

it for a particular substance or body; but having examined it, I observed it was only a pellicle, or membrane, that covered a part of the *papillæ* I mentioned. This membrane has sixteen separations, which form kinds of purses, and yet leave, in the center of the animal, an empty space, wherein several glands are brought in view. I do not know, whether, in the natural state, these membranes do not retire to the circumference, in order to discover the glands within, which they usually hide, and which fill up all the middle of the crown; but when the fleshy body is gone up again, it covers all the interior parts, closes them in, and preserves them from the touch of any extraneous body. I cannot tell how these fishes live, or what is their mechanism; for I could not distinguish either a mouth, or any *viscera*, nor any other organ serving to their nourishment.

CXIII. *An Account of several rare Species of Barnacles. In a Letter to Mr. Isaac Romilly, F. R. S. from John Ellis, Esq; F. R. S.*

Dear Sir,

London, Dec. 21. 1758.

Read Dec. 21, 1758. **T**HOSE rare and very extraordinary new species of Barnacles, which you have lately received from abroad, are so different from any of the common species, that I have seen, that I was resolved to inquire into the nature of an animal, which, like a Proteus, appears in so many different

different shapes or coverings in different parts of the world. For this end I have consulted that excellent collection in the British Museum, and some others in the cabinets of my curious friends.

In this inquiry I met with some very rare ones, which have not yet been described, as you will observe in the annexed plate [*See TAB. XXXIV.*], where I have given exact drawings of yours, as well as the other species of this genus.

This marine animal is called, by writers on natural history, *Balanus*, and *Concha Anatifera*: but the celebrated Professor at Upsal, Dr. Linnæus, calls the internal active part, or fish, the *Animal Triton*, and the covering or testaceous habitation *Lepas*, which he says is a multivalved shell, composed of unequal valves. The *Animal Triton* he describes, as having an oblong body, a mouth with a tongue in it, twisted about in a spiral manner; sixteen tentacula or claws: six of the hinder ones on each side, he says, are cheliferous.

This account differing from that given by the ingenious Mr. Turberville Needham, F. R. S. in his *Microscopical Essays*, I shall give the character of this animal, as it appeared to me from the many observations I made on it, while alive in salt water; and these I compared not only with many dried specimens of other varieties, but likewise with some of yours, that were preserved in spirits; and I found that the parts of the animal agree in all the species.

The experiments, that I made, were on the common English Barnacle, which is very frequently met with, at this time of the year, on oysters and other shell-fish. The microscope, that I made use of to
observe

observe it, was Mr. Cuff's aquatic one; where the animal, when taken out of the shell, may be put into the watch-glass with salt water, or spread on the round glass plate on the stage of the microscope, and kept moist with a hair pencil and salt water during the time of observation: this will keep the claws and proboscis alive and in motion for many hours together.

This animal has 24 claws, or cirrhi (*See Fig. A*), which are disposed in the following manner: the 12 longest stand erect, arising from the back part of the animal: they are all joined in pairs near the bottom, and inserted in one common base. These appear like so many yellow curled feathers: they are clear, horny, and articulated. Every joint is furnished with two rows of hairs on the concave side. The animal, in order to catch its prey, is continually extending and contracting these arched hairy claws, which serve it for a net.

The 12 smallest claws are placed next to these, six on each side: these are divided into pairs; that is, two claws to one stem, like the chelæ or claws of the crab. These are more pliable, and fuller of hairs, than the others, and seem to do the office of hands for the animal.

The whole number of claws lessen in size gradually each way, from the tallest in the back, to the last but one of each side in the front; which last two are of the middle size.

The proboscis, or trunk, rises from the middle of the base of the larger claws, and is longer than any of them: this the animal moves about in any direction with great agility: it is of a tubular figure,
trans-

transparent, composed of rings lessening gradually to the extremity, where it is surrounded with a circle of small bristles, which likewise are moveable at the will of the animal. These, with other small hairs on the trunk, disappear when it dies.

Along the inside of this transparent proboscis the spiral dark-coloured tongue appears very plain: this the animal contracts and extends at pleasure.

The mouth appears like that of a contracted purse, and is placed in front, between the fore claws. In the folds of this membranous substance are six or eight horny laminæ or teeth standing erect, each having a tendon proper to direct its motion. Some of these teeth are ferrated, others have tufts of sharp hairs instead of indentations on the convex side, that point down into the mouth; so that no animalcule that becomes their prey can escape back.

Under the mouth lie the stomach, intestines, and the tendons by which they adhere to the shell.

This then is the general character of the animal of the whole genus, whether with stems or without.

I shall now give you a short description of the several kinds I have met with, besides those of your own, and shall divide them into two kinds; those that have stems, and those that adhere by their shelly bases.

The first and most remarkable of those that have stems is the Barnacle, *Fig. 1.* This differs from the Lepas of Linnæus in not having a testaceous, only a cartilaginous or fleshy covering. On the top of it are two erect tubular figures like ears: these have a communication with the internal parts of the animal (*See Fig. 1. b.*) These inner parts agree with the
 general

general character already given. The stem, which is here dissected, was full of a soft spongy yellow substance, which appeared, when magnified, to consist of regular oval figures, connected together by many small fibres, and no doubt are the spawn of the animal.

This extraordinary animal (of which there were seven together) was found sticking to the Whale Barnacle (*See fig. 1. & 7.*), by Mr. Smith of Stavenger in Norway, who cut both kinds together off a whale's lip, that was thrown upon that coast last year, 1757, and immediately immersed them in spirits of wine; by which means we have been able more exactly to describe them.

I have called this animal the Naked Fleshy Barnacle with Ears; but it appears to claim the name of Triton rather than *Lepas*, according to Linnæus, as having no shelly habitation.

Fig. 2. is the next animal of this class: this is not yet described. I found several of them sticking to the Warty Norway Sea Fan, which Dr. Pantoppi-dan, the Bishop of North Bergen, sent you: from its appearance, I have called it the Norway Sea Fan Penknife. The stem of this is covered with little testaceous scales. The upper part of the animal is inclosed in thirteen distinct shells, six on each side, besides the hinge-shell at the back, which is common to both sides: these are connected together by a membrane that lines the whole inside. One of these is magnified a little at *fig. 2. a.*, in order to express the figure and situation of each shell the better.

Fig. 3. is taken from D'Argentville's *Lithologie*, *Pl. 30. fig. H.*, who says it is found in the British
 VOL. 50. 5 Q channel

channel sticking to sea plants; and that these shells consist of five pieces. This, from its appearance, I have called the British Channel Penknife, to distinguish it from the other.

Fig. 4. is a species of Barnacle called Pouffepieds by the French, and described by Rondeletius as commonly found adhering to rocks on the coast of Britany. He says the people there boil and eat the stem, which is first of a mouse-colour, and afterwards becomes red like our prawns. There are many heads, that arise out of one stem, each of which consists of two shells, in which are the same parts of the animal as in the other species. This I have called the Cornucopia Barnacle. Some of the shells of this Barnacle were drawn from a specimen in the British Museum. This *Lepas* is the *Mitella* of Linnæus.

Fig. 5. and *6.* are the Barnacles called *Conchæ Anatifera*: these are the sorts so well known to sailors, and formerly supposed to produce a large species of duck called a Barnacle. These consist of five shells. The tube, that supports one of these kinds, branches out like some species of corallines, bearing a shelled animal at the end of each branch. They are generally found adhering to pieces of wood in the sea, and most ships have some of them sticking to their bottoms. Those of the southern and warmer climates are generally of a larger kind than those of the colder and more northern climates.

The next division of these animals is, those that adhere by the base of their shells, having no stems.

Here I must observe, that the bottoms of the several species of this division conform in shape to the substances they adhere to, or grasp them in such a peculiar

peculiar manner, as to render their situation secure from the violence of the element they live in. Another provision of nature for the security of these animals are the four opercula, which, upon their retreating into the great shell, they can draw to so close after them, as to secure themselves from outward danger.

Fig. 7. represents the Whale Barnacle, called *Pediculus Ceti*, just as it was cut off the whale's lip, with the seven naked Barnacles with ears, already described. *Fig. 7. a* is the bottom of the shell. This has the appearance of the gills of a mushroom. All the spaces between these laminæ were filled with the blubber of the whale: by this means they adhere to the gristly skin of the fish. The narrow cavities between the branched laminæ are the places where the ligaments or tendons, that move the opercula, are inserted.

Fig. 8. is the Cup Barnacle, taken off an East India ship from Sumatra. The testaceous flat bottom of this was marked with the seams and lines of the sheathing, and with the rust of the nails. In one of these shells the animal is represented protruding his claws thro' the opercula.

Fig. 9. is called the Bell-shaped Barnacle. This was taken off the bottom of a ship from Jamaica, and had its flat testaceous base marked as the former.

Fig. 10. This represents part of a most elegant specimen in the curious collection of Dr. John Fothergill. It is called the Tulip Barnacle, and very properly, as well from the shape of its shell, as the beautiful stripes of red mixt with white. It adheres to a piece of the true red coral, and was fished up

near Leghorn, on the coast of Italy. It is not improbable, but that these groups of Barnacles, growing at the same time with the animals that formed the red coral, may have received an addition to their fine red colour from the coral.

Fig. 11. is a group of Barnacles of a conical form, composed of purplish tubes like small quills. *Fig. 11. a* represents one of the same, with a view of its base, from the collection of Mr. Peter Collinson, F. R. S. This was brought from the East Indies. The insides of these shells have the appearance of the spongy parts of bones.

Fig. 12. is called the Tortoise-wart Barnacle, being often found upon that animal. This shell is of a plano-convex shape, and looks like polished ivory. The divisions between the valves represent a star with six points. If these shells are put into soap lees, they will in a few hours separate into six pieces or valves, each shelly valve having two ears, like the scallop-shell: so that this species has its valves connected by membranes, instead of testaceous sutures, as most of the others have. *Fig. 12. a* represents the under part of the same shell.

Fig. 13. This shell is marked with six rays like a star, as the former; but is much deeper in proportion to its diameter. Several of this kind were found sticking to a crab, that was lately brought from the island of Nevis; from whence I have called it the American Crabs-wart.

Fig. 14. is called the Side-mouth Barnacle. This was found on the southern coast of Africa, near the Cape of Good Hope, where it adheres to a particular species of striated purple muscle. *Fig. 14. a* represents

sents two of the opercula of this Barnacle remarkably horned. The shell of this is very thin; but its obliquity may probably be owing to its situation.

Fig. 15. This egg-shaped Barnacle with a small mouth is found in clusters sticking to the Buccinum tribe of shells in the West Indies.

Fig. 16. is the Cornish Barnacle, shaped like a cone, and with a small mouth. This is described and figured by the Rev^d. Mr. William Borlase, F.R.S. in his Natural History of Cornwall, lately published.

Fig. 17. This is the common English Barnacle, that is found in such plenty upon all rocks and shells round this island. From the animal of this, examined in the microscope, I have taken the character of the fish of the Barnacle genus.

Fig. 18. This I have called the Limpet-shaped Barnacle, from its likeness to some species of that shell. I am indebted to our late worthy member, Mr. Arthur Pond, for this shell, who assured me it was brought to him from Greenland. It was, with several more, found sticking to a very large species of muscle.

Fig. 19. a. This Sea-Fan, with the Barnacles inclosed in it, was brought from Gibraltar. I have called it the Slipper Barnacle, from its shape. See *Fig. 19.* These shell-fish adhere, while they are young, to the slender branches, which are produced by the animals that compose this species of Sea-fan; and as the next succession of young animals of this sea-fan creep up its sides, to increase the bulk and extension of these first-formed ramifications, they inclose the shells all round, leaving only their mouths or apertures open, for the Barnacles to procure their food.

food. But it frequently happens, that the animals of the Sea-fans destroy these Barnacles, by overrunning and involving them in the very center of their stems. These small Barnacles, interspersed here and there on the branches, have been taken for fruit or berries by some gentlemen, who look upon the internal or horny part of the Sea-fans to be vegetables.

Fig. 20. is a very curious Barnacle, taken from an elegant specimen in the British Museum; which, from its figure, I have called the Persian Crown.

I shall now add some further observations on the nature of these animals.

Upon opening the shells of many of the common English Barnacles (*Fig. 1.*) while they were alive, I found the lower part of the shell, which contained a cavity equal to two thirds of the whole, full of spawn; so that the Barnacles, which adhere by the base of their shells, as well as those that are supported by fleshy tubes, are propagated by eggs, which they send forth in inconceivable numbers; as appears by the clusters of young shells, which we find adhering not only to the parent animals, but to all hard substances near them.

The bottom shell of these animals, as well as their upper shells, vary in form according to their situation, which occasions some difficulty in determining their several species with exactness. The form of the base shell of our common English Barnacle, is the flat radiated figure represented adhering to a scallop shell in the front of a group of them at *Fig. 17.* The Barnacles at *Fig. 8, 9, 14, 15.* and *20.* have the same kind of base.

I have very lately observed a singular kind of flat Balanus, on a white Mandrepورا coral from the coast of Italy, in the possession of Mr. Mendez D'Acosta, F.R.S. whose base appears sunk into the coral, and of the form of an inverted cone, bending a little to one side. The inward surface of this conical base shell appears curiously striated with tubular radii, which terminate on the surface of the coral, to receive the extremities of the six valves, that compose the upper shell. This peculiar form of the base seems owing to the animals of the coral and of the Barnacle growing up together, the latter keeping possession of its proper space, while the former grew close about it.

The bottom shell of the Barnacle like a Limpet, at *Fig. 18.* increases from a small point by many thin shelly margins, which exactly correspond to the indentations which we observe on the base of the outward shell; so that it appears not unlike the drawing of a fortification in miniature.

I am,

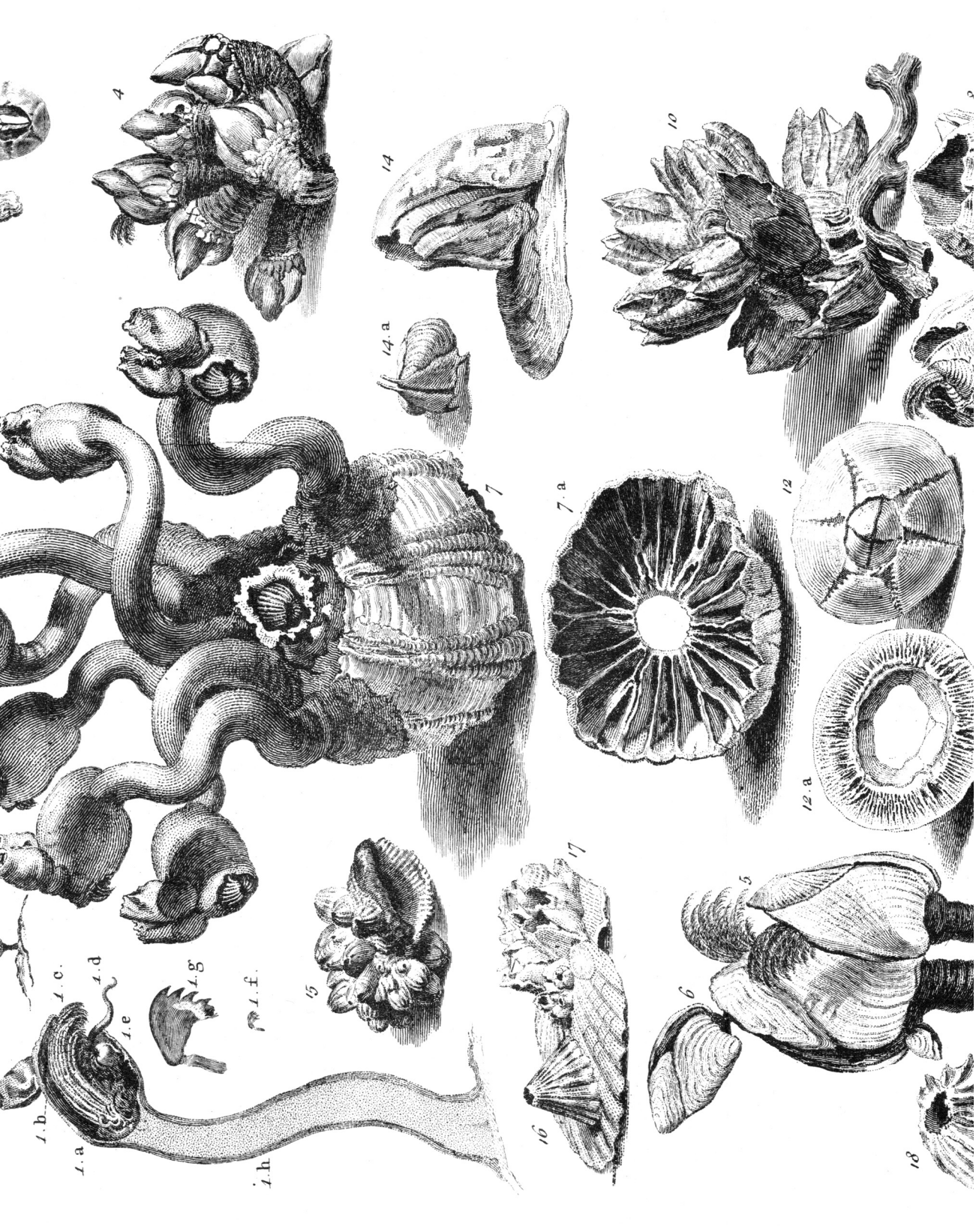
Dear Sir,

Your most affectionate Friend,

John Ellis.

P. S. The Rev. Mr. William Borlase is now of opinion, that the Cornish Barnacle at *Fig. 16.* which he has described in his History of Cornwall, is rather a Limpet or Patella.







Lepades Pedate.

1. *Lepus nuda cariosa aurata.*
- a. *Cypselum paxi superior miberna*
- b. *Foramen auri internum*
- c. *Carthi (z. d.) Proboscis at (z. c) Os*
- d. *Dens verratus, quarum octo sunt.*
- e. *Idem per. Microscopium visus*
- f. *Idem longitudo ad latera diffractas*
2. *Scalpellum. Norvegicum. Saccatophyllum*
- a. *Idem per. Microscopium visum*
3. *Scalpellum ex mari Britannico*
4. *Corium copis. Polycephalus Gallorum*
5. *Concha Analytica vulgaris.*
6. *Concha Analytica vulgaris.*
- A. *Animal Lepadis, seu Triton-Linucci.*

Barnicles with Stems.

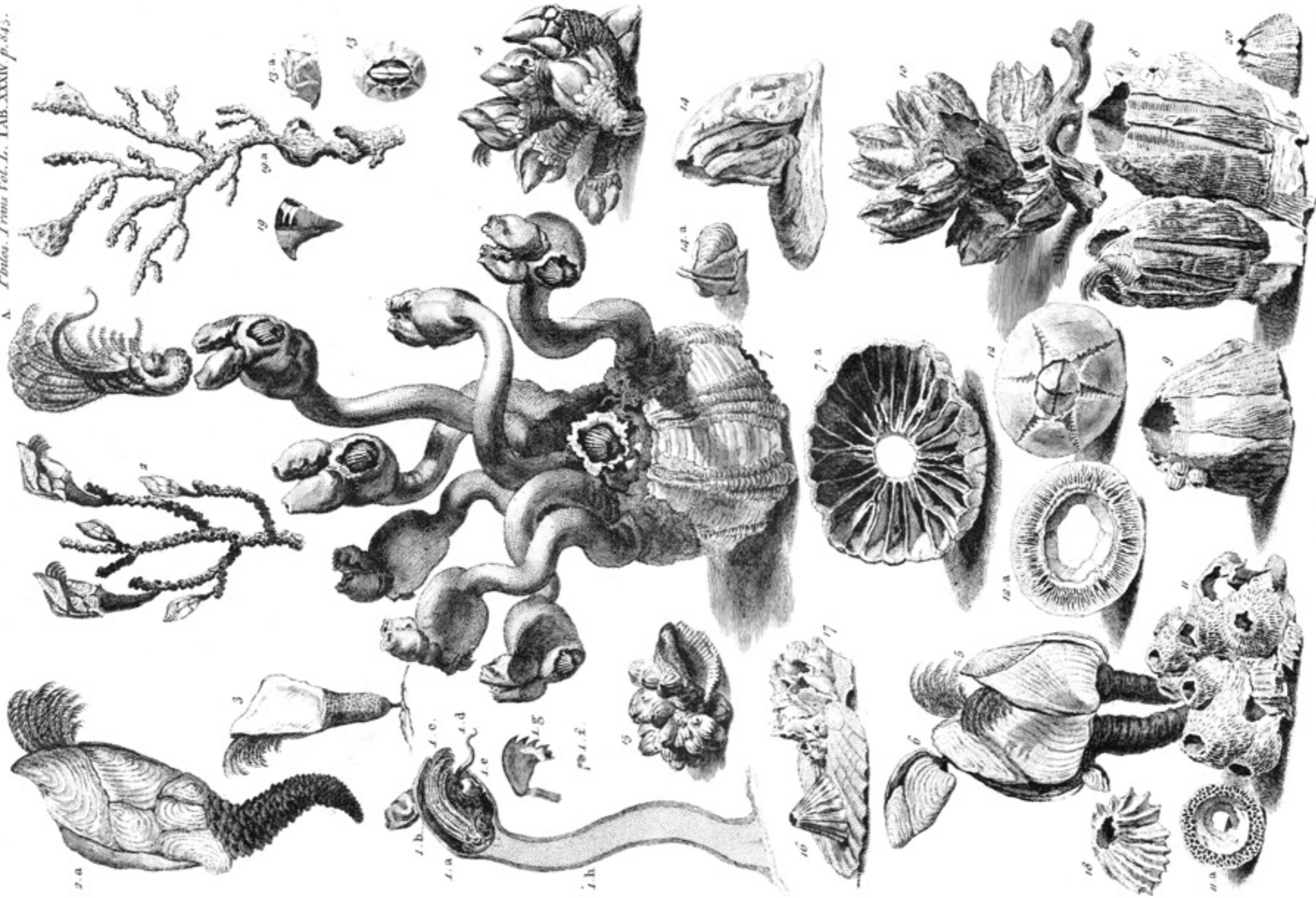
7. *Naked, fleshy Barnicle with Ear.*
- a. *The inside of the upper part of the same.*
- b. *The internal opening of the Ear.*
8. *The Plumes, & Transverse Mouth.*
- a. *From edge of tooth of which there are 8.*
- b. *The same magnified.*
9. *The stem cut in two length ways*
- a. *The Norway, Sea fan, Proboscis.*
- b. *The same magnified.*
10. *The British Channel Proboscis*
11. *The stem of protogynous French Polycephalus*
12. *The common Duck-bearing Barnicle.*
- a. *Palaeolus (Agass.) stem. Microscopically inverted.*
- b. *Animal of the Barnicle, or Triton-Linucci.*

Lepades Sesiles Balani dictæ.

7. *Pedicularis Ceti (7. a.) Stem reversed.*
8. *Calyptiformis Orientalis.*
9. *Tricantatiformis.*
10. *Tulipiformis ex Cordalis rubro.*
11. *Petalosua concava & eadem reversa*
12. *Terruca. Spatularis & spat. in reversa*
13. *Terruca lancea. Americanis & eadem dilata*
14. *Capensis ore obliqua & eam speculato. vermicul.*
15. *Subrotatus vagosa, ore minore.*
16. *Cornuiformis concava, ore minore*
17. *Anglica vulgaris ore paululo.*
18. *Arctica. Pateletiformis*
19. *Palaeolus (Agass.) stem. Microscopically inverted.*
20. *Diadema Peruvianum.*

Barnicles adhering by the base of their Shells.

7. *The Whales Louse (7. a.) The underside.*
8. *The East India cap-shaped Barnicle*
9. *The Bell shaped Barnicle.*
10. *The Red Coral Tulip Barnicle*
11. *The petty conical Barnicle by the underside.*
12. *The female short by the underside.*
13. *The American oak Bark by the same sideways.*
14. *The large salmon shell Barnicle by the basal cover.*
15. *The top shaped thick barnicle with a small mouth.*
16. *The French cone barnicle with a small mouth.*
17. *The common English Barnicle with a wide mouth.*
18. *The Greenland Limpet, shaped Barnicle.*
19. *The Copper by the same covered with the Sea fan.*
20. *The Russian Crown*



Lepadæ Pedatæ.

1. *Lepus nuda carinata aurata*.
- 1 a. *Quædam pars superior internæ*.
- 1 b. *Internæ auri internæ*.
- 1 c. *Orbitæ (s. d.) Probracæ et (s. e.) Os*.
- 1 d. *Orbitæ serratæ, quæcum octo sunt*.
- 1 e. *Idem per. Macroscopium vivax*.
- 1 f. *Idem per. Macroscopium vivax*.
- 1 g. *Idem per. Macroscopium vivax*.
- 1 h. *Idem per. Macroscopium vivax*.
2. *Leopodium, Acropogon, Anisophyllum*.
- 2 a. *Idem per. Macroscopium vivax*.
3. *Leopodium ex mari Britannico*.
4. *Crotus vixit, Puffinipolis Gallorum*.
5. *Crotus divygera vulgaris*.
6. *Crotus divygera puffinipolis*.
- A. *Animal Lepadæ, seu, Antennæ, Limbor*.

Barnicles with Stems.

7. *Pedunculæ Cellæ s. Stem reversæ*.
8. *Cellæ reversæ internæ*.
9. *Internæ reversæ*.
10. *Internæ reversæ*.
11. *Internæ reversæ*.
12. *Internæ reversæ*.
13. *Internæ reversæ*.
14. *Internæ reversæ*.
15. *Internæ reversæ*.
16. *Internæ reversæ*.
17. *Internæ reversæ*.
18. *Internæ reversæ*.
19. *Internæ reversæ*.
20. *Internæ reversæ*.

Barnicles adhering to the base of the Shell.

7. *The British Lepadæ at the under side*.
8. *The East India Lepadæ at the under side*.
9. *The Scotch Lepadæ*.
10. *The Scotch Lepadæ*.
11. *The Scotch Lepadæ*.
12. *The Scotch Lepadæ*.
13. *The Scotch Lepadæ*.
14. *The Scotch Lepadæ*.
15. *The Scotch Lepadæ*.
16. *The Scotch Lepadæ*.
17. *The Scotch Lepadæ*.
18. *The Scotch Lepadæ*.
19. *The Scotch Lepadæ*.
20. *The Scotch Lepadæ*.