

7. *A Monograph of the Sub-class Cirripedia, with Figures of all the Species*; by CHARLES DARWIN, F.R.S., F.G.S. The LEPADIDÆ or PEDUNCULATED CIRRIPEDS. 400 pp. 8vo, with 10 plates. London, 1851. —The Cirripeds, one of the least understood of all the departments of zoology, have fallen into good hands, and this volume of Mr. Darwin, although but the beginning, lays well the foundation of the science, and carries far forward its superstructure. Mr. Darwin recognizes the fact that the Cirripeds are Crustacean in structure. He divides them into three orders—one, including the common Cirripeds, and having six pairs of thoracic cirri; a second, containing the burrowing genus *Alcippe*, Hancock, and another allied; and a third, a peculiar genus (*Proteolepas*, Darwin,) having something of the form together with the sucking mouth of a Lernæan. The first order embraces three families, the *Lepadidæ* or pedunculated Cirripeds, the second *Verrucidæ*, including the genus *Verruca* or *Clisia*, and third, the *Balanidæ*; these last consisting of two distinct sub-families, *Balaninæ* and *Chthamalinæ*. The present work treats only of the *Lepadidæ*, and contains descriptions and figures of numerous species.

The author traces out the development of the species with much detail, and gives the results of his careful examination into their structure. Two prominent points of interest which he brings forward, are the occurrence of eye-spots, and the relation of the peduncle to the front or anterior part of the head of the young animal. Dr. Leidy's discovery of eyes in a *Balanus*, led to Mr. Darwin's examination for these organs in the *Lepadidæ*. The nervous system of the *Lepas fascicularis* consists anteriorly of two large ganglia, (called supracæsophageal by Mr. Darwin) and a chain of thoracic ganglia united by two chords between each. From each of the anterior ganglia, there is a nerve passing to the peduncle, and more interiorly another nerve, which extends to a spot on the median line of a nearly black color, which is the pigment of two united eyes having two distinct lenses. In each of the ophthalmic nerves there is a ganglion a short distance posterior to the eye.

The homology of the peduncle appears to be well made out. The young animal attaches itself by its anterior antennæ when the last

metamorphosis takes place, and although the base of the peduncle may be the analogue of these antennæ, the main part corresponds to the front or cephalic portion of the body, which is elongated.

The Cirripeds are to a great extent hermaphrodites. Mr. Darwin has arrived at many interesting results on this subject, and some that are exceedingly curious. An exception to the general rule of their hermaphroditic character is found in the genus *Ibla*, in which there are true males, and the Cirriped proper is simply female. These males lie within the sack of the female Cirriped, and have an elongated body with a slender pedicel below. Although very unlike the female, the organs of the mouth have a similar arrangement, being constructed on the Cirriped type. The cirri are obsolescent; two pair may however be distinguished. That these were true males was ascertained by dissection; and although their parasitic character was questioned, Mr. Darwin traced so many resemblances in the organs that existed to those of the females, that in view of the facts, he concludes, "that the evidence is amply sufficient to prove that the little parasitic Cirriped here described, is the male of *Ibla Cummingii*." Mr. Darwin has observed further that in the genera *Ibla* and *Scalpellum* there are both females and hermaphrodites. And in some hermaphrodites, males have been observed by Darwin, so similar in general character to those of *Ibla*, that he concludes them to be true males of the species with which they are connected, although the animals are hermaphrodites and not simply females. They are hence called *complemental* males, being supernumeraries. This fact is so anomalous, that Mr. Darwin naturally has been slow in coming to the conclusion that they are not parasites distinct in genus and species. Bearing on this point, it is stated that *Ibla quadrivalvis* is distinguished from *I. Cummingii* by the length of the caudal appendages and the great size of the parts of the mouth; and the so-called males of these species have corresponding differences. So in other characters. Moreover the antennæ have the peculiar hoof-like discs at the extremity characteristic of *Ibla* and *Scalpellum*. Taking these and other facts into consideration in connection with the observation that there are true female *Iblas* that are not hermaphrodites, and with them, these parasites occur with male sexual glands affording spermatozoa and without any trace of ova or ovaries; Mr. Darwin draws the conclusion above mentioned. He closes his remarks on these males with the following observations.

"In looking for analogies to the facts here described, I have already referred to the minute male *Lerneidæ* which cling to their females,—to the worm-like males of certain Cephalopoda, parasitic on the females,—and to certain Entozoons, in which the sexes cohere, or even are organically blended by one extremity of their bodies. The females in certain insects depart in structure, nearly or quite as widely from the Order to which they belong, as do these male parasitic Cirripeds; some of these females, like the males of the first three species of *Scalpellum*, do not feed, and some, I believe, have their mouths in a rudimentary condition; but in this latter respect, we have, amongst the Rotifera, a closely analogous case in the male of the *Asplanchna* of Gosse, which was discovered by Mr. Brightwell\* to be entirely destitute of mouth and stomach, exactly as I find to be the case with the

parasitic male of *S. vulgare*, and doubtless with its two close allies. For any analogy to the existence of males, complimentary to hermaphrodites, we must look to the vegetable kingdom.

Finally, the simple fact of the diversity in the sexual relations, displayed within the limits of the genera *Ibla* and *Scalpellum*, appears to me eminently curious; we have (1st) a female, with a male, (or rarely two) permanently attached to her, protected by her, and nourished by any minute animals which may enter her sack; (2d) a female, with successive pairs of short-lived males, destitute of mouth and stomach, inhabiting two pouches formed on the under side of her valves; (3d) an hermaphrodite with from one to two, up to five or six similar short-lived-males without mouth or stomach, attached to one particular spot on each side of the orifice of the capitulum; and (4th) hermaphrodites, with occasionally one, two, or three males, capable of seizing and devouring their prey in the ordinary Cirripedial method, attached to two different parts of the capitulum, in both cases being protected by the closing of the scuta. As I am summing up the singularity of the phenomena here presented, I will allude to the marvellous assemblage of beings, seen by me within the sack of an *Ibla quadrivalvis*,—namely, an old and young male, both minute, worm-like, destitute of a capitulum, with a great mouth, and rudimentary thorax and limbs attached to each other, and to the hermaphrodite, which latter is utterly different in appearance and structure; secondly, the four or five, free, boat-shaped, larvæ, with their curious prehensile antennæ, two great compound eyes, no mouth, and six natatory legs; and lastly, several hundreds of the larvæ, in their first stage of development, globular, with horn-shaped projections on their carapaces, minute single eyes, filiform antennæ, probosciform mouths, and only three pairs of natatory legs; what diverse beings, with scarcely anything in common, and yet all belong to the same species!"

Mr. Darwin has also published a monograph on the Fossil Lepadidæ of Great Britain—88 pp. 4to, with 5 plates. London, 1851. Printed for the Palæontographical Society.