Report on the Radiolaria Collected by H.M.S. Challenger During the Years 1873-1876, First Part: Porulosa (Spumellaria

Ernst Haeckel

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Report on the Radiolaria Collected by H.M.S. Challenger During the Years 1873-1876, First Part: Porulosa (Spumellaria and Acantharia): Report on the Scientific Results of the Voyage of H.M.S. Challenger During the Years 1873-76, Vol. XVIII

Ernst Haeckel

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Transcriber's note:

Text enclosed by underscores is in italics (_Actissa_).

Text enclosed by hash marks is in "gesperrt" (wide-spaced) type (#Larcoidea#).

Page numbers enclosed by curly braces (example: {25}) have been incorporated to facilitate the use of the Index in Part II.

Some typographical errors in the printed work have been corrected. They are listed at the end of the text.

The Addenda & Errata (Second Part, pp. 1763-4) have been applied without further comment.

REPORT ON THE SCIENTIFIC RESULTS OF THE VOYAGE OF H.M.S. CHALLENGER DURING THE YEARS 1873-76

Under the Command of Captain George S. Nares, R.N., F.R.S. and the Late Captain Frank Tourle Thomson, R.N.

Prepared Under the Superintendence of

the Late Sir C. Wyville Thomson, KNT., F.R.S., &c.
Regius Professor of Natural History in the University of Edinburgh
Director of the Civilian Scientific Staff on Board
and Now of
John Murray
One of the Naturalists of the Expedition

ZOOLOGY--VOL. XVIII.

FIRST PART

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CONTENTS.

REPORT on the RADIOLARIA collected by H.M.S. CHALLENGER during the years 1873-1876.

By ERNST HAECKEL, M.D., Ph.D., Professor of Zoology in the University of Jena.

FIRST PART.--PORULOSA.

(#SPUMELLARIA AND ACANTHARIA.#)

EDITORIAL NOTES.

The Report on the RADIOLARIA by Professor Ernst Haeckel of Jena occupies the whole of the present Volume, the text being bound up in Two Separate Parts and the Plates in a Third Part. The Report forms Part XL. of the Zoological Series of Reports on the Scientific Results of the Expedition, and is the largest single Report of the series which has up to this time been published.

The Manuscript of the Systematic Part was written by Professor Haeckel in the English language, and was received by me in instalments on the 12th August 1884, 13th July and 4th December 1885, and 3rd June 1886. The Introduction was written in German and was translated into the English language by Mr. W. E. Hoyle of the Challenger Editorial Staff; the German text being received in instalments between the 15th July 1886, and the 25th January 1887.

The Challenger Naturalists found the representatives of this group of animals to be universally distributed throughout ocean waters, and their dead remains to be nearly equally widely distributed over the floor of the ocean, the relative abundance and the species differing, however, with change of locality, and their abundance or variety being intimately connected with some of the most interesting and intricate problems of general oceanography.

It was a fortunate circumstance that so distinguished a Naturalist, with such an intimate knowledge of the RADIOLARIA, should have been willing to undertake the laborious examination and description of the extensive collections made during the Expedition. Professor Haeckel has devoted ten years of his life to this work, and this Report sets forth the results of his labours, on the conclusion of which he will be congratulated by all Naturalists. The entire literature of the RADIOLARIA (from 1834 to 1884) is completely recorded, and the older species (both living and fossil) redescribed, so that the Report is a complete Monograph, which will be an invaluable aid to all future Investigators.

CHALLENGER OFFICE, 32 QUEEN STREET, EDINBURGH, _1st February 1887._

THE

VOYAGE OF H.M.S. CHALLENGER.

#ZOOLOGY.#

Report on the RADIOLARIA collected by H.M.S. Challenger during the Years 1873-76. By ERNST HAECKEL, M.D., Ph.D., Professor of Zoology in the University of Jena.

PREFACE.

The significance of the Radiolaria in regard to the relations of life in

the ocean has been increased in a most unexpected manner by the discoveries of the Challenger. Large swarms of these delicate Rhizopoda were found not only at the surface of the open ocean but also in its different bathymetrical zones. Thousands of new species make up the wonderful Radiolarian ooze, which covers large areas of the deep-sea bed, and was brought up from abysses of from 2000 to 4000 fathoms by the sounding machine of the Challenger. They open a new world to morphological investigation.

When ten years ago (in the autumn of 1876) I accepted the enticing invitation of Sir Wyville Thomson to undertake the investigation of these microscopic creatures, I hoped to be able to accomplish the task with some degree of completeness within a period of from three to five years, but the further my investigations proceeded the more immeasurable seemed the range of forms, like the boundless firmament of stars. I soon found myself compelled to decide between making a detailed study of a selection of special forms or giving as complete a survey as possible of the varied forms of the whole class; and I decided upon the latter course, having regard both to the general plan of the Challenger Reports, and to the interests of our acquaintance with the class as a whole. I must, however, confess at the close of my work that my original intention is far from having been fulfilled. The extraordinary extent and varied difficulties of the undertaking must excuse the many deficiencies.

The special examination of the Challenger collection was for the most part completed in the summer of 1881; I collected its results in my Entwurf eines Radiolarien-Systems auf Grund von Studien der Challenger-Radiolarien (Jenaische Zeitschr. f. Naturw., Bd. xv., 1881). Since the manuscript of this preliminary communication was

completed only a few days before my departure for Ceylon, and since I was unable to correct the proofs myself, several errors have crept into the Prodromus Systematis Radiolarium included in it. These have been corrected in the following more extensive working out of it. Even at that time I had distinguished 630 genera and more than 2000 species; but on the revision of these, which I undertook immediately on my return from India, this number was considerably increased. The total number of forms here described amounts to 739 genera and 4318 species; of these 3508 are new, as against 810 previously described. In spite of this large number, however, and in spite of the astonishing variety of the new and marvellous forms, the riches of the Challenger collection are by no means exhausted. A careful and patient worker who would devote a second decade to the work, would probably increase the number of new forms (especially of the smaller ones) by more than a thousand; but for a really complete examination, the lifetime of one man would not suffice.

The richest source of the Challenger material is the Radiolarian ooze of the central Pacific Ocean (Stations 265 to 274). This remarkable deep-sea mud consists for the greater part of well-preserved siliceous shells of Polycystina (SPUMELLARIA and NASSELLARIA). Not less important, however, especially for the study of the ACANTHARIA and PHÆODARIA, are the wonderful preparations stained with carmine and mounted in Canada balsam on the spot by Dr. John Murray. One such preparation (_e.g._, from Station 271) often contains twenty or thirty, sometimes even fifty new species. In many of these preparations the individual parts of the unicellular organism are so well preserved that they show clearly the characteristic peculiarities of the legions and orders. Since the

material for these preparations was taken with the tow-net, not only from the surface of the sea but also from different bathymetrical zones, it furnishes valuable conclusions regarding the chorology, as well as the physiology and morphology of the group. For many new discoveries I am indebted to the study of such preparations, of which I have examined about a thousand from 168 different Stations (compare § 240). In addition to these about 100 bottles were handed to me, containing partly bottom-deposits, partly tow-net gatherings.

Sir Wyville Thomson, who directed the investigations of the Challenger with so much devotion, and only partly saw its results, has laid me under a deep debt of obligation; not less is this the case, however, with his successor, Dr. John Murray. I am especially indebted to both gentlemen for the freedom they have allowed me in the carrying out of my work, and especially for the permission to include a description of all known Radiolaria in the Challenger Report, which has thus become a second edition many times enlarged of my Monograph published in 1862. Since all previous literature of the subject has been consulted and critically revised, it is hoped that this Report will form a useful foundation for future investigations. All names of sufficiently described Radiolaria published during the first half century of our knowledge of the class (from 1834 to 1884), are inserted in alphabetical order in the index at the end of this work.

In addition to the treasures of the Challenger, my own collection of Radiolaria has yielded many new forms whose description is here included. On my journeys to the Mediterranean (an account of which is given in the introduction to my Monograph of the Medusæ), I have given special attention to these delicate microscopic organisms for more than thirty years. Besides the various points on the

Mediterranean, the Atlantic Ocean at the Canaries (in the winter of 1866-67) yielded many interesting new forms; whilst my voyage across the Indian Ocean, from Aden to Bombay, in November 1881, thence to Ceylon and back by Socotra in March 1882, was still more productive. In particular, some extended excursions which I had the opportunity of making from Belligemma and Matura (at the southern extremity of Ceylon) gave me an insight into the rich treasures of the Indian Ocean.

Most important, however, as regards the knowledge of the Indian Radiolaria, are the collections which Captain Heinrich Rabbe of Bremen has so beautifully preserved during his many voyages through that region. In the neighbourhood of Madagascar and the Cocos Islands more especially, and also in the Sunda Archipelago, he met with large swarms of Radiolaria, among which were many new and remarkable forms. These were of special value for completing the chorology, and the more so since the course of the Challenger in the Indian Ocean lay very far to the southwards. I will therefore take this opportunity of repeating my best thanks to Captain Rabbe for the friendly donation of his valuable collection.

The Radiolarian fauna of the North Atlantic Ocean, which was previously but little known and only slightly increased by the investigations of the Challenger, received a valuable increase from the interesting collections made by Dr. John Murray on various expeditions to the Færöe Islands (on the "Knight Errant" in 1880 and on the "Triton" in 1882). A large number of new Radiolaria were captured in the Færöe Channel, partly at the surface of the Gulf Stream, partly at various depths, and the proof was thus furnished that at certain points in the North Atlantic Ocean Radiolaria are very

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