tant thing is not so much the total acreage as the fact that they are scattered over a wide region suitable for rubber cultivation; and that as such, they provide practical demonstrations and establish the base for the future growth of the rubber industry. It seems to this correspondent that further efforts should be made by the United States Government to encourage and greatly expand this program of growing rubber on small farms, not only because of the strategic importance of having ample supplies of natural rubber close at hand, but primarily because it provides an inexpensive manner of efficiently developing one of the unused resources of the countries of the Caribbean.

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SCIENTIFIC BOOKS

INDIVIDUALITY

The Biological Basis of Individuality. By LEO LOEB. 714 pages. Springfield (Illinois) and Baltimore: C. C Thomas. Price $10.50:

THIS is a great and memorable work. The book is a unified presentation of a lifetime of research on certain of the central problems of biology, of an investigation held to with rare tenacity, breadth of view and unity of purpose for nearly fifty years. The beginning was a paper published in 1897 on the transplantation of skin. That paper and its successors opened wide vistas, so that since that date the author, with many different collaborators at different periods, has published more than a hundred papers in technical journals, all touching this field. Now all results are brought together, in this volume, in relation with those of other workers in this field, and in their bearing on general concepts and problems; so that a unified encyclopedic treatise results. The author is conservative and eminently "sound" in his generalizations and conclusions; yet many of them are almost or quite "sensational" in their interest. The book has been under revision in the author's hands for fifteen years. It was first written in 1930 and has been revised or rewritten repeatedly since that time.

When tissues of an individual body are removed and regrafted to the same individual ("autotransplantation") there is little or no reaction against the transplanted tissue. But if the graft is from another individual, closely related ("syngenesiotransplantation") or of the same species but not closely related ("homoiotransplantation") or is from another species ("heterotransplantation"), there is a decided reaction of the host against the graft. This is shown mainly by the gathering of lymphocytes and their further activity, and by growth of connective tissue and blood vessels into the graft. The special character of this reaction and its intensity varies with the relationship of the graft and host individuals, the reaction being slight if the relationship is close, greater as the relationship is more distant. Thence emerges the central concept of the work, the "individuality differential" or in more general terms the "organismal differential." The difference between graft and host—their individuality differential—is obviously dependent on the different genes which they possess; it is greater as the number of differing genes is greater. Investigations in genetics have been largely devoted to the effects of genes taken separately. In the individuality differential Loeb finds a single unified effect of a large number of genes acting together. The character of the individuality differential is affected—so the evidence indicates—by many genes; perhaps by all those present in the individual. Thus two individuals differing in any number of genes show individual differentials of a corresponding degree of difference.

The individuality differential is "common to all the various tissues and organs of an individual," though its manifestation may differ in intensity in different tissues. Similarly, there are also characteristics that are common to all members of a species, genus, order or class; "these may be called species—genus—order—class differentials," all being in their totality designated as "organismal differentials." Such group differentials present a means of determining or judging the relative degree of relationship of organisms. Seemingly of a different character are "organ and tissue differentials," distinguishing different parts of the same individual. All these categories are justified and elucidated by extensive illustrative experimental results described in the body of the book.

In a twenty-three-page introduction is presented a valuable systematic outline or summary of the concepts and conclusions to which the work leads, together with a generalized account of the experimentation on which they are based. A first chapter of nine pages deals more technically with the aims and methods of the investigations: how the reactions of host and graft are manifested, methods most useful in the analysis of the organismal differentials; what experimental animals are most satisfactory, and methods of evaluating the different reaction grades. Later chapters are devoted to detailed description and discussion of experiments and results which justify the concepts and conclusions reached.

The author is led to deal extensively with reactions that are induced by the impact of parts of one in-

dividual on another, yet differ from those in which the individual differentials play the chief role. He has chapters or sections on serological reactions, on immunity reactions, on blood groups, on cancer, on fertilization, on hormones, on hybridization and on other topics. Most or all of these receive illumination from experimental results presented, or from comparisons. The work thus becomes a veritable encyclopedia of the main factors and processes in development.

The book furnishes material that will be of interest to geneticists as well as to students of ontogenetic and phylogenetic development; in particular to special students of immunity, of inbreeding, of regeneration, of ageing, of cancer, of animal toxins, of tissue culture, of blood groups, of adaptations, of the relationships of groups of organisms to other groups.

The last part, on "Psychical-social Individuality," presents in three chapters the general and philosophical views of the author on what the significance of it all is for the world of man. Chapter headings are "The Physiological Basis of the Psychical-social Individuality"; "Individuality and the World," and "The Evolution of Individuality." There is an extensive bibliography and a good index.

H. S. JENNINGS

REPORTS

WAR RESEARCH AT MELLON INSTITUTE, 1944–5

THE investigational personnel, experience and facilities of Mellon Institute have been utilized fully in wartime essential research programs during its fiscal year ended February 28, 1945, as brought out in the thirty-second annual report of the director, E. R. Weidlein. Some of the vital projects and accomplishments in the pure research department and on industrial fellowships of the institute will be referred to in this summary, which supplements previous wartime records.[1] All the activities of the organization are non-profit.

RESEARCH IN PURE CHEMISTRY

The work of the institute's department of research in pure chemistry has been largely devoted to chemotherapeutic studies, with particular emphasis on the synthesis of new drugs of possible antimalarial activity, for professional, military and public benefit.

Synthesis of New Antimalarial Drugs. The novel hydroxyethylating agents developed for use with apocupreine have been applied to a variety of new compounds, some of which are possibly useful as therapeutic agents. Substituted lepidyl-pyridinium and quinolinium bromides and lepidyl mercaptans have been made for testing as antimalarials. Basically substituted diphenyl ethanolamines and substituted mandelic thioamides have also been prepared as antimalarials.

Of the two synthetic antimalarials that have achieved clinical usage, namely, quinacrine and pamaquine, the latter is representative of the most active chemotherapeutic agents so far discovered for the treatment of malaria. But the adoption of pamaquine to any extent in actual medical practice is precluded, since last year the U. S. Army advised against its routine use because the margin of safety between therapeutic and toxic doses is too small. This experience has led to the departmental search for modified compounds which will retain high antimalarial activity but will be much less toxic to the host. The possibility of obtaining a much less toxic drug of this type is an additional attraction in that pamaquine has been found to have true prophylactic action at the toxic-dose level.

This research on the detoxification of pamaquine has been patterned after the work previously done in this department in detoxifying the antipneumococcic agent "Optochin," work which resulted in the discovery of hydroxyethylapocupreine. A comprehensive plan has in fact been undertaken to synthesize and study hydroxyethyl analogs of the pamaquine series. Several compounds in this class have been made and one substance has considerable promise.

Sulfur derivatives of quinoline, including some thioethers, have been prepared. The selection of the compounds investigated was influenced by the possibility that, where toxicity is low, certain representative derivatives might advantageously be submitted for testing in relation to other fields of tropical medicine. Certain substituted 2-styrylquinolinium quaternary salts are known to have pronounced chemotherapeutic properties, but the corresponding bases have not been studied. Consequently ten new bases of this type have been synthesized.

Four new 4-(*p*-dialkylaminostyryl)-quinolines have been prepared. As it has been the experience here that the introduction of a hydroxyethyl group into the molecule greatly diminishes toxicity, 6-hydroxyethoxylepidine has been synthesized and some of its derivatives are being prepared. The corresponding 6-hydroxy derivatives have also been made. Likewise in progress is a study of the preparation of various lepidyl and quinaldyl carbinols and their derivatives in order to learn the effect of a carbinol bridge in compounds of this type. A somewhat similar carbinol

[1] SCIENCE, 97: 445–7; 99: 389–91, 409–11.