

alloys—a subject of considerable current interest—receive but scant attention.

The characteristics of chromite which are responsible for its refractory properties, as well as the processing of the ore to refractory products and the specific applications, are discussed in excellent detail in the final section of the monograph. The volume is thus a handy reference book for those interested in furnace linings and similar applications.

From an editorial standpoint, it is apparent that the individual chapters are by different authors. Some are excellently well edited, while others need more careful editing and proofreading.

In general, this is an excellent treatise, though it is somewhat weak, for a 1956 publication, in its coverage of the most recent developments.

L. L. WYMAN

National Bureau of Standards

### Energy and Structure in Psychoanalysis.

Kenneth Mark Colby. Ronald Press, New York, 1955. ix + 154 pp. Illus. \$4.50.

Books on psychoanalysis usually deal with its clinical theory; the most comprehensive one, Fenichel's, indicates this limitation by its title, *The Psychoanalytic Theory of Neurosis*. There exists, however, a fragmentary—yet consistent—general theory of psychoanalysis, which comprises the premises of the special (clinical) theory, the concepts built on it, and the generalizations derived from it. Since this general theory deals with what in Freud's time was *beyond* the scope of academic psychology, and since in relation to the clinical one it is a metatheory, it was named *metapsychology*. It is hardly ever mentioned in books written for nonspecialists; even books written for the specialist seldom do more than touch on it.

In the battle fought over the special theory, the foundations Freud laid for the general theory were scarcely noticed by the antagonists, and its adherents seem to have been too busy to systematize, develop, or use it. Only since the late 1930's has interest in it slowly revived. It is quite possible that the gap between experimental psychology and psychoanalysis, which has remained unbridged in spite of ever-increasing rapprochement, mutual interest, and much earnest work on both sides, is due in part to the undeveloped state of the general theory. It has happened before that the integration of two branches of a science was delayed until the theory of one or both reached a sufficient level of generality. Be this as it may, the special (clinical) theory of psychoanalysis remained all but intractable to the meth-

ods of experimental psychology, although the weight of amassed observations is such that the validity of the core of this theory can no longer be questioned.

Kenneth Colby's small volume focuses on the general theory. It is directed "not only to psychoanalysts, but to all theoreticians of those fluid borderlands between the psychological, biological, and sociological sciences" (p. v) and calls general attention to those rarely studied writings of Freud, which are the major sources of this general theory: the "Project for a scientific psychology," the seventh chapter of *The Interpretation of Dreams*, "On narcissism: an introduction," and "The unconscious." The book has two further merits. First, it tackles some of the thorniest problems of metapsychology: for example, the relation between energy and structure, and that between thought (meaning) content and function. Colby's treatment of both of these suggests interesting theoretical possibilities. Second, for the few who are conversant with metapsychology, there are many ideas, intuitive perceptions, and hints between the lines.

Considering that this volume has—as it were—no predecessors, it is a bold undertaking. It is to be hoped that it will be read, that it will stimulate specialists to work in metapsychology, and nonspecialists to begin to discover a different aspect of psychoanalysis from that to which they are accustomed.

Yet the volume's importance is matched by its inadequacies. It consists of two parts: one attempts to review Freud's metapsychology and the models it is built on, the other to suggest a different model replacing Freud's.

The weaknesses of the first part are rooted in its being scarcely more than a preparation for the second. The presentation of Freud's metapsychology is, to say the least, incomplete. For example, only two of his "Papers on metapsychology"—"On narcissism: an introduction" and "The unconscious"—are even mentioned. The work of other students of metapsychology fares no better: outstanding ones like Hartmann, Kris and Loewenstein merit only two references; Hartmann's major study, "Ich-Psychologie und Anpassungsproblem" ("Ego psychology and the problem of adaptation," is not referred to. Ill-informed passages and misunderstandings are embarrassingly frequent. Still the book gives the impression of serious intent handicapped by lack of tradition rather than by carelessness or malintent.

The principal aim of the book—to replace Freud's outdated and mechanical models with a modern and dynamic one—is not realized. While Freud's theory is mechanical in its trappings and dynamic in its core, Colby's is dynamic in its intent but becomes mechanical in its

execution. Yet Colby does introduce the reader to Freud's reflex, tension-reduction, and id-ego-superego models as well as to his own cyclic-circular model. The topographic reflex model represents the course of excitation, in the psychic apparatus, from perceptual stimulation to motor action. The economic tension-reduction (pleasure principle) model represents the tendency of psychological processes to prevent and to reduce tension accumulation. The structural id-ego-superego model is familiar. Colby's own model is an attempt to replace these three models by a single one and to cope more adequately with the problem all these models are designed to solve: the integration of motivations and past experience with current environmental input. It is not possible to discuss here the many cogent points Colby makes in regard to the nature of this integration or to analyze the shortcomings of his treatment of Freud's models or the inadequacies of his own model. The book's main weakness can be revealed, however, by raising the questions: What can we gain by replacing the models of a theory which has not yet been systematized and whose limits of usefulness have not yet been explored? Can one, under these conditions, hope to demonstrate which model is more parsimonious or more powerful? What can be taken as an answer to these questions in Colby's book is singularly weak. And yet, even in this respect there is something to be said for his bold attempt: it might contribute toward weakening an orthodoxy which discourages attempts to take a new look at Freud's theories.

To the specialist, the book as a whole conveys two emphases. It stresses the need for unfettered theoretical speculation and the need to keep in harmony with the conceptions of present-day science (particularly physics). Both these emphases are justified.

But in regard to the first emphasis, Colby fails to show how the empirical data of psychoanalysis can impose discipline on free speculation. This lack will certainly limit the impetus the book can give to systematic theory-building in psychoanalysis, and it may well repel the nonspecialist, leading him to the conclusion that this general theory, just like the special one, lacks that ingredient of cohesion and discipline which makes theories amenable to empirical decision.

The second emphasis consists of frequent references to specific concepts of present-day physics, but no attempt to introduce them systematically to the specialist is made. The nonspecialist in turn may be taken aback, both by the frequency of these references, which may sound to him like lip service, and by the lack of exposition, which may make him wonder how well-digested these concepts

of physics are and how relevant the link (or how premature the jump) to psychological concepts is. As an introduction for the nonspecialist, the book flounders on an obstacle common to such an attempt in any science: it fails to make the relevance of the theory to observations plausible.

It would be regrettable if, in spite of these shortcomings, this book were not read. What it deals with is at least a possibly—and to my mind, probably—crucial frontier of *psychology's* development into a unified science. Clinical psychoanalysis is in many ways a self-contained specialty, but psychoanalysis at large is psychology. It is a psychology built to account for vital phenomena of human behavior, not tackled by those theories which arose from experiments. Metapsychology holds the promise that it can bring this psychology to a level of theoretical generality where its unification with experimentally derived theories, or at least its experimental verification, will be possible [see *Theoretical Models and Personality Theory*, D. Krech and G. S. Klein, Eds., and *Systematic Resources of Present-Day Psychology*, S. Koch, Ed.]. Though this promise may prove to be an illusion, still it must be given a try. Colby's book is a contribution toward making such a try possible. Its shortcomings cannot be overlooked, but they can be accepted as reflections of the present state of psychoanalytic metapsychology and of psychology at large.

DAVID RAPAPORT

Austen Riggs Center

**Recent Advances in Science.** Physics and applied mathematics. Morris H. Shamos and George M. Murphy. New York University Press; Interscience, New York, 1956. 384 pp. Illus. \$7.50.

This volume includes papers that were presented at a symposium on recent advances in science, held at New York University in the spring of 1954 for representatives of industrial, government, and university laboratories. Although the volume did not appear until nearly 3 years after the symposium, it represents an important addition to the library of review articles in major fields of physics. The contents and distinction of the book are probably best shown by a simple listing of the chapters and their respective authors: "Methods of applied mathematics," Richard Courant; "The future of operations research," Philip M. Morse; "Atomic structure," I. I. Rabi; "Microwave spectroscopy," C. H. Townes; "Nuclear structure and transmutation," H. A. Bethe; "Elementary particles," V. F. Weisskopf; "Electronuclear machines," Leland J. Haworth; "Neutron physics,"

Norman F. Ramsay; "Transistor physics," William Shockley; "Ferromagnetism," R. M. Bozorth; "Cryogenics; very low temperature physics and engineering," F. G. Brickwedde; and "Physics and the engineer," Edward U. Condon.

A. V. ASTIN

National Bureau of Standards

**Handbuch der Physik.** vol. VII, *Crystal Physics 1*. S. Flügge, Ed. Springer, Berlin, 1955. vii + 687 pp. Illus. DM. 122.50.

*Crystal Physics 1* consists of four long articles: "Crystallography," by Heinz Jagodzinski, of Würzburg (103 pages); "Lattice theory of the mechanical and thermal properties of crystals," by Günther Leibfried, of Göttingen (221 pages); "The specific heat of solids," by M. Blackman, of London (58 pages); and "Theory of crystal imperfection," by Alfred Seeger, of Stuttgart (282 pages). These are followed, as is usual in the *Handbuch der Physik*, by subject indexes in German and English. Blackman's article is in English, the other three are in German.

The first article develops the subject of possible crystal lattices from the standpoint of symmetry operations. Tables compare the notations of different authors. Next, the geometric character of the different properties is treated, then the external geometry of crystals. Finally, the connection between chemical formula and crystal structure is discussed from a qualitative standpoint.

Leibfried's article is, so to speak, a new, more profound edition of Born's pioneer work. Although it has not been possible for him to present all the details, Leibfried always gives the fundamental quantum-mechanical equations, which consider the crystal as made up of nuclei and electrons, and indicates how one gets from that point to the coarser treatment which considers whole atoms or ions as the building stones. The different types of energy interactions are described, and the successes and the difficulties that are encountered in explaining why a particular substance has a particular lattice are indicated. Next, the lattice theory of deformation and stresses is given and compared with the continuum expressions. A very useful feature here is the tabulation of constants for simple lattice types (that is, expressions of elastic constants through intermolecular spring constants). The equations of motion from which the lattice vibrations are calculated are a consequence of the preceding theory. Then follows the discussion of the more subtle case of ionic crystals and the coupling between lattice wave and electromag-

netic waves, but crystal optics is not treated in detail. The thermodynamic properties are next taken up, and here there is some duplication with the next article. There follows an interesting discussion of the non-Hooke's law terms, which are responsible for heat expansion and thermal conductivity. The lack of a complete theory is emphasized.

Blackman has specialized for many years in calculating the distribution function of lattice vibrations, which governs—although not very sensitively—the specific heat. He develops here the methods which have become recently available but emphasizes that each case demands a separate calculation. In the simplest approximation one uses a Debye function, but, to get agreement with lattice theory and experiment, one must allow the "constant" Debye temperature to vary with temperature. In polyatomic crystals, Blackman always uses, in this approximation, pure Debye functions, not, as is often done, sums of Debye and Einstein functions. Detailed comparison with the experiment are made.

The subject of crystal defects has been developed only in recent years; there exist only a few coherent presentations that are as detailed and extensive as that of Seeger. Crystal defects are divided according to their dimensions into those of zero dimensions—empty lattice places, dislocated atoms—and those of one or two dimensions (dislocations, grain boundaries). The former may be a result of thermal equilibrium, and a detailed treatment is given of their number, heat of formation, and migration (diffusion). Those of the second kind are responsible for the diminished mechanical strength of crystals. They may be line dislocations, which wander under the influence of stresses and produce slip, or screw dislocations, which are important in crystal growth and are, in fact, decisive for the growth of ionic crystals.

In the whole volume, the printing is excellent and there is an abundance of illustrations. These are particularly valuable because so many geometric questions are discussed; in addition, many experimental results are presented graphically, especially in Blackman's article. The proofreading must have been exceptionally careful; I cannot remember having noticed any printing errors.

In one point, at least, some of the articles differ from those in the first two editions of the *Handbuch*. The latter tried to give a complete bibliography of their subject, so that it was sufficient for a research worker to take the *Handbuch* as a starting point and search the literature for only about a year prior to the publication date. Obviously, as a matter of policy, the present encyclopedia treats this problem differently. This is illustrated in the present volume.