Book Reviews

Problems in Marine Biogeography

Zoogeography and Diversity of Plankton. S. VAN DER SPOEL and A. C. PIERROT-BULTS, Eds. Halsted (Wiley), New York, 1979. viii, 410 pp., illus. $69.95.

This book deals with the biogeography of marine planktonic organisms including phytoplankton, but the emphasis is on zooplankton. By choice of topics and authors, the editors aspire to the traditional objectives of biogeography, namely, description of distribution patterns of organisms and explanations of how present ranges of organisms originated and are maintained. In fact, only the first objective is attained, but the book very clearly demonstrates why pelagic biogeography is today constrained to mere description of distributions.

All the major ocean basins are to some extent interconnected, so that even planktonic genera tend to be cosmopolitan. Present distributions of higher taxa therefore tell very little about centers of speciation, if any, or past dispersal routes. Moreover, basic biogeographic methods, such as establishing the ranges of species, interpreting disjunct geographic distributions, and documenting intrataxon variation and morphological divergence within and between oceans, depend on sound taxonomic studies that emphasize modern procedures and utilize large, geographically extensive collections. Yet major groups of planktonic animals (for example copepod crustaceans) are still poorly known taxonomically, which accounts for numerous ambiguous interpretations, particularly in the chapters that treat geographical variation in morphology of species, neritic-oceanic zonation, and modes of speciation in the oceanic pelagial. Throughout the book the plea is made for more and better taxonomic work on plankton, but there is a paucity of practicing taxonomists today.

Hypotheses concerning the origins of present ranges of most planktonic species will be speculative at best and never open to refutation because only a small fraction of planktonic organisms leave fossilizable remains. The lack of fossils is regrettable since past fluctuations in global climate and the tectonically driven changing configuration of ocean basins may have dramatically influenced the distributions of planktonic species. Plausible effects of both processes are reviewed in the two chapters contributed by paleontologists. Both chapters are based on information for the few groups of planktonic organisms whose inorganic tests, shells, or skeletal components are preserved in deep sea sediments. One chapter outlines the possible development globally of oceanic epipelagic faunal zones from Paleozoic time to the present but is sadly lacking in specific illustrations of past distributions. The other chapter deals briefly with changes in distributions of Antarctic planktonic species during the Cenozoic. There is an extensive literature on this subject, including the CLIMAP studies, to which the book provides a good entry. The chapter on speciation also contains a brief illustrated account of the trend toward "oceanic provincialism" in present-day planktonic species from a pattern of apparently much broader geographical distributions in the early Cenozoic. Plankton biogeographers will depend heavily on this information gleaned from a fossil record of an unfortunately selective and possibly not representative group of organisms.

A major conclusion to be drawn from the book is that biologists still do not understand what determines present limits of geographical distributions of planktonic species. Even in the surface layer of the sea, where ocean circulation is most intense, planktonic species have geographically restricted distributions. In the Pacific Ocean, for example, major faunal boundaries extend across the ocean at about 20° and 40° latitude in both hemispheres. The existence of boundaries in mid-ocean, where physical barriers to dispersal are lacking, is a biogeographical mystery the solution of which will at least require detailed study of the physiology and population biology of species near the edges of their ranges. This point, not sufficiently strongly made in the book, should be a cause for reflection among those marine paleontologists who infer ocean paleoclimates (essentially temperature) from changes in distributions of species or composition of plankton assemblages. Indeed, a conspicuous omission from the book is critical assessment by biologists of the assumptions, procedures, and results of the CLIMAP investigations.

Besides extensive discussions of global biogeographic patterns, there are chapters specifically covering each of the major ocean basins—the Atlantic (including Arctic), Indian, Pacific, and Antarctic seas—and a somewhat tedious chapter on the Mediterranean. Because of the diversity of interests among the authors of these chapters the treatment is uneven, making comparisons of oceans difficult. In this respect the book reflects Dunbar's complaint that "there are as many [biogeographic] methods as there are biogeographers."

Given the limitations of the taxonomy, fossil record, and ecology of plankton noted earlier, it is not surprising that a unified theory of pelagic biogeography does not emerge in this book. Nevertheless, the book provides an up-to-date, comprehensive compilation of the literature, integrates better than any recent book the historical perspective with present conditions, and clearly points to matters in need of further investigation.

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Invertebrate Behavior

Comparative Studies of the Courtship and Mating Behavior of Tropical Araneid Spiders. MICHAEL H. ROBINSON and BARBARA ROBINSON. Bishop Museum Department of Entomology, Honolulu, 1980 (distributor, Bishop Museum Press, Honolulu). 218 pp., illus. Paper, $22.50. Pacific Insects Monograph 36.

Most members of the large and diverse spider family Araneidae spin vertical orb-webs and live in a world perceived largely through touch and air- and web-borne vibrations. Upon reaching maturity a male abandons his own web to search for that of a female. When successful, this quest transforms the female's web from a prey capture device to an arena where both predatory and courtship activities occur. To reduce