A MIOSPORE ASSEMBLAGE IN SOME LOWER GONDWANA SEDIMENTS BETWEEN JEER AND DASER, SON VALLEY, M. P., INDIA

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ABSTRACT

Palynological investigations of some Lower Gondwana sediments exposed along the road between Jeer and Daser villages in Son Valley have been carried out. South of Jeer the overlapping of the Lower Gondwana beds by the Mahadeva rocks marks the southern extension of these formations in the Singrauli Coalfield. Near the contact a number of thick, persistent plant megafossil bearing bands of carbonaceous and sandy shales have been recorded. The mioflora found in these sediments shows the sub-dominance of *Densipollenites* with dominant striated disaccate pollen grains in general. This mioflora has been compared with those containing high representation of *Densipollenites* in the Barren Measures and youngest Raniganj Stage. It is concluded that the carbonaceous sediments between Jeer and Daser seem to have been deposited during the Barren Measures to the Raniganj Stage (i.e. Middle to Upper Damuda Series.)

INTRODUCTION

The area under investigation (between Jeer and Daser; Survey of India topo sheet no. 64 I/5) lies between the latitudes 23° 47′ to 23° 50′N and the longitudes 82° 26′ to 82° 30′E representing the southernmost part of the Singrauli Coalfield of the Son Valley. The approach to the area is difficult due to its being situated in a dense forest, uneven terrains of the hilly region of massive Mahadeva sandstones and the absence of road and rail communications in the nearby areas. The nearest townships are Waidhan (24° 4′ : 82° 30′) in the northeast and Sonhat (23° 29′ : 82° 34′) in the south. The area between these two places is inhabited only by the small forest villages. A narrow, unmetalled fairweather road connecting Waidhan and Sonhat, is the only link to Jeer and Daser.

The knowledge of the geology of this area has been mainly contributed by OLDHAM (1871), HUGHES (1885), KING (1885), FERMOR (1914), COULSON (1939), DUTTA (1953) and JOSHI AND PANT (1971). The Gondwana sediments in this part of the Son Valley are mainly represented by the huge thickness of Mahadeva sandstones forming high lands of the region. Some of the peaks rise as high as 850 m. These sandstones separate the Lower Gondwana sediments of the Singrauli Coalfield from those of the Sonhat Coalfield. In the Sonhat area, the Mahadevas rest unconformably over the Barakars (GOKUL & MUKHERJEE, 1971) whereas in the southern part of the Singrauli Coalfield the Barakar rocks have been overlapped by the Mahadevas (JOSHI & PANT, 1971).

So far, the geology of the coal bearing horizons of the Son Valley region has been studied mainly due to the economic importance of coal. However, the areas understood to be devoid of economically extractable coal, still need detailed geological study, at least for academic interest which may prove to be of some importance in future exploration of coal. South of the village Jeer near the contact of Lower Gondwana sediments with the overlying Mahadeva sandstones, many thick persistent bands of carbonaceous and sandy shales are exposed along the road side (Text-fig. 1). At places these beds have also been affected by faults and are intruded by the dolerite dykes. So far, these sediments have been included in the Barakar Stage (JOSHI & PANT, 1971). The present study has been undertaken to analyse their miofloral contents and to determine their probable affinities with the known Lower Gondwana miofloras.

GEOLOGY

The Gondwana rocks exposed between the villages Jeer and Daser, form the southern part of the Singrauli Coalfield. South of Jeer, the Barakar sediments have been overlapped by the younger Mahadeva sandstones. The contact between these two formations marks the southern limit of the Lower Gondwana rocks of Singrauli Coalfield. Farther south, the massive Mahadeva sandstones are developed in a very large area between Daser and Sonhat. Towards north, the Barakar sandstones are exposed up to Mara and also beyond, all along the road.

The regional geological features of the area suggest that the Gondwana sediments are folded forming an anticline. The axis of the fold runs almost E-W and passes from somewhere near the Rampa River towards Waidhan. Talchir rocks which form the oldest Gondwana sediments occupy this region and are exposed at places in various sections. North of Rampa River the Lower Gondwana rocks are dipping on low angles towards north in the Singrauli area while, towards south in Jeer-Daser, the beds are dipping towards south.

The characteristic feature of the southern limb is that, it is mainly represented by a considerable thickness of greyish sandstones. In the upper portion of these a slight change in the lithology is evident with the development of red colour at places. Near the contact with the distinct Mahadeva rocks some thick carbonaceous shale bands are present (Fig. 1). So far, these strata are included in the Barakars (Joshi & Pant, 1971).

The strata have also been affected by many faults mostly trending east-west. Dolerite dykes are common which have often intruded along the fault planes. Two such dykes affect the beds investigated here causing the burning of the shales near the contact areas.

MATERIAL AND METHODS

The samples were collected during an excursion to the area in the year 1973. The details of the samples and lithological characters are given in Table 1.

Table 1

Serial No.	*Lab. Sample No.*	*Lithology*
1	S/5	Sandy shale
2	S/6	Burnt shale
3	S/7	Clayey shale
4	S/8	Carbonaceous shale
5	S/9	Sandy shale
6	S/10	Carbonaceous shale
7	S/11	Carbonaceous shale
8	S/12	Sandstone with minor shale layers
9	S/13	Carbonaceous shale
10	S/14	Carbonaceous shale
11	S/15	Carbonaceous shale bearing plant fossils (Lower portion of the shale band)
	S/15(a)	Carbonaceous shale
	S/15(b)	Carbonaceous shale (weathered)
	S/15(c)	Carbonaceous shale

	S/15(d)	Carbonaceous shale (Top portion of the band)
12	S/16	Sandy shale
13	S/17	Carbonaceous shale
14	S/18	Carbonaceous shale
15	S/19	Carbonaceous shale
16	S/20	Carbonaceous shale
17	S/21	Carbonaceous shale
18	S/22	Carbonaceous shale

Mostly, the samples were weathered and did not contain well preserved miospores. For maceration, hydrofluoric acid was first employed to dissolve the silica, followed by nitric acid and potassium hydroxide (5%) treatment. In one of the cases where the spores and pollen were present, the potassium chlorate treatment was also tried, which helped in clearing the spores. On the whole, the preservation is not good, and the miospores

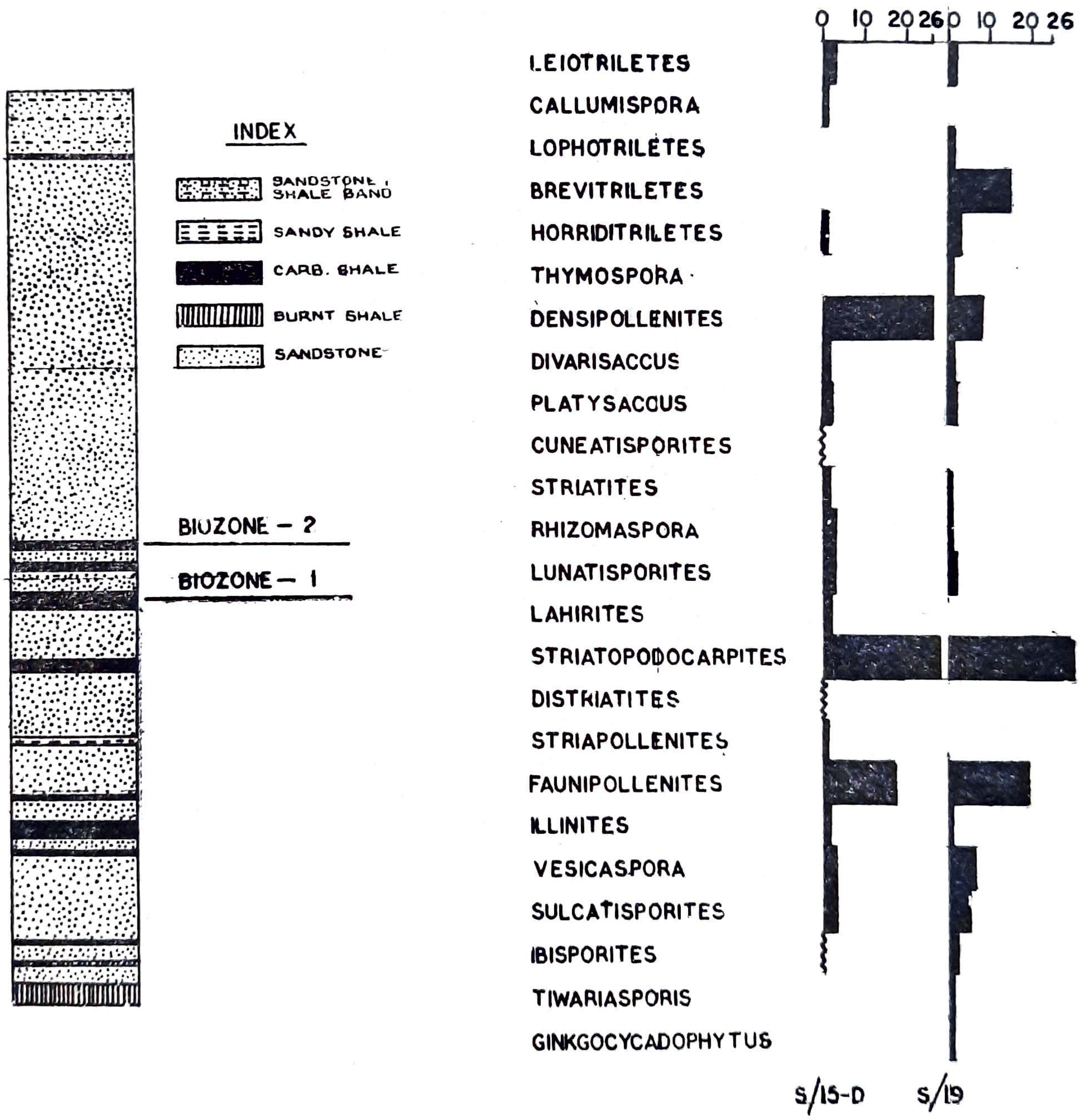

Fig. 1—Composite section along road from 12 km. post to 14 km. post between Jeer and Daser showing the lithological characters of the samples studied, and the biozones. Scale, 1 cm=30 m

Histogram 1—Percentage frequency of important miospore genera in samples S/15(d) and S/19 showing the nature of two Biozones. The former sample represents the 1st Biozone and the latter represents the 2nd Biozone.

had to be handled carefully. Only two samples i.e. S/15(d) and S/12 out of 22 samples, have yielded miospores. For quantitative analysis, two hundred specimens per sample were counted at random, at the generic level.

MIOFLORISTICS

The palynological analysis has suggested the occurrence of 26 miospore genera as listed below; some of the important ones are illustrated in Plate 1. The generic identifications are based on the morphographic lines followed by BHARADWAJ (1962, 1966):

Leiotriletes Naumova emend. Potonié & Kremp, 1954; *Callumispora* Bharadwaj & Srivastava, 1969; *Lophotriletes* Naumova 1937 emend. Potonié & Kremp, 1954; *Brevitriletes* Bharadwaj & Srivastava, 1969; *Lacinitriletes* Venkatachala & Kar, 1965; *Horriditriletes* Bharadwaj & Salujha, 1964; *Gondisporites* Bharadwaj, 1962; *Thymospora* Wilson & Venkatachala, 1963; *Densipollenites* Bharadwaj, 1962; *Divarisaccus* Venkatachala & Kar, 1966; *Platysaccus* Naumova ex. Potonié & Klaus, 1954; *Cuneatisporites* Leschik, 1955; *Striatites* Pant emend. Bharadwaj, 1962; *Rhizomaspora* Wilson, 1962; *Lunatisporites* Leschik emend. Bharadwaj, 1962; *Lahirites* Bharadwaj, 1962; *Striatopodocarpites* Sedova, 1956; *Distriatites* Bharadwaj, 1962; *Striapollenites* Bharadwaj, 1962; *Faunipollenites* Bharadwaj, 1962; *Illinites* Kosanke emend. Potonié & Kremp, 1954; *Vesicaspora* Schemel emend. Wilson & Venkatachala, 1963; *Scheuringipollenites* (Syn. *Sulcatisporites*) Tiwari, 1973; *Ibisporites* Tiwari, 1968; *Tiwariasporis* Maheshwari & Kar, 1967; *Ginkgocycadophytus* Samoilovich, 1953.

The quantitative analysis of the above miospores shows the general dominance of *Brevitriletes*, *Densipollenites*, *Striatopodocarpites* and *Faunipollenites*. The characteristic association of these genera in various percentages suggests that these miofloras in two samples form a single assemblage. However, the finer differences, when emphasized, are indicative of two zones (Histogram 1).

In Biozone-I the most dominant genus is *Striatopodocarpites* (28%) which is associated with *Densipollenites* (26.5%) and *Faunipollenites* (18%). Apart from these, the following genera, though quantitatively less represented, are also present: *Callumispora* (1%), *Divarisaccus* (1.5%), *Cuneatisporites* (0.5%), *Distriatites* (0.5%) and *Striapollenites* (1%). Thus, the mioflora of the Biozone-I in general is dominated by the striated disaccate pollen grains (56.5%). Next to them are the monosaccate pollen (27%) mainly represented by *Densipollenites*. Non-striated disaccate pollen grains and trilete miospores amount only 10 per cent and 5 per cent of the total population respectively.

In Biozone-II the striated pollen grains continue to mark the dominance. *Striatopodocarpites* (30%) and *Faunipollenites* (19.5%) share the dominance. *Densipollenites* (8.5%), the prominent genus of Biozone-I is reduced considerably. On the other hand,the genus *Brevitriletes* (15%), which was not encountered in Biozone-I, appears in Biozone-II in significant percentage, thus, increasing the total representation of trilete miospores. The following genera, though less represented quantitatively, are characteristically associated with the dominant components: *Lophotriletes* (1.5%), *Horriditriletes* (3%), *Thymospora* (1%) and *Ginkgocycadophytus* (1%). The total percentage of the disaccate pollen grains (53%) remains very near to that of the Biozone-I but the total percentage of trilete miospores in the Biozone-II rises to 21 per cent. Monosaccates reduce to 8 per cent. *Lophotriletes*, *Brevitriletes*, *Thymospora*, *Tiwariasporis* and *Ginkgocycadophytus* are present only in the Biozone-II, while *Divarisaccus* and *Cuneatisporites* are present only in the Biozone-I. Thus, the two biozones can be distinguished from each other.

MIOFLORAL COMPARISONS

The distribution of spores and pollen grains in the sediments exposed along the Jeer-Daser road have suggested the occurrence of a miofloral assemblage having two minutely differing biozones on the basis of difference in the quantitative incidence of *Densipollenites* which is prominent in the older and common in the younger biozone. *Densipollenites* is known to occur richly in the sediments from middle part of Barren Measure Stage of the Permian in India (BHARADWAJ, 1966; KAR, 1972). It declines in the late Barren Measures and is rare in most of the Raniganj Stage. However, MAHESHWARI (1967) has described a mioflora from Gopat River bed, Nidpur, Madhya Pradesh, which is also characterised by prominence of *Densipollenites* (16.5%) associated with rich *Scheuringpollenites* (21.75%), *Faunipollenites* (16%) and other striated pollen grains. This assemblage from Nidpur has been assigned to the Raniganj Stage, and it compares with the present assemblage of Jeer-Daser area in having the general dominance of the striated disaccates associated with *Densipollenites* in high percentages. However, the high percentage of non-striate disaccates in association with *Densipollenites* in the Gopat River mioflora is unlike that of Jeer-Daser. Moreover, the palynological sequence underlying or overlying the Gopat mioflora is not yet known, and hence, such stratigraphic comparison has its limitations. Another mioflora described from the Upper Raniganj Stage in the Nonia stream near Asansol (MAHESHWARI, 1974) also contains the general dominance of striated disaccate pollen grains associated with high quantity of *Densipollenites*. But the same mioflora also contains *Striomonosaccites*, *Alisporites* and *Labiisporites* which are absent in the Jeer-Daser mioflora described presently. So far, high incidences of the genus *Densipollenites* have not been reported from any other areas in the late Raniganj Stage.

CONCLUSIONS

The palynological analysis of the samples collected on the Jeer-Daser road contains a mioflora which possesses striated disaccates and *Densipollenites* as dominant elements and hence this mioflora does not resemble with the Barakar assemblage. Its affiliations with the Barren Measure mioflora on one hand and with the Raniganj assemblage on the other are indicated by the striate forms and the genus *Densipollenites*. However, since more established data of the Upper Raniganj mioflora is necessary for such comparisons, the exact placement of the present mioflora remains yet to be decided. More work on geology and subsequently on the successional palynology is needed in the Jeer-Daser area, yet on the basis of the present palynological as well as the so far known field evidences, the sediments studied along the road from Jeer to Daser can be placed in the Middle to Upper Damuda Series (Barren Measures—Raniganj) in the Lower Gondwanas. This conclusion indicates a possibility of the occurrence of older depositions below these sediments, which could in all probabilities prove to be the coal bearing horizons of the Barakar Stage.

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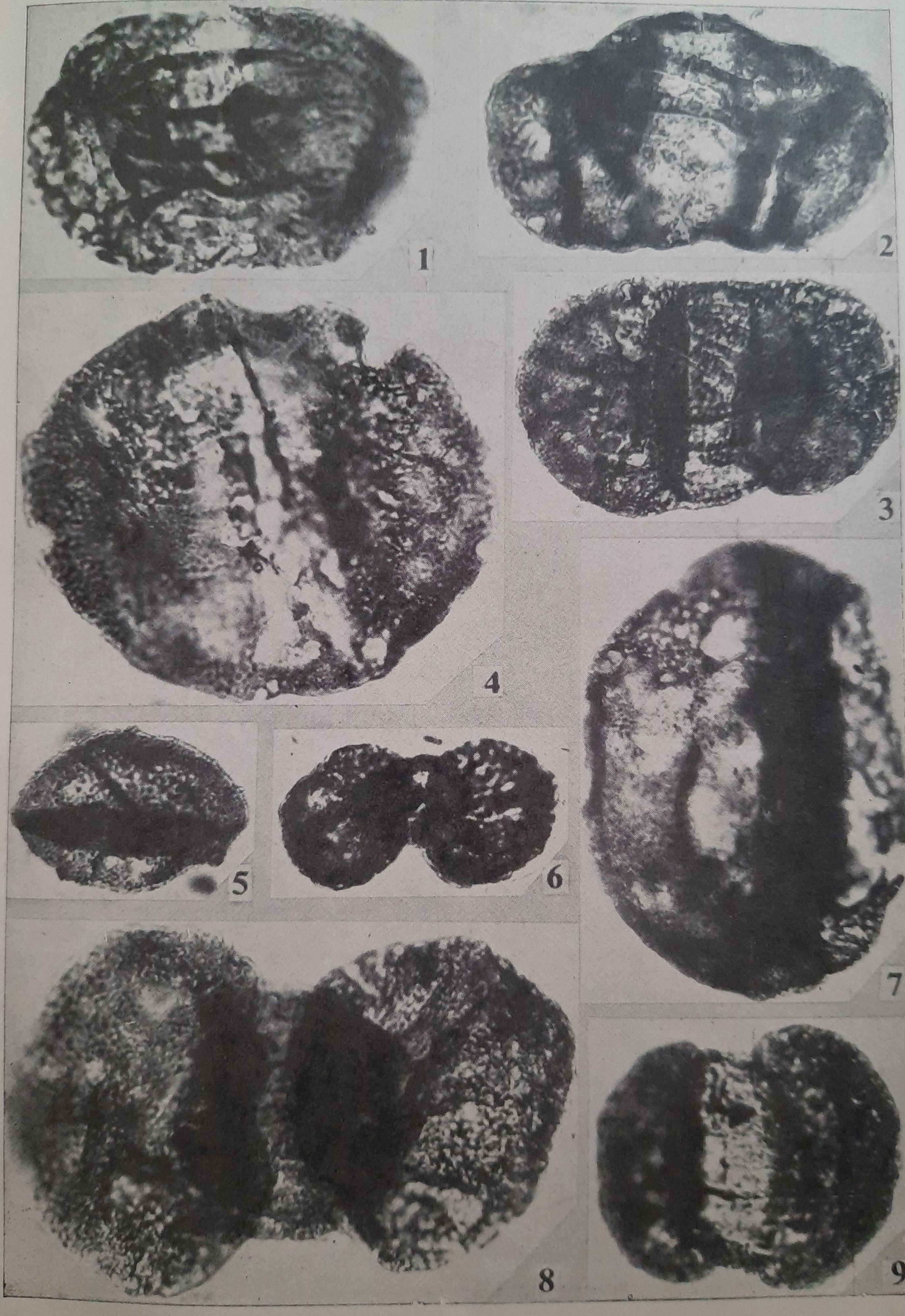
EXPLANATION OF PLATE 1

(All Figures are ×500)

1,4	*Faunipollenites*	Ph. No. 602/35, 602/11
2,9	*Striatopodocarpites*	Ph No. 602/24, 602/19
3	*Lunatisporites*	Ph. No. 602/15
5.	*Gondisporites*	Ph. No. 902/33
6.	*Platysaccus*	Ph. No. 602/32
7.	*Densipollenites*	Ph. No. 602/9
8.	*Lahirites*	Ph. No. 602/22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