History of Biology

Overtures to Biology. The speculations of eighteenth-century naturalists. Philip C. Ritterbush. Yale University Press, New Haven, Conn., 1964. x + 287 pp. Illus. $7.50.

During the 17th century experimental biology was in the forefront of the scientific revolution, but, for reasons not yet entirely explained, that science fell short of its earlier promise and of the physical sciences during the 18th century. Ritterbush's book helps greatly to understand some of the obstacles to empirical development which befell biology during that time. According to his view many 18th-century naturalists escaped the frustrations of experimental complexities, and satisfied their desire for immediate "total explanations" of organic phenomena, by resorting to several general explanatory ideas. The first such principle was that subtle fluids related by analogy to Newton's ether pervaded all of the universe, including plants and animals. Especially popular was the conception that one of these fluids, electricity, was the ultimate cause of vital phenomena. According to Ritterbush, these subtle fluid theories advanced biological explanation in that they recognized "organic texture" to be more complex and phenomena to occur at a finer level than had been imagined by the 17th-century mechanists. But since subtle fluids ordinarily escaped detection, their use enabled naturalists to explain phenomena without experimental verification. For example, mechanists who had searched for an explanation of the sexual process in plants looked in vain for an opening in the pistils of flowers by which pollen grains might pass to the ovum. Later naturalists, however, dispensed with the problem by assuming that pollen released a subtle fluid that could pass through ordinary tissues containing no discoverable passages.

The second great explanatory principle often used as a substitute for investigation was analogy. Influenced by the idea of the great chain of being, biologists looked everywhere for analogies between higher and lower forms of life and assumed they had explained organic processes in one class when they found similarities to processes occurring in another class. Unlike 17th-century mechanists who hoped to understand the more complex phenomena by their relation to simpler ones, 18th-century naturalists explained the processes of simpler forms of life by analogy to higher forms. Linnaeus as well as many less well-known biologists seriously distorted their views of plant physiology in order to find analogies with animal life. The discovery of organisms intermediate between the conventional definitions of plants and animals enhanced such tendencies.

Ritterbush describes these patterns of thought in careful, well-selected detail, with thorough documentation from primary sources. Somewhat more briefly he outlines the transition from "the idea of nature" of the 18th-century to "the science of biology" of the 19th. He considers John Hunter the first of the modern biologists, because Hunter searched for a theory of life rather than for a comprehensive analogy, used sophisticated experimental methods, and emphasized comparative anatomy.

In several respects the scope of the book is narrower than its suggested aim of describing the general prologue for the emergence of a science of life. Ritterbush treats mostly problems in botany and plant physiology, with relatively brief references to related problems concerning animals. The subtle fluid and analogy-type explanations represented as the principal reaction of 18th-century biologists to the previous mechanistic physiology were really only two of several different types of response. The selection of a few figures like Lamarck, Humphry Davy, and Hunter to represent the transition to modern experimental biology obscures the fact that many pathways led to the flourishing of that science in the 19th century. But the ideas Ritterbush describes form one very important pathway in the broader route, and his excellent examination of them brings new clarity to the larger picture as well.

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New Books

General

Caribou Eskimos of the Upper Kazan River, Keewatin. Francis Harper. Univ. of Kansas Museum, Lawrence, 1964 (order from Arctic Institute of North America, Washington, D.C.). 74 pp. Plates. Paper, $1.50.

Chemistry in Indian Universities. Report of the University Grants Commission Review Committee. University Grants Commission, New Delhi, India, 1963. 117 pp. Paper, 99¢.

The Chicago School of Architecture. A history of commercial and public building in the Chicago area, 1875–1925. Carl W. Condit. Univ. of Chicago Press, Chicago, 1964. 256 pp. Illus. $8.50. This book is a revised and enlarged edition of *The Rise of the Skyscraper* (1952).

The Critical Approach to Science and Philosophy. Mario Bunge, Ed. Free Press of Glencoe (Macmillan), New York, 1964. 496 pp. Illus. $9.95.

A Dictionary of Geology. John Challinor. Univ. of Wales Press, Cardiff; Oxford Univ. Press, New York, ed. 2, 1964. 305 pp. $5.

The Dimensions of Human Evolution. A bio-philosophical interpretation. Radhakamal Mukerjee. Macmillan, London, 1963 (order from St. Martin's Press, New York). 231 pp. 25s.

Discovery. The autobiography of Vilhjalmur Stefansson. McGraw-Hill, New York, 1964. 419 pp. Illus. $7.50.

The Ever-Present Past. Edith Hamilton. Norton, New York, 1964. 189 pp. $4.50.

The Friendly Montagnais and Their Neighbors in the Ungava Peninsula. Francis Harper. Univ. of Kansas Museum, Lawrence, 1964 (order from Arctic Institute of North America, Washington, D.C.). 127 pp. Plates. Paper, $2.

Geological Map of Africa. Prepared by UNESCO and the Association for African Geological Surveys. UNESCO, Paris, 1964 (available from UNESCO Publications Center, New York). 9 sheets and *Explanatory Note*, 39 pp. Set, $55.

An Introduction to the History of Mathematics. Howard Eves. Holt, Rinehart, and Winston, New York, ed. 2, 1964. 457 pp. Illus. $7.95.

Introduction to Programming: The IBM 1620. Charlotte Froese. Addison-Wesley, Reading, Mass., 1964. 80 pp. Illus. Paper, $2.50.

Antoine Lavoisier. And the revolution in chemistry. Rebecca B. Marcus. Watts, New York, 1964. 189 pp. Illus. $2.95 (juvenile).

Life in the Sea. Gösta Jägersten. Basic Books, New York, 1964. 184 pp. Illus. $10.

Light: Our Bridge to the Stars. John Rublowsky. Basic Books, New York, 1964. 158 pp. Illus. $4.50.

The Management of Wild Mammals in Captivity. Lee S. Crandall. Univ. of Chicago Press, Chicago, 1964. 777 pp. Illus. $13.50.

Measurement in Today's Schools. Julian C. Stanley. Prentice-Hall, Englewood Cliffs, N.J., ed. 4, 1964. 432 pp. Illus. $7.50.

Mineralogy for Amateurs. John Sinkankas. Van Nostrand, Princeton, N.J., 1964. 599 pp. Illus. $12.50.

Modern Advances in Science. A layman's guide. James Stokley. Ronald, New York, 1964. 296 pp. Illus. $5.50.

Philosophical Aspects of Modern Science. C. E. M. Joad. Allen and Unwin, London; Barnes and Noble, New York (© 1932), 1964. 272 pp. Paper, $1.50.