NOTES

GOLD MINERALIZATION IN THE SULPHIDIC BIFS OF CHITRADURGA SCHIST BELT, KARNATAKA - POSSIBILITY OF NEW WORKABLE GOLD DEPOSITS

Gold is being produced in India mainly from the lode deposits of greenstone belts of Kolar, Hutti and Ramagiri. With the gold reserves depleting there is an urgent need to search for new deposits not only in volcanic rocks but in other different lithologies like conglomerates, graywacke, banded iron formation (BIFs) and laterite. The Chitradurga Schist Belt in the Dharwar craton of South India, is one of the belts which fulfils the lithotectonic conditions favourable for gold mineralization. In view of its economic potential this belt has been selected for detailed petrological and geochemical studies and for gold exploration.

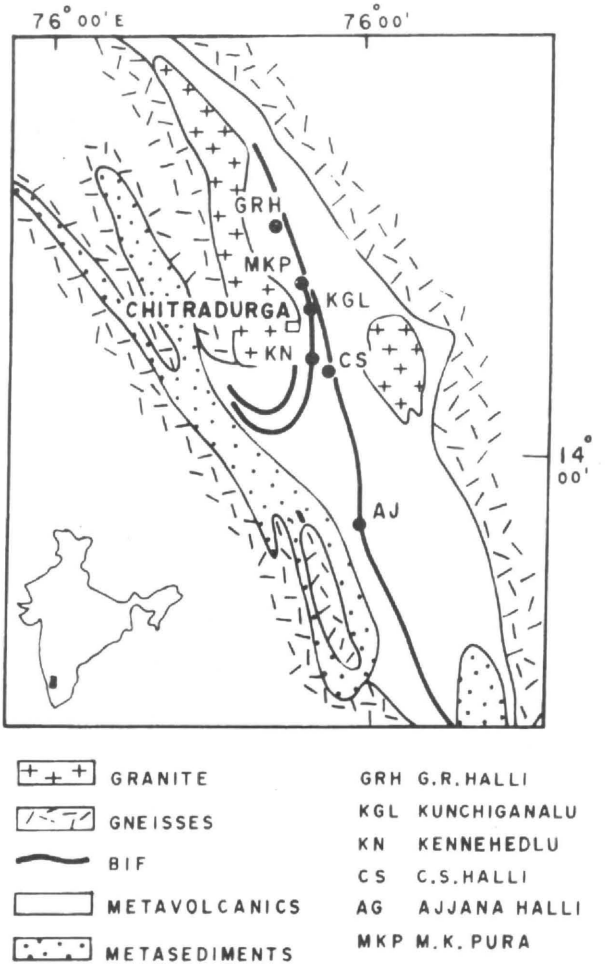

Fig.1. Sketch map of a part of the Chitradurga Schist Belt.

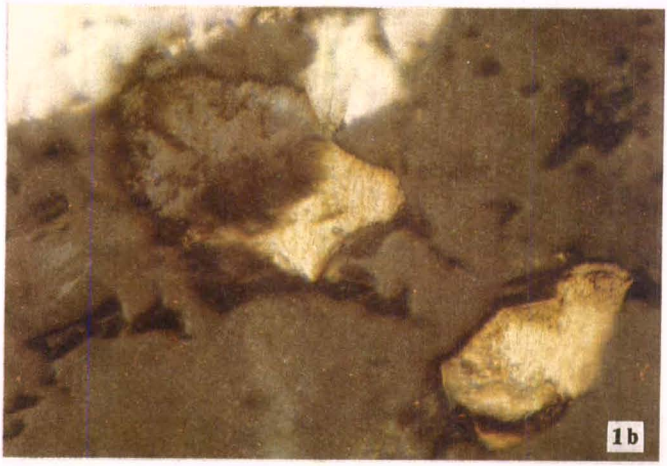

Plate 1. Gold (a) in native form, (b) in thin rims and (c) small anhedral and discrete grains

The Chitradurga Schist Belt is made up of different lithologies with distinct lithotectonic characteristics, reflecting near shore, shallow to deep water sedimentation and subaqueous volcanic activity associated with BIFs of various types. A well developed 10-15 m wide and nearly 35 km long sulphide facies BIF (in the central part of the belt) underlain by pillowed and variolitic metavolcanic rocks is highly deformed, sheared and metamorphosed from upper greenschist to lower amphibolite facies. This zone at several places contains interbedded carbon phyllite. In this sulphide facies BIF, gold occurs at Madikerepura, Kunchiganahalu, Ingaldhal, Kallehadlu and Chikkasiddavanahalli blocks (Fig.1).

Ore microscopic studies have revealed the presence of gold (a) in native form as 20-40 micron inclusions in pyrite and arsenopyrite, (b) as thin rims of Au-Ag alloy around sulphides and (c) as small anhedral and discrete grains in vein quartz (Plate 1a, b, c). It also occurs as invisible gold in the form of thiosulphate in solid solution within sulphides. Results of the preliminary sampling and analysis from certain spots at the surface indicate that these sulphidic BIFs contain gold ranging from 0.7 to 3.2 g/t. Bullion obtained after lead fire assay analyses of the BIFs from the above areas yield an average of 23% Au, 70% Ag and 7% CuO. Vein quartz and the associated carbonphyllites from the Ingaldhal mine area have yielded gold values ranging from 0.31 to 13.54 g/ton.

REE data on these samples suggest that mantle derived hydrothermal solutions added to the water column in the Chitradurga basin supplied the chemical constituents of this gold-bearing sulphide facies BIF. Later deformation and attendant remobilization in the BIFs and associated rocks during convergence, have produced secondary hydrothermal solutes due to fluid activity resulting in (a) development of second generation sulphides with Au and (b) concentration and enrichment of Au and other precious metals in quartz veins along highly deformed zones mainly in the BIFs and associated rocks. Preliminary investigations point to a great potential for gold and related metals in Chitradurga Schist Belt. An integrated collaborative exploration programme between HGML and NGRI funded by DST, HGML and NGRI has been taken up.

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