SCIENTIFIC BOOKS

MEDICAL GENETICS

Medical Genetics. By L. H. SNYDER. Durham, N. C.: Duke University Press, 130 pp. 1941. $1.50.

A BIOLOGIST trained in the Harvard School of Genetics, incumbent of the first chair of medical genetics in the land and chairman of the committee of human heredity of the National Research Council has given to the public the lectures that he delivered to the entire body of medical students of Duke University, Wake Forest College and the University of North Carolina with aid from a grant of the Carnegie Corporation. This is well, for as Dr. William C. Davison, of Duke University, says in the foreword, "the knowledge of medical genetics is of practical value in the diagnosis and prognosis of disease and in the everyday practice of medicine."

The book comprises 10 chapters, bibliography and index, and is illustrated. The first chapters consider "The Study of Human Heredity" and "Medico-legal Applications" for which the author is especially prepared by his books, "Principles of Heredity" and "Blood Grouping in Clinical and Legal Medicine." The remaining chapters deal each with inheritance of defects found in a particular group of organs, with susceptibilities and with cancer. At the outset difficulties in the study of human genetics due to small size of families, great length of the generation and varied types of genic behavior and genic expression are referred to; and certain misconceptions regarding geneticists and genetics are listed, such as that geneticists believe that all characters are rigidly determined by heredity, that a character conditioned by heredity can not be altered by environment, that the discovery of a genetical factor for a condition renders further research in that condition futile, that if a causative agent for a disease is discovered heredity factors are excluded, that absence of knowledge of action of the hereditary factor makes "heredity" meaningless. "These are all false."

The body of the text gives examples of what is definitely known about the heredity of certain traits, and here it becomes clear that less is known about certain groups of traits than about others. Thus the genetic basis of abnormalities of the skin, eyes, skeleton and muscles have been satisfactorily worked out in a large number of cases. And this is partly because they are readily observable and diagnosable, so that the family history of the abnormality is fairly complete. On the other hand, the inheritance of mental disorders and diseases of the blood is less fully known.

The book helps open a new era in the study of human genetics by popularizing the recognition of the varied types of heredity transmission—dominant, recessive and blending—as well as the varied relations and behavior of genes, such as autosomal, sex-linked, sex-influenced, lethal, epistatic and combined genes, as seen in multiple allels and multiple factors. "No longer does the familiar 3:1 ratio cover the major portion of the field of heredity." The difficulty of classifying any particular heredity as dominant or recessive is increased by the fact of degrees of dominance. Thus there are degrees of *penetrance* of the dominant gene such that the proportion of affected individuals in a fraternity or generation may depart from expectation. The author recognizes that the differentiation between a dominant gene with low penetrance and a recessive gene is not easy and requires large and unbiased samples and special analytic treatment of them. Again there may be degrees of *expressivity* or degrees of development of the dominant trait even when only a single gene is involved. For example, hemolytic icterus (blood-destroying jaundice) may show symptoms ranging from jaundice and chronic anemia to newly regenerated red blood cells and somewhat enlarged spleen. Again, Von Recklinghausen's disease or neurofibromatosis has a variable expressivity, appearing as cafe-au-lait spots, subcutaneous tumors and plexiform neuroma. This variation in expressivity may be due to environment (*e.g.,* vitamins); but probably constitutional factors play a part perhaps by the varying of the activity of hormones.

Despite all difficulties attempts must be made, and are being made, to work out linkage groups in man's 24 chromosomes. Apart from sex-linked groups little progress has been made. The greatest advance has been secured in the field of "incomplete sex-linkage." To this and results obtained by the new technique Snyder devotes the last and most timely chapter, which constitutes the clearest and fullest statement extant of progress in this field.

While the book is, in general, beyond criticism two points occur to the reviewer as not sufficiently emphasized. One point is that modern pathology seems to be far from appreciating the fact that its categories of disease and defect are shown by genetical studies to be far from unitary. Conditions that are considered under the same name have diverse constitutional organic bases. For example, retinitis pigmentosa and microphthalmus are recessive in some families, dominant in others and sex-linked in still others. Myopia may have either recessive or dominant basis. Of can-

cers some are stated to depend on dominant, others on recessive factors, and others are affected by multiple or modifying factors.

Finally a point which is not wholly overlooked in this book is, however, insufficiently stressed. It is that those traits that have a known chemical basis have the clearest cut genetics. One of the best illustrations of this conclusion is the blood groups with their agglutinogens and agglutinins. Others are found in the group of the feeble-minded—some types of which are associated with phenylpyruvic acid excretions (recessive trait), some with thyroid deficiency, like cretinism and others with storage of phosphatides like amaurotic family idiocy (a recessive). There is quite an array of inherited errors of metabolism which Garrod emphasized over 30 years ago. Again there is the dopa reaction upon which pigmentation of skin, hair and retina depend. If two or more pairs of genes are actively accelerating melanin formation in the skin the full Negro pigmentation is produced.

The relation between the somatic expression of a trait and its chemical basis may be remote. Thus hardness of hearing seems to depend on a defect in calcium metabolism such as causes abnormal bone formation at the oval window of the inner ear and simultaneously in other parts of the temporal bone. In this latter case there is reason for concluding that the result depends on a dominant factor in an autosome which modifies the reaction of the mesenchyme and a sex-linked gene which perhaps affects calcium metabolism. Indeed it seems probable that in time chemical errors in the body may throw light upon the chemical processes of development.

The fact that so many mutations have a known chemical basis and that development is, indeed, a biochemical process raises the question whether all mutations have not and lead us to seek the chemical basis of any defect. As the chemical bases of mutations are discovered the mutations may well be classified as a chemical basis rather than a morphological. Thus defects in pigmentation might well be grouped together instead of being distributed like albinism under "the eye" and skin color under "the skin." However, we are at present far from knowing these biochemical bases, with minor exceptions, and so for the present the morphological classification employed in part by the author is excusable.

CHAS. B. DAVENPORT

REPORTS

ANNUAL REVIEW OF ACTIVITIES AT FIELD MUSEUM FOR 1941

EXPANSION and improvement of exhibits continued during 1941, as for some years past, to be the major activity of Field Museum of Natural History. Two entirely new halls, one in the department of zoology and one jointly installed by the departments of anthropology and geology, were opened, and many additions were made to the exhibits in other halls throughout all departments.

The year was noteworthy also for an attendance in excess of 1,350,000 visitors; for the continuation of collecting and research by expeditions dispatched to various fields in North, Central and South America, and for the publication on a large scale of the results of these expeditions and other scientific research activities conducted by the staff of the museum.

One of the new exhibition halls is the large new Hall of Fishes, containing elaborate undersea habitat groups, and an extensive series illustrating relationships of the different species. The groups include underwater scenes of the Bahama Islands, the Texas Coast and the shores of Maine. The hall was prepared under the supervision of Alfred C. Weed, curator of fishes; the hundreds of reproductions of fishes were predominantly the work of Staff Taxidermist Leon L. Pray, although other taxidermists and artists also contributed.

The second new hall was H. N. Higinbotham Hall of Gems and Jewels, in which the museum's comprehensive collection of precious stones was reinstalled in a manner that brings out their full beauty of color, luster and brilliance as never before. The most modern museum techniques and equipment were employed, including new types of exhibition cases and improved fluorescent lighting methods.

A unique exhibit was installed in the Hall of Egyptian Archaeology through the courtesy of the General Electric X-Ray Corporation of Chicago, which contributed the x-ray and mechanical equipment. In this exhibit a mummy in its wrappings is shown alternately with the revelation of its skeleton on a fluoroscopic screen. Among many other additions and improvements to the exhibits are included a habitat group showing the inter-tidal algal vegetation of the rocky north Atlantic shore.

Further investigations were made of the prehistoric Mogollon Indian culture in New Mexico by the Field Museum Archeological Expedition to the Southwest. Dr. Paul S. Martin, chief curator of anthropology and leader of the expedition, with associated archeologists, and a "labor force" of twelve for the actual digging, excavated the ruins of an ancient village which had been occupied sometime between 1,200 and 2,400 years ago.

Notable additions to the museum's zoological col-