

*On the Occurrence of Greenockite at a New Locality.*

By Prof. HEDDLE, F.R.S.E., &amp;c.

[Read January 11th, 1887.]

**M**ORE than a year ago I obtained a number of minerals in Boylestone quarry, which lies about a quarter of a mile north-west of Barrhead, near Glasgow.

Upon breaking up at home the very unwieldy druses which alone seem to occur at this locality, I found one which contained *Greenockite*.

A single bright yellow crystal only occurs, and it lies so deep in the specimen, between two mammillations of prehnite, that its form cannot be deciphered.

I was induced by the urgent solicitations of a local collector, to whom I mentioned the find, to refrain for a time from announcing it. His argument was that the mineral collectors of the neighbourhood should have the earliest chance of being supplied.

As I have myself fruitlessly visited the quarry since, and as even the occurrence of the ordinary zeolites is only very occasional therein, I conclude that time must elapse before more crystals are turned out.

The rock-matrix, mode of occurrence, and mineral associates are here the same, or much the same, as occur at the other Scotch localities for this very rare substance.

The quarry is wrought for the most part for road metal; the rock is a friable dolerite, so soft as occasionally to have an almost wackenic appearance. It is pervaded more by inosculating fissures than by well defined steam-holes; and these fissures are plugged for the most part by calcite.

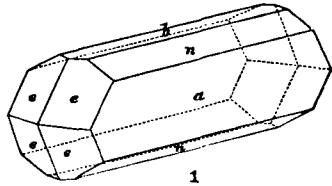
Such a rock gives but little promise of zeolites. Olivine, however, occurs in abundance, and the finest crystal of that mineral which I have seen from Scotland was found here by Mr. John Young, the Curator of the Museum of the Glasgow University.

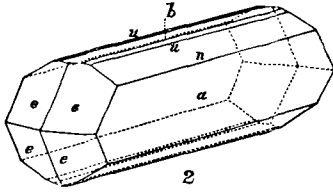
Its form is  $n a b c$ . (Fig. 1.)

It was about the same thickness, but only about one-third of the length of the figure.

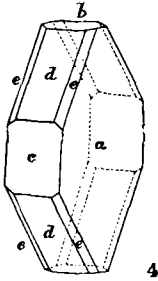
Figure 2 (p. 134) is a form in much smaller crystals observed by myself, chiefly in the denser portions of the rock.

In February 1882 I gave in this





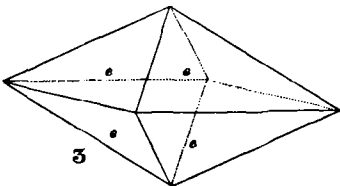
suffered change. In the immediate neighbourhood of Boyleston, and along the whole stretch of hill-face from Hatfield-Moss through Gleniffer to Fernese, the dolerite is studded with large crystals of twinned labradorite, and crystals of olivine in the form of figure 4.



This I find is the form of "ferrite," for not only are unaltered crystals of olivine in this form found, but also crystals in every stage of alteration with the brown and soft clay-like "ferrite." In ferrite the brachy-diagonal cleavage is perhaps still the most eminent, but the process of transformation of substance has exalted the macro-diagonal originally imperfect cleavage to a great extent.

Though both the above forms of olivine occur in close association, it is singular—at least, in the absence of an analysis of each we may say that it is singular—that it is only the mineral which occurs in the form of figure 4 which is changed into "ferrite."

This "ferrite" of Wallace Young is undoubtedly a substance differing altogether from that recognised by micro-petrologists under that name; and as Young's mineral had not only been analysed but fairly well described, and "held the field" long before the other, it is a pity that the ordinary scientific law has here been departed from in applying the same name to a new substance.



In order to illustrate the extreme diversity of form in which olivine, though rare in crystals of any size, is found in Scotland, I give the figure of crystals from the north-east end of the Kincaig at Elie in Fife. These crystals occur imbedded in a dense and tough blue-black basalt, and they are some inches in length. Their structure is granular, with so loose attachment of the granules that when exposed they are represented frequently only by hollow casts.

The only other locality at which I have seen crystals of olivine large enough to be figured, was the north side of the Bay of Talisker in Skye. The crystals are like figure 4, but without the faces *c* and *e*.

A granular crystal of huge dimensions was also found here by Mr. Peyton. Its form was like that of fig. 1 of Naumann, but its faces were rough, and it fell in pieces during the extraction.

A massive band of basaltic rock cuts the quarry in an east and west direction. This yields, though only very occasionally, large druses of analcime, also of prehnite with other zeolites; but, from the large size of the druses, the extreme toughness of the rock, and the feeble attachment of the zeolites thereto, it is with extreme difficulty that undefaced specimens can be obtained of a size suitable for cabinets.

I speak of what obtains at present, as, in the collection of Mr. D. C. Glen, there are several specimens fair in form and shape.

Where the amygdaloidal rock passes into basalt, which it does by insensible gradation, *native copper* is of frequent occurrence.

It is generally in very thin plates, which, being more or less extended in a single plane, seem to have filled rents; but the perfect continuity of the rock around the fringes of these plates, and their unusual brilliancy of colour, altogether preclude the conclusion that the copper was transfused into *pre-existent* fissures.

But seldom have these plates a thickness much greater than that of foil, though masses of about seven ounces have been found. The brilliancy of lustre disappears, and there is also a darkening of colour in the course of a few days. Minute crystals of copper also occur imbedded in clear crystals of calcite.

The zeolites which are found in this quarry occur for the most part in the dense basalt.

*Prehnite* is very much the most abundant. It usually forms large druses with mammillated groupings of crystals, which do not stand free or isolated at their terminations. The colours are for the most part of a dull green; but specimens of a bright green and also almost of a sulphur-yellow are occasionally found. The brighter green colours are evidently due to copper; minute distorted crystals and filaments of which, coated with powdery malachite (?), sometimes protrude from the surface of the prehnite. The cause of the colour of the yellow specimens is not evident.

That the prehnite is not the earliest formed of the zeolites is evident, for the sulphur-coloured prehnite, which is generally in isolated spheres, is disposed on the surface of analcime. The centres of the larger

masses of prehnite are colourless ; and disposed throughout the green, or mixed with opaque white, there are blotchings of a pink or somewhat lavender tint. Slabs of this when polished are not unpleasing as brooch stones.

I have seen no free crystals of prehnite in this quarry.

The *analcime* is opaque milky white ; it occurs in grouped crystals of the form *n*, from one-quarter to three-quarters of an inch in size. The specimens are as fine of the white variety as any in Scotland. Distorted crystals occur ; the distortion being a shortening along the octahedral axis.

Small opaque isolated crystals of a beautiful flesh colour also occur.

*Thomsonite* occurs of two varieties. Grouped bunches of radiating acicular crystals embedded in analcime ; and fan-shaped groups of diverging flat crystals which stand free from the surface of clustered crystals of analcime. The former of these varieties is in crystals two inches in length—these have no terminations ; the latter are about one inch by an eighth of an inch in thickness. These have the unusual development of faces figured. (Fig. 5.)

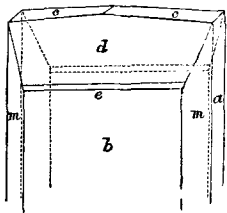


FIG. 5.

Lying upon the surface of the prehnite there rarely occur groupings of interlacing but isolated crystals of *natrolite*, disposed upon the sides of the crystals, loosely attached and sometimes doubly terminated. The crystals are nearly two inches in length, but only about a thirty-second in thickness. Although they have only the ordinary form *m o*, they are probably the finest found in Scotland.

Poor specimens of *Laumontite* occur.

In 1855 I announced the occurrence of the scaly variety of Göthite termed *rubin-glimmer* along with zeolites at Kilpatrick ; the same substance occurs here in groups of rosette-like crystals. It was by some taken for crystallised native copper ! This crystal-bloom attaches itself only to the analcime and to the Thomsonite, but it sometimes lies as a scaly down on the surface of crystals of *calcite*.

These last occur, though rarely, in several fine and highly complex forms which I am at present figuring. They sometimes are two inches in length.

Notwithstanding the apparent richness of this locality, it is one which cannot yield many specimens for the cabinet, unless the lapidaries' wheel be used for the fashioning of them ;—even a well-skilled hammerer producing only uncouth and shapeless specimens.

The chief interest connected with this quarry is in the zeolites being

solely of the lime and soda class, and this is clearly explained by the abundance of *labradorite* in the unchanged rocks of the neighbourhood. *Saponite*, however, occurs as a decomposition product, filling the smaller drusy hollows.

---