A PALYNOLOGICAL ASSEMBLAGE FROM PARSORA FORMATION, JOHILLA COALFIELD, SOUTH REWA GONDWANA BASIN, MADHYA PRADESH

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Abstract

The Parsora Formation is the younger horizon overlying the Pali Formation of Supra-Barakar in the South Rewa Gondwana Basin. The miospore assemblage containing *Striatopodocarpites*, *Faunipollenites*, *Densipollenites*, *Lundbladispora* and *Lunatisporites* has been recovered from the outcrop samples exposed in Johilla River between Dargaon and Salaia villages. The occurrence, although rare, of *Playfordiaspora*, *Lueckisporites*, *Falcisporites* and *Nidipollenites* makes this assemblage a unique one. It has been concluded that the bed which yielded this assemblage is of Permain/Triassic transition phase, however, with closer relationship with the Lower Triassic assemblages.

Introduction

The general geological sequence in Johilla Coalfield, South Rewa Gondwana Basin exhibits the presence of Talchir Formation, Barakar Formation, the Supra-Barakars, Lametas and the Traps. The Supra-Barakar encompasses all the groups of Gondwana formations which are younger to the typical coal-bearing Barakar; in the area of study it includes Pali and Parsora formations which, in their turn, are thought to be homotaxial with Raniganj and Panchet formations of Damodar Basin, respectively.

The Parsora Formation is younger to the Pali Formation. It has been variously named in the past, such as—Mahadeva (Hughes, 1881), Transitional Bed (Feistmantel, 1882), Supra-Barakar (Hughes, 1884), Parasora Bed (Cotter, 1917) and Parsora Stage (Lele, 1964).

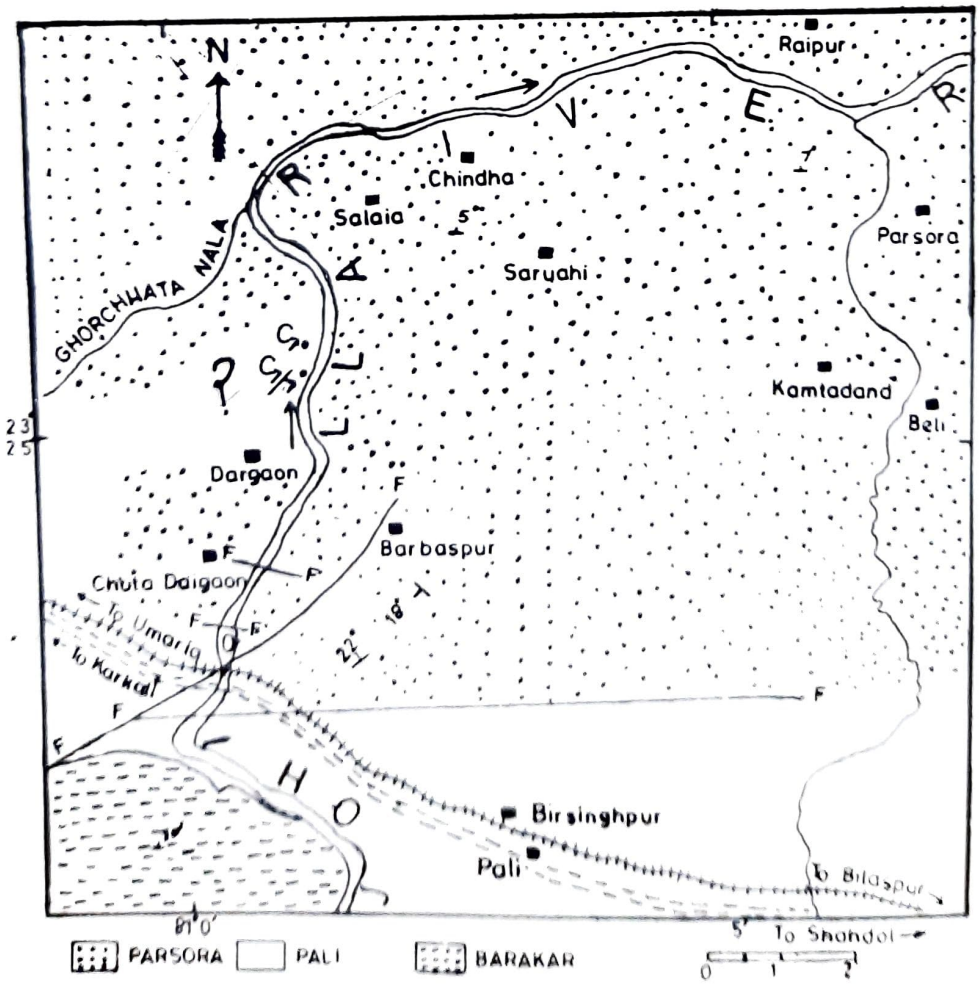
The age of Parsora Formation has been suggested on the basis of lithology as Mahadeva (Upper Gondwana). Feistmantel (1882) studied the fossils collected by Hughes and concluded that lithologically it looks like Upper Gondwana, but megafloral assemblage distinctly shows its resemblance with the Lower Gondwana. However, Cotter (1917) considered the age of this bed to be equivalent to Panchet Series.

A large number of plant megafossils have been reported by various workers from different localities (Feistmantel, 1882; Sahni, 1932; Saksena, 1962; Lele, 1955) which include both Lower and Upper Gondwana elements, such as *Cladophlebis*, *Parsorophyllum*, *Neocalamites*, *Schizoneura*, *Samaropsis*, *Dicroidium*, *Araucarites*, etc.

The palynological report from the Parsora Formation is almost non-existent; only Jhingran (1979) reported the presence of *Parasaccites diffusus*, *Parasaccites* spp., few megaspores and some fungal spores from these beds. Thus, the present palynological report is the first of its kind from this area, concerning with the age of the bed (Parsora Formation) exposed between Dargaon and Salaia villages.

The outcrop samples for the present investigation were collected along Johilla River Section which is exposed between Dargaon and Salaia villages. Out of 10 samples only two (black micaceous shale samples) were found fossiliferous (Map 1; C7 and C7/1).

Sample no.	Lithology
C1	Reddish sandstone
C2	White sandstone
C3	,, ,,
C4	,, ,,
C5	,, ,,
C6	Grey shale
C7	Black Micaceous shale (miospores present)
C7/1	,, ,, ,, ,,
C8	,, ,,
C9	,, ,,



Map 1—Showing the position of productive samples.

Palynological Assemblages

The sample no. C7 and C7/1, which yielded the spores and pollen grains, were found to contain similar forms and hence treated as constituting only one assemblage. The following genera are present :

Callumispora fungosa (Balme) Bharadwaj & Srivastava emend. Bharadwaj & Tiwari 1977 (Pl. 1, Fig. 1); *Verrucosisporites narmianus* Balme, 1970 (Pl. 1, Fig. 2); *Densipollenites indicus* Bharadwaj 1962 (Pl. 1, Fig. 3); *Laevigatosporites colliensis* Balme & Hennelly, emend. Venkatachala & Kar 1968 (Pl. 1, Fig. 4); *Striomonosaccites ovatus* Bharadwaj 1962 (Pl. 1, Fig. 5); *Gondisporites reticulatus* Tiwari & Ram-Awatar (1985) in press (Pl. 1, Fig. 6). *Lundbladispora* Balme emend. Playford 1965; *Lundbladispora* sp. (Pl. 1, Fig. 7); *Scheuringipollenites maximus* Tiwari 1973 (Pl. 1, Fig. 8); *Guttulapollenites hannonicus* Goubin (1965) emend. Venkatachala, Goubin & Kar 1969 (Pl.1, Fig. 9): *Corisaccites alutas* Venkatachala & Kar 1966 (Pl. 1, Fig. 10); *Lueckisporites virkkii* Potonie & Klaus 1963 (Pl. 1, Fig. 11); *Navalesporites spinosus* Sarate & Ram-Awatar 1984 (Pl. 1, Fig. 12); *Osmundacidites senectus* Balme 1963 (Pl. 1, Fig. 13); *Playfordiaspora cancellosae* (Pl y ford & Dettmenn). Maheshwari & Banerji 1975 (Pl. 1, fig. 14); *Laricoidites* Potonié, Thomson & Thiergart 1950, *Laricoidites* sp. (Pl. 2, Fig. 1) ; *Striatopodocarpites tiwarii* Bharadwaj & Dwivedi 1981 (Pl. 2, Fig. 2); *Striatites subtilis* Bharadwaj & Salujha 1964 (Pl. 2, Fig. 3); *Klausipollenites vestitus* Jansonius 1962 (Pl. 2, Fig. 4); *Faunipollenites various* Bharadwaj 1962 (P. 2, Fig. 5); *F. perexiguus* Bharadwaj & Salujha 1964 (Pl. 2, Fig. 6); *Distriatites bilateralis* Bharadwaj 1962 (Pl. 2, Figs. 7, 8) ; *Verticipollenites* Bharadwaj 1962, *Verticipollenites* sp. (Pl. 2, fig. 9); *Nidipollenites monoletus* Bharadwaj & Srivastava 1969 (Pl. 2, Fig. 10); *Alisporites indicus* Bharadwaj & Srivastava 1969 (Pl. 2, Fig. 11) ; *Falcisporites stabilis* Balme 1970 (Pl. 2, Fig. 12) ; *Crescentipollenites amplus* (Maithy) Bharadwaj, Tiwari & Kar 1974 (Pl. 2, Fig. 13) ; *Lunatisporites pellucidus* (Goubin) Maheshwari & Banerji, 1975, *Lunatisporites* sp. (Pl. 2, Fig. 14).

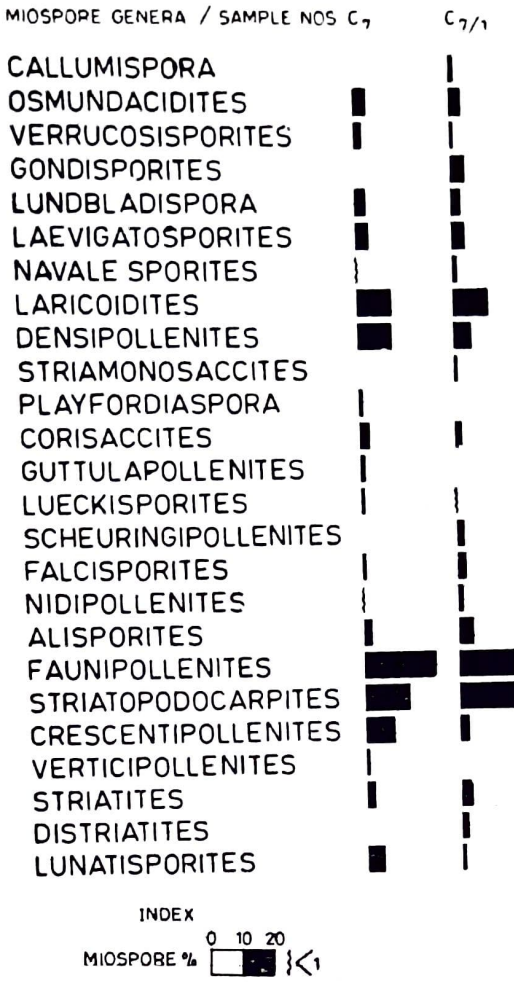
Quantitative analysis reveals that the genera *Striatopodocarpites*, *Faunipollenites*, *Crescentipollenites*, *Densipollenites* and *Laricoidites* are in dominant to abundant in occurrence (Histogram 1). A perusal of histogram further reveals that some of the qualitatively important genera are sporadic, and their presence are very significant, such as *Lueckisporites*, *Lundbladispora*, *Verrucosisporites*, *Corisaccites*, *Falcisporites*, *Nidipollenites* and *Lunatisporites*; rest of the forms are either rare or stratigraphically not very significant.

Age Determination

Parsora Formation is younger than the Pali Formation. Previously it was considered that the Parsora Formation is barren of spores and pollen grains and its age was considered to be Triassic on the basis of megafossils.

During the present investigation, a fairly well-preserved miospores assemblage has been recovered from the out-crop samples exposed in between the villages Dargaon and Salaia, in the Johilla River cutting. The assemblage extracted from these samples contained a variety of miospores. The presence of *Gondisporites*, *Densipollenites*, *Striatopodocarpites*, *Crescentipollenites* and *Faunipollenite* in a spectacular manner qualifies these beds to be of Late Raniganj age (see Bharadwaj, 1962; Bharadwaj & Salujha, 1964; Kar, 1970; Bharadwaj, Tiwari & Anand-Prakash, 1979).

In sequel to the above, the genera, like-*Lundbladispora*, *Klausipollenites*, *Verrucosisporites*, *Guttulapollenites*, *Lunatisporites*, *Falcisporites*, *Alisporites* and *Nidipollenites* are also present in



Text-fig. 1—Percentage frequency of important miospore genera found in the productive sample no. C_7 and $C_{7/1}$.

this assemblage which are definite indicator for a still younger aspect, i.e. Early Triassic, for the bed. It is, therefore, concluded here that the age of the bed has an affinity with the last phase of the Permian on one hand and early phase of Triassic on the other; that implicates that it has a Permo/Triassic transitionary aspect (Bharadwaj, 1962; Bharadwaj & Tiwari, 1977; Maheshwari & Banerji, 1975; Rana & Tiwari, 1980; Singh & Tiwari, 1982; Tiwari, & Singh, 1983). From the map (adopted after C. S. Raja Rao, 1983) it is evident that the area involving Pali and Parsora formations along the Johilla River Section is somewhat complicated (Map 1) and does not represent a simple geological sequence as normally has been thought of. The Pali beds are dipping towards NNE by 5°-10°, while the so-called Parsora sequence, after the main fault in the north of Birsinghpur, shows a change in dip direction, resulting into a NNW direction ranging from 6°-20°. Further and beyond this region the dips have been recorded in SSW direction (12°-18°). The two major faults separating the Pali and Parsora meet near the railway bridge on Johilla River.

The presence of a Permo-Triassic transitionary mioflors in the area (Sample Nos. C_7 $C_7/1$) which has been traditionally located well within the Parsora sequence (Map 1), much above the boundary of the Pali and Parsora, evidently indicates the problem of demarcation of these two formations in the area.

From the present study it is indicated that there are exposures of Pali/Parsora transition near north of Dargaon while in the south of the village, the Parsora beds are exposed

till the main fault in south; this implies that the Pali beds are repeated along the Johilla River again between Dargaon and Salaia Villages.

Conclusion

On the ground of palynological study, it is concluded that the age of exposures between Dargaon and Salaia is having a Permo/Triassic affinity and, therefore, the presence of Pali Bed in this area is indicated. The Pali/Parsora boundary is evidenced also in the area of yielding samples. The close of Pali Formation and the advent of Parsora Formation have witnessed a rich vegetation as it is implicit from the diversified spore and pollen assemblages. This observation contradicts the earlier concept that the dry and arid condition were existing during thse times when Parsora sediments were being deposited. The absence of coal seams inspite of rich vegetation may be due to the tectonic stability of the basin and absence of suiable condition in the area leading to the non-deposition of peat. The continuous energy flow and supply of oxygen in shallow swamps did not create the aseptic condition, hence no coal deposition has taken place in these regions.

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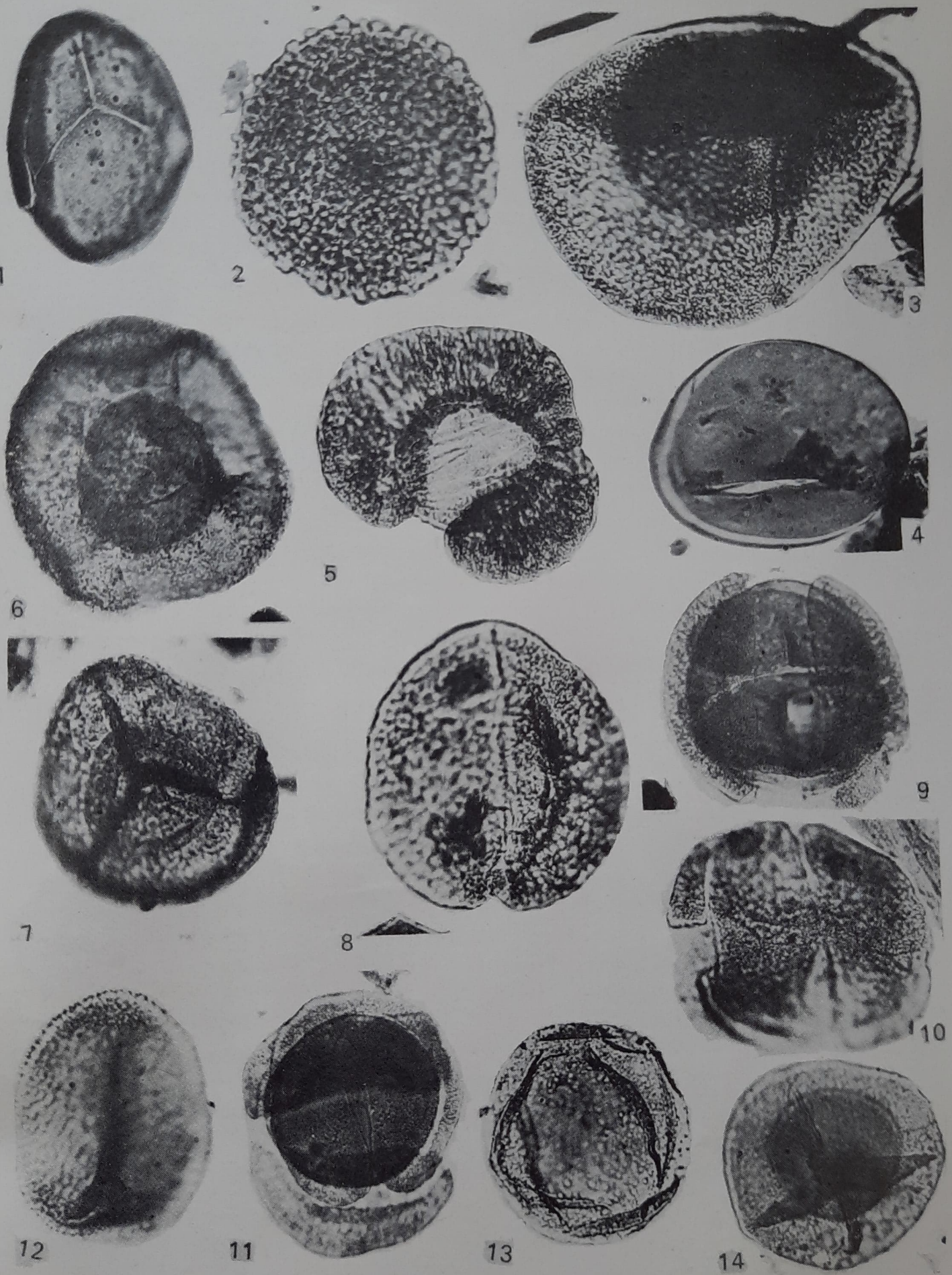
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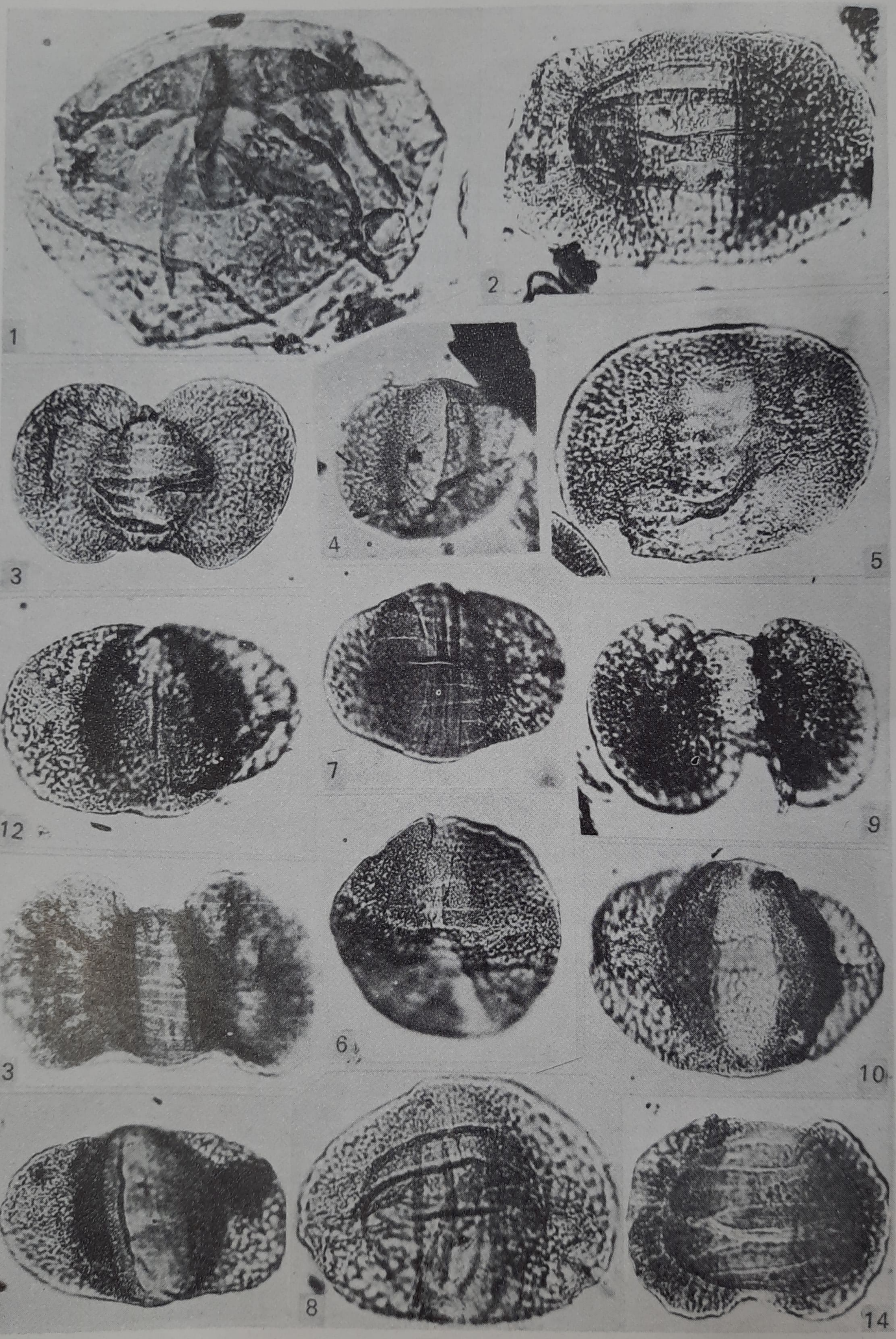

Tiwari & Ram Awatar—Plate 2

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Explanation of Plates

(All figures ca × 500)

PLATE 1

1. *Callumispora fungosa* (Balme) Bharadwaj & Srivastava emend. Bharadwaj & Tiwari 1977; B.S.I.P. Sl. No. 9054.
2. *Verrucosisporites narmianus* Balme, 1970; B.S.I.P. Sl. No. 9049.
3. *Densipollenites indicus* Bharadwaj 1962; B.S.I.P. Sl. No. 9049.
4. *Laevigatosporites colliensis* Balme & Hennelly emend. Venkatachala & Kar 1968 ; B.S.I.P. Sl. No. 9050.
5. *Striomonosacciteas ovatus* Bharadwaj 1962; B.S.I.P.Sl. No., 9056.
6. *Gondisporitrs reticulatus*, Tiwari & Ram-Awatar (1985) (in press); B.S.I.P. Sl. No. 9056.
7. *Lundbladispora* Balme emend. Playford B.S.I.P. Sl. No. 9051.
8. *Scheuringipollenites maximus* Tiwari 1973; B.S.I.P. Sl. No. 9052.
9. *Guttulapollenites hannonicus* Goubin 1965; emend. Venkatachal, Goubin & Kar 1969; B.S.I.P. Sl. No. 9051.
10. *Corisaccites alutas* Venkatachala & Kar 1966; B.S.I.P. Sl. No. 9056.
11. *Lueckisporites virkkii* Potoni'; & Klaus 1963; B.S.I.P. Sl. No. 9047.
12. *Navalesporites spinosus* Sarate & Ram-Awatar 1984; B.S.I.P. Sl. No. 9052.
13. *Osmundacidites senectus* Balme 1963; B.S.I.P. Sl. No. 9045.
14. *Playfordiaspora cancellosa* (Playford & Dettmann) Maheshwari & Banerji 1975; B.S.I.P. Sl. No. 9052.

PLATE 2

1. *Laricoidites* Potonié, Thomson & Thiergart 1950; B.S.I.P. Slide No. 9048.
2. *Striatopodocarpites tiwarii*; Bharadwaj & Dwivedi, 1981; B.S.I.P. Sl. No. 9045.
3. *Striatites subtilis* Bharadwaj & Salujha 1964; B.S.I.P. Sl. No. 9057.
4. *Klausipollenites vestitus* Jansonius 1962; B.S.I.P. Sl. No. 9055.
5. *Faunipollenites various* Bharadwaj 1962; B.S.I.P. Sl. No. 9047.
6. *F. perexiguus* Bharadwaj & Salujha 1964; B.S.I.P. Sl. No. 9076.
7, 8. *Distriatites bilateralis* Bharadwaj 1962; B.S.I.P. Sl. No. 9057, 9053.
9. *Verticipollenites* Bharadwaj, 1962; B.S.I.P. Sl. No. 9054.
10. *Nidipollenites monoletus* Bharadwaj & Srivastava 1969 B.S.I.P. Sl. No. 9057.
11. *Alisporites indicus* Bharadwaj & Srivastava 1969; B.S.I.P. Sl. No. 9069.
12. *Falcisporites stabilis* Balme 1970; B.S.I.P. Sl. No. 9047.
13. *Cresentipollenites amplus* (Maithy) Bharadwaj, Tiwari & Kar 1974; B.S.I.P. Sl. No. 9054.
14. *Lunatisporites pellucidus* (Goubin, 1970) Maheshwari and Banerji 1975, Lunatisporites sp., B.S.I.P. Sl. No. 9054.