more important gaps in present knowledge—what geographic areas have not been sufficiently explored and what unsolved problems exist in the better known areas. Illustrations are limited to a few geologic cross sections, detailed maps of small areas, and maps designed to correct or to supply more detail to the large map. The list of references at the end of each chapter is short, but includes papers to which an interested reader can turn for more complete bibliographies.

The volume holds to its purpose as a handbook, attempting no more than a concise description of the rocks and structural features shown on the map. There is no effort to synthesize an over-all picture of the geology of South America or to relate South American geology to the rest of the world. This means that the book is hardly suitable for reading from cover to cover by anyone without previous knowledge of South American geology and place names. But as a reference book it is excellent, providing an authoritative and convenient means of getting information quickly about the geology of any South American country.

KONRAD B. KRAUSKOPF
Stanford University

Handbuch der Physik. vol. XIX, *Electrical Conductivity,* 1. S. Flügge, Ed. Springer-Verlag, Berlin, 1956. 411 pp. Illus. DM. 82.

This volume is one of a series constituting the *Encyclopedia of Physics* edited by S. Flügge. It consists of four chapters. Each chapter is beautifully done with very little overlapping of subject matter. Some overlapping is found: J. C. Slater's figure 42 and Harry Jones' figure 4 illustrating the displacement of the electronic wave packet when a metal is subjected to a potential gradient are the same but with different notations. Other cases of repetition appear but these are, in general, necessary for a complete treatment of the subject and are helpful to the reader.

The volume opens with a thorough treatment of the electronic structure of solids (136 pp.) by Slater, and may be considered a discussion of methods of solving Schrödinger's wave equation for a crystal consisting of nuclei and electrons. Slater chooses typical solids to illustrate the principles involved in finding the potential in which an electron moves and treats in detail the periodic potential problem. He traces this from the free-electron theory, through the tight-binding and cellular approaches, to the augmented plane-wave method and shows the limitations or advantages of each. He is very lucid in pointing out that the free-electron approximation, although it appears to agree with more elaborate methods of calculation especially in describing conductivity, is not a true representation of the situation. Slater also carefully points out that the complete solutions are involved and have not been carried through in actual cases, although he sees hope for this in the advent of modern digital computers.

Slater's treatment of electric conductivity hits the high points. He outlines the relation of energy-band theory to electric conductivity, to semiconductors, and discusses the impurity problem. He closes his chapter with a treatment of electron interactions and discussions of chemical bonds and magnetic properties of solids.

The second chapter (90 pp.) by A. N. Gerritsen deals with the conductivity of metals. The emphasis is on experimental methods and results. He discusses the effects of melting, pressure, lattice defects, magnetic transformations, and impurities on the electric resistivity of metals and gives correlations between conductivity and atomic numbers and electronic configuration of the elements. His discussion of the conductivity of anisotropic metal crystals permeates the whole chapter and is generally good. However, on page 140 he states that experimental results for a polycrystalline material agree with Voight's equation and yet on page 155 he states that no experimental values are available for polycrystalline material. Apparently, Gerritsen's view is that all metal crystals are quasiisotropic. This chapter's great merit lies in the compilation of accepted values for resistivity and temperature coefficients of resistivity of metals.

In the third chapter (89 pp.), Harry Jones gives a thorough mathematical treatment of the theory of electric conductivity including thermal conductivity. He discusses the statistical and wave theories of conduction and proceeds to calculate the resistivity of a metal based on the Debye and Einstein solid models. He discusses the thermoelectric and galvomagnetic effects. Also he does not overlook a discussion of the anomalous skin effect where the electronic mean free path exceeds the classical skin depth. This chapter is highly mathematical and profuse with derivations but is an ideal companion for Chapter 1.

The volume closes with photoconductivity (80 pp.) by G. F. J. Garlick. This chapter is written clearly and the various diagrams illustrating the conduction band, the filled band, the Fermi limit, and the forbidden gap for the electronic energy-band of a crystal are excellent, indeed. His discussion of the barrier-layer theory of photoconductivity is especially good. The photovoltaic and photo-electro-magnetic effects are also discussed. This chapter closes with a discussion of the photoconductivity of specific solids, inorganic and intermetallic compounds, and organic systems. Nearly all materials of commercial import are considered.

This volume is highly recommended to those interested in the theory of solids. The electronics engineer would also do well to have this book as a reference. The book is especially valuable in that it indicates gaps in our knowledge and points the way for further research on the solid state.

WALTER J. HAMER
National Bureau of Standards

Psychology of Industrial Conflict. Ross Stagner. Wiley, New York; Chapman & Hall, London, 1956. 550 pp. Illus. $8.

Using the thesis that "wars begin in the minds of men; so do strikes and other forms of industrial conflict," Ross Stagner has attempted to construct out of the materials of psychological research a consistent theoretical framework for the analysis—and possible amelioration—of industrial conflict. Drawing upon his extensive experience and background in psychology and as a member of the Institute of Labor and Industrial Relations of the University of Illinois, he has performed an invaluable service in collating and organizing a great number of empirical studies in the field and of challenging both management and union people—those who have the motivation and background to stay with a complex treatise frequently written in technical language!—to reexamine their own insights and conclusions concerning management-union relations. But the framework itself seems to have only limited applicability to the problems at hand.

Although he does not deny the relevance or usefulness of the "macroscopic" approaches of sociology and economics, Stagner's framework is emphatically that of psychology—of individual psychology—and its principal structural members are the concepts of perception, motivation, frustration, and aggression. Although these concepts, as developed in recent research, do illuminate some small aspects of the problem, their overall inadequacy for the purpose of consistent analysis is reflected by the extent to which reference to them is absent from the treatment of major areas of concern.

The first six chapters develop the concepts of perception, motivation, and frustration and aggression, and the application of the psychological principles in these areas to management and union groups. Two succeeding chapters deal

with groups and group behavior (drawing upon group dynamics, sociometry, and industrial sociology), and the characteristics and identification of leadership. With these materials as background, the balance of the volume takes up institutions, management and union tactics, the accommodation process, the strike, cooperation, and industrial peace. A wealth of research is reported, but precisely in these areas the individual psychology principles either do not enlighten very much or seem to require undue straining of the facts. For example, in the treatment of management "tactics," it seems to stretch the point to analyze such procedures as job simplification, new machinery, time and motion study, employee testing, and so forth, as devices to afford management "ego gains," surely an incidental benefit if it occurs at all.

Although Stagner does not offer any prescriptions for its attainment, he seems to be, on the whole, optimistic about the possibilities for management-union cooperation and accommodation and industrial peace, which "is not an Utopian dream." All thinking men must agree with him that it can be achieved, however, only if the leadership is intelligent, informed, and mature. Whether these are virtues needed only or primarily by management leaders, as the author seems to imply, or perhaps by leaders on both sides of the table, and in government, is not yet clearly demonstrated. Furthermore, it sometimes seems that the leader and his perceptions may not so much shape the situation as the situation will permit a rise to leadership of the individual whose attitudes and perceptions fit the requirements of the situation.

I believe that Stagner's book is an interesting addition to the literature and worth the reader's time.

WILLIAM G. CAPLES
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Fire Research, 1955. H. M. Stationery Office, London, 1956 (order from British Information Services, 20 Rockefeller Plaza, New York 20). 57 pp. Illus. $0.72.

Since 1947, research on fire fighting and fire prevention in the United Kingdom has been carried on jointly by the Department of Scientific and Industrial Research and a committee formed by the insurance societies. The annual reports of the Joint Fire Research Organization provide a detailed and continuing record of the progress of this research. The most recent annual report, that for 1955, includes sections dealing with statistics of outbreaks of fires; fundamental studies of the initiation and growth of fire; results of tests on various fire-extinguishing agents; effect of fire on properties of concrete; structural aspects of fires in buildings; special fire hazards—for example, flammability of fabrics; and tests of fire-fighting equipment. A new committee to advise on research into industrial fires and explosions was set up during the year under review.

The National Academy of Sciences–National Research Council, acting on behalf of the Federal Civil Defense Administration, set up early in 1956 a Committee on Fire Research and a Fire Research Conference. Close liaison is being maintained between the British and the American organizations, and a paper on British fire research is to be read at the forthcoming Research Correlation Conference, organized by the academy.

Behavior Theory and Conditioning. Kenneth W. Spence. Yale University Press, New Haven, Conn., Geoffrey Cumberlege, Oxford University Press, London, 1956. vii + 262 pp. Illus. $4.50.

Spence represents psychology for the first time in the Silliman lectures. For this reason he begins with an essay on historical and modern conceptions of psychology. He traces psychology's struggle to become objective and defends the need for pure science research, even though it requires artificial and nonlife-like conditions of experimentation.

The remaining lectures represent a sample of psychology as science, the subject matter being that of laboratory learning and the method that of quantitative ordering of data in the context of theory. The background comes from the conditioning experiment made familiar by Pavlov and the kind of theoretical construction associated with the name of Clark L. Hull. Although Hull left his mark on a great many psychologists and other behavioral scientists who passed through Yale before his death in 1952, learning theorists look especially to Spence as the man to carry on where Hull left off. Those who were close to Hull and Spence know of their extensive correspondence about theory, and Hull in the prefaces to his major books referred to Spence's influence on his own theorizing.

In these lectures Spence has struck out on his own, acknowledging his indebtedness to Hull, but calling attention, too, to their differences. He has here brought to a head a number of suggestions that have appeared in his work during the past 20 years and has included much new analysis. The main differences in outlook between him and Hull are that Spence does not follow Hull's postulate system and the formal hypothetico-deductive method, he does not see the need for specifying a neurophysiological basis for intervening variables, and he does not commit himself on the mechanism of reinforcement.

Although in all the lectures there is a closely related interaction between data and theory, those already familiar with Hull's system will probably find Spence's treatment of motivation, especially the K factor, both the most novel and the most fertile in suggesting new lines of data gathering. The K factor refers to incentive motivation—how what happens in the goal-box affects what goes on in the next trial on the way to the goal. In rat learning, both the amount of the goal and the time spent in eating affect this subsequent behavior. According to Spence, the action is by way of motivation (K being added to D, the drive factor) rather than by way of an increase in habit strength (H), or by way of a separate process entering into multiplicative relationship with other factors. There are a number of implications systematically followed out by Spence, tested by data from his laboratory.

This is a major contribution, both to theory construction in psychology generally, and to learning theory specifically. It should help scientists from other fields to understand what psychologists are trying to do, and it should help psychologists to move forward toward the solution of their problems.

ERNEST R. HILGARD
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The Chemistry of the Coordination Compounds. John C. Bailar, Jr., Ed. Reinhold, New York; Chapman & Hall, London, 1956. 834 pp. Illus. $18.50.

This is a worthy addition to the long and distinguished Monograph Series of the American Chemical Society. Although its editors disclaim an attempt to cover the entire chemistry of coordination compounds in a single volume, a remarkably broad and excellent survey of this huge subject has, nevertheless, been accomplished. When we reflect that most of the elements in the periodic table, barring only the rare gases and some of the alkali metals, are known to enter into complex compounds, the vastness of the undertaking will be appreciated.

The first of the book's 23 chapters (there are 25 contributing authors) outlines the scope of coordination chemistry according to the donor properties of some of the more important ligand atoms: halogens, oxygen, sulfur, nitrogen, phosphorus, arsenic, and carbon. Especially