

were in general good agreement with Rayleigh's laws.

By a graphical analysis of the Rayleigh loops of rocks it is easily possible to deduce the values of A and B constants, provided the loops are simple and nearly obey the second law. From the different types of loops presented in Fig. 1, it can be seen that the value of the constant B for different rocks varies from almost zero when the loop is a straight line (Fig. 1, a) to about 10% of that of A when the loop is quite thick (Fig. 1, c). With the present apparatus we can detect the presence of constant B if it has a numerical value of 0.5% of that of A for then the scope trace just expands into a thin loop.

In general the preliminary investigations have shown that variation of susceptibility of rocks with the applied field is quite small, if any, in fields of less than 1 Oe and that beyond this it is more pronounced as determined by an A.C. method involving rectification of the signal and reading it as current. A field of less than 1 Oe or preferably 0.5 Oe can thus be taken as a safe range for the measurement of initial susceptibility of basalts and dolerites. Thus, while using fields of more than 1 Oe in A.C. methods, it is necessary to ascertain whether the field used lies within the range of initial susceptibility of the rock concerned.

Determination of susceptibility by A.C. techniques involving null method or employing tuning in the pick-up circuit has to be avoided, since the former will not be able to take care of the out-of-phase components, whilst the latter will cut them out when the constant B has an appreciable value for the specimens. On the other hand, methods involving rectification of the signal will give approximately the average value of susceptibility over the range of the field used. In any case it will be good to see the low field hysteresis loop of each rock specimen which will bring out all characteristics clearly.

Studies regarding the correlation between the constants A and B, and other magnetic and mineralogical properties of rocks, are in progress and will be reported elsewhere.

#### ACKNOWLEDGEMENT

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1. Nagata, T., *Rock-Magnetism*, Maruen, Tokyo, 1961.
2. Rayleigh, Lord, *Phil. Mag.*, 1887, 23, 225.
3. Neel, Louis, *Adv. Phys.*, 1955, 4, 233.
4. Likhite, S. D. and Radhakrishnamurty, C., *Bull. N.G.R.I.*, 1965, 3, 1.
5. Radhakrishnamurty, C. and Sahasrabudhe, P. W., *Curr. Sci.*, 1965, 34, 338.
6. Ellwood, W. B., *Physics*, 1935, 6, 215.

### BRACHIOPODA \* (BOOK REVIEW)

**T**HE *Treatise on Invertebrate Paleontology* prepared under the sponsorship of the Geological Society of America is well known to all paleontologists. The aim of this undertaking is to present as complete an inventory of our present knowledge of invertebrate paleontology as possible so that it will remain an indispensable reference text for all research workers in this field, namely, study of invertebrate organisms preserved in rocks of the earth's crust. The first volume of the *Treatise* was published in 1952, and during the twelve years since then a dozen volumes have been issued, each one devoted to a particular group of invertebrates. The general treatment includes description of

morphological features, ontogeny, classification, geological distribution, evolutionary trends and phylogeny, and systematic description of genera, subgenera and higher taxonomic units.

The present publication is Part H of the *Treatise* and is devoted to Brachiopoda. Because this work contains a large number of illustrations (about 750 plates of over 5,000 figures), it is bound in two volumes but the pages are numbered continuously and the two volumes are sold as one unit.

"Brachiopoda are solitary marine animals commonly anchored to the substratum by a fleshy stalk or pedicle. The soft parts are protected by a pair of valves of variable organic and mineral composition, that cover the ventral and dorsal surfaces and project forward to enclose a cavity in which is suspended a filamentar feeding organ or lophophore". The term "Brachiopodes" was first used by Cuvier in

\* *Treatise on Invertebrate Paleontology: Part H. Brachiopoda*. Editor: Raymond C. Moore. Bound in two volumes. (Publishers: University of Kansas Press and Geological Society of America, 231, East 46 Street, New York, N.Y. 17). Pp. 1-522 and 523-927. Price \$19.50.



1805 for the "acephalous molluscs" *Lingula*, *Orbicula*, and *Terebratula*, and in 1806 Dumeril proposed Brachiopoda as an order of Mollusca. Since then it has been customary to recognize the group either as a class of the Molluscoidea or Tentaculata, having equal status with the Ectoprocta and Phoronida, or latterly as a distinct phylum. From a paleontological point of view the promotion of the Brachiopoda to a phylum is taxonomically more realistic because the group, which includes some of the oldest fossils, has always been decisively different from other invertebrates.

This group of animals had a rich and long history and is now in decline. About 70 genera are found in the seas today. The occurrence of living brachiopods in almost every known environment from brackish-water tidal flats to abyssal regions over 5,000 m. deep is undoubtedly a relic of past adaptability. Fossil species of their dominant and diverse ancestors are available in every continent.

Brachiopod fossils attracted attention even in the Middle Ages, and from the late 16th century onward they were regularly figured by naturalists under a variety of names. Despite the familiarity with brachiopod shells the practice of indiscriminately grouping all the bivalves together prevailed until the close of the 18th century. During the 19th century many aspects of brachiopod organization and history were rewardingly explored. Till now about 1,700 brachiopod genera have been described, and the tempo of current research is such that this number is likely to increase substantially during the next decade or so.

Still it must be said that this revival of interest in the study of brachiopods is only of recent origin. As mentioned earlier, living

brachiopods are comparatively rare and insignificant members of the faunas of the present day, and their study was therefore neglected by zoologists early in the present century. As yet little is known about their nervous and circulatory systems, especially of articulates, while many basic histological and physiological problems, as for example shell growth, are yet to be resolved. Information on the relationship between the living brachiopod and its environment is still scanty. Much more reliable data are required even on such elementary aspects of brachiopod life as feeding habits, respiration, and population distributions and structures before most of the fossil evidence can be interpreted with any confidence.

In this context the publication of Part H on *Brachiopoda of the Treatise on Invertebrate Paleontology* will be warmly welcomed by paleontologists as a most significant addition to the literature on the subject. They owe a debt of gratitude to the Editor, and to Prof. Alwyn Williams and Prof. A. J. Rowell, the chief contributors, and their colleagues whose efforts have made it possible to bring out the twin volumes.

The first 250 pages give a general account of brachiopods under the following heads: Introduction; Brachiopod Anatomy; Morphology; Composition of Brachiopod Shell; Evolution and Phylogeny; Ecology and Paleocology; Classification; Stratigraphic Distribution; Techniques for Preparation of Fossil and Living Brachiopods. The remaining pages of Volume 1 and the whole of Volume 2 are devoted to Systematic Descriptions. These include diagnosis of nearly 1,700 genera assembled in 202 families, 48 superfamilies, 11 orders, and 2 classes.

#### THE INDIAN ACADEMY OF SCIENCES: THIRTY-SECOND ANNUAL MEETING

**T**HE Thirty-second Annual Meeting of the Indian Academy of Sciences will be held at Madurai, South India, under the auspices of the Madurai University, on the 20th, 21st and 22nd December 1966.

Sir C. V. Raman, President of the Academy, will deliver the Presidential Address on "The Eye and Vision".

In the Scientific Meeting in Section A, under the Chairmanship of Dr. K. R. Ramanathan, there will be a symposium on "Active Solar Regions". The participants will include Dr. Vikram A. Sarabhai, Dr. M. K. Vainu

Bappu, Dr. R. R. Daniel and Dr. A. P. Mitra.

In a meeting of the Section B, Chairman Dr. N. K. Panikkar will give an address on "New Perspective in Brackish-water Biology". A symposium in this section on "Molecular Biology" will be led by Prof. G. N. Ramachandran on "Conformation of Proteins and Polypeptides". Prof. T. S. Sadasivan, Chairman of the second session in Section B, will give an address on "Physiology of Plants under Stress".

Public lectures will be given by Dr. S. Bhagavantam on "The Atomic Nucleus", and by Dr. Jacob Chandy on "The Human Brain".