

curtailment of the plan, and only the more important minerals from the older rocks were completely analyzed; while for the bulk of the remainder, the properties of the more important constituents, iron, phosphorus, and sulphur, were alone determined, and the presence of titanium and manganese noted incidentally. The total number of samples investigated was 1250, 53 being completely and 1157 partially analyzed. The description of the methods of analysis adopted, and the tabulation of the results, occupy about a hundred pages, in addition to the 500 devoted to the geology and topography of the iron ore mines and their statistics.

The section devoted to coals, occupying eighty-seven pages, is mainly statistical, and has a very valuable introduction by Dr. Frederick Prime, Jun., which is perhaps the best condensed account of the nature and distribution of American coals that has yet appeared. A third section on the Cretaceous coals and lignites of the North-West is the result of an extensive exploration of the country traversed by the Northern Pacific Railway, made by the author subsequently to the completion of the census work proper, in 1882. This work, under the title of the Northern Transcontinental Survey, was suddenly stopped after about £20,000 had been expended upon it; and in order that the results might not be lost the observations have been reduced, analyses of the coals have been made, and a systematic memoir on the whole subject has been produced, which, although not exactly in the place where we should expect to find it, is too valuable an addition to American geology not to be welcomed in spite of its incongruous surroundings. The statistics of the base metals and minor minerals, occupying the remainder of the volume, are now of comparatively little interest, as these subjects have been treated from year to year in the returns published by the United States Geological Survey, and are available up to 1885. It must, however, be remembered that it is only in census years that returns from individual establishments can be obtained, and that therefore the figures for those years may be regarded as more authoritative than those of other dates. In any case, statistics five years old are tolerably ancient history.

In conclusion, we must call attention to the author's introductory paper on the geographical and geological distribution of the iron ores of the United States. This is a masterly abstract of the main subject of the book, and will be particularly useful to those who may wish to acquire some knowledge of the basis of the American iron industry without searching through the great mass of reports and surveys in which most of the detailed information is to be found. A plate of comparative sections of the strata in the principal iron-ore producing States is especially interesting as showing how the most important ore deposits are confined to the older rocks, such as the Archæan regions of New York and New Jersey, the Huronian of Michigan and Wisconsin, and the great stratified belt of hæmatite or "fossil ore" in the Clinton group of the Upper Silurian; while the most important iron-bearing strata of this country and Western Europe, the Lias and Lower Oolitic series, are entirely absent. Although the great activity of the iron trade in 1880-81 was the cause of very energetic explorations, very few discoveries were made in the older producing districts, and it became evident that to make these it was necessary

to go into new fields, and in any case the author considers that the accessible rich ores may perhaps be practically exhausted within the life of the present generation. It will then be necessary to fall back upon the leaner kinds, containing from 30 to 45 per cent. of iron, which are known to exist in vast quantities, though generally far removed from coal suited for smelting purposes.

H. B.

OUR BOOK SHELF.

Theory of Magnetic Measurements. By F. E. Nipher, Professor of Physics in Washington University. (London: Trübner and Co., 1887.)

THIS little work is intended to furnish information as to the practical details of a magnetic survey. The description of the instruments used is poor. Full details as to the necessary calculations are given. The directions for the use of the instruments involve in a few cases unnecessary precautions, while in others the method suggested appears rather rough. Thus the statement that it is advisable not to make any observations with a dip needle till ten minutes after magnetization, is not, we think, borne out by experience. On the other hand, the suggestion that the vibrations of a declination needle may be checked by the finger would be likely to mislead beginners. It would have been better to describe the method of bringing the magnet to rest by means of a small auxiliary magnet. On the whole, English students will probably find all that they want, and with more direct reference to the Kew pattern instruments, in Stewart and Gee's "Practical Physics," and are thus not likely to make much use of Mr. Nipher's work. A. W. R.

Studies in Life and Sense. By Andrew Wilson, F.R.S.E. (London: Chatto and Windus, 1887.)

PREVIOUS works of this kind by Dr. Andrew Wilson are so well known, that a very few words will suffice to introduce the present one to the notice of our readers. It consists of a re-publication of essays on biological and psychological topics, which the author has from time to time contributed to sundry magazines. Although there is little or no attempt at originality, the collection is well calculated to prove of use and interest to general readers. The style is everywhere entertaining, and the following is a list of the subjects treated:—"Human Resemblances to Lower Life," "Some Economics of Nature," "Monkeys," "Elephants," "Past and Present of the Cuttle-Fishes," "Migration of Animals," "The Problems of Distribution," "Songs without Words," "The Laws of Speech," "Body and Mind," "The Old Phrenology and the New," "The Mind's Mirror," "What Dreams are made of," "Coinages of the Brain," "The Inner Life of Plants," "An Invitation to Dinner."

Fermenti e Microbi. Saggio di Igiene Antimicrobica di Italo Giglioli. (Napoli, 1887.)

THIS book may be considered as marking a new departure in the teaching of hygiene. The enormous advances that have been made of late years in the recognition of pathogenic microbes, their life-history, and the conditions affecting them one way or another, have added a large and important chapter to the study of sanitary science. It is this particular subject in all its bearings on sanitary science which is treated in the volume by Prof. Giglioli. The study of ferments, like yeasts, forms the introduction: their life-history, physiological and chemical action, are described, and, owing to the accurate knowledge that we possess of them—thanks in a great measure to the researches of M. Pasteur—they form a fit starting-point in the study of schyzomycetes, bacteria, or microbes proper.