task of locating and using the reports, but it also enhances their use in connection with other contemporary studies scheduled for publication in subsequent volumes in the Antarctic Research Series.

Major variations in the format of the articles—such as the omission of an abstract or of a summary or section devoted to conclusions—are disconcerting. Comparison of the papers in this volume reveals considerable range in scope and merit. In a few of the articles the text is not concise, and substandard illustrations (drawings and photographs) are rather common. Pagination is continuous through the first seven articles (pp. 1–109), but for some unexplained reason the eighth (and last) paper begins again with page 1 and continues through page 77. The last page (p. 77) is entitled "Information for authors." This numbering will probably lead to some confusion in subsequent literature citations. There is no index to the volume as a whole; however, the last article, "Catalogue . . . of . . . benthic marine algae," contains a seven-page index to the "Catalogue." Glossy paper together with a very pleasing typography and a good binding give this volume a fine appearance.

Biology of the Antarctic Seas will be valuable to oceanographers in general and to biologists, particularly those with special interests in physiology and algology.

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Linear Algebra

Matrix Algebra for Electrical Engineers. R. Braae. Pitman, London; Addison-Wesley, Reading, Mass., 1964. xii + 162 pp. Illus. $4.50.

Matrices: Their Meaning and Manipulation. W. G. Bickley and R. S. H. G. Thompson. Van Nostrand, Princeton, N.J., 1964. xiv + 168 pp. Illus. $4.25.

These two little books reflect the recent upsurge of interest in linear algebra on the part of scientists and engineers. Each presents a short, somewhat condensed treatment of topics in matrix theory which the authors feel should be of special interest to engineers. In their selection of topics the authors agree not only with each other but generally with their colleagues, if we can assume that the existing literature reflects prevailing opinion. Each book presents the usual basic topics in matrix algebra leading to the notions of rank, nullity, inversion, quadratic forms, orthogonalization, eigenvalues and eigenvectors, and diagonalization methods. Each also gives applications of linear algebra to problems of interest to engineers. Braae's book is slanted toward electrical engineers and presents applications to mechanics, linear programming, and linear network analysis (the latter application leading to a method, "diakoptics," for reducing the size of the computation involved in inverting a matrix). Bickley and Thompson open with brief mention of ten engineering problems that lead naturally to matrices, several of which problems are brought up as illustrations at various places throughout the book. Heavy emphasis is placed on the numerical problems associated with matrix inversion and the determination of eigenvalues and eigenvectors.

The reader who has had little experience in engineering and scant acquaintance with the engineer's special language may find the applications hard going. I did so and can only assume that the engineer will find that they are sufficiently close to his own experience to motivate and sharpen his understanding of the mathematics rather than get in its way. The nonengineer who can already count matrices among his close friends will find in the applications convincing demonstration that linear algebra is the newest "applied mathematics." The unmatrixed nonengineer is in trouble.

Neither book claims to be a mathematical treatise, but it is my opinion that the mathematics in each leaves something to be desired, even by the engineer. Braae presents matrix theory with relatively heavy emphasis on linear transformations of vector spaces. For this the author, an engineer, is to be complimented. However, his terminology is archaic, and there are a number of mathematical errors or inaccuracies which will impair the reader's understanding of the mathematics if he is not mature enough to detect them—for example, the confusion between "subset" and "subgroup" on page 66 and the most unusual definition of the intersection of two spaces on page 41. Bickley and Thompson present matrix theory in the old formalism of rectangular arrays; the word "vector" appears in neither index nor table of contents. Proofs are often incomplete on nonexistent, and the reader is not always warned of this fact. The inexperienced reader will have difficulty distinguishing between bald assertion and logical or heuristic conclusion.

Both books, therefore, combine the appeal of short treatments of a beautiful piece of mathematics written by and for a community which has recently discovered that it is useful and a warning of the dangers inherent in any attempt to teach a person *just* enough mathematics for immediate applications.

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Summer Schools in Physics

Strong, Electromagnetic, and Weak Interactions. A. Zichichi, Ed. Benjamin, New York, 1964. vi + 248 pp. Illus. Paper, $4.95; cloth, $9.

The tidal wave of new summer schools in less and less likely places, which has been a feature of the last few years, especially in particle physics, is leaving behind a flood of published books containing some sort of written version of the lectures presented at these sessions. On the whole, this has been a welcome trend, doing something to alleviate the acute shortage of up-to-date textbooks and review articles in this rapidly expanding field, and some of these lectures have become standard references.

The requirements of comprehensiveness and careful organization are much less stringent for a lecture-note volume than for a textbook. However, this does not imply that these requirements can be abandoned altogether if such a publication is to have any value, other than as a documentary record. The present volume seems to be a case in point. One of the attractive sounding features of the Erice School was the small number of lectures and the emphasis on discussion. It might have given rise to a useful book, had the subject matter been more restricted, and had the style and level of the different contributions been coordinated. As it is, most of the