gene by another, the genetic control of enzyme synthesis, the interplay control of DNA (deoxyribonucleic acid), RNA (ribonucleic acid), and protein synthesis, and the feedback mechanisms in enzyme systems are examined in a penetrating way. The interdependent regulation of metabolic mechanisms (the Pasteur and Crabtree effects) are reexamined, and the effects of hormones on biochemical reactions and on growth are assessed for possible regulatory function. The effect of light on cell processes and the fascinating subject of built-in biological clocks—that is, temporal regulation of cellular processes—are covered in the final chapters.

The aim of the volume, as implied in the title, is not evenly maintained by the various contributors. This is not so much a fault of the individual authors as it is an indication of the state of knowledge in the areas which they serve. What is more to the point is that the reader is made clearly aware of the important unsolved problems, and that the biology of the future is rich in opportunities for a new generation of scientific giants.

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Well-Translated Tool

Kinematics of Nuclear Reactions. A. M. Baldin, V. I. Goldanskii, and I. L. Rozenthal'. Translated from the Russian by Ronald F. Peierls. Oxford University Press, New York, 1961. xii + 223 pp. + tables (45 pages). $6.10.

When we consider the prodigious rate of accumulation of data relating to nuclear reactions, it is somewhat surprising that more rapid progress has not been made in the fundamental understanding of the nature of the forces between the elementary particles. But the reason is not too hard to discover, if one examines in detail the nature of the data that are available, especially in the high-energy range. The fact is that most of the experimental results reflect, in one form or another, the consequences of one or more of the conservation laws—the conservation of energy, of angular momentum, of parity, of isotopic spin, of "strangeness," of baryons and of leptons, of "isotopic parity," and the like.

In the field of elementary particle physics especially, involving as it does interactions in the relativistic energy range, where the basic kinematical relationships are far from being intuitively obvious, the problem of separating out the inevitable consequences of the conservation laws is especially acute. Most observations, it turns out, yield little more than the confirmation of one of the principles of conservation or symmetry which govern the interactions among the elementary particles. Of course, as long as it is a question of discovering or verifying basic conservation laws, or when it is a matter of the discovery of a new elementary particle or symmetry principle, such observations are of fundamental importance. But in the great majority of experimental observations, the problem faced by the experimenter, or by the interpreter of his results, is one of extracting from the observations those aspects that only describe the effects of known conservation laws, in order to determine whether the observations can yield some new information relating to the dynamics of the interactions involved.

Towards this end, every nuclear experimenter will find this book indispensable for plying his trade. Beautifully organized, concisely presented, and written by a trio of physicists admirably qualified for their task, the book is concerned with this problem of extracting from experimental observations the inevitable results of kinematical relationships and conservation principles. The first part deals with the kinematical rules that govern nuclear interactions, deriving the relationships necessary for the interpretation of experimental observations, in simple and useful form. The second part is an exposition of the effects of conservation principles on the interactions among the elementary particles, utilizing the methods of the "S-matrix" as the formal device for imposing the conservation laws, especially those that are required by the quantum mechanics, on the interpretation of experimental observations.

The translation is excellent. Compared with another translation of this book, issued by Pergamon Press, this one is far superior in accuracy of translation, in printing and format, and in relative freedom from typographical errors. A short work, it manages to include in some 300 pages practically all the tables, graphs, and formulas that an experimental physicist might need. Although the authors apologize for not having covered more, they should be congratulated for having covered so much with such clarity and excellent organization. In the material covered, the only omission worth noting is in the chapter on multiple processes, where a brief discussion of the kinematics of the "two-fireball" model would have been a welcome addition.

Readers will look forward to the revised and enlarged version promised by the authors.

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Lucid, Concise Volume

Manual of Field Geology. R. R. Compton. Wiley, New York, 1962. x + 378 pp. Illus. $7.50; text. ed., $6.25.

Many fledgling geologists are inclined to panic when faced with their first mapping project—the jump from lecture hall and laboratory to the field seems so severe. Here is a book that should ease the transition; it is written by a man with considerable and varied experience gained from detailed mapping work in California, Nevada, and western Europe and from 10 years of instructing the geology field course at Stanford University. The manual is intended to provide students with the advice and information essential for independent field work, and the intention is well executed.

The organization and presentation of the material is lucid and concise. Almost all of the technical terms used are carefully defined and indexed. The numerous illustrations by the author are superb, and happily a scale, where appropriate, is included. Chapter 1 begins with a geologist's definitions of *field* and *field geology* and discusses methods of collecting data and samples. Included are numerous techniques that most geologists eventually devise themselves and then mistakenly regard as original. Chapters 2 and 3 describe the use of basic instruments; 4 and 5, the plotting of geologic features on base maps and aerial photographs (including a valuable discussion of the delineation of rock units and contacts). The next four chapters thoroughly describe procedures for constructing base maps by alidade and plane table methods, by transit surveying, and by

the use of aerial photographs. Chapter 10 discusses detailed mapping and sampling techniques, including methods appropriate for underground work. Chapter 11 is devoted to the preparation of geologic reports and has especially valuable sections on the proper use of lithologic, fossil, and formational names, and on various methods of illustration.

The last four chapters (117 pages) are outstanding. They treat field work with sedimentary, volcanic, igneous and igneous-appearing plutonic, and metamorphic rocks. The significant textures and structures of each type are described and explained, and appropriate methods of studying and of representing these features are suggested. Numerous illustrations of hand specimens and outcrops are included, and small-scale features are related carefully to larger structures. These four chapters include 79 references to significant work by American and European geologists. Unfortunately, Compton is too modest to cite his own work.

The nine appendixes include lists of necessary equipment and supplies, abbreviations for field notes, and symbols for geologic maps and cross sections. The index is complete. Future editions might be improved by a brief discussion of mineral staining and other chemical techniques that can be applied in the field, and the inclusion of a glossary.

This book is impressive and should become a standard reference in field geology. In addition, the last four chapters make the book valuable as a supplementary text for structural geology and petrology courses as well as excellent reading for all geologists concerned with field studies.

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Aerial Photography

Photogeology. V. C. Miller and Associates. McGraw-Hill, New York, 1961. vii + 248 pp. Illus. $13.50.

Miller's book represents the latest addition to a growing volume of literature on the interpretation of aerial photography, a field that has provided a unique new approach to the study of the earth's surface features, with far-reaching effects on procedures in topographic, geologic, forestry, and soil mapping, and in many fields of research. Miller is concerned primarily with one sector of the general subject, the qualitative interpretation of air photographs as a means of mapping bedrock geology, particularly from the standpoint of mineral exploration.

The volume is divided into three main parts. The first, slightly less than one-quarter of the book, is devoted to the mechanics of procuring, handling, and examining photos, with emphasis on stereoscopic methods. The treatment of distortion and vertical exaggeration of the stereoscopic image is well handled; but the discussion of instrumental techniques is incomplete, and for information on map-making methods and on the use of oblique photographs, the reader must look elsewhere.

The second part, about one-seventh of the total, considers, in a generalized fashion, the principles and criteria of interpretation. The importance of related field studies is given due attention, and the application of the geomorphic viewpoint is properly emphasized. Difficulties and limitations are faced realistically, the need for a flexible approach is noted, and, unlike some other workers, Miller and his associates scrupulously avoid making exaggerated claims.

The third and major part, somewhat more than half of the total, is more particularized; it is devoted to specific examples, as shown on stereopairs of photographs, with accompanying sketch maps, descriptions, and exercises. The examples represent a well-diversified selection of geologic phenomena, of varying degrees of complexity. However, many of these could be more advantageously studied if additional photographs of surrounding areas were provided to give a broader perspective. It is to be regretted that comparisons between photographs and accompanying maps are hindered by differences in both scale and area. Also, the quality of the photographic illustrations, as they are reproduced, leaves something to be desired, particularly in comparison with those in *Professional Paper 373* (U.S. Geological Survey), which covers similar ground. The source of each one is listed, however, and many readers may choose to procure prints of the originals for detailed examination.

A bibliography of more than 350 entries concludes the book. Very few references are made to it in the text, however, and the correlation of references with particular sections of the text is not evident.

All in all, the book constitutes a useful supplement to the available reference material on photogeology, and it should be of some service to advanced students who have a sufficient background in geology and in the study of photographs to use it. The subject is much too broad to be fully covered in any one tome, however voluminous, and new contributions from new viewpoints are always welcome.

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Finsen Memorial Congress

Progress in Photobiology. Proceedings of the Third International Congress on Photobiology. B. C. Christensen and B. Buchmann, Eds. Elsevier, New York, 1961. xv + 628 pp. Illus. $25.

The term *photobiology* has an appropriate connotation that extends throughout almost the entire spectrum of biological activities and subdivisions; as a consequence, one can find photobiologists in many scientific disciplines, including the somewhat more applied areas of agriculture and medicine. The phenomenon that unifies this diverse group is the biological action of photochemical radiations, ranging from ultraviolet on the short side of the electromagnetic spectrum to infrared on the long side. The ionizing radiations, both electromagnetic and particulate, are excluded, arbitrarily it might seem, but also necessarily; the biological action of all radiations, political as well as scientific, is too vast a topic to span successfully in a single congress—this plus the fact that each of the fields of ionizing and photochemical radiations has its own peculiar problems of reaction, instrumentation, and technique.

The interest in these international symposia, of which this is a report of the third, may be appreciated from the fact that this volume contains in excess of 150 papers presented at the 1960 Copenhagen meetings. It is not feasible to single out for review even a selected portion of these papers without doing an injustice to others, but the coverage and extent of interest can be judged by