seems desirable, therefore, to maintain a flexibility of thinking in this regard, particularly in view of the very considerable limitations of the T network equivalent.

Chapters 10–13 consider small-signal design of high-frequency amplifiers and oscillators. This section discusses in detail some of the useful coupling schemes for band-pass and video amplifiers. The lack of a satisfactory high-frequency equivalent circuit and the importance of the "built-in" feedback of a transistor makes the value of some of this analysis questionable. Qualitative results can be obtained but little more. The discussion of oscillators is extremely meager.

In Chapter 14, the authors do finally point out some of the more general approaches to transistor circuits, but unfortunately many readers may never be aware of this since the material is introduced as an illustration of matrix analysis, a completely unnecessary sophistication.

Large-signal analysis of conventional amplifiers is presented in Chapter 7, and switching circuits are treated in Chapter 19. The power amplifier discussion concentrates on the grounded-base configuration, despite the equal importance of the grounded-emitter and collector configurations.

Despite the individual points criticized here this reviewer feels that *Principles of Transistor Circuits* is, on the whole, a good book. The material presented is readable, and it should serve the avowed purpose of introducing engineers familiar with vacuum-tube circuits to some of the possibilities and idiosyncrasies of transistor circuits.

ALAN B. MACNEE

Department of Electrical Engineering
University of Michigan

Chemistry and Biochemistry

Present Problems in Nutrition Research (in German, English, and French.) *Experientia,* suppl. I. Proceedings of the symposium held in Basel, Sept. 1–4, 1952, under the auspices of the International Union of Nutrition Sciences. F. Verzár, Ed. Verlag Birkhauser, Basel–Stuttgart, 1953. 312 pp. Illus. Sw. fr. 32.

Nutrition is unique among scientific disciplines for its catholicity. In its study of the requirements, digestion, utilization, and metabolic fate of essential and nonessential nutrients, it coincides with much of biochemistry and physiology and touches some parts of microbiology. In its quantitative aspects, it can be superimposed upon bioenergetics and with some aspects of environmental physiology. Because of its implications in nutritional, as well as degenerative, diseases and its relation to the problem of resistance to infection, it is of growing importance in medicine and public health. It is an essential basis of animal husbandry. Because nutrients must be translated into foodstuffs, food chemistry is an integral part of the science of nutrition. Because, in turn, these foodstuffs must be produced, procured, economically available, palatable, and acceptable, the nutritionist must possess some degree of familiarity with agriculture, canning, milling, and refrigeration techniques, and with the branches of economics dealing with the production and distribution of foodstuffs as well as with the buying power of consumers. He must know something of the statistical methods used in population studies, be acquainted with known facts on the psychology of taste, and recognize social and religious tradition determining food habits as well as legal practices governing enrichment and addition of chemicals to foods. Truly, the nutritionist can apply to himself the verse of Terence: *Humani nihil a me alienum puto.*

This universality is strikingly reflected in the volume summarizing the proceedings of the Symposium on Present Problems in Nutrition Research that was held in Basel. This book, ably edited by F. Verzár, presents some 20 talks given by well-known European nutritionists as well as the discussions that followed each talk. Particularly outstanding, in the opinion of this reviewer, were the presentations of Tremolières (Surveys of Food Attitudes and Habits); Cuthbertson (Microbiology of Digestion); Bigwood (Free and Combined Amino Acids in Foodstuffs); Karl Thomas (Utilization of Synthetic Fats); Abramson (Chemicals in Foods and Their Control by Health Authorities); Dam (Vitamin E as an Antioxidant); Folley (Practical Possibilities of Use of Hormones in Nutrition); Beznak (Relation of Dietary Fat to Work and Growth); and Demole and Cremer (Present-day knowledge of Dietary Role of Fluorine and Other Minerals). W. R. Aykroyd, the director of the Nutrition Division of the Food and Agriculture Organization, gave a lucid and comprehensive review of the nutrition work of FAO. A. G. van Veen, also of FAO, discussed the question of satisfactory protein sources for supplementary child-feeding programs, a point of great importance now that Kwashiorkor (protein deficiency syndrome) is emerging as the most urgent world-wide nutrition problem.

The book, attractively printed, represents an excellent cross section of present-day problems and is a valuable addition to the nutritionist's library.

JEAN MAYER

Department of Nutrition
Harvard School of Public Health, Boston

A Simple Guide to Modern Valency Theory. G. I. Brown. Longmans, Green, London–New York, 1953. 174 pp. Illus. $2.50.

Although this book was originally written by a master at Eton for use in English public (that is, private) schools by "advanced sixth form pupils," many chemistry students in this country, both undergraduate and graduate, as well as older chemists who wish to keep abreast of modern developments will find this slim volume of great usefulness. In a simple, mainly qualitative manner and with a minimum of mathematics, the author has presented a clear and concise account of modern valency theory.

A short historical introduction, tracing the development of the concept of valency from Berzelius and Dumas to the present, is followed by an outline of atomic structure, including a simply written but excellent chapter on the arrangement of extranuclear electrons. This is succeeded by a discussion of electrovalent, covalent, and

dative bonds, a detailed treatment taking up approximately half the book. Following this is a brief account of the experimental methods that support the theoretical development, simple discussions of resonance and hydrogen bonding, and finally a short chapter on molecular orbitals.

This book will serve as a much-needed bridge between the treatment of valency as it is now covered in undergraduate chemistry textbooks and the detailed, highly mathematical presentation in advanced works devoted entirely to the subject. As such, it is a real contribution to a more complete understanding of chemistry.

L. H. FARINHOLT
Department of Chemistry, Columbia University

Chemistry of the Lanthanons. R. C. Vickery. Academic Press, New York; Butterworths, London, 1953. 296 pp. Illus. $6.

Here, from the land of the leaping kangaroo and the fragrant eucalyptus, comes a worth-while book on the increasingly important rare earths, albeit under a banner carrying the somewhat lofty inscription "lanthanons." This new designation, proposed by J. K. Marsh, of England, is used in place of the traditional "rare earths," La to Lu, on the grounds that such elements are neither rare nor found only on our own spinning globe. Without wishing to stem progress or to thwart those eminent chemists who deem another more enchanting name to be desirable, this reviewer respectfully submits, in the interests of humble reason, that lanthanon comes from a Greek word meaning *escape notice.* Aside from this, lanthanon, as the author uses it, almost implies that the lanthanum in Australia has mystical pseudoscaler tentacles that keep it in constant touch with other rare earths in Brazil, Madagascar, India, Idaho, and elsewhere. But we are not here to curse a new name and the learned gentlemen who propose it, but rather to describe and praise the author's book.

To begin with, there is a fascinating chapter on the history associated with the discovery and separation of the rare earths. Both here and abroad, many of the noted chemists of the past, and in our own times, have had a hand in the often tedious work of discovery and isolation of these curious elements. Oddly enough, the uncertainty regarding their total number, and the effort spent on them, revolved for many years about the mistaken notion that each light absorption band indicated one element, "one band—one element"; an erroneous theory can sometimes be more fruitful than a correct one. During the last 15 decades or so, there were acrid disputes, evidences of coercion, and even sealed packets containing unrevealed information; there is an old south-of-the-border air about it all, and one finds it easy to imagine Mosander working feverishly, while Berzelius presses an unrelenting pistol to his back. *Tantaene animis caelestibus irae?*

The second chapter deals with the composition and occurrence of various minerals that contain the rare-earth elements. (Bastnasite is practically ignored.) Here one finds very informative graphs showing atomic abundances and mineral compositions. Stony meteorites and the sun contain several of the strange elements. Chapters 3 and 4 describe the principal experimental and theoretical studies of a physical nature made by chemists as well as by distinguished physicists. Valence states, magnetic properties, absorption and emission spectra, isotopic constitution, and electronic states are discussed briefly but still with enough detail to set the beginner, the amateur, and the professional on the right course. We are now up to page 64.

Then come several chapters on the many separation procedures, analytic methods, chemical properties of individual compounds when known, and on practical applications. These are matters close to a real chemist's heart, and, considering the wide variety of separation methods and techniques, each with its one or more virtues, the author does well in his presentation. Vickery himself has made important contributions to this field of endeavor, a field requiring patience, skill, and a stout heart. Separation techniques are undergoing constant improvement, and, perhaps even unbeknown to the author, it is now possible to purchase several high-purity rare-earth oxides at moderate prices; or, if one will sign enough papers, he may be favored by the loan of gram samples of the less abundant earths of an amaizingly high purity.

In an appendix, yttrium is advanced to membership in the rare-earth family, without protest or veto.

By and large the book is well and clearly written and contains numerous useful and up-to-date tables, charts, and references. If the author lapses at times into the unnecessary use of words of Latin and Greek origin, he is quickly forgiven when he presents in a straightforward and unaffected way difficult or obscure points of fact and theory. All this is highly refreshing. For we in the United States, although endowed with almost countless material blessings, show signs of regarding secrecy and evasiveness as a religion, a religion whose pagan rites are celebrated in a gold-encrusted temple furnished with an altar in which are locked samples of unmentionable isotopes; and at the altar stands, forever mute, a man who presses to his lips a document stamped in crimson with the now familiar warning. There one finds no Book, no Candle, no Bell, no Choir; only the ever mute figure at his pentagram-bedecked altar, unmoved by prayer, by reason, by errors, or even by the exasperated and raffish exclamations of another Trinculo.

DON M. YOST
Gates and Crellin Laboratories of Chemistry
California Institute of Technology

The Proteins, Vol. I, Parts A and B. Hans Neurath and Kenneth Bailey, Eds. Academic Press, New York, 1953. Vol. I, Pt. A: 548 pp., Illus., $12.; Pt. B: 567 pp., Illus., $13.

In the words of the editors, the purpose of this treatise is "to present a comprehensive, integrated account of the chemical, physical, and biological properties of the proteins." The present volume will be followed by a second one also to consist of two parts. Volume I deals with methods and with general properties of proteins as a class. Volume II will consider specific proteins, grouped according to their occurence or their functional similarity.

In recent years, the development of new tools of investigation has given tremendous impetus to research into the chemical composition and physical characteristics of the proteins. The task of providing a comprehensive account of recent progess is an imposing one. The editors have been fortunate in having the assistance of a group of 12 very able and active workers in the field. The joint efforts of the editors and contributors have produced a volume that is broad in scope and authoritative in its treatment.

In the opening chapter, J. F. Taylor presents a very comprehensive survey of methods available for the purification of proteins. The usefulness of the chapter is further increased by the inclusion of references to detailed isolation procedures for several hundred proteins. P. Desnuelle reviews the chemistry of amino acids and peptides. The description of specific group reactions is followed by an extensive discussion of hydrolysis of the peptide bond and the application of these methods to the determination of amino-acid sequences in proteins. A desirable note of caution in the interpretation of results is included. A general description, by G. R. Tristram, of methods for the determination of the amino-acid composition of proteins precedes an assessment of the specificity and accuracy of the various available techniques. Discussion follows concerning the somewhat disappointing results of studies that have attempted to correlate amino-acid composition with physical and biological properties. Barbara Low presents extensive x-ray investigations of the structure and configuration of amino acids, peptides, and proteins. Readers who are unfamiliar with x-ray techniques may not wish to follow her detailed description of crystallographic studies. They will find her general discussion of fibrous and corpuscular proteins, the section on the structure of amino acids and peptides, and the description of helical and nonhelical configurations to be of particular interest. Doty and Geiduschek, writing on the optical properties of proteins, include sections on photochemistry, ultraviolet and infrared spectroscopy, and the physical phenomena associated with nonabsorptive interactions with visible light. In a chapter on electrochemical properties, R. A. Alberty reviews the fundamental aspects of electrophoresis and of ionization of proteins and amino acids.

In volume I, Part B, J. T. Edsall examines the application of a wide variety of physical methods to the determination of the size, shape, and degree of hydration of protein molecules. Recent progress in the rapidly developing field of protein interactions is treated by Irving Klotz. Denaturation and the chemical modification of proteins are considered in chapters by F. W. Putnam. His second chapter, and R. R. Porter's chapter on chemical structure and biological activity, will particularly interest those workers who seek, in studies of protein structure, a solution to the puzzling problems of biological function.

The contributing authors have provided a broad background of fundamental theory in their fields of specialization and an up-to-date account of the scope and usefulness of current research. The applications of newly developed techniques have been stressed. Skillful editorial direction has minimized the overlap in coverage of related topics, and adequate cross references enable the reader to turn quickly to additional material in other chapters. The usefulness of the volume is greatly increased by the inclusion, in each chapter, of extensive references to the original literature. Excellent author and subject indexes at the end of Part B contribute further to the utility of this treatise.

JOHN I. WHITE

Department of Physiology
School of Medicine, University of Maryland
Baltimore

Synthetic Methods of Organic Chemistry: An Annual Survey, Vol. 6. W. Theilheimer. S. Karger, Basel, 1952. (U.S. distr.: Interscience, New York.) 401 pp. $12.90.

The sixth volume in the series that annually surveys new methods and improvements of known methods for the synthesis of organic compounds utilizes publications which appeared in the years 1949–50 with some references from 1951. As in the previous volumes, the author has considered largely the papers concerned with syntheses, which cannot be easily discerned from the indexes of the various abstracting journals.

Extending the system started by Weygand, the reactions are classified on a purely formal basis, such as the formation of an —O—H, S—H, N—N— bond, rearrangement, elimination and so forth. The author has thereby avoided the usage of names of reactions with which the organic chemist would be quite familiar. However, the clear description of the various symbols and abbreviations used to indicate the types of reactions enables the reader to become quickly acquainted with this system of classification.

A total of 911 abstracts appear in this volume. Most entries are accompanied by equations, followed by a short description of the synthetic method involved, the yields, and the literature source. This arrangement makes possible the rapid evaluation of a synthetic method.

It is hoped that the author will continue in this task of calling attention to the important contributions from the current literature regarding the syntheses of organic compounds.

HENRY FEUER

Department of Chemistry, Purdue University

Principles of Polymer Chemistry. Paul J. Flory. Cornell Univ. Press, Ithaca, New York, 1953. 688 pp. Illus. $8.50.

Considerable work has been done on the chemistry of polymers in recent years, and a very extensive literature has accumulated on the subject. One welcomes, therefore, any work that serves to condense, select, and generally reorganize the thoughts and developments in this great field of study. Paul J. Flory has done an admirable job in preparing his book on *Principles of Polymer Chemistry,* a task initiated while he held the George Fisher Baker Nonresident Lectureship in Chemistry at Cornell University in 1948.

Flory effectively points out that rapid progress in polymer chemistry did not begin until the concept of

macromolecules was accepted. For a long time, polymers were regarded as aggregates held together by unidentified forces of various kinds, and the idea that a polymeric material was made up of large molecules held together by the same kinds of valence bonds that exist in ordinary low-molecular-weight compounds did not receive early recognition. As soon as it was realized that the only essential difference between polymeric and ordinary molecules is size, rapid progress was made toward understanding the preparation and behavior of polymeric systems.

After an interesting historical background followed by definitions, Flory proceeds to tell how polymers are made, either through condensation or vinyl addition. His discussion includes a thorough treatment of the kinetics of condensation, free radical and ionic polymerizations. The author then turns to the important question of structure, the determination of molecular weights, the characteristics of nonlinear polymers, and the theory of gelation. The latter part of the book is concerned with chain configurations, the thermodynamics of rubber-like elasticity and polymer solutions, and, finally, the fractional properties of macromolecules which are important for understanding solution viscosities and diffusion. The book naturally reflects those topics in which the author has been most interested. However, since Flory's own research contributions and interests have been so extensive, the coverage of the book is very broad. In this connection, it should be mentioned that there is little reference to proteins, a subject of particular importance to those leaning toward biochemistry.

The latter part of Flory's book will be especially useful to physical chemists who should welcome his excellent summaries of the theories and properties of polymer solutions; the earlier portions should be useful to organic and physical chemists alike. On the whole, this reviewer was highly pleased with the book and can recommend it without reservation to anyone interested in the principles of preparing and characterizing polymeric systems.

FREDERIC T. WALL

Department of Chemistry and Chemical Engineering
University of Illinois

The Screen Projection of Chemical Experiments. E. J. Hartung. Melbourne Univ. Press, Melbourne, Australia; Cambridge Univ. Press, New York, 1953. 291 pp. Illus. + plates. $4.75.

We have come to expect scholarly monographs from our English friends, and this volume is true to tradition. It is full of new ideas for making lecture demonstrations more visible: 5-ft test tubes, gas bubbles a foot in diameter, 3-ft cathodes. The first 100 pages discuss projection equipment; the last 200 pages describe 250 projection demonstrations. An experimental index and a general index conclude the book. Figures and plates are excellent.

I prefer a practical to the pedantic approach for the first 100 pages. For example, a half-page reference to the Polaroid Corporation kit for projection of experiments with polarized light would be better than the discussion (pp. 34–49) of this subject. Or a five-page evaluation of commercial projectors, à la Consumers Research, would help the teacher far more than the 31 pages on principles of optics in projection and the 41 pages on equipment. May the author who, in this book, has demonstrated such complete competence in his field, spend some months on a traveling fellowship in the United States, Great Britain, and Germany evaluating commercial equipment and add this material as a new chapter in the second edition.

The scope of the demonstrations in the last 200 pages is best judged by citing a few. Experiment 8, Shadow projection of gases of different densities streaming into air; 15, Water in a dilatometer contracting upon cooling to 4°C, but expanding below that; 24, C.T. and C.P. of ether; 32, Thermal expansion of wire; 41, Speed of crystallization of some organic compounds; 46, Dimorphism of red-yellow HgI_2; 51, Efflorescence of $CuSO_4 \cdot 5H_2O$; 56, Isomorphous growth of $NaNO_3$ on calcite; 69, Optical activity of crystals; 70–95, Solubility experiments; 100, Color changes with $Ag_2S_2O_3$; 107, Crystals of $K_2Cr_2O_7$ oxidizing $FeSO_4$; 114, Solid particles in a candle flame; 147–8, Formation of osmotic cells of copper ferrocyanide and of silicates; 152, Migration of ions; 156, Swelling of a Pd electrode upon absorbing hydrogen; 161, Na formed by electrolysis; 162, Formation of ammonium amalgam; 182–215, Surface phenomena; 219, Formation of colloidal gold; 235, Development of the latent image; and 246, Line spectra of metals.

This is not the death knell of the conventional lecture demonstration—small classes will still prefer most of their experiments firsthand, not projected. But this will go a long way to help the teacher in large classes, particularly Messrs. Zabrisky and Zimmerman in the back row.

HUBERT N. ALYEA

Frick Chemical Laboratory
Princeton University

Biology and Biophysics

Plant Growth Substances. L. J. Audus. Leonard Hill, London; Interscience, New York, 1953. 465 pp. Illus. + plates. $6.50.

This volume by Professor Audus, of Bedford College, University of London, is an important new summary of our knowledge of the chemistry and physiology of plant growth. He has undertaken to bring up to date the subject first reviewed by F. W. Went and K. V. Thimann in their classical *Phytohormones* and by P. Boysen-Jensen in *Growth Hormones in Plants* nearly 20 years ago. In the interim, our understanding of the chemical mechanisms used by plants to control and integrate their growth has increased considerably.

A development of equal importance in this 20-year period has been, however, the application of our knowledge to agriculture. The manufacture of synthetic plant growth substances has become an industry; the application of plant growth substances has become an agricultural practice; and the study of plant growth substances has spread from the academic cloister to the industrial laboratory. We know how to supervise the development of the plant by sup-