

Brannerite, a new mineral in Norway

BY

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During a radiometric survey of the Modum area, together with state geologist Thor Siggerud, various types of radioactive mineral occurrence have been found. One proved to contain brannerite, which is the first discovery of the mineral in Norway.

This mineral occurs adjacent to the main road 300 m W of Haugfoss bridge (near Åmot in the Modum district of Norway). It occurs in more or less open fissures (dip 45° W) with a maximum width of half a centimeter, in a pressed greenschist of the Bamble formation. To the W this greenschist grades into an even more crushed rock-type showing a breccia structure. Some pegmatites can be observed not far from this place, and a genetic relation seems probable. The main rock contains the following minerals: Albite in very irregular grains with strongly undulating extinction; bluish-green actinolite, often altered to penninite, which shows abnormal bluish interference-colours; orthorhombic zoisite in rounded grains. As accessories occur ilmenite partly altered to leucoxene, rutile and quartz.

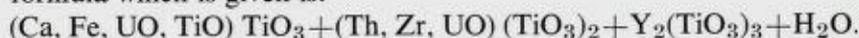
The mineral separation was carried out as follows:

The rock was crushed and sieved. Treatment with tetrabromethane took away the lighter components, while magnetic separation removed the rutile and ilmenite, leaving the brannerite in the 0.6A and 0.7A fraction (Tilt 10° Lift 15° Frantz Isodynamic Separator). Finally some grains were picked out under the microscope. Radio-

metric checking of each fraction accompanied the operations, and autoradiographs were taken both of the thin section and the last fraction of the separation. An X-Ray determination (Debye — Scherrer diagram) was kindly performed by Knut Bryn (Mineralogical and Geological Museum of the University, Oslo.) We are also grateful to J. Haaland of the Institute for Atomic Energy at Kjeller for a spectrographic analysis of the mineral.

Description of the mineral.

A first description was published by Hess and Wells in the Journal of the Franklin institute of February 1920. Chemically it is considered as a hydrated metatitanate of various bases, and the formula which is given is:



Syst. Monoclinic. $G = 4.5$ to 5.43 . $n_{Li} = 2.26$ $n_{Na} = 2.30$.

The mineral was first considered as rare, but seems to have become more common. In the Blind-river area it occurs in a conglomerate, similar to the Witwatersrand-conglomerate, and has a supposedly hydrothermal origin. In Kelly Gulch it is found in a gold placer coming from nearby pegmatites.

The mineral found at Haugfoss is blackish-brown with H 4 to 5; it presents a prismatic tendency and is strongly radioactive. The maximum grain size was about 3 mm. It is soluble both in HCl and HNO₃.

In thin section it is brown with a yellowish tinge. It contains inclusions of plagioclases (often saussuritized) and dark minerals. Straight fissures cut the mineral in all directions. It is isotropic.

The X-Ray determination showed that the mineral was highly metamict, and the sample was heated (1000°C) to restore the crystal lattice. The diagram obtained proved to be identical with one obtained from a Brannerite sample from Bou Azer (Morocco).

The spectrographical analysis showed the presence of abundant U, Th, and Ti with smaller quantities of Y, Ca and Fe. No Zr was present, but Th seemed to be more abundant than usual. These results agree with the formula given by Hess and Wells. No other rare earths were observed.

It is the writers' opinion that the mineral is of hydrothermal-metasomatic origin, and must be considered as belonging to a mesothermal deposit.

Sammendrag.

Brannerit, et nytt mineral i Norge.

Ved uranundersøkelser på Modum, ble mineralet brannerit påvist for første gang i Norge. Det forekommer ved hovedveien 300 m vest for Haugfoss bru. Mineralet opptrer på mer eller mindre åpne sprekker i en presset grønskifer tilhørende Bamble-formasjonen. Sprekkene kan ha en maksimal vidde på 0,5 cm.

Mineralet ved Haugfoss er brunsort med H 4 til 5. Det er løselig i HCl og HNO₃. Mikroskopisk er det brunt med et gult skjær, isotropt og fører inneslutninger av plagioklas og mørke mineraler. En røntgenbestemmelse viste at mineralet er identisk med brannerit. Ved en spektrografisk analyse ble påvist elementene U, Th og Ti samt mindre mengder Y, Ca og Fe. Th synes å opptre i noe større gehalt enn vanlig.

Forfatterne antar at mineralet er dannet hydrothermal-metasomatisk.