MIOFLORAL SUCCESSION OF THE LOWER GONDWANAS IN THE NORTH KARANPURA COALFIELD

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ABSTRACT

Two miofloral assemblages have been recognised from the sediments exposed north of the village Honhe in the extreme northwestern part of the North Karanpura Coalfield. The older assemblage is marked by the dominance of radial monosaccates (chiefly *Parasaccites*) and has been recovered from top of the Talchir Formation. The younger assemblage is characterised by the dominance of *Callumispora* associated with the subdominant monosaccates. This assemblage has been recorded from the carbonaceous facies developed closely above the Talchirs and represents the Karharbari Formation in this part of the basin.

INTRODUCTION

The Gondwana sediments have a wide areal extent in the North Karanpura basin. The older formations are exposed along the periphery mostly in discontinuous patches. BHARADWAJ AND TIWARI (1966) suggested the correlation of coal seams in Bachra area in the southern part of the coalfield and assigned the age of the coals as Lower Barakar. However, MUKHERJEE AND GHOSH (1972) again studied the palynology as well as petrology of the coals around the Ray-Bachra area and suggested the Lower Coal Measures as Karharbari and the Upper Coal Measures as Lower Barakar in age. Recently, the succession of Miofloras of various formations in North Karanpura basin has been synthesized by KAR (1973) after investigating the palynological composition from a number of areas. Thus, the mioflora of the Talchir Formation is known from the subsurface and that of Karharbari Formation is described from the surface and subsurface both from the southern part of the basin only. Apart from the Ray-Bachra area the Talchir-Karharbari Formations are exposed, widely scattered apart, along the northern margin of the basin and no miofloral assemblage has been described. With this view the palynological investigation of the rocks exposed north of Honhe village (23° 54′ : 84° 59′) in the northwestern part of the North Karanpura Coalfield has been undertaken. The area is not easily accessible due to undeveloped road communications and lies in the extreme northwestern part of the coalfield.

In the area north of Honhe village a mappable thickness of sediments are exposed in two small tributaries. The succession of important members is given below.

	Sandstone	Sample no. B/1	
	Carbonaceous shale	Sample no. B/2	
	Coal	Sample no. B/3	(spores present)
Karharbari	Sandstone	Sample no. B/4	
	Carbonaceous shale	Sample no. B/5	(spores present)
	Sandstone with gritts		
.....			
	Grey Shale	Sample no. B/6	(spores present)

	Sandstone with gritts	
	Siltstone	Sample no. B/7
Talchir	Varve	Sample no. B/8
	Sandstone and Conglomerates	Sample no. B/9
	Siltstone	Sample no. B/10
	Basal Boulder Bed (Tillite)	
.....	Unconformity	
	Metamorphics	

The succession of important members in this area compares very closely with those described from Misrol area by GHOSH AND MITRA (1975 ; p. 13). The Basal Boulder Bed (Tillite) rests unconformably over the granite gneiss basement and is a well developed member. Rafted boulders of various size and shape are distributed in the greenish unstratified silty matrix. Most of the boulders are sharply angular to subangular and faceted. The Basal Boulder Bed is overlain by a thin band of siltstone followed by a thick band of sandstone. The latter include numerous angular faceted boulders in the lower part, the size of which decreases upwards. In the upper part the sandstone include numerous gritts. The varve member is developed above these sandstones and is characterised by thin laminations of dark green and light yellow colour and are fine grained. These varves are interbanded with thin bands of siltstones and is finally overlain by a thick siltstone band. A coarse grained sandstone containing numerous gritts overlie the siltstone. This member is well developed in this succession and include intercalation of grey shales with small carbonaceous specks. This marks the uppermost member of the Talchir Formation.

The sandstones continue upwards and include the first coal and carbonaceous facies in them. This represents the Karharbari Formation.

PALYNOLOGICAL COMPOSITION

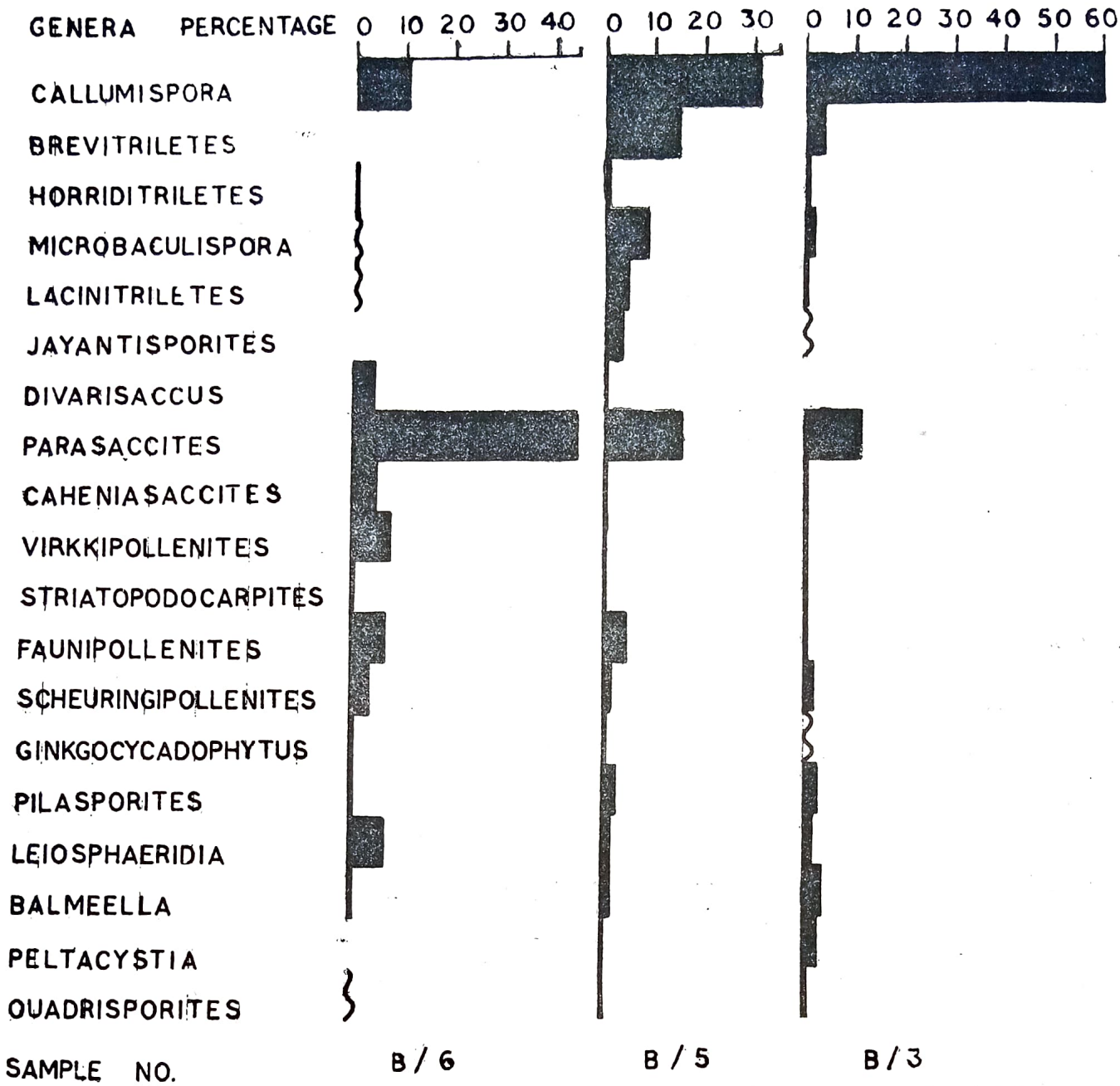
The miofloral assemblage include 21 miospore genera and 7 alete genera which are listed below :

Leiotriletes, *Callumispora*, *Hennellysporites*, *Brevitriletes*, *Horriditriletes*, *Microbaculispora*, *Lacinitriletes*, *Jayantisporites*, *Divarisaccus*, *Parasaccites*, *Caheniasaccites*, *Vestigisporites*, *Crucisaccites*, *Virkkipollenites*, *Platysaccus*, *Striatopodocarpites*, *Faunipollenites*, *Vesicaspora*, *Scheuringipollenites*, *Tiwariasporis*, *Ginkgocycadophytus*, *Pilasporites*, *Balmeella*, *Leiosphaeridia*, *Singraulipollenites*, *Peltacystia*, *Quadrisporites*, *Foveofussa*.

The quantitative distribution of the above genera in different samples suggests the occurrence of two miofloral assemblages (Histogram 1) ;

Assemblage A—The samples from the lower part of the Talchir Formation did not yield miospores. However, the grey shale (sample no. B/6) present at the top of the Talchir Formation contained a rich assemblage of miospores. Amongst these *Parasaccites* is chiefly dominant (45%). *Callumispora* (10%) occurs next to the dominant genus. *Divarisaccus* (4.5%), *Caheniasaccites* (5%) and *Virkkipollenites* (6%) follow the subdominants. In general the monosaccates form the dominant group (63%) while the triletes constitute only 13 per cent of the total assemblage. The striated disaccates constitute 8 per cent only. The rest of the percentage is shared by alete miospores.

Assemblage B—The first carbonaceous shale (sample no. B/5) developed closely above the sample no. B/6 contains a mioflora chiefly dominated by the genus *Callumispora* (30%). *Parasaccites* (16%) reduces considerably and constitute the subdominant component and is associated with *Brevitriletes* (15%). Apart from these, *Microbaculispora* (9%), *Lacinitriletes*



Histogram 1—Showing the distribution of miospore genera in various samples of Honhe area, North Karanpura Coalfield.

(5%) and *Jayantisporites* (4%) form a characteristic association in addition to the above genera. The total representation of trilete miospores rises to 47 per cent, varitriletes 14 per cent and zonate triletes 4 per cent. The radial monosaccates, on the other hand, decrease to subdominance (17%). The striated disaccates (6%) and nonstriated disaccates (3%) still remain insignificant. In sample no. B/3 the percentage of *Callumispora* rises further up to 60 per cent. *Brevitriletes* (4%) and *Microbaculispora* (2%) although reduced significantly yet maintain the general dominance of triletes.

DISCUSSION

The Talchir Formation in Honhe area is well developed and is distinctly mappable. The presence of tillite, turbidite and rythmite comprise the classical glacial deposits at the base of the Talchir sediments. The fabric study along the northern periphery of the basin shows the direction of ice flow from northwest to southeast (Ghosh & Mitra, 1975) indi-

cating the probable direction of ice movement. These sediments have proved practically barren of miospores. However, the grey shale present at the top of the Talchir Formation contains a rich mioflora. Such has been the experience from other areas too. The boulder bed associated with the basement in Giridih Coalfield (SURANGE & LELE, 1956) contained only few monosaccate pollen grains. The oldest boulder bed present in the subsurface of the bore hole NCKB-19 of Korba Coalfield (BHARADWAJ & SRIVASTAVA, 1973) also contained only few ill-preserved monosaccate pollen grains. Similarly, in the Dudhi River section of West Bokaro Coalfield (LELE, 1975) the older sediments of the Talchir Formation showing glacial characteristics contain, if at all, only few miospores showing least diversification. On the other hand, the younger part of the Talchir Formation showing comparatively more of glacio-fluvial or fluvial characteristics has successfully yielded rich miospores with distinct diversification. The rich and diversified miofloras in Korba Coalfield (BHARADWAJ & SRIVASTAVA, 1973), Jayanti Coalfield (LELE & KARIM, 1971), Mohpani Coalfield (BHARADWAJ & ANAND-PRAKASH, 1972) and Johilla Coalfield (PONTONIÉ & LELE, 1961) have been obtained only from the younger part of the Talchir Formation. In the present investigation also the *Parasaccites* dominant mioflora has been obtained from top of the Talchir Formation only. This mioflora resembles with the subsurface Talchir mioflora in bore hole KB-21 of the North Karanpura Coalfield described by KAR (1973) in view of the preponderance of monosaccate pollen grains (*Cannanoropollis*) but differs in having *Parasaccites* as the dominant genus along with significant percentage of *Callumispora*. The mioflora obtained from the siltstone present at the top of the Talchir Formation in West Bokaro Coalfield (LELE, 1975) also contains dominance of *Parasaccites* but differs in having lesser amount of *Callumispora*. The Talchir mioflora from Korba Coalfield (BHARADWAJ & SRIVASTAVA, 1973, sample nos. 138-136) compares with the present mioflora in having similar association of *Parasaccites* and *Callumispora* but differs in having higher percentages of *Plicatipollenites*. The mioflora from Mohpani Coalfield compares in many respects with the present mioflora except the higher incidence of *Virkkipollenites*. The mioflora described from the upper part of the Talchir Formation of Manendragarh area (BHARADWAJ *et al.* 1979, Palynozone 2) compares with the present assemblage but differs in having *Plicatipollenites* as a subdominant genus. The Talchir mioflora of the Honhe area, thus, maintains its own identity, in spite of its wide similarities.

The miofloras described from the Talchir sediments so far, are characterised by the preponderance of radial monosaccates in general. The glacigene sediments proved barren of miospores or if at all present, are limited in number. LELE (1975) has already suggested the occurrence of more than one miofloral zone within Talchir Stage. The mioflora described from Manendragarh (BHARADWAJ *et al.*, 1979) contains two distinct miofloral assemblages within the Talchir Formation. The older miofloral zone is marked by the dominance of *Plicatipollenites* which reduces considerably in the younger miofloral zone while *Parasaccites* rises to dominance. The *Plicatipollenites* mioflora is usually associated with the glacial sediments at the base of Talchir Formation as is present in Korba Coalfield and Manendragarh area. In both the areas, the mioflora is represented by minimum diversification among species. The *Parasaccites* mioflora shows ample diversification and encompasses almost all the miofloras described from Talchir Formations of India showing fluvio-glacial or fluvial characteristics. A gradual diversification among genera and species and also their percentage representation exists from the *Plicatipollenites* mioflora to *Parasaccites* mioflora. This is because at the beginning of the Talchir sedimentation the widespread glaciation acted as a limiting factor and must have been responsible

for the impoverished mioflora. In the younger part of the Talchir Formation as the palaeoclimate ameliorated the mioflora also diversified.

The younger assemblage containing the dominance of *Callumispora* has been recorded from the carbonaceous facies developed above the Talchir Formation and represents the Lower Karharbari Formation in the Honhe area. The mioflora of the Lower Karharbari Formation described by Kar (1973 ; bore hole no. KMB 19 and KB 21 ; N. Karanpura Coalfield) is marked by the presence of *Punctatisporites* (=*Callumispora*) and *Cannanoropollis* (=*Virkkipollenites*) in almost equal percentages. However, in total triletes are more than the monosaccates and thus compares with the present assemblage. The younger subzone of Zone 1 (Bharadwaj & Srivastava, 1973; bore hole NCKB-19, sample nos. 132-117A) from Korba Coalfield compares more closely with the present assemblage of Honhe area but the latter differs in having *Brevitriletes*. The mioflora of Lower Karharbari Stage described from the Lower Karharbari seam, Giridih Coalfield (Srivastava, 1973) compares very closely with the Assemblage of Honhe area but differs in having *Brevitriletes* in significant amounts.

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