our native land should be even more sacred than its waters, and if necessary the constitution should be amended to enable the Congress to pass laws protecting the soil as well as the waters of our common heritage.

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SCIENTIFIC BOOKS

Characteristics of Existing Glaciers. By WILLIAM HERBERT HOBBS. New York, The Macmillan Company. 1911. Pp. ix + 301.

The author tells us that the book consists of three articles, more or less amplified, which he has contributed to scientific magazines. This explains the general character of the book, which is divided into three parts; the first deals principally with glacial erosion; the second with the ice masses of the Arctics and the third with those of the Antarctics. The subject is treated in regard to some of its larger aspects, such as geographical distribution, the general forms and the meteorological relations of the ice masses. The physical character of the ice which controls its movements, the relation of reservoir to dissipator, the formation of moraines and many other details are absent, as might be expected from what has been said above. On the other hand, far more space is given to the question of erosion and to meteorological conditions than is usual in books about glaciers.

In the first part, the subject of glacial erosion, both at the bottom of the valley and in the cirque wall, is considered. Here, for the first time, accounts of Matthes's theory of nivation and Willard D. Johnson's theory of bergschrund sapping are given to the general public. The author rejects Richter's idea of sapping just above the level of the névé, because it would produce a broad shelf, which has not been discovered; but he accepts Johnson's theory, though this method would also produce a shelf at a level only 150 or 200 feet lower. He has, however, presented convincing evidence to show that the cirque is enlarged by sapping and that the forms with which we are familiar in glaciated mountains are the result of the extension of cirques by glacier erosion.

There are many ways of classifying glaciers, according to the characteristics one desires to emphasize. The author classifies glaciers in accordance with the amount of alimentation, and brings out some interesting relationships of the different forms; but it seems that, in this matter, he has not put sufficient emphasis upon underlying topography.

The accounts of the Arctics and the Antarctics are particularly interesting; the author has evidently studied the reports of all the explorers and has brought them together in a very readable form and in such a way as to give an excellent general survey of those distant regions. He insists that there are very marked fundamental differences between the character of alimentation in the polar regions and in temperate zones. In the latter, the precipitation is due to moist winds being raised to cold altitudes by the mountains themselves and then precipitating their moisture in the form of snow. In the polar regions Professor Hobbs thinks that there are no surface air currents blowing across the great ice masses from the adjacent seas. It has been made out that over Greenland and over the Antarctics there are great regions of high barometer; and the reports of explorers show that they almost invariably encountered winds blowing off the surface of the ice, and when these winds attained a fair strength they carried with them many fine particles of snow which were swept along for considerable distances. These outward air currents Professor Hobbs ascribes to the cooling and consequently increased density of the air by contact with the cold surfaces, followed by the air sliding off the great ice cap in all directions. This, of course, requires that the return currents should flow in at a higher altitude, and sink down upon the ice from above. These currents, which bring but little moisture, are heated dynamically as they sink, melting and evaporating whatever ice spicules they may be carrying, and the vapor is again frozen as it approaches the ice surface. In this way he accounts for the falling snows under clear

skies, which have been described by Arctic explorers. In the Arctics there is always a fringe around the ice masses where the winter's snow is all melted during the summer. In the Antarctics this is not the case, as the snow line extends quite to the sea level. The discussion of the various forms of ice masses and the formation and appearance of icebergs is most interesting. Glacialists will find much to interest them in this book and also many explanations with which they will not agree. For instance, the author thinks that the alimentation of the Arctic ice occurs largely at its borders and is due to the snow being driven off the ice cap by the wind and piling up, around the edges, forming a convex surface, like a sand dune; it is hard to reconcile this with retreating glaciation. Also, the figure on page 139 would hardly have been inserted if the author had carefully considered the lines of flow of glacier ice.

The book is profusely illustrated and the illustrations elucidate the text; every one of them is referred to and they make the descriptions very vivid without the use of too many words. The reproduction, on the same scale, of plans of a number of glaciers, in plate 11, and Fig. 134, is very instructive. The numerous references at the end of every chapter will be very acceptable to those who desire to consult the original articles.

Harry Fielding Reid

Fortschritte der Mineralogie, Kristallographie und Petrographie, herausgegeben im Auftrag der Deutschen Mineralogischen Gesellschaft, von Dr. G. Linck, Jena. Gustav Fischer, Jena, 1911. Pp. 290.

The German Mineralogical Society has undertaken to publish annually a report of progress in various fields of investigation related to mineralogy. This interesting first volume gives promise of a successful series. Dr. Linck is editor in virtue of his office as secretary of the society; the authors of the papers are specialists in their various fields and the presentation is intended to be popular. The varied subject matter shows how wide is the field to be covered. There are twelve reports as follows. H. Baumhauer (Freiburg) treats of the Law of Complication and the Development of Crystal Faces in Complex Zones, accepting and elaborating Goldschmidt's work (17 pp.); O. Mügge (Göttingen), On the Twin Structures of Crystals (30 pp.), and F. Becke (Vienna), On the Formation of Twin Crystals (18 pp.), discuss very fully modern points of view as to definition and development of twinning; A. Ritzel (Jena) treats of the recent literature on Velocity of Crystal Growth and Solution (13 pp.). Under the heading Mineralogy, R. Marc (Jena) summarizes the literature on the Phase Rule and its Application to Mineralogical Questions (30 pp.); R. Brauns (Bonn) deals with the Causes of the Color of Faintly Colored Minerals and the Effect of Radium Rays upon the Color (12 pp.); A. Bergeat (Königsberg), reviewing the Genetic Interpretation of the North- and Middle Swedish Iron-ore Deposits in Recent Literature (18 pp.), shows the modern tendency towards regarding them as of magmatic origin; A. Schwantke (Marburg) gives a descriptive list of new minerals which have been described since 1898, arranged alphabetically without references to literature (20 pp.). Under the heading Petrography, F. Rinne (Leipzig), on Saltpetrography and Metallography in the Service of the Study of Eruptive Rocks (37 pp.), shows the bearing of such physico-chemical investigations as those of van't Hoff on the Stassfurt salt deposits upon the interpretation of processes of crystallization in igneous magmas; F. Becke (Vienna), in Advances in the Province of Metamorphism (36 pp.), reviews 87 papers which have dealt with this subject in the past three years. Under Meteorites, F. Berwerth (Vienna), Advances in the Knowledge of Meteorites since 1900 (28 pp.), gives a complete bibliography of 394 entries, covering what has appeared on meteorites since the publication of Wülfing's book, together with critical reviews of many papers. Lastly H. E. Boeke (Halle) gives a brief account of the work of van't Hoff, especially as it bears upon mineralogy and geology.