in both the preface and the summary. Central to the problem of implementation is the shortage of pest management personnel who can work effectively with growers. Both a formal presentation and a panel discussion were addressed to the task of training such people, but the only concrete proposal presented was a program designed to produce more specialists with advanced degrees in pest management. An advanced degree should not be a requisite for doing practical work in this field, and there should be no insurmountable problems in training people at the baccalaureate level to be field advisers who can sell pest management programs as effectively as salesmen for agricultural companies sell pesticides. Until such people are trained and working in the field, the pest management movement, at least in this country, will unfortunately remain in its present position as a topic of theoretical research rather than a practical and widely used alternative to broadcast spray programs.

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A Chemical View

Chemistry of Pesticides. N. N. MELNIKOV. Translated from the Russian by Ruth L. Busbey. Frances A. Gunther and Jane Davies Gunther, Eds. Springer-Verlag, New York, 1971. xii, 480 pp., illus. $19.80.

It is evident that Russian and European traditions are similar in one way that differs importantly from the American: they have supported a breed of "pesticide chemists" who are a subculture of the "agricultural chemists." Neither group is common in the United States, where specialization in individual domains such as "insecticides" or "herbicides" is common, and where at the biological end of training specialization is universal: a phytopathologist who understands insecticides is a rare bird indeed. In the American chemical world there is somewhat more catholicity, especially where the needs of industrial chemistry drive individuals to know something of the synthetic aspects of more than one group of pesticides.

For these reasons, the obvious comparison to make (dealing only with the literature in English) is with Hubert Martin's famous book *The Scientific Principles of Crop Protection*. Melnikov's editors say in their preface that the book "represents a thoroughly modern but concise summary of the basic principles of practical pest control by chemical means" and in this way suggest a strong comparison with Martin's book. But Martin (who is a chemist) dealt rather extensively with the actual use of the pesticides in practical agricultural problems, and also gave a great deal of information about the mode of action of the agents. Melnikov's book is uncompromisingly chemical, and its title is highly accurate. For instance, the organization of the book is almost exclusively chemical: 29 of the 31 chapter headings are of the type "Derivatives of urea and thiourea" or "Halogen derivatives of aromatic hydrocarbons," so that DDT is rather humbly relegated to six pages (in a 480-page book) in the latter chapter. The two other chapters are a very general introductory chapter and a good chapter on pesticide formulation.

Because of this stress upon chemistry, the questions of biochemical action and of metabolism are touched on very lightly. Thus in the pages on DDT, its metabolism is not mentioned and nothing is said about the mode of action except that it "has not been determined" (which may be an accurate summary, but which ignores the considerable amount that we do know about the way it acts), but a half page is given to a table of the solubility of DDT in 27 different solvents. Similarly, the many organophosphates described individually (in a 62-page chapter) have their synthesis and physical properties given in detail, but their metabolism mentioned seldom, and then without discussion of the relative importance of the several routes indicated. By contrast, the discussions of the empirically observed variations of potency with structure are often quite extensive and useful. Toxicity data are given with useful frequency, but quite often important facts are omitted, such as the route of administration or the organism employed.

It is very unfortunate that references are omitted entirely except for "general references" following each chapter. Sometimes (as in "Organic mercury compounds") these are all Russian references, of small use to English readers. Happily the subject index is extensive (31 pages) and reliable. The translation is immaculate.

In summary, this really is a book for chemists, and provides a valuable and encyclopedic reference about the chemistry of all the major pesticides used in the world. The coverage is virtually total. It will therefore be an excellent reference book for all chemists dealing with any aspect of pesticides. It is not a book that one sits down to read for general interest, and the translators cannot be serious when they suggest its use for "the beginner who needs a 'comprehensive survey.'"

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Growth and Morphogenesis

Regeneration. Key to Understanding Normal and Abnormal Growth and Development. S. MERYL ROSE. Appleton-Century-Crofts, New York, 1971. xii, 264 pp., illus. $7.95.

"This book is in a sense a synopsis of the science of polarized control of growth and morphogenesis," the author writes. Using as a basis lessons learned from the study of regeneration, he develops several themes relating to the initiation and control of developmental processes. Predominant among these is the concept of a hierarchy of differentiation in which the first structure to appear in a developing system inhibits the subsequent differentiation of like structures along well-defined lines of polarized control. Rose supports this concept with examples of repression of the regeneration of normally dominant or apical structures such as the lens in the newt and hydranth primordia in *Tubularia* by material extracted from the adult structure. Rose has also extended this concept to embryonic development, and along with describing the inhibition of differentiation of specific structures by products taken from their adult homologues, he offers an alternative explanation, based upon inhibition, to the results of Spemann's transplants of the dorsal lip of the blastopore and to much of embryonic induction in general.

Inhibition and the eventual morphogenetic equilibrium must be constantly communicated to the organism as a whole, and throughout the book Rose describes systems in which pathways of inhibitory communication have been demonstrated. In several chapters dealing with regeneration of worms and the amphibian limb and with morphogenesis in Protozoa and plants he points out how the initiation and cessation of sec-

ondary development of single or multiple regenerating structures appear to be related to breaks in the polarized communications which normally result in morphogenetic equilibrium. The nature of the polarized control is still very poorly known, but Rose presents evidence linking this control, at least in part, with the bioelectric fields which are normally present in living organisms.

In several places in the book the "totipotent reserve cell" concept in regeneration is examined and dismissed as an unnecessary genetic crutch for regeneration theory since essentially all cells are assumed to possess a complete genetic blueprint. The author cites numerous examples of cell transformations which, in his view, obviate the need for postulating reserve cells, but he supports a greater extent of cell transformation (for example epidermal dedifferentiation in limb regeneration) than some people in the field are willing to accept.

Several times Rose mentions that at the forefront of knowledge there are always differences of opinions. The test of a good hypothesis is not only that it ultimately proves to be correct but that it presents the problem in such a manner that means toward its solution are clearly evident. In this respect, I think Rose has succeeded in presenting his ideas admirably. They should prove to be a stimulus for a significant amount of fundamental experimental work in the years to come.

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Studying Development

Methods in Mammalian Embryology. JOSEPH C. DANIEL, JR., Ed. Freeman, San Francisco, 1971. xviii, 532 pp., illus. $22.50.

No new data are presented; there is no effort to summarize, point to new frontiers, or define a commonality of research goals. And yet, this book could not be more engrossing for the scientist with embryological tendencies. We've all marveled at R. J. Blandau's intimate and beautiful films of ovulation and egg transport in the mammal. The report of how this photography is achieved is equally intriguing. The evolution of techniques by B. Mintz and colleagues permitting the combination of embryos into mosaic mice is nothing short of inspirational, as are several other success stories contained in these pages. Of course, all of this methodology has been available previously in the literature and from the investigators themselves, but usually in fragmented, abbreviated form. Further, many clear photographs and diagrams are included which will greatly assist anyone adopting these methods.

Technically, the growing of babies in test tubes of *Brave New World* is both farther away than sensationalists would have us believe and closer than we are prepared for as scientists and human beings. Fertilization in vitro and the transplantation of eggs and even blastocysts between uteri followed by essentially normal maturation are all feasible. The progress of D. A. T. New and associates in the culture of embryos in vitro comprises an exceedingly effective chapter in the book. It should be noted, however, that the excellent chapters on these subjects all deal with rodent or rabbit material. It is unfortunate that no author chose to review progress (and failures) in these areas for human or even subhuman primate eggs and embryos. Only 3 of 34 chapters deal primarily with animals other than rodents and the rabbit. N. L. First covers thoroughly the collecting and storing of sperm from many mammals, including the prudent admonition to attempt direct collection of sperm only from "badly crippled bulls." P. J. Dziuk describes methods for obtaining eggs and embryos from sheep and pigs. The only attention given to primates is a lucid chronicle by E. M. Ramsey of the struggle to understand the circulation of the placenta. But for rodents and the rabbit, the coverage of experimental techniques is exceedingly thorough, running the gamut from ovulation to organ culture.

Inevitably, there are some repetitions, omissions, and inclusions which are not entirely appropriate. Methods for inducing superovulation in the mouse are clearly described in the chapter by A. H. Gates and then given again (with slightly different recommendations for hormone dosages) by several other authors. No mention is made of the exact means for eliciting superovulation in the rat, whose eggs in abundance are a prelude for several other techniques contained in the volume. Occasionally, methods creep in that are in common use. Cases in point are the descriptions for autoradiography, routine histochemistry, and liquid scintillation counting, which are covered more thoroughly in other current books. Fortunately, these are only minor flaws in a nicely rounded assemblage of major techniques in current use for studying mammalian development.

As happens with multiple authorship, the descriptions of techniques vary greatly in detail and extent of presupposed background on the part of the reader. R. E. Rumery and colleagues in discussing the culture of embryonic ovaries and oviducts leave nothing to chance, even describing how to grasp a mouse in order to search for a vaginal plug. Other chapters are more remote, summarizing the kinds of techniques available for a particular type of study and providing useful references.

The trend toward symposia and many-authored books has resulted in a plethora of expensive volumes emerging in a given field every year. Unfortunately, each book may contain only a chapter or two of prime interest. For most of us, dealing with a bewildering array of laboratory problems and needing to provide consultant services to students and colleagues as a sort of embryologist-in-residence, this compilation will be a useful sourcebook for years to come.

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Books Received

Aboriginal Man and Environments on the Plateau of Northwest America. Arnoud H. Stryd and Rachel A. Smith, Eds. The Students' Press, University of Calgary, Calgary, Alberta, 1971. 262 pp., illus. Paper, $4.

Acoustic Surface Wave and Acousto-Optic Devices. Thomas Kallard, Ed. Optosonic, New York, 1971. viii, 222 pp., illus. Paper, $15.

Advances in Cancer Research. Vol. 14. George Klein, Sidney Weinhouse, and Alexander Haddow, Eds. Academic Press, New York, 1971. xiv, 418 pp., illus. $22.50.

Advances in Comparative Physiology and Biochemistry. Vol. 4. O. Lowenstein, Ed. Academic Press, New York, 1971. xiv, 410 pp., illus. $22.

Advances in Cryogenic Engineering. Vol. 16. A conference, Boulder, Colo., June 1970. K. D. Timmerhaus, Ed. Plenum, New York, 1971. xii, 510 pp., illus. $30.

Advances in Human Genetics. Vol. 2. Harry Harris and Kurt Hirschhorn, Eds. Plenum, New York, 1971. xiv, 318 pp., illus. $25.

Aircraft Wake Turbulence and Its Detection. A symposium, Seattle, Wash., September 1970. John H. Olsen, Arnold Goldburg, and Milton Rogers, Eds. Plenum

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