of the origin, location, and gross and fine anatomy of the various lymphoid organs. Weiss considers the lymphoid tissues as vascular filters, consisting of a three-dimensional network of reticular cells and reticular fibers. Each lymphoid organ has its characteristic arrangement of reticular meshwork, attached to the internal surface of the organ. The bone marrow, which is the chief source of immunologically active cells, consists of cells which migrate away. If the cells migrate to the thymus they can proliferate there and acquire thymic-specific tissue antigens (T-cells). If, on the other hand, the cells migrate to the spleen, lymph node, or other peripheral lymphoid tissues, they can become potential antibody-forming (B-) cells. In many instances, the B-cells need the help of the T-cells before they can synthesize humoral antibody. The interaction between T- and B-cells, most likely, takes place in the peripheral lymphoid tissues, such as spleen and lymph nodes.

The exact role of the B- and T-cells during graft rejection and delayed hypersensitivity is less clear, but there is strong evidence that the T-cells may be the actual "killer" cells during cell-mediated immunity. The function of the B-cell in cell-mediated immunity is unknown.

In the second part of the book Weiss deals with the cell types which comprise the tissues described in part 1. First there is the macrophage, a wandering, phagocytic cell which, in many instances, makes the initial contact with the antigen. The antigen is "processed" by the macrophage and the processed antigen is capable of turning on the T- and B-lymphocytes, leading to antibody synthesis. The macrophage is also believed to be involved in cell-mediated immunity, but its precise role in this process is unclear. Weiss also describes the structure of the stem cells, thymus cells, and antibody-forming cells. The latter, because of their increased synthetic activity, possess an elaborate endoplasmic reticulum—a common feature for cells engaged in active protein synthesis. Schematic diagrams and electron micrographs or immunofluorescent pictures of the different cell types are shown side by side so that the reader, without effort, learns to understand cell structure.

Part 3 of the book deals with the nature of the immune response. A typical response to an antigen results in the initial production of an antibody (IgM) of large molecular size (19*S*), followed by a second class of antibody (IgG) of smaller molecular size (7*S*). Other classes of antibodies include IgA, a secretory immunoglobulin; IgE, an immunoglobulin involved in hypersensitivity reactions; and IgD, of as yet unknown function. The production of antibody decreases the level of antigen and eventually results in the cessation of antibody synthesis. When an organism is confronted with the same antigen for the second time, a secondary immune response occurs. This is manifested as a more severe immune reaction. The nature of the memory cell responsible for a secondary reaction is not clearly understood.

The book is well illustrated, with plenty of schematic diagrams to explain the light and electron micrographs. At the end of each chapter, the author lists a group of suggested references, with an explanation why the particular reference is considered pertinent. As a bonus, the book has a comfortable format with non-glossy paper and easy-to-read print.

BERTIE F. ARGYRIS
Department of Microbiology,
State University of New York
Upstate Medical Center, Syracuse

Health Hazard

Pulmonary Reactions to Coal Dust. A Review of U.S. Experience. MARCUS M. KEY, LORIN E. KERR, and MERLE BUNDY, Eds. Academic Press, New York, 1971. xvi, 216 pp., illus. $14. Environmental Sciences.

This book is welcome at a time when concern about coal workers' pneumoconiosis (CWP) is widespread. The editors' stated purpose is to give the current American view of the condition, to provide a reference point for legislation and control purposes, and to promote discussion among workers in the medical, scientific, and administrative fields. These objectives have been achieved by contributors whose distinction in many different disciplines indicates the extent of the work being carried out to control the hazards to health caused by the inhalation of airborne coal dust.

The book has three parts. The first deals with the historical background and emphasizes the development of the legislation affecting coal mines. There follows an authoritative account of the present state of knowledge concerning the dust concentrations currently prevailing in the working environment of American mines and the instruments used to monitor these. Clinical characteristics are considered in part 2. In this there are seven chapters, each concerned with a particular aspect of the problem. The account of the epidemiological investigations which have already been carried out and the chapter dealing with the development and use of the International Union against Cancer (U/C) classification of the radiological appearances of the pneumoconioses are particularly helpful. Part 3 deals with treatment and prevention and presents an outline of a number of studies in which the U.S. Public Health Service is currently involved.

Although the editors comment in their preface that "it would be premature to seek a greater consensus at this time," it is disturbing to find such large differences of opinion on what constitutes CWP. Thus we find on page 111 that the condition is defined anatomically, whereas on page 189 the definition in etiological terms is very much broader and appears to include cases of nonspecific airways obstruction with negative roentgenological findings. This latter definition is surely too sweeping, at least until such time as the contribution made by the inhalation of coal dust to the development of airways obstruction has been finally established. This very real difficulty, which contributes so much to the misunderstandings between groups concerned with the clinical and administrative aspects of the condition, might be overcome by the adoption of the definition presented at the fourth International Conference on Pneumoconiosis organized by the International Labor Organization in Bucharest in September–October 1971. This is similar in its essentials to the one given by Prendergrass and his colleagues on page 111. These authors stress the dominant role the radiologist should play in the diagnosis and elucidation of the natural history of the disease, but they do not perhaps lay sufficient emphasis on the difficulty of using the recommended radiological classification. The possible errors arising from observer variation in the interpretation of the radiographs are now well recognized and can be reduced, but a major and continuing effort to do so must be made.

The elucidation of the biological significance of the changes demonstrated in the radiograph is a task related to but distinct from the problem

of the role of inhaled coal dust in the etiology of chronic bronchitis and emphysema. In this context I liked Keith Morgan and Earle Shoub's apothegm (page 210) that the epidemiologist tends to study large numbers of subjects inadequately while the physiologist studies a few—usually the wrong ones—in great detail. Dare we hope that the insight thus revealed will allow workers in the United States to avoid the mistakes made so frequently in the past by their European colleagues who have attempted to draw conclusions of general validity using data derived from nonrepresentative populations? This book must be considered essential reading for all those who would investigate or learn about the health hazards produced by the inhalation of coal dust.

STEWART RAE
National Radiological Protection Board, Harwell, Didcot, Berkshire, England

The Chemistry of an Element

Sulfur Research Trends. A symposium, New Orleans, La., Feb. 1971. David J. Miller and T. K. Wiewiorowski, symposium chairmen. American Chemical Society, Washington, D.C., 1972. viii, 232 pp., illus. $11. Advances in Chemistry Series, 110.

Theoretically oriented readers will be interested in two complementary chapters in this book, one by Cusachs and Miller on semiempirical molecular-orbital calculations on sulfur-containing molecules, and the other by Van Wazer and Absar on ab initio linear-combination-of-atomic-orbitals, molecular-orbital, self-consistent-field calculations on H_2S, H_2SO, and H_2SO_2 with and without *d* orbitals' being allowed to the sulfur. Apparently, binding-energy data demonstrate the great influence of adding *d* character to the sulfur when oxygen atoms are present. The S–H bond seems to be surprisingly independent of the oxygen atoms. A chapter by Musher provides stimulating reading almost exclusively of a speculative nature on sulfur (IV) and (VI) (sulfuranes and persulfuranes).

I found the chapter by Schrauzer on the neutral metal complexes of 1,2-dithioketones, R·CS·CS·R, and enedithiols (the so-called metal dithienes) quite interesting. For the organic chemist, there are up-to-date discussions of the photolysis of thiols by Stanley, Henderson, and Pryor, of the addition of sulfur to olefins by Strausz, and of fluorinated polymers by Krespan, Brasen, and Cripps. The reactions of mercaptans with liquid sulfur, which can serve as model for other mechanisms in sulfur chemistry, are treated mainly from a kinetic standpoint by Langer and Hyne.

I learned a great deal from the chapter by Jolly on the structure of sulfur-nitrogen compounds and from the chapter by Wayne on sulfur and selenium chlorides and organochlorides. The behavior of the sulfur molecule is discussed in two chapters, one on the spectrum of sulfur and its allotropes, by Meyer, Gouterman, Jensen, Oommen, and Stroyer-Hansen, and the other on the influence of pressure and temperature on the structure of the sulfur molecule, by Vezzoli and Zeto. Several chapters deal with more specialized topics: amorphous chalcogenide alloys (Ward), electrical conductivity of liquid sulfur and sulfur-phosphorus mixtures (Steunenberg, Trapp, Yonco, and Cairns), and chemical-mechanical applications of elemental sulfur (Dale). Finally, a chapter on potential applications of sulfur by Fike rounds out this eclectic symposium on sulfur research trends. This material is well suited to the Advances in Chemistry Series, and the book is, in fact, one of the best in the series.

FAUSTO RAMIREZ
Department of Chemistry, State University of New York, Stony Brook

Vitamin B_{12}

Inorganic Chemistry of Vitamin B_{12}. J. M. PRATT. Academic Press, New York, 1972. x, 348 pp., illus. $18.75.

Vitamin B_{12}, perhaps the most interesting of all vitamins, is a cobalt complex of the porphyrin-related corrin system. Capable of forming stable organocobalt derivatives, and existing as such in one of its coenzyme forms, vitamin B_{12} continues to attract the attention of biological, inorganic, and organometallic chemists. Pratt's aim in this book is to summarize the chemistry of the vitamin from the "inorganic" side; accordingly, the book contains only relatively scant accounts of its biochemistry and biomedical applications. The book is directed to specialists in the field, biochemists, and coordination and organometallic chemists. The literature (about 450 references) is covered through 1969, but some more-recent references are given in an appendix.

The author, a student and former collaborator of R. J. P. Williams (Oxford), understandably emphasizes the contributions from his laboratory. For the specialist the book indeed provides a convenient summary of past work, some of it unpublished, from this group. It also is valuable as a collection of spectroscopic and structural data. For a more general readership its coverage and interpretational value are insufficient for unreserved recommendation. For example, the electronic structure of vitamin B_{12} derivatives is discussed often in terms of a crude ionic formalism which will be taken with the necessary grain (or more) of salt by those knowledgeable in the field but is likely to be misunderstood by others. On page 4, figure 1.3, the structure of coenzyme B_{12} is shown as if a 5′-deoxyadenosylcarbanion is coordinated to the Co(III) ion of the corrin. This formalism is recurrent in the book, but its pitfalls are not clearly indicated (the chemical properties of organocorrins are dominated by the ability of the cobalt atom to stabilize bonds to carbon with a high degree of covalency; ionic limiting structures contribute only to a minor extent). Considerable space is dedicated to effects associated with the attachment of other substituents to the corrin cobalt atom; these effects are discussed in terms of "cis- or trans-effects," although an explanation in less empirical terms would have been advantageous. Too much space is given to description and critique of earlier work. For example, half a page is consumed for a description of the Co–C bond cleavage of cyanoethylcobalamin, first reported in 1966. Pratt's critique of some aspects of this work is no longer justified in 1972. Perhaps the most serious shortcoming of the book is the almost systematic omission of the results of work on vitamin B_{12} model compounds and of the comparative information resulting from this work. This introduces a clear impression of some of the "personal preference and prejudice" (p. 8) which the author evidently has and needlessly narrows the scope of this book. Finally, the book was written at a time when much of the inorganic chemistry of vitamin B_{12} was in a state of flux; considerable portions of it are for this reason already obsolete.

G. N. SCHRAUZER
Department of Chemistry, Revelle College, University of California at San Diego, La Jolla