

## RESEARCH NOTE

### OCCURRENCE OF COLUMBITE MINERALISATION AROUND THE TALBAHAL- KARUNAPALI AREA, PHULBANI DISTRICT, ORISSA

**Abstract:** In the columbite-bearing pegmatite occurrences in the Eastern Ghats Complex around Talbahal - Karunapali area of Phulbani district, economic concentrations of columbite with appreciable quantities of tungsten and trace of tin are recorded in the colluvial and eluvial placers surrounding the source pegmatite.

**Introduction:** In India, small occurrences of columbite-tantalite along with beryl and mica in pegmatites have been reported from a number of places in Bihar and southern Karnataka (Banerjee *et al.*, 1987; Ramachandran and Sinha, 1992). The Atomic Minerals Division is producing small quantities of columbite-tantalite from the eluvial soils of these pegmatites. Nb-Ta minerals are associated with tin ores of Bastar district, Madhya Pradesh and Koraput district, Orissa (Deshpande, 1979; Lamba and Khanna, 1981; Acharya *et al.*, 1982; Acharya *et al.*, 1989; Ramesh Babu, 1993). As large deposits of high-grade ores are very rare, even small occurrences of these rare metals become important to meet our requirement. We report here, for the first time, the columbite occurrences around Talbahal, Boudh sub-division, Phulbani district, Orissa.

**Mode of occurrence :** Four rare metal - bearing pegmatite bodies emplaced in granite gneiss and porphyroblastic gneiss of the Eastern Ghats Complex are recorded in the Talbahal - Karunapali area of Phulbani district between N. Lat. of 20°45' - 20°47' and E. Long. of 84°16' - 84°19', Survey of India Toposheet No. 73D/5 (Fig. 1). These pegmatites are both simple and zoned types. In zoned pegmatites, the core is represented by milky white quartz, followed by a feldspar zone. Occasionally, mica is seen in the intergrowth and wall rock zones. Other associated minerals are beryl, garnet, tourmaline, columbite, magnetite and ilmenite.

Columbite occurs both as primary mineral in pegmatites (Fig. 2) and as detrital mineral (Figs. 3&4) in the colluvial, eluvial and alluvial placers surrounding the pegmatites. The average incidence of total heavies in 100 kg sample is 98 gm in pegmatite, 88 gm in colluvial zone, 110 gm in eluvial zone and 200 gm in alluvial zone. The concentration of columbite is more in the colluvial and eluvial placers. Columbite crystals up to a size of 5 cm are observed. They are black to brownish black in colour and have specific gravity varying from 5.36 - 5.47.

Table - I. Chemical analysis (partial) of columbite from the Talbahal - Karunapali area, Phulbani district, Orissa

Sample No.	1	2	3
Nb <sub>2</sub> O <sub>5</sub>	71.10	69.60	69.60
Ta <sub>2</sub> O <sub>5</sub>	4.40	5.50	5.70
TiO <sub>2</sub>	1.10	1.50	1.20
FeO	15.90	N.D.	N.D.
MnO	5.00	N.D.	N.D.
SnO <sub>2</sub>	<0.10	<0.02	<0.02
WO <sub>3</sub>	1.10	0.89	0.86

N.D. : Not determined

1,2 : Southeast of Talbahal

3 : Northeast of Karunapali

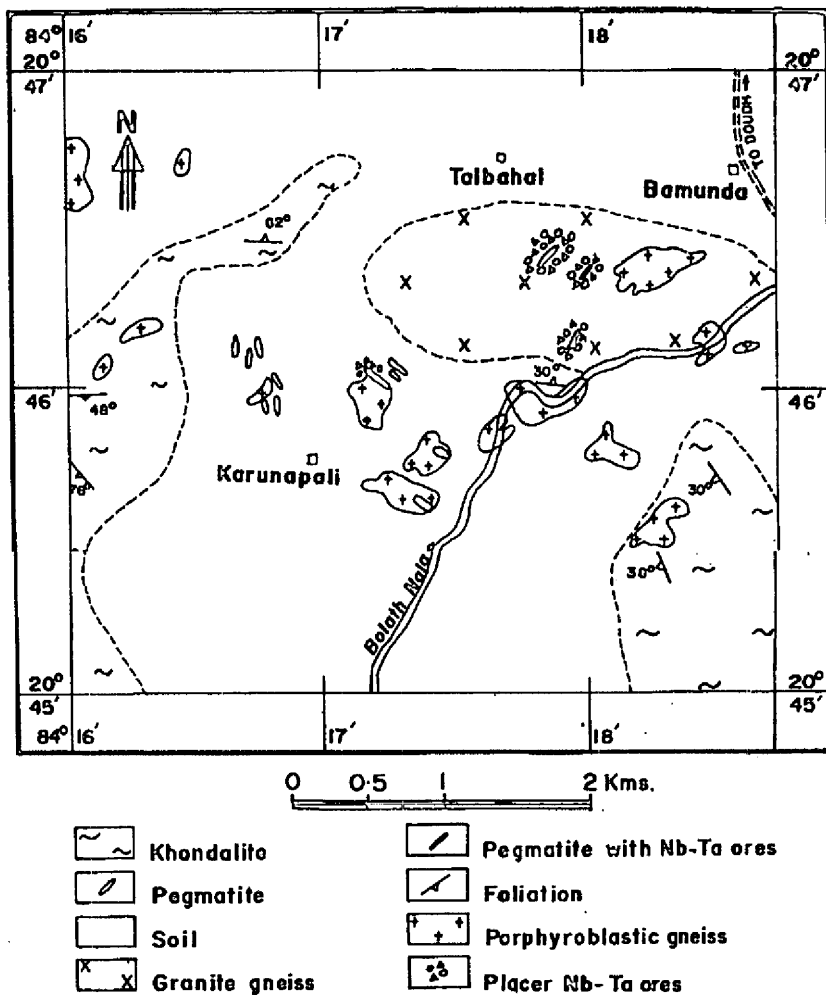


Fig.1 : Geological map of the Talbahal - Karunapali area, Phulbani district, Orissa.

**Results :** Under ore microscope, columbite crystals exhibit greyish white colour with a brownish tint, feeble reflection pleochroism and anisotropism, with Vicker's hardness number of 508 to 583 and reflectivity of 15.2 to 17.9% at 545 nm in air. Their X-ray diffraction patterns reveal that they are dominantly columbite-tantalite. The chemical analysis of the hand-picked columbite crystals (Table - I) confirms that they are niobium-rich with a small amount of tantalum. In addition to Nb and Ta, they also contain appreciable amounts of tungsten. Similar columbite with notable contents of tungsten has been reported by Beddoe-Stephens and Fortey (1981). Tin has been detected in these samples. Natural disordered columbite may contain tin as an isomorphous impurity (Ford, 1982).

**Conclusion :** In view of the presence of niobium, tantalum, tungsten and tin in pegmatite as well as colluvial and eluvial placers around Talbahal - Karunapali areas of Phulbani district,

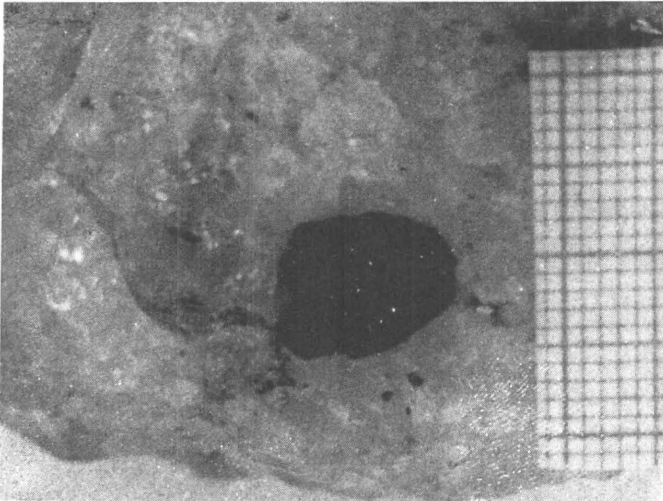


Fig.2 : Columbite (black) as primary mineral in Pegmatite. One division of the scale : 1mm.



Fig.3. Columbite crystal from the eluvial deposit.

Orissa, it is worth conducting a systematic survey and detailed prospecting to decipher the economic potentiality of these rare metals.

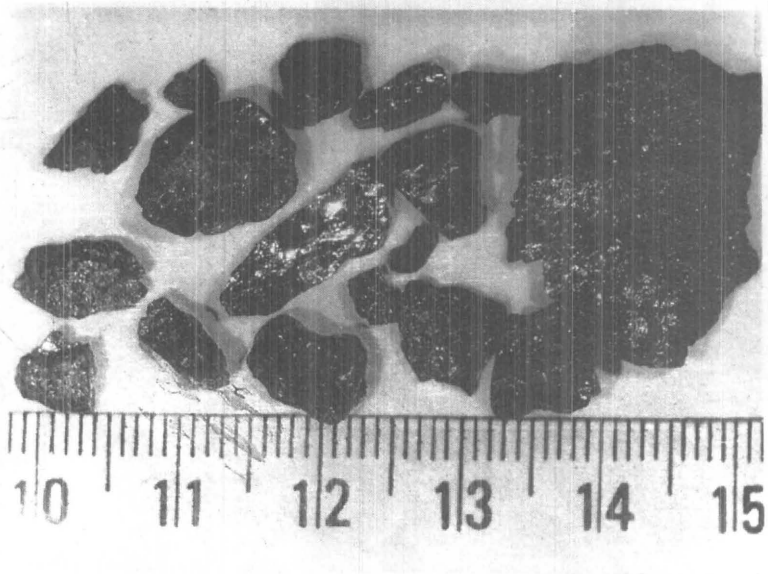


Fig.4. Grains of columbite from placer sediments.

**Acknowledgements :** The authors are thankful to Prof. H.S.Ray, Director, Regional Research Laboratory, Bhubaneswar, and Director, DMG, Govt. of Orissa for their permission to publish this communication. Samples were kindly analysed by the AMD, Hyderabad. Thanks are due to Dr R.K.Sahoo and Dr B.S.Acharya for helpful discussions and X-ray diffraction studies, respectively.

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(Received, 2 June, 1993; Revised form accepted: 15 November, 1993)