

and "Sporadotrema is nothing else than a typical *Carpenteria*".

Without fully accepting all Hofker's conclusions, it may be said that his work has brought additional and important evidence of the extraordinary variability of these sedentary Foraminifera as compared with that of their allies which remain free throughout life.

This does not necessarily lead to the conclusion that specific discontinuity does not occur in any of the sedentary Foraminifera. That would be an extreme view which is not warranted by the facts. Such species as *Sorosphaera depressa* and *Schizammmina labyrinthica* described by Heron-Allen and Earland in these papers seem to be good species. But it does suggest that in some cases such discontinuity has been lost or, perhaps,

has not yet been gained, and that their survival depends not on the evolution of specific characters but on their extreme adaptability to the environment by their great variability.

Space does not permit comment on many other interesting features of these papers, but attention may be directed to the account given of the remarkable family the Pegididæ which have an extraordinarily thick shell and an unusual system of apertures. In this paper there is a reproduction of Dr. Orbigny's original sketch for a drawing of *Rotalia dubia*, a long-lost species now included in the Pegididæ.

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¹ E. Heron-Allen and A. Earland. On the Pegididæ, *J. Roy. Micr. Soc.*, 1928. Vol. 48. Some New Foraminifera from the South Atlantic, Parts I, II, and III. *Ibid.*, 1929; 1930. Vols. 49 and 50.

² J. Hofker, Foraminifera of the *Siboga* Expedition, Part II.; 1930.

Angiosperm Origins.

G. R. WIELAND has a very interesting discussion of the origin of Angiosperms in the *Proceedings* of the International Congress of Plant Sciences held at Ithaca, vol. 1, pp. 429-456 (George Banta Publishing Company, Menasha, Wisconsin, 1929). Naturally this account contains a particularly interesting recapitulation of the main features of the discoveries in the Cycadeoideæ with which the author's name is now linked through the genus *Wielandiella*, established as the result of Nathorst's fine reconstruction of difficult Swedish and Yorkshire material; but this general account is particularly valuable as it synthesises the available material, in a problem which ranges the whole globe and a considerable part of geological time.

Wieland argues that the Jurassic was a time of leaf and carpellary change in the earlier Angiosperms, just as the Cretaceous was the time of continued stem and floral change in fully characterised Angiosperms. He points out that the abundance of Angiosperms in Cretaceous rocks is due not merely to the increasing complexity in the phylum, but also to the greater thickness of the more and more recent plant beds. From this point of view he advises the botanist not to take too seriously the geologists' suggestion that the Angiosperms originated locally and suddenly; rather this impression may be due to imperfections in the

earlier plant record; thus he calculates that of Jurassic times our plant records represent perhaps a tenth of one per cent of the species then existent, and those recorded mainly by dissociated leaves, stems, etc., more rarely by flowers and fruits. Some impressions of interesting new, possibly Dicotyledonous, fruits are recorded from Rhætic plant beds of the Argentine. Wieland states that the fossil series of insects described from these beds "mark the Argentine Rhætic as one of the most important fossil localities in the world".

Wieland concludes that there is every reason to regard the Angiosperms, "so far as actual descent goes, as old, quite as old as pines, and polyphyletic". He points out also that, from studies of fossil forms, it is easy to get a false impression that giant forms predominated in fossil periods, where specialised types make up the bulk of the fossil series. But this conclusion is not justified; the Cordaites varied from types with leaves ten feet long to those with narrow grass-like blades. Wieland suggests that "the contrast between the flowers of *Drimys*, in some species about the size of those of the chickweed, and related flowers a foot across, has surely been paralleled many times in the geologic past", so that many small fleshy forms of megasporophylls were probably grouped into seed cones allied to *Wielandiella* in Rhætic times.

Fluctuations in Fisheries.

ON April 12, 1929, the Conseil Permanent International pour l'Exploration de la Mer held in London a special meeting to discuss the present state of our knowledge concerning fluctuations in the abundance of the various year-classes of food fishes. So much interest is now being taken in this important branch of fishery research that no less than nineteen papers were read at the meeting, a full report of which has recently been published.*

When the Council entered upon its international collaboration thirty years ago, an enormous amount of work had to be done in the systematic determination of the various species, in ascertaining their geographical occurrence and distribution, and in locating their spawning grounds. As this work advanced, and more refined methods of biological analysis were brought to bear upon the steadily accumulating masses of data, it gradually became clear that to think only in terms of species was in-

adequate, and new concepts of definite tribes or races of the various species had to be evolved in order more clearly to grasp the true state of affairs in Nature. Still further research revealed, moreover, that these newly discovered tribes themselves often occur in several more or less distinct groups, depending upon such factors as age, size, and sexual maturity.

These comparatively recent racial investigations, and especially the study of the varying age-distributions in the stock of our chief species of food fishes, have opened up new vistas of marine investigation. They have explained in many cases the amazing fluctuations in the yield obtained by the fishing industry from year to year, and, more important still, it has even been possible to forecast future fluctuations—an achievement of very considerable practical value.

A paper read by Dr. Harold Thomson outlining his work on the haddock may be taken as typical of this branch of marine research, and indicates the possibilities inherent in the results so far obtained. After discussing the incidence and amplitude of brood survival, Dr. Thomson proceeds to consider the

* Fluctuations in the Abundance of the Various Year-Classes of Food Fishes. Conseil Permanent International pour l'Exploration de la Mer. Rapports et Procès Verbaux des Réunions, vol. 65, pp. 188. (Copenhagen: Andr. Fred. Høst et Fils, 1930.) 7.25 kr.