His conclusions are as follows: 1. Leprosy has existed to a considerable extent in this country during the past twenty years; 2. The tendency is for the disease to increase, not only from immigration, but also from the occurrence of sporadic cases; 3. It is a contagious disease, and may be transmitted from parent to offspring; 4. Transmission probably takes place, in some instances at least, through inoculation; 5. Segregation has been proved to be the only sure means of freeing a country from its ravages; 6. It is the duty of the government to establish central leper-hospitals or isolated settlements for the treatment of those afflicted, and for the protection of the community at large.

BURNING GARBAGE. — Sanitarians in this country have for many years been considering the practicability of destroying the garbage of a city by fire. The city of Milwaukee has been a pioneer in the movement to demonstrate the feasibility of this method of disposal. The commissioner of health of that city, in a recent letter to the *Sanitary News*, gives some interesting facts concerning the experience of that city. "For more than five months our garbage has been consumed to a dry, inodorous ash. A test of the cost of consuming the garbage was made on Dec. 27, with the following result: the amount received and consumed was 40,215 pounds, and the fuel required was 5,000 pounds, being 4.3 cents per hundred pounds of garbage consumed, — a result highly gratifying when we consider that on that date there was a large quantity of snow and ice mixed with the garbage."

BOOK-REVIEWS.

Volcanoes and Earthquakes. By SAMUEL KNEELAND. Boston, Lothrop. 8°.

THE present volume is mostly a description of ascents of volcanoes and of remarkable eruptions which the author has witnessed, or the description of which he has taken from reliable sources. Thus the book has some value as a book of travel, or for making clear the phenomena of volcanic action to the general reader. The author has visited so many volcanic regions, — the Hawaiian Islands, Iceland, the Mediterranean Sea, Japan, and the islands of south-eastern Asia, — that he is well able to give a description of the peculiarities of the various volcanoes; and the principal value of the book lies in the vividness of the descriptions, which is due to the personal knowledge of the author of so great a part of the earth's surface. He wisely abstains from a long discussion of the theory of volcanic phenomena, as this would be out of place in a popular book like this, but merely enumerates the various theories that are now held by geologists. The latter part of the book contains descriptions of remarkable earthquakes.

Lectures on the Physiology of Plants. By JULIUS VON SACHS. Tr. by H. Marshall Ward. Oxford, Clarendon Pr. 8°. (New York, Macmillan, $8.)

VON SACHS'S text-book of botany has always been regarded as one of the best in any language, and no better proof of this can be given than the fact that four editions have been published and exhausted. Dr. Sachs was requested by the publishers of his text-book, and also by his botanical friends, to prepare a fifth edition. This he declined to do, and gives his reasons therefor in the following language: "It is an old experience, that, while one works up with pleasure a second and even third edition of a comprehensive work, frequent repetition eventually becomes inconvenient or even painful to the author. Having experienced this sufficiently with the fourth edition, I was unable to make up my mind to a fifth. Apart from other circumstances, I was driven to this, to an important extent, by the progressive development of my scientific convictions." He adds, that his mode of comprehending important questions of the physiology of plants had undergone changes in various directions, and that for several years the wish had been taking a more and more definite form, in his mind, to set forth the most important results of the physiology of plants in such a manner that not only students, but also wider circles, should be interested in them. Believing that this object could be better attained by a freer form of exposition than that of a text-book, he determined to present the subject in the form of lectures. This determination has resulted in the 'Vorlesungen über Pflanzen-physiologie, which Professor Ward has translated in a most admirable manner.

The volume consists of forty-six lectures, arranged in six parts. These latter are, 1. Organography; 2. The external conditions of vegetable life, and the properties of plants; 3. Nutrition; 4. Growth; 5. Irritability; 6. Reproduction. It is impossible to give more than this brief outline of a book which embraces so many and such varied topics as are treated in the eight hundred and two pages of text. Professor Sachs has succeeded in his undertaking, to a degree which is exceptional, to produce in this series of lectures a treatise adapted to the wants of the skilled botanist and the educated man, whose studies have been in other directions, but whose desire for a knowledge of the physiology of plants has hitherto been unsatisfied. The subject is made much more intelligible by the four hundred and fifty-five woodcuts with which the book is embellished; while the elaborate index, covering thirty-three pages, makes it exceedingly valuable for reference.

Photography applied to Surveying. By HENRY A. REED, U.S.A. New York, Wiley. 4°. $2.50.

THE author gives a concise sketch of the successful experiments made in photographic surveying, and sets forth the methods now in use. The book is principally founded on the publications of Frenchmen who have paid particular attention to developing this branch of the art of surveying. The author's discussions of the various methods are clear and concise. The principle of photographic surveying is the same as that of ordinary surveying. Stations are occupied by the photographer; and the angles, which are generally measured by the theodolite, are measured on the photographic negative. For this purpose the camera is provided with a level, and the distance between the sensitive plate and the object-glass is kept constant. The horizon is marked on the negative, and a measurement of distances serves for finding the azimuths and elevations of objects. In making the photographs, various instruments are used, — the ordinary camera, with a wide-angle objective; a camera in which a cylindrical sheet of sensitive paper takes the place of the plate, and in which the photograph is produced by turning the camera around its axis; or the photographic plane table. In the latter the photographic view is represented on a horizontal surface, the rays from the object being reflected either by a triangular glass prism or by a spherical convex reflector. The author justly claims great advantages for these methods, among which the most valuable are the cheapness of field-work, and the great amount of information contained in the photographic views. Setting aside geodetic operations, photographic surveying is undoubtedly the cheapest and best method wherever the principal object is to attain, not the greatest possible accuracy, but the fullest amount of information in the shortest possible time. Therefore the publication is very valuable and welcome, giving a concise review of the advantages and results of this method, which is still very little used in this country. We may be allowed to add a few remarks on this subject, in addition to Lieutenant Reed's full discussion. Photographic surveying cannot attain the same accuracy as ordinary surveying; but the errors are so small, that for tertiary, and even for secondary triangulation, it meets all demands. Its greatest value, however, lies in the full material it furnishes for constructing the orographic features of a country. No topographer, however experienced he may be, can draw contour lines as well from sketches and a few fixed points as he can construct them from photographic surveys. The number of elevations that may be determined by this method is practically without limit. Another important use of photographic work is the facility it affords for re-surveying tracts of land, particularly in regard to changes in culture. Deforestation, roads, the extent of agricultural land, etc., are shown on the photographs, and may readily be inserted in maps without fear of omissions. Thus it will be of the greatest utility for the questions of a census. Lieutenant Reed touches only slightly upon its use in reconnaissance work. For this purpose the cylindric arrangement gives the greatest satisfaction, principally as it dispenses with the use of bulky and heavy photographic plates, which are difficult to carry. For topographic work of this kind, the use of photography, supplemented by sketches made by the *camera lucida*, gives by far the best results. A concluding chapter of the book

deals with telescopic and balloon photography. We do not believe that the latter will be of great service to the surveyor, except in cases of war for the military engineer, and it may be useful for showing the culture of extensive tracts of land without commanding points in resurveying.

Beginner's Anatomy, Physiology, and Hygiene. By JOHN C. CUTTER. Philadelphia, Lippincott. 16°. 30 cents.

FROM the title of this book, and from the preface, we gather that it is intended for young pupils, for beginners, and we are therefore gratified to find that the writer proposes to employ such language as is simple and direct, and that technical and long words are, as far as possible, avoided. Throughout the text this rule has been fairly well adhered to, though when our eyes fell upon the frontispiece, we began to fear that the author had forgotten to carry out the plan which he had promised. This frontispiece represents the muscular system of the human body, and the scientific names of these muscles are given as they would be in the most advanced work on anatomy. Orbicularis palpebrarum, occipito-frontalis, sterno-cleido-mastoid, extensor carpi-radialis, and others too numerous to mention, stand out prominently in the illustration. This same criticism applies to other figures in the book, although perhaps to a less degree.

While it may be well to describe the effects of alcohol and tobacco in such a work as this (and of course, to meet the demand for which this and so many other books of this kind have been recently written, this must be done), we question whether it is wise to speak of the effects of chloral. The writer says of it, that, "when used for some time, it may cause heart-trouble. It lessens the heart's power. It makes its action irregular. It sometimes, in a small dose, causes death by suddenly stopping the heart's action." In another portion of the book he says that in proper doses it induces rest and sleep. This kind of talk should, in our judgment, be omitted from a book written especially for beginners. The phraseology of some parts of the book is open to unfavorable criticism. In speaking of deformities of bones of children and youth, the author says that corsets and snug-fitting shoes ought not to be worn by the young, the inference from which statement would seem to be that these articles may be worn by the adult; and yet in another place he says, "Do not wear close-fitting chest and waist garments. Corsets and tight vests compress the lower ribs. They press the digestive organs out of place. They hinder deep and proper breathing."

Another inconsistency we observe in the following statements: "Cheese is a rich and hearty food, suitable for hard workers." "A food which disagrees with a person ought to be avoided. As a rule, pastry, cheese, fresh white bread, and 'made dishes,' most often cause discomfort." Dr. Cutter is opposed to candies for children. He says that common pure candies contain not only cane-sugar, but materials which are difficult to digest. Candies "should be denied children." We think the doctor goes a little too far in thus absolutely prohibiting the use of candies. There is no doubt that they are abused, and that it would be far better not to use them at all than to continue their excessive use; but at proper times, and in proper quantities, we do not think that good candies are so pernicious as he would have us believe.

The author incorporates in his book what he calls "simple directions for the management of a few common emergent cases," which, from the references already made, we infer are intended as a guide to the young pupil, the beginner. Under the heading 'Management of a Poison Case,' he says, "If it is an irritant poison (like verdigris, corrosive sublimate, etc.), give rapidly-beaten-up eggs. If it is an opium compound, give strong coffee, and keep the patient awake. If it is a vegetable narcotic (henbane, belladonna), keep him quiet. Always summon the ablest doctor to manage the case." It would, we imagine, be a sufficiently difficult task, especially for a young pupil, to determine whether the poison taken was an irritant, an opium compound, or a vegetable narcotic; but to decide who is the 'ablest' doctor, *hic labor, hoc opus est.*

While there is much in this book to criticise, there are also many things to commend. The general arrangement is good, and the figures are fairly illustrative of the text. There is one feature which is especially noteworthy, and should be reproduced by writers of other text-books of this kind. We refer to the instructions to teachers for the demonstration to classes of the principles of physiology; as, for instance, the demonstration of the movements of the blood in a frog under the microscope, and the changes which take place in the size of the human chest during inspiration and expiration; and the impoverishment of the air during respiration. This method has been admirably worked out by Professor Martin of Johns Hopkins University, in his text-books; and we are glad to see that Dr. Cutter has embodied the same plan in his book.

Taken as a whole, 'The Beginner's Anatomy, Physiology, and Hygiene,' is neither better nor worse than many other books of the same class, scores of which have lately issued from the press in response to the demand for physiologies which should teach the effects of alcohol and narcotics.

A Treatise on Algebra. By CHARLES SMITH, M.A. New York, Macmillan. 8°. $1.90.

THIS work is the latest put forth by the English press, which is just now very prolific in algebras.

The present work is intended for students who already have some knowledge of elementary algebra. For this reason the opening chapters, while complete, are nevertheless brief.

These chapters differ but little from those of the text-books in common use. Stress is laid, however, on the idea that algebra is simply the science of numbers; and the commutative, associative, distributive, and index laws are well illustrated.

Some theorems are introduced much earlier than usual. Thus, detached co-efficients are introduced in the chapter on multiplication, and the theorems on the divisibility of rational integral expressions in the chapter on factoring. In this last chapter, also, the quadratic expression ax^2+bx+c is resolved into its linear factors; and this method of resolving into factors is adopted for the solution of all quadratic equations.

Chapter IX. treats of equations with one unknown, — simple, quadratic, binomial, and reciprocal, — and contains so much, that it is decidedly confused, and the weakest chapter of the book. Here, also, the author fails to explain the terms 'infinite' and 'infinity' in a satisfactory manner.

Chapter XII. is on symbolic algebra, and contains seventy excellent examples.

Imaginaries are treated by modern methods. In the definition of 'arithmetical progression,' the customary *lapsus calami* is made. Choice should be illustrated with more examples. Series are fully and clearly treated. The binomial theorem is proved by a modification of Euler's proof, based on the introduction of Vandermonde's theorem. Euler's own proof is also given. Logarithms are considered without any thing being said about the proof of the index law for incommensurable exponents, the almost universal omission.

The definition of 'probability' is the usual faulty one given by Todhunter and others. This chapter is not clear, and is too short.

The chapter on determinants is based on the well-known works of Muir and Dostor, and is by far the best short treatment of determinants with which we are acquainted in any language. This chapter contains all the essential parts of the subject, and we recommend it to every one who desires a brief but comprehensive knowledge of these famous expressions.

On the whole, the book much resembles that of Mr. Todhunter. In form Mr. Smith has improved on the latter's work; but in fundamental ideas, — ideas which go down to the root of mathematical reasoning, — and in definitions, Mr. Smith's work is but little, if any, superior to Mr. Todhunter's. The book is simply an excellent text-book of high grade, its most distinctive feature being the chapter on determinants.

Eighteenth Annual Report of the Massachusetts Bureau of Statistics of Labor. Boston, State. 8°.

CARROLL D. WRIGHT'S Massachusetts report for 1887 deals very exhaustively with a single subject, — the unemployed. The figures taken are those of the State census of 1885, and show a wide distribution of the unemployed as a whole, because the industries of the State were in a more or less depressed condition. The investigation comprehended "all remunerative occupations, of whatever