affirmative answer constitutes a strong argument for the view that the tuberculosis of adults is exogenous.

The study thus throws new light on two of the most debated problems in the whole field of tuberculosis investigation, *viz.*, the cause of the Negro's high mortality and the relative importance of endogenous and exogenous infection in adults. The close relation between intensity of exposure and frequency of onset of tuberculosis emphasized the rôle of environment as the chief factor responsible for the Negro's excessive rate. The prompt rise in incidence following exposure in adult years furnishes an almost incontrovertible argument for exogenous rather than endogenous infection as the basis for the bulk of the tuberculosis of adult life in the population studied.

The reader is left with certain questions still in mind on the character of Negro tuberculosis. The excessive number of bacilli in the sputum, the unusual intensity of the tuberculin reaction as compared with that observed in white patients and the high proportion of lesions of the "childhood type" in Negroes of adult years in a population almost universally infected by the age of ten years, can hardly be explained on the basis of environment alone. In the present series of papers the authors have not attempted an explanation of these phenomena. The record in the respects indicated is limited to the objective presentation of facts.

The papers will be of lasting value for the science of epidemiology. In addition they indicate a practical basis of operation in programs of tuberculosis control in Negroes. The statistical methods employed and the family graphs presented make perfectly clear the gravity of exposure and the results likely to follow under a given set of circumstances. The book should be studied by every public health officer dealing with the problem of Negro tuberculosis.

ESMOND R. LONG

HENRY PHIPPS INSTITUTE,
PHILADELPHIA

ELECTRICAL ENGINEERING

Principles of Electrical Engineering. By WILLIAM H. TIMBIE, professor of electrical engineering and industrial practice, Massachusetts Institute of Technology, and VANNEVAR BUSH, president of the Carnegie Institution of Washington. Third edition. 540 pages, 388 figures. New York. John Wiley and Sons, Inc. 1940. (There is a supplementary paper-bound booklet containing the answers to the 649 problems which are distributed throughout the textbook.)

THIS book describes clearly and simply the fundamental experimental and theoretical bases of electrical engineering. Following an elementary qualitative discussion of the Rutherford-Bohr-Summerfeld theory of atoms: the principles of direct-current circuits, the magnetic circuit, induced electromotive forces, forces on conductors, electric fields, electronics, conduction in solids and liquids, and electrodynamics are discussed briefly with particular emphasis upon their implications in electrical engineering. The authors presume that students who use their book will have studied courses in elementary algebra, trigonometry and differential and integral calculus, and a general introductory course in physics. Although the material of the text is necessarily developed from mathematical physics, the emphasis is everywhere, and particularly in the problems, upon those aspects of mathematical physics that are relevant to electrical engineering.

The authors have chosen their material and the methods of presenting it with the guiding criterion that the book shall be practically useful from the student's point of view. Thus the mathematical derivations are detailed but simple; the qualifications and limitations of the elementary theories are briefly stated and the student is referred to other books for a detailed account of them. The book is therefore comprehensive without being complicated. The authors have included references to the original classic works of such men as Ampere, Faraday and Maxwell.

The Theorem of Superposition, Thevinin's Theorem and equivalent circuits are introduced in an elementary manner in the chapter (IV) on "The Simplification of Electric Networks." The extension of these ideas to alternating-current networks is not discussed, nor is there any discussion of the conventional tricks, such as the use of complex numbers, for solving steady-state alternating-current problems.

In the chapters on electric and magnetic fields the authors have not used vector notation. In many cases it would appear that the introduction of elementary vector concepts with their symbols would have made these discussions more simple and more clear.

The perspicacity of the authors of this excellent text-book is epitomized by two sentences which they wrote nearly twenty years ago in the preface to the first edition—"The subjects of thermionic emission, conduction through gases, electrolytic conduction, and certain high-frequency phenomena have been included. A knowledge of these matters is becoming more and more essential to the electrical engineer in any field." The progressive attitude symbolized by these statements has guided the authors in their preparation of this, the completely revised third edition of "Principles of Electrical Engineering."

S. REID WARREN, JR.

MOORE SCHOOL OF
ELECTRICAL ENGINEERING,
UNIVERSITY OF PENNSYLVANIA