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-

particle motion. DeShalit and Feshbach's first volume successfully fills a need for coverage with insight and understanding, from the basic concepts to the more erudite applications, of most of the most important aspects of nuclear-structure theoretical physics. May the second volume, which is to be about nuclear forces and reactions, be as successful.

DeShalit did not live to see the volume completed. His death represents a deep loss to the many friends who found pleasure and inspiration in his bouyant spirit. Some of his keen insight survives in the book. That Feshbach has been able to carry on without him on so extensive and demanding an enterprise is a triumph of devotion.

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Astrophysics of Bizarre Objects

Physics of Dense Matter. Proceedings of a symposium, Boulder, Colo., Aug. 1972. CARL J. HANSEN and LORRAINE H. VOLSKY, Eds. Reidel, Boston, 1974. x, 328 pp., illus. $36.50. International Astronomical Union Symposium No. 53.

Most conference proceedings in physics reflect a "clash between two cultures"—usually between experimentalists and theorists. In this case all the contributors are theorists; the contest is between physicists providing basic information and astrophysicists applying it to bizarre objects. And even this contest is one-sided: the topics treated are such new additions to astronomy that even the astrophysical applications are mainly in the hands of theoretical physicists.

The "bizarre objects" under consideration are neutron stars, white dwarf stars, and the early universe, with neutron stars taking up most of the book. Another recent International Astronomical Union (IAU) symposium had dealt exclusively with white dwarfs, but the three papers on white dwarfs in the present book (Van Horn, Lamb and Sutherland, O'Connell) complement rather than compete with those presented there: Only aspects relevant to neutron stars are treated—in particular, the polarized radiation emitted from white dwarf atmospheres with very strong magnetic fields (though not as strong as in pulsars) and massive white dwarfs with strong differential rotation (encroaching on the unstable region between white dwarfs and neutron stars). Two short and intriguing papers on the birth of the universe (and repeated afterbirths) by Omnès and Ne'eman (and the obvious enthusiasm for the subject Cameron shows in his concluding remarks) only whet the reader's appetite for speculation on the early universe. Nevertheless, the preoccupation with neutron stars gives the book a unity of purpose (though not of style) that is rare in conference collections.

The neutron star story itself starts with a detailed and clear exposition of "orthodoxy": the nuclear composition and equation of state for cold matter at densities up to a few times nuclear density (Bethe, Negele). One even gets some feeling of how such calculations are carried out nowadays (Pandharipande). Minor controversies (Buchler) concerning these densities only reinforce the feeling that the most basic properties of medium-mass neutron stars are reasonably uncontroversial. Neutron star cooling (Tsuruta) and other questions involving superfluidity (Greenstein) are in a worse state, but there is still something resembling consensus—even the complex effects of super-strong magnetic fields are explained simply and reassuringly (Ruderman). When the discussion gets around to ultra-super-high densities, however, it appears that consensus on even qualitative answers is out of reach, no matter whether one asks about the presence or absence of pion condensations (Sawyer), about the crystalline or fluid structure (Canuto and Chitre, Kalman and Lai), or simply about the equation of state (Wheeler, Leung and Wang, Cohen and Börner and others).

The connection between observations and the deep interior of neutron stars is given only cursory treatment in the book. This is due in part to the absence of observational astronomers at the symposium, but largely to the fact that these subjects are still in a state of flux. Colgate sets the tone with a short and honest admission of how little we know about supernova implosions. Pines, Ruderman, and Shaham tell a beautiful story of the information the "glitches" in pulsar timing data provide concerning neutron star interiors, but it will take some time before this story is fully confirmed.

Considering that about two years have elapsed since this symposium on a fast-moving subject, it is surprising and gratifying that the proceedings volume is not out of date; some topics that are not included (such as neutron stars in binary x-ray sources) have become fashionable since the symposium, but very few of the chapters in the book have been made obsolete by more recent papers. Nevertheless, it is a pity that IAU symposium proceedings take such a long time to come out and are so expensive when they do. Paperback proceedings, produced sloppily but quickly and cheaply, are a much better idea. The beautiful printing on glossy paper without misprints is not worth doubling the price and the delay when the science itself changes so quickly.

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A Memoir in Physics

The World of Walther Nernst. The Rise and Fall of German Science 1864–1941. K. MENDELSSOHN. University of Pittsburgh Press, Pittsburgh, 1973. viii, 192 pp. + plates. $11.95.

Despite its title this is a very personal book. It had its origins in Kurt Mendelssohn's visit to his native city of Berlin in 1964 to help celebrate the centenary of Walther Nernst's birth. Mendelssohn, a distinguished low-temperature physicist at Oxford, had worked in Nernst's laboratory some 35 years earlier, when Berlin was one of the great centers of physics, made so by the presence of Einstein, Planck, von Laue, Schroedinger, and Nernst himself. This exciting scientific community, built up during the Wilhelmian era before World War I and continuing to flourish during the brief period of the Weimar republic, had been quickly destroyed and its members dispersed when Hitler took power in 1933. Mendelssohn's book is the result of his reflections on the rise and fall of German science. Since Nernst held a central position in German scientific life over a period extending from Bismarck to Hitler, from Helmholtz to Heisenberg, it was a happy idea of Mendelssohn's to make Nernst's career the guiding thread of his story.

Nernst was a remarkable scientist. Einstein, his colleague for 20 years, was impressed by Nernst's "creative productivity," his "rare mastery" of experimental methods and "sovereign knowledge" of experimental facts, but what really drew Einstein's admiration