The models may be dichotomized as open or closed. The total size of a closed system does not change over time. This means either that persons neither leave nor enter the system or that any losses are replaced immediately by identical recruits. An open system, on the other hand, may have both losses and gains. The models may also be classified according to whether time is treated as discrete or continuous. A third mode of classification depends on whether or not the models possess the Markov property, which essentially means that prediction is not changed by information about the history of the process. Plausibility of the assumptions and tractability of the mathematical analysis together dictate whether the social system under investigation is assumed to be closed or open and how time and history of the process are treated. Finally, the models may be dichotomized according to whether or not the grade sizes are assumed to be large and whether or not the limiting behavior of the system is investigated. Models with large grade sizes or a limiting behavior of the system would seem to have a limited practical usefulness, since the number of members in social systems is often relatively small and an equilibrium state is approached by such systems very slowly. Such models may, however, serve as reasonable approximations to the exact solutions.

Some of the discrete and continuous time models for open systems, in which recruitment and loss appear explicitly, are characterized by transitions between grades according to a time homogenous Markov chain, constant loss probabilities, and a number of recruits which either is fixed or is a realization of a known stochastic process. Other models, some of which are original with the author, are based on the more realistic assumption that either the total size of the system or the grade sizes rather than the number of recruits is fixed. An excellent survey of models for diffusion of information in closed systems is undertaken in the last chapter. The models presuppose that information is spread by means of chance contacts between members of a given population. They differ from one another in the assumptions made about the likelihood of communication, the length of time the "spreaders" are active, and the variables affecting the cessation of the spreading.

In addition to prediction and understanding of the phenomena in question, the design of social systems and their mode of operation is explicitly recognized by the author as one of the main functions of mathematical models. Indeed, some of the models for hierarchical organizations were especially built to establish principles for the design of recruitment and promotion policies. Thus the result of several models in chapter 5, for example, is that the effect of making promotion rates an increasing function of seniority is to increase the relative sizes of the lower groups at the expense of the higher. And a conclusion reached in chapter 7 is that equal promotion opportunities and a pyramidical structure of a social system are incompatible in practice. Social scientists concerned with equal opportunities and individual freedom may find the notion that mathematics may lead to the manipulation of social systems highly intriguing.

The book is written for social scientists, but only those few who are sufficiently trained in Markov processes, the Laplace transform, and renewal theory will be able to read it. Since this is a mathematically sophisticated book and the ratio of formulas to text is rather high, even they will be required to follow the presentation carefully and to supplement many derivations by intermediate steps. The effort should be highly rewarding.

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Young Drug Users

Drugs on the College Campus. HELEN H. NOWLIS. Anchor (Doubleday), Garden City, N.Y., 1969. v + 144 pp. Paper, 95¢.

This book is the result of a project to educate college administrators about the use of drugs by students. When the project was organized—with the author as director, at the suggestion of the National Association of Student Personnel Administrators, under a contract from the Food and Drug Administration and with the cooperation of the National Institute of Mental Health and the Treasury Department—some hope existed that a factual handbook could be compiled to guide policy-making about students' use of drugs. That hope, or rather delusion, no longer exists. Although this brief book provides a penetrating and sharply focused account of campus drug problems, it is not a recipe for solving them.

Nowlis' approach is descriptive. She says of her goals in writing this book, "Above all I have tried to follow the rules of evidence." She has succeeded unusually well in carrying out those intentions, so rare in books about the student drug scene. The result is a rather complicated picture of student drug use as a manifestation of underlying social psychological problems of student life. These problems challenge almost every aspect of our culture.

The college drug scene is described in its context. It is a context of ignorance, passion, semantic confusion, and disputes about methods of inquiry and the validity of their results; it includes the increasing development of a "pill society," the "generation gap," and evidence that "tolerance of complexity is not one of the outstanding characteristics of the human species. . . ." It is a context of inconsistent and contradictory actions, laws, mores, and cultural values. Historically, it is a context of failure in policy-making, of inadequate commitment of resources, and of scientific inquiry of often poor quality. It is not a pleasant context to read or think about.

This account does not reinforce naive hopes that understanding how and why students use drugs will help very much. Understanding "what's happening," both physiologically and psychologically, can intensify conflicts about what we should do, as well as alleviate them. Social policy-making is a function of information, but also of the conservativism, tolerance, courage, and resources of policy-makers. Nowlis' view that policy on student drug use should be examined in the light of broad social issues, for example, was highly controversial only a short time ago. Until recently, conservative, intolerant, cautious, and parochial scientists and policy-makers usually succeeded in confining the consideration of drug problems to a strictly medical and legal sphere. This confinement hampered research; and it furthered the development and profitability of organized crime and other extensions of drug problems. Whether the policy consequences of social psychological conceptions of drug problems will be happier than those that followed from the medico-legal approach to them is at present a matter of sharp dispute. And, unfortunately, only time will tell.

Student drug use is not only a larger problem than in the past but an almost unploughed field for social scientific investigation. For the most part, of course, this book or any book on this

topic can only point out research needs and some of the reasons why we have been so lax about initiating many lines of inquiry. It is obvious that much more research is necessary before we can understand today's student drug use, and we must anticipate that the drug scene will keep changing in response to both chemical and social pressures. Nowlis makes clear that we must respond to today's problems with means that anticipate that new facts, new problems, and new viewpoints will have to be openly examined and incorporated into tomorrow's policy-making processes.

This unsettling book deserves a place in the library of anyone interested in student drug use. It does not presume any particular background knowledge. It does not always fill in detail on elementary matters, but it provides balanced and fairly extensive references for all topics that are discussed.

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Invertebrate Phylum

Studies in the Structure, Physiology and Ecology of Molluscs. Proceedings of a symposium, London, 1967. VERA FRETTER, Ed. Academic Press, New York, 1968. xx + 378 pp., illus. $15. Symposia of the Zoological Society of London, No. 22.

The first Symposium of the Zoological Society of London was held in 1959 and dealt with hormones in fish. Subsequent symposia have covered both specialized and general topics in zoology, and the published proceedings are good reference sources. This can also be said for the volume under review, which is one of two recent ones in the series to be concerned with a single invertebrate phylum, the other being on echinoderm biology. In this volume on the Mollusca, there is a special emphasis on the gastropod molluscs (classically, the snails and slugs), and some 13 of the 17 papers are concerned mainly, if not exclusively, with members of this class.

Within its taxonomic confines, the subject matter is fairly diverse, ranging from physiology to paleontology. Neurophysiology, on which there are five papers, receives the most coverage. This part of the volume can be recommended to the general neurophysiologist as a reference to some of the recent work on molluscan neuropharmacology. Three papers from the University of Southampton group are directed toward elucidation of the chemical transmission systems in the "brain" of the land snail *Helix*. There is also a paper on the ultrastructure of the neurosecretory cells in the brain of the pond snail *Lymnaea*. A fifth paper, on the central nervous system of *Lymnaea*, appears only as an abstract, with a journal reference to the complete work. A similar case is that of a chapter on excretion in molluscs, which is a five-page discussion of the major problems in this area based on a review published in still another journal. This discussion is very worthwhile, but inclusion of the updated review would have enhanced the value of this volume in making it a more complete reference work.

Most works on molluscan biology include a discussion of shell formation, and this one is no exception. The two chapters on this subject present both unique and new approaches. In one, on shell regeneration in *Helix*, evidence is presented for the existence of proteinaceous granules, formed especially in the Golgi vesicles of hepatopancreas cells, which are transported to the shell and act as primary crystallization centers for calcium carbonate. These "b-granules," as they are called, may also contribute to the hardening of the shell protein. A theory to account for the electrochemical deposition of calcium carbonate in bivalves is presented in the second chapter on this subject. This theory is related to the recent theory for the piezoelectric deposition of calcium in bone. Some good points are made, such as the requirements for alkaline conditions to precipitate calcium carbonate, but the article is otherwise vague about critical points and is difficult to follow.

The more exotic gastropod molluscs also receive some coverage. There is an excellent review of the bivalved gastropods, a group whose systematic position became clear only after the discovery of a new species in 1959 off the coast of Japan. These are slug-like sacoglossans restricted to an association with the alga *Caulerpa*. The interesting hypothesis is presented that the higher Sacoglossa escaped the nutritional confinements of their association with this alga during evolution by the acquisition of symbiotic zooxanthellae. There is also a study of the behavior of the nudibranch *Melibe*, which feeds with an elaborate oral veil rather than with a radula.

Other topics treated range from the paleontology of the land Mollusca of the British Isles to the ultrastructure of molluscan muscle. Thus, in general the reader is left with the feeling that he has received a good sampling of research in molluscan biology and that he has learned a great deal about the subject, irrespective of his own specialization. The main use of the book will be as a reference for specialists. It should also prove useful to those persons who are interested in the use of molluscs as experimental animals in more general areas. The book is well edited, and the illustrations are good. It is indexed by subject matter, author, and species. The systematic index is very valuable.

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Insect Physiology

Endocrinologie des Insectes. PIERRE JOLY. Masson, Paris, 1968. vii + 344 pp., illus. 96 F. Collection les Grands Problèmes de la Biologie, Monographie 7.

This monograph on insect endocrinology (the first in the French language) follows a series of comparable books and reviews by Wigglesworth (1954, 1963), Flugfelder (1958), and Novak (1959, 1966). It is the published version of the author's course on the subject given at the University of Strasbourg and covers all aspects of insect endocrinology. The chapters on molting, metamorphosis, and gonadotropic hormones form the core of the book; these are accompanied by chapters on endocrine gland morphology, diapause, metabolism, color change, and sex differentiation. Many tables and schemata and about 140 figures are used to illustrate the essentials of today's knowledge. As a basis for an understanding of physiological phenomena, the author points out repeatedly the physiomorphological changes that occur in the endocrine glands. The chronological events (time tables) of molting and metamorphosis are schematically represented for many species. The details of nearly all known facts of insect endocrinology have been included, and controversial reports are objectively treated. I could not find any omission of important details. The approach is broad and comprehensive and thus introduces the student and researcher to a field that has been growing very rapidly. On the whole I would