REVIEWS OF BOOKS

GENETICS

Stern. C. and **Sherwood. Eva R.** (Editors). *The Origin of Genetics.* San Francisco and London, 1967. Freeman. Pp. xii+179. Price 18s. paper, 36s. cloth.

ONE OF THE most intriguing events in the history of genetics was the "rediscovery" of Mendel's work at the turn of the century. In their book Curt Stern and Eva Sherwood have collected together all the relevant papers by those concerned in the "rediscovery". Also included is a completely new translation of Mendel's paper *Experiments on Plant Hybrids* (1865) because the editors found many inaccuracies in the original translation of 1901.

Mendel was most fortunate in choosing the pea (*Pisum sativum*) for his genetic experiments. In subsequent studies with the genus *Hieracium* he was less fortunate for this plant has been shown to be frequently parthenogenetic or apogamous which explains why he was unable to verify the results of his earlier experiments on peas.

Though the deeper significance of Mendel's work was not appreciated at the time, his two papers on plant hybridization were not completely neglected. In 1881 the German Botanist Focke published a comprehensive work of reference on plant hybridization in which he referred to Mendel's experiments on several occasions, though without apparently recognizing their true significance. All Focke's references to Mendel's work have been reproduced in full in this book.

It was directly through Focke's work that Correns became aware of Mendel's publications. Clearly, however, both Correns and de Vries collected their own experimental evidence long before they became aware of Mendel's publications. The communications in which these men announced their findings have been included in this book along with letters in which they describe how they came to know of Mendel's work. The editors do not include any communications by Tschermak because his papers of 1900 ". . . not only lack fundamental analysis of his breeding results but clearly show that he had not developed an interpretation".

R. A. Fisher collected together all Mendel's results and in a now famous paper published in 1936, presented statistical evidence which indicated that the results were much closer to theoretical expectations than would be predicted by chance. Fisher even suggested that Mendel may have been deceived by an assistant who knew too well what his master expected. Sewall Wright agrees that Mendel's data fit the ratios much closer than would be expected by chance but he disagrees with Fisher's explanation and suggests that it might have been the result of the cumulative effects of a slight subconscious tendency to favour expected results.

This is a most interesting collection of original papers, essays and letters by those involved in the "rediscovery" of Mendelism and deserves to be read widely.

ALAN E. H. EMERY

Brink R. Alexander (Editor) with the assistance of **Derek E. Styles.** *Heritage from Mendel.* Madison, Milwaukee and London, 1967. University of Wisconsin Press. Pp. xii+455. Price 75s.

1822 WAS A VINTAGE year—Galton, Mendel and Pasteur were born, and a discussion of the lack of communication between Galton and Mendel forms the introduction to Sturtevant's contribution in this book, a collection of the twenty-one papers presented at the symposium, sponsored by the Genetics Society of America, in commemoration

of the hundredth anniversary of Mendel's announcement to the Brünn Natural History Society of his studies on inheritance in the pea.

In subject matter, therefore, the book is inevitably similar to some other Mendel Centennial publications but this need not detract from its interest or value. Only a few of the papers are directly concerned with the historical development of inheritance after Mendel although most of the authors contrive to plot, in a paragraph or a page, the path of their subject from Mendel's paper.

The first section, *Resolution of the Genetic Material*, consists of papers by Oliver, Sturtevant, Lewis and Demerec describing the evidence which showed that the gene was no more atomic than the atom. The recent evidence, given by Sonneborn in the last section of the book, that the DNA of cell organelles is an extension of the genetic material beyond the nucleus, had a similar traumatic effect on geneticists.

Delbruck introduces the next section on *Mutation Recombination and Genetic Coding* by emphasizing that the two "genetic error processes", mutation and recombination, which have been by-passed by molecular genetics may soon be interpreted in molecular terms. The available evidence concerning the mechanism of recombination is marshalled by Meselson and the molecular approach is continued by Matthaei and his colleagues who describe in detail their own studies analysing the genetic code.

Charlotte Auerbach lucidly reviews the changes in emphasis in mutation research that have preceded the present molecular approach and gives a convincing argument for a more biological attack in the future.

The third section of the book contains papers by Beerman, Gordon and Hadorn on gene activity and Buttin, Jacob and Monod restate the operon hypothesis of the regulation of gene activity.

The Mendel Centennial year reminded geneticists that Mendel's work provided the basis for population genetics and Sewall Wright describes the foundations of this subject and his own considerable contributions in the fourth section on *Population Genetics*. Also in this section is a discussion by Carlson of inbreeding and gene fixation in natural populations and Robertson's very personal view of the genetic nature of quantitative variation. Cavalli-Sforza, in describing some of his own studies on human populations, shows that the difficulties of using man as an organism for studies of population genetics are not unsurmountable.

However, Mendel was a plant breeder and so it is appropriate that this commemoration volume should include a paper devoted to genetic principles applied to the breeding of crop plants. Kihara and Tsunewaki in the fifth section of the book discuss the utilization of artificially induced sterility in plant breeding and point to the difficulties the applied geneticist faces. They give the illuminating example of triploid water melons which, for the consumer, are better buys than diploids, but they mature later. Unfortunately, the consumption of water melons in Japan reaches its peak in August at the Buddhist Bon Festival (commemorating the souls of the deceased) and triploid water melons usually mature too late.

It is this fifth section, *Latitude of Genetics*, which is exciting. Three of the five papers include some discussion of genetics applied to Man, and the paper by Muller is concerned with the evolution of the genetic material. Crow discusses Genetics and Medicine and poses the question "how soon and to what extent should man start to intervene in his genetic future?" He argues that genetic counselling and improvements in environmental conditions would eliminate only a small fraction of "human suffering". Yet genetic engineering is not yet practical and when it is developed it will most probably be effective for single gene traits. But many factors of socio-biological significance are likely to be controlled by more than one gene and Crow's thesis is that if we really want to change

the human population by genetic means, Muller's method (i.e. the use of artificial insemination) is the most likely to succeed. However, Crow emphasizes that it is not clear what society or individuals want to do. Many geneticists feel that they can't know what is needed, they can't decide what characters and in what direction to select and so they will agree with Beadle that at least for the forseeable future, man should "concentrate on improving our cultural heritage".

Beadle in "Mendelism, 1965" argues that as it is theoretically possible for our species to "revert in a single generation to the barbaric state of a hundred thousand years ago" it is easier and quicker to raise the general cultural level of our species than it is to change its genetic composition. What is perhaps more important is that it is also safer. However to accept Beadle's view of the speed with which we could " revert" one must ignore what Beadle himself recognizes as the supplement to biological inheritance, cultural inheritance

Sonneborn, in a fascinating paper, clearly underlines this extraorganismic, second genetic system of man with its potential for "foresight and planned directiveness". He does not say what decisions man should take about his future but he does make the important point that man's genetic systems *permit* him to make decisions which will affect man's genetic make-up.

Perhaps this realization will be the important contribution from the study of genetics in the first century of Mendelism. JOHN GIBSON

Spickett. S. G. and **Shire. J. G. M.** (Editors). *Endocrine Genetics.* (Memoirs of the Society for Endocrinology, No. 15.) Cambridge, 1967. University Press. Pp. xv+325. Price 70s.

ENDOCRINE PHYSIOLOGISTS, BIOCHEMISTS and geneticists each have fields of study which they can legitimately claim as their own, but there are other fields where progress towards understanding can most effectively be made by the combined effort of their three disciplines. The organizers of this symposium have recognized such a field and have mustered a powerful multidisciplinary force with which to attack it.

The Proceedings are arranged in three sections of which the first is concerned with the mode of action of hormones; the second with major gene variation in endocrine systems and the third with quantitative variation in endocrine structure and functions, but a strong interaction between the sections is obvious throughout the discussions, which are reported as well as the formal papers and are just as valuable.

In the first section such topics as the mechanism of information transfer from genes to proteins and the role of hormones in the biosynthesis of macromolecules are discussed, together with the role of adrenal hormones in the complicated process of protein mobilization and gluconeogenesis in vertebrates. The action of hormones and other factors on the activity of genes in insects forms the basis of three contributions which provide much food for thought.

In part two we look at the effect of genes on the endocrine system and see how complicated synthetic processes can be interrupted at various stages by genetic defects. Examples of this occur in papers on the hereditary variation in the biosynthesis of adrenal hormones in man and on the "coupling defect" in familial goitre although the exact enzymic basis of the defects concerned remains obscure. We learn also that congenital goitre in sheep is basically a defect in protein synthesis. Variations in the structure of the octapeptide hormones from the neurohypophysis in various species are discussed at some length. These molecules, being relatively small and differing from each other by single amino acid substitutions, provide excellent material for studying the genetic basis of variations in hormonal structure. Genetic influences on the production of growth hormone and prolactin are discussed in relation to dwarf mice.