haps 30 percent cite books, particularly the well-known treatises by Sidgwick and Remy, or *Chemical Abstracts*, the latter presumably when it was felt that a particular journal would not be available in most libraries. The latest references are to articles published in the latter part of 1962, an indication of the termination date of the literature search.

Those working in the field of complex ion chemistry should find the book useful as a convenient source of literature references, as a concise summary of preparative techniques and chemical reactions, and as an aid in the preliminary planning of future research projects.

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Theoretical Physics

The Eightfold Way. Murray Gell-Mann and Yuval Ne'eman. Benjamin, New York, 1964. xii + 317 pp. Illus. Paper, $3.95; cloth, $8.

This timely volume contains a collection of 30 papers on the physics of mesons, nucleons, and their "strange" companions in supermultiplets of the group SU_3. The particles of lowest mass fall into sets of eight so that their states form the objects on which the group adjoint to SU_3, which is of dimension eight, operates. Most of the papers have been published in journals within the past four years, and two-thirds of them are very brief research letters and the like. The authors have supplied editorial comments on the sections into which the papers are grouped. The general topics include basic theory, predictions and comparisons with observations on masses, selection rules, electromagnetic properties, spontaneous transformations, and attempts to account for mass differences in a supermultiplet. In addition to providing an authoritative collection of the achievements and speculations of the theory, the book is of value as a handy source of roughly 300 different references to the literature.

The reader who is looking for an introduction to the subject will find that the full length articles present a variety of approaches from which he can choose the one that best matches his preparation. He should try not to be disheartened at the outset by the short articles which necessarily do not convey much in the way of explanations and some of which are written in terms of that inevitable abomination, the specialist's patois. The longer papers (which constitute about half the total material) provide the necessary definitions, references, mathematical development, and general applications. However, with respect to the latter, it must be kept in mind that suggestions made in some of the earlier articles have since been discarded. One paper treats an interesting alternative to the eightfold way proper—the possible existence of "quarks" which, incidentally, provide an elementary approach to the theory of SU_3. This aspect of the theory has commanded attention recently in connection with the combination of the eightfold way and ordinary spin. It appears that representations of SU_6 are amazingly suitable for furnishing the particle quantum numbers, including spin, as well as those of SU_3.

The success of the unitary groups in particle theory is the most interesting development in theoretical physics in recent years. One has still to relate it to physics, however. This book will most likely hasten the day when we "understand" the eightfold way.

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Paleontology and Geology

Time in Stratigraphy. Alan B. Shaw. McGraw-Hill, New York, 1964. xiv + 365 pp. Illus. $10.50.

The main thesis of this work is the application of the statistical method of least squares to correlation of faunal successions. The first nine chapters deal with the lithic successions in epeiric seas; two types are recognized, called *allochthonous* and *autochthonous*, terms more familiarly applied in a tectonic context. The section is theoretical, thought provoking, and stimulating, but the reader will leave it so hopelessly confused that he will accept the conclusions brought together in chapter 10, or with so many reservations that he will reject all of them.

The second section deals similarly with the familiar methods of faunal evaluation. Its prelude is a restatement of genetic causes of evolution; from there Shaw proceeds to criticize previous methods of the index fossil, the faunal zone, and the hemera and epibole, and continues to a chapter labeled "The biozone or the search for the Holy Grail" and another entitled "Adequacy of the fossil record, or shades of Charles Darwin." In the latter chapter, Shaw begins by claiming that the fossil record is adequate, and then proceeds to deal mathematically with the probability of finding a fossil in a given location. In fact, the fossil record is inadequate, and our knowledge of it is incomplete. We have such anomalies as one Cincinnatian aglaspid, with no others known above the Trempealeauan; one Silurian piloceroid, with no others above the top of the Canadian; and the Mississippian Rayonnoceras, with nothing connecting them with other actinoceroids in the Middle or Upper Devonian. Countless other examples of odd, seemingly isolated, survivals could be added. The special conditions necessary for the preservation of ordinary chitin leaves us with a most incomplete record of the Crustacea in the Paleozoic, and the special conditions needed for the preservation of identifiable echinoderms leaves our record of that group most incomplete. However, the subsequent mathematical treatment is not completely invalid; rather its validity is merely more limited in scope than is claimed here.

The work then proceeds to the exposition of the "equation of correlation," the application of the statistical method of least squares to faunal successions. Here the average geologist, whose mathematics is rusty, will be left behind; clarity could have been improved by clearer explanation of symbols, even at the risk of some repetition. This method is developed, and in an appendix, which makes up nearly a third of the book, its application is shown. Most of the sections here treated are from the American Upper Cambrian, surely an ideal proving ground for the method. However, these sections are exceptional. They involve few lithic changes, and these are of a sort least likely to affect faunas. They yield relatively few species, mainly trilobites, which are obtainable easily in an identifiable condition and in some numbers, throughout the sections. One deals here also with species concerning which there are few problems at the specific level. But even here the method seems dubious, for it rests upon some questionable assumptions. That some fau-

nas may pass certain facies without significant change does not disprove the well-demonstrated fact that facies may control faunas and may provide impenetrable barriers to whole faunas or significant faunal elements. No account has been taken of migrating faunas, odd local extinctions, and odd local survivals.

I fail to see that this method is any more reliable than the older methods rejected in earlier parts of this book, which do not involve such laborious computations. The method is certainly limited in its application, and, even where it can be used to the best advantage, so many dubious premises are accepted that the validity of the results is questionable.

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Astronomy

Atlas of the Moon: Astronomy–Astronautics. Vincent de Callatay. Translated from the French edition (1962) by R. G. Lascelles. Macmillan, London; St. Martin's Press, New York, 1964. 160 pp. Illus. $15.

This handsomely produced book is the best lunar atlas available among those published in this price range. The atlas section consists of an index and 23 plates, the last being the Russian photograph of the other side of the moon. This section is preceded by 16 chapters that cover a number of topics concerned with fundamental astronomy and the nature and motions of the moon. The atlas section, in turn, precedes four chapters devoted to astronautical principles involved in a journey to the moon. The original edition of the book (1962) was published in French, and the English translation is by R. G. Lascelles. There is a preface by Sir Bernard Lovell.

The reproduction of the photographs is very good. Hand-drawn charts can never compete with first-class, well-reproduced photographs of the moon. Callatay's *Atlas of the Moon* provides as good proof of this point as any publication now on the market.

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Guides for "Change Agents"

Introducing Social Change. A manual for Americans overseas. Conrad M. Arensberg and Arthur H. Niehoff. Aldine, Chicago, 1964. x + 214 pp. $4.95.

Cooperation in Change. Ward Hunt Goodenough. Russell Sage Foundation, New York, 1963. 543 pp. $6.50.

A new profession is, or should be, developing, and these two books are concerned with it. This profession has to do with the planning and execution of fundamental "modernization" changes in foreign areas. The profession in question is not primarily concerned with programs of improved technology in the materialistic sense, but rather with the social, cultural, and psychological aspects that accompany such change. A North American expert on sewage problems, for example, may devise and try to carry out an excellent modern installation in Xenolandia, involving all the latest techniques in depth of ditches, sizes of pipe, pumping stations, and the like, but find that the Xenolandians will not cooperate with him or his program because he is unaware of, and therefore cannot deal with, certain features of their kinship system and religious beliefs that run counter to his pure principles of sanitary engineering. The expert on sociocultural change can brief the technician on these problems, and preferably should work with him and the native people in the field, to translate the physical program of sanitary technology into terms that natives can understand and feel are advantageous to themselves. This type of problem is found in practically all the so-called underdeveloped areas and emerging nations that are seeking or being offered the technological advantages of Western civilization. In short, physical technology, which, in our own country, can be introduced without much trouble once funds are available, may have a different row to hoe in areas of non-American culture, social organization, and basic values.

North American aid programs to foreign areas and countries have been generous to a fault with respect to funds and narrow technical know-how, but for the most part the cultural peculiarities of the foreign people involved have been ignored. Perhaps this is because few policy-makers have ever had a course in cultural anthropology. The notion of human cultural differences and the procedures for understanding them in human terms are an old story to most behaviorial scientists, but such concepts and procedures are apparently largely unknown or misunderstood by diplomats and those who plan foreign aid programs.

Thus, one hopes that such planners and technicians will become acquainted with these two volumes. On the other hand, for a behaviorial scientist, particularly a cultural anthropologist, the volumes have little to offer in the field of "scientific breakthroughs." *Introducing Social Change*, by Arensberg and Niehoff, will probably be read by more of those who are not trained in the behavioral sciences, because it is relatively short and nontechnical. Goodenough's *Cooperation in Change* covers much the same problems, but goes into more theoretical background. Goodenough's theoretical pages will seem somewhat oversimplified and repetitious to a professional anthropologist, but perhaps that mode of presentation is necessary for "change agents." Both books suffer from the fact that the authors deal with relatively few actual foreign situations of planned change and by no means cover typical problems in all the major areas of the world.

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Microchemical Research

Methods in Microanalysis. vol. 1, *Simultaneous Rapid Combustion.* Translated Microchemical Research Papers of Mirra Osipovna Korshun. J. A. Kuck, Ed. Translated from the Russian by Phyllis L. Bolton and Kurt Gingold. Gordon and Breach, New York, 1964. xvi + 560 pp. Illus. $27.50.

The objective of the present volume is summarized by the editor as being "to acquaint the reader with the progress of quantitative organic [elemental] microanalysis in Russia during the past fifteen years, as exemplified in the publications of Korshun and her successors." Korshun, who was director of the microanalytical laboratory of the Institute of Elemento-Organic Compounds of the Academy of Sciences of the U.S.S.R. at the time of her death in 1958, was one of the most