is claimed that the generalization to spatial "coarse grained" patchiness is supported in an earlier note by Howard Levene (*Amer. Natur.* **87**, 33 [1953]), and in a paper by Levins and MacArthur (*ibid.* **100**, 585 [1966]) which extended Levene's approach. But Levene worked from carefully stated assumptions that imply (although he did not emphasize this) that survival in the different patches observes an extreme density dependence. A fixed quota were supposed to survive in each particular patch irrespective of whether the initial population contained genotypes mostly well or badly adapted to that patch. Yet Levins and MacArthur state that the fitness of each genotype does not depend on population density; and hence apparently came Levin's present view that under "coarse-grained" selection, whether temporal *or* spatial, "a concave fitness set can still permit a mixed strategy polymorphism provided the concavity is not too extreme." To make the classical argument for a spatially patchy environment *not* work, and so to permit such equilibria, the assumption of severe density dependence must be brought in, and this makes the selective advantages of genotypes take a mainly competitive interpretation. This in turn suggests behavioral adaptation in a highly social species, to which the simple maximization criteria are unlikely to apply. In short I can see no very realistic situation to which Levene's model, and the developments from it, could apply.

This criticism perhaps advises caution in accepting some of the other too-briefly explained ideas. It is the most definite I have to make, and having mentioned it I must close what is already a longish review for a very short book. If the author had written more at length, and with more care, I think he would have done more justice to his bold design and the importance of his subject.

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Known and Little-Known Pollutants

Biological Effects of Pesticides in Mammalian Systems. A conference, New York, May 1967. HERMAN F. KRAYBILL, Ed. New York Academy of Sciences, New York, 1969. Illus. Paper, $23. Annals of the New York Academy of Sciences, vol. 160, art. 1, pp. 1-422.

Chemical Fallout. Current Research on Persistent Pesticides. Proceedings of a Rochester Conference on Toxicity, Rochester, N.Y. MORTON W. MILLER and GEORGE G. BERG, Eds. Thomas, Springfield, Ill., 1969. xxii + 532 pp., illus. $22.50.

Biological Effects of Pesticides in Mammalian Systems is a series of 35 papers, together with four discussions and seven summations, that made up a conference held by the New York Academy on 2–5 May 1967. The seven main sections of this monograph cover general pesticide use, analytical instrumentation and methodology, metabolism of pesticides, and effects along biochemical, pathological, toxicological, and physiological lines. The bulk of the volume consists of review papers, with research reports occupying much of the last quarter. The organizers of the conference seem to have succeeded reasonably well in presenting in a single monograph the remarkable progress in epidemiologic and toxicologic research on chemical pesticides. The result is inevitably somewhat dated, and its utility is impaired by inadequate summaries and the lack of an index. This is not a book for those who read only abstracts, however. It contains four papers that together constitute the best summary we have seen of pesticide decomposition in the environment, a convenient compilation of residues in the atmosphere, a tight review of residues in wild animals, a cogent analysis of residues in American foods, and a good summary of residues in man. About 1200 references are cited, and an introductory chapter on the chemistry of pesticides will help the uninitiated.

The strength and weakness of this symposium are to some extent the result of its ambitious attempt to cover an enormous field that is now well fragmented into highly specialized research categories. Research on the effects of DDT and DDE has, of course, been highlighted by important breakthroughs since the New York conference took place, but most of the older data on these compounds are still solid, and the present volume also covers organophosphorous insecticides, fungicides, herbicides, and a fascinating array of sublethal and little-understood biochemical effects. In a thoughtful summary of the conference, M. B. Shimkin notes that the chronic effects of these chemicals on man are yet to be defined, that the release of pesticides for individual use would appear to require the same specific safety procedures we now impose on pharmaceuticals, and that research in preclinical toxicology and pharmacology still needs to be emphasized.

Chemical Fallout reproduces 25 papers and the discussion at a University of Rochester conference on toxicity held 4–6 June 1968. Although essentially slanted toward the primary goal of public health, this meeting paid considerable attention to effects on natural populations, and it involved more ecologists than did the New York Academy symposium. The results are also more helpfully put together by the editors: each paper has its conventional abstract, and the volume closes with an author and a subject index.

Except for overlapping papers on steroid metabolism, these two volumes do not duplicate each other. *Chemical Fallout* splurges on mercury with six papers from Sweden and one from Japan. Here for the first time in English are good descriptions of widespread mercury pollution that will surely stimulate research and monitoring of this chemical in North America. (An important summary of alkyl mercury poisoning in terrestrial Swedish wildlife have more recently appeared in *Viltrevy* **6**, 301–78 [1969]). According to Westöö, sale of fish from about 40 water areas in Sweden is now prohibited as the result of methylmercury contamination. In marine species caught commercially near the shore, mercury runs as high as 10 milligrams per kilogram. Aquatic pollution by mercury is reported to result from slimicides used in the paper-pulp industry and from mercury electrodes in chlorine-alkali factories.

These two volumes happily complement each other in a variety of ways, although one wishes that fish populations could have received more attention. Together, these books impress one with our present lack of information on worldwide or even continental patterns of chemical fallout. In the Academy monograph, Jegier's interesting paper cites only 24 references on pesticides in the atmosphere and emphasizes the extreme difficulty of quantifying residues in the air. In the Rochester book, Risebrough tackles the fallout phenomenon indirectly by addressing his attention to marine ecosystems. He

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.

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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."

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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-