

the contributors seem to have had different ideas about what was expected of them. In addition to varying in length, some chapters cite many references, while one gives none at all. Some have no table or figure; others contain numerous tables or figures, or both. In some cases the material discussed covers only the research of the contributing author. In others the approach to the topic is broader and takes up the work of other investigators.

The activities of more than 50 animals are dealt with. Birds (bullfinch, chicken, duck, dove, goose, parrot, pheasant, pigeon, quail, and song sparrow) and insects (blowfly, caterpillar, cockroach, cricket, dragonfly, *Drosophila*, grasshopper, moth, praying mantis) appear to lead the list. Fishes, ungulates, and several of the rodents and primates are also discussed. Applications to human behavior are made in a number of instances, as in Scott's treatment of social disorganization and war (chapter 11) and in Davis's discussion of human gangs (chapter 23).

The book as a whole may be considered as a study of the influence of heredity and environment upon be-

havior. Genetic factors are emphasized in the differences between strains or races and between individuals of a species. A great deal of the work, on the other hand, shows how environmental and hormonal manipulations can alter such fundamental activities as sex behavior, maternal behavior, and infant dependence upon the mother. The influence of infantile experiences in imprinting, and in special experimental environments during upbringing, are also covered. Most of the research discussed is experimental, although some naturalistic observations are included. The overall approach is illustrated by a quotation from W. D. Digler, in chapter 3.

"Psychologists have generally been concerned with learned behavior," he writes, "and have neglected the so-called 'innate' elements. Ethologists on the other hand, have traditionally been primarily concerned with 'innate' elements of behavior. The former's interests no doubt have been shaped largely by a primary concern for the behavior of humans, which is felt to be largely learned. On the other hand, ethologists, being zoologists, have been

struck by the apparent relative simplicity and rigidity of many behaviors which in these respects resembled structure. It has taken time for some psychologists to realize that innate elements commonly underlie learned behavior and for ethologists to recognize that many of these simple, rigid behaviors are wholly or partly the result of learning. Now there is an ever increasing tendency for psychologists and ethologists to cooperate in their investigations."

In a volume sponsored by the American Psychiatric Association and edited by a psychiatrist, it is interesting to note that Sigmund Freud is cited only twice, and Karen Horney once. The names mentioned most frequently—not including those of the contributing authors—are those of F. A. Beach, E. Clark, and C. S. Hall.

The volume is an excellent example of the mechanics of bookmaking, and it was undoubtedly expensive to produce. However, considering its length of 339 pages, it is certainly overpriced.

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Lack of Communication

Recent Developments in the Theory of Connections and Holonomy Groups.

Katsumi Nomizu. Fasc. 1, pp. 1-49
of *Advances in Mathematics*, vol. 1.
Herbert Busemann, Ed. Academic
Press, New York, 1962. 102 pp. \$3.

The publication of this new series, "Advances in Mathematics," is motivated by the difficulty that mathematicians encounter in communicating with each other. Specialized fields have grown so rapidly that even an active research worker can know only a few

of them in depth. Workers in these fields tend to write only for each other, and so it is difficult, if not impossible, for a mathematician to understand or appreciate what his colleague in the office next door is doing. The purpose of this series of monographs is to present the principal ideas in a variety of recent mathematical developments in a form that can be understood by the generally well-educated mathematical public. As such, its appearance is a most welcome event.

The first fascicle, by Nomizu, is an account of an important direction of research in differential geometry, which

has occurred in the last decade. Although the author overstates his case when he says this material is "the source of all that is interesting in contemporary differential geometry," certainly no one can be competent in the field without a knowledge of what is in this article.

Connections made their first appearance as the Christoffel symbols of Riemannian geometry; they were then generalized in various directions with the hope that they would provide suitable machinery for a unified field theory. The unification of these divergent trends into a general theory of connections was first accomplished by Ehresmann in 1950, and this article is an account of developments growing out of his work.

The fundamental notions are those of a differentiable manifold M and a fiber bundle with base space M . Then it is possible to define a connection in a fiber bundle, to define its curvature form, and to discuss the several holonomy groups associated with it. For these definitions the reader must be referred to the article itself. As important cases Nomizu then treats the properties of linear, Riemannian, and Kählerian connections.

The appearance of this monograph is further testimony to the fundamental influence of É. Cartan on contemporary differential geometry, for the germs of all these ideas are contained in Cartan's work. It is regrettable, however, that the modern rediscoverers of Cartan pay so little attention to the contributions of his contemporaries, such as Eisenhart, Schouten, and T. Y. Thomas. These geometers wrote in a different idiom, and their lack of influence on contemporary differential geometry is one more illustration of the difficulties of communication among mathematicians, a situation toward the correction of which this monograph series is directed.

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Clear and Perspicuous

Quantum Mechanics. vol. 1. Albert Messiah. Translated by G. M. Temmer. North-Holland, Amsterdam; Interscience, New York, 1961. xv + 504 pp. Illus. \$15.

We may expect a great many new texts on quantum mechanics in the next few years. In spite of appearances, this is not because of frenetic solicitations by the publishers of science books but rather a response to a real need. Since the end of World War II—several books appeared at that time—there has been developed a large body of new material, stimulated by the demands of theory and experiment in nuclear structure and solid state and by results and speculations in the quantum theory of fields. These developments have also produced a greater emphasis on, as well as a deeper understanding of, some of the elements of the more traditional material. A new text is to be judged, in part in any event, by the extent to which it reflects these trends.

In this regard it will not be possible to give a complete judgment of Messiah's work, since only the first volume (and the table of contents for the second volume) is available in translation; but the portents are excellent. The treatment in the text is essentially elementary in nature. Nevertheless we find such topics as projection operators, interaction representation, the wave packet discussion of scattering, penetration factors and single particle resonances, the effective range approximation, har-

monic oscillator in several dimensions, density matrix, creation and destruction operators, and, in the appendix, the theory of distributions. And whatever is missing seems certain, from its table of contents, to be in the second volume. The discussion of these topics, as well as of the more usual material, is clear, straightforward, and perspicuous.

I take issue with the author (and probably with the authors of all other quantum mechanics textbooks) in only one large matter—namely, the extensive section devoted to the statistical interpretation and the uncertainty relations. From this material the student will acquire the feeling that precise measurements are impossible in quantum systems. In fact, of course, very precise measurements are possible only because of the quantal nature of physical phenomena. It is this point that needs to be emphasized, not the musty atavistic to-do about position and momentum. Overdone, such discussions only become exercises demonstrating "Ask a foolish question—get a foolish answer."

In conclusion, this book is highly recommended, and I predict that this judgment will also extend to the prospective second volume.

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ACS Symposium Volume

Retardation of Evaporation by Monolayers: Transport Processes. A collection of papers presented at the 1960 annual meeting of the American Chemical Society. Victor K. La Mer, Ed. Academic Press, New York, 1962. xviii + 277 pp. Illus. \$10.

The general importance of monomolecular films of fatty materials is now well recognized by scientists in a wide variety of disciplines, for monomolecular films play a part in such diverse fields as boundary lubrication and cytotoxicity. Yet knowledge of the specific influence of monolayers is not nearly so widespread as it might be, considering the fact that the concepts involved in monolayer studies require a relatively slender knowledge of mathematics and physical chemistry.

One particular aspect of the behavior of monolayers, namely their influence on the transport of materials across interfaces, affects, or soon will affect, the

lives of all of us, whether or not we are professionally concerned with monolayer studies. For the translation of small-scale laboratory experiments to large-scale conservation of our water resources has proved to be one of the more exciting incidents in surface chemistry in recent years, and the pioneering work in this area holds great promise. As one of the contributors to this book remarks, "evaporation from a stockwater pond often dissipates as much water as is used in a year by 500 head of cattle."

In a book which deals with research topics it is unusual to find that the first article is an address given by a United States senator (Senator Murray of Montana, in this case), but there is no incongruity in this. As Senator Murray points out, the conservation of our water resources is vital to the maintenance of our present standards of living and to the development of higher standards in many of the world's great continental areas.

Much of the emphasis in the articles is directed to the pronounced effect on the rate of evaporation of water produced by monolayers of hexadecanol and octadecanol. La Mer's own articles give clear descriptions of experimental methods of studying these effects as well as a coherent theoretical interpretation of results. A number of papers give a good account of the large-scale application of laboratory experiments to water conservation, here and in Australia. Successful and unsuccessful methods of forming the monolayers on a large scale are critically evaluated by various authors, many of whom draw attention to the frequent failures of experiments in which an unfortunate choice of solvent results in a porous, or very permeable monomolecular film. In R. G. Vine's article there are some striking photographs of the calming effects of monolayers of hexadecanol on the surfaces of lakes. On areas coated with a monolayer, the smooth reflections of light are in marked contrast to the disturbed, rippled appearance of the uncoated water.

There are several papers dealing with the effects of monolayers on the transport of gases across the water-gas interface. These will interest biologists who are concerned with animal life in ponds and lakes, but there is much in this particular subject which will also interest cell physiologists.

Contrary to what might be expected of a group of papers presented at a large meeting, the book is remarkably