Particularly useful to the nonspecialist reader will be the comprehensive glossary. In addition, the index is cross-referenced and appears to be comprehensive.

Although the bulk of the writing for this book is attributed to Giese, accounts of several specialized topics have had joint authorship. These are as follows: cell division, conjugation, and cell regeneration (Suzuki); electron microscopy (Jenkins); and evolution and taxonomy (Hirshfield, Isquith, and DiLorenzo).

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Turbulence

Buoyancy Effects in Fluids. J. S. TURNER. Cambridge University Press, New York, 1973. xvi, 368 pp., illus. $29.50. Cambridge Monographs on Mechanics and Applied Mathematics.

Perhaps the most outstanding problem in oceanic and atmospheric fluid dynamics is the parameterization of the average effects of the small-scale motions (turbulence, clouds, waves) on the larger scales (synoptic or general circulation). In the free atmosphere we know that the normal cloud is the key process. In the "free" ocean the analogous process is unknown to us, and we are compelled to use a kind of make-believe Fourier-Fick law to parameterize the small-scale turbulence in theories of the thermocline. Convection in clouds, as well as the large-scale rotational effects, is justifiably beyond the scope of Turner's book, but oceanographers will welcome it because of its emphasis on turbulence in a stratified fluid and because of recent developments in measuring oceanic turbulence.

The book begins with laminar flow in a stratified fluid, and proceeds to the subjects of nonlinear interaction of internal gravity waves and shear flow instability. A fine collection of photographs helps to unite laboratory measurements, field observations, and the much-solicited interdisciplinary reader. The almost traditional subject of the atmospheric boundary layer introduces the reader to the main theme of the book. Considerable space is then devoted to free convection, including the case of an isolated heat source, the fundamental parallel plate convection problem, and the relatively new subject of "double diffusion." Experimental and theoretical studies are effectively related to local observations, such as regularly spaced temperature-salinity layers and clear air turbulence.

Aside from the unifying geophysical theme, the various chapters of the book are really surveys of subdisciplines and therefore require a working knowledge of part of the extensive bibliography. To tie the results together the author has had to employ an overly condensed and pragmatic presentation of the similarity laws, and it would be unfortunate if those interested in the fundamental problems were put off thereby. A little more discussion of the tentative insights that have been won from these laws, especially in those problems with well-set boundary conditions, would have been useful. On the other hand the penultimate chapter, on the grid-induced mixing across a density interface, is so fascinatingly complex that we must be content with any quantitative rationalization of the data. The interpretative problem that arises here is, of course, not different in kind from that which arises when local turbulence measurements are made in the air and sea. In both cases we must wait for a deeper understanding of the relatively simple forms of turbulence.

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Immunology

Transplantation Antigens. Markers of Biological Individuality. BARRY D. KAHAN and RALPH A. REISFELD, Eds. Academic Press, New York, 1972. xxvi, 536 pp., illus. $26.50. Immunology series.

The substances known as transplantation antigens are distributed on the surfaces of all or most cells of all species and are of interest not only because of their role in transplantation and tumor immunology but also because the genetic loci controlling them are closely associated with genes affecting other important biological phenomena such as immune responsiveness and susceptibility to disease states such as leukemia. Moreover, the loci involved, HL-A in man and H-2 in mouse, provide examples of the most highly polymorphic systems known. In this book Kahan and Reisfeld have drawn together in a logical arrangement a series of papers from most of the distinguished workers in the field to present a complete and authoritative review of these interesting glycoproteins.

The first section of the book contains several excellent papers on the phylogeny and development of transplantation antigens, and includes descriptions of the cellular localization of these substances. In addition, there are a concise review of the HL-A system of man and several papers on the significance of cross reaction between the antigens of different species, particularly between man and primates. There is no adequate genetic description, in this section or later, of the H-2 locus of the mouse, such as has been provided for HL-A. The H-2 system is given relatively little attention in the book as a whole, even though a large volume of genetic and chemical information has accumulated about it. Where H-2 is discussed, there are several errors. For instance, H-2 specificities are referred to by letter and not numerically, as is now the custom; the H-2 locus is stated to be on the 9th chromosome (it is the 9th linkage group and 17th chromosome); the description of the H-2 locus states that an inbred mouse may have one to three private H-2K specificities (each mouse has only one private H-2K specificity and H-2D specificity). However, use of the excellent reference list will rectify these.

The second section deals with the extraction, purification, and chemical characterization of transplantation antigens. The different methods using pressure homogenization, sonication, hypertonic salt, proteolytic enzymes, and detergents are presented. A biochemist reviewing these pages may wonder at this extensive review of such a variety of methods used to solubilize the transplantation antigens, but this problem has been the major hindrance to progress in this field over the last decade. Current knowledge of the structure of these glycoproteins (molecular weight approximately 35,000) is adequately presented, with the evidence that the alloantigenic activity resides in the protein rather than in carbohydrate fragment—a problem that has finally reached some sort of solution. Missing from this section, however, is the definitive structure of the carbohydrate fragment of the glycoprotein, which has recently been described for H-2 alloantigens. The use of detergents, which is currently enjoying renewed popularity, is dealt with only briefly.

Section 3 describes the biological properties of solubilized antigens and

comprehensively covers the various assays used to detect alloantigenic activity both in vitro and in vivo. Finally, some interesting speculations and data are presented by the editors on the molecular nature of HL-A antigens.

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Elements 89–103

The Actinide Elements. K. W. BAGNALL. Elsevier, New York, 1973. xii, 272 pp., illus. $27.75. Topics in Inorganic and General Chemistry, Monograph 15.

The 15 elements known as the actinides lie mostly beyond what was once thought to be the end of the periodic table. Now not only is the place of these elements within the table recognized but some of the elements beyond the actinide series have been synthesized. In addition to the knowledge of the chemical behavior of thorium, uranium, neptunium, and plutonium accumulated during the 1940's and 1950's, much information on the other members of the series has been obtained in recent years. This has been facilitated by the separation of grams of protactinium by British workers and by the production of weighable quantities of the heavier actinides through einsteinium ($Z = 99$) by the U.S. heavy-element program.

Bagnall, who has conducted much research on the inorganic chemistry of all the lighter actinides, has now written a compact survey of the chemistry of all the actinide elements. His approach is one of broad coverage rather than extensive detail and is supported by numerous references to the literature. To a chemist entering this field, this book is a good place to look for references for pursuit of a particular topic of interest, and for the student of inorganic chemistry an overall view of these elements and their compounds is easily found here. Bagnall does not make many generalizations, although he includes frequent comparisons with the chemistry of the lanthanide elements.

The emphasis in subjects covered is primarily on inorganic rather than physical or nuclear chemistry. After some introductory chapters on the discovery, separation, and purification of the actinides, the book deals with the preparation and properties of the metals, the familiar inorganic compounds such as oxides, halides, sulfates, and halates, and the more unusual species including chelates, organometallic compounds, and other carbon- and sulfur-containing compounds. These solid substances are characterized as to crystal structure, color, and reactivity. Very few data on thermodynamics or solution behavior are given except in an early chapter on oxidation potentials. The final chapter covers briefly, but quite interestingly, magnetic properties, absorption spectra, and *f* orbitals.

Because of the ongoing research on the actinides, a number of details now available in the literature are missing from the book, but this can easily be remedied if a revision is forthcoming. For the present this book is a useful manual for the working chemist and an easily comprehensible source book for the advanced student.

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