PALYNOLOGICAL STUDIES IN AURANGA COALFIELD

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ABSTRACT

The miofloral assemblages of the coal bearing sediments of Barakar Stage of the Auranga Coalfield have been studied from Tubed and Jagaldaga areas. The mioflora is characterised by the general dominance of *Sulcatisporites* associated in various combinations with *Thymospora*, *Horriditriletes*, *Cyclogranisporites* and *Faunipollenites*. The sporological succession of the seven coal occurrences is marked by five distinct miofloral assemblages. The age of the coal deposits is suggested as Middle Barakar.

INTRODUCTION

The occurrence of the plant fossils from Auranga Coalfield was first reported by BALL (1878). FEISTMANTEL (1881, 1886) studied in detail the megafossils in this area. Later on BHATTACHARYA, B. (1959) gave a general account of the microfossils along with megafossils for the first time from the eastern part (i.e. Jagaldaga, Udaipura, Gowa and Pandepura area) of the Auranga Coalfield. BHATTACHARYA, A. K. (1963) studied only the megafossils from the western part around Deobar of the same Coalfield. Recently MAITHY (1971) studied the micro and megafossils both from the Barakar sediments of Auranga Coalfield and has given a brief account of the qualitative as well as quantitative occurrence of various miospores around Tubed and Gowa area. The present study has been undertaken to add some more information to the present knowledge of mioflora of Auranga Coalfield with a view to build up the miofloral succession in the area.

The Auranga Coalfield extends over an area of about 250 sq. kms. (23° 42′ and 23° 52′ North latitudes and 84° 17′ and 84° 43′ East longitudes) and is a flat to gently rolling country with a few hills. The coal and carbonaceous shales are exposed mostly towards the eastern part of the area. The thickness of Barakar rocks around Tubed (23° 49′: 84° 35′) and Jagaldaga (23° 44′ : 84° 36′) are much less as compared to the total thickness of the rest of the Coalfield. Samples of coal and carbonaceous shales were collected from the beds exposed along Sukri River and Bagdagga nala, the details of which are given in table 1. A large number of coal and carbonaceous beds are exposed completely or incompletely, in Bagdagga nala east of Jagaladaga. One of the coal seams has been worked in past but now abandoned in a quarry. One coal seam near Jagaldaga, worked sometimes in the past, is exposed in an abandoned quarry and is nearly three meters thick. The coal is durain rich, non-caking and of poor quality.

In Tubed area a succession of coal seams is exposed in Sukri River and a small nala north of Tubed near a fire-clay quarry. Further east, near Tubed Village, stringers of coal associated with carbonaceous shales are exposed in Sukri River.

METHODS

The maceration of coal and carbonaceous shales were followed on the lines suggested by BHARADWAJ and SALUJHA (1964). Three samples (i.e. S/1, 2, & B/a) out of the 17 samples

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Table 1—Showing details of the samples collected from Auranga Coalfield

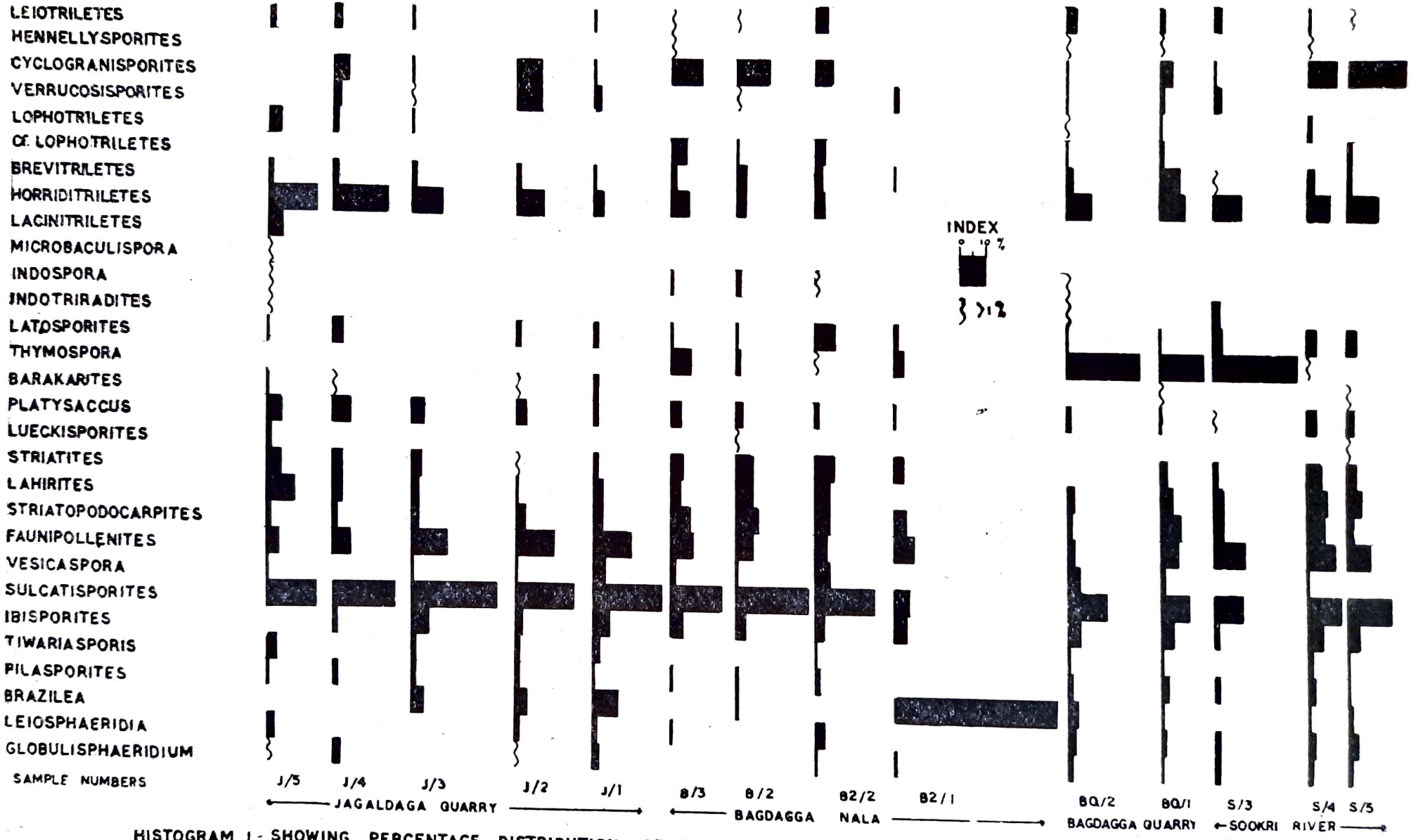
Sample nos.	Lithology	Locality
	Sukri River Section near Tubed	
S/1	Carbonaceous Shale	Exposed near Tubed village.
S/2	Grey shale	Exposed near Tubed village.
S/3	Carbonaceous shale	Exposed nearly half a mile downstream from Tubed village.
S/4	Coal	Exposed at the confluence of a nala north of Tubed near fire-clay quarry.
S/5	Coal	Exposed in the nala north of Tubed adjacent to the fire-clay quarry.
	Coal seams exposed in Bagdagga nala	
B/1	Coal—Top portion	Coal seam exposed nearly 100 yards upstream from the Latehar—Ranchi road bridge.
B/2	Coal—Middle portion	Ditto ditto.
B/3	Coal—Bottom portion	Ditto ditto.
B2/1	Coal—Upper seam	2 ft. thick coal above sandstone parting, about 2 furlongs upstream from B/1—B/3 seam.
B2/2	Coal—Lower seam	Partly exposed coal seam, 3 ft. thick, below the sandstone parting.
	Coal seam exposed in Bagdagga quarry	
BQ/1	Coal—Top portion	8 ft. thick coal.
BQ/2	Carbonaceous shale (Bottom portion).	incompletely exposed.
	Coal seam exposed in Jagaldaga quarry	
J/1	Coal	Top portion.
J/2	Coal	Middle portion.
J/3	Coal	Ditto.
J/4	Coal	Ditto.
J/5	Coal	Bottom portion.

collected did not yield any microfossil. The *sporae dispersae* is arranged according to BHARADWAJ (1962), BHARADWAJ and SALUJHA (1964), BHARADWAJ and TIWARI (1964). The results of the investigation are derived on the qualitative association of the miospores as well as their quantitative representation among the assemblages. The slides and counting areas were selected at random and 200 miospores were counted at generic level in each sample.

RESULTS

The *sporae dispersae* of Auranga Coalfield have been assigned to 41 genera, viz.: *Leiotriletes, Callumispora, Hennellysporites, Cyclogranisporites, Verrucosisporites, Lophotriletes, Brevitriletes, Horriditriletes, Lacinitriletes, Microbaculispora, Indospora, Cyclobaculi sporites, Gondisporites, Indotriradites, Latosporites, Thymospora, Densipollenites, Barakarites, Potonieisporites, Platysaccus, Lueckisporites, Schizopollis, Striatites, Lahirites, Striatopodocarpites, Faunipollenites, Vesicaspora, Sulcatisporites, Ibisporites, Tiwariasporis, Decussatisporites, Striasulcites, Maculatas porites, Pilasporites, Brazilea, Hemisphaerium, Peltacystia, Leiosphaeridia, Globulisphaeridium, Greinervillites* and *Spongocystia.*

The qualitative as well as the quantitative distribution of various palyno-taxa among each sample has been given in histogram—1. Amongst these, *Thymospora, Sulcatisporites* and *Brazilea* characterise the pollen spectra by their dominant representation. *Cyclogranisporites, Horriditriletes, Striatites, Lahirites, Striatopodocarpites* and *Faunipollenites* follow very closely the dominant components and behave characteristically in a particular set of samples. The nature and variation of different palynological assemblages in different beds of Auranga Coalfield are discussed separately hereunder.



HISTOGRAM 1 - SHOWING PERCENTAGE DISTRIBUTION OF MIOSPORES IN AURANGA COALFIELD, BIHAR

Sukri River Section

Out of the 5 samples collected from the beds exposed in Sukri River near Tubed, 2 samples did not yield microfossils while the remaining three samples contained a rich mioflora. Sample nos. S/4 and S/5 are rich in *Sulcatisporites* (15%) and *Cyclogranisporites* (16%) associated with *Horriditriletes* (10%) and *Faunipollenites* (10%). The triletes on the whole average up to 32 per cent, nonstriated disaccates 25 per cent and striated disaccates up to 27 per cent.

Sample no. S/3 is characterised by the abundance of *Thymospora* (32%), followed by *Horriditriletes* (11%), *Faunipollenites* (12%) and *Sulcatisporites* (11%). The triletes in total have reduced to 21 per cent while monoletes have increased to 36 per cent. Nonstriated and striated disaccates have reduced to 14 per cent and 21 per cent respectively.

Bagdagga Nala Section

The coal seam represented by the sample nos. B/1-B/3, is marked by an overall dominance of *Sulcatisporites*. In the lower portion of the coal seam (sample no. B/3) *Sulcatisporites* is present up to 25 per cent and increases up to 28 per cent in the middle portion (sample no. B/2). *Cyclogranisporites*, *Striatites*, *Lahirites*, *Striatopodocarpites* and *Faunipollenites* occur subdominantly. The top portion (sample no. B/1) of the coal seam is devoid of spores and pollen grains. Thus, the trilete miospores are present up to 28 per cent, nonstriated and striated disaccates are present up to 34 per cent and 28 per cent respectively.

The coal seams present in Bagdagga quarry (sample nos. BQ/1-2) shows a different spectrum. *Thymospora* is present up to 28 per cent in the bottom portion and reduces to 17 per cent in the upper portion of the coal seam. *Horriditriletes* and *Sulcatisporites* also reduces similarly. Monolete miospores total up to 20 per cent while nonstriated and striated disaccates closely follow it being present up to 23 per cent and 16 per cent respectively.

In sample no. B2/2 the dominance has been marked by *Sulcatisporites* (23%) associated with *Striatites* (8%), *Lahirites* and *Striatopodocarpites* (6% each) and *Faunipollenite-* (5%). Thus, the trilete (23%) and monolete (9%) miospores have reduced considerably while nonstriated disaccate (35%) and striated disaccate (25%) have marked the dominance.

Sample no. B2/1 occur just above the sample no. B2/2 and is separated by a sandstone. This coal contains an abundance of alete spores and acritarch microplankton. *Brazilea* is present up to 61 per cent while rest of the population is shared by the disaccate pollen grains (29%), monolete (6%) and trilete (3%) miospores.

The coal seam exposed in Jagaldaga quarry is characterised by an overall dominance of *Sulcatisporites* (25%). *Horriditriletes* (13%) and *Faunipollenites* (11%) are present subdominantly. *Sulcatisporites* occurs in lower percentages in the bottom portion of the coal seam, increases in the middle and finally decreases in the top portion of the coal seam. *Horriditriletes* shows a gradually decreasing tendency from bottom towards the top of the seam. *Platysaccus*, *Striatites*, *Lahirites*, and *Striatopodocarpites* follow a similar course. *Faunipollenites*, on the other hand, increases from bottom towards top of the coal seam. The overall dominance is marked by nonstriated disaccates (36%). The trilete miospores (27%) and striated disaccate pollen grains (22%) follow next to it.

DISCUSSION

The overall representation of various miospore genera has been shown in Histogram 2. The pollen spectra show the general dominance of nonstriated disaccate pollen grains followed by trilete or monolete miospores. The coal seam present in Jagaldaga quarry is characterised by the dominance of *Sulcatisporites* associated with *Horriditriletes* and *Fauni-*

pollenites. The coal seam represented by sample nos. B/1-B/3 also contains the dominance of *Sulcatisporites* and is closely followed by *Cyclogranisporites* unlike samples J/1-J/5. The coal seam exposed in Bagdagga quarry shows a significant increase in the percentage of *Thymospora*. *Sulcatisporites* which was dominant so far has decreased to subdominance. In the coal seam represented by sample no. B2/2 *Sulcatisporites* agian rises to dominance and is associated with *Latosporites* and *Striatites* subdominantly. Sample no. B/2/1 is separated by a sandstone parting from B2/2 and contains an abundance of acritarch remains and thus is distinct from all the above coal seams.

Among all the five coal seams investigated from the Jagaldaga and Bagdagga nalas four coal seams exhibit a close resemblance in view of higher presence of *Sulcatisporites* but each of them can be differentiated by their subdominant associations.

The higher percentage of *Sulcatisporites* associated with sufficient amount of apiculate trilete and striated disaccate pollen grains are known from Korba Coalfield (Bharadwaj & Tiwari, 1964), North Karanpura Coalfield (Bharadwaj & Tiwari, 1966) and Talcher Coalfield (Bharadwaj & Srivastava, 1969). In this respect the coal seams of Auranga Coalfield studied above shows greater resemblance with them. Thus the age of the coal deposits of this area is in conformity with the suggestion of Rizvi (1971), i.e. Middle Barakar.

The coal seams exposed in Sukri River near Tubed yielded two distinct miospore assemblages. The coal seam exposed in the nala north of Tubed (sample no. S/5) and at the junction of the same nala with Sukri River (sample no. S/4) contains similar mioflora and are continuation of the same coal seam. This coal seam also shows striking resemblance with the coal seam(sample nos. B/1-B/3) exposed in Bagdagga nala as both of them contain higher percentage of *Sulcatisporites* associated with *Cyclogranisporites*, *Horriditriletes*, and *Faunipollenites*. The dominance of *Thymospora* and the subdominance of *Horriditriletes* and *Sulcatisporites* in sample no. S/3 again bears a significant resemblance with the coal seam exposed in abandoned Bagdagga quarry (sample nos. BQ/1-BQ/2.)

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