

Geology. — *A pseudotachylytic rock from Eastern Borneo.* By W. P. DE ROEVER. (Communicated by Prof. H. A. BROUWER.)

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A schistose pseudotachylyte-breccia (U 2285) was collected by Ir. J. G. H. UBAGHS in the S. Kajan somewhat downstream of the confluence with the S. Kat. The surrounding region is mainly constituted by a dynamometamorphic formation of slates, phyllitic slates, arkoses, and sandstones, which is covered and veined by younger volcanic rocks.

The sample of the rock described here has the appearance of a volcanic breccia. Microscopic examination reveals that it is essentially constituted by a monomikt pseudotachylyte-breccia of tectonic origin. One of the thin sections studied shows a local polymikt zone, in which there are also psammitic rock-fragments of the dynamometamorphic formation, crystals of hornblende and plagioclase, and larger fragments of the younger volcanic rocks.

Besides sporadic crystals of zircon the pseudotachylyte-fragments contain irregularly bounded crystal-fragments of quartz, of small to extremely small sizes, amidst a groundmass of varying appearance. The crystal-fragments of quartz often show a strongly or very strongly undulose extinction. Especially in the polymikt zone mentioned above the groundmass of the pseudotachylyte-fragments may show all characteristics of glass; the refractive index is considerably lower than that of the Canada balsam. In some of the other fragments the groundmass has the patchy appearance of the devitrified glassy mesostasis of some types of effusive rocks. In many other fragments again there has been a later formation of chlorite-like material, sometimes showing a distinct schistosity.

The monomikt parts of the thin sections studied show a distinct schistosity owing to the parallel arrangement of newly formed chlorite-like and sericitic material in the matrix of the breccia. The fragments may also show a schistose structure, but here there is a random orientation of the schistosity-planes, which may be explained by the assumption of two phases of dynamometamorphic recrystallization.

The rock is veined by quartz and zeolites.

The formation of this pseudotachylytic rock has been caused by intensive and rapid movements along a fault-zone. The adjoining rocks have been molten due to the development of frictional heat as a consequence of these movements; that the rocks have actually been vitrified and not only crushed to an isotropic aggregate of infinitesimal fragments, is illustrated by the low refractive index of the glass. Younger phases of movement caused the

brecciation and the development of the schistose structure. The components of the polymikt zone have probably been admixed during one of the youngest phases of movement. Though most fault-zones in this region are characterized by a phyllitization of the dynamometamorphic formation in their vicinity, the rock described here illustrates that movements have also occurred after the effusion of the younger, post-metamorphic volcanic rocks.

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