Tungsten in Southern Norway.

BY

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Recent work has proved a wide-spread tungsten mineralization in Southern Norway, where scheelite occurs in hydrothermal veins of precambrian age, and also in contactmetasomatic deposits and hydrothermal veins of permian age.

Previously scheelite was known in Fennoscandia in skarn rocks and granite pegmatites in Middle Sweden, in sulphide ores and as an accessory mineral in the rocks of the Ultevis complex in Northern Sweden, in sulphide ores in Southern and Southeastern Finland, and as a mineralogical rarity in certain rocks in the South and Southwest of Finland. In Norway scheelite was found in the Oslo Area by Professor V. M. Goldschmidt in the Skjerpemyr mine near Grua more than thirty years ago, and professor J. Schetelig identified it in a specimen from Sørumsåsen mine near the town Drammen ten years later.

Both places have been visited by the authors, and a quite extensive scheelite mineralization has been proved by the aid of a portable UV. lamp. In addition scheelite has been found in the following places: Lykkens Prøve mine west of Skjerpemyr near Grua (very scarce), Rørvik mine near Sørumsåsen, Oterdalen mine about 10 km S. E of the town Drammen, in a fault through the Narverud Iron mine about 6 km W. of Drammen, and in a specimen from Årvold about 8 km N. E. of Oslo.

At Grua and Årvold scheelite occurs in contactmetasomatic limestones. The paragenesis at Grua is calcite, quartz, andradite, monoclinic pyroxene, sphalerite, galena, chalcopyrite, pyrite, and scheelite. The hemimorphite, ilvaite, and uralite of Skjerpemyr are probably formed at a later stage.[1] At Sørumsåsen, Oterdalen and Rørvik near

[1] V. M. Goldschmidt: Die Kontaktmetamorphose im Kristianiagebiet. Videnskabsselskabets Skrifter I, no. 1. 1911.

Drammen scheelite is found in quartz veins together with molybdenite. The deposits have been worked as molybdenum mines but the tungsten content was never detected and went to waste.

A systematic survey of hydrothermal veins and metasomatically altered limestones in the Oslo Area would probably give a number of additional finds.

The above-mentioned deposits were formed by hydrothermal solutions originating from the plutonites of the Oslo area, which were intruded in the "Vorland" of the variscian mountain chain. As the majority of the tungsten deposits in Europe are found in the variscides a tungsten mineralization in the Oslo area is not so surprising.

In the border zone of the precambrian Ekersund formation towards the Telemark formation wolframite was found in the Ørsdalen molybdenum mines about 1910, and about 10 years later an appreciable content of scheelite was recognized in the ores of this area. One of the Ørsdalen deposits was worked as a tungsten mine from 1937 till the end of the war, and is now reopened.

In September 1950 the authors, accompanied by Professor Tom. F. W. Barth, made a rapid survey of several hydrothermal deposits of the Telemark formation and new finds of scheelite were made in the following places: Dalen and Askom molybdenum mines near the western end of the lake Bandak, Tarjeisberg molybdenum deposit west of Nisservann, and in Bleka gold-mine in Svartdal (scarce). The Dalen, Askom and Tarjeisberg deposits are all formed by hydrothermal solutions exuded from the precambrian Telemark granite. That may be true of the hydrothermal goldbismuth veins at Bleka also, but their genesis should not be discussed in this paper.

An abnormally high tungsten content has been established in the precambrian areas west of the Oslo Fiord, while the pegmatites in Østfold (east of the Oslo Fiord) contain little or no tungsten.[2], [3], [4]. A columbite from Tveit, Iveland contains as much as 13.00 % WO_3.[2]

[2] Harald Bjørlykke: The mineral paragenesis and classification of the granite pegmatites of Iveland, Setesdal, Southern Norway. Norsk Geologisk Tidsskrift XVII, pp. 1—16. (1937).

[3] Harald Bjørlykke: Mineral parageneses of some granite pegmatites near Kragerø, Southern Norway. Norsk Geologisk Tidsskrift XVII, pp. 1—16. (1937).

[4] O. J. Adamson: The granite pegmatites of Hitterø, Southwestern Norway. Geologiska Föreningens i Stockholm Förhandlingar LXIV, pp. 97—116. (1942).

In the western precambrian area in Southern Norway three precambrian formations have been recognized: The Kongsberg—Bamble formation, the Telemark formation, and the Ekersund formation. The two first-mentioned ones are probably genetically identical and are formed contemporaneously at different depths.[5]

As to the age of the Ekersund formation which consists of anorthosites and charnockitic rocks, no definite statement can be made. In the opinion of the authors it may well be older than the other two, and the tungsten-bearing pegmatites on the island of Hitterøy and the hydrothermal veins of Ørsdalen, both in the Ekersund formation, may originate from younger igneous rocks of the Telemark and Kongsber—Bamble formations.

Our present knowledge can be summarized as follows: In the precambrian a tungsten mineralization has taken place in connection with the Kongsberg—Bamble—Telemark orogeny, while tungsten is a non-characteristic element in the East-Norwegian precambrian area, and probably also in the Ekersund formation.

In Caledonian rocks and ore deposits tungsten has not been looked for, a survey of the pyrite deposits would be worth while in view of the recent finds of scheelite in several sulphide ores in Northern Sweden.[6]

In the variscian Oslo area a wide spread tungsten mineralization has been established.

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[5] Tom. F. W. Barth: The large pre-cambrian intrusive bodies in the southern part of Norway. Report of XV International Geological Congress Washington, 1933.

[6] E. Grip: Tungsten and molybdenum in sulphide ores in Northern Sweden. Geologiska Föreningens i Stockholm Förhandlingar. LXXIII, pp. 455—472, (1951).