carefully details his own missteps, as object lessons for others engaged in comparable studies, and punctuates his remarks with anecdotes and an occasional homily.

In the course of his two and a half years of residency, and as a result of examining the bulk of the island's inhabitants, Shine's interests focused upon four areas of investigation. These were the etiology of hallux valgus (the angulation of the great toe away from the midline of the body), ischemic heart disease, congenital and inherited disorders, and inbreeding. Pursuit of these does not necessarily require elaborate laboratory support, which was not available, and simple but astute clinical observations can still provide important insights. Some of Shine's results were foreseeable, but others not. Illustrative of the predictable was the finding that hallux valgus is more common among shoe wearers than among the barefoot. Unpredictable is the report that shoe-wearing is a more important predictor of the occurrence of ischemic heart disease than body weight or smoking habits. Ischemic heart disease appears to increase among St. Helenians with increasing years of wearing shoes. While the barefooted young may rejoice, one suspects this result reflects an unidentified confounding of extraneous variability.

Among the 4259 inhabitants examined between 1960 and 1962, Shine found some 535 instances of some 63 different congenital or inherited disorders (in this tabulation an individual is counted as many times as he has disorders). Included in this total are presumably all abnormalities "obvious on clinical examination, extensive enough to cause symptoms, and genetically determined." They range from the uninteresting (92 cases of pterygium) to Christmas disease (21 individuals) to familial St. Helenian fever, an acute febrile illness characterized by an unusual cellulitis of the leg. The last the author believes to be a genetically determined susceptibility to infection, although the evidence in support of this conclusion is not strong. Among the different diagnoses or disorders encountered are many that resist precise classification into genetic and nongenetic groups; however, as Shine aptly points out, comparisons of St. Helenians with other, larger populations are still possible and of interest. In this respect, the St. Helenians have unusually high frequencies of generalized albinism, Christmas disease, and brachydactyly.

The weakest parts of the book are the final two chapters, one on inbreeding and the other an effort at synthesis. The inbreeding study described is a small touting of the ostensible superiority of sibling controls to other controls (in fact, 20 of 90 controls in the study were not siblings) and presents a point of view and choice of language that suggest the chapter was written in Hawaii. The synthesis proves to be merely a recapitulation of some of the findings and a somewhat superficial series of remarks on the founder principle, outbreeding, genetic drift, migration, mutation, and natural selection. The book concludes with a series of five appendices, tabulations of the age and sex structure of the portion of the population examined, an analysis of the water supplies on the island, of nutrition, comparisons of consanguineous spouses with nonconsanguineous ones, and finally an enumeration of the findings on the offspring of 45 consanguineous and 90 control matings.

Serendipity in St. Helena will undoubtedly find a place among the growing list of studies in depth on isolated human groups, but it is more likely to be remembered as a testimony to the drive, enterprise, and perseverance of its author than as a major contribution to human population genetics.

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British Limnology

Biological Studies of the English Lakes. T. T. MACAN. Elsevier, New York, 1970. xvi, 260 pp. + plates. $13.

This volume fulfills very satisfactorily the author's aim of bringing together widely scattered data on one of the world's most thoroughly studied lake districts. For beginning students, especially in Britain, it should provide a stimulus to take up limnology, because Macan is exceptionally forthright in admitting the doubtfulness of many suggested causal relationships and in pointing out wide gaps in our knowledge of even the best-studied lakes and groups of organisms. Established workers will find the book useful for the same reason. They will also enjoy reading for the first time a clear and coherent account of the physical, chemical, biological, and historical phenomena, the study of which in this region by members and associates of the Freshwater Biological Association has contributed so greatly to our understanding of lakes and their inhabitants. Some readers may join me in wishing that the book had been longer so that, for example, more than a single page could have been devoted to Mortimer's classic studies of the exchange of dissolved substances between mud and water, or to Lund's fascinating papers on the autecology of *Melosira*. Bottom organisms—particularly corixids—receive the greatest coverage.

The outline of the book is conventional, beginning with chapters on areal geology, lake morphometry, physics, and chemistry, and continuing with chapters on algae, zooplankton, rooted vegetation, bottom fauna, fish, sediments and lake history, bacteria and fungi, methods, and conclusions. The writing is clear, and the story is generally made as uncomplicated as possible. Errors are reasonably scarce and relatively obvious when present (but in table 14 the Esthwaite calcium concentration should be 1.4 mg/liter). Certain tables (5 and 12, for example) might be clearer in graphic form.

None of the English lakes is highly eutrophic, and so eutrophic lakes (and their problems) receive little attention. A few comparisons are made with Esrom Lake in Denmark, but others could usefully have been added from the meres of Cheshire and Shropshire. Little attention is given to lake productivity, largely because the FBA staff members—strong individualists in most cases—have been notably unconcerned with climbing on bandwagons. The lack of information is, however, to be regretted. Surface and stratigraphic studies of sedimentary pigments are not mentioned, although they probably bear as strongly as do Mackereth's studies of inorganic geochemistry on questions of present and past productivity. Moreover, they suggest that an appreciable part of the sedimentary organic matter in the most productive lakes may be autochthonous, contrary to the viewpoint espoused in this book.

The author's theme throughout the book is that lakes are better ordered in

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.

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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.

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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