and others. The reactivity of these coordinated molecules forms the basis for homogeneous catalytic processes now widely used in chemical synthesis and for others yet to be exploited, both in this area and in fossil fuel processing, gaseous pollutant control, and energy production. The subject is both important and very broad.

These two volumes survey the basic reactions of small molecules coordinated to transition metal ions. They provide a balanced, qualitative introduction to the most important reactions encountered in representative reaction systems. Discussion of the theoretical and physical chemical basis of homogeneous transition metal catalysis is held to a minimum; the emphasis is on descriptions of reaction products, possible structures for intermediates, and hypothesized reaction mechanisms. The coverage of these volumes is so broad that no single topic is explored in sufficient detail to be useful to specialists. Further, research in transition metal catalysis is very active, and discussions of many topics are either out of date or incomplete. Volume 1 includes occasional literature citations to 1972, but most are to the 1960's; very little of the extensive and important research by Russian scientists is included; current views of the details of mechanisms of certain important reactions—oxidative additions of alkyl halides to transition metals, homogeneous hydrogenation, oxidations of coordinated ligands by metal-dioxygen complexes—differ in important respects from those that were current when the books were assembled. This shallow coverage limits the value of these volumes for workers actively engaged in research on transition metal catalysis, but permits a breadth that should be useful to those requiring a general introduction to the principles of catalysis by transition metals.

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Arctic Environment

The Coast and Shelf of the Beaufort Sea. Proceedings of a symposium, San Francisco, Jan. 1974. JOHN C. REED, JOHN E. SATER, and WADE W. GUNN, Eds. Arctic Institute of North America, Arlington, Va., 1974. 750 pp., illus. Paper, $25.

To the anguish and despair of many environmentalists, petroleum development is coming to the Arctic. Not only will the Alaska pipeline have a marked influence upon the terrestrial environment of northern Alaska and Canada, its construction will assure increased offshore exploration and development. This "side effect," in fact, may have a far greater impact upon the North than construction and maintenance of the pipeline itself.

The extent of the impact, however, can only be predicted by knowing the present environmental conditions on both the shore and the continental shelf: What are the patterns of ice development and flow? To what depth does permafrost extend into nearshore and shelf sediments, and how might this affect the stability of man-made structures? To what extent could ice scour affect bottom-mounted fixtures (such as pipelines) on the shelf? Where will the pollutants (which there surely will be) move, and how will they affect the biosphere? In order to provide answers to these and other questions, the Arctic Institute of North America convened a symposium dealing with the Beaufort Sea, its coast and continental shelf. The results of the meeting are presented in this volume

Perhaps the most significant and common theme in the volume (at least to a low-latitude scientist) is the extent to which nearly all terrestrial and oceanographic processes ultimately relate to the excessively long winter and the resulting predominance of ice cover. Spring is very short, and thus most of the river flow and sediment influx occurs during a remarkably short period (several weeks). The dominance of ice cover also controls circulation patterns, in that wind-driven circulation is limited to the ice-free areas. Similarly, ice can affect depositional and erosional processes, both on the shore and on the shelf. Although ice does not necessarily restrict biologic productivity (ice algae contribute a significant portion of the particulates produced within the system), recycling of organic matter can lead to severe depletion of oxygen from ice-covered waters.

Unfortunately, the adverse climate also has restricted the number of observations and measurements documenting the environmental regime. This volume, therefore, is particularly useful in presenting a reasonably complete compilation of available data concerning the Beaufort Sea. In fact, the book is characterized by the diversity of topics, which range from winds to polar bears. The papers fall into groups according to four general subjects: water circulation; ice morphology and flow; sedimentation; and chemistry, productivity, and animal communities. Each group is punctuated by valuable discussions and exchanges among the participants. Not only does this help clarify some points, it also points out subjects requiring further research.

As in any symposium, there is a curious mixture of new and recycled data. Happily, the former dominate. Papers that were of particular interest to this reviewer (who has a bent toward geology) include those by Reimnitz and Barnes (sea ice as a geologic agent), by Lewellen and by Judge (offshore permafrost), and by Walker (flow characteristics of the Colville River). In spite of its breadth, the book does not cover all topics. Conspicuously lacking are details of topography, the shallow structure of the shelf, and (particularly) the biosphere (for example, plankton). Still, the book is far more comprehensive in scope and detail than another recent book on a similar subject, *Marine Geology and Oceanography of the Arctic Seas* (Y. Herman, Ed., Springer-Verlag, 1974).

Despite the rather stiff price, this volume has great scientific and practical value. One would hope that the planners, entrepreneurs, and politicians who are so eager for expansion in the Arctic will read and appreciate it. Economic development in the North is possible, but in order for it to have minimum ecological impact, a critical awareness of the uniqueness of this fragile and poorly understood environment will be required.

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Algae

Fossil and Living Dinoflagellates. W. A. S. Sarjeant. Academic Press, New York, 1974. viii, 182 pp., illus. $13.

First observed by Ehrenberg 135 years ago in transparent flakes of flint from the Upper Cretaceous of Silesia, fossil dinoflagellates have been under fairly continuous and intensive study by paleontologists in the last 20 years. In the current geological search for petroleum, these minute (mostly 60 to 120 micrometers) fossils are playing a significant role as guides to the geologic age and depositional environment of marine sedimentary formations of the Mesozoic and Cenozoic. On the biological scene, the study of fossil dinoflagellates has thrown new light on, and raised new questions about, the structure and living processes of modern dinoflagellates. This little book, readable and informative, brings many aspects of these organisms into focus.

Sarjeant, who has made major contributions to the study of fossil dinoflagellates, writes in a clear and comfortable style. He provides the paleontological reader with a compact source of biological information (48 pages) incorporating many facts not

generally available in geological libraries. He provides the biological reader with more than a glimpse (77 pages) of the rich detail and complexity of the fossil record of a group of microorganisms whose preservation through 150 million years and more might seem unlikely. Through the main text and 38 pages of appendices and bibliographies, he provides both—or any other venturesome reader—with a short course in fossil dinoflagellates. As the very first book to attempt such a presentation, this volume is unique and successful.

The brief chapter subtitled "history of study" reveals the author at his best, citing the major contributions made by a few early workers which laid the groundwork for the recent expansion, and lucidly tracing the intricacies of discovery and nomenclature that transformed Ehrenberg's fossil xanthidia first into Wetzel's hystrichospheres and then into spiny dinoflagellate cysts, while the still enigmatic acritarchs became defined by default.

Line drawings and light and scanning electron micrographs are plentiful and are excellently reproduced and generally effective, although some of the originals were of inferior quality. Misprints are few and, except for one completely botched sentence, trivial. More significant are a goodly number of internal inconsistencies and contradictions, individually minor misstatements of fact, and failure at times in the discussion to distinguish clearly between dinoflagellates and acritarchs. One biting personal attack on a contemporary colleague strikes a distasteful note.

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Solid Water

Ice Physics. PETER V. HOBBS. Clarendon (Oxford University Press), New York, 1975. xviii, 838 pp., illus. $85.

I have found it difficult to form a coherent opinion of this fascinating and frustrating book. It is simultaneously a very large compendium of facts and a systematic discussion of the properties of ice. It presents a strange mixture of elementary and unnecessary detail—for example, on the composition of water and the energy of its decomposition—along with the discussion of esoteric topics. In a sense it is a Victorian-style book.

On the whole, I found the discussions of the various properties of ice to be sound but uninspired. There is a tendency simply to list the observations of many investigators (the survey of the literature is very thorough), often without discriminating between conflicting data. This is not always the case, and occasional judgments are put forward by the author, but there are few speculations and rarely are conclusions stated. It is this aspect of the book that I found frustrating.

On the other hand, the coverage is impressive. There are after all not many places where one can find a discussion of "bergships" and "pykrete," a section on the use of ice and reinforced ice as construction materials, or a description of the modern theory of the role of sliding friction in skiing. It is this material that I found fascinating.

In the introduction the author points out that he did not finish the book so much as abandon it. In a field in which the literature is enormous and widely dispersed, it is inevitable that an author will miss important references. For example, the work of Bondot is omitted from the section on amorphous solid water. It is also inevitable that a book on the subject of ice will rapidly become out of date. It is unfortunate that the exciting developments of the last two years in the study of amorphous solid water could not be included in the text.

Ice Physics will likely be a standard reference, valuable as a library resource. It is not likely to inspire a reader to seek solutions to the many unanswered questions concerning the behavior of this fascinating material.

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