All such bulletins display the title of the discussion on either a cover page or in a table of contents, but many of them fail to show the name of the author in these or similarly conspicuous places. Because of this oversight or poor form of publication the cataloguer has to search through several pages of the bulletin or report to discover the name of the author, thus greatly prolonging a disagreeable but necessary task.

The practicability of a form showing the name of the author on the cover page or title page, or in the table of contents if a number of articles were bound together, is assured by its being common usage in many stations. Others display the name of the author in a prominent position on technical publications, but conceal it if the treatment is of a more popular nature. Study of recent publications from 20 stations shows 9 which display the name of the author, 2 which always hide it, 7 which vary with the type of the publication, and 2 which are inconsistent in this feature.

Just a simple change in form by some of the station editors would make the use of their publications much more convenient to such workers as catalogue them, and no others can use them to the best advantage.

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SCIENTIFIC BOOKS

Catalogue of Cainozoic Plants in the Department of Geology, vol. I. The Bembridge Flora. By ELEANOR MARY REID and MARJORIE ELIZABETH JANE CHANDLER (with a section on the Charophyta by James Groves), 206 pp., 12 pls. British Museum (Nat. Hist.), London, 1926.

ALTHOUGH it is some months since copies of this work reached this country, I have seen no reviews of it, and such a scholarly work deserves being brought to the attention of a much larger group of botanists and geologists than are otherwise likely to be aware of its existence.

It is something of a paleobotanical event for the British Museum to start a catalogue of Tertiary floras, particularly since the floras of the earlier half of the Tertiary are abundantly represented in the south of England, and these have never been made available for students, in fact, practically no work has been done on them since J. Starkie Gardner stopped in the midst of his labors in 1886. Since that time, as both the authors and Dr. Bather point out, geology has advanced, improved methods of study have been devised, and, perhaps most important of all, botanical exploration, especially in southeastern Asia, has made available a wealth of new comparative material.

The present volume is devoted to the fossil plants of the Bembridge beds of the Isle of Wight, of Oligocene age. This flora is represented by foliar remains, usually fragmentary, and by a large variety of fruits and seeds. Hence the authors are especially well qualified for this particular type of study. The senior author—Eleanor M. Reid, or Mrs. Clement Reid as the friends of her late husband like to think of her, collaborated with him in his most important contributions to paleobotany; and Marjorie E. J. Chandler, the junior author, already has several important papers along carpological lines to her credit. James Groves, the well-known student of the Charophyta, has contributed descriptions of the 8 species of Chara discovered in these beds.

One hundred and twenty-one species are described, of which 42 are new. Dicotyledons are represented by over half of the total, and there are 24 monocotyledons, 10 conifers, 1 Equisetum, 8 ferns, and 8 charas. Among the more interesting new things are a splendidly preserved species of *Azolla*—the first convincing fossil remains of this type to be discovered: *Hooleya*, a new and extinct genus of the family Juglandaceae: and the demonstration that a number, if not the majority, of the fossil fruits referred to the Compositae under such names as *Cypselites, Bidentites,* etc., are not composites, but belong either to the Apocynaceae or Asclepiadaceae. For these the authors propose the new form genus *Apocynospermum.*

Naturally a flora so largely represented by carpological material is difficult to compare with the classic Oligocene floras of Europe based upon leaf impressions or amber inclusions, so that the authors confine their comparisons to selected floras. Among the results of their systematic study the conclusion emerges that, beginning with the upper Eocene and continuing to the end of the Pliocene, the European flora gradually changed from one mainly East Asian and American—largely by the progressive invasion of the region by genera called European, although the species in these so-called European genera still show most pronounced Asiatic and American affinities. They believe that this change in facies was brought about by a southward dispersal from some circumpolar source. They have some slight evidence (*Chlorophora* in the upper Eocene of Hordle) that in the early Eocene direct connections with Africa were not yet broken. They conclude that the climate denoted by the Bembridge flora was probably warm temperate or sub-tropical, and certainly the presence of such genera as *Acrostichum* and *Palaeothrinax* point toward such a conclusion, as has long been recognized.

It seems to me that Holarctic would have been a better term than East Asian-American, for certainly the evidence is clear that other parts of Asia shared in the growing cosmopolitanism of the Tertiary floras of the Northern Hemisphere. Furthermore, although in hearty agreement with most of the author's conclusions, I can not believe that the Tertiary floristic history was as simple as it has been visualized. In Provence, at Haering, and elsewhere in Europe, we see plain evidence of immigrants from Africa, and the dispersal of Tertiary mammals offers some corroborative evidence, as well as of repeated westward spreads from Asiatic instead of northern sources.

Here in America the most distinctive elements in the early Tertiary floras appear to me to have been derived from the south, and I believe that the same is true of the warmer climate plants of the English Oligocene. I suspect that we will eventually demonstrate many latitudinal swings back and forth, rather than waves of southward dispersal urged by a single progressive cooling in high latitudes.

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SPECIAL ARTICLES

BLUEBERRY CHROMOSOMES

FOR sixteen years the writer has been making experiments in the hybridization and selection of native American blueberries, species of the genus *Vaccinium.* The practical outcome of these experiments has been the development of valuable horticultural varieties producing berries of very large size. Some of the hybrids now in commercial cultivation, Pioneer, Katharine, Cabot and Rancocas, have yielded berries three-quarters of an inch in diameter, and last year the berries of two unnamed hybrids, 1257A and 1443A, reached a diameter slightly in excess of seven-eighths of an inch.

In the course of these experiments it was found that certain species, some of them very different in general appearance and in technical characters, hybridize readily. Other species, some of them very closely related, are sterile to each other's pollen and yield no hybrids.

The lowbush blueberry, *Vaccinium angustifolium,* of the northeastern United States, hybridizes easily with the highbush blueberry of the same region, *V. corymbosum.* The horticultural variety Greenfield is a second-generation hybrid between these two species, containing two quarter-strains of each. The horticultural variety Rancocas is another second-generation hybrid of the same ancestry, containing one quarter-strain of lowbush blueberry and three quarter-strains of highbush blueberry. Natural hybrids between these two species are of frequent occurrence in New England pastures. The plant named in Gray's Manual *Vaccinium corymbosum amoenum* is one of these natural hybrids.

The dryland blueberry (*Vaccinium vacillans*), the Canada blueberry (*V. canadense*), and the bigbush blueberry (*V. atrococcum*) could not be crossed with either the lowbush or the highbush blueberry. That the highbush and the bigbush blueberry did not hybridize was to me very surprising, for the two species are closely related, so closely indeed that Asa Gray regarded one as a variety of the other.

Two southern species, the hairy blueberry, *Vaccinium hirsutum,* and the myrtle blueberry, *V. myrsinites,* hybridize freely in the greenhouse with both the highbush and the lowbush blueberry, notwithstanding the great structural differences between the species thus hybridized. One, *Vaccinium hirsutum,* a species of the southern mountains, has a bristly-hairy fruit, inconspicuous winter flowering buds, an extraordinarily large stigma, and almost woolly leaves. The other, *V. myrsinites,* a species of the southern coastal plain, has very small evergreen leaves, and hardly looks as though it belonged to the same genus as the highbush and the lowbush blueberry of the north. That these strikingly different southern species hybridize easily with the two northern species surprised me greatly.

Desiring to learn the reason for this curious grouping of blueberry species, with reference to hybridization, I tried for several years to induce some one of the plant cytologists to make a study of blueberry chromosomes, but without success. Cytologists are scarce and busy. At last, through the mediation of G. N. Collins, Dr. A. E. Longley undertook the sport of hunting the blueberry chromosome. He began the work in the spring of 1924 and continued it in the years following, as material became available. Dr. Longley's results up to this time are presented in a paper accompanying this paper of mine.

Dr. Longley has made the discovery, important and significant in blueberry breeding, and fascinating in the facility with which it removes obstacles to this pursuit, that certain species of blueberry have twelve chromosomes, others twenty-four, and still others thirty-six.

The highbush and lowbush blueberry, which hybridize freely, both in nature and artificially, have twenty-four chromosomes. In the dryland blueberry, the Canada blueberry, and the bigbush blueberry, no one of which has hybridized with either the highbush or the lowbush blueberry, the number of chromosomes is twelve.