SUPPLEMENTARY NOTES ON SOME ANTARCTIC ROCKS AND MINERALS.

By W. A. Macleod and O. E. White.

In the proceedings of the Royal Society of New South Wales, Vol. XXIX., page 461, *et seq.*, appears a paper, read in 1895, on Antarctic Rocks collected by Mr. C. E. Borchgrevink.

The authors are Professor David, Messrs. W. F. Smeeth, and J. A. Schofield. A brief summary of this valuable paper will be interesting, more especially as since then there has been donated to the Tasmanian Museum a small collection of Antarctic rocks and minerals.

The paper mentioned is sub-divided into two parts :—

I. Introductory notes about Antarctica—
- (*a*) A general introduction.
- (*b*) A summary of the history of Antarctic Exploration.
- (*c*) A summary of Antarctic Geology.

Under this last head the authors show that *Eruptive Rocks* (Plutonic and volcanic, granite pegmatite, granulites, syenite, diorite, diabase, pumice, andesites, augite-labradorite rocks, basalts, basic scoriæ, Palagonite tuffs), *Sedimentary Rocks* (Tertiary limestones, and rocks of, perhaps, Triassic and Palæozoic age, sandstones, shales, quartzites, arkose), and *Metamorphic Rocks* (Gneisses, mica schists, argillaceous schists) are well represented. Then follows a list of the then known volcanoes, and their heights and other interesting Geological data.

II. Petrology of the rocks collected by Mr. C. E. Borchgrevink :—

(*a*) Specimens from Cape Adare—
- Garnetiferous-Granulitic-Aplite.
- Trachytes.
- Glassy Augite Andesite.
- Vesicular Andesite Glass.

Basaltic Andesite.
Olivine Dolerite.
Olivine Basalts.
Limburgites.
Basic Tuff.
Mica Schist (Biotite).

(*b*) Specimens from Possession Island—
Amygdaloidal Trachyte.
Augite Andesite.
Basalts.

The specimens presented to the Tasmanian Museum have been placed at the author's disposal, through the kindness of Mr. A. Morton, and comprise the following—

Minerals—
Quartz, containing Siderite.
Ferruginous Quartz Specimen.
Massive Olivine.

Rocks—
Basalt (Olivine).
Basalt (Olivine).
Basalt (Hornblende).
Scoriaceous Basalt.
Sandstone.
Mica Schist.
Decomposed Basalt (?) Ferruginous.

Taking these in the order above given, the first specimen is that of a milk-white variety of quartz, attached on one side to mica-schist, and fringed on the other edge (water-worn) with crystalline carbonate of iron. Another more massive specimen is a ferruginous or "rusty" quartz. Unfortunately, these specimens are barely large enough to permit of assay specimens being taken; still, the appearance of quartz would warrant prospecting for gold, if climatic conditions were favourable.

The remaining mineral specimen consists of a granular and fragile massive mineral, pale green in colour, and resembling bottle glass. The hardness, colour, and chemical tests (yielding $Si\ O_2$, Mg O, and a little Fe O) clearly point to the mineral being "olivine." This is a particularly fine specimen, and the mineral probably occurs in connection with the basalts to be mentioned.

Amongst the Rock specimens *Basalts* are well represented, and vary in texture from fine-grained, dense, dark-coloured rocks to scoriaceous, lighter-coloured varieties.

The first and smallest specimen is that of a dense black *Basalt*, showing here and there a few black augites and very small grains of olivine. Under the microscope the augite (of which an excellent cross-section is present in one slide) appears almost colourless. Prismatic and a weaker pinacoidal cleavage are shown: prismatic angle about 87°. The augites are quite free from corrosion, and enclose a few magnetite grains. The olivine grains show traces of crystalline outline, and are altered round the margins and along cleavage cracks into ferruginous matter. Magnetite is present in large and small grains, sometimes showing crystalline form. The base consists chiefly of lath-shaped felspars, which show what appear like fluxion phenomena round the porphyritic constituents. The felspars, which are of a basic variety, are closely packed together, and in the interstices come fine grains of magnetite and a little glass. Fig. I. is a diagrammatic drawing showing a cross-section of an augite prism, and the base.

The rock termed Hornblende Basalt is one possessing a peculiar whitish-grey coat of weathering products, but, on fracture, shows a very fine dense rock, with here and there a few porphyritic crystals. Mr. Twelvetrees suggests that, on account of these porphyritic hornblendes, the rock is an andesite. In the New South Wales collection some doubtful andesites are mentioned. An analysis of this specimen gives 45 per cent. of $Si\,O_2$, placing this rock amongst the Basalts.

Under a high power the base of this rock is seen to consist of long lath-shaped felspars, grains of magnetite, and everywhere are scattered small needle-shaped crystals, which do not extinguish straight, and probably are felspathic microliths. These are set in a glass of a light brown tint. Fig. IV. shows the arrangement of felspars, microliths, and glass.

In the scoriaceous Basaltic Rock, augites and olivines are clearly visible to the naked eye. The augites are similar to those above mentioned, but the olivines are

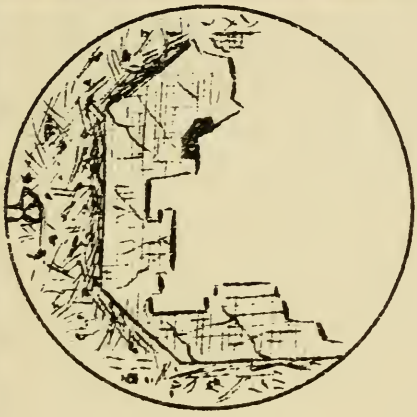

FIG. 1.

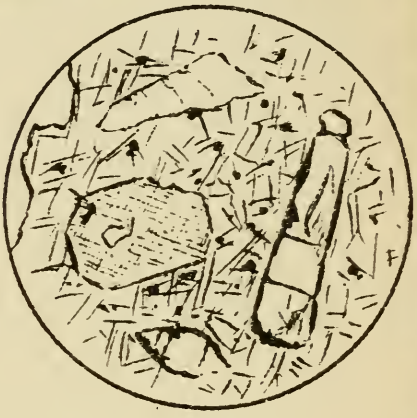

FIG. 2.

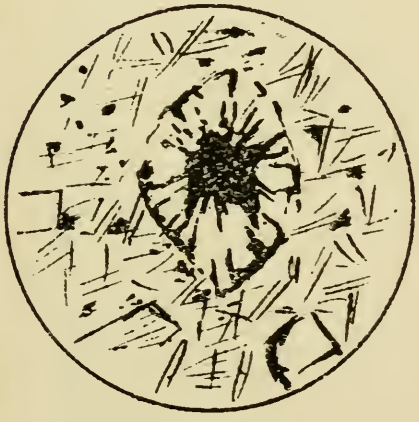

FIG. 3.

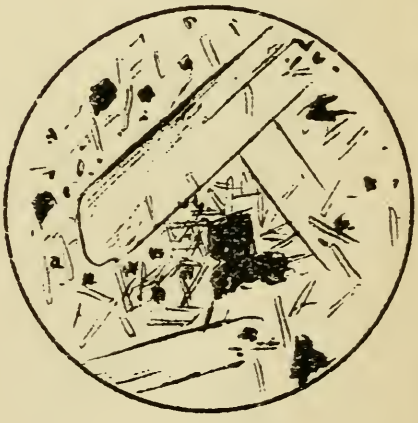

FIG. 4.

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much better developed than usual, and exhibit good crystalline outlines, high refraction, straight extinction, and an irregular cleavage transverse to their length, and somewhat similar to that exhibited by the Fayalites in the Sandy Bay Basalt. Fig. II. diagrammatically represents a section of this rock. The olivines are only slightly decomposed. Magnetite sometimes forms peculiar skeletons (perhaps decomposition products of the olivine), one of which is represented in Fig. III. The section of this rock is too thick to admit of an accurate determination of glass in the base.

Of the Sedimentary Rocks we have a single representative, in the form of a sandstone, fine-grained, and composed of angular fragments of felspars.

Amongst the altered rocks there is one specimen of a grey schistose rock which, under the microscope, in transmitted light, shows a confused mass of transparent flakes (perhaps sericite), with here and there large spots, probably occupying the place of former crystals. Analysis shows this rock to consist chiefly of SiO_2, Fe_2O_3 (or FeO), and Al_2O_3, with traces of CaO, and a high ignition loss of 5·45 per cent. This would point to a rock from which K_2O, Na_2O, MgO, and CaO had been leached out, and secondary hydrous compounds formed. This analysis agrees with those given by Rosenbusch (Elemente der Gesteinlehre, p. 497), and points to a rock of continental origin, and along with the Biotite Mica Schist of Professor David's collection, gives strong circumstantial evidence as to the existence, *at some time*, of an Antarctic Continent.

The remaining specimen is of a brown-red colour, and slightly scoriaceous, and, most probably, is a decomposition product of some scoriaceous basalt.

The authors, in conclusion, wish to thank Mr. Morton for the kind loan of the above specimens; and also Mr. W. H. Twelvetrees, for some kindly hints.