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Tin-Tungsten mineralization in and around Jabarban-Belamu, Purulia District, West Bengal

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Introduction

The area described belongs to the Precambrian terrain of the northwestern sector of Purulia District, West Bengal, and is located about 8 km north of Kotshila (23° 24″N, 86° 05″E) nearest railway station and is accessible from Calcutta both by rail and road. Significant concentrations of tin and tungsten are seen in some skarn rocks and schists in and around Jabarban–Belamu area in a zone trending east-west over a length of 4 km (Fig. 1).

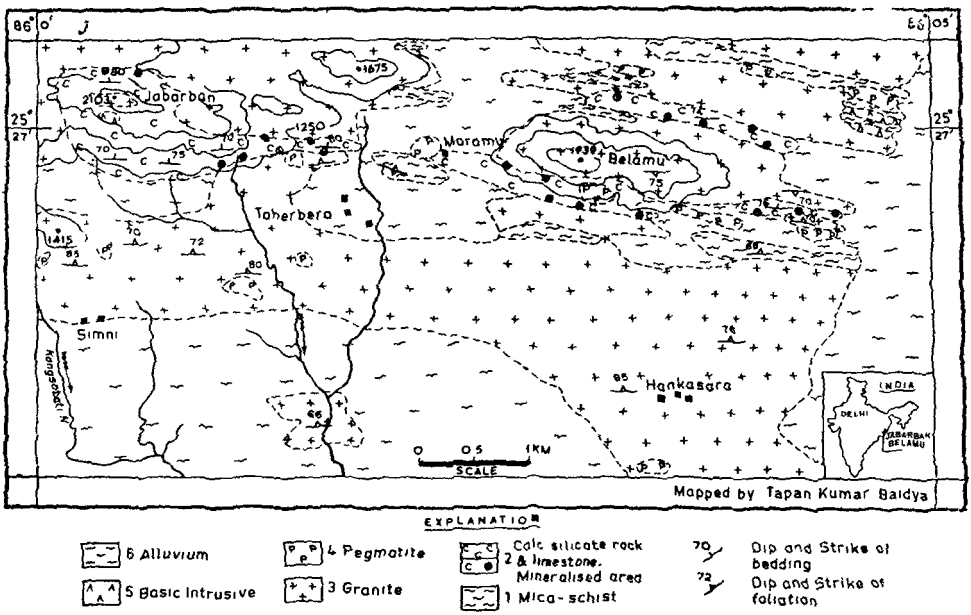

Figure 1. Geological map of Jabarban-Belamu area, Purulia District, W. Bengal

Geological Setting

The area forms the westernmost part of the northern shear zone of Purulia district. Some metasediments, e.g., mica-schist, phyllite, limestone, calc-silicate rock etc., represent the oldest rock group in the area. These metasediments are intruded and often partly digested by younger granite which is equivalent to Chhota Nagpur granite-gneiss (900–955 m.y.). The general structural trend of the metasediments and the gneissic granite is east-west (corresponding to the regional trend of the shear zone) with 60° to 85° dip towards north. The metasediments have been subjected to greenschist facies to amphibolite facies metamorphism increasing from southeast towards northwest. The calc-silicate rocks or skarn rocks have formed due to metasomatic effect of the younger granite on the limestone. The mineralized zone is restricted to within 20 metres from the granite contact. The metasedimentaries and granite are often intruded by pegmatites, quartz veins and basic rocks.

Mineralogy

The metapelites are mainly composed of quartz, Na-plagioclase, muscovite, bio-

TABLE I

Oxides in Wt %	1	2	3
SiO_2	55.10	57.62	—
Al_2O_3	7.56	9.92	—
TiO_2	0.36	0.41	—
Fe_2O_3	2.43	2.62	—
FeO	2.20	2.35	—
MnO	0.03	0.04	—
CaO	16.60	13.42	—
MgO	10.27	7.15	—
Na_2O	1.06	1.20	—
K_2O	3.49	4.73	—
P_2O_5	0.038	0.144	—
H_2O (Free)	0.04	0.02	—
H_2O (combined)	0.36	0.22	—
Element in wt %			
Tin	0.22	0.37	0.63
Molybdenum	0.037	0.042	0.05
Tungsten	0.008	0.012	0.005
Niobium	0.037	0.025	0.021
Tantalum	0.023	0 028	0.024

1. Quartz-diopside-epidote-tremolite-plagioclase-gneiss (Skarn rock): Loc: About 1.5 km ESE of Belamu Hill.
2. Quartz-calcite-diopside-epidote-tremolite-microcline-plagioclase-granulite (Skarn rock). Loc: About 1.2 km ESE of Maramu.
3. Quartz-diopside-calcite-actinolite-tremolite-plagioclase-gneiss (Skarn rock). Loc: About 1 km NW of Taherbera village.

tite, garnet and chlorite with occasional staurolite and sillimanite. The granite and its gneissic modifications consist mainly of quartz, microcline, biotite & Na-rich plagioclase, with orthoclase, apatite, tourmaline, garnet, sphene and magnetite as accessories. The skarn rock is principally composed of quartz, calcite, diopside, plagioclase (oligoclase and andesine mainly), tremolite and actinolite which are associated with accessory microcline, epidote, margarite, scapolite, sphene, sericite, zoisite and some sulfides viz. arsenopyrite, sphalerite, pyrite and chalcopyrite. Cassiterite and scheelite characteristically occur in the more quartzofeldspathic parts of some banded skarn rocks close to the granite contact. Scheelite occurs as white or pale yellow disseminated specks (0.01 to 0.05 mm in length). Cassiterite grains are disseminated and range in length from 0.02 and 0.10 mm. Some small specks and very thin veinlets of a light green mineral, optical properties corresponding to sphene, exhibit lemon yellow fluorescence under shortwave ultraviolet light. This mineral is suspected to be malayaite (a tin-analogue of sphene). Detailed mineralogical study of this mineral is being carried out.

Analytical data

Major oxide analyses and element wise analysis of some skarn rock samples from different locations are given in Table I.

Analytical results of some mica-schists for tin and tungsten are given below:

Wt. %	Sp. No. 301	Sp. No. A/10.1.78	Sp. No. J 4M	Sp. No. J 16
SnO_2	0.21	0.43	0.09	0.14
WO_3	0.08	0.203	0.044	0.112

Conclusion

The major part of tin-tungsten mineralization in the skarn rocks is the result of contact metasomatism and pneumatolytic action of the younger granite on the calcareous rocks. However, some elliptical and subrounded cassiterite grains and their orientation along the primary layering do not rule out the possibility that at least a part of mineralization may be syngenetic also. Moreover, the enrichment of tin and tungsten also in the metapelites in the locations considerably distant from the granite contact bears the possibility of syngenetic mineralization.

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