reports that polychlorinated biphenyls were undetected in five antarctic penguin eggs but were found in Panamanian pelican eggs, and reports DDT: PCB ratios on the order of 1 : 1 in San Francisco Bay. The biological significance of these widespread but little-understood industrial pollutants is now a research challenge of the first order. Fallout phenomena involving lead were brought up only incidentally at the Rochester meeting, and the effects of other chemicals such as sulfur dioxide omitted. There is an implication here that, with the DDT question settled, attention of the scientific community will turn to mounting fallout problems of a quite different nature.

Organizers of the Rochester conference deliberately sought "to promote an exchange of views between experts in generally antagonistic specialties." They got it in a spirited debate between Robinson of Shell and Risebrough of Berkeley on the merits of D. A. Ratcliffe's explanation for the decline of raptor populations in Britain. This argument has subsequently been settled (*Science* **162**, 271–73 [1968] and **165**, 199–200 [1969]; *Nature* **224**, 47–48 [1969]) in Ratcliffe's favor.

Biological Effects of Pesticides is, despite its title, a fairly broad summary of research in pesticide ecology. *Chemical Fallout* samples an even larger field. Taken together, they provide excellent reference tools for the scientist and a helpful introduction to students seeking to understand the new hazards appearing in our environment.

JOSEPH J. HICKEY
Department of Wildlife Ecology, University of Wisconsin, Madison
SUSAN HICKEY
Bureau of Research, Wisconsin Department of Natural Resources, Madison

A Science as It Was and Is

Sourcebook for Petroleum Geology. Semicentennial Commemorative Volume. ROBERT H. DOTT, SR., and MERRILL J. REYNOLDS. American Association of Petroleum Geologists, Tulsa, Okla., 1969. viii + 472 pp. $18. AAPG Memoir 5.

This book was conceived as the second in a series of three books to commemorate the 50th anniversary of the founding of the American Association of Petroleum Geologists in 1917. The first of the series, *Fluids in Subsurface Environments* (AAPG Memoir 4), a symposium edited by Addison Young and J. E. Galley, was published in 1965; the third, a history of petroleum geology, is yet to be published.

The purpose of the sourcebook is stated to be "to present by quotations the basic concepts of [petroleum geology] and to trace the evolution of thought from the earliest rudimentary pronouncements to the sophisticated hypotheses of the third quarter of the twentieth century." Dott and Reynolds have succeeded remarkably well; in addition, they have revealed the give and take of the literature by including quotations in pairs showing both sides of a discussion, with some commentary to clarify. These quotations are well selected, and there is a minimum of extraneous or unnecessary material.

In part 1 (Genesis of Petroleum), subject matter ranges from hypotheses for an inorganic origin for petroleum, including a summary of the geologic setting of virtually all occurrences of oil in igneous and metamorphic rocks, to the more generally accepted hypotheses of organic transformation. The editors have rightly emphasized the organic geochemical aspects of the problems, and their care in preparation is evident in their inclusion of an appendix of chemical terms for nonchemists. The only serious omission in the section is Cooper and Bray's fine paper on the "Postulated role of fatty acids in the formation of petroleum," which should have found its place in the discussion of odd-carbon-number preference in extracts of Recent sediments.

Part 2 of the book (Secondary Migration and Accumulation of Petroleum) shows similar care in the selection of subject matter and references. Discussions range from the nature of the pore network of reservoir rocks to hydrodynamic entrapment, with every conceivable aspect of the subject systematically covered.

Why would one want to buy this massive literature summary? In addition to its value as a historical document, the book will be a useful teaching tool. Its bibliographic wealth, excellent choice of material, and organization will render it a fine adjunct to a course in petroleum geology or geochemistry. It will not replace factual material, because it draws its quotations primarily from authors' conclusions, but it does an admirable job of putting this material into perspective. Specialists in various phases of petroleum geology should read this book to gain a perspective of their own specialty—and to learn that other specialties do impinge on their own. For the nonspecialist, a thorough reading of this book will yield a comprehensive knowledge of petroleum geology and geochemistry as it exists today, and how it got to be where it is, together with a revealing view of the numerous "sacred cows" of the science.

When one reads scientific literature either at random or chronologically, general trends are not always obvious. This collection of quotations clearly reveals the cyclicity of ideas that has characterized progress in the petroleum sciences. I was also struck by the frequent recurrence of the phrase "The conclusion that petroleum is . . . is inescapable."

WALTER E. REED
Department of Geology and Geophysics, University of California, Berkeley

Inositol Chemistry

Cyclitols and Phosphoinositides. Chemistry, Metabolism, and Function. A conference, New York, Sept. 1968. FRANK EISENBERG, JR., Ed. New York Academy of Sciences, New York, 1969. Illus. Paper, $18.50. Annals of the New York Academy of Sciences, vol. 165, art. 2, pp. 509–819.

This collection of 27 papers, a mixture of short reviews and brief research reports, provides in one handy volume the most up-to-date treatment of the subject that is available. Anyone who has not followed the developments in inositol chemistry and metabolism will probably be amazed to discover the great diversity of structural and functional roles in which this class of compounds has become implicated. To this reviewer, who has been close to the subject, the collection provides an interesting insight into the latest thinking of other workers in the field.

A large part of the collection deals with the polyphosphoinositides, acidic phospholipids first discovered in brain tissue but now known to occur in small amounts in many animal tissues and even in yeast. This family of phosphatidylmyoinositol phosphates is of particular interest because of the relatively rapid metabolism of the monoesterified phosphate groups. Considerable knowledge has been gained about the enzymes that are involved in the formation and breakdown of these lipids, and questions are being asked as to the metabolic significance of these reac-

tions. Some of the papers deal with this subject as well as with attempts to rationalize the unusual properties of these phospholipids in terms of structure. It would appear, however, that models created to visualize a specific role for these compounds in membranes have to be considered premature.

Good progress has been made in understanding the steps in the biosynthesis of myoinositol from D-glucose-6-phosphate, and this subject has entered the stage at which sophisticated questions concerning the exact mechanism of the cyclase reaction are being answered through the study of isotope effects. It is of interest that the myoinositol-1-phosphate formed in the cyclase reaction is the enantiomorph of that found in the phosphatidylmyoinositol. Thus, living cells hydrolyze the L-myoinositol-1-phosphate formed in the cyclase reaction to free myoinositol (the first irreversible step in myoinositol biosynthesis) and then convert the free myoinositol to 1-phosphatidyl-D-myoinositol, a process that is mechanistically quite distinct from that for the biosynthesis of phosphatidylcholine. Perhaps this can be rationalized in terms of the biosynthetic control of the pathway leading to myoinositol. That myoinositol should also be cleaved oxidatively to glucuronic acid, which may serve as a precursor of plant cell wall polysaccharides, adds a further puzzling note.

Myoinositol is the precursor of several isomeric inositols and their methyl ethers, as well as of aminoinositols and *C*-methyl-inositols, in reactions that are becoming fairly well defined. Functional roles for most of these substances are unknown, although a diaminoinositol is involved in the biosynthesis of the antibiotic streptomycin. An unusual role in hexose transfer has been indicated for galactinol, a D-galactoside of myoinositol. Myoinositol glycosides esterified with indole-3-acetic acid may have a function in plant growth regulation.

As with other fields of science, significant advances in inositol chemistry have followed on the development of new methods of separation and characterization. Ion-exchange separation of inositol polyphosphates coupled with characterization by nuclear magnetic resonance spectroscopy has led to the identification of all possible myoinositol pentaphosphate isomers, an accomplishment I would have thought improbable only a few years ago.

As noted in the conference summary, treatment of the subject of the mannophosphoinositides of *Mycobacteria* and closely related organisms is lacking as is, I might add, any discussion of the myoinositol sphingolipids found in plant seeds and yeast. As further evidence of the surprises that await anyone working in the field, I refer to the diacylmyoinositol mannoside found only last year in several *Propionibacterium* species.

If I wanted to get a good idea of the direction of inositol research today I would start with this volume. It is timely, authoritative, and succinct, and it should be an important reference source for both research and graduate teaching on this subject.

C. E. BALLOU
Department of Biochemistry, University of California, Berkeley

Geophysics

The Application of Modern Physics to the Earth and Planetary Interiors. A NATO Advanced Study Institute, Newcastle upon Tyne, England, March-April 1967. S. K. RUNCORN, Ed. Wiley-Interscience, New York, 1969. xvi + 692 pp., illus. $35.

Geophysicists are troubled by the problem of demonstrating the uniqueness of their models of planetary interiors derived from the inversion of geophysical data. This difficulty stems from the lack of a complete data set, from the use of imprecise data, and from the absence of a general theory establishing the basis for unique inversions. Under these circumstances there is a growing tendency to draw on modern physics in order to establish additional constraints on solutions. The modern theory of solids, the theory of semiconduction, experimental data from shock studies of solids, the theory of creep, and the mathematics of magnetohydrodynamics have been invoked to eliminate some models and to strengthen the case for others. It is a credit to Runcorn and his colleagues that they have drawn together many of the recent developments in a single volume.

The book is a collection of papers on diverse subjects connected by the central theme—applicability to planetary interiors. About two-thirds of the 48 papers are reviews, and of some pedagogical value; the remainder contain original contributions. The book is divided into major sections as follows: Cosmology and Geophysics; Solid State Physics and Geophysics; High-Pressure Physics and the Earth's Interior; Developments in Techniques; Magnetohydrodynamics; The Earth as a Fundamental Physics Laboratory. L. Rosenfeld contributes an instructive and engrossing opening chapter discussing the place of planetary physics in the history of science.

The hazards of publishing a collection of papers inspired by a conference are well known—and some are not escaped by this book. Several techniques proposed in 1967 have not panned out, and other articles have been superseded by recent events such as the landings of Apollos 11 and 12. Several of the papers would be more appropriate for specialized journals. A few papers which could be highly significant appear only as abstracts. More than 100 pages are devoted to the elusive question of secular changes of g and its geophysical consequences.

The great strength of the book rests in the dozen or so papers which will be of lasting value as reviews or important original contributions. Among these are W. Elsasser's piece where he introduces the concept of the lithospheric stressguide as a component of his mechanism of sea floor spreading. The papers by T. J. Shankland and R. G. Burns contribute new data on the electrical and optical properties of silicate minerals which are highly pertinent to the interpretation of electrical conductivity in the mantle and in the construction of thermal models of planetary interiors. T. J. Ahrens and C. F. Petersen present an excellent review of methods of reducing shockwave data. New results on the elastic properties of oxide compounds are compared to seismological data in the paper by O. L. Anderson and R. C. Lieberman. J. J. Gilvarry's extensive discussion of the Thomas-Fermi atomic model will become a standard reference for specialists concerned with the equation of state in the central regions of planets.

This book is another example of how the Advanced Study Institutes organized by Runcorn and his colleagues at the University of Newcastle have produced a number of important volumes which reflect good taste in the choice of important, forefront themes and in the selection of capable and stimulating participants.

FRANK PRESS
Department of Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge