Equally, that understanding will transform by feedback the ways in which we perceive the very social sciences to which we turn for aid.

This of course is a broad and lofty prescription. Whitley's symposiasts are well aware of the problems (one of them, Stuart Blume, has broached a particular subset of the issues in his own *Toward a Political Sociology of Science,* recently reviewed here: 12 July, p. 137). However, with one or two notable exceptions (Cornelius Lammers on the social implications of diversity in the social sciences, Dorothy Zinberg on the social perceptions of chemistry students), their contributions fail to advance our understanding in significant ways. Indeed, in its diversity of topics, in its occasional shrill dismissal of the major insights that Merton's work has afforded into the social system of science, in its narrowness of historical sympathies, and in the sketchy remedies it proposes, *The Social Processes of Scientific Development* speaks eloquently of our current confusions. To see those confusions spoken *to* rather than simply displayed, the reader should turn instead to such recent works as Mary Douglas's *Natural Symbols: Explorations in Cosmology* (Pantheon, 1970), Alvin Gouldner's *The Coming Crisis of Western Sociology* (Basic Books, 1970), the first volume of Stephen Toulmin's *Human Understanding* (Princeton University Press, 1972), the studies of Western science and non-Western tradition associated with the name of Robin Horton (for example, *Modes of Thought*, Humanities Press, 1974), and the growing range of new studies both in the sociology of knowledge and in the cultural history of the natural sciences. What these works reveal, when taken severally and together, is that a veritable revolution of consciousness is now under way.

As yet we still wait for a new consensus on the shape of our scientific past. It seems reasonable to suppose that any such refashioned understanding will be pluralistic in its stress, concerned with the diversity of the various sciences, and distinctly cautious over the autonomy of the intellect and the hegemony of the Western tradition. One rewarding site for research directed toward creating elements for that consensus would seem to be the nodal points where interaction takes place between some or all of the cognitive levels embodied in the various sciences (for example, the experiments, theories, and laws of a particular science and the concepts, orientations, and presuppositions that it uniquely holds, those that it shares with other sciences, and those that it shares with wider social elements), the cultural patterns of norms, values, and beliefs in the larger society (whether philosophical, political, economic, or religious), the social arrangements of the various sciences (such as institutional groupings, patterns of recruitment, training, employment, and reward, and patterns of financing) and those social groupings, social interactions, and social realities (whether populational, technological, or positional) in the larger society which help create, confine, and shape the ways in which organized knowledge evolves.

The challenge now is to provide new work that addresses these issues in significant ways, while also measuring up to the standards of rigor, clarity, and persuasiveness apparent long ago in, say, G. N. Clark's *Science and Social Welfare in the Age of Newton* (Oxford University Press, 1937; second edition, 1949; reprinted 1970). On this count *The Social Processes of Scientific Development* must be declared a failure. It is yet an interesting failure in the way it seeks to grapple with a major intellectual question of our day.

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Bioinorganic Chemistry

Metal Ions in Biological Systems. HELMUT SIGEL, Ed. Dekker, New York. Vol. 1, Simple Complexes. 1974. xviii, 268 pp., illus. $21.75. Vol. 2, Mixed-Ligand Complexes. 1973. xvi, 294 pp., illus. $25.25. Vol. 3, High Molecular Complexes. 1974. xiv, 290 pp., illus. $22.75.

Inorganic Biochemistry. GUNTHER L. EICHORN, Ed. Elsevier, New York, 1973. In two volumes. xxxviii, 1264 pp., illus. $110.

Both these books are collections of papers by various authors, and both are readable and well put together. There is little direct overlap in content. In general, the first three volumes of *Metal Ions in Biological Systems* deal with interactions between metal ions and proteins and their subsequent effect on protein or enzyme functions, whereas *Inorganic Biochemistry* includes many chapters on the role metal ions play in proteins and metal enzymes themselves. Future volumes of *Metal Ions in Biological Systems* will contain several chapters with titles similar to those in *Inorganic Biochemistry,* but by the time they appear new results will have necessitated further review.

Inorganic Biochemistry is a two-volume work that does an excellent job of introducing the reader to basics of coordination chemistry and of showing how metal ions function in complex biological systems. It provides an excellent pathway by which an inorganic chemist or a biochemist can enter the field of bioinorganic chemistry.

Part 1 of the work provides a brief but not entirely superficial review of relevant basic coordination chemistry. In part 2 the interaction of metal ions with amino acids, peptides, and proteins is reviewed. An excellent discussion of some metalloproteins involved in the storage and transfer of iron and copper is contained in part 3. A chapter on hemocyanin is also included. Part 4 contains a chapter on the activation of small molecules by means of coordination. The next chapter reviews how metal ions participate in enzymatic activity, and other chapters review the structure and function of carboxypeptidase A and carbonic anhydrase. Discussions of phosphate transfer and its activation by metal ions and kinases are also included. All the reviews emphasize spectroscopic techniques. Part 5 contains a rather thorough but not completely up to date review of enzymatic oxidation-reduction systems. Heavy use is made of model systems for metal enzymes that catalyze reactions with molecular oxygen and that fix molecular nitrogen. A chapter on electron transfer, which is heavy on theory, and reviews of the ferredoxins and other iron-sulfur proteins and copper-containing oxidases are included. These chapters provide numerous suggestions for possible inorganic model systems. Part 6 is concerned primarily with the porphyrin prosthetic group and its properties in and out of proteins. Chapters are included on iron-porphyrin compounds, including detailed discussions of myoglobin, hemoglobin, cytochromes b and c, cytochrome oxidase, peroxidases, and catalases. There are also excellent chapters on chlorophyll and corrinoids. Again, work with inorganic model systems is emphasized. Metal complexes of vitamin B_6 that serve as models for B_6-catalyzed enzymatic processes and metal complexes of flavins are discussed in part 7. Finally, in part

8, the interaction of metal ions with nucleic acids is reviewed. Virtually all the chapters are excellent reviews with many literature references. The literature is generally covered through 1971. This book is well organized and should certainly achieve the goal of stimulating interest and research in bioinorganic chemistry.

The series *Metal Ions in Biological Systems* should also prove successful in stimulating interest and activity in the field. Bioinorganic chemistry is growing rapidly, and a continuing series of reviews such as this one is indeed warranted. In fact, all researchers in the field will find the series necessary if they are to keep abreast of the rather different areas of research bioinorganic chemistry includes.

The first three volumes take the reader from the simple interactions of metal ions with amino acids and small peptides through the thermodynamics and kinetics of mixed complex formation with biologically important ligands to the interaction of various metal ions with proteins and enzymes. The emphasis is on the types of coordination sites available for metal-protein interaction and the structure and stability of complexes with ligands associated with protein-binding sites. As in the previous book, the model-system approach is stressed.

In volume 1, there are chapters on the structure and stability of metal-nucleoside phosphate complexes; the kinetics of metal-ion interactions with nucleotides and base-free phosphates and of metal-ion and proton transfer reactions of oligopeptide complexes; stereo-selectivity and optical properties of transition metal complexes of amino acids, peptides, and related compounds; and metal-ion–thioether interactions of biological interest. Volume 2 contains chapters on the structural, thermodynamic, and kinetic properties of mixed ligand complexes of biological interest and an interesting chapter on artificial enzymes or inorganic model complexes for enzymes or enzyme reactions. In volume 3, chapters are included on the interactions of metal ions with nucleic acids, proteins, collagen, and ribonuclease; on the role of copper in cytochrome oxidase and hemocyanins; and on monovalent cations in enzyme-catalyzed reactions. Many of the chapters are quite up to date, covering the literature through 1972 and occasionally through 1973. As in the previous book, spectroscopic techniques are adequately described.

In conclusion, both books are excellent and worth purchasing. They both convey the excitement and occasional controversy in the field and are filled with research ideas, especially for the inorganic chemist who is interested in a model-system approach. I recommend *Inorganic Biochemistry* most strongly for anyone planning to undertake bioinorganic research. It is an excellent starting point.

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Nuclear Structure

Theoretical Nuclear Physics. Vol. 1, Nuclear Structure. AMOS DESHALIT and HERMAN FESHBACH. Wiley, New York, 1974. xxviii, 980 pp., illus. $27.50.

Each of the authors of this challenging book has been an important contributor to the understanding of nuclear structure and a leader of one of the institutes that have dominated progress in the field. The book is all that would be expected of two physicists of such stature, thorough, penetrating, clear in its discussion of the intuitional background of each of its many subjects, and as clear as could be expected in its presentation of the profound and extensive details into which the many-particle problem leads the student of nuclear structure. There is an emphasis on fundamental concept, yet not to the exclusion of following some of the greatest triumphs of theoretical nuclear physics to their most up-to-the minute ramifications.

The book must be considered an advanced treatise, for it would be overwhelming to most students not already familiar with much of nuclear physics and of the mathematical methods of physics. Yet it starts, in a sense, from the beginning. Its first hundred pages are an introductory review, repeating many facts the reader probably knows but putting them in a perspective that will be useful later on. The style of the book is to pursue each topic with a series of attacks, each more advanced than the last, interspersed with similar attacks on other topics, the advancing state of one being dependent on that of some of the others. For example, early in the book the authors deal with the properties of nuclear matter to the extent of considering two-particle interactions as affected by neighboring particles through the Pauli principle and in the Bethe-Goldstone equation; then follows a moderately thorough treatment of the Hartree-Fock method; and then after extensive treatment of the shell model and deformed nuclei the authors return to the nuclear matter problem and Hartree-Fock calculations with such refinements as the Bogoljubov-Valatin transformation and linked cluster expansions. It is impressive that results quoted of recent computations (up to 1972) for energies and other properties of 4-n nuclei agree as well as they do with experiment. By contrast with the recency of those results, in the treatment of rotational levels of deformed nuclei no attempt is made to bring the subject up to date by discussing the devious behavior of the more recently observed very high rotational levels, the discussion—an excellent one—being confined to the concepts and principles so nicely illustrated in the more regular behavior of the lower levels.

The angular-momentum properties of shell-model states are presented by diving directly into equations heavy with 6-j and 9-j symbols, without any of the vector diagrams that are often useful at least for mnemonic purposes. It is hoped that the reader will have these in mind from more elementary texts. The last few hundred pages of the book are devoted to discussions of electromagnetic and weak interactions as related to nuclear structure.

The special merit of the book is the insight and thoroughness with which it spans so many aspects of the subject. The format is attractive, and the highly mathematical text is remarkably free from random errors, though there are a couple of minor systematic ones. Mathematical expressions sometimes lack needed parentheses, and some hyphens have been inserted incorrectly. The few figures not taken from original papers would have benefited from more careful checking of the draftsman. Fission is discussed only briefly, but it is distressing that the sketch of a fission barrier shows the height from the inside as having the same order of magnitude as that from the outside, missing the point of fission as a power source.

This work is quite different in style and emphasis from and considerably more ambitious in scope than that other large work by a pair of foremost contributors to the field, Bohr and Mottelson's three-volume *Nuclear Structure*, the likewise excellent first volume of which attempts to cover only single-