

all in the original crude oil, or only in insignificant quantities. Already, vast quantities of hydrocarbons are being utilized in the production of synthesized aviation spirits and synthetic rubber. Other olefins, mainly ethylene, propylene and amylene, are being employed on a vast industrial scale, also to a lesser extent the paraffins. It may well be in the future that petroleum will be used more and more as a raw material for synthesizing special hydrocarbons, and that petroleum refining may turn more and more into a chemical industry.

In extension of a view held for many years that centres of consumption rather than oilfields are the right location for modern refineries, Dr. Kind advocates their development in Great Britain. They should be adapted to meet the special conditions prevailing and not necessarily modelled on American or Russian plants. Moreover, once established, the petroleum refining industry should refrain from entering the field of chemical industry proper. Two great industries are envisaged, one producing basic raw materials from petroleum, and the other manufacturing solvents, plastics, fibres, etc., from hydrocarbon 'bricks'. Establishment of these industries will not be an easy task, but there are, in Dr. Kind's opinion, few enterprises which offer such a rich reward for endeavour.

## THE PERIDINIALES

**D**URING the cruise of the non-magnetic ship *Carnegie* of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington in 1928-29 intensive studies were carried out in the Pacific and North Atlantic Oceans, and, combined with the primary oceanographic investigations, a study was made of the plankton. The simultaneous collecting of samples and taking of hydrographic data afforded exceptional opportunities to study the relations between pelagic organisms and their environment. Among the organisms H. W. Graham selected for special study the difficult group of the Peridinales, and from a preliminary survey it became evident that no general floristic study was possible in the light of the inadequate knowledge of the group. The peridinian life-histories are incompletely known, so that classification rests upon morphology of the cell, and especially upon the number and arrangement of the complex series of skeletal plates. On this basis, so far as it is known, Lindemann has described a number of genera, which have been utilized as a basis for the present study\*. For description of the plate pattern, Kofoid's terminology has been used, though for the plate formulae abbreviations of the plate names have been found simpler in practice than Kofoid's prime signs. The analysis involves special technique which lies mainly in fixation in formalin, separation of the thecal plates by hypochlorite treatment, and orientation and microdissection in glycerine jelly.

For intensive study representatives of five families of Peridinales have been selected, with the following main objects in mind: to establish standards for analysis, to acquire a more detailed knowledge of the skeletal structure, to study the variation and to gain some concept of the inter-relationships of the genera

\* Department of Terrestrial Magnetism. Scientific Results of Cruise VII of the *Carnegie* during 1928-1929 under Command of Captain J. P. Ault. Biology, 3: Studies in the Morphology, Taxonomy and Ecology of the Peridinales. By Herbert W. Graham. (Publication 542.) Pp. vii+129. (Washington, D.C.: Carnegie Institution, 1942.) 1.50 dollars.

and species. Besides the general plate features of the cell, Graham has found the number and arrangement of the plates of the ventral area particularly valuable for distinction of genera, and he illustrates the use of this area, the girdle and the hypotheca for this purpose. Owing to the preliminary establishment of genera on incomplete data as to cell construction, it is obvious that the genera and species of earlier classifications are bound to be considerably modified as study of the group proceeds.

The general discussion of the basis for classification and possible relationships of the genera is followed by a systematic description of the types analysed. The monogeneric family *Ceratocoryaceae* receives full treatment, and the more difficult section, including *Peridinium* with its numerous species and variable forms, is studied with special reference to variability. The illustrations are very clear and well reproduced. There are also extensive tables of data bearing on distribution and environment.

Some of the forms, especially the relatively common *Ceratocorys horrida* and *Goniidoma polyedricum*, have proved valuable in tracing movements of oceanic water masses, as their distribution is closely correlated with temperature, so that records of negative occurrence are of significance.

## SPECIFIC DIFFERENCES IN PETUNIA

**T**HREE papers by K. Mather, A. J. Bateman and K. Mather, and P. M. J. Edwards, respectively (*J. Genetics*, 45, 215; 1944), deal with hybrids between *Petunia axillaris* and *P. violacea*. Important conclusions are made regarding the evolution of several characters.

In the first paper, K. Mather shows that *P. axillaris* is self-compatible and that *P. violacea* is a self-incompatible species. Hybridization of the two species shows that the factors *SaSa* of *P. axillaris* do not inhibit the growth of pollen containing *Sa*, but the  $F_1$  hybrids are of two types, self-incompatible  $S_1S_a$  and self-compatible  $S_2S_a$ . When such plants were crossed with *P. violacea*, seed was obtained, but the reciprocal cross was infertile. Similarly, the back-cross to *P. axillaris* gives different results in reciprocal crosses.

Mather suggests that modifying factors (polygenes) influence the expression of the main *S* allelomorphs. Within the species, the mechanism is stabilized and strengthened by selection of polygenes. When out-crosses are made, this polygenic background is altered. On this view the evolution of the incompatibility mechanism takes place slowly by the selection of those polygenes which favour the intensity of the mechanism.

A. J. Bateman provides further evidence that the  $S_1S_2$  factors of *P. violacea* have a weaker effect in individuals with hybrid constitution. In the light of recent work on cytoplasmic influences, the discovery that pollen containing  $S_1$  is mutually affected by previous association with *Sa* requires further investigation.

K. Mather and P. M. J. Edwards consider the inheritance of flower-colour in the above hybrids. They show that there are two main colour genes, *Ww* and *Mm*. *P. axillaris* contains *wwMM* and *P. violacea* contains *WWmm*. The succeeding generations range greatly in colour, which is shown by the