if the social environment is enriched at an early enough chronological age, the appropriate age can be speedily achieved. Inasmuch as language profoundly shapes the child's perception of his environment and influences his self-regulatory activities, the issue is an important one.

In a work of this scope, it is inevitable that specialists will find some shortcomings and oversimplifications. The non-aphasic changes in language occurring after brain injury could have been more adequately handled. The data on the electrophysiological correlates of development date from the '30's and '40's and are not precise enough to be used in the fashion in which Lenneberg employs them. The consideration of the differences between the speech of lower-class and that of middle-class children only touches on an important subject which is germane to relationships of biological and social factors. On the whole, the book is excellent. It is well written and organized, and the appendices by Chomsky on generative grammar and Marx on historical aspects are useful. It should be read by anyone interested in language and child development.

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Phosphorus and Its Compounds

Topics in Phosphorus Chemistry. Vol. 4. MARTIN GRAYSON and EDWARD J. GRIFFITH, Eds. Interscience (Wiley), New York, 1967. 537 pp., illus. $25.

The fourth volume of this infant series is a lusty one both as to size and price. Returning to a format similar to that of the first volume, the present one contains six sections.

"The structures and reactions of cyclopolyphosphines," by A. H. Cowley and R. P. Pinnell, covers the chemistry of compounds containing a cycle of phosphorus atoms. These compounds, discovered in the 19th century by Michaelis, remained *in obscura* for nearly a century and are now undergoing a revival owing to the clear need for better understanding of the chemistry of phosphorus as the element, a form in which these cyclic structures exist naturally. The chapter describes the appropriate chemistry but does not go into the more imaginative and spectacular transition states postulated by some for the various reactions. The authors' restraint in this matter is only to be applauded, in my opinion. "The natural occurrence of compounds with the carbon-phosphorus bond," by L. D. Quin, gives a surprisingly extensive literature coverage and discussion of 2-aminoethylphosphonic acid and related substances that occur in some living organisms. While these compounds are "freaks" and are components of not more than a handful of biological forms, their very existence in natural state of life is one of the most challenging and curious aspects of biochemistry of phosphorus; it surely gives a further support to the idea of chemical individuality of living species. In "Photochemical and radiation-induced reactions of phosphorus compounds," M. Halmann discusses at length the radiation-induced chemistry of various compounds of phosphorus. It is significant that most of the 100-odd references deal with information less than ten years old. The summary of mass-spectrometric study of phosphorus compounds should be of general interest to chemists working with phosphorus compounds. The title of D. S. Payne's paper, "The chemistry of phosphorus halides," is a misnomer by the author's own admission; it omits the fluorides of phosphorus, which are probably the most numerous halides of the lot. It attempts to give an encyclopedic coverage of synthesis and reactions of the halides of phosphorus with various states of oxidation of the latter. Inorganic chemistry is clearly more detailed than is organic chemistry in this chapter. Organic chemists are likely to be disappointed by the dismissal of points of interest to them.

"Progress in the chemistry of fertilizer and soil phosphorus," by G. E. G. Mattingly and O. Talibudeen, is a chapter of a type that is new to this series and one that should be welcomed. It makes up a large part of the book, describing in some detail the recent progress in the manufacture and the chemistry of phosphorus fertilizers, and outlining the progress made in recent years in the area of soil chemistry of phosphorus. While much of this material is descriptive in nature, and unavoidably so, one cannot forget that it is the manufacturing profit in making just such chemicals that has made possible much of the exploration of the exotic and sophisticated chemistry of phosphorus that occupied many pages in chemical journals in recent years. Lest this chapter be scorned by some in our profession, I wish to point out that a better understanding of utilization of the chemistry discussed in this chapter can well lead to an alteration in the nutritional balance in much of this world of ours; surely that is not a goal to be despised.

"Phosphorus-nitrogen chemistry," by E. Fluck, deals with the bulky topic of nitrogen-bound phosphorus compounds, linear and cyclic in structure, organic and inorganic in composition. The longest chapter in the book, it is not very well digested, and one must struggle line by line through the English-German language in which it is composed. The use of Arabic numerals for tagging the formulas is an inconvenience to the reader, for the numerals bear too much similarity to those denoting equations and literature references.

The book is well recommended to phosphorus chemists. I am sure that the various research grants that support the bulk of research in this branch of chemistry can be made to accommodate its price.

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Men at Work

Scientists in Organizations. Productive Climates for Research and Development. DONALD C. PELZ and FRANK M. ANDREWS. Wiley, New York, 1966. 332 pp., illus. $10.

The authors have addressed this book to scientists, engineers, and research administrators; the presentation suggests, however, that it was written for social scientists, particularly for those who do not mind wading through thickets of correlation tables, intricate graphs, and sample questionnaires to harvest a scanty offering of theories and useful concepts. The study is a testament to what can be done with government funds, survey methodology, and a computer if one wants to collect and manipulate data that may be relevant to an interesting problem. Certainly a great deal of activity can be generated and much time can be spent in such an enterprise.

Pelz began his examination of "the relationship between a scientist's performance and the organization of his laboratory" in 1951. By 1960 he had received answers to his questionnaires from over 1300 scientists and 11 different industry, government, and university laboratories. The next five years were spent in analyzing the answers, correlating measures of performance with measures of such behavior as communication, coordination, and creativity, such attributes as dedication, satisfactions, and motivations, and such conditions as freedom, diversity of work, and age. He sought "valid evidence" through "rigorous methods of research" to indicate "the best way to operate a laboratory." Considering the diversity of facilities possessed by different laboratories and the variety of purposes scientists in government, industry, and universities may serve, the assumption that there exists one best way to operate is bold, indeed.

The authors distinguish between facilities and environment (or atmosphere or climate), but they ignore the role and influence of facilities. A study which relied more upon direct observation of scientists at work in their laboratories and less upon responses to questionnaires might have led them to consider more seriously the ways in which the quantity, quality, and availability of facilities affect performance or attitudes. One might think that tools, equipment, and devices to which scientists have access would be a major determinant of performance; the researcher can ignore them only at the cost of abstracting the analysis and conclusions from the realities with which men have to deal.

Not only have Pelz and Andrews abstracted their study from material constraints upon behavior and attitudes, but they have also given it a misleading timelessness. For example, they assert that typically laboratory administrators follow "orthodox managerial theory" by keeping lines of authority and responsibility clear. They also assert that in performance reviews a single supervisor usually rates a scientist and recommends promotions. Such assertions reinforce the suspicion that the authors are more familiar with questionnaires than with lab practices in the '50's and early '60's. The rapidity with which laboratory staffs grew, the frequent promotion to supervisory positions of men inexperienced in management, and the swift change of techniques and research programs did not encourage and often did not allow the usual or orthodox managerial practices they describe.

The most serious limitation of the study, however, is the inability of the authors, or at least their unwillingness, to test the hypotheses their correlations suggest. They comment that "with survey data like ours you can never prove one causal hypothesis over another." Thus, when high performance and number of communicating contacts correlate well, they only guess that the latter might cause the former; admittedly the causal relationship might be just the reverse. In the correlation of performance and diversity of work, to take another example, they cannot tell whether scientists who perform well get pulled into a variety of kinds of work or they perform well because they engage in different kinds of work. Until Pelz and Andrews devise some theories that explain how performance is affected by the various characteristics and influences they have examined and then test the validity of those theories or support them with other data, their conclusions will not be very helpful.

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Parasitology

The Physiology of Trematodes. J. D. SMYTH. Freeman, San Francisco, 1966. 270 pp., illus. Paper, $4.

During the last decade, there has been a surge of interest in the fundamental, as opposed to medical and paramedical, problems underlying parasitism. Investigators have attempted to examine and define host-parasite relationships from the experimental and quantitative viewpoints by employing biochemical, immunological, histochemical, and biophysical tools. Selection of host-parasite associations as experimental models is no longer governed solely by the economic or medical importance of the host or parasite. This revitalized approach to the study of parasites and parasitism represents a departure from classical taxonomic, life-history, and epidemiological or epizootiological studies, for it takes into account comparative physiology and physiological ecology. It has revealed numerous new frontiers hitherto camouflaged or considered too esoteric.

One of the most popular models being utilized in modern parasitology involves trematodes and their hosts. In this small monograph, J. D. Smyth has assembled and organized a wealth of information, mostly results reported during the past 20 years, on this group, including what is known about their functional morphology, physiology, and, to some extent, biochemistry. Moreover, he has efficiently summarized current knowledge relative to interactions between trematodes and their hosts, including the tissue and humoral reactions of the hosts. He has thoroughly searched the relevant literature (365 carefully selected references are cited) and in addition has pointed out where gaps in our knowledge exist. Illustrations, graphs, and tables are effectively used.

It is refreshing to see equal treatment given to the biology of the preadult stages of trematodes. As one would expect, more is known about adults, but during the past decade considerable work has been done on the larval stages, and much information of a type that is obscure or difficult to detect within the definitive host has been uncovered. Smyth has included the more salient findings of this nature. He has also brought into focus, although by necessity briefly, the now well-recognized fact that different "strains" of the same host species may manifest different degrees of innate resistance to parasites. Conversely, different "strains" of parasites may show differences in infectivity. In addition to strain differences, the physiological states of the host and parasite, as well as a variety of ambient factors, are now known to influence, or even prevent, the establishment of a parasite. Thus host-parasite compatibility and incompatibility are not "all or none" phenomena but reflect the dynamic aspects of the host-parasite interphase.

This is a stimulating book whose virtues far overshadow the few misleading statements it contains. Although it is primarily meant to be a teaching and review text, investigators in physiological parasitology and comparative physiology will undoubtedly find it useful. Despite its relatively small size, this is by far the most comprehensive volume yet available on the biology of trematodes in all respects other than taxonomy and life history.

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