

# BARAKAR MIOFLORA FROM JHARIA COALFIELD\*

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## ABSTRACT

A bore-core from the Jharia Coalfield has given fairly well-represented palynological data, broadly correlatable with the other Barakar assemblages. However, the onset of *Densipollenites* in a fair representation, well before the commencement of lithological change-over to Barren Measures, indicates a relatively early deterioration of the climate in the provenance responsible for sedimentation in the central part of the Damodar Basin representing the Jharia coal deposits.

## INTRODUCTION

Palynology of the Lower Gondwana sediments in Jharia Coalfield has been meagrely studied so far; such attempts were, all the more, restricted to the Barren Measures Formation (BHARADWAJ, SAH & TIWARI, 1965; KAR, 1966; 1968) and the Raniganj Formation (BANDYOPADHYAY, 1967). Recently, an exhaustive study has been done by TIWARI, SRIVASTAVA, TRIPATHI AND SINGH (1981) which encompasses complete succession—right from Talchir to Raniganj Formations. The palynological evidences for the presence of Karharbari Formation in Jharia Coalfield were put forth by this analysis. Moreover, in the same study palynologically so-far-thought to be invincible coals of Jharia Coalfield were found to contain spores and pollen—although after a much longer period of oxidation than usual. Presently, a palynological account of samples from Bore-hole no. MD-8 has been given in sequel to the earlier study by TIWARI *et al.* (1981).

## MATERIAL AND METHOD

The core samples from Bore-hole MD-8 (excluding coals) were provided by the CMPDI, drilled in Madhuban area, western part of the Jharia Coalfield (Map-1). The details of the material are given in table-1; the samples which yielded miospores are marked with asterisks.

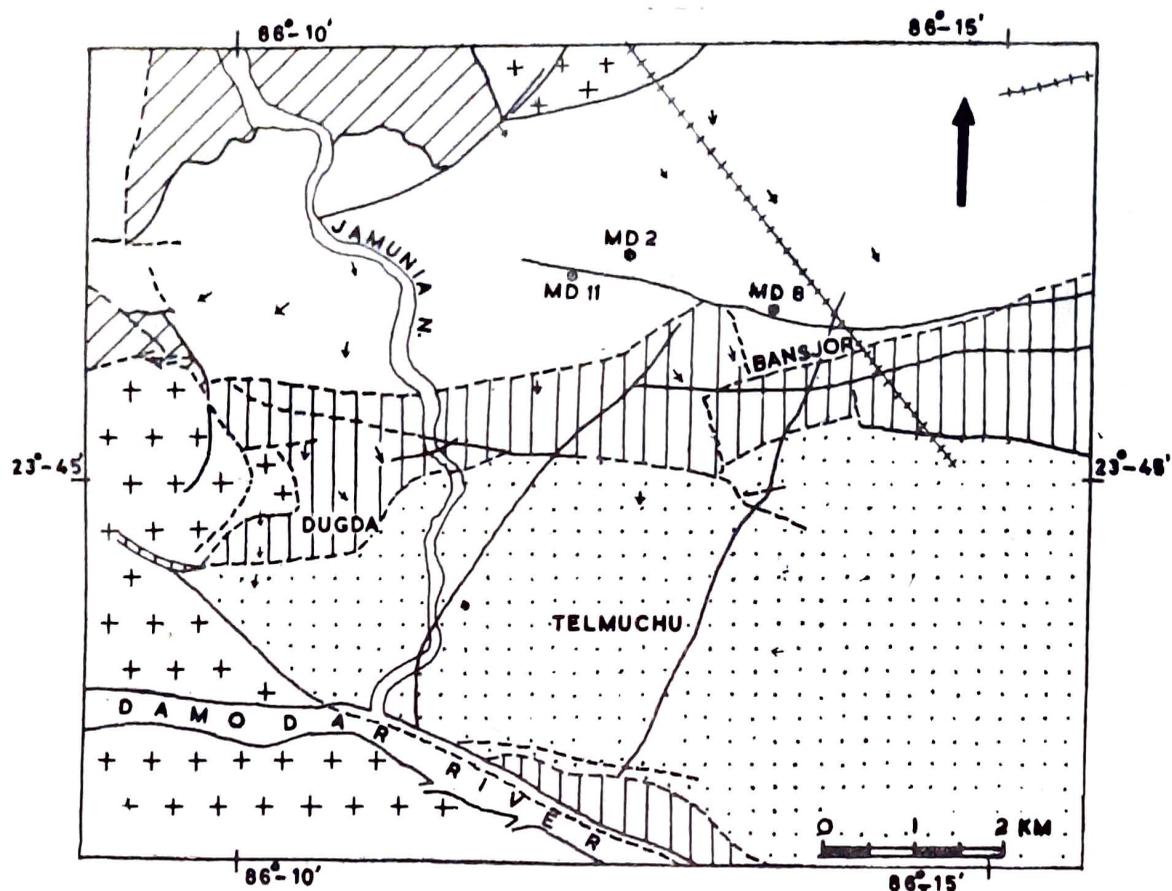
The samples were crushed to 2-3 mm pieces and treated with HCl followed by HF and then commercial HNO<sub>3</sub> and KClO<sub>3</sub> for 10-15 days after repeated washing and constant checking at every step. Wherever needed, heavy liquid (Iodide Solution) was used to remove the silica. In some samples, controlled floating and acid (HNO<sub>3</sub>) and/or alkali treatment, whatever needed, was done repeatedly to check the stages of maceration and cleaning of the spores and pollen.

## MIOFLORA

The miospores recovered from the bore-core samples have been assigned to 37 genera, out of which the following are quantitatively significant:

*Microbaculispora*, *Cyclogranisporites*, *Cyclobaculisporites*, *Striatopodocarpites*, *Faunipollenites*, *Scheuringipollenites*, *Primuspollenites*, *Platysaccus* and *Densipollenites*.

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Map—1. Showing the western region of the Jharia Coalfield with the location of bore-hole MD-8.  
 + Archeans; dotted lines—Raniganj Formation; vertical lines—Barren Measures Formation;  
 plain area—Barakar Formation; oblique lines—Talchir Formation.

Table 1—Samples from Bore hole MD-8 Madhuban area, western part of Jharia Coalfield

Sl.No.	Sample No.	Lithology	Depth in meters	
			From	To
*1.	MD 8/1	Shale	530.26	—530.80
2.	MD 8/2	Sst with laminated sh	522.30	—530.26
3.	MD 8/3	Sh	521.72	—522.30
4.	MD 8/4	Sst	514.04	—521.72
*5.	MD 8/5	Carb sh	512.18	—514.04
6.	MD 8/6	Sst with sh band	503.18	—512.18
7.	MD 8/7	Sh with sst band	500.90	—503.06
8.	MD 8/8	Sst	499.42	—500.90
9.	MD 8/9	Sh	497.80	—499.42
		Coal		
10.	MD/8/10	Sh with coal band	493.85	—494.55
11.	MD 8/11	Sst with sh bands	488.52	—493.85
*12.	MD 8/12	Sh & sst interbed	484.40	—488.52
		Coal		
13.	MD 8/13	Sh & sst intercal	476.00	—481.20
14.	MD 8/14	Carb sh	471.60	—468.22
15.	MD 8/15	Sh	468.22	—471.60
		Coal		

Table 1 (Contd.)

16.	MD 8/16	Sst & sh intercal Coal	454.70—465.05
17.	MD 8/17	Sst & sh intercal	453.50—453.92
18.	MD 8/18	Sst	448.43—453.50
*19.	MD 8/19	Sh & sst intercal Coal	443.40—448.43
20.	MD 8/20	Sst with Carb band	436.55—442.60
21.	MD 8/21	Sst & sh intercal Coal	431.55—436.55
22.	MD 8/22	Sst	426.55—430.80
23.	MD 8/23	Sh Coal	424.55—426.55
24.	MD 8/24	Sst	422.00—423.65
25.	MD 8/25	Sh Coal	420.50—422.00
*26.	MD 8/26	Sh Coal	416.00—419.45
27.	MD 8/27	Sh & sst intercal	405.65—415.20
28.	MD 8/28	Sst	399.60—405.65
*29.	MD 8/29	Sst & sh intercal	397.85—399.60
30.	MD 8/30	Sst Coal	392.55—397.85
*31.	MD 8/31	Sst & sh intercal	372.70—389.90
*32.	MD 8/32	Sst Coal	368.80—372.70
33.	MD 8/33	Sst & sh intercal	361.60—367.60
*34.	MD 8/34	—do— Coal	358.00—361.70
*35.	MD 8/35	Sst & sh Coal	339.55—352.70
36.	MD 8/36	Sst	331.00—338.60
*37.	MD 8/37	Sh & sst intercal + 4 coal bands Coal	291.30—331.00
*38.	MD 8/38	Sst & sh intercal Coal	276.40—285.95
*39.	MD 8/39	Sst & sh intercal Coal	270.95—274.20
*40.	MD 8/40	Sh	265.65—268.55
*41.	MD 8/41	Sst Coal	259.17—265.65
42.	MD 8/42	Sst	249.82—258.10
43.	MD 8/43	Sst argill Coal	246.35—249.82
*44.	MD 8/44	Sst & sh intercal	232.05—245.75
*45.	MD 8/45	Sst & sh intercal	217.24—231.10
46.	MD 8/46	Sst Coal	211.85—217.24
*47.	MD 8/47	Sst & sh intercal	187.70—209.00
48.	MD 8/48	Sst	185.97—187.70
*49.	MD 8/49	Sst & sh intercal	176.75—185.97
*50.	MD 8/50	Sst	173.10—176.75
*51.	MD 8/51	Sst & sh intercal	166.45—173.10
*52.	MD 8/52	Sst	155.75—166.45
*53.	MD 8/43	Sst & sh intercal Coal	148.40—159.75

Table 1 (Contd.)

*54.	MD 8/54	Intercal Sst & sh	147.00—147.40
*55.	MD 8/55	Sst	134.37—147.00
56.	MD 8/56	Sst & sh intercal	129.60—134.37
*57.	MD 8/57	Sst	127.90—129.60
58.	MD 8/58	Intercal Sst	104.80—127.90
*59.	MD 8/59	Sst	103.50—104.80
*60.	MD 8/60	Sst & sh intercal	98.15—103.50
*61.	MD 8/61	Sh	93.40—98.15
----- Coal -----			
*62.	MD 8/62	Intercal Sst	83.80—90.70
*63.	MD 8/63	Sst	77.00—83.80
*64.	MD 8/64	Sst & sh intercal	60.50—77.00
65.	MD 8/65	Sst	57.75—60.00
*66.	MD 8/66	Sst & sh intercal	33.25—57.75
67.	MD 8/67	Sst	27.23—33.25
*68.	MD 8/68	Intercal Sst & sh	16.60—27.23

Asterisk mark denotes the yielding samples.

Coal samples could not be included in this work.

The following genera, although rare, are qualitatively important :

*Horriditriletes*, *Indotriradites*, *Potonieitriadites*, *Parasaccites*, *Barakarites*, *Schizopollis*, *Rhizomaspora*, *Striatites*, *Distriatites*, *Striamonocolpites*, *Gnetaceapollenites* and *Paravesicaspora*.

The remaining miospore genera given below are sporadic in occurrence :

*Lophotriletes*, *Brevitriletes*, *Microfoveolatispora*, *Verrucosisporites*, *Lacinitriletes*, *Latosporites*, *Potonieisporites*, *Plicatipollenites*, *Striamonosaccites*, *Crescentipollenites*, *Verticipoollenites*, *Cuneatisporites*, *Lueckisporites*, *Distriamonocolpites* and *Weylandites*.

The results of quantitative analysis of different genera are plotted in Histogram-1. This shows the dominance of the genus *Striatopodocarpites* amongst the striated disaccate pollen, throughout the succession. The nonstriated disaccates—particularly the genus *Scheuringipollenites*, though present consistently in all the samples, show some fluctuations in their frequencies but did not attain dominance anywhere. The pteridophytic spores show their presence throughout the spectrum, but in low percentage. The commencement of *Densipollenites*, a characteristically prominent genus of Barren Measures, has been recorded in the younger samples of the present profile in a fairly good percentage.

Thus, the complete mioflora is divisible into two assemblages :

*Assemblage-I*, consisting of *Striatopodocarpites*, *Faunipollenites*, *Striatites*, *Scheuringipollenites*, *Cyclogranisporites* and *Microbaculispora*—represented by Sample No. 1 to 59.

*Assemblage-II*, consisting of *Striatopodocarpites*, *Faunipollenites*, *Striatites*, *Scheuringipollenites*, *Cyclogranisporites*, *Microbaculispora* and *Densipollenites*—encountered in Sample No. 60 to 80.

The totality of association, and the qualitative composition of these two assemblages (Histogram-1) indicate that they represent the Barakar age. *Assemblage-II* differs from *Assemblage-I* in having more pronounced incidences of the genus *Densipollenites*.



## COMPARISON AND CORRELATION

A close examination of the presently encountered palynoflora shows close resemblance with the known Barakar mioflora from Jharia Coalfield in Bore-hole MD-11, Khudia Nala and Karijhor Nala sections (TIWARI *et al.*, 1981) in having dominant *Striatopodocarpites* and a fair commencement of *Densipollenites* in the closing phase of upper most Barakar sediments.

TIWARI (1974) classified three miofloral assemblages in the Barakar Stage. The lower-most assemblage B-I—representing the Lower Barakar—is monosaccate/zonate/apiculate-trilete rich ; B-II, the middle assemblage is totally dominated by the *Scheuringipollenites* with common to rare striated disaccate and triletes—represents the Middle Barakar ; and the upper-most, B-III, assemblage is striated disaccate—*Faunipollenites*, *Striatopodocarpites*-rich, with *Scheuringipollenites* in low percentage, represents the Upper Barakar mioflora.

The Assemblage-I of the present analysis is closely comparable with the B-III assemblage representing Upper Barakar as derived by TIWARI (1974) in having *Striatopodocarpites* and *Faunipollenites* in high percentages. The Assemblage-II found in the present bore-core is younger to the Assemblage-I, and additionally shows the substantial incoming of *Densipollenites*, an element of Barren Measures mioflora. This *Densipollenites*-rich assemblage, designated here as Assemblage-II, runs right from the top most sample, at 16.60 m depth level up to 104.80 m depth level in Bore-hole MD-8 while in Bore-hole MD-11 (TIWARI *et al.*, 1981) this assemblage could be marked from 8.50 m to 124.80 m depth. Obviously, the 16.60 m to 104.80 m strata in Bore-hole MD-8 is correlatable with the 8.50 to 124.80 m strata of Bore-hole MD-11. Rest of the portion in Bore-hole MD-8 (i.e. 104.80-530.80 m) is palynologically related with the run from 124.80 m to 362.50 m of Bore-hole MD-11 having Assemblage-I.

## CONCLUSION

The miospore spectrum of the presently studied bore-core represents typical late Barakar mioflora in composition but for one trend which has not been reported earlier from any other coalfields in Damodar Basin, namely—the presence of *Densipollenites* in fairly high numerical values within the upper reaches of the bore-core. Thus, the occurrence of *Densipollenites* well within the Barakar mioflora together with low percentage of pteridophytic miospores indicate that in the Jharia Coalfield region the climate started deteriorating relatively earlier than in any other Damodar valley coalfields during the closing phase of the Upper Barakar Formation. The effect of transition phase has preceded the actual Barakar-Barren Measures boundary.

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## REFERENCES

- BANDYOPADHYAY, N. N. (1967). Sporological studies and miofloristic provinces of Lower Gondwana India and stratigraphical evolution. *Gondwana Stratigraphy*, I.U.G.S., Buenos Aires, 1967 : 1-21.
- BHARADWAJ, D. C., SAH, S.C.D. & TIWARI, R. S. (1965). Sporological analysis of some coal and carbonaceous shale from Barren Measures Stage (Lower Gondwana) of India. *Palaeobotanist*, **13** : 222-226.

- KAR, R. K. (1966). Palynology of the Barren Measures Sequence from Jharia Coalfield, Bihar, India. 1. Summary and discussion. *Symposium on Floristics and Stratigraphy of Gondwanaland*, Birbal Sahni Institute of Palaeobotany, Lucknow 1964 : 121-127.
- KAR, R. K. (1968). Palynology of the Barren Measures Sequence from Jharia Coalfield, Bihar, India. 2. General Palynology. *Palaeobotanist*, **16** : 115-140.
- TIWARI, R. S. (1974). Interrelationship of palynofloras in the Barakar Stage (Lower Gondwana), India. *Geophytology*, **4** (2) : 111-129.
- TIWARI, R. S., SRIVASTAVA, SURESH C., TRIPATHI, A. & SINGH, V. (1981). Palynostratigraphy of Lower Gondwana sediments in Jharia Coalfield, Bihar. *Geophytology*, **11** (2) : 220-237.