Book Reviews

Phenomena of Heredity

The Principles of Human Biochemical Genetics. HARRY HARRIS. North-Holland, Amsterdam, and Elsevier, New York, 1970. xiv, 330 pp., illus. Cloth, $15; paper, $6.95. Frontiers of Biology, vol. 19.

For nearly two decades Harry Harris, perhaps unknowingly, has been in the business of recruiting for human biochemical genetics. His earlier books, *Introduction to Human Biochemical Genetics* (Galton Laboratory Monographs, 1953) and *Human Biochemical Genetics* (Cambridge University Press, 1959) helped to enlist two generations of investigators. The latest version should attract a new cadre. Although the new book deals with many of the same general topics as before, it does so in a substantially different way. It attempts a degree of unity between what 11 years ago seemed unconnected classes of phenomena, such as the inborn errors of metabolism and the hemoglobin variations. The task is an ambitious one, even for the most perceptive, for our overall understanding of the topic is still very much in the natural history stage. There is no unifying view of the hierarchies of interactions existing between genes and phenotypes in higher organisms. Moreover, aside from a few uncommon disorders and some nice points of differential diagnosis, there is, as yet, comparatively little immediate utility from a field that consumes the interest of so many investigators and for which there are ultimately such great expectations. It is essential that the present-day fact of limited applicability be made clear. Our hopes are substantial but they are based on investigations still not done.

Despite such reservations, perspectives in human biochemical genetics are quite different now than a decade ago. Harris gives an excellent account of these. His tactic is to place emphasis on an illustrated set of fundamentals. These include the use of hemoglobins to typify the nature of visible mutations and the diverse kinds of phenotypic effects that can be produced by single amino acid substitutions; an exposition—exemplified by a variety of proteins—of the one-gene, one-polypeptide concept and the collateral one of the multigenic origin of some classes of polymorphic molecules; a description of gene duplications and deletions and their consequences to protein structure; a hemoglobin-centered treatment of inherited defects in protein biosynthesis; and a description of relationships between quantitative and qualitative variation of certain enzymes. A group of selected inherited metabolic errors is used to illustrate a variety of subsidiary topics such as isozymic differences between tissues, genetic heterogeneity among phenotypically similar diseases, and the detection of heterozygotes.

At the close of the book there are two more contemplative chapters. The first of these deals with the extent and sources of protein diversity in human populations. This is the topic wherein the biochemical geneticist has created controversy for the evolutionist and population geneticist. A portion of the difficulty is Harris's own doing; he is responsible for the signal finding that approximately one-third of human genetic loci seem to bear more than one common kind of allele. This result, together with similar polymorphic abundance in *Drosophila*, has provoked a widespread and still continuing reexamination of the relative roles of selective and nonselective factors in producing such unexpectedly great genetic diversity. Harris sets out the possible explanations in their simplest form. The final chapter is, in itself, worth the book. It is both a knitting together of earlier concepts in a discussion of the molecular pathology and heterogeneity of inherited disease and a straightforward recapitulation of the ways in which those men affected by variant genes interact with the world about them. In this connection the book ends on a paradox:

> The study of the genetics of many diseases may lead to their prevention or amelioration by purely environmental methods. Indeed it is very probable that one of the most important social and medical applications of genetical research will lie in the control of the environment, since the more it becomes possible to characterize the genetical constitution of an individual precisely, the more likely are we to see how to modify or tailor the environment according to his needs.

How far we can pursue this strategy and develop other therapeutic options depends on the strength of the new cadres of investigators and the will of governments to support them through all the twists and turns characteristic of life science in complex species.

What faults there are to the text are largely ones of omission, a possibility Harris foresees in his introduction. He tries to offset this with tabular appendices that serve as annotated catalogs of specific enzyme deficiencies and of protein polymorphisms. These may not be enough, since some important ideas are thereby lost. For example, the immunoglobulins of man are nowhere described despite the fact that genetic principles adduced from these seem to differ profoundly in some ways from the view of genes derived from, say, the study of hemoglobins. No matter, the book will still be eminently useful to all those who are curious as to what human biochemical genetics has been about and where it may lead.

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Biological Pigments

Heme and Chlorophyll. Chemical, Biochemical and Medical Aspects. GERALD S. MARKS. Van Nostrand, London, 1969 (U.S. distributor, Van Nostrand Reinhold, New York). xiv, 210 pp., illus. $12.

We are indebted to the long, dark, cold Canadian winter to which Marks attributes his undertaking of this valuable book on heme and chlorophyll. Marks has brought together in this volume not only recent knowledge of the organic chemistry of these pigments, but also much information relating to their biochemistry and pharmacology. Having worked in these several fields, and having already prepared two important reviews on related subjects, he writes with authority.

For a book that is rather slender in size it is a remarkably comprehensive one, packed with useful and essential information and concisely written. It will prove to be a required reference