a series than in separate groups, and he points out that the dividing line between groups will vary considerably depending upon the particular physical, chemical, or biological properties under consideration. However, the series concept is similarly beset by variations in order depending upon the particular characteristic chosen. It would seem, therefore, that grouping and ordering in series are both acceptable methods in regional limnology, their use depending largely on the particular lakes and characteristics that are chosen for the study.

Although Macan's book is enlivened by flashes of characteristic wit, it does not bring out the informality and sense of fun that have been characteristic of the Windermere laboratory and in my time there led one European visitor to express astonishment that such fine work could be produced by people who did not seem to take it seriously. Nevertheless, this book is an appropriate monument to their efforts, as well as to the foresight of the founders of the FBA to whose memory the book is dedicated.

For limnologists whose reading of the book inclines them toward keeping in touch with work at the Windermere laboratory, membership in the Freshwater Biological Association provides (very cheaply) a most informative annual report, which includes a list of currently available reprints and a valuable bibliography of limnological papers published each year in Britain.

EVILLE GORHAM
Department of Botany,
University of Minnesota, Minneapolis

Short-Lived Pesticides

Biochemical Toxicology of Insecticides. Proceedings of the Fifth U.S.-Japan Cooperative Science Program, Tokyo, June 1969. R. D. O'BRIEN and IZURU YAMAMOTO, Eds. Academic Press, New York, 1970. viii, 220 pp., illus. $8.50.

In view of the slow but inevitable decline in the use of persistent insecticides, this book is particularly timely, being devoted almost exclusively to compounds that have a short residual life. Such compounds can be expected to have minimal long-term effects on man and wildlife and will probably occupy an important place in future pest-management operations.

The recognition of the central role of microsomal oxidations, more particularly of cytochrome P-450, in insecticide toxicology is most interesting. Excellent articles by Kuwatsuka on methylene dioxyphenyl synergists, by Sato on interactions of drugs with cytochrome P-450, by Dahm on the oxidative degradation and activation of phosphate compounds, by Hennessy on the potential for carbamate synergists, and by Plapp on the biochemical genetics of resistance all develop this theme in different ways. Unfortunately, the techniques developed by biochemists and pharmacologists for assaying cytochrome P-450 have not yet been adopted by all insecticide toxicologists. If the degradation of rat hepatic cytochrome P-450 to P-420 apparent on page 168 is indicative of the effectiveness of the methods used, the value to comparative toxicologists of the carp and cockroach spectra is minimal.

Other subjects of importance are also covered, including a contribution by O'Brien on the acetylcholine receptor molecule and a series of papers that emphasize the chemical approach. These include a contribution by Hansch that is an excellent example of the analysis of structure-function relationships for which he is known and a paper by Eto and Ohkawa on alkylation reactions.

This volume is flawed in two respects. A few of the contributions are on restricted topics of no great importance to the subject as a whole, and perhaps the organizers should have invited the participants to discuss topics carefully chosen to cover the field, rather than, as was apparently done, permitting each participant complete freedom to choose his topic. And placement of all the tables and figures in a chapter together at the end of the chapter is an unnecessary annoyance to the reader.

In summary, this book is an important contribution at an opportune time. Its importance is in large part that it helps set the stage for the development of better selective insecticides of short residual life, which must occur if both food production and the quality of the environment are to be maintained. It is apparent that such development must be based on an increasing knowledge of the biochemical toxicology of insecticides.

ERNEST HODGSON
Department of Entomology,
North Carolina State University,
Raleigh

Nuclear Activation

Cell Fusion. The Dunham Lectures, Cambridge, Mass., 1969. HENRY HARRIS. Harvard University Press, Cambridge, 1970. x, 110 pp., illus. Cloth, $6; paper, $2.95.

Personal writings are generally better than impersonal ones, and Harris's book *Cell Fusion* is definitely of the personal sort. It is a very nice account of his own experiments, some of which are very pretty ones and raise interesting and deep questions about the basis for the differentiated state and the control of cell division.

Until quite recently, all the author's published studies in this area concerned the short-term fusion products resulting from the action of Sendai virus. In such polykaryocytes or heterokaryons (is it not blurring distinctions to call them hybrids?) he has studied the remarkable process of nuclear activation, which is the principal subject of this book. But it seems to me that the author's account of the independent development of somatic cell hybrids (mononucleated serially cultivable lines) suffers from a viral inflammation. After its discovery in Barski's laboratory, somatic cell hybridization was developed by Ephrussi, Littlefield, and others before the virus came into use. This was possible because for the production of hybrid lines the virus, though it may be very helpful in some cases, is very often not necessary.

My main criticism of the book is related to the extravagance of interpretation it puts forth. For example, there are described some beautiful experiments on nuclear activation, in which the appearance of the nucleolus coincides in time with the appearance in the cytoplasm of proteins determined by the same nucleus. This observation must be important and is worth pondering, but, from a number of possible interpretations, the one chosen and developed by the author is that the transport of informational RNA from nucleus to cytoplasm can take place only when newly synthesized ribosomes are available to carry that RNA into the cytoplasm. Leaving aside any criticism of the evidence (such as might be applied to some rather odd-looking sucrose gradients), what strikes the reader is that this conclusion flies in the face of a much stronger (because more direct) body of evidence, obtained by many others, that synthesis of informational RNA is regulated independently of nucleolar functions. The work of