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Heavy mineral analysis in the sandstones of Dihing group of rocks outcropped in the Tirap river section of Lekhapani Area of Tinsukia, Assam

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ABSTRACT: *Heavy minerals are more stable minerals having a specific gravity higher than 2.9 g/cm^3, and are able to resist the recycling process many a times, they are the profound indicators of provenance .Collected samples of Sandstone of Dihing group of rocks are characteristically show an fortification of heavy minerals. Petrographic characteristics of the heavy minerals are analyzed by means of supplied grain mount slides using high power Petrological microscope. Kyanite and Garnet are the most populous heavy minerals observed during analysis. From the observed properties it is evident that the sediments of the Dihing group have an origin from multiple sources, dominantly consist of metamorphosed and reworked sediments.*

***KEYWORDS*:** *Dihing Group, Garnet, Heavy minerals, Kyanite, Provenance, Reworked Sediments.*

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I. INTRODUCTION

The current investigation is based on the data attained from the analysis of provided Grain mount slides and their respective field as well as petrographic analysis data. The Dihing groups of rocks are outcropped as isolated patches in the area of investigation which lies in between N27°18'43" - E95°48'15.7", the samples are collected in the vicinity of Likabali, a small place of Tinsukia district of Assam, along a small section of Tirap River. Heavy minerals have a greater specific gravity than its respective fame work grains and also have the competency of escaping a numbers of recycling, thus they are well thought-out as profound indicator of provenance.

II. GEOLOGY OF THE AREA

The area of investigation is a tectonically troubled zone and encountered by the belt of schuppen, which is narrow linear belt of imbricate thrust slices, (Mathur and Evans, 1984).The Dihing group of rocks lies unconformably over the Namsang formation. Lithologicaly the Dihing group of rocks is comprises of pebble beds, conglomerates and subordinate sandstone. The orientation of long axis of the pebbles in the field describes the palaeoflow direction along NE-SW roughly. Margherita thrust has a prominent effect in tectonic volatility of the studies area. There occur a lot of disagreements regarding the age of Dihing group of rocks, but Pliocene age is assigned to it communally. Over the Dihing, alluvium and terrace deposits are placed in various places within the area. From the supplied petrological data of subordinate sandstone it is clear that its primary constituents are detrital framework fragments (Quartz, rock fragments, feldspar and Mica)

III. METHODS OF INVESTIGATION

This investigation is involving the analysis of supplied grain mount slides for heavy mineral identification. As per the information provided by the supplier, funnel separation method is in employment for separating the heavy minerals from the rest of framework grains by using bromoform as heavy liquid. Heavy mineral identification involves the enrollment of Zeiss Axio petrological microscope with 50X zoom. Coating due to impurities left behind after treatment in the grains makes it harder to go for point counting and further detail investigation.

IV. RESULTS AND DISCUSSION

After detail investigation presence of a few numbers of heavy minerals including low to high rank metamorphic minerals, Zircon etc. are reported from the supplied grain mount slides. Out of the identified grains, low rank metamorphic minerals include epidote; high rank metamorphic minerals consist of Kyanite, Sillimanite, garnet etc. Accountable quantity of opaques is also present in the respective slides. Though some

rounded to sub rounded grains of high-low rank metamorphic minerals are present, most of the grains of Kyanite, Sillimanite and garnet are angular to sub angular in nature. Kyanite (Fig 1c) grains are identified in terms of their characteristic bladed form along with its perfect cleavage and inclined extinction. Pale yellowish green colour is the common identifying character of epidote (Fig 1a), where the grains are equidimensional sub-rounded to rounded and weakly Pleochoric. Sillimanite (Fig1e) grains are colorless, anhedral-subdural, look more like a long slender prism, fibrous, displaying moderate relief with characteristics parallel extinction and a few can be identified in the slides. Garnet (Fig 1b) is distinguishable from the rest via its isotropic nature with sturdy relief. Zircon (Fig 1f) grains identified are mostly rounded to sub rounded. High relief, halo, high order interference colours are the distinctive skins of the mineral zircon. Due to nonexistence of characteristics optical properties, the sub-rounded to angular grain which always remains dark under both cross nicols and ordinary light are point out as opaques (Fig 1d).Grain shapes of the heavy minerals portrays clearly about the transportation history of the sediments. From all the evidences it can be inferred that the studied group of mineral suits represent group or groups of minerals that were originate due to rapid erosion as a consequences of active tectonic, and they are transported for a short duration as concluded by the angularity of grains. The rounded zircon grains (Fig 1f), though less in number propose the reworking of sediments. To draw any assumption regarding the provenance of a specific sedimentary deposit through heavy minerals is not that stress-free as it also controlled by number of factors like source area with tectonics and time, climatic condition and relief of source rock, etc. From the present study, inferences can be made that the sediments under inquiry might originate from a metamorphic source as indicate by the presence of metamorphic minerals and reworked sediment sources as depicted by rounded zircon grains.

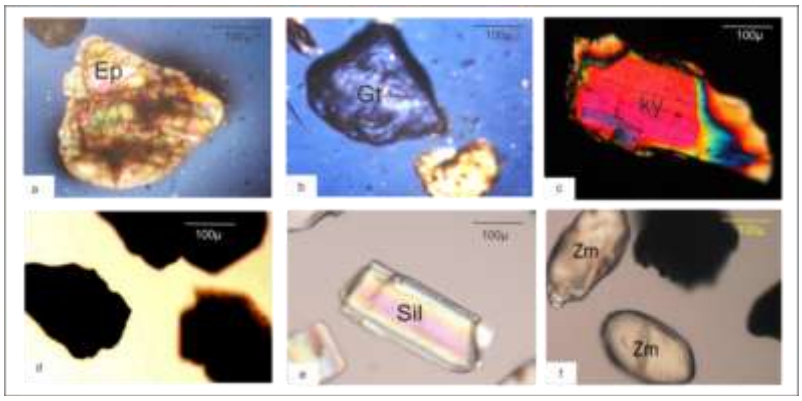

Fig 1: a: Epidote, b: Garnet, c: Kyanite, d: Opaques, f: Sillimanite, g: Zircon

V. CONCLUSION

It is rather hard-hitting situation to predict anything regarding the provenance by analyzing the heavy minerals. From the result achieved after investigation in collaboration with the supplied data, we propose that the sediments of the Dihing group of rocks undergo transportation for a short distance before deposition in the concerned basin as evident by the presence of gargantuan population of the angular grains of heavy minerals. The sediments were originating primarily from medium to low grade metamorphic rocks in association with reworked sediments up to a some extent. While looking at the present day topography and regional tectonics, a conclusion can be made that the main source of sediments of Dihing groups of rock is Naga-Patkai orogeny, which is activated toward the end of Miocene (Das and Barua, 1997). The sediments were transported to the Dihing basin from Naga-Patkai orogeny by a NE-SW (Palaeoflow direction) trending river.

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