The subject is to be treated from the technical as well as from the theoretical standpoint, and is to be made intelligible to a beginner without forfeiting its character of a complete text-book and work of reference.

Part i., after a short history of the development of metallography, deals with the "nature" of metallic alloys, the application of the phase-rule to the consideration of the various types of freezing of binary alloys, and also with solid solutions and chemical compounds of two metals. The remaining fourteen pages of the first part and half of part ii. deal with the "Zustandsdiagramme" of all the possible binary alloys of the metals manganese, iron, cobalt, nickel, copper, silver, gold, palladium, and the metals of the platinum-group. The second half of part ii. is devoted to internal kinetics, embracing such subjects as crystal growth and transformation, diffusion in metals, &c.

Whether all the objects aimed at will be achieved by the author cannot be predicted from a perusal of the first two instalments, but it may be safely asserted that a very promising beginning has been made on what can truly be described as a colossal task. The subjects already discussed are treated clearly and in a masterly style, and the arrangement (which is a matter of great importance in metallography) is excellent. The work will constitute the only complete text-book on the subject, and will undoubtedly rank as a classic.

EXERCISES IN PHYSICAL GEOGRAPHY.

(1) *Manual of Physical Geography.* By Dr. F. V. Emerson. Pp. xvii+291. (New York: The Macmillan Company; London. Macmillan and Co., Ltd., 1909.) Price 6*s.* net.

(2) *A Laboratory Manual of Physical Geography.* By Prof. R. S. Tarr and O. D. von Engeln. Pp. xvii+362. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1910.) Price 6*s.*

(1) THE purpose of the first of these books would have been made clearer if it had been entitled "Manual of Exercises in Physical Geography," for the 273 pages of which the body of the book is composed are almost entirely made up of questions and directions to students. The manual is divided into eighteen chapters, the first on the earth as a planet, the next four on climate and others on common minerals and rocks, on the contour map, on weathering streams and stream valleys (a long chapter, in which prominence is given to the cycle of erosion and all that that involves), on land forms (three chapters), on glaciation, lakes, the ocean, shore lines and forms, harbours, and soils, the final chapter being devoted to studies of typical areas.

Now there can be no doubt that teachers of the subject could hardly fail to get many a useful hint from an examination of this volume, but, on the other hand, it is scarcely conceivable that any teacher, at least in this country, would ever try to make use of it as it stands. For this there are several reasons. In the first place, the manual is not self-explanatory. Among the questions of which the bulk of the book is made up, some are childishly simple (though, it may be admitted, not without justification in the author's way of presenting his subject), others assume that the teacher is well versed in his subject, and has either already given the necessary explanations to his students or is prepared to do so when the student is required to answer them. Some of the questions are, unfortunately, confusing and misleading. Moreover, the teacher who is sufficiently well versed in his subject to be able to use the book will be too independent to submit his mind slavishly to the lead of another in presenting the subject to his class. The author says that the exercises have for the most part grown out of his class-room experiences, and it may fit in very well with the rest of the author's teaching of the subject, but it is not likely to fit in with the method of anyone else. Finally, the exercises set in this volume must involve the consumption of a great deal of time, and the doubt cannot but suggest itself whether the result in trained intelligence will be at all proportionate to the amount of time and labour expended.

(2) The work by Prof. Tarr and Mr. von Engeln is similar in design to that of Dr. Emerson, and its distinguishing features may be best given by the following extracts from the preface:—

"The feature which will first attract attention is the leaving of space after each question for the student to write the answer. This serves a double purpose. It ensures the student's following the argument of the outline and the appreciation of every point by personal observation and deduction . . .

"Another feature which we feel sure will meet with general approval is the insertion of all maps, figures, diagrams, and tables at the exact place where they are needed." (These maps, &c., it should be stated, are all likely to be very useful.)

The authors claim, moreover, as the most marked pedagogical departure in their manual, their orderly method of presenting the physiography of the lands. We may note further a feature which is likely to attract attention even before that just mentioned. The loose-leaf construction of the manual makes it a very simple matter for the teacher to change the order or introduce other work. The pages are all perforated to allow of their being detached, and pierced with two large holes to allow of their being refixed in another arrangement, this being done because

"the authors feel that teachers who are progressive, capable, and enthusiastic over the subject should be given the greatest latitude in carrying out their own ideas."

Finally, with reference to the present reviewer's remark at the end of his notice of Dr. Emerson's work, it is only fair to say that the methods of this manual,

"are not to be regarded as experiments. The senior author has had over fifteen years' experience and the junior author four in the laboratory teaching of physical geography."

They tell us, too, that the results in their own classes have been very gratifying, and that the students pursue the work with keen interest. The reviewer, therefore, would have his "doubt" taken as no more than a doubt, and he is sure that such systematic efforts towards the improvement of teaching are entitled to sympathetic consideration. G. G. C.

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