On a Micro-granite containing Riebeckite from Ailsa Craig.

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RIEBECKITE was first described by Sauer[1] in 1888. The type-mineral occurs in granite from Socotra collected by Dr. E. Riebeck.

In the same year Harker[2] identified the peculiar blue hornblende occurring in the quartz-porphyry of Mynydd Mawr with the mineral described by Sauer, and in the following year two fresh localities were given for this mineral by Le Verrier[3] and Lacroix.[4] The last mentioned observer has also shown that crocidolite must be referred to the same group of hornblendes.

The object of this communication is to place on record the occurrence of riebeckite in the so-called syenite of Ailsa Craig, the small island which stands at the entrance to the Firth of Clyde. The following description of this island is taken from the *Memoirs of the Geological Survey* (Explanation of Sheet 7, page 12):—

"Ailsa Craig is an oval-shaped island, lying ten miles west from Girvan. Its extreme height is 1,113 feet, its longer (or N. and S.) diameter is about 1,500 yards, and its shorter (or E. and W.) diameter from 1,000 to 1,250 yards. It rises nearly vertically from the sea, on all sides except the east. There a triangular patch of low shingly ground intervenes between the base of the steep eastern declivity of the island and the waves. The Craig consists of a gray fine-grained syenite, which, on the

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[1] *Ueber Riebeckit, ein neues Glied der Hornbledegruppe. Zeitschr. d. deutsch. geol. Gesell.* Band XL. (1888), p. 138.

[2] *Additional note on the blue hornblende of Mynydd Mawr. Geol. Mag., Decade* III., Vol. V. (1888), p. 455.

[3] *Sur une venue de granulite à riebeckite de Corse. Comptes Rendus,* CIX. p. 38.

[4] *Sur une roche à amphibole sodique (riebeckite), astrophyllite, pyrochlore, et zircon du Colorado. Comptes Rendus,* CIX. p. 39.

southern and western precipices, shows a system of close, parallel, vertical joints, by which a columnar aspect is given to the rock. Though no Silurian strata are visible here, there is every reason to believe that this syenitic mass rises among rocks of that age, resembling in this respect, as well as to some extent also in petrographical character, some of the crystalline rocks which rise through the Silurian strata of the south of Ayrshire. Dykes of dolerite run in a north-westerly direction through the syenite."

The syenite, which may perhaps be more appropriately termed a micro-granite, although the point is not of much importance, is of a light greenish gray colour, and fine grained, almost felsitic, in texture. Small felspars may occasionally be seen, and the surface is spotted with irregular blotches of a dark blue colour. When examined with a hand-lens the main mass of the rock is seen to be finely crystalline, and both felspar and quartz may be recognised. Nothing definite can be made out as to the nature of the dark blue patches beyond the fact that they are aggregates of a dark-coloured mineral and the main mass of the rock.

In thin section under the microscope the essential constituents are seen to be felspar, quartz and riebeckite. Zircon has been detected in the powder of the rock.

The riebeckite occurs in small extremely irregular patches wedged in between the idiomorphic felspars of the groundmass. Several of these small patches usually occur together; and, although apparently detached, they are similarly orientated. The mineral therefore forms spongy ophitic masses, the inter-spaces being occupied by felspar. Crystalline form is not generally recognisable, but cross-sections showing the cleavages of hornblende may be seen. The absorption is very great, so that it is by no means easy to investigate the optical characters of the mineral. These are best made out in the feather-edges of oblique sections and in slides made from the powdered rock. The mineral is strongly pleochroic in greenish or yellowish brown and deep blue tints.

α and β=deep blue.
γ=yellowish or greenish brown.

All that can be definitely ascertained with reference to the extinction is that the angle is very small. The fact that the greatest axis of elasticity (a) is the one which is most nearly coincident with the vertical axis can be readily observed in the small fragments obtained by breaking up the rock. This is the most characteristic feature of riebeckite, and the one which distinguishes it from all other hornblendes. It is this which makes

riebeckite, amongst the hornblendes, the equivalent of ægirine, amongst the pyroxenes.

The larger felspars, which give a micro-porphyritic character to the rock, occur in crystals and fragments. Rectangular sections with straight extinction are not uncommon, and binary twins may occasionally be observed. The small felspars of the groundmass make up a large portion of the rock. They give lath-shaped sections, and, like the larger felspars, are either simple individuals or binary twins. In the slides prepared from the powder of the rock rhomboidal flakes showing the emergence of a positive bisectrix normal to the flake (M flakes) and giving an extinction of about 10° in the positive direction have been observed. These facts point to the conclusion that the felspar is a soda-orthoclase.

The quartz is interstitial or ophitic. It fills the spaces between the idiomorphic felspars.

Only two or three zircons have been observed. They are perfect crystals of the simple type showing the forms {110} and {111}.