Book Reviews

Deciphering Vegetation History

Quaternary Plant Ecology. Proceedings of a symposium, Cambridge, England, Mar. 1972. H. J. B. BIRKS and R. G. WEST, Eds. Halsted (Wiley), New York, 1974. x, 326 pp., illus. $44.50.

Pollen analysis of lake and wetland sediments was developed more than 60 years ago as a method of presenting stratigraphic data so as to permit both ecological and historical interpretations and, with regional studies, to add the dimension of plant geography. Since then, the late Quaternary vegetational history of most lake-bearing temperate regions has been worked out, although still little is known of tropical regions or of earlier Quaternary history except in western Europe. The last 15 years have seen great advances in pollen-analytical theory and methods, and pollen-analytical methods have in turn been applied to the study of other fossil remains in lake sediments. This volume recounts some of the advances and defines further problems.

The symposium on which the volume is based was held under the egis of the British Ecological Society, and the audience of diversified ecologists stimulated most of the authors to make their remarks easily understood. The flavor of the audience and the perspicacity of the speakers are revealed in the transcribed discussions that follow each set of papers.

Among the contributions to methodology that have solidified and refined pollen-analytical theory are the use of pollen surface samples to identify modern analogs for past vegetation types, and the expression of stratigraphic variations in terms of absolute influx of pollen grains per unit of lake surface rather than simply as percentage differences among pollen types. These two approaches are combined in a paper by Margaret Davis and co-workers, which uses forest-survey data as a quantitative measure of forest composition (basal area of tree species) and compares it with pollen influx to 29 lakes in Michigan.

The surface-sample technique is also used by C. R. Janssen, who made short transects across known vegetation types in a large bog in northern Minnesota, to illustrate variable dispersal distances of different pollen types, providing a useful distinction between local and regional pollen deposition.

Other papers concerned with modern pollen dispersal and representation describe studies in Denmark, Sweden, the tropics, and arctic and alpine regions, as well as dispersal by streams.

Another group of papers comes under the heading Vegetational History and Community Development. Of these the one of greatest theoretical interest is that of W. A. Watts, who stresses the time scale involved in the invasion of a stable forest by a new tree dominant. Examples are drawn from published studies of sites in which annually laminated sediments provide a highly refined time scale and thus the opportunity to examine population dynamics on a large scale. Lake of the Clouds in northern Minnesota, where white pine immigrated into a stable conifer forest over a period of about 1000 years, until it attained a stable population, is such a site. Watts stresses the ecological importance of following the invasion patterns as well as the stable patterns in the interpretation of pollen profiles, pointing out that the standard procedure of subdividing the pollen sequence into zones tends to overemphasize the stable patterns.

The volume concludes with paleolimnological studies of the pollutional history of two lakes—Lough Neagh in Northern Ireland by Battarbee, O'Sullivan, and Oldfield, and Shagawa Lake in northern Minnesota by Bradbury and Waddington. Both papers emphasize the value of stratigraphic diatom analyses of short cores as a record of water quality. Critical in such historical reconstruction, and sometimes requiring great ingenuity, is the independent determination of the sedimentation rate, so that changes in the diatom assemblages can be correlated with historical events. In the case of Lough Neagh, a date of A.D. 1820 for maximum change in paleomagnetic declination is used, as well as a date of A.D. 1943 for a sharp maximum in cereal-grain pollen, correlated with a wartime program to divert lands from pasture to plough. At Shagawa Lake the key date (1890) is for the opening of iron-ore mines on the lake shore, recorded in the lake sediments by a sharp influx of distinctive mineral fragments.

The book is well edited and well produced. Its large format allows the incorporation of large pollen diagrams without the necessity of many foldouts. The stratigraphic diagrams in the volume, however, are highly variable in style and clarity. Some (such as those of Janssen) are elegant and ingenious in presenting stratigraphic and interpretative detail and others (such as those of Winifred Pennington and R. E. Sims) are so difficult to decipher that the reader can easily be frustrated or lose interest in the paper.

The volume well illustrates the vigor of Quaternary plant ecology as a field of diversified studies, combining the principles of historical geology with modern ecological theory. In fact, much theory that involves models of vegetational stability or successions can be adequately tested for the long time range only by critical attention to the biostratigraphic record. Refined techniques of sediment coring, fossil analysis, and data presentation, as described in this volume, show how lake muds and bog peats can be used to decipher recent earth history and add a valuable perspective of time to an understanding of the natural environment.

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The Next California Earthquake

The Jupiter Effect. JOHN R. GRIBBIN and STEPHEN H. PLAGEMANN. Walker, New York, 1974. xviii, 136 pp., illus. $7.95.

This book has received considerable popular attention because of its sensational implications. This attention possibly has been influenced by the authors' being physical scientists of respectable academic background.

The book mainly concerns empirical analyses of five correlations between astronomical and geophysical phenomena: (i) sunspots with tides raised in the sun by planets; (ii) solar activity