MORTENSEN'S CIDAROIDEA

THE great work by Dr. Mortensen, "A Monograph of the Echinoidea, I. Cidaroidea" (Copenhagen, London, 1928), is mainly systematic, and, as this is his special interest, it is doubtless a very valuable contribution to our knowledge of the group. While the morphological portion is a subordinate part of the work, it is reasonable to expect that it should be treated with the care and correctness worthy of the subject and of such a monumental publication. There are, however, certain points that are open to criticism.

Dr. Mortensen thinks (p. 6), as set forth in his paper "Bothriocidaris and the Origin of the Echinoids" (Vid. Med. Dansk Naturh. Foren., Bd. 86, 1928), that Bothriocidaris can not be considered an Echinoid. His view is based largely on the radial position of the "teeth" and the madreporite in that genus. He, however, claims, as I believe is correct, that the supposed "teeth" are not teeth but plates. This being Dr. Mortensen's opinion, it is a peculiar argument that the radial position of parts (teeth) that he himself says are not present should be considered evidence against the Echinoid nature of Bothriocidaris. Madreporic pores, while typically interradial (in genital 2), often extend to radial (ocular) plates in recent Echini.

The characters of the Aristotle's lantern, with associated parts, in Echini, are of much interest and important for their bearing on classification. A correct understanding of these parts is essential to a student of the group. Dr. Mortensen says (p. 35): "The apophyses to which the lantern muscles are attached are interradial, while in all other Echinoids they are radial in position." This is not correct. In the Perischoechinoida no perignathic girdle was developed, as far as known. The evidence, based on young Goniocidaris (Lovén, "Echinologica," 1892), is that in Paleozoic forms the compass, protractor and retractor muscles were inserted interradially directly on the basicoronal interambulacral plates. In the Cidaroida apophyses are developed as outgrowths of the basicoronal interambulacral plates and on them, interradially, are inserted the compass, protractor and retractor muscles. In the Centrechinoida apophyses (interradial) are more or less developed, and on them are inserted the compass and protractor muscles, as in the Cidaroida. In the Centrechinoida, however, the new feature of auricles is introduced, as two plates joined by suture with the basicoronal ambulacral plates. On these auricles (radially) the retractor muscles are inserted. In the Clypeastrina the apophyses have disappeared, auricles alone are retained, and there are other changes that need not be considered here. This all is recorded by Lovén, 1892, or myself (Boston Soc. Nat. Hist., 1912, pp. 177–198). Lovén, in his study, first put the knowledge of the structure of the lantern and associated parts of Cidarids and other Echini on a firm foundation. Yet his work is not even mentioned by Dr. Mortensen.

Dr. Mortensen suggests (p. 35) that small "apophyses" on the interior of ambulacral plates of Cidarids may be considered the morphological equivalent of auricles in other Echinoids. It is unfortunate that he should use the term "apophyses" in two quite different senses. The spinose processes to which he refers are direct outgrowths of the ambulacral plates in Cidarids, have no sutures and extend well up in the interior of the test. On the other hand, auricles are separate parts joined by suture with the basicoronal ambulacral plates only. Auricles are unknown in the Cidaroida and first appear in the Centrechinoida. Dr. Mortensen, in his somewhat earlier paper on Bothriocidaris, suggested that these same ambulacral processes in the Cidaroida might be homologized with the ambulacral plates of starfishes.

In Dr. Mortensen's consideration of postembryonal development of Cidarids (pp. 39–40), he records his own work, also that of Döderlein and Grieg. He quite overlooks the work of Lovén (1892) on Goniocidaris, which is the most comprehensive and far-reaching work on the later development of Cidarids that has yet been published.

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COSMOS UNLIMITED

IN an article: "The Creation of Matter," in SCIENCE for April 5, Dr. Walter S. Adams is quoted as asking, "Is it possible that radiation is finally reflected back from the boundaries of a limited space?" It would seem as if for the moment Dr. Adams's mind had lapsed from Einsteinian to Euclidean geometry, for, according to relativity, space, though limited in extent, has no boundaries.

The assumption that only a small part of the radiation of the stars can be absorbed by the nebulae is based on this idea of a restricted universe. If we conceive space to be infinite and everywhere peopled, as our great telescopes begin to show that it is, with systems of stars, which doubtless contain like our own vast tracts of nebulae both bright and dark, then all radiated energy must eventually be gathered up and set to work again on the unending round of evolution. How dark nebulae may originate in the dissolution of bodies that have sunk to the zero of temperature,

I have already suggested in an article entitled, "A Continuing Universe," published in *Popular Astronomy,* Vol. XXXVI, No. 6.

As Dr. Moulton well remarks, many minds seem to have a horror of an unending past or future, or of infinite space; yet in these very conceptions surely we have the most promising solution of the riddle of the universe. Though we can not understand all the processes, we may rest assured that Nature is not growing old, but is ever rising from the ashes of its past to renew its youth in immortal vigor.

J. G. PORTER

CINCINNATI OBSERVATORY,
APRIL 10, 1929

CHEMICAL TRAINING

THE sketch of the distinguished career of Thomas Burr Osborne (SCIENCE, April 18) recalls an incident of his early manhood, when he had just received his appointment as assistant in analytical chemistry at Yale but had not yet reached his doctorate. The quality of thoroughness, the "do-it-right" attitude, the meticulous care with which he carried on his experimentation, his intellectual integrity all showed themselves in 1883 when in a discussion carried on by a group of young people at a summer resort he exclaimed, "Training in a chemical laboratory does more to develop sound ethics than Sunday School lessons can ever do." One can not help asking whether present-day instructors are insisting that strict integrity more surely leads to success than cleverness in "getting by" does. That is one heritage from Thomas Burr Osborne.

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SPECIAL CORRESPONDENCE

OPPORTUNITIES FOR RESEARCH OFFERED AT THE BIOLOGICAL LABORATORIES OF THE BUREAU OF FISHERIES

THE fisheries biological laboratories of the United States Bureau of Fisheries at Woods Hole, Mass., Beaufort, N. C., and Fairport, Iowa, will reopen for the summer's activities on June 17.

In accordance with the long-established policy of the bureau, facilities for research will be afforded at the various stations to independent investigators in addition to the bureau's regular staff. But the opening of the stations this year is especially worthy of being called to the attention of the scientific public, for extensive improvements and alterations in buildings, grounds and equipment completed during the last two seasons make these facilities more attractive than ever before.

The advantages of the stimulating surroundings at Woods Hole, where association with the great Marine Biological Laboratory and use of its library may be had, need not be stressed here. The fisheries laboratory, however, in addition to the usual advantages of any well-situated marine biological station, such as convenient supply of marine animals and plants, the common laboratory equipment and running sea-water, offers unusual opportunities for combining experimental work in the laboratory with field observations on ocean ecology. Such problems, for example, as studies of the factors controlling migration of the animal plankton, the richness of chemical foodstuff in sea-water compared with fluctuating abundance of the phytoplankton, and an almost unlimited number of problems of the same general type involving experimental work on the one hand and field work at sea on the other, might be cited as opportunities peculiar to this station. In addition to newly finished oceanographic and physiological workrooms and chemical storerooms at the laboratory, the service of such floating equipment as the bureau's sea-going steamer *Albatross II* and steamer *Phalarope,* which base at Woods Hole during part of the year, two smaller launches and several rowboats may be obtained. Furthermore, the chance to participate in a "going" program of fishery biology, such as studies that the bureau is now making on the bionomics of marine fisheries of the North Atlantic region, should prove attractive.

Owing to the increased demand for these accommodations, it has become necessary to make careful selection of those who are granted the privileges of the laboratory. Applications made well in advance are reviewed by a committee, and preference is given to those investigators who work along lines of especial interest to the bureau and who have shown ability for energetic and productive research.

Less well known to the younger generation is the fisheries biological laboratory at Beaufort, N. C. Since before the Civil War, the comfortable little city of Beaufort has been a favored resort for biologists, and the present biological station, opened for research in 1902, has been occupied almost continuously during the summer season in exploration and research. The station is situated on Pivers Island about 150 yards from the mainland in Beaufort Harbor and consists of a two-story frame laboratory building, 70 feet long and 42 feet wide, with two-story wings each 52 feet long, surrounded by porches. There are also adjacent to the main building a mess hall, power house, carpenter shop, boat house and terrapin-rearing house, and along the shores are constructed 15 large concrete enclosures for the rearing of terrapin. During the past year all of these build-