Reconstructing angiosperm history.

At present any book in English by a Soviet botanist is sure to be avidly welcomed, for while we know something of their achievements we know little of their thought. Armen Takhtajan is more especially assured of a ready audience because of his visits to this country and the friends he has made here.

This is a small book*: the main text is only 204 pages and the appendices, a synopsis of his system of classification and of the major plant-geographical areas, add another 49. There are also 30 pages of bibliography, which is a vital component of the book because of the way it fuses western and Russian references. The text is very readable and the easy-flowing English of Mr. C. Jeffrey's translation deserves every praise.

Using threads from disciplines as far apart as classical plant morphology and modern population genetics Takhtajan has woven a story of the flowering plants, from their origin to their status of dominance in the vegetation of the world. It is not a true, proven, story; but it is a reasonably possible one in the present state of our knowledge. On the whole the author is very fair in indicating where the element of factual evidence is weak and the element of speculation is strong, but the reader must constantly bear these warnings in mind: they are not constantly repeated.

Takhtajan's views on the origin of the angiosperms may be described as orthodox, in that he regards the carpel as a foliar organ and vessel-less members of the Magnoliales with monocolpate pollen as the most primitive survivors. The first part of his story therefore marches generally in step with the views expressed on a more strictly morphological basis by Eames (*Morphology of Angiosperms*, 1961). He then goes on to the spread of angiosperms, and it is here that his introduction of data from the work of his Russian colleagues will be most appreciated by western readers.

Takhtajan's argument is not always impeccable and there are places where it will unfortunately confirm some readers in their condemnation of all phylogenetic thought. For example, Takhtajan points out that the pollen of angiosperms is primitively monocolpate, and this is the condition in the bulk of the monocotyledons. In Ranunculales, however, it is normally tricolpate. He then goes on (p. 109) "In the dicots monocolpate pollen is known in . . . . . and it is amongst these dicots, therefore that we must seek the group which is closest to the extinct ancestors of the monocots." This, of course, is nonsense. In the argument presented there is no reason why some part of Ranunculales should not be "closest to the extinct ancestors of the monocots", but have changed essentially in this one character of tricolpate pollen. The method of argument is wrong and the concentration on one character is wrong.

Preoccupation with pollen presumably explains his classifying Illiciaceae and Schisandraceae with Ranunculaceae rather than Magnoliaceae, although he admits their derivation from the latter. It was the late Humphrey Gilbert-Carter's dictum that Magnoliaceae were aromatic shrubs and trees and Ranunculaceae were bitter herbs; this was more important than all the technical characters. I think he would not have meekly agreed that monocolpate versus tricolpate pollen was paramount.

* Takhtajan, A. Flowering plants: origin and dispersal. Pp. 310, pl. 13, figs. 32. Edinburgh: Oliver & Boyd. 22·5 cm. 1969. Price 50 shillings.

Takhtajan accepts Cheadle's view that vessels had an independent origin in the monocotyledons: thus the monocots must have been derived from vessel-less dicots, and that, he says, leaves a choice of only the Magnoliales or the Nymphaeales. Again the argument is false (and I will risk the comment that any group vigorous enough to throw off the beginnings of the monocotyledons would almost certainly have enough evolutionary potential to develop vessels itself).

It is, perhaps, in dealing with the monocotyledons that Takhtajan is at his weakest, and the systematic arrangement that he proposes for this group is certainly not one I would wish to teach in the light of current knowledge. It is possible to modify Hutchinson's useful division of monocots into Corolliferae and Calyciferae so as to harmonize with data on stomata, vessels etc. This seems to have been what Thorne has done (see Aliso 6, 1968), though we do not yet have his arguments.

Despite such criticisms, Armen Takhtajan's story of the Flowering Plants is a distinct acquisition to current literature. I shall certainly give it to students to read, hoping they will absorb its breadth of outlook and its unifying thought and will discuss its value as well as its weaknesses.

B. L. BURTT

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