

The official announcements and other circular matter connected with the Congress will be distributed through the American committee as soon as the documents are received from Berlin. Any members of the society to whom these circulars may not be sent can secure them by writing to the chairman of the American committee.

Chemists not members of the American Chemical Society are also cordially invited to participate in the Congress both as members and as authors of papers, and the same courtesies will be extended to them, if so desired, as are offered above.

H. W. WILEY,

*Member of Permanent Committee on  
Organization and Chairman of  
American Committee.*

#### SCIENTIFIC BOOKS.

##### RECENT PAPERS ON THE EMBRYOLOGY, STRUCTURE AND HABITS OF LIVING BRACHIOPODA.

1. *Observations on Living Brachiopoda.* By EDWARD S. MORSE. *Memoirs Boston Soc. Nat. Hist.*, Vol. 5, No. 8, 1902. 4to. Pp. 313-386; pls. 39-61.
2. *The Embryology of a Brachiopod, Terebratulina septentrionalis Couthouy.* By EDWIN G. CONKLIN. *Proc. Amer. Phil. Soc.*, Vol. 41, No. 168, 1902. 8vo. Pp. 41-76; pls. 1-10.
3. *On the Development of Lingula anatina.* By NAOHIDÉ YATSU. *Jour. College of Science, Imp. Univ. Tōkyō, Japan*, Vol. 17, Art. 4, 1902. 8vo. Pp. 1-112; pls. 1-8.
4. *Notes on the Histology of Lingula anatina Brugière.* By NAOHIDÉ YATSU. *Ibid.*, Vol. 17, Art. 5, 1902. 8vo. Pp. 1-29; pls. 1, 2.
5. *On the Habits of the Japanese Lingula.* By NAOHIDÉ YATSU. *Annotationes Zoologicae Japonensis*, Vol. 4, Pt. 2, 1902. 8vo. Pp. 61-67.

The publication of studies on living Brachiopoda seems to have become almost epidemic during the present year. Sporadic papers have appeared during the past ten years, but no marked infection has occurred until now.

The results are most satisfactory, for the contributions here noticed are of a high degree of excellence and constitute a decided advance in our knowledge of the habits, anatomy and embryology of this interesting class, whose culmination was attained far back in the Paleozoic era.

Professor Morse possesses the unique distinction of having first studied the early stages and embryology of a brachiopod. His observations on the embryology of *Terebratulina* and the systematic position of the Brachiopoda were published thirty years ago. The importance of the subject led him to visit Japan, where the adjacent seas offer the greatest inducement to the student of the recent species of this class. The allurements of Japanese art have prevented the publication of the studies then made until the present time. It is quite remarkable that so few of his observations have been anticipated during the intervening years, though the publications of Joubin and Blochmann have indeed covered many of the details relating to *Lingula* and *Discinisca*.

Morse's observations refer principally to the genera *Lingula*, *Glottidia*, *Discinisca*, *Hemithyris*, *Dallina*, *Terebratalia* and *Terebratulina*. The points of especial interest comprise the discussion of the otocysts, pharyngeal glands, the accessory hearts of Hancock, the strand-like spermaries, the pallial circulation, the life attitudes of different forms, and particularly the varied and graceful movements of the brachia. The strand-like spermaries and the pharyngeal glands are characters heretofore undescribed, and further details are given regarding the external glands first described by the author. The presence of otocysts in *Lingula* and *Glottidea* are definitely shown although Blochmann has doubted their existence in these genera. The organs described by Hancock as the 'heart' and the 'accessory hearts' have been frequently investigated by various observers, but no final conclusion has been reached. The author shows that they cannot well belong to the circulatory system, but must be regarded as in some way connected with the genitalia, though their precise functions have not been

determined. The plates accompanying this memoir were drawn by the author in his usual clear and artistic manner. They represent just what is intended to be shown, and are evidently depictions of natural objects.

Conklin's embryology of *Terebratulina septentrionalis* (2) presents an excellent illustration of the results obtained by modern methods. Owing to the opacity of the embryos and to the absence of serial sections, good microtomes and other accessories, Morse during 1871-73 was able to show mainly the external modifications in the developing embryo. His observations, however, were very thorough and complete.

Conklin describes in detail the egg and its cleavage, gastrulation and the formation of the body layers and cavities, the orientation of the embryo, and the development and organization of the larva.

The constrictions of the cephalula, hitherto supposed to mark distinct segments, are shown to be produced by the anterior and posterior mantle furrows, but at no time do they form true septa dividing the coelom. The author, after reviewing the real and supposed resemblances between the larval and embryo brachiopods and other organisms, concludes that the relationship between *Phoronis*, the Bryozoa, and the Brachiopoda, is sufficiently close to warrant their being placed in the same phylum, though not in the same class.

All our knowledge regarding the embryology of the Brachiopoda has hitherto practically been confined to the group known as Articulata. The work of Yatsu (3) is, therefore, of great interest and value, since it relates to *Lingula*, the living and almost unchanged representative of the most ancient types. The developmental characters of *Lingula* are in many respects quite different from those of any brachiopod previously studied. The three-lobed cephalula stage of the neoembryo, so characteristic of *Cistella*, *Lacazella* and *Terebratulina*, is not developed in *Lingula*, which does not attain more than a two-lobed condition. Also, the posterior lobe is not the caudal as in those genera, but constitutes the thoracic division. *Cistella*, *Lacazella*, etc., undergo a metamorphosis in passing from the

neoembryonic to the typembryonic condition, consisting of the reflexing of the mantle lobes forward over the anterior division. This change is absent in *Lingula*, and the mantle lobes simply grow anteriorly. This difference has an especial significance in the development of the shell, for in *Cistella*, etc., the shell is developed from what was originally the inner side of the mantle lobes, while in *Lingula* it is secreted by the outside. The author further considers that the pedicle is embryologically and morphologically distinct from the pedicle of the articulate brachiopods.

The embryonic and early post-embryonic stages are fully described, together with full details and illustrations of the various organs and structures. As a whole, no single species of brachiopod has heretofore received so complete and extended treatment along these lines of research.

The two other papers by this author (4, 5) relate to the histology and habits of *Lingula*. New facts are given, showing the extraordinary power of resistance to unfavorable conditions, which has doubtless been a potent factor in preserving the genus since Cambrian times.

It is noteworthy that in all the standard literature on the Brachiopoda no notice has been taken of the earliest American publication relating to the anatomy of these animals. It is contained in a 'Text-book of Vegetable and Animal Physiology,' by Henry Goadby, published in New York in 1858. One chapter is devoted to the nutrition in the Brachiopoda and another to a description of their nervous and circulatory systems. Inasmuch as Goadby's observations were based upon original dissections and studies, their claims for a place in the literature of brachiopod research are perfectly valid. C. E. BEECHER.

*General Investigations of Curved Surfaces.* By KARL FRIEDRICH GAUSS. Translated with Notes and a Bibliography by JAMES CADALL MOREHEAD, A.M., M.S., and ADAM MILLER HILTEBEITEL, A.M. The Princeton University Library. 1902. Quarto. Pp. viii + 127.

By the liberality of the Princeton Library Publishing Association and the alumni of