same conclusion has been independently arrived at by Professor H. Vater (Zeits. Kryst. Min., 1901, vol. xxxv, p. 149), who further gives reasons for considering that ktypeite also is probably identical with aragonite.

A new issue (fourth thousand) has been received of Professor A. H. Church's useful and well-known little Handbook on Precious Stones. Except for one or two minor alterations, the text remains the same as before, but two pages of supplementary notes are given at the beginning of the volume.

We have received from Mr. H. Y. L. Brown, F.G.S., the Government Geologist of South Australia, various reports and a Handbook of Mining which have been issued for free distribution by the Department of Mines. The Handbook of Mining gives a brief account of the mineral resources of the State, together with a summary of the Mining Acts and regulations, and it is accompanied by four large maps showing the distribution of metallic minerals. From the same source we have also received an excellent geological map of South Australia on a scale of 16 miles to the inch.

REVIEW.

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. lviii and 148, viii and 247, 30 text-figs. and 120 plates). Edinburgh: David Douglas. 1901. (Price 36*s. net.*)

These two handsome volumes form a fitting memorial to Professor Heddle, so well known for the enthusiasm and energy with which for many years he studied the minerals of his native country. No one was better acquainted with the mineral localities of Scotland, nor has any one laboured more assiduously at the chemical analysis of Scotch minerals. The many papers, some of great length, published in the pages of this Magazine, are sufficient testimony to his ceaseless activity in this direction. For many years he had been collecting material which some day he hoped to publish as a connected whole, but at his death[1] in 1897 this work was unfortunately still incomplete. In handing over his voluminous notes and drawings to his son-in-law, Mr,

[1] For an obituary notice of Dr. Heddle see this Magazine, vol. xii, p. 38.

Alexander Thoms, Heddle expressed the wish that they should be published as a book, and the laborious work of editing this material has been ably performed, considering the difficult nature of the task, by Mr. J. G. Goodchild. This has been done with as little alteration as possible, the aim of the editor being to complete the work as Heddle would himself have done. In this work of completion free use has been made of the large collection of Scottish minerals brought together and arranged by Heddle himself, and now under the charge of Mr. Goodchild in the Edinburgh Museum of Science and Art.

In addition to the main part of the work, for which Mr. Goodchild is responsible, Mr. Thoms contributes a memoir of Dr. Heddle, as well as lists of minerals found in each of the counties of Scotland, while Mr. James Currie gives (vol. i, pp. xxxvii–l) a very complete and useful list of Scottish pseudomorphs, with the localities at which they have been found.

The bulk of the volumes is occupied by particulars of the occurrence of just over 200 mineral species in Scotland. Every locality at which each species has been found is enumerated, and in each case is stated the kind of rock in which the mineral occurs, and the other species with which it is associated, together with a brief description of the mineral itself, including in most cases the combinations of forms observed on the crystals. For information concerning Scottish mineral localities, this treatise far surpasses anything hitherto attempted, and it will long remain a standard work of reference. Mr. Goodchild has greatly added to its value in this respect by a very full synonymic index of locality names, in which he has been at great pains to give the exact situation of each place; the various mineral species found at each locality are also enumerated.

While the topographical portion is very complete and of much value, that dealing with crystallography is less satisfactory. Here the editor has been at a disadvantage owing to the different systems of notation employed by Heddle at various times, and apparently because of the incomplete state in which this portion was left at the author's death. Whether the numerous forms have been determined by mere inspection of crystals or by actual goniometric measurement does not appear to be stated; at any rate for only a few species are tables of *calculated* angles given, these being in some places the face-angles and in others the normal-angles. Under calcite is given a long list of 266 forms, which surely have not all been observed on Scotch crystals of this mineral. To the crystallographic portions Mr. Goodchild has added several beautiful

plates giving stereographic or gnomonic projections for the more commonly occurring crystallized species. These, though excellent in themselves, are open to the same objection as is the list of forms of calcite noted above, since in representing all the forms known for each species they seem rather out of place in a 'Mineralogy of Scotland.'

The most striking feature of the volumes is the 120 excellent plates, one of which is a portrait of the author; most of the others contain eight figures of crystals, beautifully and clearly drawn. In the preface we find the statement that 'The author died before making a final selection of the illustrations, and it has therefore been deemed advisable to have these all engraved just as they left his hands, even though some of them appear to have been taken from other sources.' There is thus no guarantee that all of these numerous figures refer to Scottish crystals, and it is possible that some of them may have been drawn by the author to illustrate an account of minerals in general, as for example his article on Mineralogy in the ninth edition of the 'Encyclopædia Britannica.' Several of the figures seem familiar; some of those of chalcopyrite, for example, are exact copies of Haidinger's figures of Cornish crystals.

In many cases very little account is taken of the work of other authors except as far as regards occurrences and chemical analyses; and the descriptions of some typically Scotch minerals, for example, greenockite, are consequently rather disappointing.

In works of this kind errors and omissions are almost unavoidable, and the present is by no means an exception in this respect. The way in which Dana has been rigidly followed has led to one or two curious mistakes. The only index of mineral names includes also those of minerals not found in Scotland, and is unfortunately not accompanied by references to pages. In the absence of any list of the abbreviations and signs of various kinds which are made use of, it is not always easy to discover their meaning.

ABSTRACTS.

Constitution of Silicates (W. Vernadsky, Zeits. Kryst. Min., 1901, vol. xxxiv, pp. 37–66).—In this contribution to the study of the theoretical constitution of silicates the author first points to the analogy between the part played by carbon in organic chemistry and the part played by silicon in mineralogical chemistry. Admitting that the investigations of the latter have not led at present to results which