Book Reviews

Life, the Great Adventure. Jean Rostand and Paul Bodin. Scribner's, New York, 1956. 228 pp. $3.50.

Jean Rostand is well known and widely read in France. He is better known, I would guess, than any biologist in this country is known to the general public. It is a credit to French broadcasting that the series of discussions contained in this book were prepared for the radio.

The subject matter is largely the same as that in Rostand's *Ce que Je Crois,* and, in fact, the dialog technique is largely used for Paul Bodin to criticize and ask amplification of statements made in *Ce que Je Crois.* The few new topics that are covered add to the interest which the present volume arouses.

Rostand strikes a middle course between two extremes found among scientists writing for the lay public. On the one hand, there are those who extract the fruit of recent research and present it in a readable form. The best examples of this sort of writing give the reader excellent mental exercise and also sometimes the same consummation of curiosity that is the life blood of the professional scientist. On the other hand, there are those who write of subjects far removed from science—on philosophy, politics, or religion—from what they sometimes consider a privileged position as scientists. Such writing is sometimes entertaining and serves to present different and often unorthodox ideas.

Rostand does not belong to either category; he does not indulge in describing the mechanism of heredity or of hormonal action, nor does he spend much time on setting the philosophers, politicians, or theologians right, except in details that touch upon biological topics. What he attempts is to give an up-to-date account of what a biologist believes concerning great biological questions.

The main theme is given by Paul Gaugin's inscription written under a painting more than a century and a half ago: "Where do we come from? What are we? Where are we going?" One's first thought after reading this book is how little the answers to these questions have been advanced since 1898. Rostand is a firm believer in evolution and mentions one or two prominent French biologists who are not. He believes, however, that all the main groups of animals and plants were formed under special conditions and that only trivial evolution is now taking place.

He believes that intellect can be improved perhaps by genetic or surgical means but more likely by chemical means, such as hormones or glutamic acid. Man's life-span may be extended to about 100 years but not more. He makes the nice point that, just as man evolved by fetalization or neoteny, so intellectually a genius is often an example of retarded development, the period of keener learning and curiosity of the child being extended into the man. He thinks water divining and radiaesthesia are pure quackery and is skeptical about telepathy.

Marston Bates tells us in the foreword that this is an adaptation of a translation by Alan Brodrick published in England but unfortunately there is no mention of the title or publishers of the English publication, of whether the French text is available; more important, there is no clue as to when the work was first published or broadcast.

The scientist and nonscientist alike should find this enjoyable reading. The biologist may disagree with parts and may wish to amplify other parts, but both will be induced to wander to future horizons of biology with their feet firmly planted on the ground of present knowledge.

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Genetics and Metabolism. Robert P. Wagner and Herschel K. Mitchell. Wiley, New York; Chapman & Hall, London, 1955. xi + 444 pp. Illus. $7.50.

This book is a rich and provocative account of current knowledge in physiological genetics, written in a careful and critical but lucid style. The subject may be taken as the linkage between genes and characters; unlike some unduly optimistic accounts, the authors are careful to emphasize how fragmentary our knowledge of these links really is; at the same time, they explore its riches. Some of the content of the experimental work in this field is seemingly rather remote from gene function—for example, the aspect of "biochemical genetics," which concerns the analysis of metabolic pathways with the help of genetic tools. Albeit these links are rather terminal, they are still a necessary part of our understanding of how a mutant gene affects the development of the mutant character.

In a book of this scope, one might expect to find many details to quarrel about, but the discussion is so analytic and circumspect that I could find hardly any issues in which all sides were not given ample recognition. There is, naturally, a heavier emphasis on illustrations from *Neurospora* and *Drosophila*, with which the authors are more closely acquainted than, say, with bacteriophage and bacteria. If only because of the importance of tracer studies with phage and with DNA-mediated-transductional analysis in forging the most fundamental links between chemistry and heredity in contemporary research, this emphasis may be expected to shift in future versions.

The book would be rewarding enough for its help in the assimilation of current factual knowledge in its field; the plums in the pudding are cautions against pretension and critical reminders on almost every page that recall first principles in genetics and in biochemistry. The book will therefore be equally useful in various ways, to the new student and to the experienced investigator. The impact of genetics is now so widespread that no physiologically minded student of biology can afford to be unaware of the material it covers. The first few pages, which are intended as a review of elementary genetics are perhaps supererogatory; any reader who would need them would better refer to a complementary textbook such as that of Srb and Owen. As is so typical of the rest of the book, Wagner and Mitchell have already pointed this out themselves.

The authors have wisely refrained from anticipating unpublished work to give the color of up-to-dateness. The work has therefore a sound foundation, from which the contemporary biologist can build a perspective on the exciting day-to-day developments on the biochemistry of genes.

The following are a few points raised by the authors that are worth remembering: (i) "It is the whole cell which is the living system, for it is the smallest unit capable of reproducing life, and it is important to recognize that the expression of inherited characteristics . . . is through the activities of cells, not merely through genes, which are parts of cells." (ii) "The [spontaneous mutation rate] is usually stated to be low, but this needs to be qualified as to whether one is speak-

ing of the rate of mutation of a specific gene or of the total mutation rate of all the genes in the genome." (iii) "To say that the primary action is unitary, each gene having but a single primary function, is to formulate a simple straightforward hypothesis neither supported nor contradicted by experimental evidence, and at present not subject to experimental test by known and proven methods." (iv) "It is not possible to make a choice between [the particle theory versus the metabolic-state theory of cytoplasmic inheritance] or even to be certain they are mutually exclusive." (v) "The oft-stated claim that one strain differs from another by a single gene always carries with it the usually unstated qualification that they differ in only one known gene." (vi) "Genes have been variously described as (1) units not reduced by crossing over, (2) units of mutation, and (3) units of function."

The last sentence quoted is followed by a lucid discussion of these definitions; I wonder whether the term *gene* when used in the singular, is still useful in precise discussion. At a recent symposium, the terms *rit* (recombinational unit), *mit*, and *pfit*, or the more euphonious *recon*, *muton*, and *cistron* were proposed to distinguish these concepts. These were jocular suggestions, but they emphasize that recent studies have outgrown an outmoded, and often confusing, terminology.

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The Dynamics of Living Protoplasm. L. V. Heilbrunn. Academic Press, New York, 1956. 327 pp. Illus. $6.50.

The well-known Pennsylvania physiologist, L. V. Heilbrunn, describes changes in protoplasmic colloids which he thinks provide a basis for understanding mechanisms underlying living activity. From direct viscosity measurements, he concludes that protoplasm is fluid in the interior of a cell and stiffer near the edges, probably because of calcium ions. Near the edges, proteins are on the alkaline side of their isoelectric points and can combine with cations like calcium, while toward the interior they tend to become more acid, combining with anions like chloride. This difference contributes to the origin of gradients in electric potential in cells.

The author suggests a fundamental pattern of colloidal change during cell activity, similar to that noted in specific precipitation reactions, such as those that occur in clotting. Indeed, muscle contraction, nerve excitation and transmission, cell division, anesthesia, and biostasis are explained on the basis of such colloidal changes related to cation binding or release by protoplasmic proteins.

Here is offered a full account of a general physiological theory which, in its present elaboration, deserves serious consideration, both for the facts on which it is built and for the abundant indicative support to which reference is given. The necessity for extensive study on physicochemical factors in colloidal changes in living material is clearly indicated, especially such changes as are involved in the equilibrium between clotting inducers like thromboplastin and clotting inhibitors like heparin.

This volume is an important one in bolstering the position that the broad foundation of general physiology is essential for the progress of every field of biology and medicine.

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A Handbook for the Identification of Insects of Medical Importance. John Smart. British Museum (Natural History) London, ed. 3, 1956. 303 pp. Illus. £2.

This is a photolith reproduction of a book, the first edition of which was published in 1943, that was evidently intended to meet the needs of the British Commonwealth of Nations without special reference to other areas. It therefore contains but little information on insects of medical importance in North and South America. Nevertheless it is an admirable presentation of the material that comes within its intended range.

The numerous illustrations, which, always with adequate credit, have for the most part been borrowed, are all of unusually high quality, and the text may be accepted as being thoroughly adequate. More than half of the book is given to the identification of flies of medical importance, which, considering the significance of this group, is entirely just. A short, but entirely admirable section by Karl Jordan, on fleas, is perhaps somewhat longer than is strictly necessary, and a section by R. L. Whittick on the Arachnida is perhaps somewhat shorter than is deserved.

The book is a reprint of its second edition, which was published in 1948, with corrections and additions, especially to the bibliographies, which bring it up to date. In spite of its dealing primarily with other parts of the world, the book will be of value to American medical entomologists, many of whom are working at present in the parts covered, or even to those who stay at home.

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Clinical Electrocardiography. pt. 1. *The Arrhythmias.* With an atlas of electrocardiograms. Louis N. Katz and Alfred Pick. Lea and Febiger, Philadelphia, 1956. 737 pp.

The literal translation of the word *arrhythmia,* according to Paul D. White, is "not measured motion." Rephrased, the term indicates any irregularity in the force, equality, and sequence of the heartbeat. When the arrhythmias are studied electrocardiographically, variations in the nature of the electric potential engendered by excitation, either of the atria or the ventricles, are added to consideration of the force and sequence of the mechanical beat of the heart.

This book represents the first half of an edition in two volumes on clinical electrocardiography. The authors indicate that the second volume will be devoted to a consideration of contour changes in the electrocardiogram. Their decision to devote this first volume to the arrhythmias was based on the judgment that "no comprehensive textbook is now available for the student and practitioner." They define specifically their intention to base interpretation of arrhythmias on a physiologic approach, while emphasizing the clinical import of materials under consideration. Recent advances in their thinking that are included in this volume are "a larger scale evaluation of the concepts of concealed A-V conduction, of aberrant ventricular conduction, and of the effects of cycle length upon the duration of the refractory phase; the concepts of retrograde and unidirectional conduction, and of the re-entry phenomenon, and their bearing upon ectopic beats and rhythms; the concept of multiple areas of block; the concept of depression of cardiac pacemakers by extraneous impulses; and finally the application of well known concepts of mechanisms operating in A-V block to other areas of the heart such as the S-A region and the ventricles themselves."

About one-quarter of the 700 pages in the volume is devoted to text, while the remaining three-quarters are composed of illustrative electrocardiograms supplemented by detailed legends. So abundant are the illustrations that the impression may arise that a search sufficiently long and enthusiastic eventually would produce every conceivable variant in a field replete with variables.

Deciphering complex cardiac arrhythmias is an assignment for those who delight in puzzles. Pursuit of this assignment will promote an understanding of certain fundamental properties of the heart, namely, its rhythmicity, conductivity, and excitability. Competence in analysis of arrhythmias will enhance the stature of a teacher in the eyes of his pupils. There remains a reasonable ques-