Book Reviews

Static and Dynamic Electron Optics. An account of focusing in lens, deflector, and accelerator. Cambridge Monogr. on Mechanics and Applied Mathematics. P. A. Sturrock. Cambridge Univ. Press, London, 1955. x + 240 pp. $5.50.

The range covered by this book is indicated more clearly by the subtitle "An account of focusing in lens, deflector, and accelerator." On the other hand, the subtitle should not mislead the reader into thinking that the book is concerned with devices. It is not. The emphasis is on the focusing. Furthermore, as the author makes plain in the preface, if not in the title, this is a theoretical treatise. Examples illustrating the theory are used sparingly.

In brief, the book is a treatise on geometric electron optics based, almost entirely, on the use of variational principles and the Hamiltonian characteristic functions in particular. The portion on static electron optics proceeds, after a brief introductory chapter, to a general treatment of path ensembles in the electric and magnetic field; imaging along curvilinear axes; the focusing properties of rotationally symmetric fields, including a derivation of third-order geometric, chromatic, and "relativistic" aberrations and the effect of space charge and asymmetries; and focusing in fields with mirror symmetry as encountered in deflection fields and particle spectrometers.

In the second part, on dynamic electron optics, time is introduced as an added variable in the characteristic function, and emphasis is placed on the "stability" of path ensembles—that is, the convergence or divergence of their envelopes. Its two chapters deal, respectively, with uniform focusing in particle accelerators, as illustrated by the original synchrotron and linear accelerator, and periodic focusing, exemplified by the strong-focusing synchrotron.

The scope of the book does *not* include the determination of focusing fields, focusing by electron mirrors, and the behavior of beams in fields in which there is a dynamical interplay between space charge and electrode potentials.

Even so, confining the information contained in it to 240 pages is a remarkable accomplishment. It is made possible in part by making greater claims than usual on the reader's familiarity with theoretical mechanics and matrix and vector operations, in part by the practically complete avoidance of repetition. Finally, choices of units that eliminate constant coefficients simplify formulas and equations. This may well be worth while, even though it robs the reader of the comfort of dimensional checks and makes casual reference somewhat more difficult.

In summary, Sturrock's book is a unique and valuable contribution to the literature of electron optics. It is not an easy book to read. However, a careful perusal is likely to prove both stimulating and highly rewarding.

E. G. Ramberg

RCA Laboratories

Vitamins and Hormones. vol. XIII. Robert S. Harris, G. F. Marrian, and Kenneth V. Thimann, Eds. Academic Press, New York, 1955. xi + 382 pp. $9.

The marriage between the sciences of nutrition and endocrinology, arranged by the editors in 1943, in volume I of this series, continues to show no signs of strain or dissolution, like any good *mariage de convenance*. The present volume contains nine chapters by authors in four countries, five related to vitamins, two dealing with other nutritional topics, and two with hormones.

The eclecticism that results in the assembling of nine diverse surveys really means that within the covers of this volume one has nine small books—which would demand, at least, nine small reviews. But this, like small praise, would be damning, and the reader will understand if I settle for a brief run-through.

A. E. Axelrod and J. Pruzansky have set forth "The role of the vitamins in antibody production" and, by dissecting their analysis away from the thorny problems of resistance to infection, have succeeded in giving the subject a degree of definition that it has heretofore never possessed.

Harry J. Deuel, Jr., and Raymond Reiser review the physiology and biochemistry of the essential fatty acids. This is straightforward and is in the nature of a progress report involving the application of the newer technology in lipid chemistry.

L. W. Mapson has totted up the present information on the biosynthesis of ascorbic acid, from D-glucose to the completely inverted L-ascorbate.

J. E. Ford and S. H. Hutner have pulled together the many diverse aspects of the role of vitamin B_{12} in microorganisms, especially as tools in the penetration into the nest of the rapidly spawning multiplicity of pseudovitamin B_{12} compounds.

Charles C. Ungley's thoughtful essay on the chemotherapeutic action of vitamin B_{12} contains an interesting synopsis of the present knowledge of Castle's intrinsic factor and nails to the mast, once more, the dictum that, with the exception of the action of vitamin B_{12a} in cyanide poisoning, the only certain chemotherapeutic action of vitamin B_{12} seems to be the correction of the metabolic disorder that results from an existing deficiency of the vitamin.

Lionel B. Pett, in a pithy piece, says some things about vitamin requirements of human beings that have needed saying. As Pett points out, we tend to ignore in these matters (i) biological variation, (ii) the phoniness of the view that consuming several multiples of demonstrable needs results in a kind of superhealth, and (iii) the undemonstrated basis of the view that to grow faster and larger is, *ipso facto*, an advantageous goal.

Dean A. Smith, in his view of parasitic infections and nutrition, is at his ease in dealing with the effect of the parasite on the nutrition of the host—which he finds is bad—but stumbles when he deals with the effects of host nutrition on the parasite and the disease it brings about.

W. S. Bullough concentrates on hormones and mitotic activity, but his contribution is overshadowed by the masterly essay of Oscar Hechter entitled "Concerning possible mechanisms of hormone action." Indeed, if the present volume has any claim to being memorable, it will be for its inclusion of this article by Hechter. Proceeding from an analysis of the operational bases of endocrinology, Hechter advances in the best scientific tradition to recover some important questions that have been lost in the modern mumble of answers. Like the best of philosophers, this author generates a certain disquietude and courageously, but modestly, stands against the stream of present preoccupation with energetics as suitable answers to all biological questions.

The widely accepted hormone-enzyme hypothesis here undergoes a searching cross-examination—and emerges scathed.