PALYNOSTRATIGRAPHY OF MESOZOIC SEDIMENTS FROM MACHRAR NALA, BANSA, M. P., INDIA.

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ABSTRACT

The present paper deals with the quantitative analysis of dispersed miospores in the carbonaceous shales exposed in the Machrar Nala, Bansa, Shahdol district, Madhya Pradesh, India, belonging to Bansa Formation included in the Jabalpur Stage, South Rewa Gondwana basin. Quantitatively, two different miofloral assemblages have been encountered. Assemblage A (older) has the dominance of *Callialasporites* with subdominant *Araucariacites*. Assemblage B (younger) shows the dominance of *Araucariacites* with subdominant *Callialasporites*. The cryptogamic miospores are rare in both the assemblages.

A comparison of the mioflora reveals that the assemblage A from Bansa closely resembles Bottom Zone of Upper Katrol, and assemblage B compares well with the Middle Zone of Upper Katrol. Hence, the assemblages from Bansa have been dated as Upper Jurassic.

INTRODUCTION

The present paper deals with the palynostratigraphic study of the sedimentary deposits exposed in Machrar nala near the village Bansa, in the South Rewa Gondwana basin, belonging to the Jabalpur Stage, Madhya Pradesh, India. FEISTMANTEL (1877) studied the plant fossils from South Rewa Gondwana basin. Recently BOSE AND DEV (1959, 1961) and DEV (1961, 1970, 1972) have recorded megafossils from Machrar Nala near the village Bansa and nearby localities in Shahdol district. They have recorded *Weichselia reticulata*, an unclassified fern from the carbonaceous shales of Bansa. DEV (1961a) has reported some miospores from the same sediments. Regarding the age, Bansa deposits being of the Jabalpur Stage, various workers have proposed Middle Jurassic, Upper Jurassic or Lower Cretaceous age for them on the basis of lithology and megafloristic studies. No detailed sporological study has been reported so far from these beds.

MATERIAL AND METHODS

Ten samples of clay, clayey shale and carbonaceous shale were collected from the outcrops exposed in the Machrar nala near the village Bansa (80° 39'; 23° 36'). Out of these samples, only five carbonaceous shale samples have yielded miospores having good preservation. The usual maceration technique has been followed for isolating the sporiferous contents. The macerates suspended in glycerin jelly were utilized to prepare slides for the quantitative and qualitative analyses of miospores. Only quantitative analysis is being given in the present paper.

Table 1—Samples from Machrar Nala near Bansa, Shahdol district, Madhya Pradesh.

Sample No.	Nature of the rocks	thickness of the rock	Stratigraphic sequence
	Sandstone		Top
1517/10	Carbonaceous shale	1 foot	Overlying Sst. (8)
	Sandstone 8	± 1 foot	
1517/9	Carbonaceous shale	1½ feet	Overlying Sst. (7)
	Sandstone 7	± 10 feet	
1517/8	Carbonaceous shale	2 feet	Overlying thin clayey band (Overlying the Sst. (6),
	Sandstone 6	± 20 feet	
1517/7	Carbonaceous shale	1½ feet	Overlying carbonaceous shale
1517/6	Carbonaceous shale	4 feet	Overlying Sst. (5)
	Sandstone 5	1 foot	
1517/5	Clay light grey colour	1½ feet	Overlying Sst. (4)
	Sandstone 4	±100 feet	
1517/4	Carbonaceous shale	4 feet	Overlying clayey shale band
1517/3	Clayey shale band	1½ feet	Overlying Sst. (3)
	Sandstone 3		
1517/2	Clay light pink colour	1 foot	Overlying Sst. (2)
	Sandstone 2	±150 feet	
1517/1	Clay light brown in colour	1½ feet thick band	Overlying Sst. & grit
	Sandstone 1 and grit		Bottom.

Quantitative Composition of the Mioflora:

Quantitatively, the composition of the mioflora has been determined in a count of 200 spore-pollen grain per sample. Fourteen spore genera have been figured in the counting. The genera which are above 30 per cent or more have been considered as *dominant* or *prominent*, below 30 and up to 20 per cent in distribution are *subdominant* or *common*. The components ranging from 10 to under 20 per cent have been regarded as *fair*, and those under 10 but up to 5 per cent are *poor*. The elements below 5 per cent in distribution are *rare*.

Only sample Nos. 6, 7, 8, 9 and 10 have yielded the miospores. The mioflora mostly consists of the elements produced by the plant fossils belonging to podocarpinae and araucarinae. The pteridophytic elements have been found very rare in the assemblage.

The quantitatively significant miospores distributed in the assemblage are *Callialasporites*, *Araucariacites* and *Podocarpidites*.

From the perusal of the histograms 1 and 2 it is apparent that there are two different miofloral assemblages A and B occurring in the Upper Gondwana deposits near Bansa.

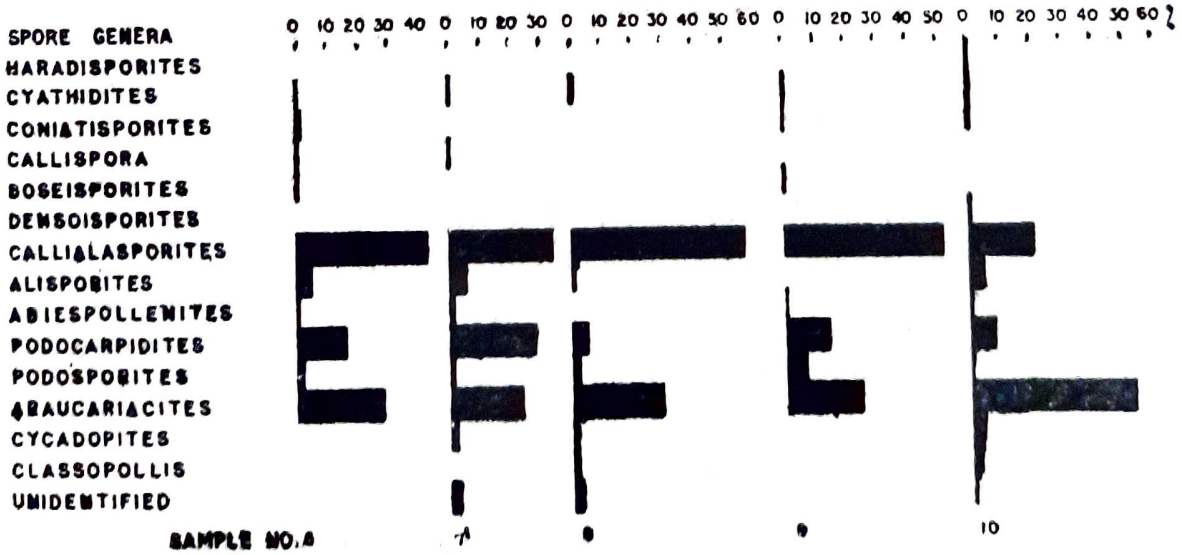
Assemblage A has the dominance of *Callialasporites*—46.5 % with the common occurrence

Table 2—Percentage representation of various spore genera

Spore Genera	Sample Nos.				
	6	7	8	9	10
Haradisporites					1
Cyathidites	1	1	1.5	1.5	1
Coniatisporites	2			0.5	1
Callispora	1	0.5			
Boseisporites	1			0.5	
Densoisporites					1
Callialasporites	43	34	57	52	21.0
Alisporites	5	5.5	1		5
Abiespollenites	1	1.5		0.5	1
Podocarpidites	16	28	5	14	8
Podosporites	2	1.5	2	6.5	0.5
Araucariacites	28	23.5	29.5	24.5	53.0
Cycadopites		2	1		4.5
Classopollis			1		2.5
Unidentified		2.5	2		0.5

of *Araucariacites*—26% and *Podocarpidites*—16%. *Assemblage* B shows the dominance of *Araucariacites*—53% followed by *Callialasporites*—21%, *Podocarpidites*—8%, *Cycadopites*—4.5% and *Classopollis*—2.5%.

Hence, in a vertical section miofloristically the genus *Callialasporites* is dominantly represented along with *Araucariacites* in sample nos. 6, 7, 8 and 9, making up assemblage A. Whereas sample no. 10 shows the dominance of *Araucariacites* followed by *Callialasporites* forming the assemblage B.



Histogram-1 Showing percentage frequency range of miospores from Bansa, M. P., India.

In assemblage A the dominantly represented genus *Callialasporites* shows the increasing tendency (43 to 52 per cent) upwards i.e. from sample nos. 6-9, but suddenly falls to 21 per cent in the top sample no. 10. Simultaneously, *Araucariacites* which is represented as common in sample nos. 6-9 shows the declining tendency towards the top up to sample no. 9, but suddenly rises in the topmost sample, no. 10, acquiring a dominance of 53%, characterizing assemblage B. Assemblage B is also characterized by the presence of *Cycadopites* (4.5 %) and *Classopollis* (2.5 %) which are almost negligible in assemblage A. Distribution of pteridophytic miospores viz., *Cyathidites*, *Haradisporites*, *Coniatisporites*, *Callispora*, *Boseisporites* and *Densoisporites* is numerically very low in both the miofloral assemblages.

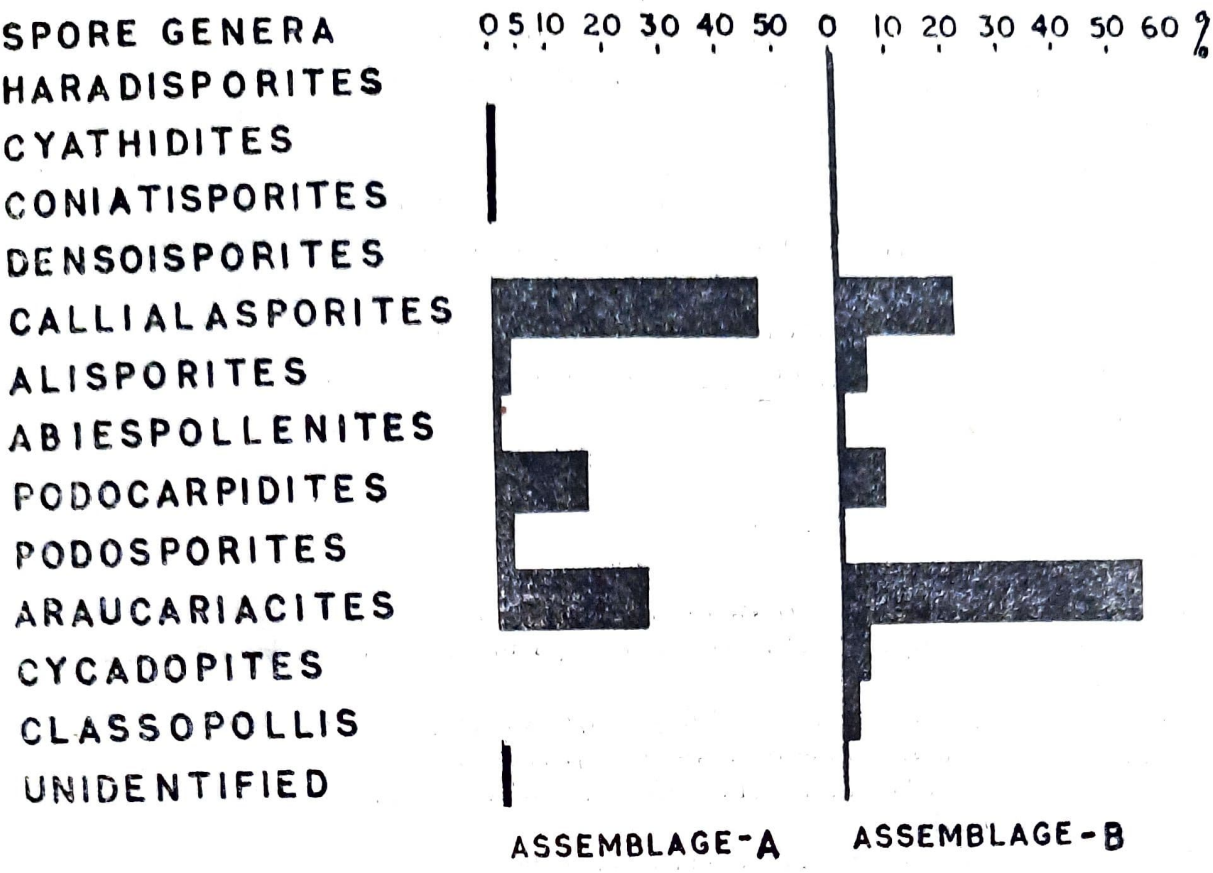
Comparison of the Miofloras

The miofloral assemblages A and B as quantitatively represented in Bansa, Shahdol district, Madhya Pradesh, India, have been compared with the following comparable Upper Mesozoic miofloras available from India so far.

According to Bharadwaj (1969) the miospore assemblage from Basko and Sakrigali-ghat in Rajmahal Hills as counted by him, shows the dominance of *Araucariacites* ±30% followed by *Podocarpidites* and *Cyathidites* ±17% each and *Gleicheniidites* ±12%. In respect to the dominance of *Araucariacites*, the assemblage B from Bansa and the assemblage from Rajmahal Hills are closely comparable if in the latter assemblage the lesser frequency of *Araucariacites* is ascribed to the higher record of pteridophytic spores. However, Rajmahal Hills assemblage appears to be different from Bansa in lacking the subdominance of *Callialasporites*. So, on that account, the miospore assemblage from Bansa is different from Rajmahal Hills assemblage.

Venkatachala *et al.* (1969) have worked out the mioflora from Upper Katrol deposits near Bhuj, Kutch in India. They have quantitatively made five palynological sections in Upper Katrol. Bharadwaj (1969) has reduced these to three palynological zones, by combining the morpholographically more or less similar pollen grains *Araucariacites* and *Laricoidites*. Thus, in Upper Katrol the *Bottom palynozone* has dominance of *Callialasporites* ± 50% and subdominance of *Araucariacites* ± 25%; *Middle palynozone* possesses *Araucariacites* ± 50% and *Callialasporites* ± 15%; and the *Top polynozone* is characterized by the dominance of *Araucariacites* ± 60%, *Callialasporites* ± 10% and *Schizosporis* ± 15%. In the light of the above miospore frequencies the assemblages A and B from Bansa closely compare with *Bottom* and *Middle palynozones* of Upper Katrol respectively in having similar prominence of the genus *Callialasporites* 46.5% and subdominant *Araucariacites* 26% in the older assemblage A and dominance of *Araucariacites* 53% associated with *Callialasporites* 21% in the younger assemblage B of Bansa. The trilete miospores are rarely represented also in the Bottom and Middle palynozones of Upper Katrol and so is the case in assemblages A and B of Bansa. The *Top palynozone* of Upper Katrol is quite different from both the assemblages of Bansa in having dominant *Araucariacites* but lesser frequency of *Callialasporites*. The presence of *Schizosporis* ± 15% (marine element) which is lacking in Bansa assemblages also indicates that the *Top zone* is different from that of the two assemblages from Bansa.

In the miofloras from Jabalpur Stage, particularly those from Sehora and Hathnapur, the quantitative analysis as given by Bharadwaj *et al.* (1972), shows the dominance of



Histogram-2 Showing percentage frequency range of miospores in assemblages A & B from Bansa.

Araucariacites (32.5 and 31.5%) associated with *Cycadopites* (±16 and ±7%) whereas Bansa assemblages A and B have the dominance of *Callialasporites* and *Araucariacites* respectively while *Cycadopites* is 'rare'.

DISCUSSION AND CONCLUSION

The quantitative analysis of the miofloral assemblage recovered from the carbonaceous shales of the Jabalpur Stage, Bansa reveals that there are two different palynological assemblages. Coniferalean pollen grains are dominant and pteridophytic spores are meagre in both the assemblages. In the two palynological assemblages, the older described as assemblage A has dominant podocarpaceous element and assemblage B is the younger mioflora in which araucarinae is dominant. Assemblage A is characterized by dominance of *Callialasporites* followed by *Araucariacites* and *Podocarpidites;* assemblage B has the prominent genus *Araucariacites* associated with *Callialasporites.*

Similar type of miospore associations are also present in the Bottom and Middle zone of Upper Katrol which correspond to the Bansa assemblages A and B respectively.

From the above facts and discussion it is evident that the miofloral assemblages A and B from Bansa belong to the same time zone during which the Bottom and Middle palynozones of Upper Katrol were deposited. Palaeontologically, the Upper Katrol shales have been dated as of Tithonian age (Upper Jurassic) on the basis of the ammonite fauna (Spath's work in ARKELL, 1956). Thus, Bansa deposits having almost similar mioflora as contained in Upper Katrol were deposited nearly during the same period and are similar in age (Upper Jurassic) as understood for the latter at present.

FEISTMANTEL (1877) regarded Jabalpur Group as Middle Jurassic in age entirely on

palaeobotanical grounds and placed them floristically in a somewhat older stratigraphical position than that of the Umia flora in Kutch. WADIA (1961) dated palaeontologically the beds of Jabalpur Stage as 'Lower Oolite'. MATLEY (1921) believed the Jabalpur beds, particularly those exposed at and near Jabalpur (Jubbulpore), to be Lower Cretaceous. BOSE AND DEV (1959) regarded beds of Jabalpur Series exposed near Bansa and Sehora to be Lower Cretaceous on the basis of the occurrence of *Weichselia* and *Onychiopsis* which are mostly found in the Wealden beds of Europe. However, palynologically an Upper Jurassic age is indicated.

Evidently the true nature of *Weichselia* and *Onychiopsis* in Bansa deposits, on the one hand and the palaeontological dating of Upper Katrol on the other must be rechecked to arrive at a final conclusion.

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