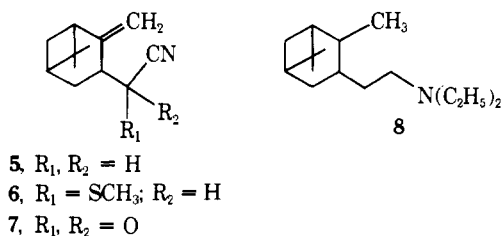


Preparation of the anion of the ene adduct is straightforward using either butyllithium or lithium diisopropylamide in tetrahydrofuran. However, [2,3]-sigmatropic rearrangement does not occur under these conditions. Addition of methyl iodide or deuterium oxide gives the ene adduct with the hydrogen replaced by methyl or deuterium.<sup>14</sup> Extended reaction times give only decomposition. Addition of 25% HMPA to the solvent allows the rearrangement to proceed readily (less than 1 h at  $-20^{\circ}\text{C}$ ). The function of the HMPA is presumably to convert a tight ion pair into a solvent separated ion pair.<sup>15</sup> The thiolate resulting from rearrangement is trapped with methyl iodide giving the products shown in Table I. As one would expect, the trans olefins are the predominant products (>90%) and in case 7 the isomer shown predominates. In a typical experiment lithium diisopropylamide was formed in situ from 0.46 ml of diisopropylamine (3.14 mmol) and butyllithium (2.93 mmol) in 20 ml of 3:1 tetrahydrofuran:HMPA at  $0^{\circ}\text{C}$ . The solution was cooled to  $-20^{\circ}\text{C}$ . The ene adduct of **1** with  $\beta$ -pinene (**2**) (0.506 g, 2 mmol) in THF was added slowly. After 1 h at  $-20^{\circ}\text{C}$  the solution was quenched with 0.5 ml of methyl iodide and allowed to warm to room temperature. After 2 h the reaction was worked up giving 0.386 g (72%) of **4** which was >95% pure by NMR analysis.

We are presently engaged in investigating the chemistry of the cyanobis(methylthio)methyl group. Preliminary results indicate that treatment of **4** with deactivated W-4 Raney nickel<sup>16</sup> for 24 h in refluxing ethanol cleanly affords **5** in 83% yield. Treatment of **4** under the same conditions with W-4



Raney nickel affords **8** in 90% yield. Stirring **4** in ethanol with aluminum amalgam<sup>17</sup> converts **4** to the monothioether **6** in 72% yield. This compound can be obtained as the corresponding anion by treatment of **4** with methyl lithium or butyllithium in tetrahydrofuran (2 h,  $-78$  to  $0^{\circ}\text{C}$ ) in 75 and 68% yield, respectively. The alkyllithium procedures are of special interest since they give an acyl anion equivalent directly.<sup>18</sup> Attempted hydrolysis of **4** to the acyl nitrile **7** has been un-

successful due to the sensitivity of **4** to oxidizing agents and acidic conditions.

We are presently engaged in investigating the uses of the above compounds in synthesis as well as other routes to the allylic insertion of a functionalized carbon atom.

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## Book Reviews

**Scanning Electron Microscopy.** By OLIVER C. WELLS (IBM Thomas J. Watson Research Center). McGraw-Hill Book Co., New York, N.Y. 1974. xviii + 421 pp. \$22.95.

This book comes at an appropriate moment because there have been a considerable number of important advances in scanning electron microscopy during the past several years. Those advances have led to this form of microscopy being applied to an increasing number of different areas of science. Already these applications have led to much new and valuable information about structures.

The book has been written not only by Dr. Wells, but considerable portions have been contributed by Alan Boyde, Eric Lifshin and Alex Rezanowich. The aim of the volume is to give a detailed account of the problems of the design and use of scanning electron microscopes. The authors naturally also give useful accounts of the applications to

the physical sciences, and also in biology and medicine. The level of writing is appropriate for those using scanning electron microscopy in their research work, and the authors are to be congratulated on striking an interesting balance between descriptive material and also at the same time giving a satisfactory mathematical treatment of the problems of signal-to-noise ratio in electron microscopy, electron penetration, bulk scattering, secondary electron emission, and the problem of the optical design of small current probe forming systems.

In addition to excellent chapters covering the above topics, it was pleasing to note that there is a valuable introductory chapter which gives an interesting account of not only the different types of scanning electron microscopes but also a useful survey of the history of the development of this important instrument.

Despite the number of authors, the writing is remarkably uniform, and the book is well illustrated not only with line diagrams but with electron micrographs, all of which are clear. Particularly notable are the satisfactory descriptive legends beneath each diagram or picture.

Another interesting feature of the book is the inclusion of a chapter on *Histological and Cytological Methods for Scanning Electron Microscopy in Biology and Medicine*, which gives many useful, practical details before obtaining the best electron micrographs from such materials. A particularly complete and useful biography is given at the end of the book which lists not only the authors quoted but also gives the titles of the papers to which reference is made in various parts of the text.

There is no doubt but this is an important contribution to the literature on scanning electron microscopy. It should prove useful to all persons interested in using this type of microscopy. It could also prove a useful basic textbook for graduate courses in that field, and the reviewer has no hesitation in recommending it to these categories of persons.

C. A. McDowell, *The University of British Columbia*

**Transport Properties of Ionic Liquids.** By JAMES L. COPELAND (Kansas State University). Gordon and Breach, New York, N.Y. 1974. v + 76 pp. \$11.50

This work appears to be best described as a review article which covers, to paraphrase the author, the microscopic theory of transport in fused salts from the inductive viewpoint of the chemist (i.e., use of some adjustable constants combined with molecular interpretation). The reference list contains 105 citations, and subject and author indexes are included. The book can be recommended as a useful guide to the literature on the subject, although it should be forthrightly stated that its price is an outrage considering its brevity.

Gerald S. Manning, *Rutgers University*

**Mediators of Inflammation.** Edited by G. WEISSMANN (New York University Medical Center). Plenum Press, New York, N.Y. 1974. 205 pp. \$18.50.

Considerable progress has been made in the past two decades toward the understanding of the role of humoral mediators involved in inflammatory reactions. This volume provides a convenient survey of the progress being made in the analysis of the mediators of inflammation. The primary literature has been carefully, and often critically, surveyed up to the end of 1973 and into 1974.

As the reader will see, each chapter emphasizes a different aspect of the inflammatory process. As such, the presentation of the reviews, as well as the overview by Dr. Weissmann in reflecting upon the tone as well as the major thrusts of various chapters, should lead to the logical conclusion that the process of inflammation is a highly complex and multifaceted phenomenon. It is hoped, therefore, that this volume will serve not only to give well-documented analyses of various aspects of inflammation, but also to motivate the entry into this fascinating field of biological research of additional scientists from all areas of biology, medicine, and the physical sciences as well.

Sheikh A. Saeed, *Miles Laboratories Limited*

**Advances in Experimental Medicine and Biology. Volume 40. Metal Ions in Biological Systems: Studies of Some Biochemical and Environmental Problems.** Edited by SANAT K. DHAR (De Paul University). Plenum Publishing Corp., New York, N.Y. 1973. xii + 306 pp. \$17.50.

The book is a collection of ten papers presented at a conference on the Role of Metal Ions in Biological Systems held at Argonne National Laboratory in November of 1972. The unifying theme of the conference, developments in the area of chemical and environmental participation of heavy metal ions in the biological system, was spanned by the diversity of the individual topics of each paper which reached from detailed discussions of a particular methodology with regards to a specific metal ion in a specific biological molecule to the heated aspects of the metal pollution-economy-health standards interplay.

Since the topics covered in each paper are diverse, it is best to indicate all ten. B. L. Vallee discusses the convenience of using cobalt(II) substitution for zinc in metalloenzymes as a spectral and kinetic probe of their structure. J. B. Neilands has a review paper on iron proteins, iron functions, and iron metabolism related diseases. G. L. Eichorn

et al. offer both an elementary discussion of the basics of nucleic acid chemistry as well as some original research results modeling the interference by various metal ions of the normal nucleic acid function. A short survey of naturally occurring chelating ligands is presented by A. Lindenblum while K. D. Hardman presents the crystal structure of Concanavalin A. Manganese bound proteins lend themselves to magnetic spectroscopy, whose discussion is presented by M. C. Scrutton, A. H. Reed, and A. S. Mildran.

Toward the end of the book, the more environmental aspects of metal ions are emphasized in articles by J. W. Huckabee and B. A. Blaylock on the transport of Hg and Cd from land into water and by R. Hartung who reviews some of the facts concerning the presence of heavy (toxic) metals in rivers and streams and so elegantly points out how little we know about these seemingly simple systems. Finally P. R. Harrison traces the lead aerosol problem while J. Schubert ends the book with a collection of case histories of metal poisoning, environmental action (and inaction) chronologies, metal pollution sources and distribution, chelate therapy, and recommendations for committees on public health.

The book should be of use for persons unfamiliar with the overall importance of essential metal ions, their regulation, excess toxicity, deficiency, or the presence of foreign metal ions in metabolic cycles. It should also be of use for those wishing to become at least basically familiar with the global problems of wide usage of mercury, cadmium, lead, zinc, etc. Because statistical tabulations of data are indispensable in the consideration of environmental problems, the numerous tables listing metal sources, transport, allowed levels, tons manufactured, etc., contained in the book may also be of value for those interested.

The references at the end of each chapter as well as a detailed subject index should add to the usefulness of the book. There are no formal negative values to the book except the inherent diversity of the areas covered in the conference and any subjective opinions individual critics may formulate.

R. J. Motekaitis, *Texas A&M University*

**Equilibrium and Non-Equilibrium Statistical Mechanics.** By RADU BALESCU (Universite Libre de Bruxelles). John Wiley & Sons, Inc., New York, N.Y. 1975. xiv + 742 pp. \$29.95.

The last two decades have seen the extensive development of statistical mechanics both as a practical tool in the physical sciences, and as a sophisticated arm of analytical dynamics. It is precisely these aspects, techniques and concepts, that are emphasized in Balescu's new textbook. The coverage is quite broad, and in impressive depth in the theory of classical simple fluids, in and out of equilibrium. Interacting quantum systems are treated via the Wigner distribution in close analogy with their classical cousins, an economical procedure which, however, deemphasizes the characteristic properties of specific physical systems. The burgeoning area of lattice gases—equilibrium and dynamics—is also treated sketchily, mainly as background for a nice introduction to renormalization group techniques. But in a text of finite length, relative weights must be assigned, and Balescu's choice of topics is certainly a reasonable one.

The book is organized along the lines of recent courses in the subject. Part I reviews the needed mechanics and quantum mechanics, and generalizes them through the introduction of classical and quantum distribution functions, as well as the associated reduced distributions. Part II is confined to equilibrium behavior. It starts routinely with the various ensembles, the relation of thermodynamics and statistical mechanics, and analysis of ideal systems, proceeds to diagrammatic analysis of weakly nonideal systems, and then to the various integral equation techniques for dense fluids, finally bringing in a quite up-to-date discussion of phase transitions and critical point phenomena. The long concluding Part III, on nonequilibrium, can be described loosely as half-text, half-monograph. The text portion includes a comprehensive discussion and comparison of the older kinetic theories attached to the names of Boltzmann, Langevin, Fokker, Planck, and the newer ones of Landau, Bogoliubov, Vlasov, Lenard, and Balescu. The transition to, and consequences of, the hydrodynamic limit are examined in detail, and the general theory of transport coefficients, fluctuation-dissipation theorem, etc. treated effectively. The monograph portion contains a very clear exposition of the subdynamics approach to kinetic equations of the "Brussels School". All in all, the Balescu text is a well-written up-to-date version of a large portion of the subject.

J. K. Percus, *New York University*