its able compiler may, with great propriety, plead the almost infant state of our knowledge of the *Cheilostomata*, and the abundant and accurate lists of synonyms which he has in every case appended; the other is the price at which they are published. This we would not, perhaps, dispute if they appeared as publications emanating either from the pen of Mr. Busk or any other similar source; but when they are ushered into existence with the pompous announcement that they are *printed by order of the Trustees of the British Museum*, we would have hoped that the price of the Catalogue might be such, that, when completed, even the poorest student could have been in possession of it as a welcome addition to his previously scanty store.

We, however, will look with impatience for the future parts, and hope that these two, comprehending so many puzzling genera, will be succeeded by others in which the same care and accuracy of description will be maintained, and that their talented author will be spared to see them valued, as, sooner or later, they must be by *all* who are capable of duly appreciating the laborious research which every page bears evidence of.

We also regret, that in the conclusion of Part II. a Concordance of Synonyms, similar to that appended to other lists published by the British Museum, was not attached. We hope, however, to find it with the last part, as we can speak from experience of the great facilities it affords the student, who, perhaps, is only acquainted with the nomenclature of some British Monograph; and this is the more necessary, as in some genera of the *Cheilostomata* the specific distinctions are often so trivial as even to puzzle a practised observer to recognise them with certainty.

Of the illustrations of every species catalogued we cannot speak too highly; they far surpass anything of the kind we have yet seen for rigid accuracy and fidelity of execution, and will be prized by all whose good fortune it may be to possess so valuable and welcome an aid as "Busk's Catalogue of British Marine Polyzoa."

A MONOGRAPH OF THE SUB-CLASS CIRRIPEDIA. With figures of all the species. By Charles Darwin, F.R.S., F.G.S. Volume I. 8vo. The Lepadidæ. London: Printed for the Ray Society. 1853. With 10 Plates. Volume II. 8vo. The Balanidæ, The Verrucidæ, &c., &c. London: Printed for the Ray Society. 1854. With 30 Plates.

UNTIL comparatively recent years, the Lepadidæ and Balanidæ—commonly known by the names of "barnacle," and "acorn shells"—were supposed to

belong to Cuvier's second division of the animal kingdom—viz., the Mollusca —and came under the denomination of multivalve shells; which term was applied by the great Swedish naturalist, not only to those animals which really belonged to the Testaceæ, but also to the Cirripedes, which have nothing whatever to do with shells, properly so called. It was not, however, until Mr. V. Thompson's splendid discovery of the larva in the last stage of development in the Balanus, that this sub-class received its proper place in the third division of Cuvier—namely, the Articulata—and in the class Crustacea. This error in classification is not surprising when we consider the fixed condition of their shell, and the degree of external resemblance between, on the one hand, Lepas and Teredo, and, on the other hand, between Balanus and a Mollusc, compounded of a patella and chiton. It is remarkable that Cuvier, although aware of their internal structure, allowed the external false resemblance to the Mollusca to counterbalance the opinion which his knowledge might have arrived at.

Straus, who was an eminent and philosophic writer, remarkable for his bold deductions and able generalizations, was supposed to have been the first who, in 1819, maintained that the Cirripedes were most nearly allied to the Crustacea; but this view was disregarded until Mr. Thompson's discovery, just alluded to, about eleven years afterwards; since that time, with trifling exceptions, the Cirripedes have been almost universally admitted among the Crustacea.

In the present able Monograph Mr. Darwin divides the Cirripedia into three orders—viz., the Thoracica, Abdominalia, and Apoda—between which the fundamental difference consists in the limbs or cirri being thoracic in the first, abdominal in the second, and entirely absent in the third. The Cirripedes are commonly bisexual or hermaphrodite; but in some genera the sexes are separate. The males in these genera are minute—often exceedingly minute—and, consequently, more than one is attached to a single female. In several species they are short-lived; for they cannot feed, being destitute of a mouth or stomach. In those genera it is the females which retain the characters of the genus, family, and order to which they belong—the males often departing widely from the normal type. Perhaps among all the wonders that we occasionally hear of in natural history, none are so strange or so startling as the description of the males of the Cirripedes. In some cases they are rudimentary to a degree, unequalled in the whole animal kingdom, so as to exhibit, in fact, nothing but mere bags of spermatozoa. For example, the male Alcippe has no mouth, no stomach, no thorax, no abdomen, and no appendages or limbs of any kind! After such a surprising amount of abortion, Mr. Darwin

supposes it very likely that he may be asked, how he knows that these rudimentary epizoons are really the males of the Cirripedes to which they attach themselves, and answers—"that even if the whole course of the metamorphoses had not been known in three of the cases, the mere fact of these epizoons being cemented by the three terminal segments of their peculiar, pupal antennæ, would have been sufficient to have shown that they belonged to the class of Cirripedes." He was also able to demonstrate, in nearly every case, that these epizoons were males; and as in several cases the spermatozoa were developed, and in no instance, notwithstanding, was there a vestige of ova or ovaria, it may safely be concluded that they were not hermaphrodites, and, therefore, required females of some kind. And who would, under these circumstances, conclude that they had no special or sexual relation to the female Cirripedes to which they are attached? This subject is most fully treated of in the text; but we give the above interesting, though curious facts, hoping it may be the means of making some of our readers take an interest in this strange class of creatures. In speaking of the metamorphoses of the Cirripedes, Mr. Darwin says as follows:—

"I have reason to believe that the metamorphoses undergone can be reduced into three principal stages or heads, and that these three include all the main changes. *First*, larvæ in first stage—Their shape is oval and the whole dorsal surface is evidently covered by a carapace; the body exhibits no distinct articulations; the eye varies considerably in the state of its development, and is of different shapes. In Scalpellum vulgare we see arising posteriorly to the eye a pair of minute curved horns directed backwards. These horns are very difficult to make out, and probably could not be seen previous to first moult in any larva of smaller size than that of S. vulgare; but after the first moult these appear to enclose the first pair of antennæ; the second pair are not found until the pupal state. The mouth is more or less proboscitormed, differing considerably in this respect in different species of the Lepadidæ; during its very early stages there are no jaws; but the labrum is furnished with some short, thick, sharp spines and some hairs. We come now to the three pairs of natatory legs; the first has throughout the order only one ramus, whereas the two succeeding pairs are biramous. After the first moult these limbs are furnished with plumose spines, some curved and some straight and strong, which are most probably prehensile. Lastly, behind the natatory legs on the ventral surface, the body is much produced and terminates in a horny fork, which, after the first moult, becomes much elongated; after the first moult the posterior end of the carapace becomes much elongated and serrated on both sides. Situated under this posterior prolongation of the carapace there is a swelling which apparently lies on the dorsal surface of the spinose and forked abdomen; here, when the larva is compressed, the cellular and oily contents of the body burst forth; and I suspect that this swelling is the anus. *Larva second stage*—Only one specimen has hitherto been observed of a larva in this stage. The carapace has now greatly altered its character. The small internal and anterior pairs of antennæ are, it would now appear, aborted; the eye has commenced becoming double; the mouth is proboscitormed and does not differ much from its condition in the first stage; the first pair of legs is uniramous, and the two other pairs biramous; the abdomen has become much shortened, but still space is left for the development in the pupa of the three posterior pairs of legs. *Larva* in the *third* or *pupal stage*—On comparison with the larva in the second stage, the changes in external appearance and structure are not very great;

the prehensile antennæ are freed from their cases; the two eyes stand further apart; the three posterior pairs of legs have been developed, and a small abdomen has become distinctly separated from the thorax. When the due time for the act of the metamorphosis has arrived, the pupal carapace splits along the dorsal edge and is cast off, together with the acoustic sacks, the basil segments of the two antennæ, and the great, black, compound eyes, hanging to the UU-like apodemes. The exuviæ usually continue for a time united to the cemented antennæ, but are finally washed away."

We need hardly say that the above extracts are only a tithe of the account given by the author, which extends over many pages, and that in several species slight modifications occur. We have a long account of the structure of the shell and of the anatomy of the various parts of the body of the Cirripede. In speaking of their nervous system, we have some interesting remarks on their sensitiveness, which we subjoin—

"I found the following three species—viz., *Balanus balanoides*, *B. crenatus*, and *Chthamalus stellatus*—very sensitive to shadows—that is, to an object like my hand, passing even quickly, and at the distance of about a foot between them and the source of light. They were indifferent to a gradual change from bright to obscure light; but instantly perceived and drew in their cirri, when my hand was passed between the basin in which they were kept and the window, even when this was tried rather late on a dusky evening, and, likewise, when my hand was passed between them and a single candle. I took, of course, the precaution of passing my hand in other directions, but this never produced any effect. These species are moderately sensible to any vibration in the vessel in which they were kept, but they were indifferent to noises made in the air, or in the water. I found it impossible to touch, under water, an individual shell ever so lightly with a needle without all the immediately surrounding individuals, when several adhered together, perceiving it and retracting their cirri; it made no difference whether the one touched had withdrawn its cirri and was motionless. From this fact, and from seeing that a similar, but slighter effect was produced by touching the rock on which the specimens adhered, I infer that the perception by the others of the one being touched, is communicated by vibration. When an individual was touched under water, not by a needle but by a pointed camel-hair brush, it generally withdrew its cirri; but the neighbouring specimens took no notice; when touched by a single hair of the brush no notice was taken, unless the skin of the orifice leading into the sack was so touched."

With respect to the geographical range of this sub-class, the results arrived at have no very peculiar interest, owing to the species not being sufficiently distinct, and, what is still more adverse, the genera, with unimportant exceptions, range over the world. Sessile Cirripedes are found in every sea, from lat. 74° 18′ north, to Cape Horn. Mr. Darwin divides the globe into four provinces and one sub-province. First, the North Atlantic Province, to lat. 30° north, contains 31 species, of which 22 are confined to the province; if the West Indies be included, the numbers will be 42 and 28. Second, sub-province of South Africa, total number of species, 11; peculiar to the province, 5. Third, second province, west coast of North and South America, total number of species, 22; peculiar, 15. Fourth, third province, East Indian Archipelago, total number, 37; peculiar, 24. Fifth, fourth province, Australia, total number, 30;

peculiar, 21. Total number of species enumerated, 122, which, with 18 excluded, owing to their being attached to floating or swimming objects, or to their habitation being unknown, make 147, which is the total number of known existing Cirripedes.

Wonderful as is the present history of the barnacle, yet our forefathers believed in fables which, certainly, if true, would have been more astonishing than anything we have found in the pages of the two octavo volumes before us. We allude to the once popular (?) belief that the barnacle goose was the offspring of these marine creatures; and notwithstanding that worthy Master Gerard gives a circumstantial account of the whole process, and, moreover, prefaces it with a voucher, that "what our eyes have seen, and hands have touched, we shall declare," and even goes to the trouble of giving us a figure representing the metamorphose going on—which should satisfy the most incredulous—Mr. Darwin passes the worthy old naturalist by, and takes not the slightest notice of his account; this could not have been forgetfulness; for one could hardly repeat the name of the first species of the first genus of the Lepadidæ, without having the whole story strongly brought before him.

We have now told our readers of the existence of these two volumes—of what they treat about—and given them quotations, from which they will perceive that the wonders of this portion of creation are almost unrivalled; and it only now remains for us to give our opinion on the work.

We still recollect the suggestion given by one of our most distinguished British naturalists, some twenty years since, "that those who were really desirous of advancing the progress of zoology, should restrict their chief attention to some given department, and, when practical, to those particular groups which have been least studied; for that the longest life, added to the enjoyment of the most favourable opportunities, would not suffice for acquiring more than a very limited knowledge of the details of the history of all the existing species of nature." Acting on this advice, Mr. Darwin has applied his talents to the elucidation of the sub-class of the Cirripedia, as contained in these two volumes, which are published by the Ray Society; and it reflects credit on the Council of the Society that they selected for publication a work in every way so worthy of them. The plates to these volumes are drawn and engraved by George Sowerby with the greatest care, and will be found faithful delineations from nature. Mr. Darwin was awarded the Coply Gold Medal by the Royal Society of England for his researches in the Cirripedia, the result of which is contained in these volumes; after this high mark of honour, praise on our part would be of little worth; and yet we cannot help quoting the words addressed by the

great Sir Charles Linne to John Ellis, and referring them, in all sincerity, to Charles Darwin—"You have enriched our science by laying open a new submarine world to the admirers of nature. You have taken so lofty a rank in science, by your discovery among the Cirripedia, that no vicissitudes in human affairs can obscure your reputation." Such is our opinion of the author of this splendid Monograph; and we have little doubt that posterity will attach an equal value to it; and this, it is universally acknowledged, is the best test of a writer's merit.

Obituary.

It is with feelings of more than ordinary regret that we are called on to record the passage from time into eternity of two whose names were as familiar as household words to many of our readers—the Rev. David Landsborough, and Professor Edward Forbes; each of whom has left a blank in our scientific circles which will not be easily filled.

THE REV. DAVID LANDSBOROUGH,

Whose labours, to use his own language, "though carried on late and early, by one who all day, and every day, was occupied with his professional duties [duties which we know that *he* never neglected], were still far from unpleasant," and the record of which are well calculated, from their cheerful, popular style, to encourage many to tread in his steps. A severe attack of cholera carried him from the little things of this earth into the great things of eternity; he has ceased from his labours, he has entered into his rest; and for him we sorrow not, as those without hope.

PROFESSOR EDWARD FORBES,

So intimately associated with the progress of natural science in this country, has also passed away; but his memory will be long treasured up among the bright things of the past by all who were acquainted with him. Possessing scientific talents of the highest order, he was also gifted with those social qualities which were most calculated to endear him to all his fellow-students; and though his circle of acquaintance was more than usually great, it has been frequently remarked of him that he was a man who never lost a friend. There are few who read this

notice who cannot record instances of his kindly disposition, often most prominently displayed to those most in need of sympathy and friendship. Professor Balfour, his early friend and fellow-student, has already sketched,* with a kindly hand, the history of his discoveries; and shown what a man of zeal and energy may, even in this every-day world of ours, accomplish; and how, independently of a high reputation, he may also win that which is more difficult of attainment, the love and respect of all engaged in the same career.

He died at Edinburgh, on the 18th of November, 1854.

JAMES EDWARD WINTERBOTTAM, ESQ., M.B., F.L.S.,

Was born on the 7th of April, 1803, and was educated at private schools, partly at Twyford, near Winchester, under Mr. Clarke and Mr. Bedford, successively; but principally at the Rev. Dr. Mayrick's, at Ramsbury, in Wiltshire; he was entered a commoner at St. John's College, Oxford, in May, 1831, and in July, 1833, took out his M.B. degree. Of independent fortune, well educated, well informed, possessing a mind deeply imbued with a love of natural history, and endowed with almost an athletic frame, it is no wonder, says Sir W. Hooker, that he early sought to improve his mind by travelling. Owing to his remarkably retiring habits, and a disposition to avoid whatever might bring him into public notice, it would be impossible to do justice to his memory by stating all the services which Mr. Winterbottam has rendered to science.

On the 3rd of January, 1854, he left home for Egypt, *via* Southampton, and arrived at Alexandria on the 20th; after performing a voyage up the Nile for a considerable distance, he returned back to Alexandria, which he left in an Austrian steamer on the 14th April, for Beyrout, in Syria; he thence started over the Lebanon range to Balbec; thence to Damascus, Jericho, and Jerusalem, and all the other places of sacred interest. Having stopped at the Dead Sea for ten days, he went on to Beersheba and to Gaza, and returned thence by the coast to Beyrout; and, having visited Tyre and Sidon, went up to "the cedars," and almost to the summit of Lebanon, about 4,000 feet above them. Returning to Beyrout, he started in an Austrian steamer, the *Adria*, for Smyrna, on his way to Constantinople; but, being taken ill of diarrhœa, he was put on shore at Rhodes, on the 3rd of July, and died on the following day, after, it is said, six days illness.

* "Annals of Natural History," January, 1855.