Geology of Corundum Occurrances in Parts of Khammam Schist Belt

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Abstract- Khammam Schist Belt in Andhra Pradesh is considered as a northern extension of the Nellore Schist Belt (NSB). Both KSB and NSB are referred to a single unit of 600 km long west-vergent Nellore-Khammam Schist Belt (NKSB) occurring as a paleo - proterozoic/late archaean greenstone belt on the basis of similar geological and structural setup in the Precambrian terrain of South India. The Nellore Khammam Schist Belt (NKSB) is considered to be the equivalent of Sargur Schist Belt (3.3 Ga, Peucat, et al; 1995).

The Khammam Schist Belt (KSB) forms a curvilinear belt in parts of Khammam and Krishna districts of Andhra Pradesh. The KSB is inferred to be a tectonised belt sandwiched between the Dharwar Craton in the West and the Eastern Ghat Mobile Belt (EGMB) in the East. (Leelanandam, C and Narasimha Reddy, M, 1988). The KSB mainly consists of metamorphosed felsic and mafic volcanic, now preserved as quartzo-felspathic gneisses, hornblende schists and schistose amphibolites, with or without garnet. The pelitic meta-sediments such as sillimanite-kyanite schists, sillimanite- cordierite-orthopyroxene-corundum bearing rocks, pegmatites and banded iron formations (quart-magnetites). Garnet bearing quartzites are rare and insignificant in volume in the KSB. The present study area is bounded by 17^{o} 10': 17^{o} 20': 80^{o} 15': 80^{o} 25'. Mafic and Felsic rocks are exposed in the area.

The dominant lithology comprises amphibolites, which may be described as banded, foliated, garnetiferous or massive based on its field appearance. The lithological formations of KSB form a basement for the proterozoic pakhals and phanerozoic gondwana sediments. The KSB is endowed with economically viable corundum (ruby variety) and podiform chromite occurrences; however, they are significantly controlled by both lithology and structure.

I. GEOLOGICAL SETTING

The area is a part of KSB which mainly consists of metamorphosed felsic and mafic volcanic, now preserved as quartzo-felspathic gneisses, hornblende schists and schistose amphibolites, with or without garnet. Lithological variations include the pelitic meta-sediments manifested in sillimanite-kyanite schists, sillimanite- cordierite-orthopyroxene-corundum bearing rocks , pegmatites and banded iron formations (quart-magnetites). Garnet bearing quartzites are rare and insignificant in the KSB. The dominant lithology comprises amphibolites, which may be described as banded, foliated, garnetiferous or massive based on its field appearance and form a basement for the proterozoic pakhals and phanerozoic gondwana sediments. (Fig.1)

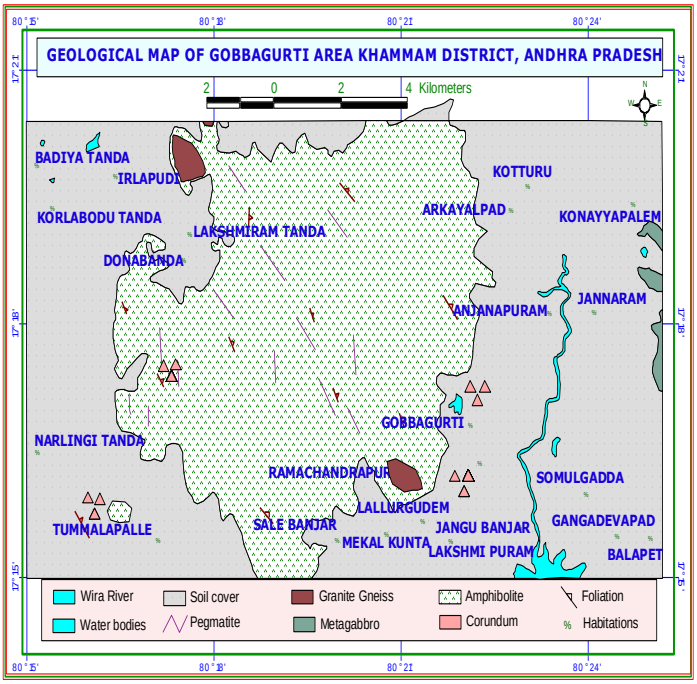

Fig. 1 Geological Map of Study Area

In the area, corundum is found enclosed in tonalitic gneisses within which, sillimanite schists and cordierite-corundum rock form small lenticular bodies, pyroxene granulites and biotite gneisses .The host rocks for corundum are pegmatite veins which have cut through the archaean suite of rocks. (Pavanaguru, R and Narayan Sangam, 2005).

The study area is occupied by different rock groups of biotite-granite-gneisses, schists of various types, amphibolites, tonalites, quartzo-felspathic intrusives (quartz veins and pegmatites) and gabbroic anorthosites.

II. LITHOLOGY

The main rock formations include amphibolites, schists, and gneisses of various compositions and also include anorthosites, pegmatites and quartz veins, magnesium-aluminium rich pelitic granulites (corundum bearing) and hornblende pyroxene granulites. Careful observation of the gneissic tract

reveals the continuity of the Nellore Schist belt into the KSB, across the districts of Guntur and Krishna, making the Khammam Nellore belt, a single transcratonic, continuous supracrustal belt (Babu, V.R.R.M, 1972). The lithology of the KSB is almost identical to that of the lower part of the NSB.

Metamorphosed pelitic, psammitic and calcareous sediments are represented by garnetiferous biotite muscovite kyanite - chlorite schists, kyanite and sillimanite bearing meta - pelitic schists, calc-silicate rocks, quartzites, fuchsites, and magnetite quartzite. The meta-sedimentary unit is tectonically emplaced below a metavolcanic unit made up of quartz-chlorite schists, hornblende schists and tonalitic gneisses. The KSB rocks are intensely migmatized with the development of streaky biotite gneiss and hornblende gneisses. amphibolites, meta - ultramafics and meta-gabbros, meta-anorthosite gabbro complex as well as pink granite are the intrusive phases into the KSB assemblage

The area represents the following stratigraphic sequences

Stratigraphic Succession of the area around Gobbagurti, Khammam District

Era	Lithology
Recent	Soil cover
Precambrian	Quartzites Amphibolites Anorthosites Mafic granulites Sillimanite-Cordierite-Opx-Corundum rocks Schistose amphibolites Hbl-Plag gneisses Quartzo-felspathic gneisses (Tonalites)

III. GEOLOGY OF CORUNDUM OCCURRENCES

Occurrence of semi-precious corundum of abrasive variety and rare occurrences of gem variety are observed in the exploration pits at Lakshmipuram where the host rock is sillimanite-corundum schistose rock. At Gobbagurti and Singaraipalem corundum occurs in association with kyanite schists. However, at Lallurgudem corundum is occurring locally in the soil cover accounting for placer concentrations. The contact zones of altered basic rocks and pelitic schists host corundum at Salebanjar. The Donabanda area exhibits similar occurrence along the contact zones of pegmatitic veins and schists. The Tummalapalle occurrence is associated with pyroxene granulites and gneisses. In the Mekalkunta area, sillimanite schists and gneisses host corundum. At Wyra, corundum occurs with cordierite-sillimanite schists and gneisses. Majority of the occurrences are observed in the silica deficient geogenic system and account for its concentration.

Both the megascopic and microscopic characters support the lithological controls of the host rocks for mineralization of corundum in Khammam Schist Belt.

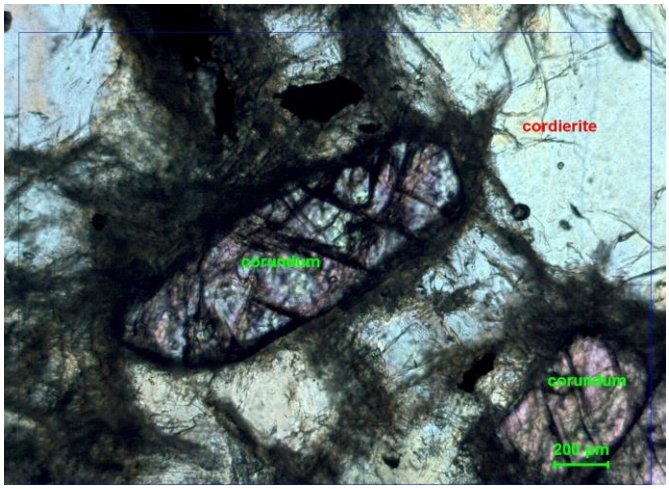

Fig.1.1 Section showing Corundum associated with Cordierite

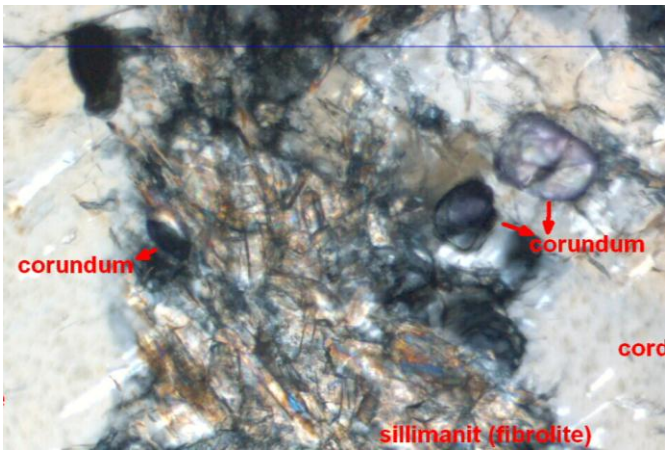

Fig.1.2 Section showing Corundum in Cordierite-Sillimanite Gneiss

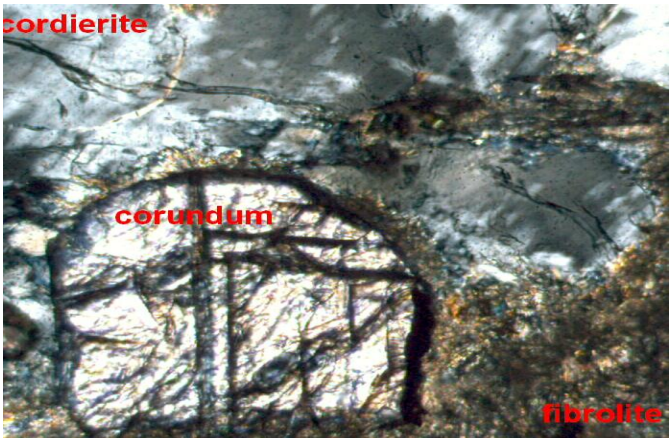

Fig.1.3 Section showing Corundum in Cordierite and the altered mineral fibrolite

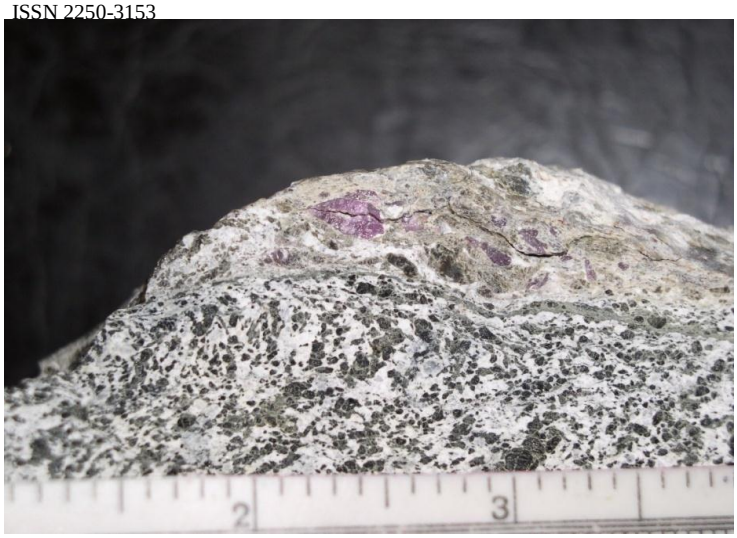

Fig. 1.4 Corundum occurrence along contact zone of cordierite gneiss and tonolite

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