is stimulating and should provoke new investigations. The first paper by A. A. Miles on "The meaning of pathogenicity," as its title implies, is preoccupied with definitions. The remaining authors do not always conform to his suggestions on the use of the terms *pathogenic* and *virulent,* but little confusion results. The ideas expressed in Theobald Smith's philosophic classic *Parasitism and Disease* are alluded to repeatedly. It is, however, by no means clear that these ideas have had an important impact in the field—at least so far as the contributions to the present volume are concerned.

As might be expected, understanding of the mechanisms of action of specific toxins, whether in plants or animals, is better understood than the invasive manifestations of microorganisms, and excellent progress is being made from this approach. This is exemplified in the chapter by Smith and Keppie on pathogenesis of anthrax and in the chapters by Wood and by Brian on the role of toxins, whether enzymes or small molecular substances, in certain plant diseases. The discussion of the relative importance of lycomarasmin and pectic enzymes in tomato wilt is particularly instructive.

Somewhat questionable statements occur in a few places. For example, on page 34 it is stated that the somatic antigen of *Sh. shigae* is protective against the disease, and on page 187 the immunological response to infection is described in terms so mechanistic that they can hardly be accepted as constituting a valid generalization.

This book is strongly recommended to those interested in the pathogenic properties of microorganisms.

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Philosophy and Analysis. A selection of articles published in *Analysis,* 1933–40 and 1947–53. Margaret Macdonald, Ed. Philosophical Library, New York, 1954. viii + 296 pp. $7.50.

Philosophy and Analysis consists of 37 articles, all except two of which had been previously published in *Analysis* between 1933 and 1940 and between 1947 and 1953. *Analysis* has played a unique role in publishing short articles on precisely defined philosophical questions and in offering an exchange of views among like-minded philosophers. Unfortunately, its limited circulation made reference difficult; hence, the present collection fills an important gap, not only for technical workers in this field, but also for educated laymen, who are here provided with more variety and continuity than is available in any single issue of such a highly specialized journal. This cultivation of small-scale, rather than large-scale, philosophies has been quite fruitful. As a result there has been a tendency for philosophers to concentrate on separate problems in contrast to their previous procedure of issuing pronouncements about the whole universe.

A very helpful introduction is provided by Margaret Macdonald, editor of *Analysis.* She undertakes to clarify the special outlook or attitude represented by this journal, which is concerned primarily with philosophical analysis and the application of the method of logical analysis to philosophic problems. She points out that this concept was introduced by Moore and Russell and later extended by Wittgenstein.

In general, the idea is "that philosophical problems might be solved by a better understanding of the meaning of language." In other words, "To find out what a sentence means or a proposition asserts one must deduce those other propositions upon which its truth depends." This is related to Russell's *Principle of Acquaintance*—namely, "Every proposition which we can understand must be composed wholly of constituents with which we are acquainted." All this is in line with Moore's *Defence of Common Sense,* "That we understand and know for certain the truth of many statements of ordinary life, though we do not know their analysis." Moore's position may be stated, "To be understood, a philosophical statement, or problem, must be explained in ordinary, that is, known philosophically technical language. When so explained, one will find that the problem concerned can be solved, or shown to be soluble, which is a kind of solution, only by careful examination of the uses of certain words in oridnary contexts."

In this connection there has been considerable influence by Wittgenstein and members of the Vienna group through their principle of verifiability—namely, "A proposition is significant if it is logically possible that it should be verified by one reporting an experience. . . . If not so verifiable, a proposition is either analytic tautologist or nonsensical, which includes metaphysical." Usually one "does not so much try to answer philosophical questions or solve philosophical problems as ask in what sense of 'question' and 'problem' they are questions and problems and what sort of answer would satisfy those whom they puzzle." It is significant that analytic philosophy has concentrated on certain problems while completely ignoring others. Thus the present collection is concerned with questions in logic and epistemology—that is, problems such as meaning, knowing, truth, and probability.

There is included an article on "The relationship between philosophy and psychology" and also one on "Ethics." Probably most interesting to the general reader are some papers that appeared in 1939 dealing with dialectic materialism as presented by speakers from both sides.

Although recognizing the value of linguistics per se and of semantics in general, the average scientist may well look askance at this kind of approach, which, however, may be justified as an attempt to present a unified and coherent word description of experiential ideas.

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Linearized Theory of Steady High-Speed Flow. Cambridge monogr. on mechanics and applied mathematics. G. N. Ward. Cambridge Univ. Press, New York, 1955. xv + 243 pp. Illus. $6.

This book is a systematic and coherent account of the basis of linearized theory of steady flow. It is written in a careful and scholarly style. The approach to the subject matter is formal in the sense that general methods are studied first and the special cases extracted and in that formal mathematics is used to deduce all the theorems and representation formulas.

The book is divided into three parts: "General theory," "Special methods," "Slender body theory." Chapter 1 presents the assumptions (perfect gas, inviscid fluid), exact equations under those assumptions, and derivation of linearized equations. Chapters 2 and 3 give general solutions for subsonic (Laplace equation) and supersonic (wave equation) flows in terms of the basic elements, sources, vortices, and so forth, and integral formulas, domains of dependence, and so on. Chapter 4, an especially interesting chapter, discusses usually troublesome points of the theory, such as boundary conditions, formulas for over-all forces, including the effect of singularities at edges, nonuniformities of approximation at infinity, and also flow reversal theorems.

Chapter 5 presents a brief account of the application of the methods of Chapter 2 to subsonic wing theory. In Chapter 6 the methods of Chapter 3 are applied to supersonic wing theory. The lifting problem is treated in detail by the method of Evard and Krasilshchikova, using characteristic coordinates and the source representation. In Chapters 5 and 6 no specific examples are worked out.

Chapter 7 presents the theory of linearized supersonic conical fields following Goldstein and Ward and applies it to flat wings. Chapter 8 covers those applications of operational methods to

supersonic flows for which the technique is especially suited, mainly quasi-cylindrical bodies and jets. The final chapter is a detailed exposition of slender body theory for subsonic and supersonic flow. The basic approach is to expand exact solutions, represented by singularities, near the axis and to study orders of magnitude carefully.

The desire for a concise account has meant that the working out of examples and comparison of results with more exact theory or experiment has been put aside. Thus an evaluation of the usefulness and an intuitive feeling for the nature of the results has to be found elsewhere. The level of the book is such that the reader with some training in mathematical physics can follow the details. Vector notation is used extensively. There is a good bibliography, except that no reference is made to Russian literature, and there are practically no figures.

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Science and the Human Imagination. Mary B. Hesse. Philosophical Library, New York, 1955. 171 pp. $3.75.

Mary Hesse, lecturer in mathematics at the University of Leeds, has written a slim book about a subject that is increasingly a matter of professional concern—the relationship of science and religion. Her position seems to be adequately summarized in the following passage (p. 155): "The conflicts between science and religion over their respective descriptions of various aspects of experience are usually genuine conflicts about experience, and not mere verbal misunderstandings or confusions of two apparently similar but actually distinct types of language. . . . All . . . attempts to divide the provinces of science and religion are dangerous illusions, they are false for science, because science has a valid claim to investigate *all* aspects of experience, 'spiritual' as well as 'material' . . . they are false also for Christianity, because they deny the concern of the Christian God for the material world which He has created."

Such seems to be the author's most serious message; but she takes up a great deal of space *not* saying it. More than two-thirds of the book is devoted to a pedestrian survey of the development of scientific methodology which bears no obvious relationship to the avowed purpose of the work. She (rightly) disdains a science made impotent to develop new fields by its strong bias in favor of that which can already be symbolized clearly and logically. To speak out boldly in behalf of the still unclear, the still ambiguous aspects of man's situation is admirable but is hardly enjoyable for the reader unless the writer possesses the scintillating literary endowment of a Whitehead or a Wisdom.

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The Chemistry of Petroleum Hydrocarbons. vols. II and III. Benjamin T. Brooks, Stewart S. Kurtz, Jr., Cecil E. Boord, and Louis Schmerling, Eds. Reinhold, New York, 1955. vol. II, vi + 442 pp. Illus. $13.50. vol. III, vii + 690 pp. Illus. $18.

Together with volume I, which appeared in 1954, these volumes constitute the most complete and authoritative summary of our knowledge of the chemistry of petroleum hydrocarbons that is presently available. Volume II contains 16 chapters (Chapters 22 to 37). Chapters 22 to 29 discuss various aspects of cracking (thermal and catalytic) and reforming operations. Specifically, the topics include: mechanisms for the thermal decomposition of hydrocarbons; conditions and results of thermal cracking for gasoline; composition of synthetic and cracked gasolines; acetylene by the pyrolysis of light hydrocarbons; pyrolytic reactions of aromatic hydrocarbons; theory of catalytic cracking; the effects of variables in catalytic cracking; aromatization, hydroforming, and platforming. The related topics of catalytic dehydrogenation and the mechanism of the reactions of nonbenzenoid hydrocarbons are considered in Chapters 30 and 31. The oxidation of hydrocarbons is described in Chapters 32 to 37 under the headings: general theory of hydrocarbon oxidation; low-temperature oxidation of paraffin hydrocarbons, oxidation of paraffin wax; olefin antoxydation; synthesis gas from methane, oxygen, and steam; the partial oxidation of the simple paraffinic hydrocarbons; special oxidation reactions of unsaturated hydrocarbons.

In volume III, which comprises Chapters 38 to 59, a wide variety of topics are discussed as follows: oxidation of orthoxylene to phthalic anhydride; isomerization of saturated hydrocarbons; chlorination of paraffins and cycloparaffins; fluorination and properties of fluoroderivatives of paraffins and cycloparaffins; nitration of paraffins and cycloparaffins; special chemical reactions of paraffins and cycloparaffins; isomerization of olefins; vinyl polymerization; polyethylene; Diels-Alder condensations and related reactions; polymer gasoline; the chemistry of natural and synthetic rubbers; condensation of saturated halides with olefins; catalytic hydrogenation of hydrocarbons; the oxo-reaction; alkylation of saturated hydrocarbons; special reactions of olefins; aromatic substitution—theory and mechanism; industrial applications of aromatic alkylation; sulfonation of aromatic hydrocarbons; nitration of aromatic hydrocarbons.

It is noticed with regret that, in these volumes which seem to have covered the field so completely in other respects, no chapter has been included on the thermodynamics of hydrocarbons.

The field of hydrocarbon chemistry is now so vast and so diversified that it is virtually impossible for an individual to keep informed concerning its many aspects, by reference to the original literature alone. Thus, a real need has existed for a treatise to summarize in one place this vast information. This need has now been filled in an authoritative and readable manner in the three volumes of the *Chemistry of Petroleum Hydrocarbons.*

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New Books

"Krebiozen," The Great Cancer Mystery. George D. Stoddard. Beacon Press, Boston, 1955. 282 pp. $3.50.

Encyclopedia of Chemical Technology. vol. 14, *Thermodynamics to Waterproofing.* Raymond E. Kirk and Donald F. Othmer, Eds. Interscience Encyclopedia, New York, 1955. 980 pp. Single copy, $30; subscription, $25.

Frontiers of Astronomy. Fred Hoyle. Harper, New York, 1955. 360 pp. $5.

The Diseases of Occupations. Donald Hunter. Little, Brown, Boston, 1955. 1046 pp. $20.

Building, Planning and Design Standards. For architects, engineers, designers, consultants, building committees, draftsmen and students. Harold R. Sleeper. Wiley, New York; Chapman & Hall, London, 1955. $12.

The Quantitative Analysis of Drugs. D. C. Garratt. Philosophical Library, New York, rev. ed., 2, 1955. 670 pp. $17.50.

A Short History of Medicine. Erwin H. Ackerknecht. Ronald Press, New York, 1955. 258 pp. $4.50.

One in Six. An outline of the cancer problem. I. Hieger. Wingate, London, 1955. 80 pp. 12s. 6d.

Classical Electricity and Magnetism. Wolfgang K. Panofsky and Melba Phillips. Addison-Wesley, Cambridge, Mass., 1955. 400 pp. $8.50.

The Unified System Concept of Nature. Stephen Th. Bornemisza. Vantage Press, New York, 1955. 137 pp. $3.

Analytic Geometry. Frederick H. Steen and Donald H. Ballou. Ginn, Boston, ed. 3, 1955. 244 pp. $3.50.

Plastics for Corrosion-Resistant Applications. Raymond B. Seymour and Robert H. Steiner. Reinhold, New York, 1955. 423 pp. $7.50.