that do not meet the usual criteria, such as acid phosphatase deficiency, where there is no evidence for storage of any material, and cystinosis, where lysosomal storage occurs but an enzyme deficiency has not yet been demonstrated. An interesting chapter on neuronal ceroid lipofuscinosis is included even though the authors state that "current available data does not permit extension of the concept of lysosomal diseases to the neuronal ceroid lipofuscinosis." Aspartylglycosaminuria, lactosyl ceramidosis, Farber's disease, β-xylosidase deficiency, chronic granulomatous disease of childhood, myeloperoxidase deficiency, Chediak-Higashi syndrome, and the relationship of lysosomes and gout, silicosis, and drugs are all included in a single chapter. Heterozygote and prenatal detection using a variety of biological materials for enzyme determinations, as well as the use of suction biopsy of intestinal mucosa for cytopathological investigation, are discussed in separate sections.

Several chapters are included which document the functional role of lysosomes in the digestion of intra- and extracellular macromolecules. These are based both upon cytochemical observations in situ and investigations employing isolated intact organelles. A brief catalog of the enzymes detected and their observed hydrolytic role is provided.

The book is heterogeneous, containing 26 chapters, varying from 9 to 35 pages, by 35 authors. Certain of these chapters provide only superficial treatment of their subject matter. The editors have included essays describing the biochemistry of the sphingolipids as well as the mucopolysaccharides in order to provide the basic information required for a thorough understanding of the biochemical aspects of the diseases. These are offered presumably for the clinician or nonspecialist. A similar treatment of basic clinical pathology might have been useful for the biochemist who is not a physician.

As an attempt to relate the functional and physiological role of lysosomes to these diseases the book is not completely successful, since approximately 80 percent of it is devoted to the diseases and only 20 percent to lysosomes and their function.

The book is too expensive to be used as a primary source for any formal course. It could be useful as a general survey of the field for investigators who are not actively working in it, however. There are books available which treat these diseases in greater detail but are not restricted to lysosomal disorders. Also available are books about lysosomes that do not extensively discuss the lysosomal storage diseases. This book could bridge the gap.

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Radicals in Organic Reactions

Free Radicals. JAY K. KOCHI, Ed. Wiley-Interscience, New York, 1973. Two volumes. Vol. 1, xxii, 714 pp., illus. $37.50. Vol. 2, xxii, 906 pp., illus. $42.50. Reactive Intermediates in Organic Chemistry.

The brilliant contributions of M. Kharasch and F. R. Mayo in America and D. H. Hey and W. A. Waters in England in the 1930's proved, contrary to the then-current thought, that radicals are involved in many types of organic reactions in solution. (The pioneering work of L. Michaelis did the same in the biological field at about the same time.) Waters's monograph, the first to discuss the chemistry of organic radicals in mechanistic terms, was published in 1946; in 1957, Walling published his widely quoted monograph. Both these books offered far-reaching insights and a conceptual framework for understanding what was a novel, burgeoning field.

The 1960's saw the publication of the first textbook on radicals and an impressive series of monographs covering virtually every topic in the field. My own shelves contain over 50 books on specialized themes in radical chemistry, electron spin resonance, photochemistry and photobiology, and radiation chemistry and biology. Clearly, radical chemistry now is a mature field, and novel mechanistic insights cannot be expected in the same degree as when Waters and Walling wrote. Nevertheless, there have been many important theoretical as well as practical developments in the past decade, and a detailed rationalization and review of the wealth of new data was sorely needed. Now, however, this task is beyond the talents or time of a single author: the field is just too vast. Clearly, a series of chapters by specialists writing under tight editorial direction was called for; Kochi's volumes elegantly supply this need.

These two volumes provide an up-to-date review of virtually all of organic free radical chemistry. A series of 26 chapters, most by recognized experts, are divided into four main classes: dynamics of elementary processes; radical chain reactions; structure and energetics; and reactions with heteroatoms. Gas-phase reactions are covered only in a short, introductory chapter, as is appropriate for a work centered on the chemistry of organic radicals. More surprisingly, there is no chapter on polymerization, although some discussion of polymer data is included in other chapters. This work is, of course, aimed at organic chemists, and virtually no free radical biology or examples of the role of radicals in biological systems are included.

Most of the chapters are excellent. Some are more perceptive, better written, or of more general interest than others. Some, as would be expected, duplicate material already available in recent monographs; some provide reviews and insights into recently developing areas that are not available elsewhere.

In sum, the book is a most satisfactory effort which will be widely used: well organized and, with very few exceptions, expertly and lucidly written. Every organic radical chemist should own a personal copy of these two volumes, expensive though they are. These books will be one of the first places to look for a survey of data and theory on organic radicals and their reactions for the decade to come.

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The Arctic Region

Arctic Geology. Proceedings of a symposium, San Francisco, Feb. 1971. MAX G. PITCHER, Ed. American Association of Petroleum Geologists, Tulsa, Okla., 1973. xviii, 746 pp., illus. $30; to members, $24. AAPG Memoir 19.

Arctic Geology is by far the most up-to-date, comprehensive, and authoritative volume on the geology of the Arctic Ocean basin and its margins. The book, consisting of 70 papers selected from the symposium program, goes a long way toward achieving its goal: "integration of regional geology of the Arctic provinces." This is done

with a series of short summary papers, their authors representing eight countries. Exceptionally good summaries cover Greenland and much of the Canadian Arctic. Especially noteworthy is Trettin's outline of the starved basin, geanticlinal uplift, and igneous history of the Franklinian geosyncline. A lucid discussion of the tectonic framework of Alaska by Lathram concludes that Alaska is not a "graveyard" of continental segments that drifted thousands of miles, but rather was formed by the interaction of the Canadian and Siberian shields with the Pacific and Arctic oceans. The geologic development of Arctic Alaska is clearly illustrated in a series of maps and stratigraphic sections by Brosgé and Dutro for the Paleozoic and by Detterman for the Mesozoic.

The U.S.S.R., with 52 percent of its land fronting on the Arctic Ocean, is dealt with in an impressive set of 22 papers. Six of these deal with the regional geologic structure and most of the rest with biostratigraphy. Krasny subdivides northeastern U.S.S.R. into major "geoblocks" having unique crustal characteristics and separated by steep faults. This tectonic style is implicit in many of the Russian papers, including those of Tkachenko and Egiazarov, which postulate that a Precambrian platform sank to form the Arctic Ocean basin. Unfortunately, too few maps, structure sections, and stratigraphic diagrams are provided to enable a reader not familiar with Soviet geology to grasp readily the geologic framework of this enormous region. The translations from the Russian are unusually good and reflect a monumental job of editing by Pitcher, who journeyed to the U.S.S.R. to read through each paper with the author.

More integration would have been desirable across the international borders, but some correlations are given by Egiazarov and others between northeast U.S.S.R. and Alaska; by Bridgewater and others between Greenland, Labrador, and Baffin Island; by Brosgé and Dutro between Alaska and Yukon Territory; by Friend for Devonian stratigraphy between Greenland and Svalbard; by Cherkesova for Lower Devonian deposits between U.S.S.R. and North America; by Ustritsky and Chernyak for upper Paleozoic strata of the entire Arctic; and by Biske for Tertiary nonmarine deposits between Alaska and northeastern Asia.

Besides the papers covering regional geology, two sections constitute in themselves minisymposia: Evolution of Arctic Ocean Basin (12 papers) and Economics of Petroleum Exploration and Production in the Arctic (seven papers). The papers specifically dealing with the development of the Arctic Ocean basin themselves cover a wide range of topics, including opening of the Eurasian basin by sea floor spreading continuing north from the Atlantic, rifting between Canada and Greenland to form Baffin Bay, and rift versus sea floor spreading origin of Canada basin; then a theory totally discounting plate tectonics and sea floor spreading in the North Atlantic–Arctic since the Precambrian is presented.

An inside view of oil and gas possibilities in a dozen major basins in the Soviet Arctic, including its continental shelf (70 percent of the total Arctic shelf), is given by Semenovich and others. Patrunov and Samoilovich show the wide distribution of middle Paleozoic reefs in the Arctic as potential petroleum reservoirs and also as paleogeographic indicators. Meyerhoff and Meyerhoff provide an overview of physical and political geography, coupled with estimates of total mineral resources that show that "Russia's position in the Arctic is not just predominant; it is overwhelming." The set of six papers covering the economic aspects of petroleum production in the Arctic indicates that potential rewards are commensurate with the risks—very timely reading in view of the energy crisis.

Finally, there are some 25 papers covering a range of topics: With respect to igneous rocks, three major episodes of batholithic intrusion in the Alaska-Aleutian Range are described by Reed and Lanphere. Volcanic arc development in northeast Asia is discussed by Belyi. On biostratigraphy there is a set of outstanding summaries of the Soviet Arctic, with papers ranging from one on the latest Precambrian by Sokolov, through a comparison of Carboniferous and Mesozoic zones for warm water and Arctic areas by Menner, to one on Tertiary zones of the North Pacific by Gladenkov. A number of papers deal with the tectonics of particular areas—a new interpretation of the Denali fault in Alaska as an ancient subduction zone reactivated later into a transform fault is presented by Richter and Jones, and there are papers on the tectonics of Sweden by Padget, East Greenland by Henrikson, and Norway by Guyer and by Nilsen. On marine geophysics there are half a dozen papers covering not only the Arctic Ocean basin proper—its sedimentary layering by Demenitskaya and others, its magnetics by Karasik and others and by Ostenso and Wold, and the Alpha Ridge by Hall—but also parts of the Canadian Arctic Archipelago by Sobczak and Weber, the Baffin Bay–Davis Strait region by Manchester and Clarke, and the Barents and Kara seas by Vogt and Ostenso.

All in all, this book has something for almost anyone who has an interest within the broad realm of earth science and mineral development of the Arctic and is a milestone in the mutually beneficial international exchange of data on the region.

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Books Received

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ABC's of the City of Man. Mary Phelan. Orbis Books, Maryknoll, N.Y., 1974. vi, 54 pp., illus. Paper, $2.95.

Abelian Categories with Applications to Rings and Modules. N. Popescu. Academic Press, New York, 1973. xii, 468 pp., illus. $32.50. L.M.S. Monographs.

The Abortion Experience. Psychological and Medical Impact. Howard J. Osofsky and Joy D. Osofsky. Harper and Row, New York, 1973. xx, 668 pp., illus. $25.

Across the Frontiers. Werner Heisenberg. Translated from the German edition (Munich, 1970) by Peter Heath. Harper and Row, New York, 1974. xxiv, 230 pp. $7.95. World Perspectives, vol. 48.

Activation Analysis with Neutron Generators. Sam S. Nargolwalla and Edwin P. Przybylowicz. Wiley-Interscience, New York, 1973. xviii, 662 pp., illus. $29.50. Chemical Analysis Series, vol. 39.

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Advances in Protein Chemistry. Vol. 27. C. B. Anfinsen, John T. Edsall, and Frederic M. Richards, Eds. Academic Press, New York, 1973. xiv, 506 pp., illus. $29.

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