for if we inspect the subtitle, we find "Reprints of selected papers 1912–1925." And I would recommend that all who have not read them do so. First, they describe various phases of the geomorphology of an area that few of us are fortunate enough to see. Second, they are the building up of the ideas that Cotton's students have carried beyond the borders of New Zealand and applied in other regions with considerable ability. Third, they are good reading.

Sixteen papers are reprinted, and I can see no good being served in listing the 16 titles with their sources. I compliment the Victoria University College in bringing together these 16 excellent papers in one volume and wonder if it was a birthday surprise for Cotton for his 70th year. I am sorry, though, that the original paging is lost.

E. WILLARD BERRY
Department of Geology,
Duke University

Physical Chemistry. Farrington Daniels and Robert A. Alberty. Wiley, New York; Chapman & Hall, London, 1955. vii + 671 pp. Illus. $6.50.

This new textbook is a successor to the long series of previous editions that were initiated by Frederick H. Getman in 1913 and continued by Farrington Daniels. Some new subject matter and new exercises and problems are introduced, and, in some instances, the order in which topics within a chapter are presented has been changed. The sequence and titles of the 20 chapters are essentially the same as in the last edition of Daniels' book. The text follows its predecessors' excellent example in that it has a number of exercises throughout each chapter that illustrate the more important principles in detail. References to original work and to more recent reference works have been brought up to date and many new citations are included.

Although adding new figures to the chapter on crystals, for instance a Fourier plot for maleic acid, is highly desirable, it apparently necessitated omitting other figures that were quite useful for class purposes, such as those illustrating interplanar distances. The addition of some figures and some rearrangement of topics, such as placing Onsager's conductance theory in the chapter on electrolytic conductance rather than in the chapter on ionic equilibria, make the teaching of the subject matter of these chapters somewhat more orderly. A brief discussion of the application of light scattering and the more extended discussions of diffusion and other physicochemical principles in the chapter on colloids are significant improvements.

The inclusion of the chemical potential and free-energy functions is a welcome addition, although use of the former may well have been illustrated in connection with the chapters on equilibrium. Tables of heats of formation, bond energies, standard entropies, standard electrode potentials, and so forth, have been revised, using the most recent values. The contraction effected in the appendix of this new textbook is more apparent than real since the essentials of much of the material deleted from the appendix of previous editions is incorporated in appropriate chapters. The omission of elementary subject matter that was included in earlier editions seems quite appropriate for, as the authors say, such topics are now generally handled adequately in prerequisite courses.

The fundamentals of physical chemistry are well covered, and experience with teaching this book's forerunner indicates that a radical departure in the new volume from the established pattern would hardly be justified at this time.

MARCUS E. HOBBS
Department of Chemistry,
Duke University

Chemical Engineering. vol. 2, *Unit Operations.* J. M. Coulson and J. F. Richardson. McGraw-Hill, New York; Pergamon, London, 1955. 975 pp. Illus. $9.

Of all the engineering disciplines, chemical engineering defies attempts at systematization. The range of the field is so great that the sort of continuity one expects in moving from one topic to another is impossible. These reasons, perhaps more than any others, explain the sort of treatment of chemical engineering given in U.S. schools under the catchall "unit operations." Now come two Englishmen who recognize that unit operations is exactly chemical engineering if we include a discussion of basic theory, as was done in volume I. One must admit that basic theory is a strongly unifying ingredient.

Coulson and Richardson have done a remarkably fine piece of work. Their first volume is superior to anything that has thus far appeared in the United States, and now the second volume presumably integrates the field. Unfortunately, this cannot be so. There must eventually be a third volume, because the discussions on the diffusional processes are not only sketchy but also are not sufficiently comprehensive.

Since the last chapter of volume I was devoted to mass transfer theory (with a single application), one had begun to look forward to what has long been needed in chemical engineering—a detailed analysis of the diffusional processes. This has not been done to the extent anticipated. Instead, a great deal has been written with reference to particulate technology—particle motion, sedimentation and fluidization, size reduction and classification. All these are, of course, needed and are better and more thoroughly done in the second volume than in several U.S. textbooks combined. But some day, a third volume must appear that will bring together the sections dealing with the diffusional processes. Then Coulson and Richardson will have settled once and for all what chemical engineering means and is.

J. M. DALLAVALLE
School of Chemical Engineering,
Georgia Institute of Technology

Biochemistry and Physiology

Biochemistry and the Central Nervous System. Henry McIlwain. Little, Brown, Boston, 1955. vii + 272 pp. Illus. $9.50.

This book is apparently intended for use as a textbook of neurophysiology and psychological medicine and, as such, it fulfills a valuable function in bringing students and workers in the general area of CNS research up to date on biochemical methods and findings in the field. Although in general, the author deals with the same material as is covered by the recent encyclopedic works on neurochemistry by Elliott *et al.* and by Waelsch, his treatment is necessarily far more concise but still sufficiently detailed for clarity. Many of the chapters contain well-documented, valuable summaries of quantitative data collected from various sources.

The chapter headings are "Biochemical studies of the brain," "Metabolism of the brain *in situ*," "The chemical composition of the brain," "Metabolism of separated cerebral tissues," "Cell-free cerebral systems," "Glycolysis and an oxidative pathway," "Pyruvate metabolism," "Oxidative phosphorylation," "Amino acids and cerebral activities," "Vitamins and the central nervous system," "Cerebral lipids," "Cytochemical and histochemical aspects," "Chemical and enzymic make-up of the brain during development," "Acetylcholine, sympathin and related substances," "Depressants and excitants of the central nervous system," "The speed of chemical change in the brain."

It seemed to me that the discussions of general metabolic processes in the brain—for example, glycolysis and the tricarboxylic acid cycle—although quite adequate themselves, did not emphasize sufficiently that these, or closely related reactions, occur in other mammalian organs as well as in some microorganisms and plants. This suggests that the brain is not distinguished from the other organs on the basis of its gross energy-

yielding or synthetic reactions, but that these reactions supply the over-all potential for the very rapid ion-transport events that are probably responsible for its characteristic electric activity.

For this reason, perhaps, the interested reader is bound to feel some disappointment on reading any book of this type. It seems that, as yet, research at this level falls short of a biochemical "explanation" for psychological, or even neurophysiological, phenomena.

GORDON M. TOMKINS
National Institute of Arthritis and Metabolic Diseases, National Institutes of Health

Androgens. Biochemistry, physiology, and clinical significance. Ralph I. Dorfman and Reginald A. Shipley. Wiley, New York; Chapman and Hall, London, 1956. 590 pp. Illus. $13.50.

Experimental endocrinologists, biochemists, and clinicians will enjoy this reference volume as a source book of information on the androgens. There are 1852 references in this medium-sized book, which consists of four parts: (i) "Introduction," (ii) "Biochemistry," (iii) "Physiology," and (iv) "Clinical aspects."

The arrangement of the textual material is clear, concise and presented in an interesting manner. The four sections are further subdivided into 20 chapters: (i) "General aspects" and "Historical background"; (ii) "Sources of androgens," "Isolation and chemistry of androgens and related compounds," "Preparation of urinary extracts," "Assay of androgens and 17-ketosteroids," "Metabolism of the androgens," "Relative activities of androgens," and "Biological actions and interactions of androgens"; (iii) "Androgens and the embryo, intersexuality," "Actions of androgens on sex structures of animals," "Androgens and behavior," "Influence on endocrine glands, other than gonads, and various non-endocrine glands," and "Influence of androgens on metabolism and enzymes"; (iv) "Normal puberal development in boys," "Conditions of androgen excess," "Androgen deficiency—hypogonadism," "Androgen therapy," "Androgen preparations and methods of administration," and "The excretion of androgens and 17-ketosteroids in various clinical conditions."

Immediately following a very comprehensive review of the clinical aspects of the androgens is an appendix containing "Names and structural formulae of compounds," "Preparation of urinary extracts for 17-ketosteroid and androgen assay," "Androgen bioassay methods," and "Chemical assay methods."

It is apparent that the authors have an excellent appreciation of the literature on this subject, and their survey of the basic and clinical literature, collated in an interesting fashion, should prove useful to the busy investigator. The combination of a basic scientist and a clinician adds considerable merit to their unbiased treatment of the subject matter.

This reference book is so heavily laden with information that the two unqualified statements I observed should be cited only for academic reasons devoid of any tones of criticism. On page 4 it is stated, ". . . the adrenocorticotropic hormone (ACTH) is essential for the full function of the adrenal cortex . . ." Robert Gaunt [*J. Clin. Endocrinol. and Metabolism* **15**, 621 (1955)] states that "Although the mechanisms which regulate the secretion of aldosterone are not yet known, one important fact is all but certain: aldosterone is not under the complete and direct control of ACTH, as are the other major corticoids." Therefore, according to Gaunt, it seems inadvisable to say that "ACTH is essential for the full function of the adrenal cortex." Further evidence bearing on this point may be found in Gaunt's paper. On page 16 the authors refer to a "female prostate." The term is incorrect, and it is believed that they are referring to the urethral glands including paraurethral ducts, a structure in the female that is homologous to the male prostate [H. Morris, *Human Anatomy,* J. P. Schaeffer, Ed. (Blakiston, New York, ed. 11, 1953), pp. 1565, 1567–1568].

In the final analysis, it is my opinion that the authors should be congratulated in bringing 1852 references together on the androgens. They have used these references well in writing their volume. This book could be greatly improved by the inclusion of more photographic material and by the citation of reviews, both of which could serve to highlight information that is at present documented elsewhere.

JOSEPH T. VELARDO
Department of Anatomy, Yale University School of Medicine

Immunology and Serology. Philip L. Carpenter. Saunders, Philadelphia–London, 1956. vi + 351 pp. Illus. $6.50.

This is the latest addition to a field in which, as the author points out, there is a shortage of textbooks. It will be the more welcome because knowledge of the subject is growing rapidly, and numerous significant advances have been made not only since the publication of the second edition of Boyd's book in 1947, but also since the publication of Raffel's book in 1953.

The book has many other virtues. For one thing, it is smaller than either of the other two books, and thus perhaps better adapted to the needs of students in the invariably abbreviated courses in immunology that are available in our medical schools. It shows throughout the signs of having been written to accompany a course that emphasizes laboratory serology. Among the attractive features are a clear discussion of the physical properties of the serum proteins that is liberally illustrated with electrophoretic and ultracentrifugal diagrams, a discussion of plasma fractionation, good accounts of the current theories of antibody formation, a rather full account of the phylogenetic applications of the precipitation reaction, and a good account of complement fixation.

The subjects that must be discussed in such a book are pretty generally agreed on, and it comes as no surprise that the chapter headings are, respectively; "Infection and immunity," "The immune reactions," "Antigens," "Serum proteins," "The production of antibody," "The antigen-antibody reaction," "Precipitation," "Agglutination," "Isohemagglutination," "Toxins and antitoxins," "Phagocytosis," "Cytolysis and complement fixation," "Antiviral immunity," "Allergy," and "Experiments in serology." This last chapter constitutes a brief laboratory manual.

Some omissions, doubtless deliberate, render the book less attractive for certain purposes. There is little account of the actual operation of immune mechanisms in disease; there is only fragmentary discussion of the use of serological methods in the diagnosis, treatment, and prevention of specific diseases; and the chapter on blood groups is rather incomplete. However, without these and other omissions the book could not have been kept down to its attractive size.

There are some debatable statements. On page 22, the discussion seems to ignore the abundant modern evidence that the "unitarian" theory is a great oversimplification; on page 46, old work on the role of lecithin and cephalin in precipitation, which has not been confirmed, is presented without comment; on page 84, the probably nonexistent nonspecific anamnestic reaction is presented as well established; and on page 179, it is stated that "most (Rh) typing serums in use today contain blocking antibodies, so saline must not be used as a diluent." The first part of this statement is true, but the second exactly reverses the consequences of this fact, which are that saline *must* be used as a diluent. Throughout the book, the author writes *haptene* instead of Landsteiner's actual (English) neologism *hapten,* which he meant to sound analogous to *antigen.* In this particular matter,