Aiyengar's fossil collecting in the Salt Range, in Jammu and in the Simla Hill states resulted in a good representative collection of Siwalik fossils. Amongst these a substantial collection of fossil primate remains will make a welcome contribution to the present scanty knowledge of this higher anthropoid group.

Most of the fossil material was sent to the United States for investigation, while the prehistoric material, numbering some 4,000 specimens, was placed under the care of Paterson at the Archaeological Museum of Cambridge University. It is planned eventually to distribute the collections between Yale and Cambridge Universities and the Indian Museum in Calcutta.

H. DE TERRA,
Leader of the Expedition
P. TEILHARD DE CHARDIN
T. T. PATERSON

SCIENTIFIC BOOKS

SANITARY ENGINEERING

Elimination of Taste and Odor in Water. By JOHN R. BAYLIS. pp. x + 392, 85 figs. in text, 88 tables, chapter bibliographies, index; 9 by 6 inches. McGraw-Hill Book Company, Inc., New York and London. 1935. $5.00.

FOUR national engineering societies, the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers and American Institute of Electrical Engineers, have made arrangements for the production of books adjudged to possess usefulness for engineers or industry, but not likely to be published commercially because of too limited sale without special introduction. The first of these Engineering Societies Monographs is written by the physical chemist of the Division of Water Purification of the Bureau of Engineering, Department of Public Works, of the City of Chicago.

The esthetic qualities of potable waters reside not only in their color and clarity but also in their freedom from objectionable odors and tastes. These last-named qualities have various origins. Many have a natural origin, either organic or chemical, while others arise from industrial pollution which in turn may combine with, increase or decrease those occurring in nature. The author lists thirty-six adjectives descriptive of tastes and odors, twenty of which are traceable to organisms. These are mainly synthetic green algae, blue green algae, diatoms, colored flagellates and plants which may produce volatile essential oils; or more rarely molds, bacteria and occasionally microscopic animals of the plankton or larger attached animals, such as sponges and bryozoans in water mains. The death of plankton organisms occurs in distributing systems, and their decay is rapid because of the ratio of their surface to their volume. Their numbers per cubic meter in reservoirs are subject to the rhythm of seasonal and photic fluctuations and they multiply a hundred fold or more in a very short time, thus giving rise to sudden flares of quite perceptible odors and tastes, some of which are esthetically objectionable. No water supply exposed to light escapes this organic source of odors and tastes.

Chlorination of water supplies before admission to the water mains for the removal of the possibility of contamination with pathogenic bacteria often leaves a chlorinous taste in the water at the faucet. Few, if any, streams escape industrial and sewage pollutions, some of which persist for a long time with little change except by dilution.

The sanitary engineer who seeks to maintain a municipal water supply in a uniform state of minimum odor and taste may prevent some invasions by inspection for pollution, by treatments with copper sulfate or chloramine to destroy algal growths, by precipitation and filtration to remove substances and organisms from the water, but any one or even all of these treatments are inadequate to insure continuous freedom from objectionable tastes and odors. The engineer therefore is compelled to seek some easily operated system, using inexpensive materials not subject to quick exhaustion which will uniformly remove the exceedingly varied chemical substances from the water before it enters the water mains. This book explains the use of activated carbon for this protean task.

The first chapter deals with the sources of odors and tastes and the methods of their detection and quantitative measurement. The apparatus for detecting odors in cold and hot samples by seriated dilutions with standard odorless water are elaborate and ingenious. It seems probable in the light of known variations in the sensitiveness of the individual and the amplitude of individual variations among different observers that both qualitative and quantitative variations will somewhat reduce the comparative values of such tests. If applied uniformly by a single observer of proven sensitiveness to slight differences in amounts of the various substances concerned, these tests may, however, have a high practical value in regulating the processes of control by the methods described in this book.

The industrial uses of activated carbon are an indirect result of the use of irritating and lethal gases

in the world war, especially in gas masks. While chlorinous tastes may be removed by the use of ammonia, practically all other tastes and odors generally may be removed by activated carbon. It was introduced to remove odor and taste from water supplies in 1930. By the end of 1932 over 400 plants were using it, and the development of the process and of specialized equipment for its use has grown rapidly in recent years.

The greater part of the book is given to technical accounts and discussion of subjects such as charcoal and activated carbon, physical and chemical properties of activated carbon, experiments in the removal of taste and odor in the laboratory and in the operation of water plants, handling and applying powdered activated carbon and granular carbon in small and large units, dechlorination with carbon, tests and specifications for activated powdered and granular carbon and quantitative phenol determinations and their reliability for evaluating carbon.

Consideration is also given other methods of water purification than that by activated carbon, such as the ammonia-chlorine treatment for sterilization, prevention of chlorinous tastes and superchlorination followed by dechlorination for removal of tastes and odors. Aeration, ozonation, permanganate and bleaching clays are also discussed.

The book is a mine of information on principles, tests and practices in this very important and very recently developed field of sanitary engineering. Its material is well organized, the text is clearly written, the illustrations are clearly labelled and structurally differentiated and the numerous tables are carefully headed and legibly set up. Typographically and in make-up the book is a credit to the publishers. On the whole it is a fitting exemplar to initiate the Engineering Societies Monographs.

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VITAMINS

Vitamins in Theory and Practice. By LESLIE J. HARRIS. The Macmillan Company, New York, 1935.

THE standard books and reports on vitamins are already largely out of date. This in itself would make the book under review a welcome addition. When it is added, however, that besides being up-to-date, the book is delightfully written and that it is authoritative (the author is head of the Nutritional Laboratory at Cambridge), we have a most valuable addition to current vitamin literature.

If an author steers clear of the chemistry of the vitamins—and Dr. Harris barely touches the subject—it is possible to write a "popular" account of these substances without any material sacrifice to even extreme accuracy. In this respect certain aspects of nutrition stand apart from several branches of science. The book before me, an outgrowth of a series of lectures delivered at the Royal Institution, is, within its compass, sufficiently scientific to be of value to every biochemist; and so fascinatingly written that it should appeal to thousands of others.

The first part of the book deals with the history of vitamin discovery. Takaki and Eijkman and Funk and Hopkins and McCollum, among the pioneer hunters, get the credit they so richly deserve. Incidentally, Funk, "the originator of the vitamin theory" and an early worker on the chemistry of Vitamin B, is here for the first time given that commanding position in the development of the subject which rightfully belongs to him. Incidentally, also, we learn that, though Eijkman did his work on beri-beri during the years 1890–1897, it took the Stockholm committee (and the scientific world at large) some 30 years to decide that the Dutchman's contribution was worthy of a Nobel prize.

In the chapter on "How Many Vitamins Are There?" the author very conservatively (and very rightly) limits himself to 6, for the time being. With but one exception (vitamin E)[1] the chemistry of these substances has been incredibly advanced during the last five years. One vitamin (C) has even been synthesized. The structural formulas of three others (A, D, B_1) are reasonably above suspicion. The time seems not far distant when the chemist will no longer find it necessary to have a supplementary chapter on vitamins and other unidentified substances, but will include the vitamins, at least, under such headings as alcohols, sterols, pyrimidines and sugars.

Under vitamin B_1 we find, unfortunately, no mention of Clarke's and Williams's beautiful work on the chemistry of this substance. As for its function, the author stresses the fact that in its absence too much lactic acid accumulates in the body, poisoning the heart muscle and the central nervous system; which implies that vitamin B_1 may be a co-enzyme for lactic acid oxidation.

Harris quotes the U. S. Census Department to the effect that in 1930, 7,000 people died of pellagra in this country. "The explanation is economic, not scientific . . . the food is to blame." In the Southern states, the "pellagrins" (mainly Negroes) subsist largely on maize-meal (corn-meal), molasses and meat (salt pork)—the three m's; and they suffer from dermatitis, diarrhoea and dementia—the three d's.

One would anticipate from the very structure of vitamin C that it plays a rôle in the oxidation-reduction system of the body; but just how it fits into the scheme of complex systems in the body is highly

[1] In the February number of the *Journal of Biological Chemistry*, Professor Evans and his coworkers report the isolation of an alcohol from wheat germ having the properties of vitamin E.