reader; but it serves our critic to swell the accumulation of details for his contention that our work is careless because the same fraternity is described by the use of different words in different parts of the paper.

A critic who is guilty of such extensive stupid, captious and misleading criticism can hardly expect a scientific consideration of other points he raises of a more general sort. I fear it will be futile for a biologist to attempt to show to the "applied statistician" his errors. Genuine, scientific criticism has always been useful in the advancement of science, but friends of Galton must regard it as a tragedy that the fortune of one of the largest-minded and most fertile-minded men of science should be supporting a laboratory one of whose leading members spends much time making elaborate researches into his delusions concerning the blunders of others instead of making positive discoveries in a field where so little is known and where the need of utilizable knowledge is so great.

Chas. B. Davenport
Cold Spring Harbor, N. Y.,
November 10, 1913

SCIENTIFIC BOOKS

Mineral Deposits. By Waldemar Lindgren. New York, McGraw-Hill Co. Pp. v + 883, Figs. 257. 8vo. $5.00.

In the preparation of this invaluable treatise a great boon has been conferred by Professor Lindgren upon all geologists. The work is of interest not alone to those immediately engaged in mining, but to all who are concerned with the processes of mineral solution and deposition in the earth's crust. For those who have not followed from year to year the advances of observation and interpretation, many new and striking results will appear.

The author has brought exceptional preparation and experience to the task. An old Freiberger, he was grounded by one of the best of teachers, the late Professor A. W. Stelzner, in the "*Lehre*" or "lore" of ore-deposits, and learned of the applications of geology in the steadying atmosphere of an engineering school. Beginning in 1883 on the Transcontinental Survey of the Northern Pacific railroad, Mr. Lindgren entered the U. S. Geological Survey the next year, and has thus had nearly thirty years of study in the mining districts of America. Journeys in Australia and Europe have further amplified experience, and courses of instruction given by him at Stanford University and in the Massachusetts Institute of Technology have served to systematize and formulate conclusions. To all has been added a thorough scholarship and spirit of fairness, such that the resulting work is marked by all these characteristics. It is also the ripe fruition of a little school of American observers, whose views have found special expression in the magazine *Economic Geology*.

The book is divisible into two parts. An introductory one of about one fifth the total embraces the general chemical and structural principles on which the remainder is based. The major portion is thus devoted to a review and discussion of the types of mineral deposits whose scheme of classification is at once the climax of the first part and the skeleton of the second. As the title implies, the work takes up "mineral deposits" rather than "ore deposits." The title makes logical and consistent the treatment both of the deposits with the distinctive metals and those with non-metals. It enables the author to have freer scope in that questions of profitable working are less involved. The title is a little over-inclusive for the subject-matter, because coal, our most important mineral deposit, is not mentioned, although a place for it is provided in the scheme of classification. Old associations were probably so strong with our author that coal, petroleum and natural gas faded from the field of view when actually writing.

In the introduction, water necessarily plays a very important part. Six extremely interesting chapters are devoted to it. For the greater number of mineral deposits water is quite correctly regarded as the all-important agent. Its composition, circulation, chemical reactions and amount are all reviewed. The question, may, however, be raised, whether, when the general shallow penetration of the meteoric

groundwaters into the crust of the earth is appreciated; when the great restrictions upon their actual amount which have been demonstrated in recent years are grasped in their full significance; and when the great depths to which many veins extend are kept before us; we may justifiably state, as on page 24: "However important these (*i. e.*, magmatic waters) may be in the formation of certain kinds of ore deposits, they are insignificant in quantity compared to the great circulation of atmospheric water." It sometimes seems to the reviewer that even while stating newer facts almost from force of habit we are inclined to reiterate older doctrines from beneath which the newer facts have largely removed the foundations. Had we known at the outset of the limited vertical distribution of the meteoric groundwaters and of their small amount, it is quite possible that we should have had a less firmly rooted faith in them as the *prima facie* source of deep-seated circulations, and would have given other kinds of water greater relative importance. The subject is, however, young, and a gradual modification of views may come in time as we escape the hypnotic influence of the past. Indeed, as we read Professor Lindgren's subsequent pages, and especially Chapter VI., we feel as if, when the actual phenomena were reviewed, the magmatic waters seemed of greater and greater importance. Indeed, who can affirm that the surface waters were not themselves once magmatic?

The introductory portion also contains valuable chapters on faults, folds, openings in rocks, textures of deposits and ore-shoots, on almost all of which Professor Lindgren has previously written in a most illuminating way. The classification of mineral deposits, which is to form the framework of the later pages, is introduced by a condensed review of other schemes and of agents.

The scheme of classification is the foundation of the treatise. It is fundamentally based on mechanical processes of concentration on the one side, and chemical, on the other. While these two have been emphasized in one way and another by earlier writers, no one else has so logically and completely carried out the chemical processes in determining the subgroups on the basis of temperature and pressure. The types of mineral deposits are, therefore, taken up in order, beginning with reactions at the surface at ordinary temperatures and pressures, passing to those in the rocks at greater and greater depths and terminating in the natural climax of those produced by processes of differentiation in magmas. Perhaps the question will arise in the minds of some, as to whether we are sufficiently well-informed regarding the temperatures and pressures at which minerals develop in order to make this grouping sound. The reply may be made, that the associations of minerals in the various types are in contrast; that we have learned much from their artificial production; and that the peculiar etch-figures afforded by quartz, a mineral of wide occurrence, and differing according to its crystallization above or below its conversion point of 575° C., have all given critical data now of great significance.

Professor Lindgren reviews practically all the famous mining districts of the world and in connection with them discusses with fullness and illuminating insight the questions of secondary enrichment, of persistence of mineral characters with depth, of contact zones, of magmatic segregations and of pegmatites. Indeed, no student of the subject can read these pages without feeling his interest quickened and his grasp of the causes which have led to the formation of mineral deposits greatly broadened. Professor Lindgren has, therefore, as stated in the opening sentence of this review, placed his colleagues and students everywhere under a great debt by the preparation of a masterly work.

J. F. KEMP

Der Mensch der Vorzeit. Von DR. HUGO OBERMAIER, Professor am internationalen "Institut de Paléontologie Humain," Paris. Mit 39 Tafeln, 12 Karten und 395 Textabbildungen. Allegemeine Verlags-gesellschaft, M. B. H., Berlin, München, Wien. 1912.