where they had become scarce. M. Fatio mentions an old hunter who boasted of having killed as many as 3,000 chamois.

The Alpine marmot, which is so common and so well known to Alpine tourists, is not the mammal which attains the highest elevation of habitat in Switzerland ; another little rodent, the *Arvicola nivalis*, has that distinguished honour, living at a greater altitude than any other European mammal.

Both this species and the marmot live among the oases of rock and herbage which stand out amidst the vast masses of mountain ice. The Bobac marmot does not occur in Switzerland, being confined to the north-eastern districts of Europe. The Alpine marmot inhabits the Carpathians and the Pyrenees, as well as the Alps.

M. Fatio's book is illustrated by eight plates, giving figures of new or rare forms. Synoptical tables of the families and genera are also given, so as to enable the least experienced naturalist to determine with facility the species which may come before him. A second volume, to include the reptiles, batrachia, and fishes, and a third, treating of the birds, are soon to be brought out by the same careful and enthusiastic observer.

E. RAY LANKESTER

OUR BOOK SHELF

Mining Geology.—*Die Lagerstätten der nutzbaren Mineralien.* Von Johann Grimm. (Prague : J. G. Calve).

THE author of this volume is an Oberbergrath, and also Director of the Imperial Mining Academy at Pribram. During the last seventeen years he has from time to time published notices of the mineral veins and other mining features of Transylvania, Hungary, and Bohemia ; and he now presents to the public a general treatise or handbook of the useful minerals. His experience has not been wide enough to enable him to write a book that fully justifies the title he has chosen for it, and his acquaintance with the literature of his subject appears to be limited to the German language. But the book is the work of a practical man, is well arranged, and contains much useful information. Fresh illustrations even of well-known facts are always interesting, more especially when they carry with them some little features that are novel. In this respect, mining geologists in this country will find it worth their while to hear what Herr Grimm has to say of the minerals, veins, beds, faults, and other mining features of various parts of the Austrian Empire.   A. G.

Practical Astronomy and Geodesy.—*Geographische Ortsbestimmungen mit Hülfstafeln.* 4to. pp. 88. By W. Valentiner. (Leipzig: 1869. London : Williams and Norgate.)

THE purpose of the author was to afford the astronomers engaged in the great European Triangulation tables for facilitating the reduction of the observations made for finding azimuths and the altitude of the pole. The work is, however, of more than a transient merit, for it will probably be of much assistance to our Indian officers engaged in the great trigonometrical survey of the Peninsula, and some of the tabular matter might henceforth in a modified form be well included in works on higher geodetic operations generally.

The author, by differentiating some of the fundamental equations which connect the latitude of a place with the altitude of a heavenly body above the horizon, its declination, azimuth, hour-angle, and parallactic angle, shows the influence which the errors in the observed quantities exert upon those that are dependent upon them, and comes to the conclusion that circumpolar stars are best adapted

for azimuth determinations. He especially recommends to the observers engaged in the arc measurement the star *Ursæ minoris*, which is seen at all hours with telescopes of about $1\frac{3}{4}$ to 2 inches aperture, and the succeeding formulæ have been calculated with special reference to that star. Thus, taking the fundamental equations, in which z, a, δ, t, ϕ, are the well-known symbols for zenith distance, azimuth, declination, hour-angle, and latitude respectively, the author obtains by division, transformation, and expansion, and substituting p for $90° - \delta$, the following elegant expression for the azimuth :—

$$a = \text{p sin t see } \phi + \text{M sin 2t} + \text{N}$$

The values of M and N being essentially dependent on t and ϕ alone, admit of tabulation with t and ϕ as arguments, and are given by the author for all latitudes between 36° north and 64°, this being the extent of the arc to be measured ; t is given from ten to ten minutes.

The formulæ for the altitude of the pole are discussed very carefully on the same principles. The whole is the result of much labour, and M. Valentiner well deserves the sincere gratitude of the numerous computers whose work he has facilitated.   B. L.

Manual of Physics.—*Lehrbuch der Physik, einschliesslich der Physik der Luft (Meteorologie), des Himmels (Himmelkunde), und der Erde (Physikalische Geographie).* Von Dr. Paul Reis. Erste Hälfte, pp. 256. (Leipzig : Quandt und Händel. 1870.)

THIS is the first half of a treatise on Elementary Physics from a highly scientific point of view. Dr. Reis considers that the principle of the conservation of force—as he puts it, "Die energie des Weltalls ist constant" (the energy of the universe is constant)—is at the root of all science, and that it is possible to deduce a large part of physics as a mathematical consequence of this principle. We confess to a little doubt whether it is advisable to introduce it in this form in the first instance in an elementary text-book. The attempt is one, however, that must be made no doubt at an early date, in some form or other.

The first instalment of the work contains an introduction of considerable length on the elementary ideas at the root of physics—such as space, time, matter, rest and motion, matter and force—the forces which appear in all phenomena, molecular, chemical, cohesion, adhesion, gravitation—and the fundamental axioms of physics, which he gives us in six statements not materially differing from Newton's three laws. After 80 pages out of 500 have been occupied in this way, we confess that we doubt whether sufficient room is left for the adequate treatment of the enormous range of subjects which is to follow. The mechanics of solids, fluids, and gases occupy the author for the next 100 pages, and the last 70 of this first part are given to wave-motions and acoustics.

The book is carefully worked, and full of examples for the student. The new form in which familiar things are presented makes it interesting to those who are acquainted with the subjects it treats of. It appears to be conscientiously brought up to the science of the present day, but we must reserve our opinion as to the question whether it accomplishes the task it proposes to itself, or whether, in its present form, it will be valuable as a text-book till the appearance of the second half, which completes the work. It claims to possess a plan of its own, and it must be estimated according to that claim.

W. J.

Meteorology.—*Die Theorie und Das allgemeine geographische System der Winde.* (Göttingen, 1869. London : Williams and Norgate.)

THE author is an opponent of Dove's school of meteorologists. The facts discussed by him are well known, and far more concisely stated in any recent work on meteorology. The theories founded by the author on those facts are too fanciful, and of his speculations—founded on no facts at all—the least said about them the better.