

Record of palynodebris from the Upper Disang - Lower Barail groups around Kohima District, Nagaland

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The present paper deals with first report of palynodebris recovered from Disang and Barail Groups of Nagaland. The palynodebris are analysed on the basis of simple classification of plant derived organic matters. Spores and pollen grains are rare while black debris and structured terrestrial organic matters are abundant. Due to paucity of index palynofossils these sedimentary sequences are not correlated with contemporaneous deposits of the region.

Key-words—Palynodebris, palaeoecology, Nagaland, India.

INTRODUCTION

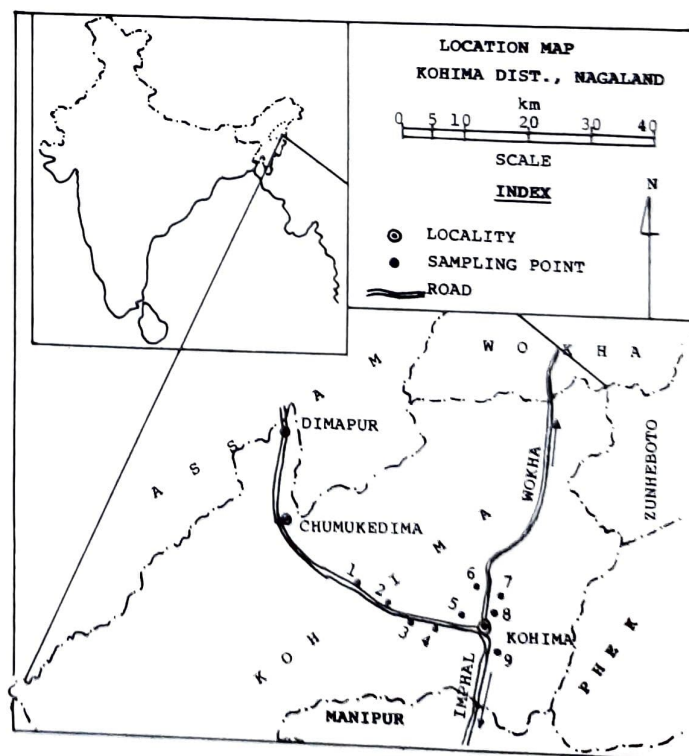
THE Rocks under study are exposed in Kohima District of Nagaland and forms a part of inner folded belt of the Kohima Synclinorium. The belt of Schuppen running through the area affected the lithotypes to a great extent. As a result, the rocks are highly disturbed and landslides are quite common. At places sinking areas have also been observed in the Dimapur-Kohima road around Kohima. Rocks expose the part of Disang and the base of the Barail Group (Laisong). So far, no plant microfossils are known from the Disang of Nagaland. Mandal (1996) reported some palynofossils from Barails of Mariani-Mokockchung road. It is the first record of palynodebris from Disang and Barail groups of rock around Kohima. Pollen and spores are very rare while other palynodebris are abundant in most of the studied rock samples. The recovered palynodebris are analysed following the classification of Masran and Pocock (1981), Pocock *et al.* (1988) and Venkatachala (1981).

MATERIAL AND METHOD

Localities from where samples were collected are exposed along Dimapur-Kohima road and around Kohima town (Map-1). Forty seven samples have been collected from nine places viz. 1- near Tourist Hotel, 2- Lalmati, 3- 63 km from Dimapur,

4 - 70 Km from Dimapur, 5. about 5 km on Kohima Science College road, 6, 7, & 8- around Bayavu Colony and 9- about 8 km on Kohima-Imphal road. Of these 29 samples are from Upper Disang, 3 samples from contact of Disang-Barail and 14 are from Lower Barail (Laisong).

The slide of figured specimens are stored in Repository of Birbal Sahni Institute of Palaeobotany, Lucknow.



Map-1. Location of sampling areas.

STRATIGRAPHY

Disang Group

Nomenclature and Type Section-The Disang Series was named by Mallet (1876 in Evans, 1932) after the Disang (Dilli) River Section, Upper Assam (27°01' - N : 95°20' - E), to a very thick splintery grey shale interbedded with fine grained sandstone becoming thin towards top. However, Evans (1932) preferred to include the uppermost sandstones in the Barail Group. Biswas (1961) redesignated the Disang Series as Disang Group. Since it is a lithological unit, the latter nomenclature is justified.

Stratigraphy-The Disang Group by and large exhibit a monotonous lithological sequence. It consists of hard, grey to dark grey splintery shale interbedded with hard sandstone bands towards the top. In some of the shales concretionary structures are present. Its subdivision and interdomain correlation is difficult due to paucity of fossils and intense deformation. Evans (1932) opines that the correlation of Disang Series is one of the most difficult problems of Assam Tertiary geology.

The Upper Disang rock is conformably succeeded by the Laisong Formation forming the base of the Barail Group.

Around Kohima the Disang Group is overlain by Laisong Formation of Barail Group in the core of the syncline. The precise delineation of Disang - Barail contact is one of the most intriguing problems of the Paleogene fold belt of the region.

Sarmah (1989) opined that the clay mineral of Disang sediments indicate shallow marine or near shore depositional condition while texture and trace elements suggests it to be fluvial. Dutta (1982)

reported spores of *Dandotiaspora* spp., *Neocouperipollis rarispinosus*, *N. brevispinosus*, *Lycopodiumsporites parvireticulatus*, *L. palaeoecenicus*, *Tricolpites levis* etc.

Age - Mathur and Evans (1964) equated the Disang Group with the Jaintia Group of Meghalaya and opined that Disang may range down into uppermost Cretaceous (Maestrichtian). Based on the occurrence of radiolaria, *Acanthocirus discranocanthus* (squinalob) which ranges from Upper Tithonian-Barremian, from the Disang flysch sediments of Nagaland, Duarah *et al.* (1982) suggested Jurassic to Lower Cretaceous age. Sinha and Chatterjee (1982) recorded *Dictyocowoides*, foraminifera of Middle Eocene age. Hence it may be safely deduced that the Disang Group ranges from Early Cretaceous to Late Eocene age.

Barail Group

Nomenclature and Type Section - Evans (1932) has named the rock types conformably overlying Disang and Jaintia Groups as Barail Series after the Barail Range that forms the 'backbone' of the North Cachar Hills subdivision. He recommended that the part of the range in the north of Silchar may be regarded as the type area for the series. Since it is a lithological unit, subsequent workers redesignated it as Barail Group.

Evans (1932) divided the Barail Group into three formations. The oldest Laisong Formation, named after the village Laisong near the Jenum River, comprises mostly of very hard, thin bedded, well-cemented, grey sandstone, alternating with hard sandy shale. Moderately well-bedded sandstone, massive sandstone, shale occasionally carbonaceous shales and even thin streaks of coal are

PLATE 1

(All photographs magnified x 500, unless otherwise mentioned)

1. *Aplanosporites* sp., slide no BSIP 11867
2. *Palmidites plicatus* Singh 1974, slide no. BSIP 11868
3. *Psiloschizosporis* sp., slide no. BSIP 11868
4. *Polypodiaceasporites* sp., slide no. BSIP 11869
5. Biodegraded organic matter of Terrestrial origin showing semidegraded cells, slide no. BSIP 11870
6. Amorphous organic matter (completely transformed) associated with pyrite, slide no. BSIP 11871
7. Degraded black debris showing wood cells, slide no. BSIP 11872
8. Structured terrestrial organic matter, slide no BSIP 11873
9. Highly pyretized degraded debris, slide no. BSIP 11874
10. Biodegraded leaf tissue, slide no. BSIP 11874
11. Black debris, slide no. BSIP 11876.

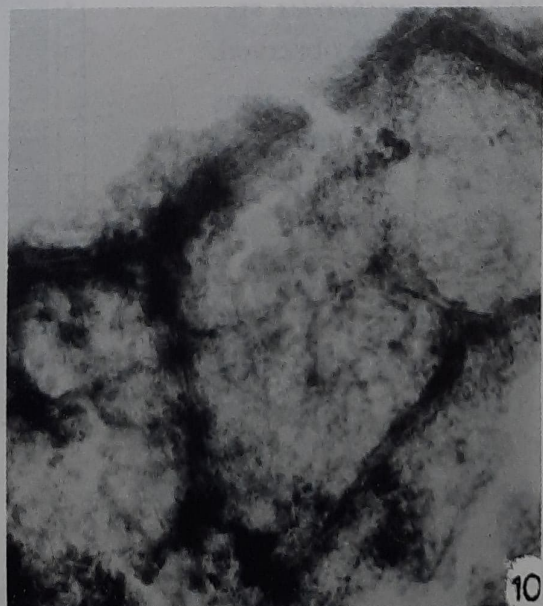
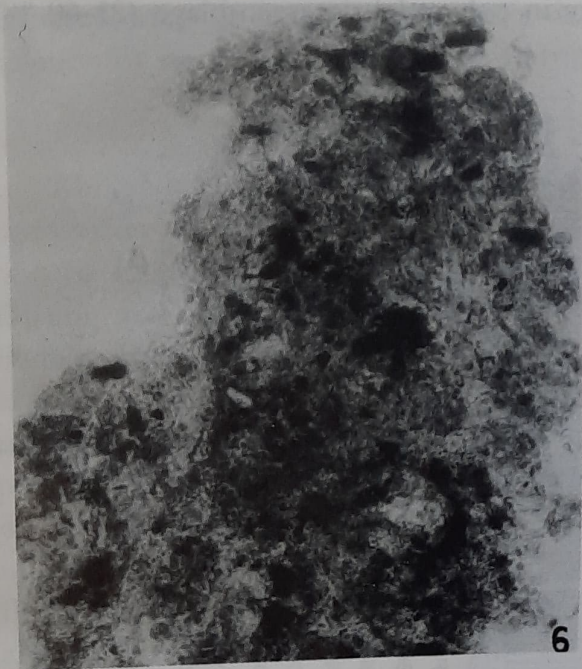
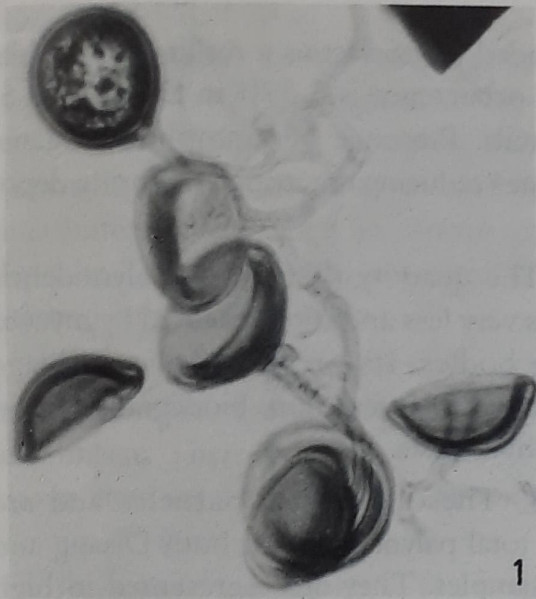


PLATE 1

also found associated in the formation. The study area exposes massive, very hard, compact, grey and well bedded sandstone interbedded with shale. The sandstone is brownish, hard, compact and fine to medium-grained. Asymmetrical ripple marks, load cast and current beddings are common. Only one coal layer has been observed on the Kohima-Imphal Road.

Age - Evans (1932) opined that the base of the Barail Group may be regarded as Auversian. He further suggested that the Laisong Formation may be correlated with the Pondaung Sandstone Formation of Burma which is Upper Eocene (Auversian-Bartonian) in age. Mathur and Evans (1964) equated the Laisong Formation with the Nagaon Formation (Oligocene) forming the base of the Barail Group in the Upper Assam Shelf. Further, they suggested that probably the lowest part of the Barail Group is of Eocene in age while the upper part is Oligocene. However, most of the stratigraphers have regarded the Laisong Formation as Early Oligocene age.

PALYNODEBRIS ANALYSIS

The analyses of palynodebris recovered from Disang and Barail rocks (Pl. 1, figs 1-11; Text-fig.1) are follows :

Spore-pollen - The occurrence of spore and pollen grains are rare. Only few pollen of *Palmidites plicatus* and spores of *Polypodiaceasporites* sp., *Aplanosporites* sp. and *Psiloschizosporis* sp. are observed.

Structured terrestrial - Stem, root and leaf remains of higher plants have been observed in abundance in the sediments. The epidermal tissues of angiospermic plants are common in Disang and Barail samples both.

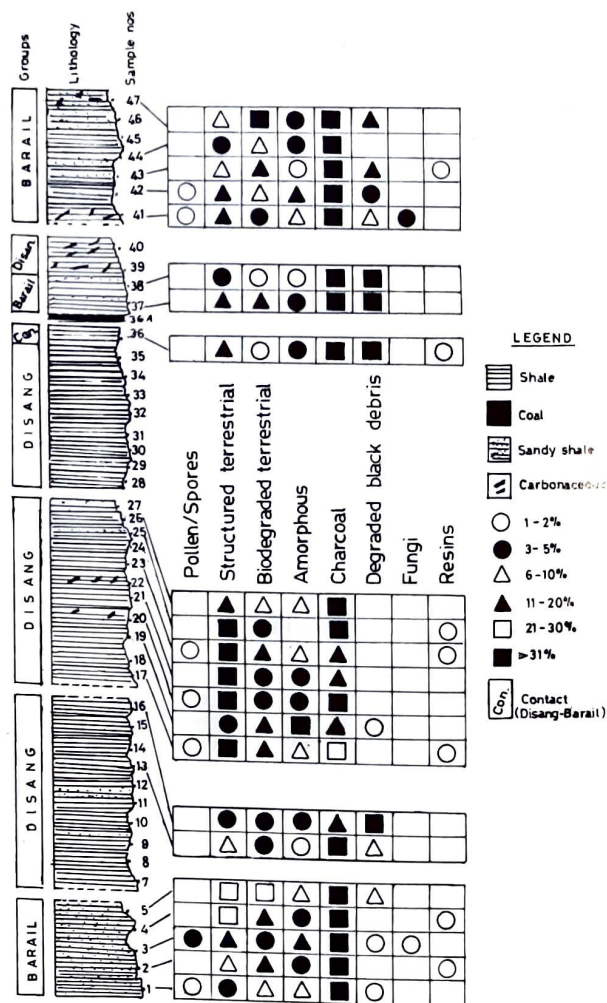
Biodegraded terrestrial - The plant derived organic matters are subject of fungal and bacterial degradation. They are semitransformed in nature with indistinctly visible cellular structure. Their frequency in Barail is 6-20 % and in Disang 6-40%.

Amorphous - The structureless and finely biodegraded visible plant products are less represented in the assemblage. It is an end product of structured

and biodegraded phytoclast as a result of microbial activities. Its occurrence is 3-35% in Disang and 5-20 % in Barails. Presence of amorphous organic matter indicates reducing environment during deposition.

Fungi - The quantity of fungi in palynodebris assemblage is very less and is represented by mycelia and fruiting bodies. Its presence in assemblage shows the action of infestation, biodegradation on structured phytoclasts.

Charcoal - These are black particles and are dominant in total palynodebris in both Disang and Barail rock samples. They are represented in high frequency in palynodebris assemblage (21-60 %).



Text-fig. - 1. Occurrence of palynodebris in various samples of Disang and Barail sections (Diagrammatic) around Kohima, Nagaland.

These are generally carbonized or oxidized form of phytoclasts which lost original visible structure. It has least significance in palaeovegetational studies. According to Pocock *et al.* (1988) charcoal (inertinite) are abundant in stream and lacustrine deposits. They are also an important component in palynodebris of tidal zone.

Resins - Resins are product of gymnosperm and angiosperm plants which are very rare (1-2%) in the assemblage. Their occurrence with woody particles shows that deposition of sediments took place in vicinity of thick vegetation.

Degraded black debris - They are very dark coloured, irregular in outline positively due to degradation by microbial activity or by transportation.

DISCUSSION

Abundance of charcoal or black debris indicates oxidizing environment at the time of deposition of Disang and Barails. The palynodebris of Disang are comparatively darker than that of Barails. Amorphous and pyretized woody particles in the assemblage also show gradual and alternate recurrence of reducing environment. Structured plant materials *viz.* leaf, stem and root tissues, which are more abundant in Disang than in Barails, indicate deposition of studied sequences under fluvio-marine condition and that the surrounding area sustained thick vegetation.

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