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-