

SPOROLOGICAL CORRELATION OF COAL SEAMS IN BISRAMPUR COALFIELD, M.P., INDIA*

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ABSTRACT

Sporological study of 21 bore-core coal samples from Bhatgaon, Khargaon and Songara blocks of Bistrampur coalfield, M.P., has been done. The qualitative as well as quantitative distribution of various palyno-taxa among the samples, has suggested the occurrence of four distinct miospore assemblages. Assemblage-A is marked by the higher representation of *Microbaculispora* associated with *Dentatispora*. Assemblage-B is characterized by the dominance of *Indotriradites*, while Assemblage-C has the dominance of *Brevitriletes* in association with *Sulcatisporites* and Assemblage-D is dominated by an association of *Brevitriletes*, and *Horriditriletes*. These four palynological assemblages suggest the occurrence of four coal seams among the samples investigated.

INTRODUCTION

BISRAMPUR coalfield (MAP 1), bound by 83°21' and 82°54' east longitudes, and 23°8' and 23°26' north latitudes, occupies an area of about 400 square miles. The coal measures, suggested to be of Barakar age, are little disturbed by faulting and are for the most part horizontal. Recently, extensive survey has been done in this coalfield and bore core samples made available to us have been investigated palynologically.

The present study includes 21 overall coal samples from 17 bore holes representing three blocks of Bistrampur coalfield, viz. Bhatgaon, Khargaon and Songara blocks. The sketch plan giving the location of bore holes in Khargaon and Songara blocks is given in Map 1 and that of Bhatgaon block in Map 2. The details of the samples are given in Table 1. The position of each sample with reference to other coal seams encountered in each bore hole is given in Table 2.

METHODS

Maceration and analysis of all the samples was done on the lines similar to those

described by Bharadwaj (1962) and Bharadwaj and Salujha (1964). Usually 500 miospores were counted in each sample at the generic level and their percentage occurrence was calculated.

TABLE 1 — BISRAMPUR COALFIELD

LAB. SAMPLE Nos.	BORE HOLE Nos.	SAMPLE Nos.
Bhatgaon Block		
1	NCBN — 1	CACI-NS/2154(A)
2	NCBN — 22A	CACI-NS/2171(B)
3	NCBN — 25	CACI-NS/2175-C(C ₁ -C ₂)E
4	NCBN — 33	CACI-NS/2181A(C ₁ -C ₂)
5	NCBN — 47	CACI-NS/2198B(C ₁ -C ₃)E
6	NCBN — 50	CACI-NS/2200B(C ₁ -C ₂)E
7	NCBN — 52	CACI-NS/2206B(C ₁ -C ₂)
8	NCBN — 60	CACI-NS/2211
9	NCBN — 61	CACI-NS/2212(A)
10	NCBN — 62	CACI-NS/2213B(C ₁ -C ₆)E
11	NCBN — 64	CACI-NS/2215(A)
12	NCBN — 67	CACI-NS/2224(A)
Khargaon Block		
13	BKG — 6	CACI-BH/8(A)
14	BKG — 7	CACI-BH/107
Songara Block		
15	BSG — 2	CACI-BH/54B(C ₁ -C ₂)E
16	BSG — 2	CACI-BH/54D(C ₁ -C ₆)E
17	BSG — 2	CACI-BH/54(E)
18	BSG — 2	CACI-BH/54(F)
19	BSG — 3	CACI-BH/55A(C ₁ -C ₂)
20	BSG — 3	CACI-BH/55B(C ₁ -C ₂)B
21	BSG — 4	CACI-BH/108(C)

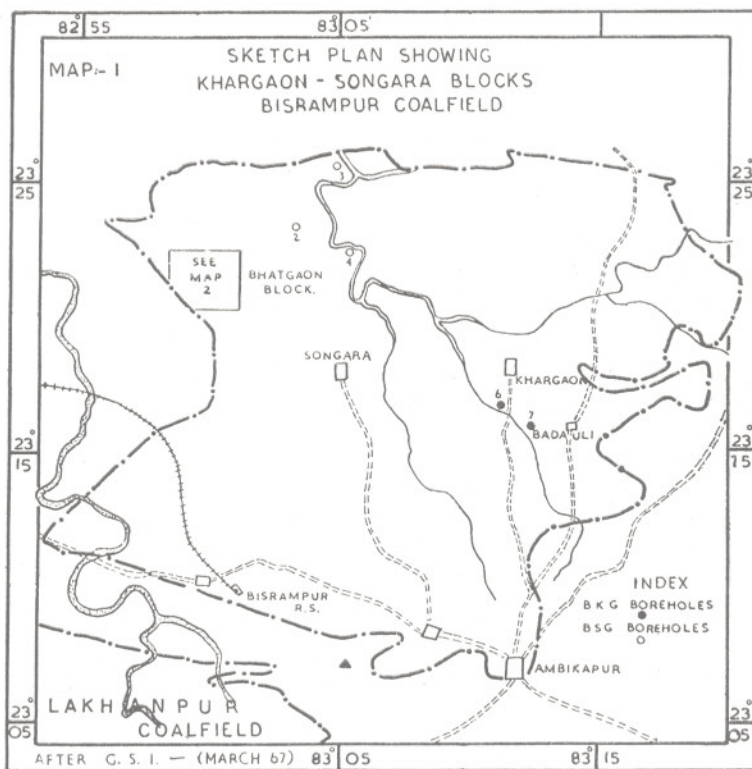
RESULTS

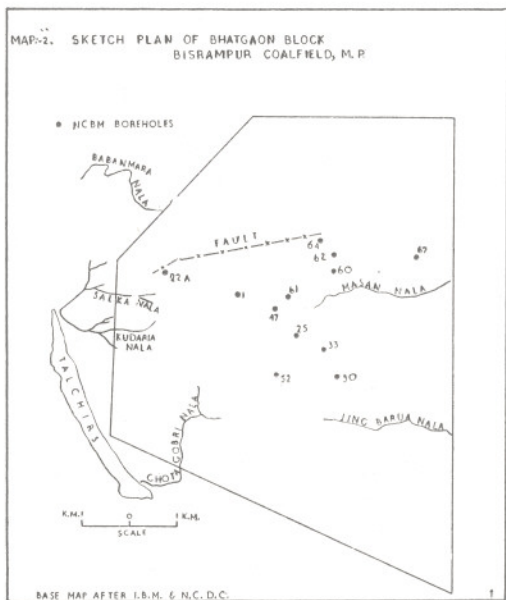
The mioflora consists of 27 genera listed below, pertaining to a number of trilete, monolet, monosaccate, bisaccate and monocolpate groups (*sensu* BHARADWAJ, 1962; BHARADWAJ & SALUJHA, 1964; TIWARI, 1964; and BHARADWAJ & SRIVASTAVA, 1969b): *Callumispora*, *Hennellysporites*,

*Results of investigation carried out in the scheme "Palaeobotanical Investigations of Indian Coals (C.S.I.R.)."

TABLE 2 — STATEMENT SHOWING OVERLYING AND UNDERLYING COAL SEAMS IN DIFFERENT BOREHOLES OF BISRAPMUR COALFIELD

Sl. No.	BOREHOLE No.	SAMPLE No.	NUMBER OF COAL SEAMS	
			Overlying	Underlying
Bhatgaon Block				
1	NCBM — 1	CACI-NS-2154 A	—	1
2	NCBM — 22A	CACI-NS-2171 (B)	1	—
3	NCBM — 25	CACI-NS-2175 C(C ₁ -C ₂)E	2	—
4	NCBM — 33	CACI-NS-2181 A(C ₁ -C ₂)	—	1
5	NCBM — 47	CACI-NS-2198 B(C ₁ -C ₃)E	1	—
6	NCBM — 50	CACI-NS-2200 B(C ₁ -C ₂)E	1	—
7	NCBM — 52	CACI-NS-2206 B(C ₁ -C ₂)E	1	—
8	NCBM — 60	CACI-NS-2211	—	—
9	NCBM — 61	CACI-NS-2212 A	—	1
10	NCBM — 62	CACI-NS-2213 B(C ₁ -C ₆)E	1	—
11	NCBM — 64	CACI-NS-2215 A	—	1
12	NCBM — 67	CACI-NS-2224 A	—	1
Khargaon Block				
13	BKG — 6	CACI-BH-8A	—	—
14	BKG — 7	CACI-BH-107	—	—
Songara Block				
15	BSG — 2	CACI-BH-54B(C ₁ -C ₂)E	1	7
16	BSG — 2	CACI-BH-54D(C ₁ -C ₆)E	3	5
17	BSG — 2	CACI-BH-54(E)	4	4
18	BSG — 2	CACI-BH-54(F)	5	3
19	BSG — 3	CACI-BH-55A(C ₁ -C ₂)	—	5
20	BSG — 3	CACI-BH-55B(C ₁ -C ₂)E	1	4
21	BSG — 4	CACI-BH-108(C)	2	1





Cyclogranisporites, *Verrucosisporites*, *Lophotriletes*, *Brevitriletes*, *Horriditriletes*, *Microbaculispora*, *Indotriradites*, *Dentatispora*, *Latosporites*, *Parasaccites*, *Potonieisporites*, *Platysaccus*, *Striatites*, *Primuspollenites*, *Rhizomaspora*, *Lahirites*, *Striatopodocarpiteis*, *Striatopiceites*, *Illinites*, *Vesicaspora*, *Sulcatisporites*, *Tiwariasporeis*, *Ginkgocycadophytus*, *Pilasporites*.

Quantitatively, the trilete miospores listed below are more important and form the characteristic associations in various combinations: *Hennellysporites*, *Brevitriletes*, *Horriditriletes*, *Microbaculispora*, *Indotriradites*, *Dentatispora*. Among the bisaccate pollen grains, *Sulcatisporites* occurs consistently in all the samples.

The quantitative distribution of these prominent genera among various samples (HISTOGRAM-I) suggests the occurrence of four palynological assemblages.

Assemblage A

Assemblage A is represented in only one sample of Khargaon block (BSG-7, lab. sample no. 14) and is characterized by the dominance of *Microbaculispora* (average 34.7%), associated with the subdominant genus *Dentatispora* (up to 23.3%). This is an isolated sample with total dominance of trilete miospores up to 84.9 per cent and seems to be different from others in quantitative as well as qualitative composition.

Assemblage B

Assemblage B is characterized by the dominance of *Indotriradites* with an average frequency of 27.3 per cent. The subdominant genera are:

- Hennellysporites* 6.5%
- Brevitriletes* 16.5%
- Horriditriletes* 4.9%
- Microbaculispora* 15.4%
- Sulcatisporites* 5.1%

The other miospore genera, which occur consistently, but in low percentages, do not ameliorate much the pollen spectra exhibited by the dominant genera, and hence, they have been excluded from consideration for correlation.

Assemblage B is common to the following samples.

Bhatgaon block	Khargaon block
Lab. sample nos. 1, 2, 3, 5, 6, 7, 9, 10	Lab. sample no. 13

Among all these nine samples, it is found that *Indotriradites*, *Microbaculispora*, *Brevitriletes*, *Hennellysporites* and *Horriditriletes* are the chief constituents which along with other trilete genera total an average of 76.3 per cent. The saccate pollen grains fall next to the triletes and total up to 16.1 per cent.

The trend of variation in different miospore genera among the above nine samples suggests that samples 3, 5 and 2 are slightly older in view of the higher percentage of *Microbaculispora* and lesser of *Indotriradites* as compared to sample nos. 1, 6, 10, 9 and 13. The latter samples have less of *Microbaculispora* and more of *Indotriradites*. Sample 7 seems to be the youngest of Assemblage B in view of the high representation of *Brevitriletes* associated with *Microbaculispora* and *Indotriradites*. In spite of these variations, all these samples tend to cohere and make up Assemblage B.

Assemblage C

Assemblage C has been found to occur in the following samples.

Bhatgaon block	Songara block
Sample no. 12	Sample nos. 17, 18, 19, 20 & 21

The trilete miospores, as in other two assemblages, are in abundance being present up to 61.4 per cent. *Brevitriletes*, which is subdominant in Assemblages A and B, has become the most dominant component in Assemblage C and is present up to 30.2 per cent. On the other hand, *Microbaculispora* and *Indotriradites* decrease to 6.1 and 3.0 per cent respectively. Among the bisaccate pollen grains, which average up to 27.8 per cent, *Striatopiceites* (5.5%) and *Sulcatisporites* (16.6%) show a considerable increase over the former two assemblages.

All the six samples, in which Assemblage C is present, show an overall palynological resemblance but for certain minor variations among the dominant genera. Sample no. 12 of Bhatgaon block exhibits an older aspect in view of appreciable *Microbaculispora*. Sample nos. 19, 20 within the bore hole BSG-3 are identical to each other and are similar to sample no. 21. In all these samples, *Brevitriletes* continues to increase in percentage while the other trilete genera decrease appreciably.

Assemblage D

Assemblage D, also a trilete miospores dominated assemblage, is distributed among the following sample.

Bhatgaon block	Songara block
Sample nos. 4, 8, 11	Sample nos. 15, 16

In this assemblage *Brevitriletes* is present in higher percentages (31.6%) than Assemblage C, and shows a distinctive association with *Horriditriletes* which is present up to 11.7 per cent. The trilete miospores total up to 80.1 per cent. The occurrence of saccate pollen grains is almost similar to Assemblage C.

The palynological picture of Assemblage D is closely comparable to Assemblage C in view of the dominance of *Brevitriletes*. Within the bore hole BSG-2 the two samples compare closely to each other but the upper part of this seam (i.e. sample no. 15) presents a younger aspect with increased percentage of *Lophotriletes*.

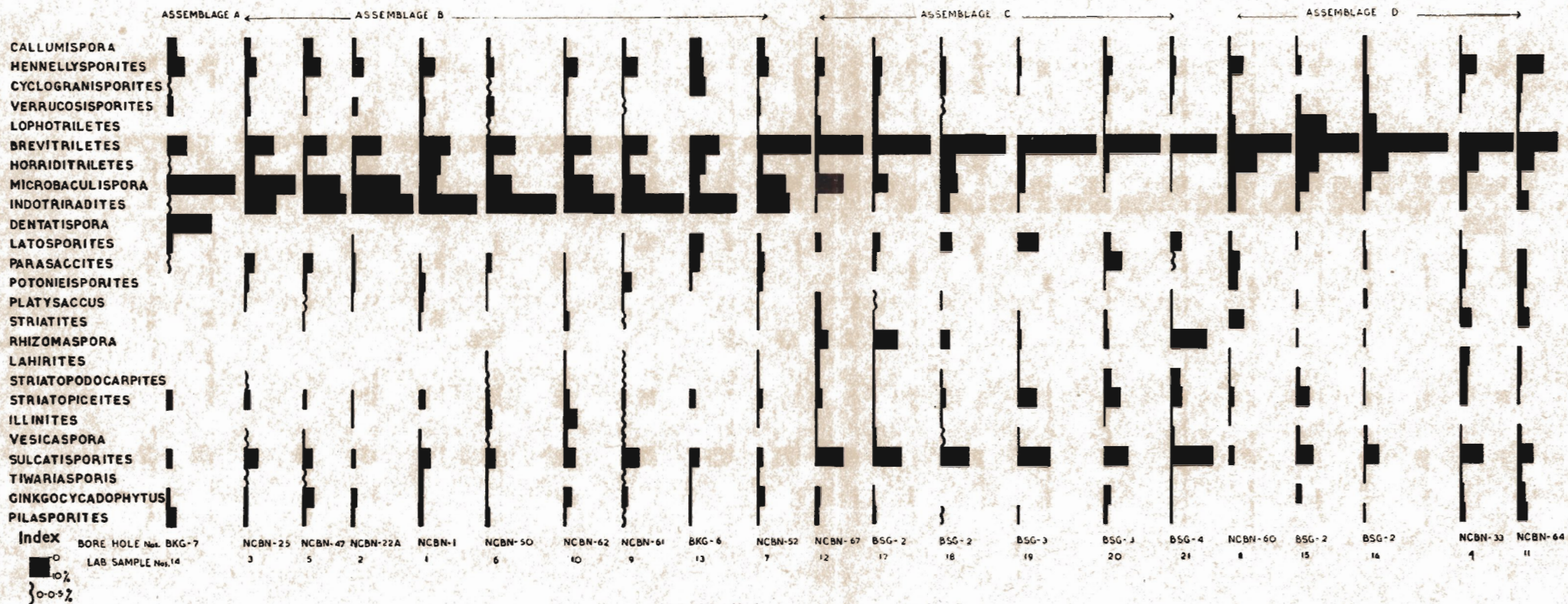
CORRELATION

The coal samples as located at various depths from the surface in different bore

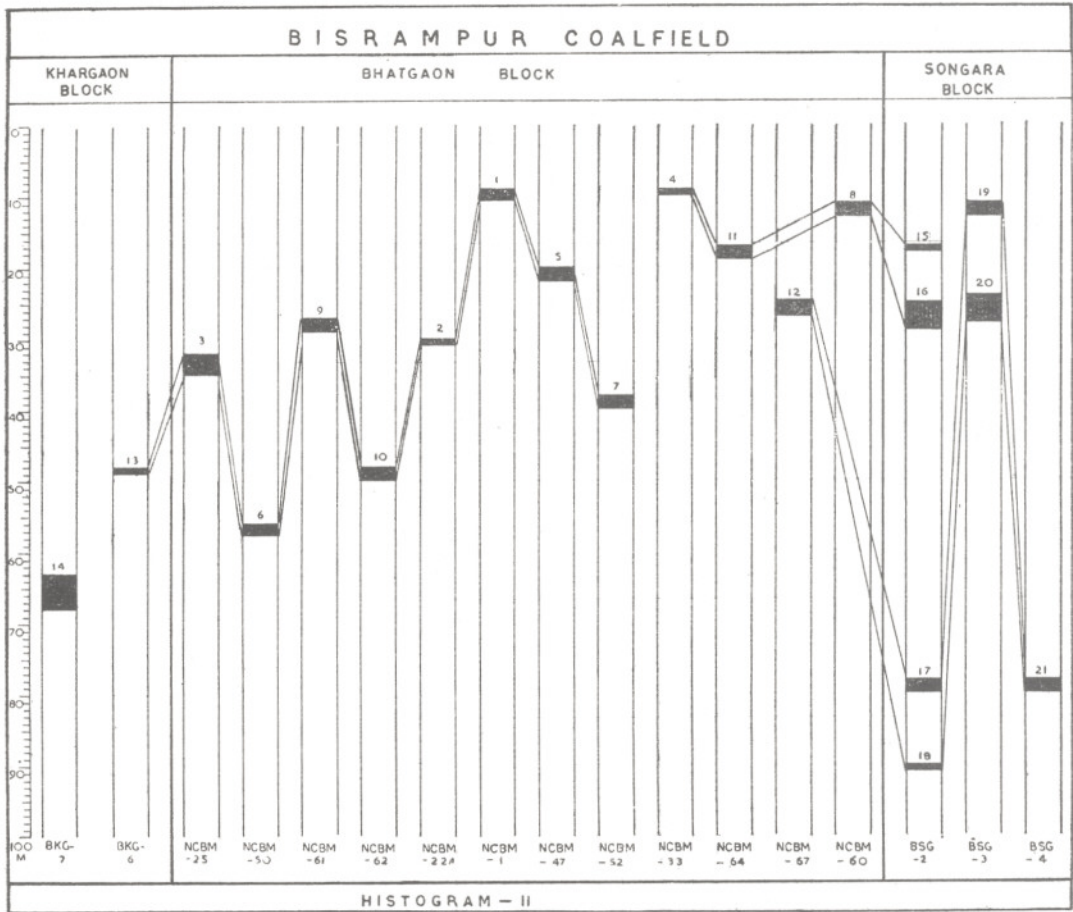
holes of Bisrampur coalfield have been sporologically correlated in Histogram-II. The occurrence of four different palynological assemblages suggests the existence of four main coal seams. Thus, the coal sample no. 14 from Khargaon block remains an isolated sample showing the dominance of *Microbaculispora* associated with *Dentatispora* (Assemblage A). This coal seam is not represented among the samples of Bhatgaon and Songara blocks. Higher incidence of *Dentatispora* is reported in the oldest coal seam of Korba coalfield (BHARADWAJ & TIWARI, 1964; Assemblage C, Ghordewa sector) and high incidence of *Microbaculispora* is known from the oldest assemblage (Assemblage A) of Chirimiri coalfield (BHARADWAJ & SRIVASTAVA, 1969a).

Sample nos. 1, 2, 3, 5, 6, 7, 9 and 10 of Bhatgaon block and sample no. 13 of Khargaon block are correlated together in view of the general dominance of *Indotriradites* which is closely followed by *Microbaculispora* and *Brevitriletes*. Abundance of *Indotriradites* is also known in Assemblage B of Korba coalfield (loc. cit.) but the other two components are absent in the same. On the other hand, the general dominance of *Microbaculispora* in association with *Indotriradites* is a characteristic feature of Assemblage B of Chirimiri coalfield (loc. cit.) and in this respect it shows a close relationship to the sample nos. 2, 3, 5 of Bhatgaon block of Bisrampur coalfield. As discussed earlier, the sample nos. 2, 3, 5 do not differ appreciably from the rest of the samples of Assemblage B and hence, are suggested to represent the same seam.

Assemblage C is distributed among the sample no. 12 of Bhatgaon block and sample nos. 17, 18, 19, 20 and 21 of Songara Block. This assemblage is marked by the dominance of *Brevitriletes*. The genera ranking next in abundance are *Sulcatisporites* and *Microbaculispora*. Comparable association of miospores has also been observed in Assemblage A (oldest) of Talcher coalfield (BHARADWAJ & SRIVASTAVA, 1969c). *Striatopiceites* and *Sulcatisporites* also show an increasing tendency from Assemblage A onwards, i.e. from older to younger deposition. This is a characteristic feature of all the Barakar assemblages (BHARADWAJ, 1966). In bore hole BSG-2 the four samples correspond to the Assemblages C and D, whereas, the coal samples in bore hole



HISTOGRAM-1
 BISRAPUR COALFIELD



BSG-3 and BSG-4 correlate with Assemblage C only. The younger coal seam (sample nos. 15, 16) of bore hole BSG-2, and the seam represented by sample nos. 4, 8, 11 of Bhatgaon block represent Assemblage D.

The qualitative as well as quantitative behaviour of microfossils, and also the distributional pattern of various miospore genera among the samples investigated, suggest a Lower Barakar age for the coal seams.

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