PALYNOSTRATIGRAPHIC STUDIES OF SUB-SURFACE SUPRA-BARAKAR SEDIMENTS FROM KORAR COALFIELD, SON VALLEY, MADHYA PRADESH

R. S. TIWARI & RAM-AWATAR
Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow-226 007, India

Abstract

From Korar Coalfield, which is the smallest coalfield of Son Valley in Madhya Pradesh region, the first palynological report is communicated. Varied types of pollen and spores, viz., Faunipollenites, Striatopodocarpites, Gondisporiles, Lundbladispora, Denisipollenites, Lunatisporites, Nidipollenites, Satsangisaccites, Infernopollenites, have been recovered in samples from bore-hole UKD-8. On the basis of miofloral assemblages these yielding horizons (depth from surface 41 to 193 m) have been dated to be Late Permian to Early Triassic in age. This finding is significant because it fills one more gap in the palynostratigraphic succession of Gondwana Sequence in Son Valley.

Introduction

The name Korar Coalfield was introduced by Hughes in the year 1884 after the village Korar-Kotalwar (23°37' - 80°53'), (Map-1) which is situated about 11.5 km N.E. of Umaria Railway Station, Katni-Bilaspur line of the Central Railway in M.P. The total area of this coalfield is about 25.6 sq km.
The Barakar rocks comprise grey and yellowish felspathic sandstone, beds of carbonaceous shale and coals. They are overlain by Supra-Barakar sequence having mainly yellow, redish, whitish sandstone with clayey shale and shale-bands. These sediments are proved only in subsurface.

There is no record of plant megafossils or microfossils from any horizon of this coalfield; consequently, their age has not yet been determined precisely, although on lithological and stratigraphical grounds they are classified as Talchir, Barakar and Supra-Barakar. An attempt for search of palynofossils in bore-hole UKD-8 was made and few samples at 41 to 193 m depth were found to yield a fairly well-preserved palynological assemblage. These yielding beds are from Supra-Barakar levels, which all the more makes it a purposeful study for age determination. At the same time, one more gap in the succession of Gondwana palynostratigraphy is filled through this record in Son Valley.

**Material and Methods**

The material for the present investigation was collected from bore-hole UKD-8 (Map 1) drilled by Geological Survey of India, at about 2 km North of Forest check-post, on Umaria-Tala road and about 2 km South of Dhamokhar Village. Thirty-two samples were collected, out of which only six samples were found to contain palynofossils (See Table-1).

**Palynological Assemblage**

The following genera were found in the assemblage.

**Triletes**

Callumispora Bharadwaj & Srivastava 1969; Brevitriletes Bharadwaj & Srivastava 1959; Horriditriletes Bharadwaj & Saluja 1964; Microfoveolatispora Bharadwaj 1962 (Plate-1, Fig. 6); Microbaculispora Bharadwaj 1962; Verrucosisporites Ibrahim 1933 emend. Smith et al. 1937; Osmundacidites Couper 1953; Indotriradites Tiwari 1964; Gondisporites Bharadwaj 1962; Lundbladispora Balme emend. Playford 1965.

**Monoletes**


**Aleite Type**

Pl. 1, fig. 9

**Monosaccates**

Paresaccites Bharadwaj & Tiwari 1964; Densipollenites Bharadwaj 1962; Plicatipollenites Lacle 1964; Pontoniosporites Bharadwaj emend. Bharadwaj 1955; Barakarites Bharadwaj & Tiwari 1964 (Plate-1, Fig. 3); Playfordiaspora Maheshwari & Bauerji 1975; Striamonosaccites Bharadwaj 1962.

**Non-striate diisaccate pollen**

Podocarpidites Cookson emend. Potonié 1954; Satsungisaccites Bharadwaj & Srivastava 1969 (Plate 1, Fig. 8); Alisporites Daugherty 1941 emend. Somers 1958; Cateniosaccites Bose & Kar 1966; Chordasporites Klaus 1960; Scheuringipollenites Tiwari 1975; Ibispores Tiwari 1968.
<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Lithology</th>
<th>Depth in meter from surface</th>
<th>Remarks</th>
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<tr>
<td>UKD 8/1</td>
<td>Argillaceous Sandstone</td>
<td>25.15-29.00</td>
<td>Supra Barakar</td>
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<td>8/2</td>
<td>Argillaceous Sandstone</td>
<td>35.90</td>
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<tr>
<td>8/3</td>
<td>Greenish grey clay</td>
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</tr>
<tr>
<td>8/4</td>
<td>Sandy Shale with carbonaceous streak</td>
<td>41.50</td>
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</tr>
<tr>
<td>8/5</td>
<td>Argillaceous sst (current bedded)</td>
<td>61.80-64.80</td>
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</tr>
<tr>
<td>8/6</td>
<td>Argillaceous sst (current bedded)</td>
<td>69.70</td>
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<td>Clay</td>
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<td>Sandstone</td>
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<td>Clay</td>
<td>142.75</td>
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<td>225.35-226.25</td>
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<td>Supra Barakar</td>
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<tr>
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<td>335.05</td>
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Note: Asterisk (*) mark indicates yielding samples.

**Striatae disaccate pollen**

Ricovispora Wilson 1962; Faunipollenites Bharadwaj 1962 (Plate-1, Fig. 2); Striatopodocarpites Soriisch. & Sedova emend. Bharadwaj 1962 (Plate-1, Fig. 4); Distriatites Bharadwaj 1962; Lahirites Bharadwaj 1962; Striataites Bharadwaj 1962; Crescentisporites Bharadwaj, Tiwari & Kar 1974 (Plate-1, Fig. 5); Striaisulcites Venkatachala & Kar 1968; Hemiapollenites Wilson, 1962.

**Taeniate disaccate pollen**

Lanatisporites Leschik 1955 emend. Scheuring 1970; Corisaccites Venkatachala & Kar 1966 (Plate-1, Fig. 7); Guttulapollenites Goubin emend. Venkatachala & Kar 1966; Lueckisporites Klaus 1963, Infernopollenites Scheuring 1970.

**Other**

Ephedripites Bolkhovitina, 1953 (Plate-1, Fig. 1);
Weylandites Bharadwaj & Srivastava 1969.

**Quantitative Analysis**

The percentage frequency of important pollen and spore genera, depicted in Histogram-1, reveals that there are two distinct assemblages in the sequence:

Assemblage-I: Contained by the older samples-UKD-8/18 (193.35 m), UKD-8/17 (164.00 m), UKD-8/16 (155.0), UKD-8/15 (152.30) and Assemblage-II: Contained by the younger samples-UKD-8/6 (69.70 m), UKD-8/4 (41.50 m). A perusal of Histogram-1, reveals that in Assemblage-1, the abundant taxa are Striatopodocarpites (11.7%), while common genera are Microbaculispora (1.7%), Microfoveolatispora (1.5%), Densipollenites (2.7%), Parasaccites (7.7%), Plicatipollenites (1.7%), Barakarites (2%), Potonieisporites (1.7%), Striatozonosaccites (2.5%), Laevigatosporites (1.7%), Sahnites (1.2%), Vestigisporites (1.5%), Cuneatisporites (3.1%), Scheuringisporites (8.2%), Faunipollenites (9.2%), Striatitites (2%), Chordasporites (1.5), Crescentisporites (3.5%), Osmundacidites (1.2%), Corisaccites (1.7%), Indotriradites (1.1%), Callumispora (1.5%), Verrucosisporites (1.3%), Lundbladispora (3.2%), Alisporites (1.2%), Lunatisporites (3.2%), Infernopollenites (4.5%) and Alete type grains are about 6.4%. Rare elements are Gondisporites (0.5%), Rhizomaspora (0.3%), Lonicoidites (0.5%), Weylandites (0.5%). The genus Satsangisaccites is sporadic being less than 0.5% in the presently described Assemblage-1.

In Assemblage-II, the appearance of taxa are somewhat different than the Assemblage-I; here the abundant taxa are Densipollenites (20%), Striatopodocarpites (17%). Common genera are Gondisporites (1.2%), Vestigisporites (1.7%), Scheuringisporites (8.5%), Faunipollenites (9%), Crescentisporites (2.5%), Osmundacidites (2.5%), Corisaccites (6%), Lundbladispora (1.5%), Alisporites (3%), Satsangisaccites (8%), Nidipollenites (1.5%), Lunatisporites (1.5%) and Alete type is about (1.5%). The rare elements in Assemblage-2 are Laevigatosporites (0.7%), Sahnites (0.7%), Chordasporites (0.5%), Verrucosisporites (0.7%) and the sporadic forms which are less than 1% are—Pronisaccites, Plicatisporites, Potonieisporites, Striatozonosaccites, Cuneatisporites, Indotriradites and Weylandites.

At a glance, it appears that all the six samples which yielded miospores contain a continuous assemblages; some of the major elements, viz., Scheuringisporites, Faunipolle-
nites, Striatopodocarpites, and most of the less represented forms, such as—Plicatipollenites, Lunatisporites, Satsangisaccites, and most of the less represented forms, such as—Plicatipollenites, Lunatisporites, Satsangisaccites, and most of the less represented forms, such as—Plicatipollenites, Lunatisporites, and most of the less represented forms, such as—Plicatipollenites, Lunatisporites, etc. are uniformly present in them. However, Densipollenites, Corisaccites, Nidipollenites and Satsangisaccites are better represented in Assemblage-II while Microbaculispora, Parasaccites and Barakarites are more abundant in Assemblage-I.

Except for the above nuance in certain generic incidences, it appears that the sequence is continuous as there seems to be no sudden miofloral break between the two assemblages proposed here. However, the pattern of change and alteration in quality being evident, two distinct assemblages have been identified here.

Comparison

The present assemblages, when compared with the already known assemblages from the Gondwana sequence of India, show a fair degree of resemblance with the miofloras of the Raniganj Stage (Upper Permian) because the elements, like—Faunipollenites, Striatopodocarpites, Densipollenites and Gondisporites are abundant in the present assemblage; moreover, qualitatively significant genera, viz., Callunumispora, Microbaculispora, Microfoveolatispora, Parasaccites, Plicatipollenites, Barakarites, Satsangites, etc., are also present which indicate Permian affinities (see Bharadwaj, 1962; Bharadwaj, Tiwari & Anand-Prakasn, 1979; Kar, 1970; Sarbadhikari, 1972; Maheshwari & Banerji, 1975; Bharadwaj & Tiwari, 1977; Tiwari & Rana, 1980; Tiwari & Ram-Awatar, 1986.)

Among the other set of palynomorphs, the genera Alisporites, Lundbladispora, Nidipollenites, Infernopollenites, Playfordiaspora, Podocarpidites and Weylandites are some of the important taxa which have been found in the presently described two assemblages; these genera are indicator of younger affinity than those which are found in Upper Permian. The above mentioned forms are mostly reported from the Lower to Middle Panchet Formation. But even then, the Late Lower Triassic and Early Middle Triassic assemblages so far known from the Damodar Graben area do not exactly coincide with the assemblages I & II of the Korar Coalfield. The former has qualifying taxa—Pyramidosporites, Pretricolpipollenites, Goubinispora, Ringosporites, Orbella, Cuneatisporites, Carnisporites, Aratrisporites, Muerrigerisporites, etc. (Tiwari & Rana, 1980, Table 3) while in the latter they are absent.

There are some important data on the Supra-Baraker palynological assemblages known from Son Valley Graben of Madhya Pradesh region (cf. South Rewa Gondwana Basin); these are from Nidpur, Tharipathar and Ghiar, Janar Nala, Pali and Parsora (near-Dargaon).

When compared with the Nidpur Flora (Bharadwaj & Srivastava, 1969), the presently described assemblages are older and do not match with it; however, the beginning of fair occurrence of Nidipollenites, Satsangisaccites and rare incidences of Weylandites reflect some relationship with Nidpur flora.

The palynological assemblage from Tharipathar and Ghiar (Maheshwari & Kumeran, 1979) has been designated as Stauracaccites tharipatharensis and Rimasporites potonius assemblages; They consist of Stauracaccites, Samaropollenites, Rimaspores, Alidispores, Carnosporites, Duplicispores, etc. and many other taxa which are not encountered in the presently studied Korar assemblage. In fact, the Tharipathar-Ghilar flora are much younger to the presently described one.

The other mioflora known from this region is of Janar Nala (Kumeran & Maheshwari, 1980) which is still younger than the two described above in having Convolutispora, Clava-
**Miopore Genera**

- Microbaculispora
- Microfoveolatispora
- Gondisporites
- Densipollenites
- Parasaccites
- Plicaticollenites
- Barakarites
- Potonieispores
- Striamonasaccites
- Laevigatosporites
- Sahnites
- Vestigisporites
- Cuneatisporites
- Rhizomaspora
- Bisporites
- Schauerisporites
- Faunipollenites
- Mikropollenites
- Striatopodocarpites
- Striatites
- Chordasporites
- Crescensipollenites
- Osmundacidites
- Corisaccites
- Lericodites
- Indotriradites
- Callumispora
- Verrucosisporites
- Lundbladispora
- Alisporites
- Satsangisaccites
- Nidipollenites
- Lunatisporites
- Infernopollenites
- Weylandites
- Alete Type - 1

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<th>8/17</th>
<th>8/16</th>
<th>8/15</th>
<th>8/14</th>
<th>8/9</th>
<th>8/1</th>
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<tr>
<td>Depth in m</td>
<td>193.35</td>
<td>194.9</td>
<td>195.0</td>
<td>195.2</td>
<td>195.3</td>
<td>195.7</td>
<td>196.0</td>
</tr>
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</table>

Text-fig. 1

Miopores, Dicytyophyllidites, Lycopodiadites, Cornisporites, Urnispores, Tikisporites, etc. The comparison is, therefore, not close.

The assemblage from a bore-core samples whose level has been referred to Pali Formation has been described from Johilla River Coalfield to contain major genera, as, Faunipollenites, Striatopodocarpites, Striatites and Lericites; other rare forms are Densipollenites, Barakarites, Parasaccites, Schmites, Microfoveolatispora, etc. Some taxa, viz., Satsangisaccites, Podocarpidites, Lunatisporites, etc. are rare and sporadic but indicate an younger string. (Tiwari & Ram-Awatar, 1986). This assemblage has been dated to be Late Permian.
(Raniganj) and it compares well with the Assemblage-I described presently. However, the latter has a somewhat younger affinity than the former within the Upper Permian frame-work. The Assemblage-II of the present report is relatively younger.

Tiwari and Ram-Awatar (1987) also studied a miofloral assemblage from Johilla River section near Dorgaon to which a Permian—Triassic transition age was assigned. This assemblage contained *Strictopodocarpites*, *Desipollenites*, *Lundbladispora*, *Lunatisporites*, *Playfordiaspora*, *Satsangisaccites*, *Nidipollenites*, etc. In its constitution, fair similarity with the presently described assemblages I and II is evident.

In spite of the basic composition of the presently recorded two assemblages to have their Raniganj affinities, certain elements, like, *Lunatisporites*, *Chordasporites*, *Nidipollenites*, *Satsangisaccites*, *Playfordiaspora*, *Lundbladispora*, etc. try to give an younger aspect qualifying for the Panchet miofloras; nevertheless, these taxa are normally very rare, inconsistent and sporadic in the UKD-8 assemblage no. II. This fact corroborates with our findings elsewhere (in the Raniganj Coalfield) that rare incidence of these younger elements start almost at the beginning of the Panchet Formation.

It is contended here, after thoughtful matching, that the Assemblage-I has more of Latest Permian characters while Assemblage-II inclines more to the earliest Triassic. This may not suggest directly that we are handling the Permian-Triassic boundary, but it is certain that we are in that zone, and the physical gap of about 80 m in between the assemblage-I and II might have unlocked mystery of a change, if it would have yielded palynofossils.

The Supra-Barakar miofloras thus known from the Son Valley area of M.P. (South Rewa Gondwana Basin) are sequentially positioned in the ascending order and the tier of presently recorded Assemblage I and II has been allocated in the following manner.

6. Tharipathar, Ghiar, Janar Nala.
5. Nidpur bed Assemblage
4. Assemblage in Johilla River Section in between Dorgaon and Salaia villages
3. Assemblage-II
   Assemblage-I
2. Assemblage in Bore-hole JHL-27A; Pali Formation; Tiwari & Ram-Awatar, 1986

This sequence is not yet complete and many intervening assemblages are yet to be known. Only their relative positioning with relation to each other has been depicted. This has been derived on the basis of age affinities of certain miospore taxa.

**Conclusion**

The Korar Coalfield although a small patch of deposition, appears to have the sequence of Barakar and Supra-Barakar, the latter encompassing formations equivalent to Pali and Parsora. Although the yielding samples are not many which could build up a continuous, complete sequence, this is the first report from this area having an interesting data which is important for comparison as well as age determination. The palyno-
fossils in strata in B.H. UKD-8 between 41.50-193.50 depth resemble Upper most Raniganj and Lower Panchet palynoflora. The above mentioned strata, therefore, represent a Late Permian to Early Triassic deposits. Thus, a transition of Permo-Triassic periods is probably being dealt here, as was the case in the Dorgaon exposures in Johilla river (Tiwari & Ram-Awatar, 1987). The Permo-Triassic boundary as depicted in Damodar Valley (Tiwari & Singh, 1983) has not been demarcated here in this basin; neither it is expected by seeing the trends of the microfossils that the behaviour pattern will be repeated in the Son Valley. The Korar assemblage I and II are from the transitional zone.

Acknowledgements

Thanks are due to Dr Suresh G. Srivastava and Anand-Prakesh, B.S.I.P. for their kind help during the collection of the samples. The help rendered by the Geological Survey of India (Coal wing) during our work is also gratefully acknowledged.

References


Explanation of Plate

PLATE 1

1. *Ephedripites* Bolkhovitina 195?; Coordination No. 78 x 9; Regd. Slide No. 9060
2. *Faunipollenites* Bharadwaj 1962; Coordination No. 91 x 8; Regd. Slide No. 9059
3. *Barakarites* Bharadwaj & Tiwari 1964; Coordination No. 76 x 17; Regd. Slide No. 9061
4. *Striatopodocarpites* Soritsch. & Sedova emend. Bharadwaj 1962; Coordination No. 69 x 10; Regd. Slide No. 9059
5. *Crescentipollenites* Bharadwaj, Tiwari & Kar 1974; Coordination No. 77 x 4; Regd. Slide No. 9060
6. *Microfoveolatispora* Bharadwaj 1962; Coordination No. 84 x 3; Regd. Slide No. 9061
7. *Corisacites* Venkatachala & Kar 1966; Coordination No. 92 x 8; Regd. Slide No. 9061
8. *Satsangisaccites* Bharadwaj & Srivastava 1969; Coordination No. 78 x 4; Regd. Slide No. 9061
9. *Alete* Type-1, Coordination No. 63 x 3; Regd. Slide No. 9061.