On the Zeolites of Rye Water, Ayrshire.

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THE first volume of the Transactions of the Geological Society of Glasgow contains the following notice of Zeolites as occurring in the banks of the Rye Water:—"About one-and-a-quarter miles below Howrat Toll-bar, white and red stilbite occur, small white prehnites, with fine pellucid quartz approaching to hyalite, and calcite."

As this locality was at a considerable distance from any other which I had visited, and as an association of stilbite of *two* colours was both new to me, and gave hope of the diversity of colour being associated with difference in crystalline form, I was desirous of visiting it. In the so doing I was fortunate in being accompanied by Mr. Blackwood, of Kilmarnock.

Having heard that some quarrying was going on about a mile further up the Glen than Howrat, in connection with new Water-works, we examined the rock so cut. No zeolite was found in its numerous amygdules, which were solely and solidly filled with calcite. This warrants, so far, the suspicion that the plagioclase crystals of the doleritic matrix may prove to be anorthite, and not as usual labradorite. These crystals, and those also of the associated olivine, are of such size as almost to make the rock a porphyry.

From Howrat for a distance of about a mile-and-a-half, the stream runs in a straight course, through a treeless, uninteresting flat, the turf of which is now and again cut through by projecting bosses of a rock very similar to that already noticed, but of extreme hardness. Suddenly, however, these features give place to a rocky copse-clad gorge, through which the stream forces its way with many windings. This gorge ceases at the Cunningham Beadland limestone quarry, where the Lower Coal Measures are brought in by a great downthrow fault. The length of the gorge, as measured on the map, is a little over a mile, but the meanderings of the stream afford probably twice that amount of ground for exploitation.

At or near the confluence of the South Burn, a bed of amygdaloid crosses the main stream. It is characteristic on account of the great total bulk of its amygdules, these being lined throughout with delessite, and filled for the most part solidly with pellucid highly cleavable calcite.

It is characteristic, also, from the matrix being composed chiefly of a minutely crystalline and highly calcareous paste, which carries large porphyritically disposed, and highly-kaolinised crystals of some felspar.

When we had passed over this bed for some distance down the stream, we found the stilbite, *apparently* both white and red, or rather flesh-coloured. This last was in the usual built up sheaf-like form, but of very minute size; it sometimes lined otherwise vacuous druses, and sometimes was imbedded in calcite.

It appeared at first sight to be associated with milk-white stilbite, in radiated, sheafy bundles; but this, upon closer examination, proved to be *quartz*. The error, however, was not surprising, so exactly did many of the diverging groups of radiating crystals simulate stilbite in habit. The hardness however, and the observing the terminations of the crystals in some cavities, sufficed for the determination.

The specimens, though quite insignificant in size, are very characteristic, and altogether different in appearance from anything I have seen in Scotland or elsewhere.

Radiating but isolated groups of singularly white and very opaque quartz, of the zeolitic habit, lie lowest in the cavity. These groups are set round with circlets and groups of flesh-red stilbite, while minute spheres of dark green delessite sparingly overlie both.

The dull and yellowish felspar (? anorthite) is zoned occasionally by delessite, and the crystal-margins are ill-defined.

Some half a mile or so further down the stream, we found in loose blocks of non-porphyritic amygdaloid, two specimens of analcime, and also two of chabasite, both in the primary rhombohedron and in twins of the same.

We could not find *in situ* the rock with the prehnite; but within half-a-mile of the opening of the gorge we found two loose masses of the rock which contained it.

This was a rock of entirely different character from that which carried the stilbite, being a dense and tough porphyry, with large crystals of opaque white plagioclase. The prehnite was not white, except where its crystals interfered with each other. It was colourless, and of high lustre. Occasionally several confluent radiating groups seemed to plug an amygdule; but the marked character of the mineral here is that it is *embedded* in divergent spherical groups of crystals in the rock-paste. The spheres are about the size of peas.

It was of necessity difficult to break up the fragments in every direction so thoroughly as to make certain of the fact, but I was unable after several attempts to find any point of attachment to the skin of a cavity, which had

acted as the centre or offset of the divergent crystallisation. The terminations of the individuals of the crystalline sphere seemed to abut upon the rock substance, without any intervening druse skin. This *indicates* radiation from a central point.

However anomalous and improbable the separation of prehnite as a primal solidifying substance from a fluent lava-flow may be, or however improbable its occurrence in such, otherwise than as a product of the change of a felspar, such is the appearance in this rock.

The sections of this and of the other rocks of the district which Mr. Blackwood is at present making will, however, throw much, if not an all-sufficient light upon the question. We found no hyaline quartz.

The dolerite of the flat near Howrat affords fine micro-sections, as both the olivine and the labradorite are in well-developed crystals.