dietary carbohydrate and fat on protein metabolism; hormonal action and body protein distribution; and interaction of diet and hormones in the regulation of protein metabolism. This comprehensive and well-written chapter reflects the author's own long experience in, and contributions to, studies of protein metabolism.

The final chapter of this volume, "Elimination of nitrogen from the body," by J. B. Allison and J. W. C. Bird, includes consideration of the excretion of nitrogenous compounds via the three excretory pathways available to mammals—the kidney, the skin, and the gut. A section presenting the concept of nitrogen balance, and considering the above three excretory routes, completes this chapter and the first volume.

The second volume is concerned primarily with the role of protein in nutrition, and with aspects of protein metabolism in diseased states. Chapter 11, "An introduction to nutritional aspects of protein metabolism," by Munro, considers the measurement and quality of dietary protein and the assessment of protein requirements. Chapter 12, "The nutritive value of dietary proteins," by J. B. Allison, includes a discussion of the relation of the nutritive value of dietary proteins to growth and maintenance, the supplementary and complementary relationships of mixed protein diets, and problems of dietary protein depletion and repletion. Chapter 13, "Amino acid toxicities and imbalances," by A. E. Harper, deals with problems of amino acid imbalance and excess.

In chapter 14, "Protein requirements," D. M. Hegsted discusses the protein requirements of infants, children, and adults; pregnancy and lactation; and concludes with a section on amino acid requirements. K. L. Blaxter (Hannah Dairy Research Institute, Ayr, Scotland) prepared chapter 15, "Protein metabolism and requirement in pregnancy and lactation." Blaxter presents a section on protein synthesis in pregnancy and lactation, and then considers the comparative biology of pregnancy and lactation. The chapter concludes with detailed consideration of protein metabolism in pregnancy and in lactation. Chapter 16, by R. A. McCance and E. M. Widdowson, describes protein-metabolism requirements in the newborn. These authors discuss, in turn, growth and mother's milk, amino acid requirements, molecular protein metabolism (largely a consideration of the ability of the newly born to absorb antibody globulins), and renal function in relation to food and growth.

Chapter 17, "Protein metabolism and requirements in the elderly," by D. M. Watkin, includes discussion of plasma proteins as a measure of nutritional status, the effects of anabolic agents, protein requirements and allowance, protein withdrawal, amino acid requirements of the elderly, digestion and absorption changes with age, aspects of loss of cell function versus cell death, and nucleic acid metabolism in relation to the process of aging.

The last part of this volume is devoted to pathological aspects of protein metabolism, and begins with an excellent contribution by Munro—"A general survey of pathological changes in protein metabolism." These changes are summarized well, in tabular form, under six general headings: Abnormalities of Protein Metabolism in the Alimentary Tract; Changes in Intermediary Protein Metabolism Associated with Disease; Conditions Directly Affecting the Mechanism of Protein Synthesis; Changes in the Protein Metabolism of Individual Organs and Tissues; Protein Intake and Disease; and Effects of Treatment on the Course of Protein Metabolism. In chapter 18, "Anomalies of amino acid metabolism," L. E. Holt and S. E. Snyderman discuss these anomalies under two major headings: The Congenital Anomalies and The Acquired Disturbances of Amino Acid Metabolism. In chapter 19, "Physical injury and its effects on protein metabolism," D. P. Cuthbertson, a pioneer in the field of protein metabolism, presents a scholarly consideration of the nature of the inflammatory reaction, the general response to physical injury and the general disturbance of protein metabolism following this injury, physical injury in relation to endocrine function, and nutritional aspects of the injured individual.

"Protein metabolism and tumor growth" is the title of chapter 20, by G. A. J. Goodlad. The author describes the protein and amino acid metabolism of tumors, protein metabolism in precancerous tissue, the protein and amino acid metabolism of the tumor-bearing host, and the mechanism by which the tumor influences host protein metabolism.

Chapter 21, "Experimental protein-calorie deficiency," by B. S. Platt, C. R. C. Heard, and R. J. C. Stewart, describes with thoroughness investigations designed (i) to study the effects on animals of diets and regimens which in human subjects produce protein-calorie deficiency; (ii) to devise methods of defining the nutritional values of such diets and regimens; (iii) to attempt to equate the clinical and pathological conditions in man and experimental animals; and (iv) to determine the contribution of various nonnutritional factors.

Chapter 22, "Clinical aspects of protein malnutrition," by Viteri, Behár, Arroyave, and Scrimshaw, is divided into two sections: (i) Protein-calorie malnutrition in children and (ii) Protein malnutrition in adults.

The final contribution to this treatise, chapter 23, "Protein deficiency and infective disease," is by Scrimshaw. Consideration is given to the effect of protein malnutrition on infection and to factors that are determinants of this effect.

Each of these volumes contains its own subject and author index. The authoritative nature of each review, and the extensive bibliographies at the end of each chapter, make these volumes valuable sourcebooks for the many diverse areas that are discussed in this treatise. The volumes present a modern picture of the normal and pathological aspects of protein metabolism in mammals, with significant emphasis on man. One must view with awe and approval the enormous and valuable task that has been accomplished by the editors and contributors.

ABRAHAM WHITE
Department of Biochemistry,
Albert Einstein College of Medicine,
Yeshiva University

Powder X-Ray Analysis

Handbook of X-Ray Analysis of Polycrystalline Material. Lev Isoifovich Mirkin. Translated from the Russian edition (Moscow, 1961) by J. E. S. Bradley. Consultants Bureau, New York, 1964. xx + 731 pp. Illus. $35.

X-ray methods for the identification and analysis of crystalline substances are now widely used throughout the world in a great variety of studies. The use of computers is essential in crystal-structure investigations, but the powder method still requires a large number of tables, charts, and other

reference material. This handbook appears to be an attempt to collect all of the necessary data. There are 12 chapters, the first ten dealing with x-rays and the last two with electron and neutron diffraction. The arrangement is roughly in the sequence used by the x-ray analyst. There are hundreds of tables, graphs, and nomograms reproduced from many sources. Each section has a brief description and some key formulae, and a more extensive treatment is presented in some chapters.

To compile and organize such a large mass of material is an enormous task. For example, the author has included the Frevel papers on powder data published in the 1940's and early 1950's, the Sagel tables, the $1/d^2$ table from Azaroff and Buerger's book, and sections from *International Tables for the Determination of Crystal Structures*. (The original Russian book also contained a 126-page tabulation of the American Society for Testing Materials Powder Data File, but this was omitted from the translation.) Mirkin has thus produced the most comprehensive single reference source for the powder method, but the book falls far short of *International Tables for X-Ray Crystallography* in terms of format, attention to detail, accuracy, authoritative accounts, and other criteria. The *Tables* were prepared by a group of experts, each of whom was a specialist in the subject he covered, whereas Mirkin himself has attempted the ambitious task of covering the entire field. Consequently, there are many errors like the statement on page 521—"The counter slit must be fairly broad (about 1 millimeter) in precision measurements." Many of the formulae are difficult to use because frequently not all the symbols, units, or constants are explained or defined.

The selection of material for a handbook is governed by many factors, and it is unlikely that any two experts would agree on the material that should be covered. Mirkin has avoided this problem by including almost everything that has been published. Thus, all the Hull-Davey charts for indexing powder patterns are reproduced, but one glance at the overcrowded condition of these graphs indicates how useless they would be in practice. The use of other compilations rather than primary sources eases the task of the compiler, but may perpetuate errors. For example, the wavelength of $WL\alpha_2$ is given as 1.48738 angstroms instead of 1.48741 angstroms, an error carried over from the secondary source used (Sagel's *Tabelle zur Röntgenstrukturanalyse*). The wavelengths of Table 1-8a are incorrectly labeled A instead of kX.

Chapter 2 contains a description of Soviet x-ray equipment which will be revealing to Western readers. It is not possible to comment here on the designs except to note one example. The BSV3 Cu anode x-ray tube used in diffractometry is rated at 400 watts, one-fifth the permissible power of commercial tubes with approximately the same focal line dimensions available here.

The reader must refer to the references in the back of the book to find the sources of the material because the names of authors are not given in the text. The literature references contain numerous misspellings, and the names of the book publishers are generally omitted. The format is occasionally poor—for example, Table 2-11 should have been placed on one page. The translation is sometimes quaint—for example, "ball-ended legs." The price is about 3.5 times higher than the individual volumes of *International Tables for X-Ray Crystallography*. The original Russian volume may be of greater relative value to crystallographers in the Soviet Union than this translated edition will be to Western scientists who have much of this material available to them in original or better form.

WILLIAM PARRISH
Philips Laboratories,
Briarcliff Manor, New York

Organic Chemistry Series, Volume 2

Bridged Aromatic Compounds. Brandes H. Smith. Academic Press, New York, 1964. xii + 533 pp. Illus. $14.

This excellent book discusses in detail all aspects of the bridged aromatic compounds, of which the principal examples are the cyclophanes. The bridged ferrocenes are also discussed.

Compounds of the bridged aromatic series are of interest for many reasons, including the unique geometric situations found in a number of the systems, and a variety of transannular reactions and interactions that have been observed. Many of the systems are highly strained and more than a few of them provide real challenges to synthetic organic chemistry. Many of them also have been used as proving grounds for the critical evaluation of theoretical chemical principles. All of these matters are discussed fully, and it is difficult to find even very minor points of interest that the author has not unearthed and included in this volume.

The longest single chapter in the book, "Preparation," covers 160 pages and contains 436 references to the original literature. It is truly an exhaustive compilation of the synthetic methods available for the preparation of these compounds, and the discussion fully covers all of the ramifications and details that are of significant interest with respect to the synthesis.

Each of the next two chapters, "Chemistry of the bridged nucleus" and "Chemistry of the bridge," is about 50 pages long and contains more than 100 references. The space devoted by the author to each topic is approximately compatible with the amount of original literature (and in the original literature there is a good deal more on synthetic methods than there is on the chemistry of the compounds themselves). Several other minor chapters, which actually cover the available literature thoroughly, are entitled "Dissymmetry of bridged aromatics," "Ultraviolet absorption spectroscopy," "Infrared absorption spectroscopy," "X-ray and other structural studies," and "Nuclear and electron magnetic resonance studies." These chapters are well written and cover the literature thoroughly.

Finally, the book is concluded with 70 pages of tables, with 214 references, in which the author has attempted to list all of the known bridged aromatic compounds. I was unable to find any missing compounds among those with which I am familiar.

The book is well written throughout, and covers the area as well as I can imagine it being covered. The volume will serve as an excellent reference work for those active in the field, and its appearance will doubtlessly stimulate much further activity in the area.

NORMAN L. ALLINGER
Department of Chemistry,
Wayne State University