

essential for the approach and initial union of the gametes, evidence for a direct role of these substances in the primary activation reaction is wanting.

The two chapters that follow deal with fertilization in mammals. C. R. Austin and M. W. H. Bishop analyze the highly specialized internal environment in which fertilization takes place. Many integrated processes and reactions ensure the meeting of the gametes in appropriate numerical relations and at the optimal phase of their life-cycle. However, different species of mammals exhibit wide variations in the details of these mechanisms. M. C. Chang deals with the physiological changes at sperm penetration, activation, and syngamy and points out the great gaps in our knowledge of these processes and of the physiology of the Fallopian tube, the corona radiata, the zona pellucida, and the vitelline membrane. Results obtained with marine eggs may not be applied to mammalian fertilization at present.

A. L. and L. H. Colwin contribute a lucid summary of their researches on the importance of the acrosome filament in the initial contact between sperm and egg in echinoderms, molluscs, annelids, and enteropneusts. In spite of these important discoveries, the mechanism of the subsequent movement of the sperm into the egg is still not known. A brief section on changes in proteins of the sea urchin egg following fertilization, by A. Monroy, is followed by an excellent review of nucleocytoplasmic relations in early insect development, by R. C. von Borstel, where the destruction of three of the four nuclei resulting from meiosis in the egg, and the inhibition of the accessory sperms, offer special and intriguing problems. The occurrence of photoreactivation of ultraviolet radiation damage following irradiation of the nucleus, and the absence of such photoreactivation when the egg cytoplasm is irradiated, may make it possible to distinguish between action of the nucleus and action of the cytoplasm in the causation of an embryonic event.

H. E. Lehman summarizes the evidence for nuclear differentiation during development, particularly the results obtained with nuclear transplantation in amphibian eggs, and concludes that progressive nuclear differentiation, presumably imposed upon the nucleus by the cytoplasm surrounding it, must be admitted at least as a possibility.

In the section entitled "Morphogenesis and metabolism of gastrula-arrested embryos in the hybrid *Rana pipiens* × *Rana sylvatica*," J. R. Gregg describes the peculiar biochemical features of hybrid embryos, one of which is the lowered rate of energy liberation from glycolytic processes. Unfortunately, it cannot yet be decided whether this biochemical deficiency is the cause of the arrest of devel-

opment or is itself a parallel effect of the hybrid constitution of the embryo.

J. R. Shaver discusses the possible role of cytoplasmic particles, particularly of mitochondria, in differentiation. He is critical of attempts to explain differentiation on the basis of ordered distribution patterns of mitochondria, whose existence has not been demonstrated beyond doubt.

Under the uninformative title of "Early determination in development under normal and experimental conditions," S. Ranzi presents evidence that, in the sea urchin egg, fertilization activates certain enzyme systems at the animal pole and that the resulting metabolites lead to development of this area in the animal direction.

G. Reverberi presents an admirable summary of the role of some enzymes in the development of ascidians and other animals, studied by means of cytochemical methods and specific inhibitors. He concludes that there is "reasonable probability" that some enzymes play a role in morphogenesis of "mosaic" eggs, while the evidence for "regulative" eggs is less convincing.

The volume concludes with a chapter on "Immunological studies of early development," by A. Tyler, in which the author reviews recent studies on the detection in the embryo of specific antigens to adult tissues, on the development of antibody-forming capacity, and on the effects of antibodies on development. He relates the results to his well-known auto-antibody concept.

The book as a whole contains a wealth of facts and hypotheses on various important aspects of the beginnings of development, which the reader is left free to evaluate and coordinate. I could not avoid having the strong impression that, at this time, it is still impossible to prove the causation of any process of differentiation by biochemical events, and that no new avenues of approach have opened up which would lead to crucial evidence in the near future.

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Electron Impact Phenomena. And the properties of gaseous ions. G. H. Field and J. L. Franklin. Academic Press, New York, 1957. ix + 349 pp. Illus. \$8.50.

Important to physical chemists and chemical engineers is the identification of molecules and molecular fragments that follow reactions with catalytic agents, breakdown in intense heat, or dissociation under electron bombardment. The modern commercial mass spectrograph is one of the most important tools at the

disposal of the physicist and the chemist for making identifications, and yet the results may not always be unambiguous. It is one of the purposes of this book to discuss, in a critical manner, experiments and experimental techniques that yield data on electron impact phenomena that may help in the interpretation of research investigations of interest to physical chemists in general and physical organic chemists in particular.

The organization of the book follows a logical procedure. First the apparatus and methods are discussed. Then there is a brief discussion of theory, followed by an extensive treatment under the heading "Energetic considerations." These sections constitute approximately one-half of the book and are written in a manner that I consider very effective. Even though there is a minimum of equations and technical description, the subjects discussed are presented concisely and critically. Over 500 references to original researches are given, and the organization of these alphabetically by author at the end of the book is to be commended. The fact that there is a good "name index" and "subject index" permits the reader not only to use the book as an effective reference source but also to locate the sections containing critical evaluation.

Not only will the reader find interesting text; the book contains a vast compilation of numerical data in tabular form, such as critical potentials applicable to many molecules, organic and inorganic. Associated with these data are excellent references, so that the user can evaluate for himself the experimental details on the basis of which the numerical values were determined.

This book will serve as an excellent reference book, useful to both physicists and chemists, and represents an important contribution to the literature.

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Behavioral Goals of General Education in High School. Will French and associates. Russell Sage Foundation, New York, 1957. 247 pp. \$4.

The Russell Sage Foundation, The National Association of Secondary School Principals, and the Educational Testing Service, feeling that all learning is evidenced by changes in reactions, have jointly sponsored a volume on behavioral goals for general education in high schools and have organized these under three "maturity goals" and four "areas of behavioral competence." The first two parts of the book discuss the following topics: first, the history, purposes, nature, evidence, and scope of

general education; and second, the methods of using the present compilation to improve such general education. Then the major part of the book (122 pages) lists these goals as actions (for example, "uses the typewriter or writes well enough to meet his needs"). Listings of the general behaviors are followed not only by long lists of such illustrative, or more specific, behaviors but also by lists of "developmental equivalents" which are expected of younger or less mature students.

This is a remarkably useful collection that discusses more specific goals than most teachers have ever been asked to formulate for themselves. An honest appraisal of any high-school curriculum against these criteria will be both revealing and rewarding. The greatest danger is that a faculty may become so fascinated that it accepts *general education* as equivalent to all of education, and *behavioral goals* as the only goals of learning. Some goals may be more in the mind than evident in behavior.

In the book there is a fairly specific denial of the possibility that knowledge can be of value for its own sake and an apparent unawareness that some goals now unexpressed or even unrecognized might occur to a person of imagination as a result of his having acquired much knowledge of a subject in which he was informed and interested. It seems far too optimistic to expect all the troubles in schools to disappear if the schools could but become "behavioral-centered." Perhaps science and mathematics overlap general education less than some other subjects do, and learning in these areas is less often reflected in obviously overt behavior. For all areas of knowledge, however, it is profitable to state our purposes as specifically as possible, and this book supplies a generous number of thoughtfully formulated goals.

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New Books

Diseases of Tobacco. George B. Lucas. Scarecrow Press, New York, 1958. 506 pp. \$10.

The Evil Eye. Edward S. Gifford, Jr. Macmillan, New York, 1958. 216 pp. \$4.95.

Chemical Aspects of Ecology in Relation to Agriculture. Research Monogr. 1, Publ. 1015. Hubert Martin. Science Service Laboratory, Canada Department of Agriculture, Ottawa, 1958. 96 pp. \$3.

Proceedings of the Rehovoth Conference on Nuclear Structure. Held at the Weizmann Institute of Science, Rehovoth, 8-14 Sept. 1957, under the auspices of the International Union of Pure and Applied Physics. H. J. Lipkin, Ed. North-Holland, Amsterdam; Interscience, New York, 1958. 630 pp. \$12.50.

Infrared Absorption Spectra of Steroids. An atlas. vol. II. Glyn Roberts, Beatrice S. Gallagher, R. Norman Jones. Interscience, New York, 1958. 103 pp. and charts 309-760. \$20.

The Role of Solid State Phenomena in Electric Circuits. Proceedings of the symposium sponsored by Polytechnic Institute of Brooklyn, Microwave Research Institute. vol. 7. Interscience, New York, 1957. 356 pp. \$5.

Analytic Geometry. Edwin J. Purcell. Appleton-Century-Crofts, New York, 1958. 299 pp. \$4.50.

Year Book of the Royal Society of London, 1958. Royal Society of London, London, 1958. 367 pp.

The Planet Jupiter. Bertrand M. Peek. Macmillan, New York, 1958. 283 pp. \$8.50.

Gaseous Conductors. Theory and engineering applications. James Dillon Cobine. Dover, New York, rev. ed. 1, 1958. 625 pp. \$2.75.

Figures. More fun with figures. J. A. H. Hunter. Oxford University Press, New York, 1958. 127 pp. \$3.50.

Colorimetric Determination of Non-metals. David F. Boltz, Ed. Interscience, New York, 1958. 384 pp. \$8.50.

Gas Dynamics. Ali Bulent Cambel and Burgess H. Jennings. McGraw-Hill, New York, 1958. 428 pp. \$11.

Population Studies: Animal Ecology and Demography. Cold Spring Harbor Symposia on Quantitative Biology and Demography, vol. XXII. Biological Laboratory, Cold Spring Harbor, N.Y., 1957. 451 pp. \$8.

Control of the Plant Environment. Proceedings of the University of Nottingham Fourth Easter School in Agricultural Science, 1957. J. P. Hudson, Ed. Academic Press, New York; Butterworths, London, 1957. 256 pp. \$7.50.

Quantum Mechanics of One- and Two-Electron Atoms. Hans A. Bethe and Edwin E. Salpeter. Academic Press, New York; Springer, Berlin, 1957. 376 pp. \$10.

Proceedings of the Fourth International Conference on Soil Mechanics and Foundation Engineering. London, 12-24 Aug. 1957. vols. 1 and 2 (vol. 3 in press). Butterworths, London, 1957 (order from Interscience, New York). 466 pp.; 467 pp. \$79.50 for 3 volumes.

Connective Tissue. A symposium organized by the Council for International Organizations of Medical Sciences. R. E. Tunbridge, Madeline Keech, J. F. Delafresnaye, G. C. Wood, Eds. Thomas, Springfield, Ill., 1957. 371 pp. \$8.50.

Introductory Plant Science. Henry T. Northen. Ronald, New York, ed. 2, 1958. 730 pp. \$6.75.

The Impact of the Antibiotics on Medicine and Society. Monogr. II, Institute of Social and Historical Medicine. Iago Galdston, Ed. International Universities Press, New York, 1958. 232 pp. \$5.

Tuberculosis in White and Negro Children. vol. I, *The Roentgenologic Aspects of the Harriet Lane Study*, Janet B. Hardy, 122 pp., \$7.50; vol. II, *The Epidemiologic Aspects of the Harriet Lane Study*, Miriam E. Brailey, 103 pp., \$4.50. Harvard Univ. Press (for the Commonwealth Fund), Cambridge, Mass., 1958.

Miscellaneous Publications

(Inquiries concerning these publications should be addressed, not to Science, but to the publisher or agency sponsoring the publication.)

Decennial Review Conference on Tissue Culture, Proceedings. Woodstock, Vt., 8-12 Oct. 1956. Philip R. White. National Institutes of Health, Bethesda, Md. (reprinted from *J. Natl. Cancer Inst.* vol. 19, No. 4; (order from Philip R. White, Jackson Laboratory, Bar Harbor, Me.). 377 pp. \$4.

Measurement of Air Pollution. Recommended methods for deposited matter, smoke, and sulphur dioxide. Department of Scientific and Industrial Research, London, 1957. 28 pp. 2s.

Radium-Isodosen. Die radiumdosierung in „r“. August Verhagen. Thieme, Stuttgart, 1958. 102 pp. \$4.65.

Civil Air Regulations and Flight Standards for Pilots. Associated Aeronautical Staff. Aero, Los Angeles, ed. 19, 1958. 96 pp. and supplements.

Central Wyoming Phosphate Rock. Character, processing and economics. Bull. No. 6. Walter E. Duncan and H. G. Fisk. Natural Resources Research Institute, University of Wyoming, Laramie, 1957. 60 pp.

Workbook for Field Biology and Ecology. Allen H. Benton and William E. Werner, Jr. Burgess, Minneapolis, 1957. 268 pp. \$2.75.

Manual of Mammalogy. E. Lendell Cockrum. Burgess, Minneapolis, 1955. 160 pp. \$4.

Fundamental Concepts of Mathematics. R. H. Moorman. Burgess, Minneapolis, ed. 2, 1955. 92 pp. \$2.75.

A Method for Specification of Sand for Beach Fills. Tech. Memo. No. 102, 100 pp.; *Model Study of Wave Refraction*, Tech. Memo. No. 103, 30 pp.; *The Mechanics of the Motion of Discrete Spherical Bottom Sediment Particles Due to Shoaling Waves*, Tech. Memo. No. 104. 62 pp. Beach Erosion Board, Corps of Engineers, Washington, 25, 1958.

Use of Specifications for Pharmaceutical Preparations. WHO Tech. Rept. Ser., No. 138. 29 pp. \$0.30. *African Conference on Bilharziasis.* Brazzaville, French Equatorial Africa, 26 Nov.-8 Dec. 1956. WHO Tech. Rept. Ser. No. 139. 42 pp. \$0.30. World Health Organization, Geneva, Switzerland, 1957.

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Nouveau Levé Magnétique de la Belgique. pt. 1. E. Lahaye, L. Koenigsfeld, A. de Vuyst, E. Hoge. Institut Royal Meteorologique de Belgique, Koninklijk Meteorologisch Instituut van België, Brussels, 1957. 95 pp.

Spectrochemical Abstracts. vol. V. 1952-1953. Ernest H. S. van Someren and F. Lachman. Hilger & Watts, London, 1958. 66 pp. 20s.

A Study of Muscle Forces and Fatigue. WADC Tech. Rept. 57-586. ASTIA Document No. AD 131 089. Paul A. Hunsicker. Wright Air Development Center, Wright-Patterson Air Force Base, Ohio, 1957 (order from ASTIA Document Service Center, Knott Building, Dayton 2, Ohio). 47 pp.