

THE NATURAL HISTORY OF THE CEYLON PEARL BANKS.<sup>1</sup>

PROF. HERDMAN is to be congratulated on the completion of his report on the pearl fisheries and marine biology of Ceylon. It fills five large volumes, which, besides containing much information of direct practical importance in regard to pearls and pearl fishing, form a broad and firm basis for further study of the biology of the Ceylonese region of the Indian Ocean. The report speaks volumes as to Prof. Herdman's genius as a collector—we doubt if any single worker ever made such large collections over the whole field of zoology in so short a time; he has also done his share of the descriptive studies, and he, along with Mr. Hornell, is responsible for the parts that deal directly with the pearl oyster itself.

It is very interesting to find that since Prof. Herdman's expedition there have been four successive fat years of pearl fishing—the most profitable, so far as is known, that have ever been. In 1905, eighty-one and a half millions of oysters were fished, and the revenue brought in was upwards of two and a half millions of rupees; in 1906, more than sixty-seven millions of oysters were fished, and the total proceeds amounted

to the deposition of successive layers of pearly material within an epithelial sac. It seems that the grain-of-sand method is occasionally found operative in the causation of true pearls, and it is possible that some of those that appear to have no nuclei may have been deposited around very minute inorganic particles; some pearls not of the finest quality are probably formed as calculus-like growths independently of known parasites; but most and the best pearls are deposited around the larva of a Platyhelminth. In the Ceylonese pearl oysters (*Margaritifera vulgaris*) it seems likely that the parasite is a larval *Tetrarhynchus*. Apart from pearly excrescences on the interior of the shell, due to the irritation caused by Clione and other boring animals, the authors distinguish (1) ampullar pearls, where the nucleus and resulting pearl lie between the shell and the body, or in an ampulla of the ectoderm projecting into the mantle; (2) muscle pearls, formed around minute calcareous concretions (calcospherules) near the insertions of the muscles; and (3) cyst pearls, formed around encysted parasites. As to the proposal to secure artificial infection of oysters, the authors think that this is probably quite unnecessary on the Ceylon pearl banks. There seem to be plenty of parasites to go round, and every

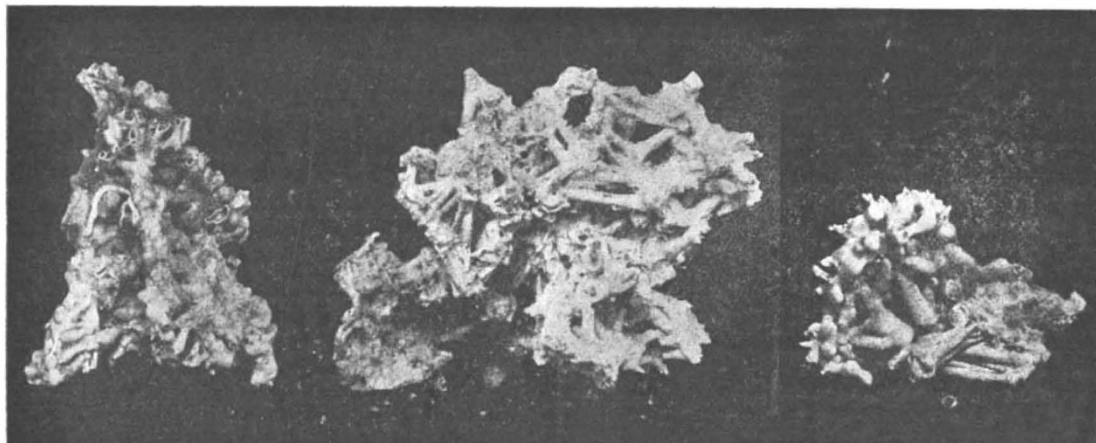


FIG. 1.—*Ramulina herdmani*, Dakin. Natural size.

to 1,385,000 rupees. This should surely convince the Philistines that there is something in biology after all! Prof. Herdman predicts a moderate fishery for this year, and a good fishery for 1908, adding that "after 1908 the prospects depend upon further careful scientific inspecting, transplanting and culching, upon the lines which have been laid down in successive sections of the report." As is well known, the fisheries have been leased by the Government to a company, and it is a matter for congratulation that Mr. Hornell is retained on the spot, and that, in terms of the lease, the necessity for a scientific treatment of the pearl banks during the next twenty years has been duly recognised and provided for.

Vol. v. begins with an interesting essay on pearl production. The authors (Herdman and Hornell) examine the three main theories—(1) that the pearl is the result of a reaction to a grain-of-sand irritation, (2) that the pearl is a pathological secretion, and (3) that the stimulation caused by the presence of a parasitic worm, which acts as a nucleus, results in

pearl oyster in the Gulf of Manaar, or, for that matter, around the coast of Ceylon, runs a fair chance of becoming infected. It is to be hoped that further investigation will make our knowledge of the pearl parasite and its life-history more precise.

In their report on Cestodes from Ceylonese fishes, Messrs. A. E. Shipley and J. Hornell have some notes on *Tetrarhynchus unionifactor*, which they described in vol. ii. Some of the larval forms entering the oyster arrive in the mantle and other tissues, acquire an ectodermic sac, and there encyst, finding "a costly grave in the developing pearl." Others reach the alimentary canal, and, after growing there, encyst on the outer surface of the intestine. "They are too big for enclosure in a pearl, and they can wait without anxiety for the advent of their second host (*Rhinoptera javanica*), within whose intestine they rapidly become sexually mature."

The late Prof. M. Stossich made notes on a few Nematodes in the collection, and Dr. Max Lühe describes seven new species of Trematodes from fishes. The first part of the volume ends with a very valuable general summary of practical conclusions and recommendations, which we may hope will find application not only in Ceylon but elsewhere. One cannot but

<sup>1</sup> Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar. By W. A. Herdman, D.Sc., F.R.S., P.L.S., with Supplementary Reports on the Marine Biology of Ceylon by Other Naturalists. Part v. Pp. viii+452; 38 plates. (London: Published at the request of the Colonial Government by the Royal Society, 1906.)



admire Prof. Herdman's wide scientific outlook—the true naturalist's point of view—which may be inferred, for instance, from this sentence, "It is impossible, until a careful study has been made of each case, to say which members of the fauna and flora of an oyster bed are of most importance to its prosperity—probably none are wholly without influence for good or evil, so closely interwoven in past history and present function is the web of living nature." If this wise saying were as widely accepted as it is certainly true, biological science would find more generous public support, and we should hear no more of impatient criticisms of scientific investigations which do not yield an increase of rupees so rapidly as Prof. Herdman's study of the Ceylonese oyster beds has done. It is fitting that the practical recommendations should end with a beautiful plate of the life-history of the pearl oyster.

The second half of the volume is occupied with eleven supplementary reports (xxxi-xli). Dr. Nelson Annandale reports on the Cirripedia (11 species); Prof. G. H. Carpenter on a new species of Halobates;

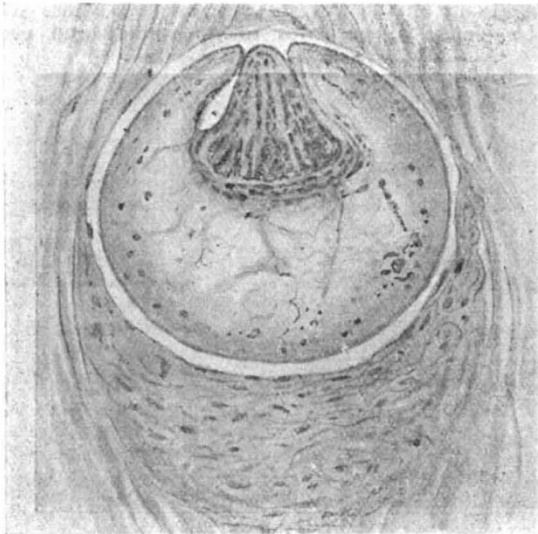


FIG. 2.—Young larval Cestode (*Tetrarhynchus*, sp.) encysted in connective tissue of pearl oyster.

Mr. W. M. Tattersall on the Leptostraca, Schizopoda, and Stomatopoda; Mr. C. B. Wilson on an interesting series of parasitic Copepods, including two new genera; Mr. T. Southwell on the Anomura (48 species, 2 new); Mr. W. J. Dakin on the Foraminifera (131 species and varieties), which include *Ramulina herdmani*, n.sp., forming masses of calcareous tubules varying in size from a hazel-nut to a small apple; Prof. G. C. Bourne on *Jousseaumia*, an interesting new genus of Eulamellibranchs commensal with the corals *Heterocyathus* and *Heteropsammia*; Messrs. R. Standen and A. Leicester on a large number of Molluscan shells; Prof. Herdman on the Tunicates (64 species); Mr. R. Douglas Laurie on the Brachyura (208 species, 15 new, three of which are referred to new genera).

The volume ends with a general discussion of the faunistic results by Prof. Herdman. His expedition has made known 2615 species of marine animals from the coasts of Ceylon. Of these 575 are described as new to science, and have required the formation of 65 new genera and three new families. About 250 of the Ceylonese species extend into the Malay

region and 300 on into the Pacific. At least 240 are known from the Red Sea, and 130 from the Mediterranean. About 280 species extend southwards to the Australian coasts and a few are found elsewhere in southern latitudes. Finally, 90 Ceylon species are found also in the West Indian region, and may indicate a closer connection by sea in a former period than exists at the present day. Prof. Herdman makes an interesting comparison of his collections with those of the *Investigator*, with those from the Mergui Archipelago and off the coast of Lower Burma, and with those from the Maldivé and Laccadive Archipelagoes.

After reviewing his rich collection, Prof. Herdman concludes in the following words:—

"Such are the animate surroundings, including both friends and foes, amid which the pearl oyster habitually lives in the Gulf of Manaar, and seems, if left in comparative peace, able to hold its own in the struggle for existence; but the balance, as we have shown in previous parts of this report, is liable to be seriously disturbed by three all-powerful factors: devastating hordes of voracious fishes which come up from the deeper waters and leave crunched shells and torn byssus in their wake; storms, currents, and over-washes of sand which may sweep away or bury a promising bed; and lastly man, who comes periodically from above on his diving stone and clears the bank of tens of millions of oysters, old and young. The carnivorous fishes and the monsoons cannot be controlled; but to show that much can be done by man to mitigate their influence, and to compensate for the decimation necessarily caused by his own operations, has been the chief object of the present report."

#### THE DESERT AND THE SOWN.<sup>1</sup>

SOME of the best books of travel nowadays seem to be written by women. We may instance Mrs. Bishop, Miss Durham, and now Miss Lowthian Bell, who, in "The Desert and the Sown," has given us a most delightful description of a wandering undertaken by herself alone with native servants from Jerusalem across Jordan to the Haurân and Jebel Drûz, thence to Damascus and on by Homs, Hama, and Aleppo to Alexandretta. Miss Lowthian Bell's route is, of course, not new. She has seen nothing that has not been seen before, and has contributed nothing new to our archæological knowledge beyond one or two short Arabic inscriptions. But this we do not expect, nor had she any archæological intent in the shaping of her travels beyond the desire to see the famous ruins of Roman Syria. The reason for her journeyings is frankly set forth by her as pure delight in the life of the Near East, and more especially that of the desert. To "travel on where travels above him the Mother of all the clustered stars," deeming "the wild the sweetest of friends," in the words of the Arab poet prefixed by the author to her book ("yeraya al-wahshaha al'ansha al-anisha, wa yahtadi behayithu ahtadat Umm enejumi esh-shawabiki"), was her desire, and she has given us a good book describing what she saw in her wandering. As she says at the beginning of the book, "To those bred under an elaborate social order few such moments of exhilaration can come as that which stands at the threshold of wild travel."

Of all wild travel, surely the most exhilarating is that in the Syrian desert. Here the Druze, with his strange religion, descendant of the Old Man of the Mountain and his "Assassins," still reigns in

<sup>1</sup> "The Desert and the Sown." By Gertrude Lowthian Bell. Pp. xv + 347. (London: W. Heinemann, 1907.) Price 16s. net.