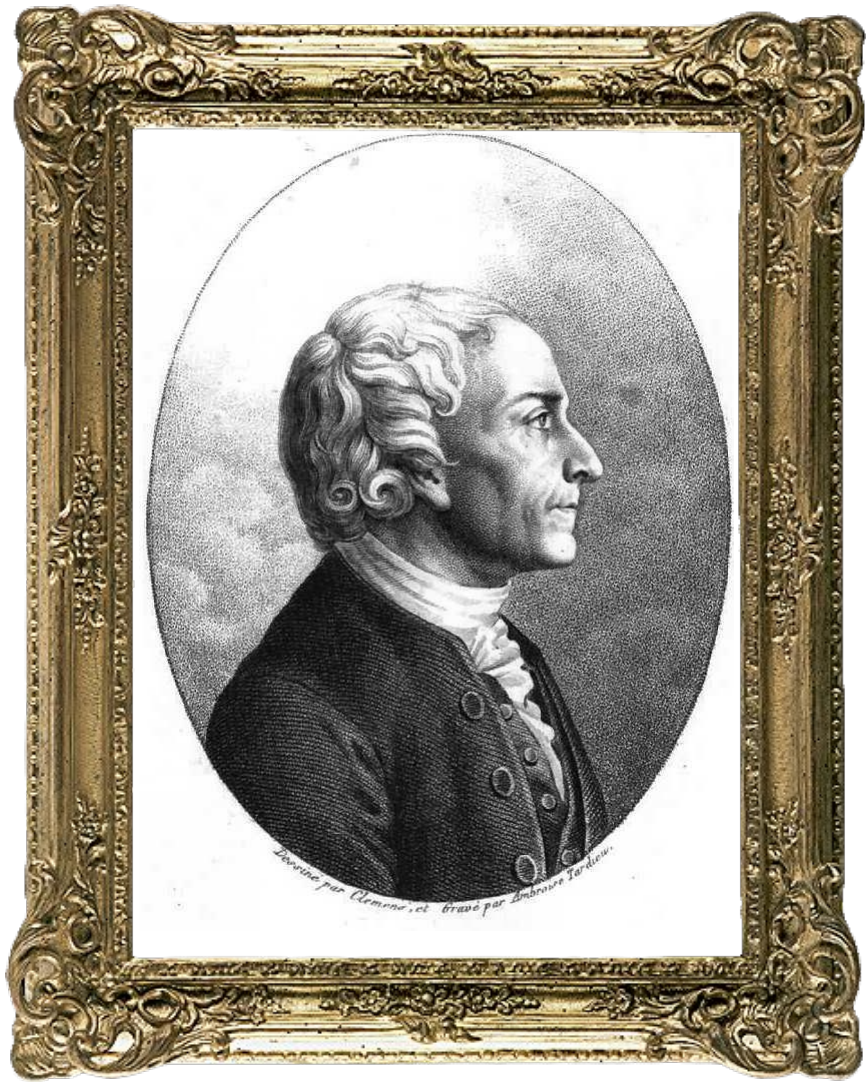
A L E I D E,
Chez JEAN & HERMAN VERBEEK,
M. D C C. X L I V.

***Mémoires pour servir à
l'histoire d'un genre de
polypes d'eau douce, à
bras en forme de cornes
(1744)***

(Memoirs concerning the natural history of a species of freshwater polyp with arms in the shape of horns)

[THINK 12]

[Think 12] Recall Charlotte Sophie, the mother of Trembley's tutees. How do you think she might have contributed to the investigations if she had been invited to participate?



Abraham Trembley
(1710-1784)

[THINK 13] What does the case of “Abraham Trembley and the Creature that Defies Classification” reveal about the following aspects of the nature of science?:

- the role of interpreting observations [1, 3, 9]
- the role of theory in interpreting evidence [4, 6, 9]
- the role of experiments [2, 4, 7, 8, inversion expt.]
- role of unexpected results [3, 4, 6, 8]
- response to criticism [7, 10, witnessing of expts., sharing of samples]
- the material culture of science [5]
- ethics in scientific conduct [11]
- the role of gender and access to science [12]