have any testable consequences in isolation. It is not unusual for a perfectly meaningful scientific theory to lack testable consequences when considered in isolation. We may say that what we test when we revise or confirm geometrical postulates by reference to physical experiments is not the geometry itself but rather the conjunction of geometry with a certain portion of optics and mechanics. On this account, "light travels in straight lines" is no more a "definition" than the parallels postulate is. It is just a principle of optics, nothing more nor less than that. And if "something goes wrong," we can revise either the geometry or the principles of optics, depending on the nature of the trouble. In certain worlds it might be best to retain Euclidean geometry and say that light does not travel in straight lines. In other worlds it might be best to abandon Euclidean geometry and retain this much of optics. The usual operationalist account hides, where it should emphasize, the fact that optical and geometrical principles figure on a par in scientific inquiry.

Since Professor Frank's book is thirty years out of date (at least in philosophic sophistication), the reader of this review might be interested in knowing where he can find a more contemporary account. Perhaps the best single book on philosophy of science currently available is *Scientific Explanation,* by Braithwaite (Cambridge University Press). For readers with a smattering of symbolic logic there is also a very good monograph by Professor Hempel: "Fundamentals of Concept Formation in Empirical Science" [*International Encyclopedia of Unified Science* (University of Chicago Press), vol. II, No. 7]. Those interested in the issues surrounding operationalism and the so-called verifiability theory of meaning might also read the pioneering articles by Carnap: "Testability and Meaning" and "The Interpretations of Physics" [both of these articles may be found in Feigl and Brodbeck's *Readings in the Philosophy of Science* (Appleton-Century-Crofts), a volume which also contains a large number of other good articles in contemporary philosophy of science]. A critique of Carnap's views by C. G. Hempel was published in a philosophic journal and has been republished in Linsky's *Semantics and the Philosophy of Language* (University of Illinois); a lengthy reply by Carnap, giving his current position, may be found in vol. I of *Minnesota Studies in the Philosophy of Science* (University of Minnesota). Those interested in more general issues in the philosophy of science might read *Philosophy of Science* by Stephen Toulmin (Home University Library)—a book which I do not think is a sound introduction to the philosophy of science, taken by itself, but which supplies some needed corrective to the stark "deductivism" of the Carnap-Hempel-Braithwaite account of scientific theories. And for the detailed examination of specific physical theories there is still no better work available than the writings of the late Hans Reichenbach.

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An Educational History of the American People. Adolphe E. Meyer. McGraw-Hill, New York, 1957. xx + 444 pp. Plates. $6.

A. E. Meyer states that his new book, *An Educational History of the American People,* is written mainly for novices. The book indeed is a light, interesting history. The author traces his theme from colonial America up to the present. The text has three major divisions: "The Beginnings," describing educational practices in colonial America; "Growth and Evolution," presenting the development of a distinctive public school system; and "Coming of Age," analyzing the emergence of modern educational practice and theory. The last section, which clearly describes the controversies in modern American educational philosophy, is by far the best part of the book.

Undergraduates should enjoy reading this work. Yet a *caveat* must be entered: This is not an impartial history—indeed it is not really a history but, rather, a running commentary. If one looks carefully beneath the intriguing literary style (sometimes Meyer is even too coy in his word usage), one can discover biases and personal judgments. The criticism of public education is a case in point (page 326). Thus, for the more serious layman this story may do more harm than good, for the author's subjectivity often distorts the history of American education.

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Job Attitudes: Review of Research and Opinion. Frederick Herzberg, Bernard Mausner, Richard O. Peterson, and Dora F. Capwell. Psychological Service of Pittsburgh, Pittsburgh, Pa., 1957. xii + 279 pp. $7.50.

"There is a serious discrepancy between our technological success in creating the machinery for production of goods and services and our understanding and dealings with the people who operate and manage these modern tools of production," asserts the preface to this volume. As the contents make clear, this discrepancy cannot be ascribed to lack of publications; rather, it relates to the restricted quality of the research available.

Research on workers' attitudes has been hampered by a variety of factors. Much of it has been naive or has been motivated by a wish to prove the wisdom of management. Even more has been limited by the difficulty of getting managerial permission to study employees on the job. Problems which should be tackled with a multidisciplinary team and large resources have been studied by one person without even access to high-speed computers. The result is a haystack of bibliographical references in which the wheat is truly hidden by the chaff. Unfortunately, the authors have not been very critical in identifying, for the reader, which items fall into which category.

The book contains a tremendous amount of information which can be valuable to researchers in psychology, medicine, economics, and sociology, as well as to managers and union officers. It should serve an especially useful purpose in spotlighting the gaps in our knowledge of phenomena which might well wreck our technological-economic system if we do not learn to deal more understandingly with them.

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First Symposium on Host Specificity Among Parasites of Vertebrates. Institut de Zoologie, Université de Neuchâtel, Neuchâtel, Switzerland, 1957. 324 pp. Illus.

One of the most outstanding characteristics of parasitism is the specificity for certain kinds of hosts. For a very long time the facts concerning this specificity have been recorded, organized, and filed away with little attempt to analyze the bases upon which it rests, its significance, or its relationship to other biological problems. This symposium records an attempt to pose some of these problems before a group of parasitologists who have concerned themselves with various phases of host specificity and zoologists who are interested in speciation, evolution, phylogeny, and taxonomy of the hosts.

After establishment as a working hypothesis of the existence of some parallelism between the phylogenies of hosts and parasites, the various groups of hosts (mammals, birds, reptiles, and fishes) and of parasites (ectoparasites and helminths) were examined to determine the extent of this parallelism between the

classification of hosts and parasites. As was to have been expected, special emphasis was given to taxonomic groups of hosts whose classification is unclear, in an attempt to determine to what extent information regarding their parasites clarified the classification.

Mammalian phylogeny presents an area in which there is comparatively good agreement. Major problems still exist in the isolated groups such as whales and in the groups now placed in the Edentata. The known data on ectoparasites of these groups are disappointing in their contributions to the solutions of these problems. The more unsatisfactory conditions relative to avian phylogeny offer a more promising opportunity for use of data on parasites (see *Mallophaga of Birds,* by Theresa Clay). Such suggested relationships as that of the Musophagidae to gallinaceous birds and of flamingos to the Anatidae give the students of phylogeny some much needed clues. In the phylogeny of fishes the cestodes are the most reliable indicators of host affinities, but some digenetic trematodes also appear to point the way toward clarification of host phylogeny.

Further generalizations on the subjects treated are difficult. There is much grist here for the phylogenist's mills of the future. It would appear that this first symposium held to seek the degree to which the taxonomists of parasites may lend assistance to the taxonomists of vertebrates and vice versa was successful in pointing the way to future collaboration of the two groups.

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Advances in Pest Control Research. vol. I. R. L. Metcalf, Ed. Interscience, New York, 1957. vii + 514 pp. Illus. $11.

For the purpose of this book the term *pest* is defined in the preface by the editor as including all organisms that compete with man for his food supply, damage his possessions, and attack his person. This is, no doubt, an intentionally wide definition given with an eye to the future, but the ten articles in this volume are concerned primarily with various aspects of control, by means of chemicals, of arthropods (chiefly insects), fungi, and weeds. Methods of control other than chemical control have not been considered.

The proposed aim of the series is to provide a number of articles by specialists in the various fields of pest control, where the author will not only give a comprehensive review of the particular field but will, in addition, make a critical evaluation of new concepts and developments.

The contribution by J. M. Barnes on the control of health hazards associated with the use of pesticides fulfills this aim admirably. This is also true of the article by A. S. Crafts on the chemistry and mode of action of herbicides, and of the contribution, written in his own inimitable style, by J. G. Horsfall on the mechanisms of fungitoxicity. T. R. Fukuto, in his article on the chemistry and mode of action of organic phosphorus insecticides, has not attempted to give a detailed account of the literature on the chemistry and biological action of this group of chemicals, but is concerned with the more fundamental aspects of the subject. He first describes the enzymes which have been shown to be inhibited by the organophosphorus insecticides and possibly concerned with their toxic action. Then, following an evaluation of the present knowledge of the mechanism of inhibition of esterases by these poisons, the relation between their structure and biological activity and their metabolism by the organism, he derives the molecular characteristics necessary for toxicity, which may also serve as guides in the search for new compounds.

Three contributions deal with the more practical applications of chemicals for pest control. D. B. Kendrick, Jr., and G. A. Zentmyer give an account of the recent advances in the control of soil fungi; G. F. Shambaugh, R. F. Brown, and D. J. Pratt, Jr., give a review of work on repellents for biting arthropods; and W. E. Ripper discusses the status of systemic insecticides in pest control practice. In addition to giving a practical account of the methods of use and the possible uses of systemic insecticides, Ripper considers the theoretical implications of the type of selectivity shown by systemic insecticides and considers its application in the integration of biological and chemical control.

The contribution on the uses of radioisotopes in pesticide research, by P. A. Dahm, summarizes the use of radioactive atoms in insecticides, fungicides, and herbicides. Their use for tagging insects, mites and ticks is also dealt with. The use of radioisotopes in epidemiology and public health and the use of radiation in food preservation and pest control is touched on. Perhaps because the subject is not suitable for theorizing, this article tends to be a catalog of facts. The same comment might be made of the comprehensive review on the chemical analysis of pesticide residues, by M. S. Schechter and I. Hornstein, but here such treatment is necessary if the subject is to be dealt with adequately. These authors have confined their remarks to chemicals used for the control of arthropods, weeds, and fungi but have taken a commendably broad view of techniques, including, for instance, a valuable section on enzymatic methods of analysis.

The other article concerned with the assessment of pesticides, that by Yun Pei Sun on the bioassay of pesticide residues, deals entirely with insecticides. The author deals with the subject as a whole and not particularly with any one aspect of it. A section on the factors influencing results is included. In this section there seems to be the tacit assumption that all the factors influencing the results have been recognized; this would seem to be a rather optimistic view.

The volume of work currently in progress on chemicals for pest control is so great that it is difficult, if not impossible, for any one individual to keep up with progress in all areas of the field by reading original papers. For this reason these authoritative and critical summaries are of the greatest value, and it is to be hoped they will be followed by others equally good.

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The Chemistry of Organic Medicinal Products. G. L. Jenkins, W. H. Hartung, K. E. Hamlin, and J. B. Data. Wiley, New York; Chapman & Hall, London, ed. 4, 1957. x + 569 pp. $10.75.

This new edition of a familiar textbook of organic medicinal chemistry should evoke great interest and enthusiasm among students and teachers alike. While the desirable features of the previous editions have been retained, the reader is impressed by the meticulous care and effort with which each chapter has been revised. It takes cognizance of the newer developments in the ever-changing field of pharmaceuticals by replacing discussion of many obsolete drugs with items of current interest. The text has been rearranged to achieve conciseness by the omission of material which is readily available in other books on general organic chemistry. A new chapter on antibiotics and several flow diagrams showing step-by-step syntheses of many important drugs have been added. Journal references, brought up to date, are quite adequate to arouse interest in readers who would like to pursue the subject matter more deeply. I feel that the chapter on sterioisomerism could be abridged substantially. Inclusion of a general chapter on the chemical changes which drugs undergo during their metabolism and detoxication in the body might not be out of place.