

## Book Reviews

**Biochemical Individuality.** The basis for the genetotropic concept. Roger J. Williams. Wiley, New York; Chapman & Hall, London, 1956. 214 pp. Illus. \$5.75.

The author of this stimulating monograph has devoted a major portion of his career to the development of the concept of biochemical individuality and to a demonstration of the validity of its role in a proper understanding of man and his disorders. In *Biochemical Individuality*, Roger Williams has extracted from a wealth of information, obtained by himself and others, a careful development of his thesis and its significance to various aspects of biological and medical science. He has presented this material in a way which is both succinct and interesting.

The concept of biochemical individuality holds that, just as each human being is unique from the point of view of certain physical or personality characteristics, he also possesses an individuality, to a large extent genetically determined, in terms of the biochemical and metabolic patterns within him. Although this concept may in former years have had only academic or speculative value, in recent times chemical technology and biochemical understanding have advanced to the point where its validity can be demonstrated and a wide variety of chemical profiles can be obtained. The development of paper chromatography and of isotopic tracer techniques and the great advances in the knowledge of intermediary metabolism, which have all taken place within this generation, have made possible biochemical characterizations of a high degree of relevance and resolution.

Williams discusses the genetic bases of biochemical individuality in a sophisticated manner, with some reference to the recent interest in microbial genetics. He briefly reviews the variances and anomalies in gross anatomy along with a number of pertinent illustrations and passes quickly to biochemical deviation, which he develops and illustrates in considerable detail, with separate chapters devoted to individuality in composition, enzymic patterns, endocrine activity, excretion patterns, nutrition, and drug action.

The monograph concludes with three provocative and engaging chapters on the implications of biochemical individuality for the biological sciences, for medical and dental research, and for advances in psychiatry. Even though one may disagree with the occasional choice of particular examples to illustrate these implications, one cannot deny that the concept of individuality is a refreshingly new departure from the traditional "unity of biochemistry," in which not only all men but even all cells are biochemically equal. The field of biochemical individuality is one that deserves all the interest and much of the hope which Williams has aroused for it.

SEYMOUR S. KETY  
*National Institute of Mental Health,  
National Institutes of Health*

**Education in the U.S.A.** A comparative study. W. Kenneth Richmond. Philosophical Library, New York, 1956. 227 pp. \$4.50.

No use trying to write a book about a foreign country, they say, if you stay in it longer than a week and less than a lifetime. Kenneth Richmond's firsthand acquaintance with the U.S.A. clearly falls within these limits. I cannot cite any textual authority, but my impression is that he spent some 12 months here as a visiting teacher, on furlough from his regular job as lecturer in education at the University of Glasgow. I myself—an Englishman who has lived in this country, on and off for upward of 10 years—am presumably in no better case. Certainly, with the passage of time, one's early judgments come to seem absurdly superficial if not outrageously biased. Even so, I am willing to venture the opinion that *Education in the U.S.A.* would take some beating, within the compass of a couple of hundred pages, as a fair and illuminating study of its complex subject.

Kenneth Richmond traveled widely, read deeply, and observed acutely. In the one area of American education with which I can claim any personal familiarity, he makes a few errors of fact and judgment, but they do not distort the accuracy of his picture. He is properly

diffident in face of the dangers of generalizing about so disparate a collection of phenomena as education in the United States, but he is right in insisting that, beneath the surface, they present "an unmistakable likeness." Americans are fond of descending on the diversity of their educational system, just as they are highly conscious, and proud, of local variations in other aspects of their national life. In so doing, I think, they underestimate the unity that underlies the diversity. It is only natural that it should be more evident to a foreigner, who is inevitably struck by those common features of the whole system that distinguish it from his own. Richmond finds this differentia in "Americanism," which he says "has a special significance for anyone wishing to understand the forces at work beneath the surface of the educational system of the sub-continent, since it provides the one clue by which the system's bewildering diversity can be reduced to any kind of unity."

Another British observer of American education recently remarked: "The educational systems of all countries develop gradually in response to characteristics peculiar to the local environment. Whether the results achieved under the system are satisfactory or not becomes an argument of quite different character from that which springs from international comparisons." Although Richmond calls his book "a comparative study," he is, in my view, successful in interpreting American education precisely because he understands that it has developed, and is still developing, in response to distinctively American values. He recognizes that these values have their roots in geography, climate, and history and, above all, in a sense of national mission—all of which set the United States of America apart from the older countries of the West. An Englishman (or, say, a Dutchman) understands, and shares, the broad democratic ideals that inspired the American Revolution; he has much greater difficulty in appreciating the peculiarly American attitudes that played an equal part in that movement and have continued to mold American life down to the present day—what may be summarized as "the frontier tradition" and the belief in "the American Way of Life" as something unique and providential. Americanism is all but incomprehensible to Europeans, just as it renders the evolutionary democracies of Western Europe a mystery to Americans.

Because Richmond has grasped this situation, his chapters on "Education in Americanism" and "The American high school: dream and reality" are the most valuable in the book. He is remarkably sympathetic toward the American educational ideal and apparently optimistic about the possibility of reconciling what

he calls the Jeffersonian and Jacksonian viewpoints. When he comes to "Higher learning," however, he shows himself painfully aware of the difficulties of reconciliation. He is convinced that American public opinion will never stand for a system designed to educate an "intellectual elite." But he asks the pertinent question whether "full-time further education" (that is, education beyond the high school) and "university education" are necessarily one and the same process. This old question of quantity versus quality is the unsolved problem of American education. How can we provide equality of educational opportunity without sacrificing the leaven that leaveneth the lump? With all his tact and imagination, Richmond's treatment of this problem is forthright enough to make his book worth while for Americans as well as for his own countrymen, for whom it was primarily intended.

A small point perhaps, but as a proof-reading job the book is no credit to British publishing.

F. L. WORMALD

*Association of American Colleges*

**Advances in Genetics.** vol. VIII. M. Demerec, Ed. Academic Press, New York, 1956. 402 pp. Illus. \$9.

This latest volume in a well-known series contains eight articles by ten authors and deals with the usual diversity of topics: mutations in plants; population genetics of *Gilia*; chromosome re-patterning and adaptation; genetics of flax, bees, ladybeetles, and sheep; and the cytogenetics of the tomato.

As in previous volumes, the articles, with few exceptions, deal with the total or general genetics of specific kinds of organisms. This arrangement is both an advantage and a disadvantage. It is an advantage to the investigator who wishes to find all the facts he can about the genetics of bees, beetles, barley, and toads, and to the teacher who is searching for apt examples of genetic phenomena beyond the often quoted textbook cases. It is a disadvantage to the student of heredity who is looking for competent reviews of the scientific issues of current interest in genetics. He will have to seek elsewhere.

The greatest single shortcoming of the eight volumes appears to be in the use of "advances" in the title. While genetics does advance by the accumulation of facts and the naming of genes, these advances must always be secondary to the improvements in concepts and interpretations based on the facts. If a person, not familiar with the nature of these volumes, were to come upon the title in a library file, search out the volumes, and examine the contents, he might go away

with the impression that genetics advances only by discovering new facts and miss the idea that genetics advances by exploring issues.

EARL L. GREEN

*Roscoe B. Jackson Memorial Laboratory*

**Principles of Fungicidal Action.** vol. 30 of *New Series of Plant Science Books*. James Horsfall. Chronica Botanica, Waltham, Mass.; Hafner, New York, 1956. 279 pp. Illus. \$6.50.

The study which relates man's fight against fungi and mildew, like all divisions of science, has advanced very rapidly in the last decade. This book, compiled at the rate of a chapter a week while the author was on sabbatical leave at the University of California during 1955, serves to bring the academic and applied microbiological devotee up to date on our present knowledge of mechanisms of fungitoxicity. Of the 678 references in the bibliography, 52 percent have been published since 1945, the date of James Horsfall's first publication on this subject. The treatise differs from the run-of-the-mill scientific compilations, since, as is pointed out by the author, the researches of his friends served as the source of light; Horsfall "merely produced the design for the shadow." This shadow of the compiler is cast throughout each chapter by the folksy way in which a very involved mechanism of action may be described, by the idiomatic expressions which are interspersed, and by the author's metaphorical description of fungus cells and components.

If your interests center around the composition of a fungus symphony and the effects which may be wrought upon this orchestra merely by a squeaky metabolic clarinet, these chapters are recommended for your further attention. A bonus, consisting of the author's opinions, questions, and suggestions for further research, is to be found in almost every chapter. Because of the manner in which the technical aspects of this microbiological field are presented, and because the reading of this volume accentuates the presence of gaps in our knowledge of this field, *Principles of Fungicidal Action* should prove of interest and value to those allied with this specialty as well as to academicians in both university and industrial life.

In the opening pages of this book, Horsfall acquaints the reader with landmarks in the history and development of fungicides. Appropriate definitions and necessary background information are found in the following two chapters, which are concerned with the appraising and the measuring of fungicidal and protective action of chemicals. The

various theories which attempt to answer such questions as how a chemical becomes available to the fungus and how it is mobilized so that its toxicity may be exerted are next discussed. The author hazards the guess that 75 percent of the reactions operative in fungitoxic mechanisms occur inside the cell; therefore, the important principle of fungicidal action—namely, permeation and penetration—is treated separately, in chapter 5.

The remaining ten chapters of the book contain discussions of the disruptive disturbances imposed by chemicals upon the fungus cell. These are divided, generally, into physical and chemical interferences. Under physical influences caused by various fungicides are included effects upon cellular structures, mitosis, spindle formation, chromosomal division, and conidial production. Chemical disruptions attributable to fungicides include such effects as those on enzymes, respiration, pigmentation, metabolites, and dormancy. In an entire chapter, importance of mineral nutrition to the well-being of the fungus is discussed in relation to the importance of chelation as a possible mechanism of fungitoxicity.

Discussions, in five chapters, contain background information in which the organic chemist, faculty adviser, or research director may find the appropriate clue to synthesize, or have synthesized, the best fungicide. These chapters are entitled: "Action of metals," "Action of sulfur," "Action of organic sulfur compounds," "Action of quinones and other ketones," and "Action of heterocyclic compounds."

The author's enthusiasm for the new frontier in plant pathology—namely, chemotherapy—is evidenced by his introduction to this subject in the last chapter of the book.

HAROLD G. SHIRK

*National Academy of Sciences—  
National Research Council*

**Principles of Guided Missile Design.** *Aerodynamics, Propulsion, Structures and Design Practice*. E. Arthur Bonney, Maurice J. Zucrow, and Carl W. Besserer. Van Nostrand, Princeton, N. J., 1956. 595 pp. Illus. \$10.

This book is aimed at those individuals who may be interested in, or are at present directly working in, the guided-missile field. The organization of each section is of such a nature that the material presented can be readily understood by those who may themselves be untrained specialists. As a consequence of this objective, each section contains a large amount of general information in addition to the presentation of the fun-