

pinocytosis. Three practical experiments (fate of food vacuoles in *Paramecium*, contractile vacuole activity, chemotactic behavior of amoebae) are included. With a historical component, the programmed approach reaches significant levels of sophistication for an introductory biology course. Elegant electron micrographs, drawings and graphs complement the text material.

Book nine covers a wide spectrum of topics that could be covered with the title of molecular genetics. These topics include some that traditionally provide stumbling blocks to beginning students: protein and nucleic acid chemistry, cascade effects of mutations, fingerprinting, DNA structure, the genetic code, transcription, translation, transfer RNA and the adapter hypothesis, ribosome function and structure, direction of protein synthesis, DNA/RNA hybridization, polytene chromosomes, the operon model, hormone action and cyclic AMP (the second messenger hypothesis) and variation of hemoglobin content of red blood cells with altitude. Book nine should be particularly useful in supplementing lectures and discussions on this area of biology.

The recommended readings include several *Scientific American* articles and some advanced texts for the beginning student. The two volumes may be used in various ways in different courses; these include as challenge materials in introductory courses and as review materials in advanced courses.

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BIOLOGICAL PRINCIPLES AND PROCESSES

by Claude A. Villee and Vincent G. Dethier. 1976. W.B. Saunders Company (West Washington Square, Philadelphia 19105). 999 p. \$15.95.

The second edition of this text carries forward the organizational structure of the first edition with emphasis upon biological principles and the functional aspects of biology at the molecular, cellular, organismal and population levels or organization. Some added topics in the new edition include immunology and hormone action.

Appropriate plant or animal examples are used to illustrate the principles under discussion. Intended to "provide enough knowledge of biology for the student who will continue and to provide a general framework of biological information for those who will not," the text is comprehensive and thorough. In my experience, however, many beginning

students will be overwhelmed by the volume of paper. Notwithstanding an instructor's prerogative to select specific chapters for the course inclusion, the massiveness of the text may inhibit all but the most dedicated.

The many illustrations are well executed. The practice of introducing terms with bold face type, and a spacious margin to highlight emphasis of the narrative, complimented with a good bibliography at the end of the chapters, all enhance the text's utility. For highly motivated and talented students, for a year-long course sequence in biology and for a general reference (including the high school biology student), this book should be considered. For the short introductory course, other texts would appear more suitable.

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EXPLORATIONS IN DEVELOPMENTAL BIOLOGY

by Chandler Fulton and Attila O. Klein. 1976. Harvard University Press, (79 Garden St., Cambridge, Massachusetts 02138). 704 p. \$17.50.

This book is considerably more than a textbook for a course in developmental biology even though it may frequently be used in that way. The authors operate on the premise that serious undergraduate students with an introductory biology background can benefit from reading original works if they are provided with background about the organisms utilized and techniques employed. Thus, the book consists of 57 original articles and explanatory material to make them meaningful to serious students of developmental biology.

Six general themes are selected, including phenotypic change with geotypic constancy, differential gene function, protein synthesis to ordered structures, cellular interactions, cell differentiation, and development beyond the embryo. Each of these has a general introduction by the authors followed by explanatory material to support the original papers selected. Following the research articles some unanswered questions are raised, conflicting results are discussed and explorations are suggested. A list of references and further reading is also provided.

The 57 papers selected represent the work of over 100 investigators ranging from a translation of Spemann and Mangold's work on embryonic induction published in 1924 to Minna, Glazer, and Nirenberg's 1972 work on genetic dissection of neural properties utilizing somatic cell hybrids. Most of the articles

represent work done in the past ten years with a few classics such as DuShane's work done in the laboratory of pioneer R. G. Harrison on the origin of pigment cells and King and Briggs' nuclear serial studies involving placing embryonic *Rana pipiens* nuclei into recipient enucleated *Rana pipiens* eggs.

The organisms utilized range from bacteriophage through slime molds, sea urchins, and crowngalls to salamanders, chicks and cats. As with any compilation of readings, there is an unevenness of suitability with some selections providing quite a challenge to the undergraduate student even with the introductory material provided by the authors. The teacher will probably be required to be quite selective in what sections are utilized in a quarter or semester course in developmental biology.

Within each of the major themes the papers are organized into subunits. An example of this is the organization of the cell interaction section into primary embryonic induction (4 papers), induction and programmed synthesis in pancreas (a single paper), interaction of tissue layers in limb morphogenesis (2 papers), cell sorting (3 papers) and pigment cell formation (3 papers). If one is looking for classical chick embryology, this is one of the few places it may be found with introductory material including some Hamburger staging and articles by Zwilling and Saunders on limb development.

The book would be an excellent addition to the library of serious students and teachers in developmental biology. It would make an excellent textbook for an advanced course in developmental biology, and with careful selection and well prepared students, it could be used in introductory developmental courses. The authors indicate how modern developmental biology depends on cytology, genetics, and biochemistry and thus the better the background of the student the better this material will serve as a textbook. As a reference source, it will be invaluable to the general biologist who wants to be updated in modern developmental biology.

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INVESTIGATION IN SCIENCE, A MODULAR APPROACH, LIFE AND ENVIRONMENT, NETWORKS

by R.H. Howard and John K. Olson. 1976. Wiley Publisher of Canada Limited. Price not given.

Presumably this text is one of an articulated series. Networks is an interesting paperbound text that attempts to provide learning situations in a few basic