The Geology of the Gold Deposits

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Amongst all metals found in the earth's crust, Gold is the most precious one. Gold not only symbolizes individual 's prosperity, but also represents the strength of a Nation.

Mining and Agriculture have been and remain, for the foreseeable future, the two basic industries or occupations on which all other human activity eventually depends. For the gold, man has retained a curious fascination for more than 5000 years, undoubtedly promoted by its great natural beauty and universal durability. The gold continues to represent stability and relatively constant intrinsic value over a long period. Gold has caused some of the greatest human migration, and has cursed and blessed. India is the leading gold consumer in the world.

Gold mining is important not just from the point of view of easing the burden of import but also from the economic, social and infrastructure development of India. Infrastructure development in mining region will not only lead to significant development but will also create considerable employment opportunities in rural areas.



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The first recorded history of mining in India goes back to 1774, when the East India Company was granted permission for mining coal in Raniganj. This was followed by M/s John Taylor and Sons Ltd. starting gold mining in Kolar Gold Fields in 1880, along with the first oil well in Digboi in 1866. However, up until the beginning of the current century, mining activities in India remained primitive in nature and small in terms of scale of operations. It was only after India gained independence in 1947, that the mining sector underwent extensive modernisation as a result of industrial expansion. Further development was made possible through implementation of the several Economic Mineral Policy Reforms.

The Indian gold occurrences can be broadly divided into two classes namely: Primary and Secondary. Primary gold deposits are found mainly in granulite terrain of Archaean age(2600 to 3200 M.Y) in Tamil Nadu and Kerala (Wayanad - Nilambur); the Dharwar greenstone belt of Archaean to early Proterozoic

age (2100 to 3000 M.Y) confined mainly to Karnataka and AndhraPradesh (Kolar, Hutti, Nuggihalli, Mangalore, Gadag, and Shivamoga belts); Bijawars of middle Dharwar age in Madhya Pradesh (Sonakhan, Bhagmara and Deogaon blocks); the Sakoli group of early Proterozoic (2200 M.Y) in eastern Maharashtra(Bhwapur - Kolari): the Dhajori group of middle proterozoic (1700- 2000 M.Y) in Bihar and Orissa (Lawa), Kunderkocha, Sonapet, Sona of Bihar and Telkoli, Banspal blocks of Orissa): and Deccan trap(30-90 M.Y) in Gujarat(Alech hills).

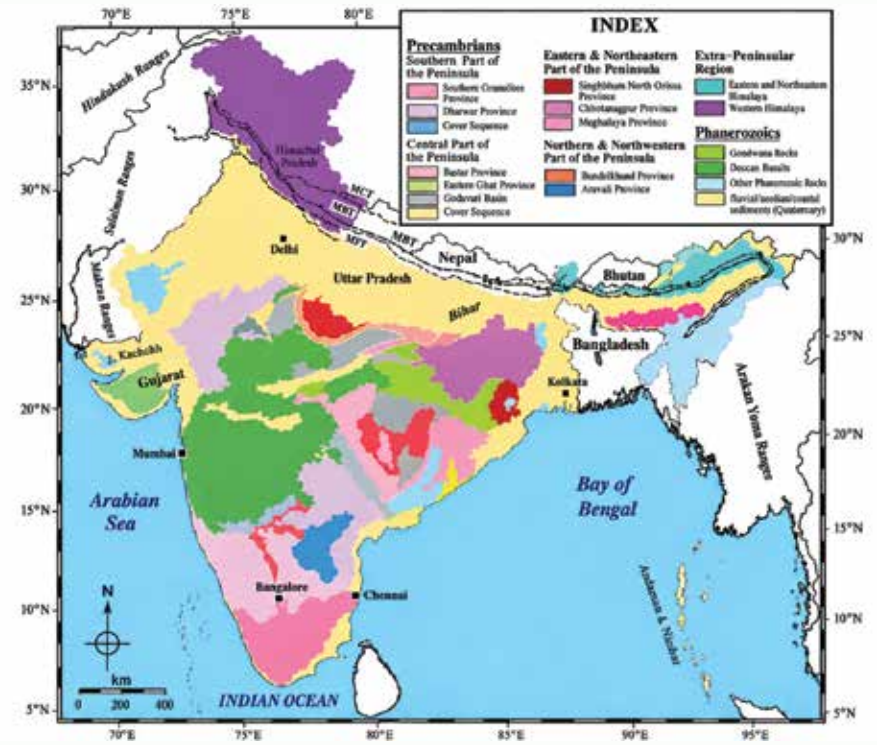
Secondary gold deposits are seen in Wayanad - Nilambur gold fields of Kerala; in Keonjhar district of Orissa; Raigarh district of MP; Chikamagalur of South Kanara, Shivamoga districts of Karanataka; Siwaliks of Jammu, Haryana, HP, UP, Tippam sandstone of Assam.

MODE OF OCCURRENCE

Gold occurs in a variety of geological settings. The following are the principal modes of occurrence observed in India (Radhakrishna & Curtis, 1999).

i. **Lode gold:**
Quartz-carbonate vein-type: Usually confined to metamorphosed volcano-sedimentary rocks forming linear schist belts of late Archaean age (greenstones) and invariably in the form of Au-quartz veins occupying fissures and shear zones persisting to great depths. These types of deposits have been and remain the main source of gold. They are second and only to the palaeoplacers of the Witwatersrand type.

ii. **Gold in Banded Iron Formation:**
This is generally seen in association with schistose amphibolites and banded iron formation of late Archaean age, Chitradurga, and Sandur belts (Eg: Chinmulgund, Ajjanahalli, and Sandur in Karnataka, Sonadehi in Madhya Pradesh).



iii. **Gold in Granulite terrain:**
This type is similar to the vein and stratiform type described under (1) & (2) but falls within the granulite terrain of south India. (Eg: Wayanad, Kerala) which is in continuous gradational transition from greenstone terrain.

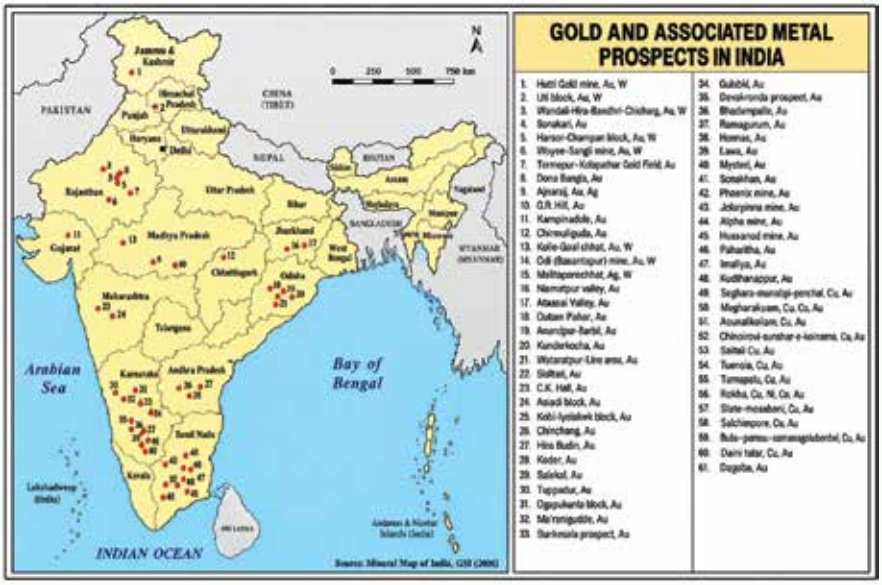
iv. **Disseminated gold:**
Gold commonly occurs in disseminated form throughout an intrusive body or volcanic rock. The grade of ore is poor, but deposits are amenable to large-scale mining operations by open cast methods. (Eg: Malanjkhand in Madhya Pradesh).

v. **Gold associated with early Proterozoic volcanogenic polymetallic sulphide deposits:**
In this category are included deposits of copper, lead, and zinc-containing values of gold, silver, and other metals (Eg: Khetri in Rajasthan, Rakha in Bihar). Gold production from these deposits containing less than 1 ppm, in recent years has become significant, gold as a by-product.

vi. Gold in quartz pebble conglomerates and quartzites (ancient placers):
Detrital gold usually occurs in quartz pebble conglomerateunconformably resting on older gneisses and schists at the Archaean Proterozoic boundary (Eg: Bababudan in Karnataka, Dhanjori in Bihar, Cuddapah in Andhra Pradesh).

vii. Greywacke or turbidite hosted deposits:
These occur in late Archaean sedimentary successions along with volcanic intercalations. (Eg: Gadag in Karnataka).

viii. Gold in coal:
Report of gold in the coal of New South Wales opens up a new area for exploration. (Lamproite dyke rocks intruding Gondwana).



ix. Epithermal 'bonanza' type deposits of Tertiary 7age (Mainly in North America Cordillera region):
The younger granites of fold mountain chains and altered volcanic rocks are likely to show the concentration of gold. These have yet to be identified in the Central Himalayan region and their economic potential is to be ascertained.

x. Placer and alluvial gold:
Alluvium of rivers showing concentrations of detrital gold and draining auriferous tracts. (Includes all river gravels).

xi. Gold in laterite, soil, and weathering profiles:
This is a newly recognized mode of occurrence of economically exploitable gold (Example: Nilambur valley, Kerala).

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