Department of Biology, Chico State College, Chico, California

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REVIEWS

The Evolution and Classification of Flowering Plants. By ARTHUR CRONQUIST. x + 396 pp. Houghton Mifflin Co., Boston, 1968. Price $6.95.

In an invited paper presented at meetings commemorating the 50th anniversary of the Botanical Society of America, held at the University of Connecticut in 1956, this reviewer had the temerity to suggest that, "there seems to be rather general agreement that sufficient evidence to formulate a really new, thorough-going, and generally satisfactory phylogenetic arrangement of flowering plants is not yet available." (Amer. J. Bot. 44: 88–92. 1957.) Later in the same meetings, however, two new systems for at least part of the angiosperms were presented by Herbert F. Copeland (Madroño 14: 1–9. 1957) and Arthur Cronquist (Bull. Jard. Bot. Etat 27: 13–40. 1957), respectively, and Robert F. Thorne announced that he was working toward the same goal (Aliso 6: 57–66. 1968). I do not recall that any of us were then aware of the work of Takhtajan, which has subsequently assumed such major importance.

The present volume is the outgrowth of that original Cronquist paper and is an attempt to devise a general classification of angiosperms responsive to all presently available pertinent information. The scope and variety of this information and its application are impressive. It ranges from the more traditional morphology and anatomy of the flower, fruit, and vegetative body, to pollen, embryology, and biochemical characteristics. The author is especially partial to type of nectary, nuclear constitution of pollen grains, details of ovular structure, nature of seminal food reserves, distribution of vessels, and type of stomatal apparatus, among other features.

Cronquist emphasizes that while taxonomy is necessarily based on multiple correlation of characters, a proper taxonomic system must also reflect (albeit muddily) evolutionary relationships, and that development of taxonomy and the unraveling of phylogeny each influences and strengthens the other. "A phylogenetic scheme which provides for all the available information and hangs together without serious internal contradictions is regarded as not only satisfactory but also something of a triumph." His classification is essentially one of consensus, in which he attempts to capitalize on the various natural groupings that have been achieved in the past. It is interesting to note how numerous these are on various levels. He asserts that if the requirement of a strictly single (monophyletic) origin for groups is not insisted upon too strictly, much of the apparent conflict between phylogeny and taxonomy

disappears. He thinks the occurrence of evolutionary parallelism is itself an indicator of relationships and should be taken into account. The evidence for the adaptive significance of many of the character combinations that distinguish orders and families leaves him distinctly unsatisfied, and he repeatedly wonders aloud if the unfashionable concept of "evolutionary momentum" (orthogenesis?) may not play a role where selective impetus is obscure or undemonstrated.

He believes that angiosperms are a monophyletic group with ancestors somewhere in the seed ferns, and that the primitive flowering plants were woody and probably arborescent dicotyledons with magnolian/ranalian characteristics. Monocotyledons must have been derived from aquatic dicotyledons which had lost their cambium and hence the capacity to produce secondary growth and vessels in the normal way; monocot leaves developed from modification of a bladeless petiole. Consistent with his emphasis on consensus, Cronquist has adopted in major outline the system proposed by Takhtajan (Taxon 13: 160–164. 1954). The angiosperms (re-christened Magnoliphyta by Cronquist) are divided into dicots (Magnoliatae) and monocots (Liliatae). The dicotyledons are construed as consisting of 6 subclasses—Magnoliidae, Hamamelidae, Caryophyllidae. Dilleniidae, Rosidae, and Asteridae—and the monocotyledons as comprising 4 subclasses—Alismatidae, Commelinidae, Arecidae, and Liliidae. Whereas Takhtajan admitted 61 orders of dicots and 21 orders of monocots for a total of 82, Cronquist accepts 56 orders of the former group and 18 of the latter for a total of 74. Thorne, incidentally, eschews subclasses but recognizes 19 superorders and 43 orders of dicots and 5 superorders and 11 orders of monocots for a total of 54 orders. Although a good many differences in treatment do in fact exist between the first two of these arrangements, and even more between them and the last, the similarities are vastly more striking than are the differences. As Cronquist remarks, "We are all—or nearly all—Besseyans." It appears that we may be in danger of becoming Takhtajanians, as well.

Cronquist provides keys to the subclasses, to the orders, and to the component families. These must obviously allow for many exceptions, but they are useful. The selective bibliography accompanying the discussion of each order should prove to be even more useful. The writing is clear, concise, and positive, but the difficulties with various taxonomic dispositions and the possibility of alternative choices are pointed out frankly. The really fascinating aspect of the book is the opportunity afforded in the running discussions of orders to find out what has happened to the groups of one's particular interest. If there is any danger in the treatment, it is that so many of the long-standing controversies and indecisions seem to have been resolved so easily and logically. It should be rewarding to see whether consensus widens or diminishes as other books involving comparable schemes of classification appear, as they surely will. For the present, Cronquist has given us a very useful, well written, and stimulating volume in an uncrowded field of endeavor. —Lincoln Constance, Department of Botany, University of California, Berkeley.

Flora of Alaska and Neighboring Territories. By Eric Hultén. xxii + 1008 pp., illustrated. Stanford Univ. Press. 1968. $35.00.

Eric Hultén's preeminence among students of the Alaskan flora is a present-day example of how floristics research in a state or region tends to be dominated, for long periods of time, by the outstanding work of a single individual. Although Professor Hultén's principal interests, by his own admission, have been in the phytogeography of circumboreal floras, he has contributed to taxonomy such important references as the Flora of Kamchatka (1927–1930), Flora of the Aleutian Islands (1937, 1960), and Flora of Alaska and Yukon (1941–1950). As those who have used these books know, their purpose was to document scientifically the literature, collections, nomenclature and distribution of arctic plants; and descriptions, illustrations and keys are generally lacking.