have something to learn from the way this book is constructed, for Smith has written a work in the history of technology that is regarded by a jury of American historians as a superior example of American history.

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Microfossils

Conodont Paleoecology. Proceedings of a symposium, Waterloo, Ontario, May 1975. C. R. BARNES, Ed. Geological Association of Canada, Waterloo, 1976 (available from Business and Economic Service Ltd., 111 Peter St., Toronto). viii, 324 pp., illus. $12 Canadian; to GAC members, $10. Geological Association of Canada Special Paper No. 15.

The calcium phosphate hard parts called conodont elements do not occur in any living organism and are last known in the Triassic. Thus the traditional way of answering the perennial question "What are conodonts?" is to say, "No one knows." A better way of answering it is to tell what we know about their general morphology (several pairs of serially arranged elements of right- and left-handed forms, indicating an elongate, bilaterally symmetrical animal), their biogeography (they define faunal provinces in the marine realm), their place in the water column (most floated or swam, some were more nearly sessile), and their size and abundance (in the range of modern zooplankton), and what we can reasonably infer about the dominant function of the elements themselves (grasping, in my view). Species of the modern phylum Chaetognatha provide perhaps the best ecologic analog to conodonts. On the basis of these morphologic and ecologic traits the question "What are they?" can be answered as well for conodonts as it can for most other fossil groups.

The purpose of the volume under review is to tell what conodonts are in terms of which species occur in which formations (Ordovician through Triassic) and what can be inferred about their living environment from that information. Sixteen of the 18 chapters document which species occur in sediments of lagoon, reef, shelf, or open-ocean environments. A really excellent contribution is that by S. M. Bergström and J. B. Carnes, who begin by documenting the distinctive associations of species found in calcilutite tidal flat deposits, lagoonal beds, and shallow subtidal, deeper subtidal, and basinal deposits of the Middle Ordovician of Tennessee. The conodont associations of the basinal deposits of Tennessee are the same ones that occur in shallow subtidal deposits of the Baltic shield. Therefore, if these conodonts were benthic they would have had to encompass an enormous range of ecologic conditions; more likely, as Bergström and Carnes prefer, and as the evidence supports, they had a mode of life in the water column.

Many other papers rely on the assertion that if conodonts are found to change with lithology, then a benthic mode of life is indicated, whereas in fact the variation could be due to a change in the water column overlying the sediments or could reflect preservational differences (see below). Missing is any discussion of the modern transition from continental shelf to continental slope, with attendant changes in water as well as in sediments, and the quite different faunas one finds as one moves seaward. Such changes are due to the patterns of normal shelf and oceanic circulation and would yield patterns of animal distribution very much like some of the onshore-offshore transitions mentioned in the text. This hypothesis is difficult for the reader to test owing to the virtual absence from the book of paleogeographic charts on which patterns of ocean currents might be placed.

Special note should be given to Jeppsson's life table for a Late Silurian conodont, and specialists will need to evaluate Kozur's claim that the assemblage of elements in an individual animal changed as the animal got older. Nicoll failed to find conodonts in marine high-latitude rocks of the age of the extensive Carboniferous-Permian glaciations, an indication that conodonts of that time were tropical- and temperate-latitude beasts. Three papers report that large, robust conodont elements, with "variable denticulation," are preferentially found in the littoral environment. Several chapters comment on the paucity of conodonts in algal, coral reef, and hard-bottom facies, although whether this reflects initial distributions or merely the preservation potential of conodonts in those environments is not at all clear. Too much is claimed (in my opinion) without independent evidence. For example, it is stated that conodonts responded dramatically to salinity changes (the authors assert confirmation by the boron method but don't give any data) and that some conodonts were even more stenohaline than crinoids; unscaled graphs are presented to document "considerable variation in salinity"; and "semirestricted" environments are differentiated from "very slightly restricted" ones.

Most of those writing in this book have been concerned in their previous work with problems of geologic correlation. I look forward to their further use of ecologic and oceanographic literature in search of explanations for distributional patterns. Future volumes on the theme of conodont paleoecology may owe their success in no small measure to the pioneer efforts presented in this one.

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