cuits, as well as integrating circuits and pulse amplifiers. Frequent references are made to the literature, and the final contribution is a generous bibliography on counter construction and practice.

The clarity and inclusiveness of all these discussions will be welcomed by the large body of scientific and technical workers who constantly or even occasionally employ this increasingly valuable tool.

GLADYS A. ANSLOW

Department of Physics, Smith College

The effect of smallpox on the destiny of the Amerindian. **E. Wagner Stearn and Allen E. Stearn. Boston, Mass.: Bruce Humphries, 1945. Pp. 153. $2.50.**

Introduced to the New World shortly after Columbus' discovery, smallpox decimated the native population for four centuries, constituting one of the most important factors in the displacement of the American Indian by the Whites. It has been estimated that between the years 1500 and 1850 at least 3,000,000 Indians died from smallpox in the West Indies and in Central and South America. The authors of the present volume give an account of its ravages north of Mexico, where the disease claimed approximately an additional 500,000 lives of an aboriginal population of 1,150,000. The role disease plays in the history of populations cannot be overemphasized and constitutes an approach that has not received the attention it merits. The effect of smallpox was devastating on the American Indian not only in the often complete extermination of whole villages and tribes but also in the spreading of terror, the breaking of morale, and the disintegration of native cultures.

In a well-documented account the spread of smallpox is traced from tribe to tribe. It is shown that epidemics appeared in cycles and that the death rate varied, depending on the virulence of the virus, the type of smallpox, and how much care the sick received. Recurrence of high death rates depends on the growing up of nonimmune populations. With the exception of a statement in which the American Indians are referred to as a "highly susceptible, non-immune race" (p. 8), the authors make it clear throughout the book that, strictly speaking, there is no such thing as "racial immunity." Early attempts to prevent infection were generally unavailing and in many instances met with strong resistance. Control came about gradually at first (1721) through variolation, after 1797 through vaccination, until in 1905 smallpox ceased to be a menace to the Indian.

Necessary corrections are few and of only a minor nature. The population figures for the American Indian are based on the estimates of Mooney, which are the most reliable in existence. A revision of these figures is available only for California.

The authors are to be commended on having made a valuable contribution both to the history of medicine and to anthropological demography in this well-documented and readable reference work.

GEORG K. NEUMANN

Indiana University

Theory and practice of filtration. **George D. Dickey and Charles L. Bryden. New York: Reinhold, 1946. Pp. v + 346. (Illustrated.) $6.00.**

In this new book the co-authors of the older volume, *A textbook of filtration*, have greatly expanded the scope of the work with the introduction of much new subject matter. A brief history of filtration is followed by a comprehensive discussion of the objectives, the media, the apparatus and machinery, and many of the applications of filtration as a unit operation. In its description of filters and filter presses of all kinds and the mechanics of their operation the book is undoubtedly all that could be desired, except perhaps that, in spite of a prefatory promise, operating data on which to base plant equipment design are somewhat meager.

It is rather in the matter of filtration theory that the work falls short of meeting the implications of its title. The mathematics of the subject, such as it is, is touched lightly indeed, and the chemistry and physics of colloidal suspensions are ignored. Surely the plant engineer bedeviled with the problem of filtering a gelatinous slime would find little in this volume to comfort his misery. By the same token a history of filtration should at least mention the blood, sweat, and tears shed in developing the art of activated sludge filtration in Milwaukee in the early 1920's.

Lest the reviewer's stand be misconstrued, it should be said that filtration practice ranges on the one hand from the dewatering of granular suspensions that present no difficulty to the pretreatment and dehydration of complex slimes on the other; only the science of colloids can give much help to the solution of problems in this latter and more important phase of the subject. If the reviewer were allowed to compromise on a title such as *The practice of filtration*, he would in all sincerity call this a fine book.

H. L. OLIN

Department of Chemical Engineering
State University of Iowa

Human embryology. **Bradley M. Patten. Philadelphia-Toronto: Blakiston, 1946. Pp. xv + 776. (Illustrated.) $7.00.**

Teachers of embryology in medical schools will welcome this volume on the development of the human embryo as an addition to the literature of this special field. The emphasis on the incompleteness of our knowledge, which necessitates a changing viewpoint as more information is acquired, holds before the student the too easily forgotten idea that science cannot be learned "once for all time."

The excellent illustrations of progressive stages of histogenesis in different organs help to bridge the gap between the thin line of cells representing the organ in the embryo and the adult tissues as studied in histology. The inclusion of some gross dissections of the adult body is an excellent idea, since the steps taken by the fetus in development are better understood when the goal to be attained is clearly defined. The three stages in the descent of the testis and the schematic

diagram of the inner ear are cases in point. The liberal use of color in the illustrations is of great value in complicated diagrams. A more satisfactory result would have been achieved, however, if certain of the diagrams had been enlarged to cover two pages instead of one. A table giving a bird's-eye view of the stage reached by the various systems at different fetal lengths and fertilization ages would have been of value for students trying to place the approximate age of any given embryo. It is gratifying to see included a table of mean weights of organs corresponding to different fetal weights. An additional feature of great value here would have been the range of these weights, the standard deviations, or both. It is to be hoped that these will be included in the next edition.

This is a book dealing with the human embryo, and the comparative details of cleavage, germ layer, and membrane formation in lower forms have been omitted with resultant clarification of presentation. The student must study the young embryo as a unit rather than as a series of body systems; hence, the chapter which takes the reader through the early phases of development in all the systems is an excellent one. The general topics of gametogenesis, changes in the maternal organs in preparation for fertilization and implantation, membrane formation, early development of the embryo, age and growth changes in external appearance, twins and teratology are all discussed before the "system by system" description is dealt with. Then follows an account of development in the integumentary, connective tissue and skeletal, muscular, and nervous systems, sense organs, face and teeth, digestive and respiratory systems, coelom and mesenteries, ductless glands, pharyngeal derivatives, urogenital and circulatory systems.

An excellent bibliography of 42 pages, arranged according to chapters, and an index in which pages with illustrations are set in boldface type complete a highly satisfactory text on human development which should stimulate makers of medical curricula to recognize this as a science in its own right, not as a mere adjunct of gross anatomy.

MADGE THURLOW MACKLIN
Department of Zoology, The Ohio State University

Diseases of the retina. Herman Elwyn. Philadelphia-Toronto: Blakiston, 1946. Pp. xi + 587. (Illustrated.) $10.00.

The comprehensive exposition of retinopathy as primary eye disease and as secondary eye changes developed in the course of chronic systemic disease is presented for the use of physicians in this most recent book by Elwyn. When one considers the importance of vascular changes in the body during growth, development, anatomical disorders, and disease—changes that for the most part must be inferred by indirect means—the value of ophthalmoscopy is incalculable. Only in the fundus of the eye can the blood vessels be clearly seen, greatly magnified, in their natural state. The vascular networks of the retina and choroid constitute the most important feature of the fundus picture, since they not only undergo changes due to aging and diseases of the vascular system but are subject to wear and tear of circulatory effects of general systemic and local diseases such as arteriosclerosis, hypertension, and many of the blood dyscrasias.

In 1871 Clifford Albutt published a book on the opthalmoscope, much of which was devoted to vascular changes and their sequelae in the fundus. The ophthalmoscopic picture of Bright's disease and other disorders of the kidneys, of diabetes, of uremia, and of many conditions which effect the general circulatory mechanism, was meticulously described and commented on by a general practitioner rather than an ophthalmologist.

Since that time many volumes have appeared on cardiovascular-renal disease. The nature of the changes in the blood vessels themselves and the resultant changes in organs with various types of blood supply, particularly the kidney, have been studied, and of the results of these studies new explanations have frequently been offered. It is hardly conceivable that a book on disease of the retina could be published that would give in detail the various conceptions of retinal manifestations of vascular disease. Ophthalmologic studies have contributed a great deal to the fund of knowledge that has been built up about vascular and related diseases. The cooperation that has existed between ophthalmologists and internists has made possible a good understanding of certain eye diseases that would otherwise have been hazy in the minds of most of us.

It is no accident that the author opens his book with an account of retinopathy resulting from disturbances in circulation and from vascular malformations. Together they constitute the largest of the sections. In 170 pages he describes the pathological changes as well as the clinical appearance and adds, where possible, an explanation of physiological processes. The current conceptions of the significance of ophthalmoscopically visible retinal changes are stated clearly and understandingly. They may not always be the explanations most acceptable to the reader, but they are historically correct, reasonable, and only slightly controversial, as he has wisely omitted arguments to sustain his theme. The most difficult of all ophthalmological subjects to write upon at the present time has been presented in a most useful manner for the understanding and use of all persons interested in ophthalmology and in the retinal changes in circulatory disease.

In seven chapters, or parts, the diseases of the retina on a hereditary basis, inflammatory diseases of the retina, tumors of the retina, diseases of the retina leading to retinal detachment, developmental anomalies of the retina, and radiation injuries of the retina are described briefly, with comment on the systemic relationship, pathology, and treatment. These have to do mostly with conditions that concern the ophthalmologist. The classification of ocular diseases is based on physical and pathological findings adequate for the needs of clinicians. The work is comprehensive enough to be a valuable handbook on diagnosis.

W. L. BENEDICT
Mayo Clinic, Rochester, Minnesota