

BOOK REVIEWS:

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NORTH DAKOTA'S MUSSELS, CLAMS, AND SNAILS

Aquatic Mollusks of North Dakota. Alan M. Cvancara. 1983. Report of Investigation No. 78, North Dakota Geological Survey, Grand Forks, N.D. 141 pages. No charge (paper).

Unlike many groups of aquatic invertebrates, the freshwater molluscs of North America are fairly well known. Virtually all of the mussels, pill clams, and snails that may be found in the diverse aquatic habitats of North Dakota are illustrated and described in A. H. Clarke's recent semipopular guide to the freshwater molluscs of Canada (*The Freshwater Molluscs of Canada*, National Museums of Canada, 1981). Alan M. Cvancara now provides a detailed report on the zoogeographic, historical, and ecological distributions of the 44 molluscan species he has collected from North Dakota's streams, ponds, and lakes during an eleven-year period.

The contents of this report are diverse, reflecting Cvancara's stated five-fold purpose of providing (1) diagnostic characters and illustrations for the 44 species, (2) state distribution maps for all species, (3) species associations characteristic of selected habitats, and speculations about (4) ecological and (5) historical-biogeographic influences on distribution patterns observed for this fauna. The first 27 pages include a wide-ranging discussion of previous studies on North Dakota's aquatic molluscs and an overview of the biology, ecology, and economic significance of these animals. In addition, Cvancara characterizes the geology, climate, vegetation, and water chemistry of North Dakota. Cvancara then describes his collecting methods and summarizes the results of his faunistic survey with several tables and figures. The most effective of these are a map indicating regions where highest densities of mussels may be found, and a dendrogram illustrating four species associations suggested by cluster analysis, each of which he relates to a specific aquatic habitat. Another 40% of the report consists of a systematic account of the 44 species. For each, there is a diagnosis, a range map for North Dakota, notes on general geographic and geologic ranges, and biological, ecological, and taxonomic remarks. The remainder of the volume consists of a half-page, six-point summary, 200 references, two appendices listing molluscs collected at each of 298 stations and the ranges of physical and chemical variables associated with each species, and finally six plates of photographs showing shells of each species.

The first 20% of the report (Introduction, Results, Interpretations) is readable (despite a few annoying grammatical errors) and quite useful to a reader interested in either molluscs or the natural history of North Dakota. Indeed, much of the descriptive material on geology, climate, and vegetation is superfluous to the main purposes of the report but does serve to characterize North Dakota for readers unfamiliar with the state. The section entitled "Morphology, Reproduction, Growth, and Biotic Associations" provides an unwieldy but detailed and accurate overview of the general biology of freshwater mussels, pill

clams, and snails. The remainder of the book is an excellent reference for those engaged in faunistic or ecological studies of North Dakota's streams, lakes, and marshes.

This report summarizes many years of effort, and it is unfortunate that it could not have been published in a more substantial form. The dot-matrix print, fuzzy reproduction of a few figures, and a weak paper binding all detract from the wealth of undoubtedly hard-won data that this volume represents. I was surprised not to see a dichotomous key to North Dakota's mollusc species, and Cvancara simply tells the reader to match his/her specimen to the photographs. This should work well for a fauna of only 44 species and seems to be standard procedure for malacological guides, as Clarke's (1981) account of 179 Canadian mollusc species also lacks keys beyond the family level. Clarke's book provides better illustrations of all but two of the species Cvancara found in North Dakota, including beautiful watercolor illustrations of 53 mussel species. The two books should be used in conjunction by anyone identifying shells from North Dakota.

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