two-particle problem. Recent developments such as the existence of cuts are discussed and the effects of these, as well as other theoretically possible singularities in the angular momentum plane, on high-energy scattering. The possibility of "elementary particles" of conventional field theory being Regge poles is also treated.

The phenomenology of what the author cheerfully admits is the most naive application of the Regge pole hypothesis to high-energy scattering is described by B. M. Udgoankar (Tata Institute). The possibility of using Regge ideas in the low-energy pion-nucleon system is also discussed.

A detailed model for very high-energy reactions in which very many particles are produced is presented by S. Fubini (Università degli Studi di Padova). The relation between this approach and Regge ideas is explained.

What is perhaps the most elaborate dispersion theoretic attack extant on the low-energy pion-nucleon system is very coherently discussed by J. Hamilton (University College, London). All of the intricacies of this problem are carefully revealed, and the rug covering 10 years of dirt is raised.

One of the most appealing ideas to grow out of dispersion theory, although the idea is actually much older, is that all so-called elementary particles are composites of each other. This idea is refreshingly presented by F. Zachariasen (California Institute of Technology). The possibility of symmetries—for example, charge independence of strong interactions—emerging from self-consistency requirements is explained by simple, quantitatively unreliable, model calculations.

R. Blankenbecler (Princeton University) addresses himself to the problem of how one may hope to do actual computations in the real world of strongly interacting particles. He describes a formalism which is an elaboration of the so-called determinental approach to scattering problems. This D-(determinant) matrix theory has considerable formal beauty and is at least in theory free of some of the complications encountered in other current approaches.

After a slightly pretentious introduction, C. Lovelace (Imperial College, London) describes his own version of the theory of three-particle systems, based on the theory of Faddew who first attempted to give a rigorous formulation of the three-body system. The connection between various approximate treatments, in which the true three-particle states are roughly represented as one particle and a resonating pair treated as a particle, and the exact formulation is discussed. At the end of the article the reader is assigned a number of exercises which might be completed by the time of the next summer school session on the present topic.

This is a good and useful book for both students and advanced workers in the field.

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Organic Chemistry

Solvolysis Mechanisms. Edward R. Thornton. Ronald, New York, 1964. viii + 258 pp. Illus. $7.

The study of solvolysis reactions has received a great deal of attention from organic chemists in recent years. The mechanisms of these reactions, among the simplest we know about from a gross viewpoint, are exceedingly subtle when the fine points are critically examined. Classical organic techniques often prove inadequate and recently such approaches as investigations of linear free-energy relationships and isotope effects have been used to bring more evidence to bear on the subject. However, the story is far from complete, and the use of additional physical techniques, such as relaxation methods, will probably be required before the final answers are known.

Thornton's book, a volume in the "Modern Concepts in Chemistry" series, is not a review work but a discussion, and a rather successful one at that, of the important concepts generated by the investigation of simple solvolysis mechanisms. The various theoretical treatments involved are, in general, well integrated with the clear and quite readable qualitative discussions. The recent literature is used extensively, and particularly good lists of references, which are placed at the end of each chapter, give suggestions for further reading. Two chapters, one dealing with isotope effects and another with the more classical mechanistic aspects, are especially good, although it is regretable that a fuller discussion of nonclassical carbonium ions was not included. In another chapter the author gives a good discussion of linear free-energy relationships and other aspects of the study of reaction rates, and, in a fourth chapter, he deals with the theory of reaction rates and molecular orbital theory. This last chapter is the weakest portion of the book. Thornton introduces the theories at the simplest level, but then progresses rapidly to more advanced levels in a way that is not entirely satisfactory for the more advanced student or for the beginner. The portion on molecular orbital theory, although important to the subject of the book, seems out of place because very few results are ever discussed in terms of the theory.

The objections raised should not be considered particularly serious. The author obviously is well acquainted with the subject, and, in general, he presents the material very well. It is suggested in the preface that this book may be useful as an introduction to theoretical organic chemistry. Although I feel that there are better choices available for this purpose, Thornton's book is highly recommended as a perceptive discussion of the many aspects of physical organic chemistry involved in the study of solvolysis mechanisms.

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Statistics and Biology

Stochastic Models in Medicine and Biology. Proceedings of a symposium (Madison, Wisconsin), June 1963. John Gurland, Ed. University of Wisconsin Press, Madison, 1964. xvi + 393 pp. Illus. $6.

The inherent variability in almost all biological data strongly suggests that probabilistic techniques are required to derive the maximum information from them. Stochastic models are required for the elucidation of many phenomena in the life sciences, and indeed theoretical models seem to have appeared and proliferated with only the slenderest motivation from experiments. This volume, the proceedings of the Wisconsin symposium, is a good sample of current research; it illustrates not only the scope of such research, but also the large fluctuations