authors is strongly embryological, morphogenesis and differentiation being the central themes. Tissue interactions (including interspecific interactions), the study of which has contributed much to the understanding of morphogenetic mechanisms, and the effects of environmental factors, including those of hormones and teratogens, on differentiation are extensively covered. The wide diversity of organs and combinations of organs from mammalian, avian, and invertebrate sources studied is impressive. Among the most significant accomplishments documented here are the analyses of the effects of dissociation and reassociation of organ rudiments on differentiation and morphogenesis. The culture of gonads, and of secondary sex structures, has been one of the most substantial contributions of the Paris group to our knowledge of sexual differentiation and intersexuality. This book provides indispensable background for those who want to explore and exploit the potentialities of in vitro systems for the solution of morphogenetic problems.

The translation is for the most part excellent, though nuances are occasionally lost. The illustrations are good but lack some of the sharpness of reproduction of those in the original French edition.

CHARITY WAYMOUTH
The Jackson Laboratory,
Bar Harbor, Maine

Teaching Science as Enquiry

A Strategy for Education. HERMAN T. EPSTEIN. Oxford University Press, New York, 1970. x, 122 pp., illus. $4.95.

A tension between the teaching of science as a rhetoric of conclusions and the teaching of science as enquiry has existed, doubtless, since Galileo presented one of his major works in the form of a dialogue. At any rate, in the early 19th century, Auguste Comte could remark with no air of originality that

> Every science can be viewed according to two modes of development—the historical and the dogmatic. According to the first, one considers the science successively, following the order by which the human mind has really acquired the knowledge. . . . According to the second, one presents the system of ideas as they would be conceived today by a mind which . . . is concerned with remaking the science as a totality.

Comte goes on to remark that the first mode treats original works (research papers) with primary emphasis on the manner in which the science has been formed.

In 1937, the University of Chicago refurbished the idea of making research papers accessible to beginning undergraduate students, using them as exemplars of scientific research and as occasions for participation by students in some of the activities of scientific enquiry. A report of this extensive experiment, including a bibliography of some 60 research papers in six series used and tested in the program, is contained in *The Idea and Practice of General Education* (various authors, University of Chicago Press, 1950). In 1950 the University of Puerto Rico launched a similar endeavor on a substantial scale, and currently such schemes are used occasionally or systematically in a number of colleges and universities. Indeed the use of original papers in the social sciences is so widespread that one publisher (Bobbs-Merrill) has made reprints of some 1100 papers available in loose-leaf form.

In the Inglis lecture delivered at Harvard in 1961, I argued for a similar treatment of science at the high school level (*The Teaching of Science*, Harvard University Press, 1962) and described a number of alternative means for doing so. The Biological Sciences Curriculum Study adopted one of these, "Invitations to Enquiry," and published 44 such "Invitations" together with suggestions for their use by high school teachers (*Biology Teachers' Handbook*, Evelyn Klinckman, Ed., Wiley, 1963, pp. 45–226). More recently, the Elementary Science Study has developed and published a large and varied body of material, much of it highly ingenious and extremely sensitive to the needs and limitations of very young students, all of it designed to bring activities of enquiry to students at the elementary level (Webster Division, McGraw-Hill, various publication dates).

This highly incomplete review is by way of saying that Herman Epstein has apparently rediscovered, quite independently, two of the principles which generate these varied efforts. He has rediscovered the extent to which participation by students in the solution of significant problems challenges many of them to renewal of interest and marshaling of energy. He has rediscovered also that primary sources (research papers) constitute accessible occasions and effective springboards for posing problems of scientific enquiry and inviting participative solution. In his slim volume (81 pages plus 41 pages of appendices) he presents one pattern of instruction for realizing these principles. The collegiate teacher of science unfamiliar with such modes of instruction may find the work suggestive. He is warned, however, that there are numerous alternatives to the kind of material and pattern of instruction suggested by Epstein and a great many issues involved in the curricular choices among them that are entirely omitted from Epstein's treatment.

JOSEPH J. SCHWAB
Department of Education,
University of Chicago,
Chicago, Illinois

Books Received

Active Filters. Lumped, Distributed, Integrated, Digital, and Parametric. Lawrence P. Huelsman, Ed. McGraw-Hill, New York, 1970. xii, 372 pp., illus. $16.50. Inter-University Electronics Series, vol. 11.

The Analysis, Design, and Synthesis of Electrical Filters. DeVerl S. Humpherys. Prentice-Hall, Englewood Cliffs, N.J., 1970. xii, 676 pp., illus. $18.95.

Annual Reports on NMR Spectroscopy. Vol. 3. E. F. Mooney, Ed. Academic Press, New York, 1970. xii, 506 pp., illus. $19.50.

Automated Cell Identification and Cell Sorting. George L. Wied and Gunter F. Bahr, Eds. Academic Press, New York, 1970. xii, 404 pp., illus. $19.50.

BASIC. For Beginners. Wilson Y. Gateley and Gary G. Bitter. McGraw-Hill, New York, 1970. xviii, 152 pp., illus. Paper, $3.95.

Basic Engineering Sciences and Structural Engineering for Engineer-in-Training Examinations. H. Jack Apfelbaum and Walter O. Ottesen. Hayden, New York, 1970. xvi, 408 pp., illus. $13.95. Professional Engineering Examination Series.

Basic Statistical Methods. N. M. Downie and R. W. Heath. Harper and Row, New York, ed. 3, 1970. xii, 356 pp., illus. $9.95.

Behind Ghetto Walls. Black Families in a Federal Slum. Lee Rainwater. Aldine, Chicago, 1970. xii, 446 pp., illus. $12.50.

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

Brown Adipose Tissue. Olov Lindberg, Ed. Elsevier, New York, 1970. xiv, 338 pp., illus. $24.50.

Cell and Tissue Culture in Biology and Medicine. A symposium, Edmond, Okla., December 1969. Paul F. Kruse, Jr., Ed. Oklahoma Academy of Science, Norman, 1970. vi, 102 pp., illus. Paper, $5. *Annals of the Oklahoma Academy of Science*, No. 1.

(Continued on page 1434)

BOOKS RECEIVED

(Continued from page 1394)

The Computer Simulation of Behaviour. Michael J. Apter. Hutchinson University Library, London; Hillary, New York, 1970. 180 pp., illus. $5.25. Psychology.

The Conservation of Orbital Symmetry. R. B. Woodward and R. Hoffmann. Verlag Chemie, Weinheim; Academic Press, New York, 1970. vi, 178 pp., illus. Cloth, $5; paper, $3.50.

Continuum Mechanics. An Introductory Text for Engineers. Philip G. Hodge, Jr. McGraw-Hill, New York, 1970. xvi, 252 pp., illus. $12.50. Advanced Engineering Series.

Cost and Optimization Engineering. F. C. Jelen. McGraw-Hill, New York, 1970. xxii, 490 pp., illus. $13.50.

The Decision to Go to the Moon. Project Apollo and the National Interest. John M. Logsdon. M.I.T. Press, Cambridge, Mass., 1970. xviii, 188 pp. $10.

Design Analysis of Shafts and Beams. R. Bruce Hopkins. McGraw-Hill, New York, 1970. xvi, 488 pp., illus. $18.50.

Design for Strength and Production. C. Ruiz and F. Koenigsberger. Gordon and Breach, New York, 1970. x, 270 pp., illus. + plates. $14.50; to libraries, $27.50.

Dictionary of Organic Compounds. The Constitution and Physical, Chemical and Other Properties of the Principal Carbon Compounds and Their Derivatives, Together with Relevant Literature References. Sixth Supplement. Oxford University Press, New York, 1970. viii, 280 pp. $29.

Educational Research Methods. J. D. Nisbet and N. J. Entwistle. Elsevier, New York, 1970. 192 pp. $7.25.

Engineering Fundamentals. In Measurements, Probability, Statistics, and Dimensions. Keith C. Crandall and Robert W. Seabloom. McGraw-Hill, New York, 1970. xii, 254 pp., illus. Paper, $5.95. General Engineering Series.

Foundations of Modern Auditory Theory. Vol. 1. Jerry V. Tobias, Ed. Academic Press, New York, 1970. xviii, 466 pp., illus. $22.50.

Fundamentals of EDP and FORTRAN. A Self-Instructional Manual. Leonard J. Kazmier and Andreas S. Philippakis. McGraw-Hill, New York, 1970. xii, 180 pp., illus. Paper, $4.95.

Genetic Theory and Abnormal Behavior. David Rosenthal. McGraw-Hill, New York, 1970. xviii, 318 pp., illus. $9.95. Series in Psychology.

Groundwater Resource Evaluation. William C. Walton. McGraw-Hill, New York, 1970. viii, 664 pp., illus. $17.50. Water Resources and Environmental Engineering.

Introduction to Advanced Inorganic Chemistry. Philip John Durrant and Beryl Durrant. Wiley, New York, ed. 2, 1970. xvi, 1250 pp., illus. $22.

An Introduction to Photobiology. The Influence of Light on Life. Yves Le Grand. Translated from the French edition (Paris, 1967) by Michael Peckham and Lesley Williamson. Elsevier. New York, 1970. viii, 178 pp., illus. $6.95.

Introduction to Signal Transmission. William R. Bennett. McGraw-Hill, New York, 1970. xviii, 266 pp., illus. $12.50. Electrical and Electronic Engineering Series.

Iterative Solution of Nonlinear Equations in Several Variables. J. M. Ortega and W. C. Rheinboldt. Academic Press, New York, 1970. xx, 572 pp., illus. $24. Computer Science and Applied Mathematics.

Materials for Structural and Mechanical Functions. Gabor Koves. Hayden, New York, 1970. x, 358 pp., illus. $13.95. Hayden Series in Materials for Electrical and Electronic Design.

Physical Acoustics. Principles and Methods. Vol. 7. Warren P. Mason and R. N. Thurston, Eds. Academic Press, New York, 1970. xx, 380 pp., illus. $19.50.

Physical Therapy Procedures. Selected Techniques. Ann H. Downer. Thomas, Springfield, Ill., 1970. viii, 174 pp., illus. $7.95.

Physicochemical Measurements in Metals Research. Part 1. R. A. Rapp, Ed. Interscience (Wiley), New York, 1970. xiv, 562 pp., illus. $29.95. Techniques of Metals Research, vol. 4, part 1.

Politics, Position, and Power. The Dynamics of Federal Organization. Oxford University Press, New York, 1970. xii, 312 pp. Cloth, $7.50; paper, $4.95.

Principles of Polymer Systems. Ferdinand Rodriguez. McGraw-Hill, New York, 1970. xiv, 560 pp., illus. $18.50.

Proceedings of the North American Paleontological Convention, Chicago, September 1969. Allen, Lawrence, Kansas, 1970. Part A, Teaching Paleontology, 54 pp., illus., paper, $2; Part B, Computers in Paleontology, pp. 55–154, illus., paper, $3.50; Part C, The Genus: A Basic Concept in Paleontology, pp. 155–320, illus., paper, $5; Part D, Paleoclimatology, pp. 321–408, illus., paper, $3.

Psychiatry as a Behavioral Science. David A. Hamburg. Prentice-Hall, Englewood Cliffs, N.J., 1970. xiv, 114 pp. Cloth, $5.95; paper, $1.95. Behavioral and Social Sciences Survey.

Psychoanalysis and Psychopathology. Philip S. Holzman. McGraw-Hill, New York, 1970. xiv, 204 pp., illus. Paper, $3.50. Paperback Series in Psychopathology.

The Scale of Nature. John Tyler Bonner. Illustrated by Patricia Collins. Pegasus, New York, 1970. 173 pp. Paper, $2.25. Reprint of the 1969 edition.

Social Implications of Biological Education. Arnold B. Grobman, Ed. National Association of Biology Teachers, Washington, D.C., 1970. viii, 134 pp. Paper, $1.95.

Social Stress. Sol Levine and Norman A. Scotch. Aldine, Chicago, 1970. xiv, 296 pp. $9.75.

A Strategy for Education. Herman T. Epstein. Oxford University Press, New York, 1970. x, 122 pp., illus. $4.95.

Technology in the the Ancient World. Henry Hodges. With drawings by Judith Newcomer. Knopf, New York, 1970. xviii, 302 pp., illus. $10.

To the Arctic! The Story of Northern Exploration from Earliest Times to the Present. Jeannette Mirsky. University of Chicago Press, Chicago, 1970. xxvi, 356 pp., illus. + plates. Cloth, $10; paper, $3.45. Reprint of the 1934 edition.

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