BOOK REVIEW


The word fossil to most people evokes a vertebrate fossil in sedimentary rock. Studies of such fossils have made a tremendous contribution to knowledge of evolution of vertebrates. Knowledge of evolution of marine organisms, including arthropods, likewise is benefitting through studies of astounding Paleozoic life forms in the Burgess shales of British Columbia (e.g., Gould, S. J. 1989. Wonderful life. Norton; New York, $19.95). A spate of studies within the last two decades of Holocene and Pleistocene insect fossils has served mainly to show the antiquity of extant species. Studies of earlier fossils (e.g., from the Miocene shales of Florissant, Colorado, by T. D. A. Cockerell and H. F. Wickham, 80 or more years ago) were plagued by the poor state of preservation of the specimens and the uncertainty of identification. Given that systematists dealing with freshly-trapped insect specimens often have to resort to dissection of internal structures of a series of specimens to distinguish between closely-related species, how can a flattened, distorted, Miocene (or earlier) petrified insect specimen be identified to species? How many of the published specific, generic and even familial identifications of such fossils are reliable?

There are other means of fossilization. Preservation in asphalt deposits, in peat, in ice, by desiccation in dry environments, and in copal (resin) are four of them. A fifth is preservation in amber, which is copal more than 3-4 million years old, hardened by slow loss of volatile oils. This book is about fossils in amber, mainly insects, but including all life forms from bacteria to vertebrates. It is not the first book on amber, nor the first monograph on life forms in amber, nor the most voluminous treatment of insects in amber, but it is a well-written, well-illustrated, and up-to-date review, in English. Furthermore, its author has first-hand experience of the collection and study of organisms preserved in amber.

Chapters 1-3, represented by pages 1-67, define amber, suggest the plant resins which form it (mainly from Araucariaceae and Leguminosae), and give its physical properties. The principal locations from which it is known (the Baltic, the Dominican Republic, the Mexican state of Chiapas, and a surprising number of others) and extraction methods are described. These chapters also mention the principal workers on fossil inclusions and, with good reason, the contribution made to collecting fossiliferous amber in the Dominican Republic by Jake and Marianella Brodzinsky and in Mexico by Francis and Gertrude Blom. Though many insects preserved in amber retain their form, they may be difficult to examine even if the amber is cut or ground carefully to reveal them well, because there is no known chemical method of extracting them which does not also cause their dismemberment. Ambers from various deposits range from early Cretaceous through Miocene, and they oxidize when exposed to air. Amber has commercial value for use in jewelry and other artifacts and, unfortunately, inclusion of insect fossils increases this value. Perhaps this is what has led to faked insect fossils in real amber, in copal, and in synthetic substitutes. Enormous quantities of amber have been melted down for production of varnish, and the world's major collections contain only some 180,000 pieces of fossiliferous amber.

Chapter 4, represented by pages 68-242, or the bulk of the book, is a catalog of organisms in amber and is the most error-prone and (to the generalist) least exciting part. Poinar deals with organisms taxon-by-taxon, and gives the catalog in text instead of in tables, presumably the better to be able to comment on findings without the limitations that tables would have imposed. To create text, he provides an introductory sentence or two on the characteristics of each taxon. Such characteristics could be (and
probably were) drawn from standard textbooks, since few if any authors could be expected to have a working knowledge of all the taxa cited (to the family level in the larger orders). These sentences are rather stilted. Within each taxon he lists genera recorded from amber, and the names of the genera are drawn from the literature without necessarily checking their validity with specialist systematists. For example, in Staphylinidae (Coleoptera) he lists 49 genera, including Bembeciaea (a fossil genus), Carpalimus (misspelling of Carpelimus), Leptochirus (misspelling of Leptochirus), Pseudeleistea (a fossil genus), Rugilus, Stilicus (synonym of Rugilus), and Trogophloeus (synonym of Carpelimus), so the total number of genera should be reduced by two. Whether the specimens really belong to those genera is a matter not broached. He mentions Stenus inexpectatus (Schlüter) (misspelled as inepectatus) as a species described from French Cretaceous amber. Thus are errors perpetuated in catalogs.

Chapters 5-6, represented by pages 243-275, deal with implications of the fossils in amber. Many of the insect genera and species in Baltic amber are extinct and their closest relatives exist in distant, often tropical, parts of the world. In contrast, fewer of the taxa in Dominican and Chiapae amber are extinct, suggesting a long climatic stability in those areas, though the amber may be younger. The species composition in Dominican amber tends to support the vicariance hypothesis for the fauna of the Greater Antilles. Transmission electron microscopy of insects in amber shows a remarkable level of preservation even at the infra-cellular level, and it has been possible to extract genomic DNA. Tantalizingly, Poinar presents only six glimpses of the use of fossils from amber in determining the age of species, of which he admits that at least three are equivocal and subject to authentication of age of the sample or identity of the species. If there is a fault in the book, it is that Poinar has not used his insight to give a great deal more information in these chapters. This section is followed by two appendices (listing organisms, at least to the family level, from Mexican and Dominican amber respectively), a comprehensive bibliography (with some typographical errors) and a good index.

I think the book is worth its price, especially in view of the excellent colored plates. though it is nowhere near the bargain of Stephen Gould’s book (above) nor so vivid an account. To my surprise, the half-tone black-and-white plates are not printed on glossy paper but, along with the text, on acid-free matte paper. The use of family names is curious: on p. 28 I read “Araeopetesia is [singular] represented . . . ” but two lines later “the Pinacea made their [plural] appearance” and then on p. 130 “the only fossil representative of a Micromalthid [singular, should be micromalid]” and on p. 168 “the earliest Ceratopogonidae [singular, should be ceratopogonid] in amber is reported…” A Latin family name (in animals ending in -idae, in plants generally in -aceae) is unequivocally plural, so the singular uses above are unacceptable. The typographical errors that jumped out at me were “Adelphaga” [for Adaphaga] on p. 131, “Gresset” [for Grissit] on p. 139 and 300, and “Cases” [for Casas] on p. 46. The proofreaders and publishers did well in limiting such errors.

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