aspects must appear alternately, not as compromise. Since they do not lead circularly back to where they started, they provide an inescapable basis for dynamic change. Institutionalized opposition can also provide the analytical base to account for social change.

I have reservations about some of Blau's analytical tools. First, the central focus is on *social* exchange, which involves things given without explicit return obligation. Although some highly important aspects of social structure are competently developed from this base, which is essential to them, I strongly suspect that a more complete explanation will have to rest simply on *exchange*, whether social *or* economic (Blau's terms are roughly equivalent to what I would call *generous* or *selfish* transactions). Second, much emphasis is put on the power differentiating effects of giving larger favors than others can reciprocate, in which process "the ability to distribute valuable possessions becomes a socially defined mark of superiority." With awareness of the many sociological toes to be trampled, and without in the least deprecating the importance of the symbols involved, I would suggest that nothing really important about power differentiation has been explained until we have found out why one man is able to dispense more favors in the first place. This reservation ties to the first, since the answer may lie heavily in selfish transactions, whether of a sort that economists deal with or not. Third, after some long tussles of my own with related problems, I think that a meaningful analysis of power *must* distinguish sharply between bargaining power (whether A can get B to do what A wants, on relatively good terms) and "just plain" power (whether A can get B to do what A wants, whether on relatively good or bad terms in the particular case). Blau does not make the distinction, and, in consequence, his analysis of power often seems fuzzy.

I am convinced that Blau is working squarely in the area, and with the general kind of technique, that will produce the most significant social analysis at this stage of the science. Further, despite my reservations about particulars, I feel that this contribution is itself highly significant.

ALFRED KUHN
Department of Economics,
University of Cincinnati

Refractory Materials

The Science and Technology of Tungsten, Tantalum, Molybdenum, Niobium, and Their Alloys. Based on an AGARD conference. N. E. Promisel, Ed. Published for the North Atlantic Treaty Organization by Pergamon, London; Macmillan, New York, 1964. xiv + 588 pp. Illus. $20.

Since the end of World War II, the development of materials suitable for structural uses at ever higher temperatures has been one of the principal aims of materials research conducted on behalf of military and space programs. Among the metals with high melting points which suggest that they are potentially useful, tungsten, tantalum, molybdenum, and niobium, and their alloys, are currently considered most promising. This judgment is based on a number of considerations including not only the melting points of the metals, but also the temperature dependence of their mechanical properties, as well as their fabricative properties, rate of oxidation, and availability. In June 1963 (at Oslo, Norway) NATO's Advisory Group for Aeronautical Research and Development, AGARD, sponsored a Conference on Refractory Metals which was held to discuss the present state of the science and technology of these four metals and their alloys. The papers that were submitted to the conference constitute the major portion of the bulk and substance of the volume under review.

The papers are organized in seven sections: Introductory Papers (three papers that provide the rationale for the conference); Alloys and Alloying Behavior; Properties and Engineering Applications; Deterioration and Protection; Analysis and Testing; Primary Fabrication; and Secondary Fabrication. With the exception of the first section, each section consists of four or five contributed papers (which were distributed as preprints and therefore not presented in full at the conference), an interpretive paper in which one or more rapporteurs comment on the contributed papers, and a summary of the discussion that was stimulated at the conference by the rapporteurs' remarks and the preprinted papers.

The field of refractory materials, doubly blessed by the urgency of military and space requirements and by generous funding, is moving rapidly. This collection of approximately 30 papers provides the most up-to-date, comprehensive discussion of the state of the art and the science that is available. However, as one would expect, the papers are not of uniform quality. This is, unfortunately, equally true of the interpretive statements and the summary and conclusion provided in each section.

It is stated in the preface to the book, that one of the objectives of the conference was ". . . to force a 'marriage,' a more intimate intellectual relationship, between the . . . 'scientist' and 'engineer.'" To this end, both are well represented among the authors, and it is evident that theoretical concepts are being used, with some success, to explain the behavior of engineering materials and to suggest approaches to the development of more desirable properties.

I was most pleased with and reassured by Frederick Seitz's remarks in his introductory paper, "Trends and stimulation in solid state science," to the effect that solid state science ". . . is still a very rich field for future work and will continue to be exciting as long as man has any direct interest in condensed matter." It is difficult to conceive of a time when this might not be so.

L. M. KUSHNER
Institute for Materials Research,
National Bureau of Standards

On Teaching Mathematics

Some Lessons in Mathematics. Members of the Association of Teachers of Mathematics. T. J. Fletcher, Ed. Cambridge University Press, New York, 1964. xiv + 367 pp. Illus. Paper, $2.95.

Some 20 members of the Association of Teachers of Mathematics (of Great Britain), who had been giving careful consideration for a substantial period of time to problems of the mathematical curriculum, met in Leicester in the summer of 1962, and from that meeting the volume under review emerged. Its aim is to indicate, through the presentation of model lessons, the sort of mathematics and the sort of classroom treatment that the authors deem appropriate for the training of users of mathematics in the

secondary schools. The lessons are not intended to be directly available to students but rather to be guides to the teacher, and they are accordingly supplemented by explanatory remarks and notes which serve admirably to motivate the choice of material and to establish the proper mathematical and pedagogical perspective. The authors disclaim any intention to produce a comprehensive syllabus and explicitly warn the reader against supposing that the omission of a topic indicates that they recommend its expulsion from the curriculum. (The point is taken, since there is no treatment in the book of the elementary differential calculus; it is intriguing to wonder why no member of this excellent group felt an irresistible urge to rethink out loud the vexatious problem of how to teach this fundamental topic in mathematics.)

The book consists of an introduction, 11 chapters, and an extensive bibliography. The chapters are "Binary systems"; "Finite arithmetics and groups"; "Numerical methods and flow charts"; "Sets, logic, and Boolean algebra"; "Relations and graphs"; "Linear programming"; "Patterns and connections"; "Convexity"; "Geometry"; "Vectors"; and "Matrices." Throughout the book the authors consistently emphasize both the mathematical content of the ideas being presented and their applicability to situations within the grasp and experience of the student; each of these facets of mathematical instruction enriches the other, and I was delighted to observe this splendid vindication of the viewpoint that mathematics is one and indivisible (contrary to the view that there are many different subjects, called respectively mathematics, mathematics-for-the-layman, mathematics-for-the-engineer, mathematics-for-the-physicist, and so on).

A few comments of a more critical nature should strengthen the effect of my general approval. For example, there seems to be insufficient emphasis on clear-cut definition. It is common ground that some familiarity and appetite must be generated before definitions are given and terminology established; but strict definition is an essential part of the mathematical process, and this is often not supplied (could the reader ever say just what a vector space is?). I am also out of sympathy with the tenor of the authors' remarks on the psychology of teaching. Had they confined themselves to observing that mathematics teaching (indeed, all teaching) must make the subject matter attractive, there could have been no cavil; but it is strongly implied that in planning our curriculum we must take into account the information available to us from modern psychology. I am strongly of the opinion that this information is of an observational and not of a predictive nature; and that it would be folly to halt the exciting experiment in mathematical pedagogy, to which the authors have significantly contributed with this book, on the basis of evidence obtained exclusively from situations in which none of the participants had been exposed to such experiment.

PETER J. HILTON
Department of Mathematics, Cornell University

A Concise Review

An Introduction to Physical Biochemistry. Henry B. Bull. Davis, Philadelphia, 1964. xii + 433 pp. Illus. $8.50.

The intent of the author, a practising physical biochemist, was to show the capabilities of physical chemistry in interpreting phenomena and structures encountered in biochemistry. Avowedly, *An Introduction to Physical Biochemistry* is designed for students in biological sciences, who are not expert in either biochemistry or physical chemistry. On the basis of the material in the book, and particularly on the manner in which the material is presented, the author must have assumed that the prospective students would have mastered at least the fundamentals of mathematics, physics, physical chemistry, and biochemistry. All of these subjects are touched on in the course of the presentation of various topics.

In the first chapter (28 pages), in order to recall what students might have learned about mathematics, the author most briefly runs through numbers and exponents, solution of equations, differential calculus, integration, expansion series, trigonometric functions, probability and error, method of least squares, and dimensional analysis, and even comments on computers.

Equally concise are the chapters "Energetics in biology," "Electrolytes and water," "Oxidation-reduction potentials," "Acids and buffers," "Biopolymers," "Osmotic pressure and related topics," "Solution optics," "Surfaces and interfaces," "Viscosity and the flow of liquids," "Diffusion," "Ion transport," "Electrophoresis and electrokinetic potentials," "Sedimentation," "Kinetics and enzyme activation," and "Elasticity and structure." For the interested student, there are general references at the end of each chapter so that a given subject can be pursued in greater detail. A stimulus to do so would be supplied by an attempt to solve the problems given to test one's understanding of the points touched on in a chapter. The answers to these problems are given. A rather well organized index adds to the usefulness of the book.

The application of the methods of physical chemistry to the problems of biochemistry are frequently indicated by examples taken from the literature. Furthermore, there are comments on the applicability or limitations of the methods thus used.

All in all, this is a refreshingly *concise review* or *outline* of the relationship between physical chemistry and biochemistry. It is *not*, strictly speaking, an *introduction* to physical biochemistry. A beginning student would certainly be frustrated by the dearth of detail on any of the topics covered.

There are many, many typographical errors in this book, and some of them are rather amusing.

Those who want a concise review of some topics in physical biochemistry may find that this book serves them well. It is readable and at times stimulating. But those who desire a detailed presentation should look elsewhere.

DOMINIC D. DZIEWIATKOWSKI
Rockefeller Institute, New York

Organic Chemistry

The Systematic Identification of Organic Compounds. A laboratory manual. Ralph L. Shriner, Reynold C. Fuson, and David Y. Curtin. Wiley, New York, ed. 5, 1964. x + 458 pp. Illus. $7.75.

The fifth edition of this well-known text differs from its predecessors in that more space is devoted to instrumental methods of analysis. A section on proton magnetic resonance has been added, and the section on the use of optical methods has been sub-