

# Early Triassic palynomorphs from Nand-Besur Coalfield, Nagpur District, Maharashtra, India

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## ABSTRACT

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The present paper records, for the first time, Early Triassic palynomorphs from the subsurface sediments of Besur Area of Nand-Besur Coalfield, Nagpur District, Maharashtra. The study area represents the north-eastern extension of the Bandar Coalfield, Chandrapur District, Maharashtra. Samples for the present study were collected from Borehole No. NP-50, which is located at about 2.5 km north-west of Nand village. The mudstone sample (at 113.10 m depth) from this borehole yielded palynofloral assemblage, which is characterized by dominance of non-striated bisaccate palynotaxon *Alisporites* and subdominance of *Krempipollenites* followed by other Early Triassic marker palynotaxa, viz. *Klausipollenites*, *Falcisporites*, *Brachysaccus*, *Arcuatipollenites*, *Chordasporites*, *Crustaesporites* and *Weylandites*. Recovery of these palynotaxa suggests deposition of Early Triassic sediments in Nand-Besur Coalfield. The present palynoassemblage is quite different from the typical Triassic palynoassemblages known from the other Indian Gondwana basins, as it contains meagre representation of cavate cingulate trilete and striated bisaccate palynomorphs. This palynocomposition compares well with the previously known palynoassemblages from the Early Triassic sediments of Damodar, Wardha-Godavari, Rajmahal, Satpura, Son-Mahanadi and several other Indian Gondwana basins.

**Key-words:** Palynology, Lower Gondwana, Early Triassic, Nand-Besur Coalfield, Nagpur District, Maharashtra, India.

## INTRODUCTION

Gondwana deposits of Bandar Coalfield (between latitudes 20°20' and 20°38'N and longitudes 79°14' and 79°34'E), occupying an areal extent of 295 km<sup>2</sup>, are exposed in Bandar Tehsil of Chandrapur District, Maharashtra. The Gondwana sediments in the Basin were deposited in a depression having metamorphites exposed on its eastern and western margins. In its southern side, the Lower Gondwana sediments have been deposited on the hilly region, formed by the rocks of Sullavai Group. In the northern region, Lower Gondwana succession is capped by the Lameta Formation and the Deccan Traps. The study area

represents north-eastern continuity of the main Bandar Basin and is known as Nand-Besur Coalfield (Table 1).

## MATERIAL AND METHOD

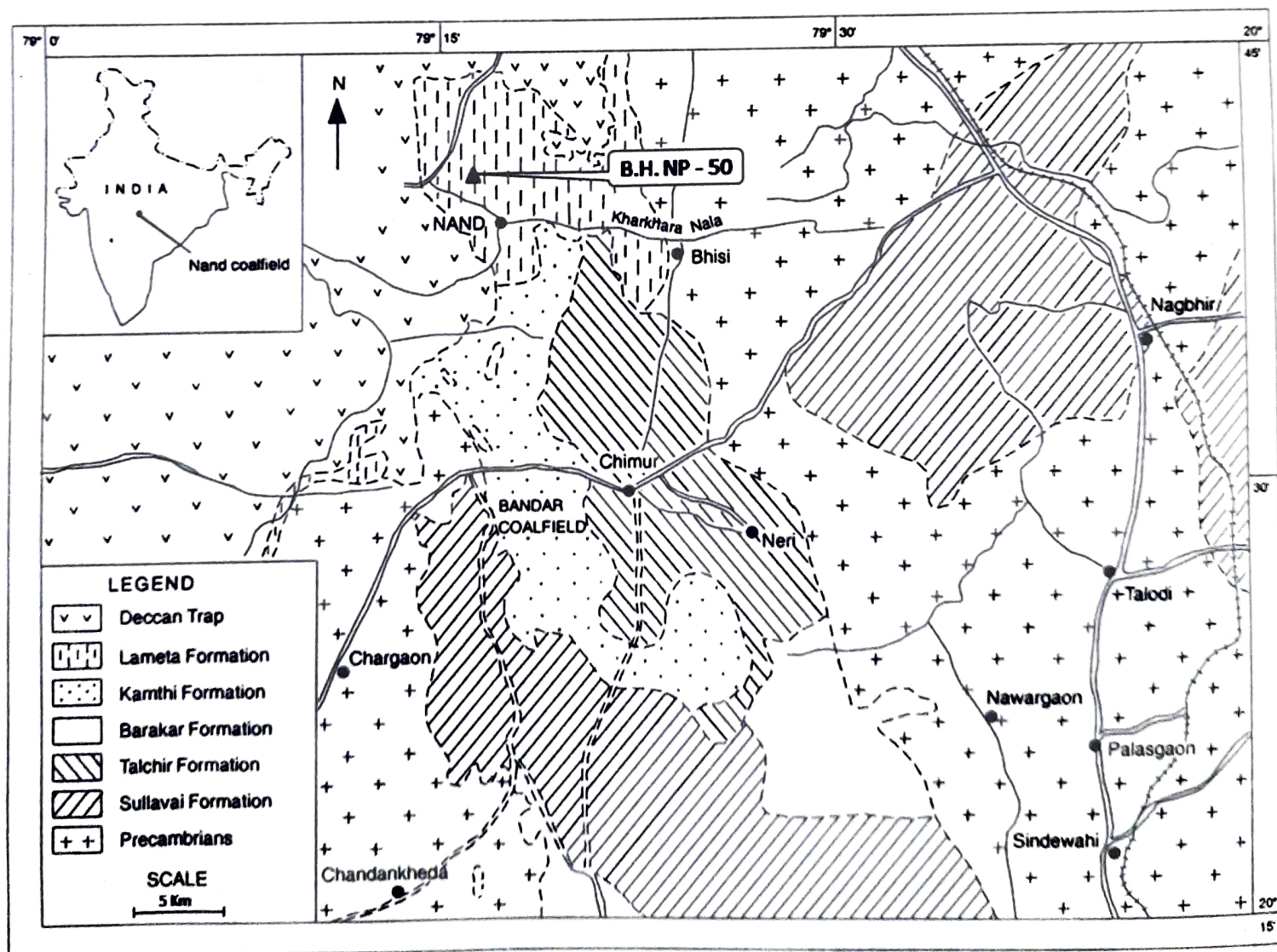
The samples for the present palynological study were collected from Borehole No. NP-50, drilled at a distance of about 2.5 km north-west of Nand village. The study area is located in Bhiwapur Taluka of Nagpur District, Maharashtra. (Text-figure 1, Table 2). The collected samples were processed following the standard maceration technique. Approximately 10-15 gm of each sample was taken and powdered. The silica

**Table 1. General lithostratigraphic succession in Nand-Besur Coalfield (Raja Rao 1982).**

| Age                           | Group/Formation | Lithology   |
|-------------------------------|-----------------|---|
| Recent                        |                 | Alluvial gravel, soil   |
|                               | Unconformity    |   |
| Eocene                        | Deccan Trap     | Tholeiitic basalt   |
|                               | Unconformity    |   |
| Cretaceous                    | Lameta          | Limestones, cherts and silicified sandstones                  |
|                               | Unconformity    |   |
| Late Permian - Early Triassic | Kamthi          | Yellow and buff sandstones, yellowish clay                    |
|                               | Unconformity    |   |
| Early Permian                 | Barakar         | Fine to coarse-grained sandstones, Grey shales and coal seams |
|                               | Unconformity    |   |
| Late Carboniferous            | Talchir         | Fine-grained sandstones and shales                            |
|                               | Unconformity    |   |
| Proterozoic                   | Sullavai        | Quartzites  |
|                               | Unconformity    |   |
| Archaean                      |                 | Metamorphites   |

containing and shaly samples (crushed) were taken into the plastic jars and were treated with 40% hydrofluoric acid (HF) for about 3-4 days with periodic stirring with glass rod, after an interval of about 2-3 hours every day, to dissolve silica contents and to avoid lump

formation in the sample. These samples were then made acid free by addition of water in the jars and allowed to settle for 2 hours, followed by decantation. This process was repeated for 3-4 times. Concentrated  $\text{HNO}_3$  was then added to these samples and kept for 4-5 days to



**Text-figure 1.** Map showing the location of the Borehole NP-50 in Nand area, Maharashtra.

**Table 2. Showing details of the lithological succession intersected in the Borehole NP-50 in Nand area, Maharashtra.**

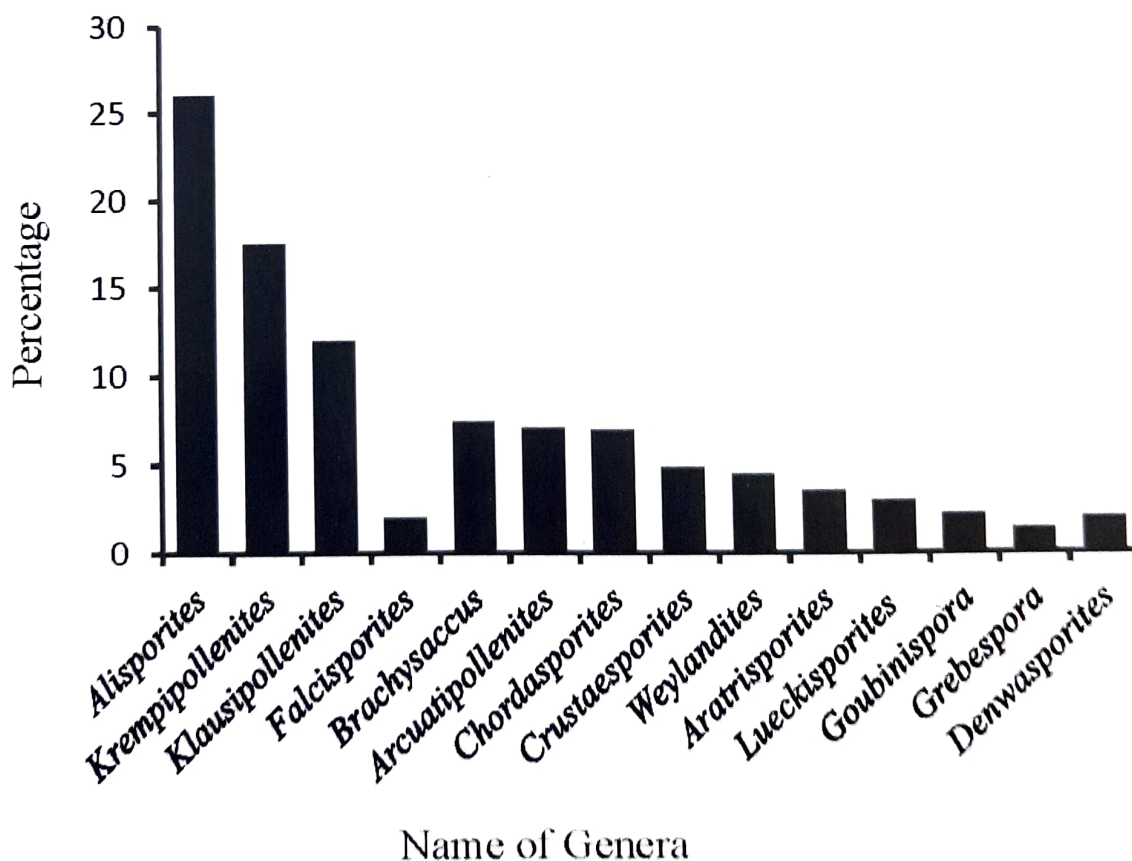
| S. No. | Depth (m) | Lithology  | Formation | Remarks        |
|--------|-----------|------------|-----------|----------------|
| 1      | 9.5       | Chert      | Lameta    | Non-productive |
| 2      | 12.20     | Sandstone  | Lameta    | Non-productive |
| 3      | 15.00     | Sandstone  | Lameta    | Non-productive |
| 4      | 18.30     | Chert      | Lameta    | Non-productive |
| 5      | 44.20     | Sandstone  | Lameta    | Non-productive |
| 6      | 53.00     | Red clay   | Kamthi    | Non-productive |
| 7      | 76.20     | Shale      | Kamthi    | Non-productive |
| 8      | 94.50     | Clay       | Kamthi    | Non-productive |
| 9      | 111.00    | Sandy clay | Kamthi    | Non-productive |
| 10     | 113.10    | Mudstone   | Kamthi    | Productive     |
| 11     | 134.50    | Clay       | Kamthi    | Non-productive |
| 12     | 146.00    | Shale      | Kamthi    | Non-productive |

digest the humic material. The samples were made acid free following the same procedure as mentioned above. To dissolve the humic contents, the samples were treated with 10% potassium hydroxide (KOH) solution. The samples were washed repeatedly (3-4 times) to make them KOH free. The macerate was passed through successively placed two sieves of 150 and 400 mesh sizes respectively, placing 400 mesh sieve at the bottom and 150 mesh sieve at the top. One or two drops of residual material was mixed with same amount of

polyvinyl alcohol over a cover slip and spread uniformly over it. The cover slip was allowed to dry for one day. The dried cover slip was mounted on the slide using canada balsam. Five slides of each productive sample were prepared and pollen-spores were observed under the transmitted light microscope (Olympus 51) and selectively microphotographed. All the eight slides, which have been studied, have been deposited in the museum of the Birbal Sahni Institute of Palaeobotany, Lucknow (Statement No. 1350).

### PALYNOLOGICAL ANALYSIS

Altogether, twelve samples were collected from Borehole NP-50, which represents the topmost Lameta and its underlying Kamthi formations. However, only one mudstone sample, located at the depth of 113.10 m, yielded diversified palynofloral assemblage (Table 3, Text-figure 2). The palynoassemblage is characterized by the dominant association of *Alisporites* (26%) and subdominance of *Krempipollenites* (17.5%). Other significant age marker genera are



**Text-figure 2.** Frequency distribution of palynomorphs recorded from the Borehole NP-50 in Nand area, Maharashtra.

*Klausipollenites* (12%), *Goubinispota* (2%), *Falcisporites* (7.4%), *Aratrisporites* (7.0%), *Arcuatipollenites* (6.9%), *Brachysaccus* (4.8%), *Chordasporites* (4.4%), *Weylandites* (3.5%), *Crustaesporites* (2.9%), *Lueckisporites* (2.2%), *Grebespora* (1.4%) and *Denwasporites* (2%) (Plate 1).

### PALYNOFLORAL COMPARISON

**Damodar Basin:** Early Triassic palynoflora recorded from Sukri River section (Banerji & Maheshwari 1975) contains dominance of striate and non-striate palynomorphs besides significant Triassic palynotaxa, viz. *Playfordiaspora*, *Alisporites* and *Klausipollenites*. The present assemblage has closer affiliation with *Klausipollenites schaubergeri* assemblage zone of Panchet Formation of Damodar Basin (Tiwari & Tripathi 1992) in having *Alisporites asansoliensis*, *Klausipollenites schaubergeri* and *Lunatisporites* spp. However, *Indotriradites mamillatus* is not recorded here. The Early Triassic palynoassemblage (Assemblage II) of Panchet Formation recorded from the Borehole NCRD-6 from Deshergarh-Asansol region, Raniganj Coalfield (Bharadwaj & Tiwari 1977) has closer similarity with present findings as it also contains the palynotaxa, viz. *Klausipollenites*, *Alisporites*, *Lunatisporites* and *Playfordiaspora*. The present palynoassemblage is also correlatable with the palynoassemblage recovered from the Borehole RAD-5 (Group Iie) from East Raniganj Coalfield (Tiwari & Singh 1983) as it also contains *Alisporites*, *Falcisporites*, *Lunatisporites*, *Weylandites*, *Goubinispota*, *Playfordiaspora* and *Klausipollenites*. Similarly, it can also be compared with the assemblage P-IA of Raniganj Coalfield (Tiwari

& Singh 1986) in having significant taxa, viz. *Klausipollenites*, *Falcisporites*, *Alisporites*, *Weylandites* and *Playfordiaspora*. Assemblage A recorded from the Borehole RNM-4, from eastern region of Raniganj Coalfield (Tiwari & Rana 1980) has been assigned an Early Triassic age. This assemblage compares well with the present assemblage as it also contains important palynotaxa, viz. *Goubinispota*, *Lunatisporites* and *Alisporites*, etc. The Panchet palynoassemblage recorded from Borehole RAD-II, East Raniganj Coalfield, West Bengal (Singh 1984), containing *Striatopodocarpites-Lunatisporites* complex, besides *Alisporites*, *Chordasporites*, *Playfordiaspora* and *Klausipollenites*, is also comparable with the present assemblage. The palynoassemblage encountered from Borehole RD-1 (designated as Assemblage-1), located near Durgapur Area (Tiwari 1979), also contains *Lunatisporites-Lundbladispota* as the major taxa. The present palynoassemblage also contains *Lunatisporites*, *Alisporites*, *Chordasporites*, *Playfordiaspora* and *Klausipollenites* and therefore has similarity with this assemblage. Assemblage reported from the Maitur Formation, exposed near Damodar River at Junut village (Banerji & Maheshwari 1977), is also comparable with the present assemblage as it contains *Klausipollenites*, *Alisporites*, *Falcisporites* and *Chordasporites*.

**South Rewa Gondwana Basin:** The Triassic palynoflora recorded from South Rewa Gondwana Basin, Madhya Pradesh (Ram-Awatar 2003) is marked by the dominant association of non-striate bisaccate pollen, viz. *Alisporites*, *Falcisporites* and *Krempipollenites* along with taeniate and other taxa, e.g. *Arcuatipollenites*, *Minutosaccus*, *Reticulatisporites*, *Chordasporites*, *Brachysaccus*



### Plate 1

1. *Crustaesporites trilobatus* Venkatachala & Rawat 1978, slide no. V, U27.
2. *Denwasporites* sp., slide no. VII., E58/3.
3. *Weylandites bilateralis* Bharadwaj & Srivastava 1969, slide no. II, T45.
4. *Aratrisporites granulatus* (Klaus) Playford & Dettmann 1965, slide no. I, E61/1.
5. *Brachysaccus triassicus* Tiwari & Kumar 1990, slide no. VI, V44/1-2.
6. *Grebespora* sp., slide no. V, N48/2.
7. *Alisporites grobus* Bharadwaj & Tiwari 1977, slide no. I, T38/2.
8. *Playfordiaspora cancellosa* Maheshwari & Banerji emend. Vijaya 1995, slide no. IV., V40/3.
9. *Krempipollenites indicus* Tiwari & Vijaya 1995, slide no. VIII., D47/3.
10. *Klausipollenites staplinii* Jansonius, slide no. VIII., H51/4.
11. *Klausipollenites schaubergeri* Potonié & Klaus 1954.
12. *Goubinispota morondavensis* Tiwari & Rana 1980, slide no. V, U46.
13. *Lueckisporites virkikae* Potonié & Klaus 1954, slide no. II, F36/3.
14. *Falcisporites zapfei* Leschik emend. Klaus 1963, slide no. V, S40/4.
15. *Arcuatipollenites damudicus* Tiwari & Vijaya 1995, slide no. VI, Q30/3.
16. *Arcuatipollenites paliensis* Tiwari & Vijaya 1995, slide no. VI, S39.
17. *Arcuatipollenites pellucidus* Tiwari & Vijaya 1995, slide no. V, W29.
18. *Chordasporites* sp. slide no. V, O53.
19. *Chordasporites minutus* Kar et al. 1972, slide no. VI, T30.
20. *Falcisporites minutosaccus* Kumaran & Maheshwari 1980, slide no. V, W46

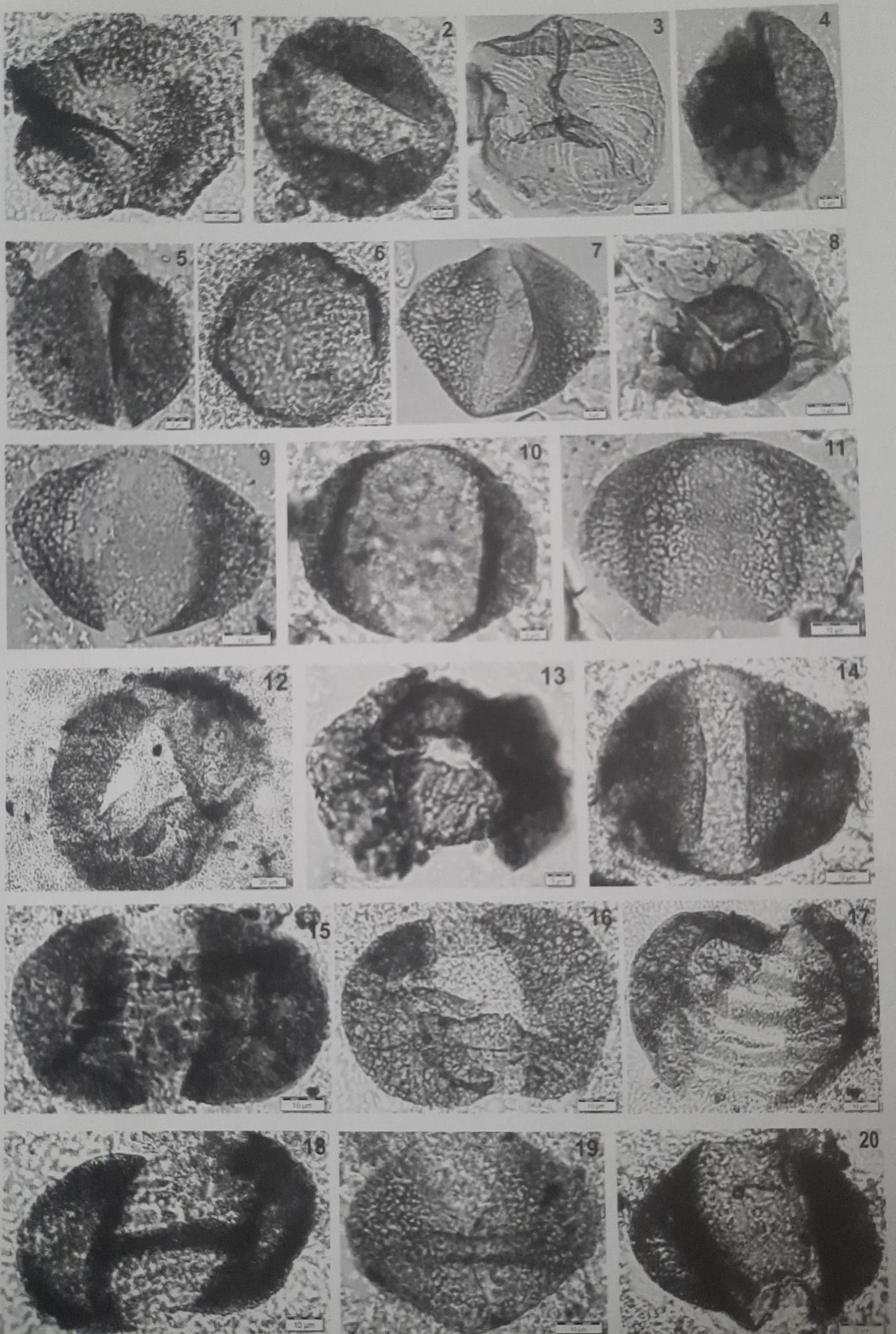


Plate 1

**Table 3. Comparison of present assemblage with other Gondwana coalfields of Peninsular India.**

| Section/Borehole   | Coalfield              | Formation            | Assemblage  | Significant palynotaxa compared with present study   | Age affiliation      |
|--|------------------------|----------------------|---|--|----------------------|
| Sukri River Section, near Kaima (Banerji & Maheswari 1975)           | Auranga                | Panchet              | Triletes- non striate bisaccate and striate bisaccate | <i>Playfordiaspora</i> , <i>Alisporites</i> , <i>Klausipollenites</i> , <i>Falcisporites</i> and <i>Lunatisporites</i>   | Early Triassic       |
| Review work (Tiwari & Tripathi 1992)                                 | Damodar Basin          | Panchet              | <i>Klausipollenites schaubergesii</i>                 | <i>Lunatisporites</i> , <i>Alisporites</i> and <i>Klausipollenites</i>   | Early Triassic       |
| Borehole NCRD-6 (Bharadwaj & Tiwari 1977)                            | Raniganj               | Panchet              | <i>Lundbladispore-Densoisporites</i>                  | <i>Playfordiaspora</i> , <i>Lunatisporites</i> , <i>Crescentipollenites</i> and <i>Klausipollenites</i>  | Early Triassic       |
| Borehole RAD-5 (Tiwari & Singh 1983)                                 | Raniganj               | Lower Panchet        | Non striate   | <i>Alisporites</i> , <i>Falcisporites</i> , <i>Lunatisporites</i> , <i>Weylandites</i> , <i>Goubinispora</i> , <i>Playfordiaspora</i> and <i>Klausipollenites</i>                          | Triassic             |
| Borehole P-1A (Tiwari & Singh 1986)                                  | Raniganj               | Raniganj-Panchet     | Non striate   | <i>Klausipollenites</i> , <i>Falcisporites</i> , <i>Alisporites</i> , <i>Weylandites</i> and <i>Playfordiaspora</i>  | Permo-Triassic       |
| Borehole RNM-4 (Tiwari & Rana 1980)                                  | Raniganj               | Panchet              | <i>Goubinispora morondavensis</i>                     | <i>Goubinispora</i> , <i>Playfordiaspora</i> and <i>Lunatisporites</i>   | Early Triassic       |
| Borehole RAD-11 (Singh 1984)   | East Raniganj          | Panchet              | <i>Lunatisporites-Striatopodocarpites</i>             | <i>Lunatisporites</i> , <i>Falcisporites</i> , <i>Chordasporites</i> and <i>Klausipollenites</i>   | Early Triassic       |
| Borehole RD-1 (Tiwari 1979)  | Raniganj               | Panchet              | <i>Lunatisporites-Lundbladispore</i>                  | <i>Lunatisporites</i> , <i>Alisporites</i> , <i>Chordasporites</i> , <i>Playfordiaspora</i> and <i>Klausipollenites</i> .  | Late –Early Triassic |
| Damodar River Section near village Junut (Banerji & Maheshwari 1977) | Raniganj               | Maitur               | Striate and Non striate                               | <i>Klausipollenites</i> , <i>Alisporites</i> , <i>Falcisporites</i> , <i>Chordasporites</i> and <i>Lunatisporites</i>  | Early Triassic       |
| Son-Chundi River section (Ram Awatar 2003)                           | Umariya Sub Basin      | Pali Formation       | Non-striate bisaccate-Taeniate-striate bisaccate      | <i>Alisporites</i> , <i>Falcisporites</i> , <i>Krempipollenites</i> , <i>Arcuatipollenites</i> , <i>Minutosaccus</i> , <i>Chordasporites</i> , <i>Brachysaccus</i> and <i>Goubinispora</i> | Early-Late Triassic  |
| Borehole SSM-II (Tripathi et al. 2005)                               | Singrauli              | Panchet              | <i>Satsangisaccites-Striatopodocarpites</i>           | <i>Alisporites</i> , <i>Goubinispora</i> , <i>Falcisporites</i> , <i>Krempipollenites</i> and <i>Arcuatipollenites</i>   | Earliest Triassic    |
| Nidpur beds, Gopad River section (Tiwari & Ram-Awatar 1990)          | Singrauli              | Upper Pali           | Taeniate  | <i>Lunatisporites</i> , <i>Alisporites</i> , <i>Falcisporites</i> and <i>Klausipollenites</i> .  | Early Triassic       |
| Sandy shale, Nidpur Bed (Tiwari & Ram-Awatar 1992)                   | Singrauli              | Mahadeva             | Taeniate-cavate                                       | <i>Lunatisporites</i> , <i>Alisporites</i> , <i>Falcisporites</i> , <i>Klausipollenites</i> , etc.   | Early Triassic       |
| Borehole TP-8 (Tripathi 1996)  | Talchir                | Supra Panchet        | <i>Lundbladispore</i>                                 | <i>Playfordiaspora</i> , <i>Arcuatipollenites</i> and <i>Goubinispora</i>  | Early Triassic       |
| Borehole TP-8 (Tripathi 2001)  | Talchir                | Supra Panchet        | <i>Lundbladispore-Arcuatipollenites</i>               | <i>Goubinispora</i> and <i>Playfordiaspora</i>   | Early Triassic       |
| Borehole MKH-5 (Kumar & Jha, 2000)                                   | Katol Godavari Graben  | Panchet              | <i>Callumispora</i>                                   | <i>Falcisporites</i> , <i>Chordasporites</i> and <i>Lunatisporites</i>   | Panchet              |
| Borehole-DGW-6 (Srivastava & Bhattacharyya 1996)                     | Kamptee                | Kamthi               | Striate disaccate + <i>Falcisporites stabilis</i>     | <i>Falcisporites stabilis</i> , <i>Chordasporites</i> , <i>Lunatisporites pellucidus</i> , and <i>Klausipollenites schaubergeri</i>  | Early Triassic       |
| Borehole SSP-133 (Jha 2008)  | Chintalapudi Sub-Basin | Panchet              | Taeniate  | <i>Lunatisporites</i> , <i>Chordasporites</i> , <i>Playfordiaspora</i> , <i>Alisporites</i> and <i>Klausipollenites</i>  | Early Triassic       |
| Borehole 1008 (Jha et al. 2011)                                      | Godavari Graben        | Kamptee              | <i>Lundbladispore-Densoisporites</i>                  | <i>Lunatisporites</i> , <i>Falcisporites</i> , <i>Alisporites</i> , <i>Klausipollenites</i> , and <i>Chordasporites</i>  | Early Triassic       |
| Borehole GAM (Srivastava & Jha 1990)                                 | Godavari Graben        | Panchet              | <i>Lunatisporites-Verrucosporites</i>                 | <i>Lunatisporites</i> , <i>Falcisporites</i> , <i>Klausipollenites</i> , etc.  | Early Triassic       |
| Borehole GBR-7 (Srivastava & Jha 1988)                               | Godavari Graben        | Panchet              | <i>Striatopodocarpites-Lundbladispore</i>             | <i>Falcisporites</i> , <i>Klausipollenites</i> , <i>Lunatisporites</i> and <i>Alisporites</i>  | Early Triassic       |
| Chota Mahadeva, Tamia scrap (Kumar 1995)                             | Satpura Basin          | Pachmarhi            | Non-striate   | <i>Falcisporites</i> , <i>Alisporites</i> , <i>Klausipollenites</i> , <i>Goubinispora</i> and <i>Weylandites</i>   | Early Triassic       |
| Tamia scrap (Kumar 1996)   | Satpura basin          | Bijori and Pachmarhi | <i>Falcisporites-Satsangisaccites</i>                 | <i>Falcisporites</i> , <i>Klausipollenites</i> , <i>Chordasporites</i> and <i>Goubinispora</i>   | Early Triassic       |

and *Goubinispora*. Most of these palynomorphs are also recorded in the present palynoassemblage; therefore, there exists a closer palynofloral affiliation in both the areas.

**Son-Mahanadi Basin:** The Nand palynoassemblage shows similarity with the Early Triassic palynoflora (Assemblage A) recorded from Borehole SSM-II of Singrauli Coalfield (Tripathi et al. 2005) Chhattisgarh, as it also contains *Alisporites asansolensis*, *Goubinispora morondavensis*, *Falcisporites* sp., *Krempipollenites indicus*, *Arcuatipollenites pellucidus*, *A. ovatus* and *A. damudicus*. This assemblage is also comparable with palynozones I and II recorded from Nidpur beds (Tiwari & Ram-Awatar 1990) with respect to the presence of *Weylandites*, *Goubinispora*, *Klausipollenites*, *Falcisporites* and *Alisporites*. Similarly, the palynoassemblage recorded from Mahadeva Formation of Nidpur area, Singrauli Coalfield (Tiwari & Ram-Awatar 1992) is marked by the presence of taeniate (*Lunatisporites*) and non-striate bisaccate (*Alisporites*, *Falcisporites* and *Klausipollenites*) in significant proportion, as observed in the study area. The present assemblage has affiliation with Early to Late Triassic palynofloras recorded from Talchir Coalfield (Tripathi 1996, 2001) in having dominance of the non-striate bisaccate (*Satsangisaccites nidpurensis*, *Falcisporites stabilis* and *Krempipollenites indicus*) and sporadic representation of *Arcuatipollenites pellucidus*, *A. ovatus* and *Arcuatipollenites* sp., besides, *Goubinispora morondavensis*, *Arcuatipollenites* spp., *Alisporites* spp. and *Playfordiaspora cancellosa*.

**Wardha Basin:** The Early and Late Triassic palynoassemblage IV from Katol area of Wardha Basin (Kumar & Jha 2000) is closely comparable with the present assemblage in having *Falcisporites*, *Chordasporites* and *Arcuatipollenites* in fair amount.

**Coalfields of Nagpur District, Maharashtra:** Palynoflora is also known from borehole-DGW-6 near Bazargaon, Nagpur District (Srivastava & Bhattacharyya 1996). Among the three assemblages, Palynoassemblage-3 corroborates the present assemblage due to presence of significant taxa, viz.

*Falcisporites stabilis*, *Chordasporites* sp., *Lunatisporites pellucidus* and *Klausipollenites schaubergeri*.

**Godavari Basin:** The present palynoflora has resemblance with assemblage III of Sattupalli area (Jha 2008) of the Chintalapudi Sub-basin as it contains *Falcisporites*, *Arcuatipollenites* and *Chordasporites* and also compares with Manuguru Area (Jha et al. 2011) of Godavari Graben with respect to the predominance of cingulate-cavate spores *Lundbladispota* and *Densoisporites* and taeniate pollen *Lunatisporites*, in association with other taxa such as *Falcisporites*, *Alisporites*, *Klausipollenites* and *Chordasporites*, which are characteristic feature of Early Triassic age. This palynoassemblage (*Alisporites-Krempipollenites*) is comparable with the assemblage V from Mailaram area of Godavari Graben (Srivastava & Jha 1990), which denotes early Triassic age in having *Lunatisporites*, *Klausipollenites*, *Playfordiaspora* and *Alisporites*. However, *Verrucosisporites*, *Taeniaepollenites*, *Guttatisporites*, *Polypodiidites* are absent from the present assemblage. Similarly, palynoassemblage recorded from the study area is also comparable with the palynoassemblage recorded from Budharam area of the Godavari Valley which contains *Lunatisporites*, *Hamiapollenites*, *Falcisporites*, *Klausipollenites*, *Chordasporites*, *Playfordiaspora* and *Brachysaccus* (Srivastava & Jha 1988).

**Satpura Basin:** The palynomorphs recorded from Chota Mahadeva of Tamia Scrap, Satpura Basin (Kumar 1995) compares closely with present palynoassemblage in having presence of *Falcisporites*, *Alisporites*, *Klausipollenites*, *Goubinispora* and *Weylandites*. Assemblage B, having dominance of *Falcisporites* and followed by *Satsangisaccites* in Pachmarhi Formation of Tamia river Section (Kumar 1996) of Satpura Basin, is also comparable to the present assemblage in having significant forms such as *Klausipollenites*, *Chordasporites* and *Goubinispora*.

## CONCLUSION

Existence of Early Triassic deposits is indicated on the basis of palynoflora recorded from Nand-Besur Coalfield (representing north-eastern continuity of

Bandar Coalfield) in Nagpur District, Maharashtra. The palynoassemblage has higher incidence of non-striated bisaccate pollen, viz. *Alisporites*, *Krempipollenites*, *Klausipollenites*, *Falcisporites* and *Brachysaccus*, and representation of *Arcuatipollenites*, *Chordasporites*, *Weylandites*, *Curstaesporites*, *Minutosaccus*, *Goubinispota*, *Playfordiaspora*, *Denwasporites* and *Aratrisporites*. Besides, meagre representation of cavate cingulate spores indicates an Early Triassic age (Scythian) for the sedimentary sequence of the studied area. The palynoflora compares well with the deposits palynologically assigned to the Early Triassic age from several Indian Gondwana basins (Table 3).

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