educational value and with serious consequences to our native fauna and flora. The teachers have it in their hands to impress upon their pupils that nothing is to be gained and everything to be lost by plucking every flower because it looks pretty, by raiding every nest because it is good sport, or by killing every insect that looks strange. If by proper tuition the child can be made to realise how infinitely more instructive and interesting is the living organism than the dead "specimen," a well-organised course of nature study should have as distinct a moral influence as it is intended to have an intellectual influence in moulding the character of the pupil. For this reason we should like to see in such works as those under consideration special and emphatic recommendations to teachers to repress all unscientific collecting.

R. MELDOLA.

HEDDLE'S MINERALOGY.

The Mineralogy of Scotland. By the late M. Forster Heddle, M.D., F.R.S.E., Emeritus Professor of Chemistry, St. Andrews. Edited by J. G. Goodchild, H.M. Geological Survey, F.G.S. Two vols. Pp. 148 and 212. (Edinburgh: David Douglas, 1901.)

NO book is of more use to the practical mineralogist and collector than one which describes in a detailed manner the mineral localities of a country. Among the best examples are the *lexicon* of Zepharovich and Becke for Austria; that of Frenzel for Saxony; and, on a much more elaborate scale, the treatise by Lacroix on the mineralogy of France and her colonies, which is still in progress.

Greg and Lettsom's "Mineralogy of Great Britain and Ireland" (1858) is also a very useful book of reference, but scarcely adequate at the present date. Much of that work was actually due to Prof. Heddle; and it was known that he was for many years collecting materials for a "Mineralogy of Scotland"; no man possessed anything like his intimate knowledge of Scotch localities, so that a treatise of considerable importance and magnitude was expected from him.

After his death the unfinished manuscript was left to Mr. Alexander Thoms, who placed the work of completion in the competent hands of Mr. J. G. Goodchild. The present handsome volumes are the result, and it is evident that no trouble has been spared in their production. The book is a worthy monument of Prof. Heddle's lifelong labours, and will rank with the above-mentioned treatise of Lacroix.

Mr. Goodchild's task must have been a heavy one. There was a great mass of detail to be sifted; many of the localities have been difficult to identify, having been phonetically spelt by the author in his early journeys and not existing in the maps; further, it is not known to what specimens many of the figures relate, or what is the meaning of their symbols.

Prof. Heddle was an expert draughtsman, and there are no less than 103 plates, each containing about eight figures beautifully drawn and engraved. But many of these are taken from other sources, and their origin is doubtful. Confronted with the impossibility of making a trustworthy selection, the editor has thought it best to

publish all the figures, though many of them have, perhaps, little direct bearing on the mineralogy of Scotland. These figures, and the numerous chemical analyses quoted throughout the book bear witness to Prof. Heddle's untiring industry.

In addition to these plates, a remarkable feature of the book is a number of beautiful and elaborate stereographic and gnomonic projections drawn by Mr. Wilbert Goodchild. The only book which has hitherto been provided with such complete stereographic projections is Des-Cloizeaux's "Manuel de Minéralogie," and even they are not so elaborate as those which adorn the present book. The gnomonic projections are quite a new feature, and will probably be found useful. The book is, further, provided with very complete tables and indices of mineral names, localities, pseudomorphs, &c.

A great part of such a book as this must necessarily consist of a mere list of localities; but, in addition, an account of the crystalline forms and of the physical and chemical properties is given for each mineral, and under some species will be found a good deal of interesting comment and historical information—conspicuous examples are gold, silver, galena and niccolite.

The reader's attention may be particularly directed to the description of agate and onyx, where he will find a very interesting and suggestive account of their probable mode of formation.

The most important part of the book is the description of the mineral localities; errors in the other portions are not of so much account, but it may be noted that it is not correct to call the form *x* of quartz a double three-sided pyramid, nor the face *a* the twin plane of pyrites.

The term *gleit-face* is a curiously hybrid expression for the glide-plane (*Gleitenebene*) of calcite, and some of the terms used in the description of the varieties of agate, such as Jasp-agate, Oonachatae, Hæmachatae, Hæma-ovoid agate, can scarcely be regarded as satisfactory.

One failing inseparable from a posthumous work of this character may be noted; the reader, not knowing how much is generally established fact, and how much derived from incomplete or inadequate notes of the author, cannot feel equal confidence in all the statements. It is difficult, for example, to feel entire confidence in the occurrences of some obscure minerals, or in the identification of many of the crystal forms. It would have been well if Mr. Goodchild could have distinguished in some way those statements which he has been able to confirm from his personal knowledge and from his own extensive experience or from that of others. An appendix which contains some of his own observations is for this reason particularly valuable.

The book, as a whole, is remarkably free from the ornate style and the tinge of romance displayed by many of Prof. Heddle's published papers. It must long remain the standard treatise on the mineralogy of Scotland. It is satisfactory to know that the author's extensive collection of Scotch minerals is in the Museum of Science and Art at Edinburgh, and has been carefully arranged and made intelligible to the public by Mr. Goodchild, to whom the hearty thanks of all mineralogists are due for the labour and care which he has bestowed both upon the collection and upon the present treatise.

H. A. MIERS.