

## ZOOLOGICAL RESEARCHES.

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### MEMOIR IV.

*On the Cirripedes or Barnacles ; demonstrating their deceptive character ; the extraordinary Metamorphosis they undergo, and the Class of Animals to which they indisputably belong.*

NATURALISTS of the greatest leisure, and the most devoted to their favorite pursuit, as well as those to whom the most opportune occasions present, have seldom to congratulate themselves on any other discovery than that of a few *new* Genera or Species, rarely on that of a type difficult to associate with those already known, or of a fact altogether new and without parallel; how highly then ought we to estimate that of the *Metamorphoses of the Crustacea*, announced in the First of these Memoirs, and those facts now about to be exposed in regard to the Cirripedes, a tribe of marine animals which have long puzzled the most acute and laborious Zoologists. Although both of these Memoirs, from the nature of the discoveries made, have a tendency to condense, rather than to extend and amplify our distributions of animals, I nevertheless consider myself as having been highly favored, and feel it incumbent upon me to give them publicity with all the detail of which they admit.

The animals embraced under the title of Cirripedes by Naturalists, are familiarly known in these countries by the name of Barnacles. Two very different types are included under this comprehensive name, viz. the families of Lepas or true Barnacles, (shewn in the wood cut) and that of



the Balani or the acorn-shells of British Conchologists (Pl. IX. f. 11, 12.); the former elevated on a membranous pedicle, the latter sessile and provided with a domicile wholly calcareous; both are marine, and several species of either, amongst the most abundant and common productions, the Balani attaching themselves for the most part to the surface of rocks, stones and other *fixed* bodies, and are consequently littoral, the Lepades on the contrary are rarely found on *fixed* bodies, but almost always on such as float upon the surface of the open ocean, as Fuci, pieces of wood, and the bottoms of ships, by which means they participate in the benefits of the vagrant life of those Crustacea which are gifted with perpetual freedom of motion. In this distribution of the Cirripedes throughout the ocean, we recognize the operations of Superior Intelligence, as well as in the peculiar structure of these curious and interesting animals, which fits them so admirably to

draw within the vortex created by their cirri the minute and powerless animalculi with which the surrounding element abounds. In order to account for the election made by those two types of the Cirripedes as to site, it might be supposed that the *ova* were of different specific gravity, that those of the Balani from their greater density were disposed to remain at or sink to the bottom, while those of the Lepades being lighter tended to rise towards the surface, and by a glutinous property attached themselves to the first solid body with which they came in contact ; there will be no further occasion for the exercise of our ingenuity however to account for this remarkable circumstance, when aware that *in the first state of these animals they not only possess perfect freedom and power of motion, but organs of sight* which furnish them with the means of making that election which is best suited to their respective habits as impressed upon them by Omnipotence, and members calculated to anchor them securely to the chosen spot ! how otherwise should we find the Coronula and Tubicinella exclusively on the backs of the Whale tribe, the Chenolobia on the shells of Turtle, and Acasta as invariably imbedded in Sponge ?

That these animals should have been a great stumbling block to systematists is not much to be wondered at, considering the complete disguise under which they usually present themselves, and our total ignorance of that part of their Natural History about to be developed. The celebrated Linnæus arranged them under the sole generic title of Lepas, with the Testaceous *Mollusca*, (Shells.) Naturalists of the present day, anxious to group them from their Natural affinities, deduced principally from anatomical structure, have scarcely been more happy in assigning to these animals a more suitable station. M. Cuvier, for example, arranges them with the Mollusca, of which they constitute his sixth or last class, by which means they are interposed between the above named race and the Annelides

and widely separated from their real relations the Crustacea. "Behold us" says he "arrived at animals very different from all the *Mollusca* of which we have hitherto spoken:—members of a horny texture, in some measure articulated, numerous, susceptible of varied movements, a mouth furnished with lips and jaws, a nervous system formed of a series of ganglions, announce that Nature is about to conduct us to the race of articulated animals"—"Nevertheless as their body is not itself articulated, as we have already in the Terebines, which undoubtedly belong to the acephalous *Mollusca*, examples of articulated members, as in short the shell of the Lepades seems to be modelled after that of many Bivalves, we think ourselves authorized to leave this Order amongst the *Mollusca*." *Mem. sur les animaux des Anatifes et des Balanes*, &c. p. 1. Cuvier follows up the comparison of the five valves in *Lepas anatifera* with those of the *Muscle* p. 3 and at page 6 makes what must now be considered a more just comparison between these animals and the Crustacea. Mons. Lamarck also, has the Cirripedes as a distinct Class, which with Cuvier he places between the *Mollusca* and the *Annelides*. Latreille in his last work "*Familles du Regne Animal*" assigns them as a Class the same situation, but appears still to consider them as *related* to the Ostracoda and Branchiopoda of the Crustacea; that he has not been able to form any decided opinion is evident however from what he says p. 231 "The sessile Cirripedes would appear to represent in this place the animals which terminate the family of the *Acéphales* enfermés of M. Cuvier. The two tubular horns of the Otions (*Lepas aurita* Linn.) present to us, (but with other uses) the two tubes of many *Acéphala*! the tentacula of these last animals are converted into jaws. The cirri are a kind of feet divided into branches, and analogous to the sub-abdominal appendages of many Crustacea, and especially the Amphipoda; we may also compare them to those of many *Annelides*.

The oviduct has some resemblance to that of the Phalangiums. It is thought in short, that Nature to form the Cirripedes, has borrowed *different sorts of organs from the animals of several Classes.*"

The Zoologists of our own country who have devoted a share of their attention to these animals, have also considered the Cirripedes as constituting a distinct Class. M<sup>r</sup> Leay in his *Horæ Entomologicæ*, thinks, and not without reason, that the Lepades (Pentelasmus) shew the greatest affinity with the Ostracoda (Daphnia) of the Crustacea (p. 307) but what appears extraordinary he seems to imagine that the Balani belong to a *different Class* (p. 309) and that there exists an affinity between the shell of these and that of the Echini or Sea-eggs (p. 313), and sanctions the opinion of Latreille that their articulated cirri have their analogue in the *arms* of other genera of the Radiata, and particularly Comatula ! (p. 315).

These quotations while they clearly shew the distraction which these animals have caused to the most intelligent observers, make manifest the high importance we should attach to the discovery of their real nature, the key of which has hitherto remained concealed in their Metamorphosis, without a knowledge of which they must have remained as an enigma incapable of any satisfactory solution.

From the heading of this Memoir, some readers aware of all that has been already written on the subject of these animals, might suspect a revival of the old and vulgar fable of their being the young or embryo state of the wild-geese which teem over the northern regions of Europe and America; and although this would be a prodigy quite incompatible with the laws of Nature, as Dr. Tancred Robinson has long ago shown, (*Philos. Trans. abridged*, Vol. 2 p.850.) we shall find the Cirripedes, as I have before stated, really to undergo a metamorphosis scarcely less wonderful, and hitherto without parallel in the whole range of nature, and one which clearly shews that *Classical characters*,

derived from the circumstance of animals being fixed or free ! furnished with eyes or destitute of sight ! are not always of that importance which Naturalists are disposed to attach to them, and of which additional proofs will be found in the future pages of these Memoirs.

The belief that the Barnacles are the young or embryo state of the Barnacle Goose ( *Anas erythropus* Linn. ) and the Scoter or Black Goose ( *Anas nigra* Linn. ) is one of those popular errors which has not only extended through several ages, but still prevails amongst the vulgar on all the shores of the European seas, and appears to have no other foundation than a fancied resemblance in the plumose members of the animal-inhabitant to the wing of a bird. One circumstance however which serves in no small degree to keep up this absurd error, and may be worthy of remark, is that in some Catholic countries, the above species of Geese are still considered as of the Finny tribe, in order to extend the bill of fare at Lent and at other times of fasting and abstinence “ *C'est un gibier d'eau fort estimé ; une qualité, que les pieux gourmet savent apprécier, c'est qu'on peut le manger dans le temps d'abstinence religieuse* ” ( *Article Benache, Nouv. Dict. d'Hist. Nat.* ) “ The bird which at Paris is called Macreuse, and in the other parts of France Macroul, the French eat upon fast days and all lent, thinking it to be a sort of Fish, or a marine animal with cold blood, or else a Barnacle generated either out of rotten or corrupted wood floating upon the sea ; or out of certain fruits falling into the water, and there metamorphosed into a Bird, or else from a kind of sea-shells adhering to old planks and ships' bottoms called Conchæ Anatiferæ ( *Lepades* ) ” Dr. Tancered Robinson ( *Philos. Trans. abridged*, — Vol. 2, p. 850.

To show how far the force of imagination will sometimes carry men who from station and education should be fortified against such delusion, I need only add what Sir Robt. Moray has said upon this subject in a grave communication

which is to be found in the same work p. 849-50, No. 84. Having observed wood thrown up by the ocean on the shores of the Western Isles of Scotland which were covered with Barnacles, (from the figure and description probably *Lepas anatifera*) he states that the pedicle "seems to draw and convey the matter which serves for the growth and vegetation of the shell and the little Bird within it." "In every shell that I opened I found a perfect *Sea-Fowl*; the little bill like that of a *Goose*, the eyes marked, the head, neck, breast, wings, tail and feet formed, the feathers every where perfectly shaped, and blackish coloured, and the *feet* like those of other Water-Fowl to my best remembrance"—"nor did I ever see any of the little Birds alive, nor met with any body that did; only some credible persons have assured me that they have seen some as big as their fist!!

The facts about to be laid open in regard to the Cirripedes are of so extraordinary and novel a nature, that they would hardly gain credence did they not proceed from some respectable source, or were they not placed within the power of every Naturalist to satisfy himself of their correctness without any remarkable degree of trouble. They were partly, like many other interesting discoveries, the result of chance rather than of design and industry, and were at the same time accompanied by so many interesting circumstances as to render memorable the day on which they first presented themselves to the notice of the author. On that day April 28, 1823, devoted to the investigation of some marine productions, he was returning home without any addition to the stock of knowledge, when casually throwing out a small muslin towing net on crossing the Ferry at Passage, such a capture of minute animals was made as furnished a treat which few can ever expect to meet, and could hardly be excelled for the variety, rarity, and interesting nature of the animals taken. Some of them never before met with but in the great Ocean (*Zoe Taurus*);

others previously seen by a solitary observer (*Argulus armiger*) and almost lost sight of by Naturalists and excluded from their works; others actually inhabitants of fresh water and quite accidental (*Polyphemus oculus*); some not commonly observed (*Megalopæ*); others perfectly nondescript and incapable of being associated in any of our classifications of the Crustacea; of this description is the little animal about to be described: besides these were many others of inferior note, as *Cyclops*, *Praniza*, *exuvia* of *Tritones*, &c.

Without dwelling upon the advantages of such an unexpected and valuable accession to a person in pursuit of the Natural History of Marine animals, the above nondescript and anomalous genus, as it was thought at the time, shall be first described, and then the facts which the last season has furnished towards the completion of its history.

This is a small translucent animal one tenth of an inch long, of a somewhat elliptic form, but very slightly compressed laterally, and of a brownish tint. When in a state of perfect repose it resembles a very minute muscle and lies upon one of its sides at the bottom of the vessel of sea water in which it is placed; at this time all the members of the animal are withdrawn within the shell, which appears to be composed of two valves united by a hinge along the upper part of the back and capable of opening from one end to the other along the front, to give occasional exit to the limbs. The limbs are of two descriptions, viz. anteriorly a large and very strong pair, provided with a cup-like sucker and hooks, serving solely to attach the animal to rocks, stones, &c. and posteriorly six pair of natatory members, so articulated as to act in concert and to give a very forcible stroke to the water, so as to cause the animal when swimming, to advance by a succession of bounds, after the same manner as the water-flea (*Daphnia*) and other *Mono-culi*, but particularly *Cyclops* whose swimming feet, are

extremely analogous : for a more detailed description of these members consult the explanation of Plate IX. The tail which is usually bent up under the belly is extremely short, composed of two joints, and terminates in four setæ, and is employed to assist in progression and in changing the position from a state of repose. The greatest peculiarity however in the structure of this animal is the eyes, which although constantly shielded by the valves of the shell, are pedunculated ! as in the Crab and Lobster, and placed anteriorly at the sides of the body.

Any Naturalist acquainted with the Crustacea, on reading this short description will readily assent to what has been advanced as to the very extraordinary and anomalous character of this little animal, and to the dislocations it seems calculated to produce in our Classifications : but for its pair of pedunculated Eyes it would find place as a new Genus of the bivalve Monoculi (Ostracoda) ; its members approximate it to Argulus on the one hand and to Cyclops on the other, Genera which are widely separated ; while its Eyes shew its relationship to the Decapoda (*Crabs, Lobsters &c.*) ; reflecting upon all these circumstances, and others viz. their great abundance during the early part of spring alone, and their presenting no variation indicative of a difference of sex, induced a belief that they were the larva or disguised state of some Crustaceous animal, or (as it had been previously ascertained that the Cirripedes were Crustacea) that they were the *males* of these, not being disposed to believe that the two sexes were united in the same individual ; in favour of this idea too, it may be observed that the males of many Crustacea are remarkably less in size and different in aspect, as in the Caligi and Bopyri, and also that in some they are rarely met with, and only at a particular season, one impregnation serving for all the broods thrown off in the course of the animal's life, as in *Daphnia* ; to which may be added that all the Barnacles examined by comparative anatomists, have proved to be of the female sex or were at least furnished with ovaria.

Under the foregoing impressions, some of them were collected in the Spring of 1826. and in order to see what changes they might undergo, were kept in a glass vessel covered by such a depth of sea-water that they could be examined at any time by means of a common magnifying glass; they were taken May 1st, and on the night of the 8th, the author had the satisfaction to find that two of them had thrown off their exuvia, and wonderful to say, were firmly adhering to the bottom of the vessel and changed into young Barnacles! such as are usually seen intermixed with grown specimens on rocks and stones at this season of the year—(*Balanus pusillus* Penn.) In this stage the sutures between the valves of the shell and of the operculum were visible, and the movements of the arms of the animal within, although these last were not yet completely developed; the Eyes also were still perceptible, although the principal part of the black colouring matter appeared to have been thrown off with the exuvium. On the 10th another individual was seen *in the act of throwing off its shell*, and attaching itself as the others, to the bottom of the glass. It only remains to add that as the secretion of calcareous matter goes on in the compartments destined for the valves of the shelly covering, the Eyes gradually disappear, from the increasing opacity thence produced, and the visual ray is extinguished for the remainder of the animal's life; the arms at the same time acquire their usual ciliated appearance.

Thus then an animal originally natatory and locomotive, and provided with a distinct organ of sight, becomes permanently and immoveably fixed, and its optic apparatus obliterated! and furnishes not only a new and important physiological fact, but is the only instance in nature of so extraordinary a metamorphosis.

Having made manifest the metamorphosis in the Cirripedes, and shown by the nature of the animal in its first or larva state, that they are clearly referable to the class of Crustacea, it may still be thought requisite to add the

other proofs that they are so ; these are derived from the structure of the mouth (pl. X. fig. 4. 5. 6.) and from the fact of their throwing off their exuvia exactly after the manner of the other members of this class, a circumstance hitherto denied, but of which any person may be easily satisfied. During the whole of the spring and summer months, the water teems with these exuvia of Tritones, (the animal-inhabitant, according to Linnæus, of the Barnacles)—it is impossible to avoid drawing up numbers every time a towing net is thrown out, nay the tide is at times discoloured from their abundance ; but to be certain that these are really such, let a stone with several barnacles upon it, be kept in sea water, regularly renewed, towards the latter end of April or the beginning of May, and with due attention many of them may be observed *in the act of throwing off exuvia* in every respect identical ; let it be recollected however, that these are casts of the *animal* alone, and not of the valves of the shell, or of the operculum. If these exuvia be examined with care, a considerable approach in the limbs and mouth to the more perfect Crustacea will *now* readily occur, the former are composed of six pair, in structure however, more resembling the limbs of Mysis than the Decapoda, being divided into two pluri-articulate branches from the second joint ; the mouth is furnished as in the above tribe with two pair of true jaws and with a *pulpigerous* pair of mandibles, but is without the pedimaxillæ, thus also they approximate in the apparatus of the mouth to Mysis, and only differ in the greater simplicity of the parts, and in the Palp being composed of but two instead of three joints. A comparison may be readily made by a reference to the Plates of Triton and Mysis which mutually illustrate each other.

The circumstance of their undergoing a metamorphosis might have been urged against the Cirripedes being Crustacea, had not the author anticipated this objection by his discovery, that these latter, contrary to the received opinion

do actually undergo Metamorphoses ( see Memoir 1st. ) of which he has many new proofs to adduce.

Having stated the several points which shew the Cirripedes to be true Crustacea, and to be very closely related to the more perfect animals of that Class, I beg to suggest the probability of the Exuvia of the Balani, having led Linnæus and others into the opinion of the Animal of the Barnacles ( or Triton as he has named it ) living in a separate state in holes of rocks &c. an opinion which the foregoing discoveries must completely annul. The most naked and unprotected of the Barnacle tribe are the genera of Otion and Cineras, and these attach themselves to the *superficies* of floating bodies, while the only genus known to live *deeply imbedded* in rocks and stones viz. Lythotria, is provided with a solid calcareous basis, and above with eight equally solid valves. Cuvier appears to be the only Naturalist who had already declared himself of the same opinion:—"Linnæus supposing that Cirripedes are also found without any shell, gave them the name of Triton, but the existence of these Tritons in nature is not established as certain, and we should rather think that Linnæus had only seen the animal of some Barnacle (anatife) torn from its shell." *Regne Animal*, Note, Vol. II. p. 506.

From a consideration of the whole History of these animals are we to conclude that they have the *sexes united* ? a fact so much at variance with what we see in all the rest of the Crustacea may authorize a degree of scepticism, for although they are fixed for life when they put on their permanent disguise, yet from their associated or clustered mode of growth, and from the extreme length of the tubular organ which terminates the body above, they may still appear capable of communicating with each other : dissection however favors the former idea, for the oviduct of each side, formed by the union of branching tubes from the various lobes of the ovary, becomes suddenly bulky, gland-like and tortuous, and has been thought to represent the male organ,

and to impregnate the ova in their passage through it ! having preserved the same appearance as it mounts along the side of the body, it again, at the height of the anus, as suddenly becomes a simple canal or tube, unites with its fellow from the opposite side in the ovipositor or that long proboscidiiform organ in which the tail part or highest end of the animal ends, at the extremity of which they open together by a simple orifice.

Those who may wish for further particulars of the anatomical structure of the Cirripedes are referred to the unrivalled work of Poli "*Testacea utriusque Siciliæ*", to a memoir by Cuvier "*Sur les animaux des Anatifes et des Balanes*" and to the Lectures on Comparative Anatomy of Sir Everard Home.

Towards the completion of the Natural History of this tribe of animals; it remains to be known whether the Larvæ of all the Genera are similar or dissimilar, and whether, in any of them, males exist at any stage of their progress. Industry and the acuteness of the present generation may be expected to bring about the solution of these interesting questions in the course of a very few seasons, now that the road has been so fully pointed out.

In the thirteenth Lecture of Sir Everard Home on the comparative anatomy of Animals, Vol. III p. 410, that gentleman exposes the economy of the *Lepas anatifera* in regard to its propagation, and which might incline some Naturalists, sensible of the authority due to so celebrated a veteran in the paths of science, either to doubt the wonderful facts now brought forward, or to imagine that the mode of propagation may be very different in the *Lepades*. Sir Everard finding the fleshy tubular pedicle replete with ova after their exclusion from the Ovaria in the specimens which he examined, supposes they remain there to receive their ultimate developement, but has probably been deceived in imagining the embryos to make their way out through the parieties of the pedicle, by which he accounts for their

associated mode of growth. How, if that is the case, are we to explain the detached mode of growth of many of the species ? how their growing from the outer surface of the solid valves ? and how they are communicated to new sites ? analogy is too strong altogether to permit us to doubt that they do not resemble the Balani in this particular. No doubt the appearances exhibited pl. CL. coupled with the fact of the ova being found within the pedicle, are calculated to mislead, but we perceive the associated species of Lepas attaching themselves indiscriminately to the valves, the pedicle or its basis, as well as to all sorts of floating bodies.

CIRRIPEDES.

PLATE IX. Fig. 1, Natural size and appearance of the young of the Barnacle (*Lepas balanus*) when reposing on its side, with its limbs concealed and the valves closed.

Fig. 2. The same somewhat magnified as seen from above, to show the turgid appearance of the valves. *a*, an elbow of the anterior members of the animal. *t*, tail part.

Fig. 3. Side view of the same more highly magnified, with its limbs protruding from the anterior opening of the valves. *b*, one of the fore feet, its fellow being removed for the sake of clearness; this member is represented as when naturally exerted by the animal when it wishes to fix itself by means of the sucker *c*, and claw *d*, a fourth large basil joint remains concealed by the shell. *f*, its six pairs of natatory members behind, seen as ready to give a stroke to the water; *t*, the bifurcate extremity of the tail. *e*, one of its peduncled eyes as seen through the shell. *x* presumed nucleus of future attachment on the dorsum.

Fig. 4. One of the Eyes detached and more highly magnified.

Fig. 5. The bi-articulate tail, more highly magnified ending in two long and two shorter setæ *t*. *a*, posterior part of the abdomen.

Fig. 6. One of the posterior or natatory members very highly magnified. *a* its outer division. *b*, its inner division; the rest of these members are exactly similar, and become changed into the six pair of cirri of Triton as exhibited in Plate X. fig. 1.

Fig. 7. Natural size and appearance of the animal after its metamorphosis.

Fig. 8. The same magnified, *e* rudiments of the eyes seen through the large valves of the operculum 5. the smaller valves are pointed out by fig. 6. *m* the opening or mouth of the valves, permitting the included animal to be seen. 1, 2, 3, 4 the valves of the body of the shell, separated by visible sutures. *b* the marginal projection of the basis.

Fig. 9. The same seen in profile, with the arms or cirri protruded *c*. 5, anterior valves of the operculum; 6, posterior valves. — 1, posterior valve of the basis; 2, valves nearest the posterior valve; 3, valves nearest the anterior valve; 4 anterior valve; *b*, basis.

Fig. 10. One of the cirri more highly magnified, to show that although pluri-articulate, they are as yet without ciliæ.

Fig. 11. A common full-grown Barnacle of the natural size (*Lepas balanus* Linn.) with the animal retracted; the figures of reference point out the corresponding valves in figure 8.

Fig. 12. The same in profile, in the act of throwing off its old skin or exuvium *c*.

PLATE X. Fig. 1, the exuvium of *Lepas balanus* magnified. *o* oviduct. 1, 2, 3, 4, 5, 6 the six pairs of arms, each consisting of two robust basil joints, supporting two branches or cirri, which are each composed of numerous articulations, ciliate on the opposite edges; those designated by the first three figures differ considerably from the others in being shorter and more robust. *m*, mouth, covered by the first or most anterior pair of members. *b*, cast of the body.

Fig. 2. One of the first pair of members more highly magnified.

Fig. 3. Labium ? highly magnified. + basis

Fig. 4. one of the first pair of maxillæ or jaws magnified in the same degree. + point of union. *a*, apex.

Fig. 5. One of the second pair of jaws, similarly magnified. *a*, toothed margin. + basis.

Fig. 6. One of the mandibles with its palp, also highly magnified. *a* toothed apex of the mandible. + apophysis for muscular attachment. *b*, palp

Fig. 7. *Lepas Balanus* or common acorn-shell seen from above and of its natural size, with the valves of the operculum open *m*, and the animal exerted *b*, in the act of throwing off its Exuvium *c*.

## NEBALIA

PLATE XI. Fig. 1, *Nebalia Herbstii*, after Dr. Leach, magnified ; the line beneath indicates its natural size. *c*, Clypeus. *t* tail or abdominal portion. *r*, beak. *e*, eyes. *a*, antennæ. *a* 2, anterior pair of feet. *f*, the 5 posterior or natatory feet of one side, with their bifid divisions. *s*, styles terminating the tail.

Fig. 2. *Nebalia Montagu*, magnified ; the same letters indicate corresponding parts of the former. *f* 2, short intermediate members. *f* 3, minute sub-abdominal fins.

## ERRATA.

Page 73, line 10 from the top .. *for* *Daphnia* *read* *Daphnia*.

74, " 15 from bottom .. *for* *Benache* *read* *Bernache*.

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Fig. 1.



Fig. 3.

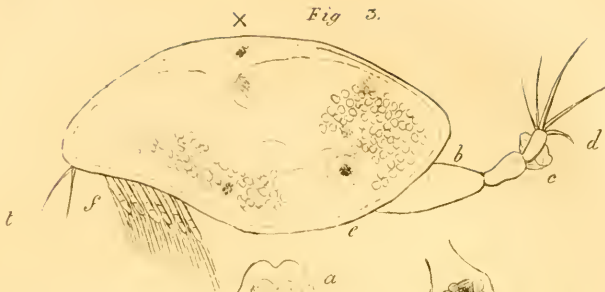


Fig. 4.



Fig. 2.



Fig. 6.



Fig. 7.



Fig. 8.

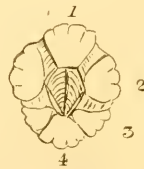
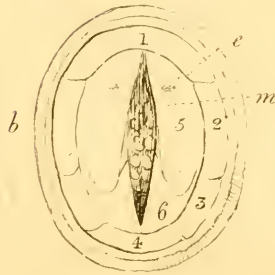


Fig. 11.

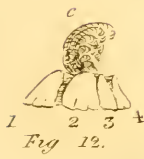


Fig. 12.

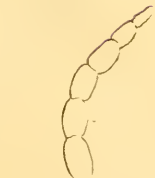


Fig. 10. x

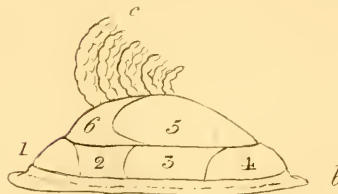
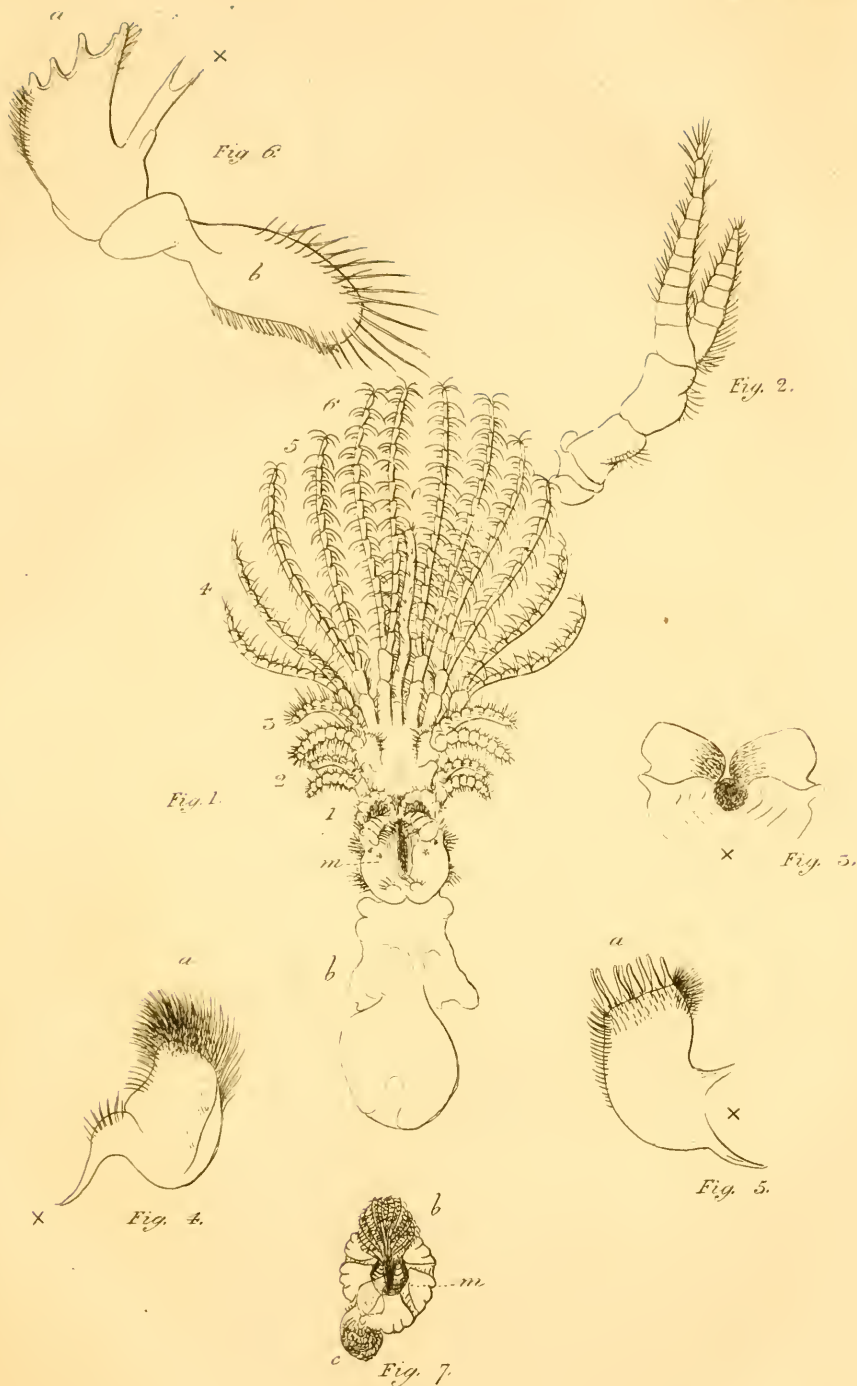


Fig. 9.

CIRRIPEDES.





CIRRIPEDES.

IVT. Del. et. Sculp.

