tween an older metallurgist (that is, before quantum theory) and a young scientist. In general such a treatment would be difficult to sustain for more than, say, 50 pages, but the author has done a wonderful job, giving the older metallurgist just the right amount of curiosity and intelligence.

The book is well organized and starts by examining the physical principles upon which quantum mechanics is based; quantum theory is then described, and the periodic table is examined. The behavior of electrons in a solid is then considered, with free electrons, Brillouin zones, and electron density versus energy curves being examined. Various types of cohesion are then considered: molecular crystals, valence crystals, and metals. Next the electronic differences among metals, insulators, and semiconductors are described. Atomic and ionic radii are then discussed. Then a thorough study of the cohesion of univalent and, finally, of the transition metals is given. In the case of the transition metals the treatment includes an accurate and up-to-date discussion of ferromagnetism. The last major section of the book deals with alloys. Since this is a field in which the author has made notable contributions, one hopes for something rather special. The expectations are fully realized, for all of the various results produced by electron to atom ratio, size, and the electrochemical factor are described with illustrations.

It can be seen that the book covers a tremendous amount of material, but the writing is skillful and careful so that the net result is to instruct rather than to confuse. A very useful feature of the book is a good set of references for further reading.

J. S. KOEHLER
Department of Physics,
University of Illinois

Political Systems of Highland Burma. A study of Kachin social structure. E. R. Leach. Harvard Univ. Press, Cambridge, Mass., 1954. xii + 324 pp. $7.

A brief review can hardly do justice to a major contribution to theory in any field. The judgment "major contribution" should not be lightly bestowed, and certainly in the case of *Political Systems of Highland Burma* many anthropologists would dissent. I shall therefore restrict my comments to assertions of the book's importance—criticisms, of which I have many, will be reluctantly foregone.

Several of the most crucial aspects of anthropological theory are treated and skillfully interrelated by Leach. His work is not an ethnography but a remarkably keen analysis of varieties of social structure in the still remote mountainous reaches of northeastern Burma. But social structure for Leach is not a topic exclusively devoted to kinship or political algebra. Starting firmly with the contrasting ecological bases of three subregions within the general area, he seeks to isolate and construct conceptual models of the political organization of the "simple" Kachin and the "sophisticated" Shan. This in itself would represent a contribution only in the degree of its elaboration of detail, for the gross dichotomy involving the generally lowland dwelling, irrigated rice cultivating, territorially organized Shan (T'ai) and the generally highland dwelling, shifting cultivators with kinship-oriented societies, in Leach's case the Kachin, has long been utilized either implicitly or explicitly by Chinese and British rulers and many of the literate travelers who left commentaries on the area of which this present volume treats a small part.

But the genuine contribution of Leach is twofold: he has constructed his models with unusual vigor, and he has substituted a trichotomy for the earlier dual categorization. He still retains Shan with no apparent amendment of his predecessors' work and he similarly utilizes the concept of the simple political organization, although he describes it in terms of a model of *gumlao,* the idealized Kachin structure based on egalitarian kinship. The innovation is the insertion of a transitional sociopolitical type, *gumsa.* This, stripped to essence, I would call "stratified kin society," although Leach does not use this terminology.

While Leach, trained in British social anthropology, nowhere explicitly commits himself to a general evolutionary view of culture (he would say "society") and although he explicitly seeks the dynamic of change outside the system with which he is concerned (p. 212), other anthropologists may wish he had gone much farther with the implications of his work. Briefly, this would have meant adding to the *general* theory of the evolution of class-stratified society and the state.

Here, then, is the locus of my enthusiasm. As Leach himself points out, none of the great 19th-century evolutionists in social science, Morgan, Engels, Spencer, and so forth, "discussed in detail—still less observed—what happened when a society in Stage A changed into a society at Stage B; it was merely argued that all Stage B societies must somehow have evolved out of Stage B societies" (p. 283). The work that might fill this lacuna is still quite scanty, but I find it incredible that, although Leach cites the pioneer work of Fortes and Evans-Pritchard, *African Political Systems* (1940), he makes no conspicuous use of his own excellent report on various peoples of Sarawak, *Social Science Research in Sarawak* (1950).

Leach, himself, ends on an equivocal note. He finds the transitions from kin to stratified kin to state organization a difficult one and wonders in print how other peoples have dealt with similar situations. I apparently am more confident of the richness of comparative data presently in hand. But, regardless of the ultimate determination of the issue, it must be admitted that a scientific approach to basic questions of the evolution of social classes and state organization is an exciting reality demonstrated by this book.

MORTON H. FRIED
Department of Anthropology,
Columbia University

An Introduction to Stochastic Processes with Special Reference to Methods and Applications. M. S. Bartlett. Cambridge University Press, New York, 1955. xiv + 312 pp. Illus. $6.50.

This book, based on the author's lecture notes at the University of North Carolina, is the first of a proposed three-volume work on the theory and application of stochastic processes. It is an introductory work addressed to the applied mathematician and statistician and presents the elementary methods and statistical techniques involved in stochastic processes. A detailed treatment of the basic mathematical theory and applications in physics are the topics for the forthcoming two volumes, both by J. E. Moyal.

A stochastic process, aside from its precise mathematical formulation, is initially defined by Bartlett as some possible actual process in the real world that has a random or stochastic element in its structure. After a brief introduction into some of the basic concepts of statistics and probability, the author introduces discrete and continuous Markov processes. He then deals with the random walk, the theory of queues, the application of stochastic processes to population growth and epidemic models. Two chapters are devoted to limiting stochastic operations and stationary processes. Prediction, communication theory, and the statistical analysis of stochastic processes make up the latter portion.

Although Bartlett does not always conform to the commonly accepted notation of the theory, his volume is a model of clarity and organization. On the whole this book is to be highly recommended for the applied mathematician and statistician who like a sound but not too abstract treatment of the theory of stochastic processes. For research workers in the natural, physical, and social sciences, who

have a strong mathematical background, this book provides a means of becoming acquainted with some applications of the theory to their respective fields.

SEYMOUR GEISSER
National Bureau of Standards

The Lipids. Their chemistry and biochemistry. vol. II, **Biochemistry.** Digestion, absorption, transport and storage. Harry J. Deuel, Jr. Interscience, New York, 1955. xxvi + 919 pp. $25.

This comprehensive treatise on *The Lipids* was originally planned to be published in two volumes but has been expanded to three. Volume I, *Chemistry,* appeared in 1951. Volume III, which will include biosynthesis, metabolism, and nutritional value, is yet to come.

Volume II covers digestion, absorption, transport, and storage of lipids with literature citations up to and including 1953. Its seven chapters are "Introduction," "The digestion and absorption of fats in the gastrointestinal tract," "The digestibility of fats," "The digestion, absorption, and digestibility of lipids other than fats," "Blood lipids," "The occurrence of lipids in the animal as a whole," and "Lipid distribution in specific tissues and in their secretions."

The chapter on digestion and absorption of fats in the digestive tract includes very complete discussions of the various fat-splitting enzymes and the chemistry of the bile acids and their role in fat digestion and absorption. The pathways of fat absorption in animals are thoroughly discussed, along with the physiological and chemical factors that affect them. Chapter III reviews the important concept of "digestibility of fats." The numerous experimental methods of investigating this concept are described, and there is an excellent résumé of published data on digestibility. An unusual feature, Chapter IV, is a 97-page review of digestion, absorption, and digestibility of *lipids other than fats,* including such diverse types of compounds as phospholipids, sterols, and the several fat-soluble vitamins—subject matter that is covered only briefly in the usual textbook. Even to one who is familiar with this field, it was astonishing to see more than 600 references cited in this chapter alone.

Chapter V on blood lipids, 170 pages, is by far the most exhaustive treatment of this subject to date. It should be of great value to those who are conducting investigations related to this subject. Subjects covered include chemical nature, qualitative and quantitative relationships, factors affecting blood levels, and pathological considerations, including the currently important subject of arteriosclerosis.

Total body lipids are considered, in Chapter VI, as originating from the diet and from synthesis from protein and carbohydrate. Methods are described for determining total lipids of human and other animal bodies. Fatty livers and the lipidoses are included in the discussion of abnormal lipid deposits. Chapter VII includes a vast fund of information on specific tissue lipids, a coverage somewhat similar to that in Bloor's monograph published in 1943 but, of course, including data published since that time.

After reading the first two volumes of *The Lipids,* one is deeply impressed by the comprehensive treatment of the subject matter. In volume II alone nearly 4000 authors are cited with about an equal number of literature references. One is, in fact, amazed that so many investigators have contributed to this field. Indeed, the citation of so many references may be confusing. On the other hand, no author could be expected to evaluate critically and justly all that has been published. The graduate student entering the field will be impressed with the confusion of data and ideas on these several subjects, and yet, no doubt, if he will study the old and the new citations on any given subject, he will learn much from the experimental methods that are covered in this volume in more detail than usual and will certainly be in a position to profit by the mistakes of those who have gone before.

The author is to be congratulated on his audacity in having attempted such a comprehensive treatise on this subject and for the general excellence of his results. This work will undoubtedly be an important milestone in this branch of science and will serve as an invaluable reference book.

J. B. BROWN
Department of Physiological Chemistry, Ohio State University

Theories Relativistes de la Gravitation et de l'Electromagnetisme. Relativite Generale et Theories Unitaires. A. Lichnerowicz. Masson, Paris, 1955. xii + 298 pp. Illus. F. 2800.

A. Lichnerowicz is, while still young, a recognized leader in the difficult mathematical theories that have blossomed out of the classical tensor calculus of Ricci and Levi-Civita. In the present volume, which embodies his lectures of the last 2 years at the Collège de France, he applies these theories to what is called the unitary problem. The treatment of the electromagnetic field in tensor form, on the one hand, and the relativistic solution of the two-body problem, on the other, are quite generally known, but it is probably not recognized outside the circle of the specialists that there exists as yet no final "unitary" theory leading to the equation of a gravitational and electromagnetic field.

The first part of this volume is an advanced treatment of the mathematics of general relativity, including some new results obtained by the author and his research students. The second part is devoted to two major movements in the contemporary advance toward a unitary field theory: one, labeled the Jordan-Thiry theory, calls to aid the greater potentialities of a five-dimensional space; the other, the Einstein-Schrödinger theory, introduces an affine connection that forsakes the symmetry of the classical "gammas." Generalizations of the wave-propagation theory contained in Hadamard's famous lectures on the Cauchy problem are made throughout the book and contribute clarity and elegance.

This book, needless to say, is not meant for the general public; it is a scholarly presentation of some of the most recent gropings toward a unitary theory, which every worker in the field will wish to ponder. The printing is excellent; the index may be (we are not sure) a product of the tongue-in-cheek humor of the French mathematical school.

P. LE CORBEILLER
Division of Engineering and Applied Physics, Harvard University

La Mécanique au XVII^{e} Siècle (des Antécédents Scolastiques à la Pensée Classique). René Dugas. Bibliothèque Scientifique 26, Philosophie et Histoire. Dunod Editeur, Paris 6, 1954. 620 pp. Illus.

The author of this book published in 1950 an *Histoire de la mécanique,* in which the major ideas of the science of mechanics, both statics and dynamics, were traced historically from antiquity to the present; that book had the unique virtue of combining into a single study a history of the ideas of both classical and quantum mechanics. It might, therefore, seem as if the present book were merely an expansion of the section of the former work dealing with the 17th century, but this is not the case at all. Great as the merits of the former work were, it suffered from the fact that the author had not made much use of the scholarly efforts in the history of science in the last three-quarters of a century, much of which has been devoted to elucidating the historical development of mechanics. The present study shows the same familiarity with the primary material as the previous one, but the whole book is enriched by the fact that the author does now take into consideration the impor-