The book derives from a conference sponsored by the Sigrid Jusélius Foundation, which, it is said, has supported most of the medical research done in postwar Finland.

The book is broadly representative of research done on the subjects listed above and furthermore has the advantage of incorporating the views of many of the recognized authorities in these fields.

As is common among cell biologists generally, most of the authors of papers purportedly dealing with fibroblasts either are not dealing with fibroblasts or are not, as they seem to imply, dealing with normal fibroblasts. Studies done in vitro on such "fibroblast" populations as 3T3, BHK21, and mouse L cells suffer from the fact that the populations are clearly abnormal in at least one property yet are regarded either as consisting of typical normal fibroblasts or as providing normal controls for virus-transformed cells. The use of these cells is usually predicated on their common availability and the ease with which they may be cultured; but this is hardly a convincing rationale in view of the likelihood that any similarities between them and normal fibroblasts may be purely coincidental. Since such cell populations resemble no known in vivo cell type, their use can be likened to a kind of extraterrestrial biology. How disconcerting it is to realize that so much good science, carefully reasoned and technically sophisticated, rests on the use of cell populations twice removed from reality. Normal mouse, hamster, rabbit, and human fibroblasts are as easily available and as simply cultivated as are the continuously propagable abnormal cell populations now in wide use. Why do cell biologists resist using the genuine articles, which would make data extrapolation, with its inherent dangers, unnecessary?

Equally troublesome is the apparent assumption on the part of several of the authors represented in this book that a primary cell population consists entirely of fibroblasts. Surely this assumption is erroneous and the chapters based on it must be reevaluated. Several authors also base their experimental design on the notion that "normal cells in culture stop dividing after growing to confluent monolayers," a "fact" again widely accepted by cell biologists but patently false, as has been shown in several publications and as one should expect from the three-dimensional distribution of normal fibroblasts and other normal cell types in vivo.

Despite these deficiencies, this book is a unique collection of information on connective tissue, ancillary cell types, and biosynthesis of the extracellular matrix. Those readers who are cell culturists might very well conclude that the fibroblast, long regarded as analogous to a weed pest, is fast approaching deserved recognition as an important cell species which, in addition to being the archetype of proliferative capacity in vitro, is capable of several complex and important functional activities.

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Metal-Ammonia Solutions

Electrons in Fluids. The Nature of Metal-Ammonia Solutions. J. JORTNER and N. R. KESTNER, Eds. Springer-Verlag, New York, 1973. xii, 494 pp., illus. $44.10.

Although most of the 37 papers in this volume are concerned with metal-ammonia systems (including both liquid- and solid-phase systems), at least 12 of them deal with nonammoniacal systems such as metallic vapors and excess electrons in hydrocarbons. About half the papers present new experimental data; the others are either theoretical expositions or interpretive reviews.

One gets the impression on reading this book that the last few years have produced no major breakthroughs in our understanding of metal-ammonia solutions. Of course, the nature of dilute metal-ammonia solutions is now fairly well understood; this understanding has come through the application of a wide variety of physical techniques, including optical spectroscopy, nuclear magnetic resonance, electron spin resonance, calorimetry, magnetic susceptibility studies, electrical conductivity studies, and density measurements. Perhaps the principal remaining perplexity regarding these dilute solutions is an unexplained 400-cm^{-1} shift in the infrared absorption band that accompanies a change in concentration from $10^{-3}M$ to $10^{-1}M$.

Most of the current research on metal-ammonia systems is concerned with relatively concentrated solutions and with metal-ammonia solid compounds. Evaporation of ammonia from a dilute, blue, electrolytically conducting metal-ammonia solution produces a concentrated, bronze-colored, highly conducting solution. This "nonmetal-to-metal" transition has fascinated many experimentalists and theoreticians and has not yet been explained completely. One approach toward understanding the phenomenon, described in this volume, is the study of the properties of compressed metal vapors as a function of density. Such one-component disordered systems show analogous transitions and serve as simple models of the more complicated ammonia system.

By low-temperature evaporation of ammonia from the appropriate metal-ammonia solutions, one can isolate the solid compounds $Li(NH_3)_4$, $Ca(NH_3)_6$, $Sr(NH_3)_6$, and $Ba(NH_3)_6$. These materials exhibit unusual magnetic behavior and phase transitions that deserve further study. Unfortunately, the compounds are very difficult to prepare in a pure state, and reliable data are obtained only with extreme difficulty.

Only four of the papers are concerned with chemical reactions of metal-ammonia solutions. Chemical reactions definitely deserve more attention. It is remarkable that the kinetics of reactions of the short-lived aqueous electron (which must be studied by ultrafast techniques) have been much more extensively studied than the kinetics of the ammoniacal electron (which can be studied by many conventional techniques).

The book will be of interest to a wide spectrum of readers, from theoretical physicists to chemical kineticists, and it can be recommended as a summary of recent activity in the field.

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Scattering

Chemical Applications of Molecular Beam Scattering. M. A. D. FLUENDY and K. P. LAWLEY. Chapman and Hall, London, 1973 (U.S. distributor, Halsted [Wiley], New York). x, 400 pp., illus. $24.95.

Chemists have long recognized that they could find out much about molecular interactions if they could observe the scattering of a beam of molecules from a target of other molecules. Many of the techniques developed by physicists to learn about the nucleus should enable chemists to learn in detail about

the nature of molecular collisions that lead to chemical reactions. However, the difficulties of producing and detecting beams of either neutral or ionized molecules at energies in the range of chemical interest, roughly 0.005 to 5 electron volts, were serious enough to delay the growth of the field until after the successful experiments of Taylor and Datz in 1956 on the reaction $K + HBr \rightarrow KBr + H$. Subsequent work pursued actively in many laboratories showed that the high hopes for the results of molecular scattering experiments could be realized to a considerable extent. Molecular beam studies now provide information of significance in many fields, for example, about transport properties, energy transfer, and chemical kinetics. Now that reliable results are available in quantity from studies using molecular scattering, many people are likely to want to learn how to interpret and use these results, and others will want to start similar studies of their own. This is therefore a suitable time for a comprehensive account of the subject to appear.

Fluendy and Lawley have written the first book devoted to explaining what molecular scattering is, how apparatus is built to study it, how the results are interpreted, and what significance the results may have for related problems in chemistry and physics. It was an ambitious undertaking, and they have carried it out well. The book is for those who care to learn about the details as well as to understand the principles. It has several particularly attractive features. In the sections on scattering theory, the authors emphasize the physical interpretation of the quantities appearing in the equations and lead the reader gently into what is for some a difficult subject. They offer a useful guide for those who may hesitate to go directly to the original literature. Kinematic diagrams, useful to those working with scattering problems but often a source of confusion to those listening to discussions of molecular beam work, are clearly described. There are good discussions of the criteria for the design of apparatus as well as of the sources of noise in experiments. Because greater advances have been made in the study of elastic and reactive scattering, the sections on these subjects are much more extensive than the one on inelastic, but nonreactive, scattering.

Unfortunately, many errors and misprints were overlooked in the proofreading. Users of the book will have to be on their guard if they are not to be misled. There are many references throughout the book, but a few more might have been helpful in directing readers interested in extended treatments of some of the topics to the original sources.

The book will be appreciated by chemists working with molecular beams or interested in the results of scattering experiments. It is a significant contribution to physical chemistry.

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Dielectric Systems

Aqueous Dielectrics. J. B. HASTED. Chapman and Hall, London, 1973 (U.S. distributor, Halsted [Wiley], New York). xiv, 302 pp., illus. $18.50. Studies in Chemical Physics.

The author of this book contributed to the first research in this field using the technology made available by the development of radar, and his laboratory has continued to play a leading role in research on aqueous dielectrics. This account covers a wide field: the dielectric behavior of pure water in the liquid and solid states, of ionic and nonionic aqueous solutions, of biological tissues, of water in the absorbed state, and of fallen snow and other wet materials important in earth science.

Three of the ten chapters are mainly theoretical, and there are extensive theoretical passages in some of the others. The accounts of the numerous theories that have been developed for the molecular interpretation of the dielectric constant and its frequency dependence in the various systems listed above are at a level such that the whole comprises an annotated bibliography covering the period from about 1920 to 1971, with a few references to more recent work. Especially useful is the chapter on the theory of heterogeneous dielectrics.

The dielectric relaxation process well known in water and aqueous solutions has a correlation time τ of about 8 picoseconds in pure water at 25°C. In this book the evidence for a "second relaxation" process in these systems, with a correlation time $\tau' \simeq 0.05$ picosecond in pure water at 25°C, is carefully presented. For solutions, however, the main experimental coefficients are the molal changes in the static dielectric constant and in τ; for these coefficients there is little critical comparison of data from various sources, and in some cases the newer data seem to be neglected altogether. Most of the tabulations of the molal coefficients that are given are organized for the comparison of the data with various theoretical calculations.

The remaining chapters give the reader a good idea of what dielectric measurements have been made on the various more complicated aqueous systems and the interpretations that have been inspired by the data.

The text reads well, but the book suffers from slipshod editing. Some literature citations are missing, and others are given in duplicate in the same list. There is little correspondence between the order of references in the lists and the order in which they are cited in the text. There are undefined symbols. It also must be remarked that there is substantial duplication of the material in the chapters on dielectric phenomena in Felix Franks's treatise on water, two of which were written by Hasted.

The book is aimed at those in the "sciences where water is important"; the members of this audience can be sure they will find some useful information in it.

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Solid Forms of Water

Physics and Chemistry of Ice. Papers from a symposium, Ottawa, Canada, Aug. 1972. E. WHALLEY, S. J. JONES, and L. W. GOLD, Eds. Royal Society of Canada, Ottawa, 1973. xiv, 404 pp., illus. $30.

Owing to the shape of its molecules and their capacity to form directed hydrogen bonds, water displays a rich variety of crystal structures. Of course the most familiar is hexagonal ice, but at least ten other solid polymorphs can be formed under suitable experimental conditions. These are joined by a topologically fascinating family of water-molecule networks that appear in hydrate crystals. Properties of all of these forms of solid water were relevant to the international symposium reported in this volume.