again, is a paperback prepared for students but valuable to more advanced microbiologists. How many of us have read the 1898 report of Loeffler and Frosch on foot-and-mouth disease? *Milestones* begins with Fracastoro (1546) and ends with Woods (1940) on *p*-aminobenzoic acid and sulfanilamide action. There are six headings: "Spontaneous generation and fermentation" (covering the years 1677–1897, 16 articles); "Germ theory of disease" (1546–1882, 11); "Immunology" (1798–1895, 7); "Virology" (1898–1935, 4); "Chemotherapy" (1897–1940, 5) and "General microbiology" (1875–1924, 12). All selections are in English, but five also appear in an appendix in French. Bibliographies are omitted, and some condensation has been effected—"most nineteenth century workers were verbose."

If professors use these volumes wisely, they will be valuable teaching adjuncts, but scientific literature and history are continually being made. The papers presented should be added to, and inclusions and exclusions should be debated. Last, in view of professional tradition, one can be critical of the presentation of all of these articles in English.

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Paleocene Flora

The Lower Tertiary Floras of Southern England. I. *Palaeocene Floras, London Clay Flora* (supplement). Text and atlas (2 vols.). M. E. J. Chandler. British Museum (Natural History), London, 1961. xi + 354 pp. Atlas, 34 plates. £10.

In 1933 E. M. Reid and M. E. J. Chandler published a 550-page monograph describing some 250 species of fossil fruits and seeds collected from "the stiff brown clay" found chiefly on the shore of the island of Sheppey on the north coast of Kent, southeast England, near the mouth of the Thames. This monograph climaxed a more than 250-year interest in the London Clay fossils, an interest that commenced with the sharks' teeth mentioned in the diary of John Evelyn in 1668.

Reid and Chandler's brilliant contribution unfolded a dramatic story of altered geography and shifting limits of land and sea for northwest Europe and of an evergreen, tropical rain forest, of present Indo-Malayan affinities, thriving in southern England and continuously along the north shore of the warm-current, ancient Tethys Sea that connected, through the Mediterranean, with the Indian Ocean.

Chandler's new monograph is in large part a supplement to the London Clay flora, and it is the first of a comprehensive series that will be devoted to early Tertiary plants of southern England. It considers mainly the "angiosperm fruits and seeds of the Palaeocene floras (pre-London Clay) and . . . those of the London Clay not previously described." Leaves are generally disregarded unless related fruits are known. Wood, pollen, spores, and diatoms are reserved for later papers.

The monograph is based on specimens laboriously collected from fresh and reworked exposures from six principal Paleocene and Lower Eocene horizons in the London and Hampshire basins. The fortuituous conditions which permitted the accumulation and preservation of such an enormous number of fruits and seeds is remarkable. More remarkable is the fact that the 500 species now known are probably only a small proportion of the plants "present in life" in England in the early Tertiary. The feat of recovering so many specimens and species is further impressive since most of the outcrops erode rapidly and many of the remains themselves quickly decompose once exposed.

The main body of the work (286 pages) contains records or detailed systematic descriptions of some 500 species, distributed in more than 140 genera and about 62 families. Nine families and 29 genera are not previously recorded in the London Clay flora. Many of the genera are form genera, or they are extinct. Others are identified as living genera or are considered closely related to living genera. The specimens are described with a thoroughness and competence that characterizes the London Clay monograph, and they are beautifully illustrated in an accompanying atlas in 34 photographic plates and by 54 diagramatic drawings in the text.

The systematic portion is prefaced by a briefer introduction (51 pages). The general scope is indicated by a partial listing of topics: mode of occurrence of fossils and collecting methods, physiographic background and geological records of the Poltavian flora (tropical flora of Indo-Malayan type), conditions of deposition and character of the successive beds, recent work on phytogeographic relations of London Clay flora and climate. A table (pages 8–9) shows correlation of early Tertiary beds of the Hampshire and London basins and relates them to the continental stages of Wrigley and Davis (1937) and Arkell (1947). A map (page 10) shows Eocene physiography of southeast England; the present limit of Eocene rocks; the Eocene limits of fluviatile, estuarine, and marine sediments; and the minimum extent of the Lower Eocene (Ypresian) Sea. Named Paleocene and Eocene species are listed with localities on pages 21 and 24 and 39 to 48.

As a supplement, the present volume is not disappointing in comparison with the London Clay monograph, although it is mainly descriptive. It is to the credit of Reid and Chandler that recent botanical knowledge of the tropical rain forests of the southeast Asian areas and the addition to the fossil flora of several elements, including the Rhizophoraceae (mangroves), has strengthened the similarity between the Indo-Malayan and London Clay flora and mainly confirmed their interpretation of the early Eocene paleoecology of Southern England. Their views concerning the nature of pre-London Clay floras in northwestern Europe are, however, modified. Reid and Chandler believed the antecedent Cretaceous and earlier Tertiary floras of that area to be of a much cooler type than characterized the early Eocene, and "direct migration of the London Clay flora from Indo-Malaya itself along the northern shores of the Tethys was explicitly stated. . . ." As the result of recent paleobotanical work in England and elsewhere, Chandler now thinks that a Poltavian type flora occupied the entire area bordering the Tethys, and recolonized newly exposed land surfaces in northwest Europe following regression of the Upper Cretaceous sea. She shows that the pre-London Clay floras of Britian contained definite tropical forms; some were among the more characteristic or common elements of the London Clay flora.

If other papers in this series are of the caliber of this present volume, they will be worthy additions to paleobotanical literature.

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