Physical Properties of Macromolecules

Polymer Fractionation. MANFRED J. R. CANTOW, Ed. Academic Press, New York, 1967. 539 pp., illus. $22.50.

Long-chain molecules invariably consist of species of different chain lengths or molecular weights. Virtually all properties of such systems are dependent to some extent on the nature of the molecular weight distribution. It therefore becomes a matter of prime importance to characterize this distribution quantitatively and to be able to separate or fractionate the whole system into its constituent molecular species. The present volume is intended to be an aid to those concerned with the problem of selecting an appropriate fractionation method for a particular class of polymers. The book consists of 15 chapters, each written by a different set of authors, and encompasses virtually all aspects of the problem. The subject matter ranges from a highly mathematical discussion of procedures for calculating molecular weight distributions from polymerization kinetic schemes to detailed descriptions of the methods involved in preparing fractionation columns.

As seems to be inevitable in volumes of this kind, there is a great deal of unevenness and a lack of continuity from one chapter to the next. This is a natural consequence of the diversity of interests and background of the different sets of authors and the quite obvious appeal that is being made to different audiences. A major virtue of the book is its completeness, as far as subject matter is concerned; all the major topics are covered. The natural division between preparative and analytical methods is recognized.

Many of the available fractionation methods are based on the solubility properties of high polymers. The basic theory of polymer solutions and its application to fractionation problems are clearly set forth in the excellent first chapter by Huggins and Okamoto. The necessary distinctions are made in this chapter between crystalline and noncrystalline polymers and copolymers. Unfortunately, not all the subsequent chapters which are directly or indirectly concerned with solubility theory take proper account of the theoretical basis of solution theory. In another area, sedimentation techniques provide a useful analytical method for characterizing molecular weight distributions. This subject is given a detailed and critical review by McCormick. The various theoretical assumptions that are usually made are carefully delineated so that proper precautions can be taken in performing the experiments and analysis.

A highlight of the book is the chapter on "Gel permeation chromatography" by Altgelt and Moore. This is a relatively new and very potent fractionation method. The subject is given an exhaustive and authoritative discussion. A connection is made between the behavior of naturally occurring systems and synthetic polymers. Although the chapter is primarily operational or practical in content, the outlines of the underlying theory are set forth; this should certainly help in promoting a deeper understanding of the process.

On the whole, this book should be extremely useful to those engaged in setting up fractionation procedures and concerned with the multitude of technical detail that is involved. On the other hand, except for the last-mentioned chapter, it offers very little in the way of any new concepts or theoretical ideas.

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Arctic Ecology

Animals of the North. WILLIAM O. PRUITT, JR. Harper and Row, New York, 1967. 183 pp., illus. $5.95.

Contrary to popular belief, the site of these delightful sketches—the vast taiga or coniferous forest region of subarctic North America—is in reality a fragile zone of extremely low productivity. It has one of the world's simplest food webs, set in overwhelmingly powerful surroundings. During the numbing cold of weeks on end, only the moose and caribou, the wolf, lynx, and raven remain active; in summer, hordes of insects plague their hosts. This is a land of contrasts—warm and cold, humid and dry, dark and brilliant. This volume deals with the animals of this environment, their adaptations to survive in it, and their ways of life. It also carries a strong plea for the protection of these northlands as the destructive land-use practices of the temperate zone continue to move in from the south.

The book, practical ecology at its best, leads the reader "into the vole's tunnels, to see how the red squirrel and spruces are symbiotically entwined, to pad with the lynx along a hare's trail." We learn how the shrew and ptarmigan escape freezing in a subnivean retreat; how some maintain their body temperature by an increased metabolic rate, while for others an insulating fur eliminates this need; why wet fur may be fatal to voles; how young hares huddle to reduce the menace of mosquitoes. A fascinating chapter describes the culture and customs of the Dinje or Moose People, a nomadic band of Athapaskan Indians.

This is sound natural history presented in an unusually palatable style. Pruitt, with some 15 years of field experience from Alaska to Newfoundland, speaks with authority as a biologist and writes as a skilled dramatist. "This drama of life and death, of food-searching, killing and eating has no end. It continues with the unceasing cycle of the seasons. All living creatures enter it for a few scenes—the vole, the weasel, the jay, the caribou, the Indian, and the white man—while the eternal snow whispers down through the spruces, winter after winter."

Several of the chapters have been published previously in the *Scientific American, Holiday, Animals,* and *Harper's Magazine.* A short glossary defines some of the specialized terms employed. A dozen sensitive and accurate drawings by William D. Berry add greatly to the book's appeal.

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Magnetic Fields

Magnetism and the Cosmos. NATO Advanced Study Institute, Newcastle upon Tyne, England, April 1965. W. R. HINDMARSH, F. J. LOWES, P. H. ROBERTS, and S. K. RUNCORN, Eds. Elsevier, New York, 1967. 450 pp., illus. $27.50.

The present symposium report has the virtues as well as the defects of this familiar form of publication. There are five sections: 1, Geomagnetism (twelve papers); 2, Stellar Magnetism (six); 3, Solar Magnetism (six); 4, Planetary Magnetism (twelve); and 5, Solar System Magnetic Fields (three).