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Molybdenum-copper mineralization near Chintamani, Kolar District, Karnataka

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Introduction

Reports of the occurrence of molybdenum in Karnataka craton are few. Those so far recorded are from amphibolite in Kushalnagar (Govindarajulu and Sheriff, 1967), pegmatite in Dodballapur (Rama Rao, 1962), as fracture fillings in gneiss, Manchavalli (Gaikwad, 1969), and as dissemination in pink granites, Malatgud, (Gururaja Rao and Devadu, 1975). The present note records the occurrence of molybdenite as fracture fillings in ovoid quartz pipes emplaced within the migmatitic Peninsular gneisses near Chintamani.

Mode of occurrence

The molybdenum bearing area is situated half a km NNW of Yegawakota village (78°9'35"; 13°29'50") in Chintamani taluk of Kolar district (topo sheet No. 57 K/2). The area near Yegawakota is composed of migmatitic Peninsular gneiss. The migmatitic character of the gneiss is made out by mineralogical banding, drag folds, xenoliths of amphibolite and two sets of foliation. Shearing and development of feldspar porphyroblasts aligned in northeasterly direction are noted. The prominent foliation trends N35° to 50°E and dips at angles varying from 40° to 60° to the northwest. The second set of foliation is N-S and dips west at 30° to 60°. The N-S trending foliation appears to be later. Drag fold axes plunge at low angles (30°) both towards NE and SW. Pegmatite veins are emplaced mainly along northeasterly trending foliation. Two independent lenticular quartz pipes have intruded into the gneiss.

Mineralized quartz pipes

The Mo-Cu mineralization is confined to two independent vertically disposed quartz pipes emplaced within the migmatitic gneiss with a spacing of 140 m between them across the foliation (Fig. 1). The two quartz pipes are oval in shape and measure 74 m × 34 m and 50 m × 30 m respectively. They have a sharp and well defined contact with the host rock except for occasional minor slip planes. Vertical attitude of the pipes could be made out. The longer axis of the oval plan of the pipes is parallel to the predominent northeasterly trending foliation. The quartz pipes exhibit two sets of well developed joints; the northwestern pipe shows N85°W trending steep northerly dipping and N15°E trending steep easterly dipping joint sets; the southeastern pipe exhibits N45° to 65°E and N30° to 45°E trending joints with steep dips. Apart from these, the quartz bodies have developed fine fractures which are not easily perceptible unless healed by pale pink potash feldspar. At places the quartz shows signs of shearing and recrystallization. Such sheared portions are very fine-grained and have a reddish look. All fractures including joints developed in quartz pipes are healed by fine grained pale pink potash feldspar and constitute favourable loci for deposition of molybdenum and copper (Fig. 2). Along the contact, pegmatite forms a crude ring around the quartz pipes.

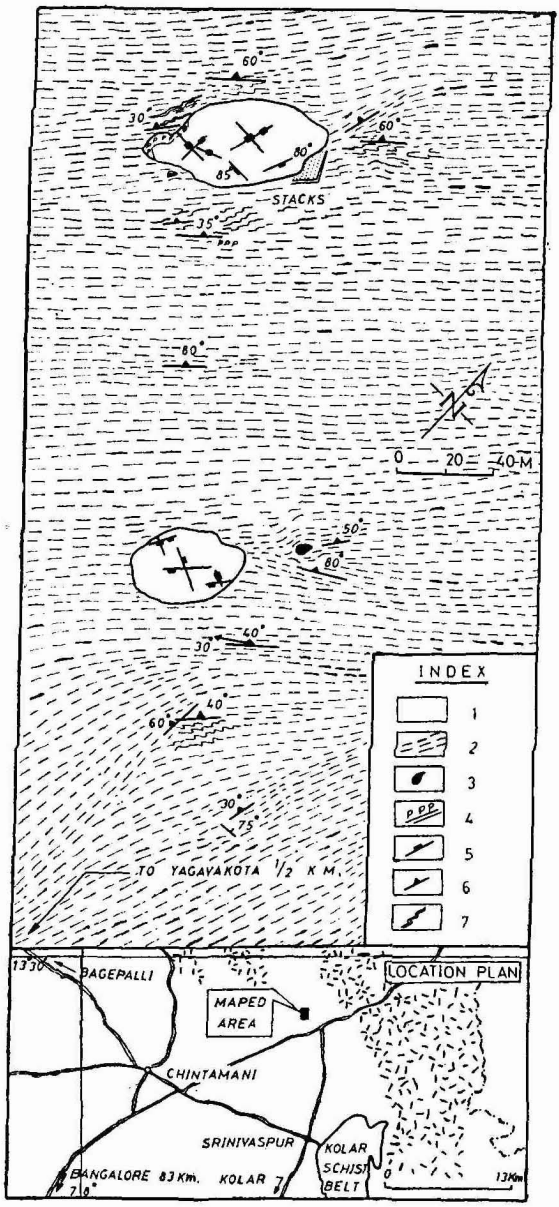


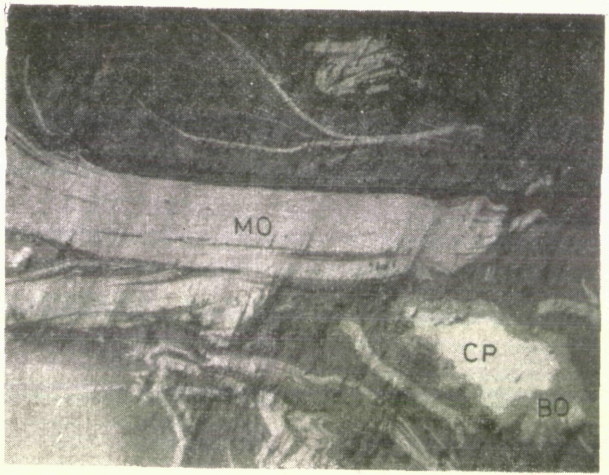
Figure 1. Geological Map of the area.

INDEX: 1. Mineralised quartz pipes
2. Migmatitic Gneiss
3. Amphibolite xenolith
4. Pegmatite
5. Dip and strike of joints
6. Dip and strike of foliation
7. Minor folds

Mineralogy

Molybdenite is associated with chalcopyrite, pyrite and sphalerite; bornite, hematite and malachite are secondary minerals. The gangue minerals consist of chlorite, biotite, pale pink potash feldspar and sericite mica.

1



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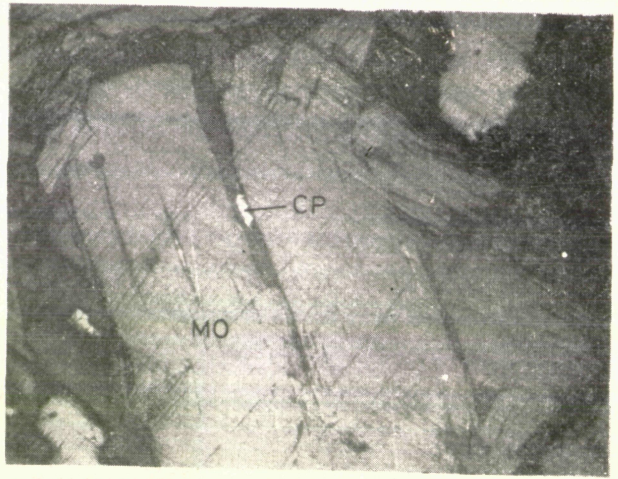

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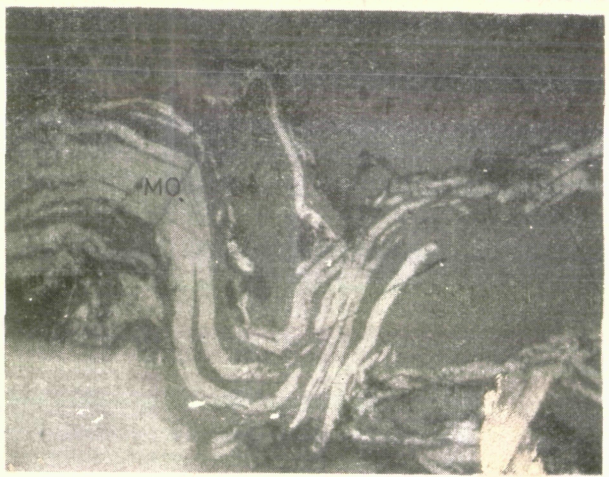

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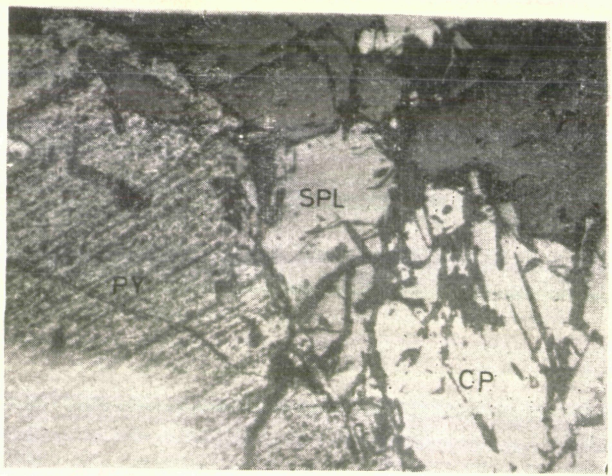

Molybdenite: Molybdenite has been identified by its characteristic hexagonal crystallographic form, lead grey metallic luster, and greasy feel. On rubbing, the soiled finger exhibits metallic lustered fine powder particles unlike graphite. Under ultra violet light, violet colour is exhibited which again distinguishes it from graphite.

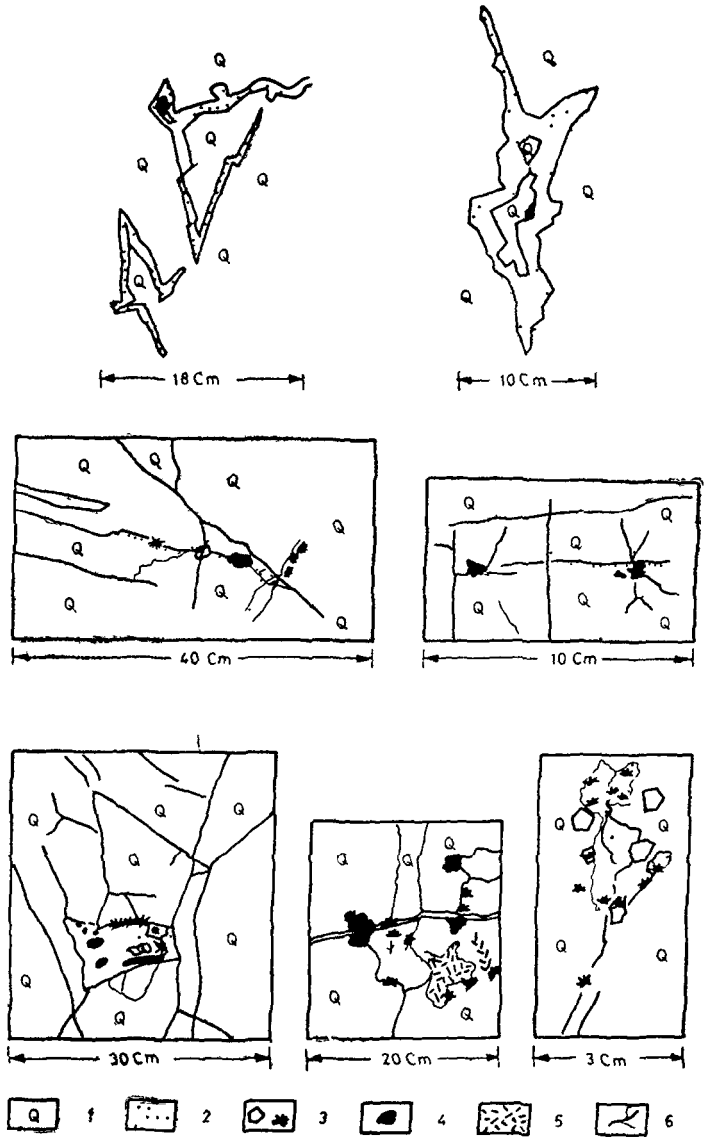

Figure 2. Structural control of mineralization.

INDEX: 1. Quartz, 2. K. Feldspar, 3. Molybdenite, 4. Sulphide, 5. Biotite, 6. Fractures in Quartz.

The hexagonal plates have a basal cleavage. Molybdenite crystals occur in the form of rosettes in cavities in quartz, as plates set parallel to the walls of fractures in quartz and feldspar, as smears over fracture surfaces and as fine granules within feldspar (Fig. 2)

Under reflected light molybdenite possesses its characteristic pale grey to

brownish grey pleochroism and reddish brown to ash-grey anisotropic colours. Crystals have tabular form (Plate I, Fig. 1) and are bent as well (Plate I, Fig. 3). Cleavage planes and intercrystal spaces are occupied by chalcopyrite (Plate I, Fig. 2). Inclusions of molybdenite are noticed in sphalerite.

Chalcopyrite: Chalcopyrite is subordinate in amount. It occurs as disseminations and stringers filling fine fractures in quartz, feldspar and molybdenite. It also occurs as fine exsolved blebs within sphalerite. Bornite occurs as a rim around chalcopyrite (Plate I, Fig. 1).

Sphalerite: Sphalerite was identified only under the microscope (Plate I, Fig. 4). It has pale grey colour; exhibits characteristic internal reflection and exsolution texture. Exsolved blebs of chalcopyrite are unoriented. Sphalerite replaces molybdenite and inclusions of molybdenite are found in sphalerite.

Paragenesis

The following sequence of deposition of both metallic and gangue minerals is deduced:

Quartz (emplacement in migmatitic gneiss)
—minor shearing and development of fractures—
K-feldspar
Biotite and chlorite
Molybdenite
Pyrite
Sphalerite
Chalcopyrite
Bornite (secondary after chalcopyrite?)

The mineralization at Yegawakota has a resemblance to the Malanjkhand Mo-Cu mineralization where mineralization is stated to be confined to fractures within an arcuate trending thick quartz vein emplaced within the granite-granodiorite country rock.

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