best to control or eradicate louse breeding under war conditions. Nor has there been found any highly effective or reliable method of immunization against typhus. Moreover, no specific treatment for the disease, once it is contracted, has thus far been discovered.

The chief reason that so little progress has been made in the study of this malady is the lack of an experimental animal which would equal man in its susceptibility to typhus, and in which the disease could be reproduced as it occurs in human beings. Until such an animal is found, progress in the study of typhus is bound to be slow. In the past the standard animal employed for this purpose has been the guinea pig, but in comparison with man the susceptibility of the guinea pig to typhus is slight. The infection in this animal is usually characterized by a short transitory period of fever followed by recovery. There has been a tendency to believe that the various preventive measures effective in the comparatively refractory guinea pig are equally effective in the highly susceptible human being. The hazards of such reasoning were recently demonstrated when vaccines which fully protected guinea pigs failed to afford similar protection to laboratory workers exposed to infection due to accident. Two doctors on the staff of the Rockefeller Foundation contracted typhus this last year, although they had been vaccinated with the latest and supposedly the most effective type of vaccine.

The International Health Division of the Rockefeller Foundation began laboratory research in typhus in January, 1941, and soon afterward a field worker was sent to Spain to study on the ground the epidemic active in that country. Some progress was made during the year in finding a better tool for typhus research in the form of a more susceptible animal. This proved to be the Eastern cotton rat, previously used in the United States in the investigation of infantile paralysis. These rats are highly susceptible to European typhus, but only when very young. During the period when they are expected to develop immunity as a result of vaccination, they also acquire a certain degree of natural resistance by simply growing up. On the other hand, they have proved extremely valuable in facilitating comparison of different vaccines as well as in the study of chemotherapy in typhus.

Although the cotton rat is greatly superior to the guinea pig for typhus studies, the search for a still better experimental animal is being continued. Ever since 1938 field workers of the Foundation's International Health Division have been collecting and testing wild animals for their susceptibility to virus diseases, particularly in the jungles of Brazil and Colombia, on the island of Jamaica and in Africa. The previous discovery of the value of the ferret in influenza and the hedgehog in yellow fever suggested that other animals might be discovered if a systematic search were made. It is to be hoped that some animal more susceptible than the cotton rat will soon be found so that advance in knowledge of typhus can be hastened.

INFLUENZA

A year ago in this Review a report was made of the development of a vaccine for influenza A and of the field studies then in progress, both in this country and in England, to determine its efficacy. These studies indicated that while the vaccine effected about a 50 per cent. reduction in the incidence of influenza A, it would have to be greatly improved in quality before it could really control the disease.

During 1941 the research was energetically pushed in relation not only to influenza A but to influenza B; and the laboratories of the Foundation were successful in developing a new technique for measuring antibodies in the blood before and after vaccination. Aided by this technique, eleven different types of vaccines have been prepared and tested in human volunteers in groups varying in size from 150 to 200 persons. Generally speaking, the number of antibodies in the blood of persons vaccinated with some of these types was about the same as that which would follow an actual attack of influenza.

On the basis of these results it was decided to make a field trial of one of the most promising vaccines containing both influenza A and B viruses. Groups of 1,000 persons have therefore been vaccinated in Oklahoma, Georgia, Virginia, Ohio and New York. All vaccinations have been done in large institutions where a similar number of persons living under identical conditions have been left unvaccinated, to serve as controls. At the moment no influenza has been reported anywhere in the United States. If this should be an "off year" for influenza, there may not be an opportunity this winter to test the efficacy of the new type of vaccine.

SCIENTIFIC BOOKS

THE LAPLACE TRANSFORM

The Laplace Transform. By DAVID VERNON WIDDER. x + 406 pp. Princeton: Princeton University Press. 1941. $6.00.

THE Laplace transform has been extensively investigated by two classes of people—mathematicians and applied mathematicians. The latter have been chiefly interested in the formal properties of the

Laplace transform, which make it useful for obtaining solutions of physical problems; the former have been interested in embedding the formal properties in a mathematically satisfying logical structure. This book was written by a mathematician for other mathematicians, and contains no applications outside pure mathematics. However, it could serve as a useful source in which applied mathematicians might look for the properties which they need to use. The first chapter, which is the most convenient account of Stieltjes integrals yet to have appeared in a book, is also recommended to applied mathematicians. Stieltjes integrals, with their ability to handle both discrete and continuous cases at once, seem admirably suited for use in applied mathematics; however, up to the present time few applied mathematicians seem to have been aware of the potentialities of Stieltjes integrals. In this book the author uses Stieltjes integrals systematically, and is thus able to discuss both classical Laplace transforms and Dirichlet series as cases of the same general theory.

The book contains proofs of nearly all the auxiliary material which the author has used, and interesting applications of some of it to topics other than those strictly within the subject. Thus the theory of moment problems, introduced partly because a moment sequence is a discrete analogue of a Laplace transform and partly because some of the results are needed elsewhere in the book, is applied in a discussion of Hausdorff summability. Wiener's general Tauberian theorem (with Pitt's elegant proof) is applied not only to Tauberian theorems for Laplace transforms, but also to the prime number theorem (of which two proofs are given).

Other topics covered include regions of convergence of Laplace transforms; inversion formulas (both those involving contour integrals and those involving derivatives); necessary and sufficient conditions for the representation of functions as Laplace transforms; the iterated Laplace transform (or Stieltjes transform); absolutely and completely monotonic functions (no discussion of this last topic has previously been available in book form).

An experienced analyst will find in this book a large amount of useful material conveniently arranged and concisely expounded; a specialist will observe new theorems and new proofs of old theorems; a beginner will find important classical methods as well as problems at the frontiers of current research. The book contains ample refutation of the opinion, so frequently expressed nowadays, that "classical" analysis is a field in which interesting results are no longer to be expected.

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MEDICAL PSYCHOLOGY

A History of Medical Psychology. By GREGORY ZILBOORG, M.D., in collaboration with GEORGE W. HENRY, M.D. 606 pp. New York: W. W. Norton and Company, Inc. 1941. $5.00.

THOSE students who have felt the need of a historical orientation in the subject of mental disorders are now presented with the first comprehensive history of medical psychology in any language. Valuable material of this character exists in brief articles distributed through the medical and philosophical literature of the ages, in Jelliffe's translation of Friedreich's writings, in Kannabich's history of psychiatry in Russian (1928), in the contributions of Calmeil, Lelut, Trélat and of the two Semelaignes, and in the essays of D. Tuke and T. Kirchhoff, but heretofore there has been no perspective offered in a systematized way.

Here one finds a description and an evaluation of the evolution of the concepts of mental suffering, of emotional illnesses and of personality disorders, along with the story of the whole development of culture and the struggle against mental illness.

To the primitive man, mental deviations were mysterious. They are still far from being well understood, and streaks of demonology are found at present in the midst of our modern culture and in the offshoots of our contemporary thinking. The section "Primitive and Oriental Medical Psychologies" contains the statement that mental disorder "whether viewed with the clouded vision of a very primitive man, through the mystic eyes of Mosaic law, or through the pantheistic glasses of the Hindu, remained a mystery, reprehensible or admirable, which did not belong to medicine."

It is pointed out that the first serious attempt to place mental disease on a scientific foundation was made by the Greeks, and in the section on the Greeks and the Romans the activities of Hippocrates, Plato, Aristotle, Cicero, Celsus and Aretaeus are emphasized. Galen, who added so much to the general medical knowledge of the times, is characterized as having "contributed nothing new either to the therapy or to the clinical description of mental diseases." Then came the "Great Decline," a period toward the end of the twelfth century when medical psychology as such became attenuated as a healing art and was gradually isolated from scientific consideration, almost to the point of extinction.

The sections entitled "The Restless Surrender to Demonology" and "The Blows of the Witches' Hammers" are among the most informative, constituting fascinating accounts of the current ideas and prac-