its generally authoritative treatment, will make it indispensable as an introduction to the literature and as a guide to the many interesting facets and applications of surface science for many years. We can hope, however, that the editors will use their authority to make the next volumes even more valuable to "other specialists."

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Biogeography Theory

The Geography of the Flowering Plants. Ronald Good. Wiley, New York, ed. 3, 1964. xvi + 518 pp. Illus. $13.

The publication of this third edition of a well-known discussion of biogeographical theory—Good's *The Geography of the Flowering Plants*—will be welcomed by botanists, and particularly by taxonomists and others concerned with evolutionary problems. The new edition invites comparison with its forerunners published in 1947 and 1953. At the outset one may congratulate the author for keeping abreast of his subject, for one of the strengths of the new edition is its excellent bibliography, which lists 838 titles in contrast to 295 in the first edition and 629 in the second edition.

A comparison of the three editions shows that there is only one completely new chapter in the current volume; in many other respects the scope of the changes is somewhat disappointing. For instance, the same 25 halftone plates are used in all editions, and they do not always bear much relationship to the associated text. However, several important new text figures and maps have been added, and others have been refined in accord with current opinion. The new edition follows the same logical sequence in developing (in part 1) the facts of angiosperm distribution, insofar as the author's firsthand experience and study permits, and (in part 2) the factors of distribution, including the author's explanation of the facts.

Examples are truly worldwide in scope and are admirably presented but, because chapter 12, "The floras of the southern hemisphere," is new, it is worthy of particular attention. In summarizing his own recent and scholarly work and his extensive field studies in Australasia, Good shows a full appreciation of the great importance of southern floras in providing clues to a solution of the central problem: how did the flowering plants attain their modern distributional patterns? The author has now become greatly impressed by the significance of New Guinea, which is indeed critical in the opinion of many biogeographers. In discussing the Australian flora, he points out that it comprises three very different components: (i) a true Australian flora, which is very large and has relationships, as much as any exist, that are suggestive of South Africa; (ii) a small "Antarctic" element, related to the floras of temperate South America and New Zealand; and (iii) a small extension of the great Indo-Malayan flora. Stress is laid on the differences between the "great and peculiar Australian flora proper" and that of New Guinea, only 100 miles away.

Good sees no explanation of this except that these areas were not always in their present locations. Without suggesting a positive solution, he implies that the Wegener-Du Toit concept of continental drift, which has linked Australia and New Guinea historically, might be modified to a quite different concept that would have these land masses brought to their present proximity by a gradual diminution of the distance between them in the course of geological time. How this new scheme would account for the Indo-Malayan element (which, incidentally, includes some of the most primitive angiosperms) in eastern Australia is not explained by Good.

Part 2 of the book is not basically changed from that of the second edition, except for the welcome inclusion of certain new materials derived from recent studies, many of which bear on geophysics. Chapter 21 indicates that Good is still thoroughly convinced that the only possible explanation of angiosperm distribution is found in theories of continental displacement. In view of the continuing disagreements among geophysicists with respect to the reality of such major displacement, or at least in view of their skepticism about any such large-scale movement in Cretaceous or later time, it is perhaps dangerous for a mere biologist to fix so avidly on continental drift as the only explanation of angiosperm distribution.

Since the author himself is so emphatic, one may quote certain statements (p. 407) that are unchanged since the second edition: " . . . it can be said, in the writer's opinion, without fear of rebuttal, that the theory of continental drift explains the peculiarities and leading features of Angiosperm distribution more simply than any other hypothesis." And then " . . . drift can explain the details and sequence of distribution in a way quite beyond the power of any reasonable theory of land-bridges or of the theory of distribution entirely by dispersal. The writer also believes that few will read the early chapters of this book dispassionately without coming to the same conclusion."

Good is doomed to disappointment in his expectations: he should have a real fear of rebuttal (many such are available in print); and indeed a great many dispassionate students of the "facts" will come (and have come) to a quite different conclusion. The particular chapter being quoted (chapter 21) appears to be highly subjective; it slights the massive biological evidence favoring other conclusions. Discussion of land-bridge theories is comparatively cursory and unsympathetic, even somewhat distorted, and evidences of long-range dispersal are lightly dismissed. To refute Good's conclusions would require a treatise as extensive as his and obviously cannot be lightly undertaken. Any writer on so controversial a subject may be inclined to favor evidence that furthers his preconceived concepts (however soundly these may be based on accurate observation), ignoring or neglecting other evidence that tends to contradict, or indeed to refute, some of his basic ideas of the factors of distribution.

Although my comments stress disagreements among botanists with respect to the "how" of modern angiosperm distribution, I wish to reiterate my admiration for one of the outstanding biogeographers of our time. He is entitled to discuss a controversial subject in a controversial manner. His revised major work is a "must" for every student of phytogeography and indeed for every student of biogeography. If a fourth edition should be forthcoming, one might hope that Good's often quoted "Theory of Tolerance" will be extended in a different way to those who interpret the "facts," and especially the facts related to southern floras, in a different manner.

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