The second volume, with the title "Molecule-Based Materials", is as expected strongly oriented towards synthetic aspects, and describes in 14 articles how organic and inorganic molecular units can be used to build the corresponding magnetic materials. Here an important role is played by organic radicals—aminoxy, triarylmethyl, and amine radicals—which can be used independently, as well as ligands in coordination compounds for the construction of magnetic materials. In addition, two organic systems—1) organic Kagome antiferromagnets based on aminoxyl radicals and 2) ferromagnetic charge-transfer salts based on fullerenes—which are interesting on conceptual grounds are described in concise articles. Further emphasis is placed in this volume on coordination-chemistry concepts for building magnetic materials of various dimensions: 1) high-spin molecules based on metal complexes and 2) one-, two-, or three-dimensional networks using azido or oxalato bridging ligands. A third focus deals with the so-called organic–inorganic hybrid materials, and particularly those systems based on metal hydroxides, metal phosphorus trisulfides, and metal phosphonates are described. In addition a chapter is also found on magnetic Langmuir–Blodgett films, which gives details particularly on the building of the corresponding hybrid materials. This volume would not be complete without an article on the theme of molecular bistability—valence tautomerism of dioxylene cobalt complexes—not least because this feature is of particular interest because of the possible applications of these types of materials for data storage. This volume is rounded off with a detailed article on the theory of the electronic structure of polynuclear compounds of transition metals and their magnetic properties. Here, after a good introduction to the basics, single case studies are given to illustrate what modern quantum chemistry can achieve in the calculation of magnetic properties.

In contrast to the first two volumes, the third volume with the title "Nanosized Magnetic Materials" has an introductory chapter of the same name that gives a very good overview of this theme and presents a rich source of references from the primary literature. The further chapters of this volume are essentially dedicated to two main focuses, both of which when taken alone reflect a great deal of the fascination and opportunities of modern magnetism. The first of these milestones is the discovery that single molecules in a layer can behave as individual magnets at low temperatures. The second milestone, which has already found practical applications, the development of metallic multilayer systems, is directly linked with themes such as spin electronics and colossal magneto resistance. In a further chapter the magnetic properties of metallic clusters and island structures on metal surfaces are described. In addition, this volume also contains a chapter somewhat outside the framework which describes the magnetic properties of transition metal Zintl phases.

Pleasingly each article is preceeded by a short introduction, which usually also facilitates entry of the nonexpert to the different topics. For this one must occassionally go back to the—however, extensively cited throughout—original literature, although a somewhat clearer or more detailed description would have been sufficient in many cases. I don't want this critical tone to be misunderstood, for while this book series was certainly not conceived as a lecture accommpaniment, it can in some cases offer advanced students a good entry to respective specialist areas. In any case, this book series is an excellent reference work for everyone working in the area of magnetism and as such should be available in the appropriate libraries.

This open book series sets its goal in presenting the newest results from all the areas of magnetism. The creation of this kind of forum for an interdisciplinary overview of the research area of magnetism was long overdue. These three volumes are a successful beginning.

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Understanding Chemistry. By *C. N. R. Rao*. University Press, Bangalore 2001. 298 pp., softcover Rs 190.00.—ISBN 81-7371-250-6

Professor C. N. R. Rao is a distinguished Indian chemist, a former president of the Indian Academy of Sciences and of the International Union of Pure and Applied Chemistry (IUPAC), currently president of the Third World Academy of Sciences, and a member of many other prestigious national and international academies. With all these duties in addition to his own research in solid-state and materials chemistry, his time and energy must be more than fully occupied, and it is therefore most commendable that he has managed to find time to write this little book for nonspecialists, intended "for high school students and others interested in an appreciation of chemistry". His purpose is clearly educative: to describe and explain the elements of chemistry in an introductory fashion and to show the relevance of chemistry to many current and future problems of our planet, particularly those of India.

The book consists of seven sections: 1. "Chemistry in a Capsule"—basic facts and concepts (atoms, molecules, states of matter, classification of substances, etc.); 2. "Elements and the Periodic Table"; 3. "The Chemical Bond"; 4. "Structures and Shapes of Molecules"; 5. "Chemical Energy"; 6. "Chemical Reactions"; 7. "Two Chemists"—biographical sketches of Michael Faraday and Linus Pauling, the two chemists who stand highest in Rao's scientific pantheon. In such a program, the choice of topics and the level of treatment must represent compromises and, of course, they mirror Rao's own interests. There are descriptions of several industrial processes, such as the production of metals from their ores and the Haber process. I learned that in Delhi there is an iron pillar that is free of rust after more than 1500 years. Of the two main trends in current chemistry, towards the biosciences or towards materials science, Rao's interests lie more in the latter direction, but he does not neglect bio-topics, particularly those connected with health and nutrition, and he includes simple, sober discussions of environmental problems, such as the greenhouse effect. On the

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whole, Rao has a hands-on approach, and at each stage he urges his young readers to carry out simple experiments and observe what happens: for example, add a small quantity of zinc powder to a solution of copper sulfate. In the final chapter there are recipes for making aspirin (from salicylic acid and acetic anhydride) and nylon fibres (from sebacoyl chloride and hexamethylene diamine).

I must admit that from the title I had expected a somewhat different content. No one is going to understand chemistry from reading this book. What it can do is to help the reader to understand what chemistry is about. Rao's book is definitely not directed towards readers of this journal, but if it encourages a single young person to pursue chemistry with anything like Rao's own enthusiasm and creativity, then it will have fulfilled its purpose.

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The Biological Chemistry of the Elements. By *J. J. R. Frausto da Silva* and *R. J. P. Williams.* Oxford University Press, Oxford 2001. 575 pp., softcover £ 39.95.—ISBN 0-19-850848-4

With this second edition the authors have provided a significant update to their 1991 textbook. That earlier edition has trained many students and researchers in the area of the biological impact of the inorganic elements. This new edition is even better than the original, both in terms of organization and content. It is easier than before to use as a textbook or as a reference source owing to the detailed indexing. It provides the most up-to-date and extensive compilation of operational concepts in bioinorganic chemistry of any single textbook available today.

The authors have retained the original structure of the text, which has two parts: six chapters on the physical and chemical factors that control the elements within living systems, and 12 chapters on specific groups of elements. Two other chapters (7 and 20) deal with networks of interactions and feedback within cells and between cells and the environment. These chapters are unique and are not found in any other popular textbook on bioinorganic chemistry. Chapter 7 provides a holistic approach to the operation of a cell, including internal spatial localization and timing of cellular functions. Chapter 20 extends this systems approach by further developing the concept of a total cellular "metallome" (free and chelated), which is in contact with the environment through exchange. The authors suggest how the metallome is integrated with the genome and proteome to create an interactive system that can compete for survival. The beginnings of evolution are suggested here.

Like the original text, this edition is not written in a traditional style based on structures or physical properties of isolated molecules found within a biological context. Instead the pedagogical style emphasizes the functional value of the elements in living organisms. Thus, the first seven chapters are organized in the form of a discussion of living systems as a network of flows of material, energy, and information, both within a structured cell and between it and the environment. The revisions to Chapters 9–19 focus primarily on including a section on the networking of interactions of the elements and on genetic control of the cellular molecules involved in the uptake and distribution of the elements.

The significant advances that have been made in determining the structures of the molecules of life are not uniformly emphasized in this new addition. However, this material is readily available to readers in the form of several monographs (including two handbooks of metalloproteins published in 2001 by Huber et al. and Bertini et al.) and databases (Braunschweig Enzyme Database (BRENDA); Protein Data Bank (PDB); PRosthetic groups and Metal Ion SitEs in proteins (PROMISE); Metalloprotein Database at Scripps; The Inorganic Crystal Structure Database (ICSD); The EF-Hand Calcium-Binding Proteins). With the additional help of these structure databases, the educator can present an up-to-date survey of bioinorganic chemistry using the new edition of this textbook as the conceptual framework for understanding how biological systems use chemical principles to thrive.

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Heme, Chlorophyll, and Bilins. Methods and Protocols. Edited by *Alison G. Smith* and *Michael Witty.* Humana Press, Totowa 2002. 340 pp., hardcover $ 125.00.—ISBN 0-896-29111-1

The "pigments of life" perform essential tasks as cofactors in many biological transformations. Their importance for the evolution of life on our planet and for maintaining the processes of life is overwhelming. Research into the structure, functions, and processes catalyzed by this extraordinary family of pigments has long fascinated many eminent scientists. Published results have described details of the variations in structure and the determination of biosynthetic routes, and many of the central proteins containing "pigments of life" as cofactors have even been crystallized. One can assume that the exploration of these pigments is now a mature field of research. The amount of knowledge acquired over more than 100 years is huge. It is probably correct to say that the research centered around the tetrapyrrole-based pigments is no longer the hot topic that it used to be. Nevertheless, many important fundamental questions are still unsolved, and tetrapyrroles have found an ever growing number of new applications. It is fair to say that research around the "pigments of life" continues, and the number of published papers is so great that no scientist is able to follow all the developments in detail. As in many other fields, monographs have been published regularly to help the newcomer and the experienced researcher. In particular, *The Pophyrin Handbook,* a ten-volume work, was published in 2000.

The book edited by Smith and Witty about natural tetrapyrroles is a collection of chapters written by 20 different authors and experts in the field. With just over 330 pages, it is obvious that one cannot expect a comprehensive treat-

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