which is based on folkloristic, ethnonymic, material cultural, and archival evidence.

A concluding article (by Dolgikh and Levin) relates the ethnogenetic questions to distribution and acculturation of peoples. Their essay on the transition of Siberian peoples from kin to territorial groupings points to a development, based on the studies of ethnogenesis, which is of both theoretical and practical relevance. During the early period of Russian contact, the indigenous peoples were reorganized on the basis of "administrative clans," which were not always, or perhaps even usually, related to their aboriginal organization. In the light of the investigations carried out in recent decades, faithfully reported in this volume, it is clear that the problem of local territorial groupings of Siberian peoples as administrative units during the Tsarist period is to be re-examined, as is now being done. Out of the research, the problem of consanguineal groupings, linguistic relationships of peoples, and ethnic origins is being clarified. These questions of theoretical purview can only be developed through the kind of painstaking research that is reported in this volume.

The work is well translated and edited, and difficulties of jargon, and of multilingual transcription and transliteration, have been overcome. Numerous maps, illustrations, and a glossary are included; the price of the volume is low. Those responsible for the realization of the series and of this volume are to be congratulated.

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Review of Related Fields

Researches on Meteorites. Carleton B. Moore, Ed. Wiley, New York, 1962. xii + 277 pp. Illus. $7.

This volume contains 12 papers that were presented at a symposium on meteoritics held in March 1961. The purpose of the papers was to review and discuss "current problems in meteoritics and those which will probably be answered by future research on meteorites." A specific attempt was made to include as many as possible of the various disciplines that contribute to this field, and metallurgy, nuclear chemistry and physics, mineralogy, petrology, and geophysics were represented.

It was intended, according to the editor's preface, that "the essays generally review the current status of research in each area, describe the author's recent work, and contain a pertinent bibliography." Unfortunately, not all the papers conform to this model. Instead, they range from intensive reports of original research, which would perhaps have been better published in one of the current journals (at least one has been, and is reprinted in this book), through a short statement of preliminary work, to the more rounded review papers.

The first paper, by E. L. Krinov, contains a condensed history and an overall definition of the subject. P. Signer and A. O. Nier present a chapter, which contains a mass of new data, on cosmic-ray–produced rare gases in iron meteorites. The chapter by P. S. Goel and the one that follows (by J. R. Arnold, M. Honda, and D. Lal) are detailed studies of models which attempt to correlate and interpret data on cosmic-ray–produced stable and radioactive nuclides in the meteorites. To conclude the nuclear portion of the book, Goel and T. P. Kohman present some preliminary data on the detection of carbon-14 in a stone and in an iron meteorite.

T. B. Massalski gives a descriptive review of the role of metallurgy in the study of iron meteorites. R. E. Maringer and G. K. Manning carry this aspect further with a hermeneutic survey of observed deformation and thermal alterations in the irons. B. Mason lists a summary compilation of the minerals found in meteorites. C. B. Moore discusses the relationship of meteoritic evolution with the experimental petrochemistry of the achondrites. J. F. Lovering reviews nonimpartially the available evidence for the possible coexistence of chondritic, achondritic, and iron meteorites in a parent body and the influence of this postulated association on evolutionary theories. A. E. Ringwood presents a review of the chondritic earth model, and H. H. Nininger closes with an anecdotal description of the problems involved in meteoritic material recovery.

The book itself was obviously rushed into print, presumably utilizing a photolithographic reproduction process. The text is not hard to read, but some of the graphs are mildly illegible. A lack of proofreading is painfully obvious; captions for some of the graphs (see page 170) contain no identification of the various points, circles, squares, and question marks. The text abounds in typographical errors, some of which, aside from the obvious misspellings, may be confusing—for example, "the average chondrite contains only 13 per cent of its mass" (page 201). There are also occasional references to such things as "A" and "B sub-groups" (page 208) which are nowhere defined.

These faults, while distracting, are relatively minor. The main objection to the book is that much of it is probably too detailed to fulfill its stated purpose of providing scientists "not actively engaged in meteorite work with an outline of problems of current interest," although it does fulfill its alternate promise of "enlightening (meteoritic) workers of the activity in fields related to their own."

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Concepts and Investigations

Biochemical Mechanisms. L. L. Ingraham. Wiley, New York, 1962. x + 108 pp. Illus. $5.75.

Many fields of science have evolved from a descriptive and ground-breaking period to the stage of development at which the scientist can and must ask questions about the underlying nature of the phenomena he observes. Organic chemistry, whose synthetic aspects were brilliantly developed in the latter part of the 19th and the first part of the 20th centuries, has now progressed to the point where study of the mechanisms of organic reactions shares in research efforts along with the synthesis of new compounds. Biochemistry, and particularly enzyme chemistry, has developed to the stage that makes it possible and desirable to be concerned about the mechanisms by which these complicated reactions occur. The present book is the first of a number that will certainly appear to fill the need for a consideration of biochemical or enzymatic mechanisms.

Occasionally such a pioneering book will define the field, discuss its manifold complications and possibilities, and predict the future work in it. Such a book in the field of organic reaction mechanisms is L. P. Hammett's classic work, *Physical Organic Chemistry*. The

present book is an attempt to provide the same treatment for the exciting field of biochemical mechanisms. The first third of the book is a summary of fundamental concepts in physical chemistry and physical organic chemistry which are applicable to a discussion of biochemical mechanisms. The last two-thirds of the book offers a brief description of some of the work with organic model systems of enzymatic reactions and of investigations of enzymatic reactions themselves, with emphasis on the former aspect. The reactions discussed include esterification and hydrolysis, elimination reactions, decarboxylations, oxidations, condensations, alkylation reactions, and rearrangement reactions. There are some provocative ideas that will undoubtedly lead to future research. However in its brief compass, this book only whets the appetite for a further look into this area of research that is destined to become of great importance in the future.

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Founder of Modern Atomism

Roger Joseph Boscovich. 1711–1787. Studies of his life and work on the 250th anniversary of his birth. Lancelot Law Whyte, Ed. Allen and Unwin, London, 1961. 230 pp. Illus. 32s.

To most scientists today the name of Roger Joseph Boscovich is wholly unknown, and yet his scientific writings elicited the highest praise from leading men of science, including—among others—Faraday, Clerk Maxwell, J. J. Thomson, Laplace, Ampère, Helmholtz, Hertz, and Lorentz. In 1870 Mendeléeff compared Boscovich to Copernicus and held him to be "the founder of modern atomism," while in 1905 Kelvin described his own position as "Boscovichian pure and simple." Boscovich's contributions to science were many, but the two most outstanding were certainly his theory of "point atoms," in opposition to crude views of atoms as tiny material bodies, and his doctrine of the relativity of space and motion. His exposition of these topics (like so much of what he wrote) has so modern a ring that it is difficult to see how such a man has all but slipped away from us, to be rescued today from partial oblivion only by scholars such as those who have contributed to the volume under review.

Born (in 1711) and brought up in Dubrovnik, Boscovich was educated by the Jesuits and became a member of their society, following a period of training and education that lasted 19 years. Appointed professor at the Collegium Romanum, he began to publish works on mathematics, astronomy, dynamics, and geodesy, and became famous for Latin verses on scientific subjects. On visits to France and England he worked for his order and made contact with foreign scientists; he was elected a fellow of the Royal Society of London on 15 January 1761. The Royal Society invited Boscovich to become a member of the expedition to California in 1769 to observe the transit of Venus, but he was unable to do so. His later life was spent partially on political and diplomatic missions and partially on scientific work, until his death in 1787.

The present book is especially welcome because it is half (pages 1–101) biographical and half (pages 102–212) analytical. In an essay on "Boscovich's atomism," the editor of the volume, Lancelot L. Whyte, analyzes both Boscovich's mathematical theory of atomism and his general philosophy of science (operational and somewhat positivistic). Zeljko Marković contributes a critical analysis of Boscovich's major work, *Philosophiae naturdlis theoria*, fortunately available in an English translation published in 1922. Boscovich's influence on British chemical theory is explored by two American historians of science, L. Pearce Williams and Robert E. Schofield. Zdenek Kopal gives us an estimate of Boscovich's contributions to astronomy and geodesy, including the important experiment he designed "to measure the aberration of starlight by means of a telescope filled with water," so as to discover whether the speed of light is independent of the medium through which it travels. J. F. Scott deals with mathematics at large, and Churchill Eisenhart presents Boscovich's work on the combination of observations, showing him to have been "the first to devise a completely objective procedure for uniquely determining the coefficients of a two-parameter line $y = \alpha + \beta x$ from a set of three or more observational points."

The bibliography of Boscovich's works and of writings on him in English will enable scholars to find out more about him. The volume as a whole should go far toward redressing the neglect into which he has fallen. But as to the question of why Boscovich does not have the reputation today to which he would seem to be entitled—this remains unanswered by the authors of this volume.

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Studies of Random Phenomena

Mathematical Statistics. Samuel S. Wilks. Wiley, New York, 1962. xvi + 644 pp. $15.

Mathematical Statistics. John E. Freund. Prentice-Hall, Englewood Cliffs, N.J., 1962. 260 pp. Illus. $7.50.

Elements of Mathematical Statistics. Howard W. Alexander. Wiley, New York, 1961. xi + 367 pp. Illus. $7.95.

Introduction to Probability and Mathematical Statistics. Z. W. Birnbaum. Harper, New York, 1962. viii + 325 pp. Illus. $6.50.

We are considering four books that are intended for three different levels of readers: Alexander and Freund are both for use at the junior level, Birnbaum at the senior level, and Wilks at the graduate level. Alexander's book is an introduction to probability and mathematical statistics for students who have no prior acquaintance with probability or statistics but who have completed a year of calculus. Freund expects his readers to have had a basic course in calculus, including some elementary material on partial differentiation, multiple integration, and series, but no prior acquaintance with probability or statistics. Birnbaum's book, although intended as an introductory text in probability and mathematical statistics, is for students with a firm grasp of calculus, some knowledge of the theory of matrices and determinants, and familiarity with simple statistical routines. It is not a book from which a beginner can learn the elements of statistical technique. Wilks' book is a graduate-level introduction to mathematical statistics, for readers with good undergraduate backgrounds in mathematics but no prior knowledge of probability or statistics.

Each of these books contains an in-