

A JURASSIC MIOFLORA FROM THE JABALPUR GROUP EXPOSED IN MORAND RIVER NEAR MORGHAT, HOSHANGABAD DISTRICT, MADHYA PRADESH*

HARI K. MAHESHWARI AND PRAMOD KUMAR

Birbal Sahni Institute of Palaeobotany, Lucknow-226007

ABSTRACT

Twenty-eight samples, collected from exposures of Jurassic rocks in the Lokhartalai area, Hoshangabad District, Madhya Pradesh were processed for microflora. Only one sample, a carbonaceous shale from the Morand River Section near Morghat, yielded a microflora comprising spores, pollen and a few microplankton. The microfloral assemblage is dominated by gymnospermous pollen, particularly the species *Callialasporites dampieri* and *Araucariacites australis*. The pteridophytic spores are rather rare in the assemblage. The assemblage closely resembles the Upper Jurassic palynological assemblages from Parsapani and Jagannath Prasad. No satisfactory explanation is available for the occurrence of microplankton in these apparently fresh-water sediments.

INTRODUCTION

The rocks of the Jabalpur Group form the highest Gondwana formations in the Satpura Basin. The westernmost outlier of this group in the basin is around Lokhartalai (22°22'N. lat. : 77°26'E. long.) in the Morand Valley. The position of the sediments of the Lokhartalai area in the Gondwana Sequence has till recently been in doubt. According to Fox (1926, p. 85) "the coal seams in the Lokhartalai area are in strata of Damuda age, possibly the equivalent of Barakar Stage." CROOKSHANK (1936, p. 365), on the other hand, says that "the age of the Morand River coal is now definitely fixed as Upper Gondwana, and probably Jabalpur."

Following is a list of important plant megafossils reported by CROOKSHANK (1936, p. 251-253) from the Chaugan Stage of the Lokhartalai area (including exposures at Budhimai, Jatamao and Morghat) :

Dictyozamites indica Feistmantel, *Cladophlebis* spp., *Taeniopteris vittata* Brongniart, *T. spathulata* McClelland, *Hausmannia dichotoma* Dunker, *H. buchii* Andrae, *Pterophyllum princeps* Oldham & Morris, *Williamsonia gigas* Carruthers, *Ptilophyllum acutifolium* Morris, *P. catchense* Morris, *Desmiophyllum indicum* Sahni, *Elatocladus* sp., *Pachypteris indica* (Oldham & Morris) Bose & Roy, *Brachyphyllum mamillare* Brongniart, *Pagiophyllum peregrinum* (Lindley & Hutton) Schimper, *Araucarites catchensis* Feistmantel and *Ginkgo lobata* Feistmantel.

SHAH AND SINGH (1964a, 1964b) made a fresh collection of megafossils from the area and discovered some more forms, e.g. :

Equisetaceous stem, *Sphenopteris* sp. cf. *S. arguta* Lindley & Hutton, *Dicksonia* sp., *Hausmannia crookshankii* Shah & Singh, *Bucklandia* sp., *Zamites indicus* Shah & Singh?, *Elatocladus jabalpurensis* (Feistmantel) Sahni, *Brachyphyllum* sp. cf. *B. rhombicum* (Feistmantel) Sahni, etc.

Thus, the plant megafossils recovered from the Morand Valley show that these sediments belong to the Upper Gondwanas (Jabalpurs).

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The age of the Jabalpur Group has been a matter of great controversy. Based on palaeobotanical and palynological studies the age of this group is placed as Upper Jurassic and Lower Cretaceous (FEISTMANTEL, 1876 ; BOSE & DEV, 1959; BHARADWAJ, KUMAR & SINGH, 1972 ; MAHESHWARI, 1973, 1974). SHAH, SINGH AND SASTRY (1971) and ACHARYA AND SINGH (in SASTRY, *et al.*, 1977; p. 43), however, date the group as ranging from? Early Jurassic to Early Cretaceous.

The Jabalpur beds in the Lokhartalai area being the oldest of the group, therefore, seem to hold the key for finding the lower age limit of the group. In the present paper, a palynological approach is tried for age determination of these beds.

MATERIAL AND METHOD

For collection of palynological samples following areas were visited by one of us (H. K. M.) : (i) Morand River Section, E. N. E. of Morghat, (ii) Section along Jatamao-Pipalkota dirt road, about $\frac{1}{2}$ km east of Jatamao Village and (iii) Tilak Sendur Stream section near the Khatama Cave Temple.

The section near Morghat is mostly constituted by gently dipping sandstones. A trap flow is seen lying horizontally across the sandstones. Intercalated in the sandstone is a red shale, a grey shale, and a coaly shale. Plant megafossils, mostly fragmentary, are found in the red shale.

At Jatamao, the dominant rock type is an earthy hematite with well-preserved plant megafossils, such as *Cladophlebis*, *Sphenopteris*, *?Coniopteris*, *Hausmannia*, *Taeniopteris*, *Dictyozamites*, *Pagiophyllum*, *Brachyphyllum* and *Elatocladus*; etc. No argillaceous shale was found.

In the Tilak Sendur Stream, the dominant rock is a massive sandstone with infrequent white clay partings and some coaly streaks. The clay has yielded some impressions of *Pagiophyllum* and root remains.

In all, twenty-eight palynological samples were collected from the three localities—1 sample from Jatamao, 9 samples from Tilak Sendur and 18 samples from Morghat. Of these, only one sample, i.e., from the coaly shale at Morghat yielded well-preserved pollen, spores and some microplankton. The present paper gives the results of observations on the pollen and spores in the sample.

For isolation of microfossils, 20-40 gm of each sample was broken down into pieces, 1-2 mm in size. The sample was then treated with 10 per cent hydrochloric acid for about an hour. After washing with water the sample was digested in hydrofluoric acid for 2-4 days. Dissolved silicates were washed out by decantation method. The sporiferous material was treated with commercial nitric acid for about 12 hours, washed with water, then digested in 5 per cent potassium-hydroxide solution and then again washed with water. The microfossils were transferred to coverglasses in polyvenyl alcohol. The coverglasses were mounted on slides with canada balsam.

COMPOSITION OF THE MIOFLORA

The mioflora recovered from the Morghat coaly shale is characterized by the dominance of coniferous elements. Pteridophytic spores though quite diversified are comparatively rare. Cycadalean and bennettitalean pollen are almost absent. There is a total of 50 species referable to 30 genera. The miospore genera are referable to following higher categories : Triletes (18), Monoletes (4), Monocolpates (1), Monosacciti (1), Disacciti (3), Polysacciti (1), Operculati (1) and Aletes (1). A few disaccate pollen with striate central body have been observed in the preparations. A few microplankton-like bodies have also been identified in the mioflora.

Following is a check list of the species identified in the miofloral assemblage :

- Cyathidites australis* Couper 1953, *C. minor* Couper 1953, *C. densus* Kumar 1973, *C. concavus* (Bolkhovitina) Dettmann 1963
Alsophilidites psilatus Kumar 1973
Dictyophyllidites haradensis Kumar 1973
Haradisporites mineri Singh & Kumar 1972, *H. undulatus* Kumar 1973
Todisporites minor Couper 1958
Osmundacidites wellmanii Couper 1958
Baculatisporites comaumensis (Cookson) Potonié 1956
Coniatisporites haradensis Singh & Kumar 1972
Ceratosporites equalis Cookson & Dettmann 1958
Leptolepidites sp.
Klukisporites haradensis Kumar 1973
Lycopodiumsporites pallidus Kumar 1973, *L. sinuosus* Kumar 1973
Cicatricosisporites australiensis (Cookson) Potonié 1956
Contignisporites glebulentus Dettmann 1963, *C. cooksonii* (Balme) Dettmann 1963, *C. dettmannii* Singh & Kumar 1966
Callispora potoniaei Dev 1961
Matonisporites dubius Kumar 1973
Murospora sp.
Polycingulatisporites sp.
Laevigatosporites gracilis Wilson & Webster 1946
Monolites indicus Kumar 1973
Dettmannites attenuarus Singh & Kumar 1972
Metamonoletes haradensis Singh & Kumar 1972
Callialasporites dampieri (Balme) Dev 1961, *C. doeringii* Kumar 1973, *C. discoidalis* (Döring) Bharadwaj & Kumar 1972, *C. enigmatus* (Singh & Kumar) Kumar 1973, *C. indicus* (Singh & Kumar) Kumar 1973, *C. lametaensis* Kumar 1973, *C. primus* (Singh & Kumar) Kumar 1973, *C. segmentatus* (Balme) Srivastava 1962, *C. trilobatus* (Balme) Dev 1961
Alisporites grandis (Cookson) Dettmann 1963, *A. sehoraensis* Kumar 1973
Vitreisporites pallidus (Reissinger) Nilsson 1958
Podocarpidites cristiexinus Sah & Jain 1965, *P. ellipticus* Cookson 1947, *P. grandis* Sah & Jain 1965, *P. multesimus* (Bolkhovitina) Pocock 1962
Podosporites tripakshi Rao 1943
Striate bisaccates (reworked?)
Classopollis indicus Maheshwari 1974
Araucariacites australis Cookson 1947
Cycadopites couperi (Dev) Kumar 1973, *C. gracilis* Sah & Jain 1965
Microplankton

DISCUSSION

Though the microflora from the Morghat section comprises 50 species of spores and pollen attributable to 30 genera, in the frequency count only 7 genera and 16 species show an incidence of 0.5 per cent or above. The microplankton-like bodies account for hardly 1 per cent. The approximate frequencies of the various taxa are as follows :

A. GENERA

<i>Cyathidites</i>	..	..	..	..	1.5%
<i>Baculatisporites</i>	..	..	..	..	1.5%
<i>Callialasporites</i>	..	..	..	..	54.0%
<i>Araucariacites</i>	..	..	..	..	36.0%
<i>Alisporites</i>	..	..	..	..	2.0%
<i>Cycadopites</i>	..	..	..	..	3.0%
<i>Classopollis</i>	..	..	..	..	1.0%
Microplankton	..	..	..	..	1.0%

B. SPECIES

<i>Cyathidites minor</i>	..	..	..	..	1.0%
<i>Cyathidites concavus</i>	..	..	..	..	0.5%
<i>Baculatisporites comaumensis</i>	..	..	..	..	1.5%
<i>Callialasporites dampieri</i>	..	..	..	..	30.0%
<i>Callialasporites enigmatus</i>	..	..	..	..	3.0%
<i>Callialasporites indicus</i>	..	..	..	..	2.5%
<i>Callialasporites lametaensis</i>	..	..	..	..	1.0%
<i>Callialasporites limbatus</i>	..	..	..	..	2.0%
<i>Callialasporites segmentatus</i>	..	..	..	..	7.0%
<i>Callialasporites trilobatus</i>	..	..	..	..	8.5%
<i>Alisporites ovalis</i>	..	..	..	..	1.0%
<i>Alisporites similis</i>	..	..	..	..	1.0%
<i>Cycadopites gracilis</i>	..	..	..	..	1.0%
<i>Cycadopites couperi</i>	..	..	..	..	2.0%
<i>Araucariacites australis</i>	..	..	..	..	36.0%
<i>Classopollis indicus</i>	..	..	..	..	1.0%
Microplankton	..	..	..	..	1.0%

Thus, we observe that the Morghat mioflora is predominated by species belonging to the genera *Callialasporites* and *Araucariacites*. In this respect the mioflora resembles the miofloral assemblages reported from Kutch (VENKATACHALA, KAR & RAZA, 1969), Vemavaram (KAR & SAH, 1970), Rajmahal Hills (SAH & JAIN, 1965), Lametaghat, Sehora and Hathnapur (BHARADWAJ, KUMAR & SINGH, 1972), Bansa (BHARADWAJ & KUMAR, 1975a), Parsapani (BHARADWAJ & KUMAR, 1975b), and Athgarh (MAHESHWARI, 1975).

The miofloral assemblages from both Basko and Sakrigalighat in the Rajmahal Hills are easily distinguished by the presence of large numbers of pteridophytic spores (up to 35 per cent), mostly belonging to the genera *Deltoidospora*, *Cyathidites* and *Gleicheniidites*. The Vemavaram mioflora is differentiated by the presence of as much as 70 per cent *Araucariacites* pollen with about 10 per cent pollen of *Podocarpidites*. The latter genus is totally absent in the Morghat mioflora. Similarly the Upper Katrol and the Bansa miofloras are also distinguished by the prominence of the genus *Podocarpidites* which is seen at its peak in sample no. 1495/2 from Parsapani.

The miofloral assemblages obtained from the Parsapani carbonaceous shales (MAHESHWARI, 1973) and the Athgarh Formation shales in the Jagannath Prasad Quarry are the most closely comparable assemblages. Both these assemblages have been dated as Upper Jurassic in age. The overall picture of the Morghat mioflora has the looks of palynological zone B of *Araucariacites*—complex mioflora of BHARADWAJ (1969) which is also dated as Upper Jurassic in age.

Palynologically there is no evidence to support an Early Jurassic age of the Morghat sediments as the known Early Jurassic microfossils from the Indian subcontinent are characterized by the predominance (50—80%) of pollen belonging to the genus *Classopollis* (JAIN & SAH, 1969 ; SRIVASTAVA, 1966). This genus forms just 1 per cent of the Morghat microfossils. Thus, palynologically the Jabalpur Group does not seem to be older than Late Jurassic in age.

The occurrence of microplankton-like bodies in the assemblage from apparently fresh water facies is intriguing.

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