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Earth Science

GEOLOGY AROUND MANPURA AND DEDKIYA VILLAGE, SE OF UDAIPUR, RAJASTHAN

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KEYWORDS :

Introduction:
The state of Rajasthan forms an important part of the Indian union. It consisted of 19 Princely states, the centrally administrative province of Ajmer-Merwara, and three principalities in the times British rule, and it was formerly known as Rajputana. The region provides significant clues to the geology and tectonic development of the NE conditional segment of the Indian peninsula. Southeast of Udaipur is an important region in Aravalli hills. The importance is expressed in Archean basement and Proterozoic cover rocks. It is a very large area to study the basement cover characteristic. Dedkiya and Manpura village lies about 26km in SE from Udaipur city. The area is highly vegetated and comes under reserve forest. The highest peak in the area is about 605 meter. Granite gneiss forms the basement in this area, covered by various litho-units comprising quartzite, impure dolomite, chlorite schist and conglomerate-Grit-Arkose.

Regional Geology:
Geology of Rajasthan presents an interesting picture. The geological history of the northwest Indian craton in Rajasthan region covers a wide span of time from ca. 3.5 Ga to 0.5 Ga. The oldest rocks of Archaean age that occur in Rajasthan are popularly known as Banded Gneissic Complex (BGC), by Heron (1953). The rocks are dated between 2500 to 3300 Ma. Roy (1988 b) proposed a new nomenclature, the Mewar Gneiss, for the true basement of Archaean age, in preference to the Banded Gneissic Complex (BGC).

Number of late Archaean granitoids occur either as large bodies within the Mewar Gneiss Complex (Untala Granite & Gingla Granite) or as separate bodies of granitic inliers (Berach Granite & Ahar River Granite) surrounded by metasediments and metavolcanics of the Aravalli Supergroup. Berach granite (2500 Ma) is mark the culmination of Archaean-Proterozoic boundary. The basement ensemble of gneiss-amphibolite granite, which has undergone tectonothermal reworking during the Proterozoic known as the Sandmata Complex. These belts are described as Tectonothermally Reworked (TTR) basement. Similar TTR granitoid bodies also lies in the southernmost part in the Aravalli Mountains, south and east of Salumber.

The Proterozoic Aravalli Fold Belt (AFB) is an important litho-tectonic unit of western India and it exhibits a wide variation in stratigraphic lithopackage and their distribution as well as structure behaviour of the individual segments Furthermore, it is punctuated by a number of gneissic and ultramafic bodies, and conglomerate horizons, whose exact significance in stratigraphic delineation remained unresolved. These factors warranted repeated revision of the stratigraphy as proposed by Heron (1953).

The region around Udaipur is also known as the type area of the Aravalli Supergroup, the depositories in the Aravalli Sea during the Early or Paleoproterozoic period (a time period that spanned between 2500 million years to 1600 million years ago). The ensemble of rocks that constitute the Aravalli Supergroup in the type area is clearly differentiated into two facies types, the shallow water shelf facies and the deep-sea facies (Table-1). It is only in the shelf sea facies where we find sequences of carbonate association, which are endowed with a host of metallic and non-metallic mineral deposits.

The Aravalli rocks are characterized by complex pattern of deformation. In surrounding areas of Udaipur the Aravalli rocks exhibit polyphase deformation resulted from three major phases of folding i.e. F1, F2 and F3 and associated shearing. In addition to these flat-lying folds small-scale folds and crenulations have also developed locally at places. The entire belt of Aravalli Supergroup in Udaipur region is characterized by Low to Very Low grade metamorphism (Roy, 1988; Sharma, 1988). Locally the rocks represent middle amphibolite facies metamorphism.

Lithology of the Study Area:
The Lithological map has been prepared on 1:20000 (Map 1). Lithologies of the study area are studied on the basis of outcrop patterns and thin section petrography. There are five types of lithologies:

Granite Gneiss:
Majority of the area is occupied by grey granite. The granite is composed of quartz, white feldspar and sericite. The nature is very similar to grey granite of Jagat. At places, grey granite is criss-crossed by pink granite veins, in addition, the lenses of quartz also occur along the foliation plane. In the granite gneisses a few bands of chlorite schist and quartzite indicate very shallow environment of the basin. The unit is showing gneissic foliation commonly in the area (Fig. 1). It is suggested that the area was part of basin dominantly of grey granite phase. The leucocratic bands are showing folds of varying geometry from tight isoclinal in the west to open in the east.

Quartzite:
Quartzite occurs along the sheared contact with Granite Gneiss. It is white to yellowish colored, massive and compact. The quartzite is trending NNE-SSW and dip towards SE to S. Bedding as well as thin laminations are observed in quartzite on the basis of difference in colour mainly due to change in composition. Secondary features are also noted in outcrops of the foliated quartzite. Boudinization of quartz veins occurs due to extreme stretching and shearing at some outcrops. 2 and 3 set of joints are observed in quartzite.

Chlorite schist:
Chlorite schist is a green colour rock, occur at the contact of gneisses and impure dolomite. It show well developed schistosity plane parallel to the contact (Fig. 3). Along the schistosity plane numerous quartz veins pink granite and a few sideritic veins change the nature of the unit. Lenses of granite gneiss also present in chlorite schist (Fig. 2). At a few places vesicles and feldspar amygdule indicate volcanic parentage. At a place along the contact thin 4 feet wide dykes, is the characteristic occurrence in the area. At the some places the chlorite schist is strongly crenulated and small garnet (1.5-2 mm) crystallized in the unit.

Impure dolomite:
Impure dolomite is dark brown coloured rock (Fig. 5). Quartz, sideritic veins and thin layers of chlorite schist are parallel to carbonate layers. They are regular as well as irregular. Epidote veins also noticed in impure dolomite (Fig. 6). At few places, veins of calcite and quartz are noticed on the contact. Some black metallic minerals crystallized on the contact. Acid test of the sample gives high amount of effervescence.

Along the foliation planes quartz and siderite veins are observed at many places in the area (Fig. K). The veins contain large size of calcite crystals and quartz clusters with some black colour minerals. The veins also have brown colour impure iron-rich dolomite. Rarely collapse breccia is observed in the impure dolomite. The breccia is characterized with impure dolomite fragments of 2-4 cm. size with siliceous matrix. The fragments are regular suggesting that the development is on faulted blocks in NS directions.

Conglomerate-Grit-Arkose:

The polymictic conglomerate is immature and contains clasts of quartzite, quartz, sericite schist, chlorite schist, marble, granite. pegmatite etc. The nature of the matrix varies from arkosic to chloritic. However one type of matrix grades into another type the grit beds associated with the conglomerate are mostly arkosic. The grit contains alternate phyllitic bands having quartz and sericite as the main constituent. The phyllite contains opaque and the tourmaline. At places clasts of both quartz and feldspar occur in matrix of quartz sericite and muscovite with minor amounts of feldspar, tourmaline and opaques. Some of the plagioclase clasts are anhedral indicating very little transportation.

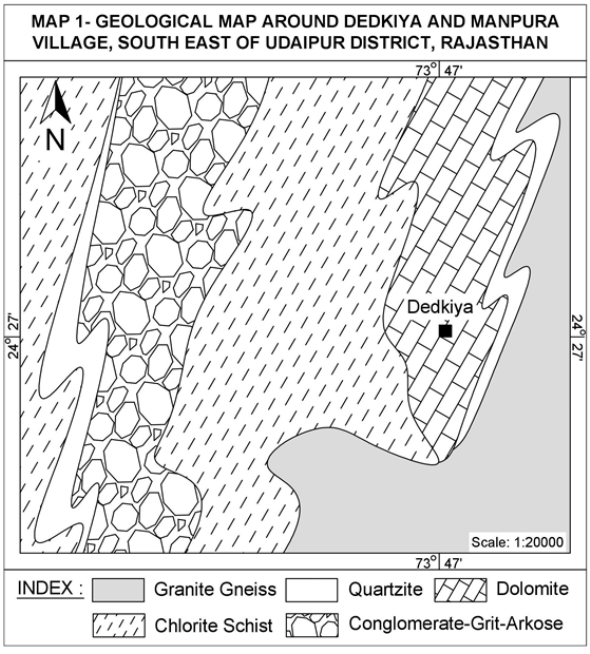

Fig.1 - Field photograph shows gneissic bands in granite gneiss observedat Manpura village

Fig.2 - Field photograph shows lenses of granite gneiss in chlorite schist

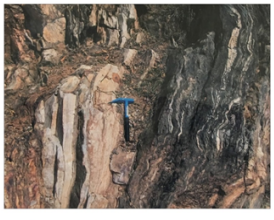

Fig.3 - Field photograph showing contact between granite gneiss and chlorite schist observed at river section

Fig.4 - Close folding observed in chlorite schist near Manpura village

Fig.5 - Field photograph shows outcrop of impure dolomite near mataji temple, Manpura villege

Fig.6 - Field photograph shows Epidote vein in impure dolomite observed on Kharwa Chandsa road

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