

A. PRELIMINARY SPOROLOGICAL ANALYSIS OF SOME COALS FROM TALCHER COALFIELD, INDIA

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ABSTRACT

Sporological analysis of some coals from Nandira and South Belanda Mines of Talcher Coalfield, Orissa, India, has been done and miospores have been assigned to 33 genera. A generic quantitative analysis has revealed that *Parasaccites*, is a dominant genus while *Faunipollenites*, *Punctatisporites*, *Striatopodocarpites*, *Sulcatisporites* and *Apiculatisporis* are fairly well represented genera. This assemblage has been compared with those from some of the other beds of Lower Gondwana of India.

INTRODUCTION

DURING the last five years, almost all the stages of Lower Gondwana of India have been sporologically worked out (POTONIE & LELE, 1961; BHARADWAJ, 1962; BHARADWAJ & TIWARI, 1964; TIWARI, 1965; MAITHY, 1965; BHARADWAJ, SAH & TIWARI, 1965), and this has provided very informative data for the miofloristic comparisons. Some coals from Talcher Coalfield of India were taken up for the petro-palynological studies by one of us (GKBN) and in the present paper, the quantitative miospore analysis of the same coals has been done. This miospore assemblage has been compared with those from some other stages in Lower Gondwanas.

MATERIAL AND METHODS

The sporological analysis dealt with in this paper is based upon the coal samples from Nandira and South Belanda Mines of Talcher Coalfield (20°57': 85°14') in the Mahanadi coal basin of Orissa, India. In the former mine there are two seams out of which the bottom seam is workable being 10' in thickness and the same seam extends in the latter mine attaining a thickness of 15' (For details see NAVALE, 1965). The samples were collected from the exposed surface of the seam in the form of blocks and for sporological analysis 2-5 mm sized representative samples were prepared. For maceration 40 gm of coal was taken for each sample and was subjected to similar

treatment of acid and alkali. To determine the overall average frequency of the miospore genera, one thousand specimens have been counted. The slides with marked sectors have been selected at random for counting.

OBSERVATIONS

The mioflora in these coals consists of the following important genera:

Punctatisporites (Ibr.) Pot. & Kr.

Lophotriletes (Naum.) Pot. & Kr.

Apiculatisporis Pot. & Kr.

Cyclobaculisporites Bhard.

Parasaccites Bharad. & Tiwari

Potonieisporites (Bhard.) Bharad.

Plicatipollenites Lele

Striatopodocarpites (Soritch. & Sed.)

Bharad. (*sensu* Bharad. 1962)

Faunipollenites Bharad.

Vesicaspora (Schemel) Wils. & Venkat.

Sulcatisporites (Lesch.) Bharad.

Ginkgocycadophytus Samoilowitz

The following miospore genera are also present in the coals under study but they show a meagre representation and are thus quantitatively less important.

Leiotriletes (Naum.) Pot. & Kr.

Retusotriletes Naumova

Cyclogranisporites Pot. & Kr.

Verrucosisporites (Ibr.) Pot. & Kr.

Horriditriletes Bharad. & Salujha

Indotriletes Tiwari

Latosporites Pot. & Kr.

Densipollenites Bharad.

Virkkiipollenites Lele

Crucisaccites Lele & Maithy

Cuneatisporites Lesch.

Illinites (Kos.) Pot. & Kl.

Rhizomaspora Wilson

Lunatisporites (Lesch.) Bharad.

Welwitschiapites Bolchowit.

Quadriflorites (Henn.) Pot. & Lele

The following genera, although present, did not encounter in counting.

Microbaculispora Bharad.

Microfoveolatispora Bharad.

Striatites (Pant) Bharad.
Verticipollenites Bharad.
Vittatina Luber

Some of the important genera are figured in Plates 1 and 2.

A quantitative analysis shows that the genus *Parasaccites* dominates the whole miofloral population, being 31 per cent (Histogram I).

Other miospore genera characteristically prominent in their average frequencies are:

<i>Faunipollenites</i>	— 19.4 per cent
<i>Punctatisporites</i>	— 11.0 "
<i>Striatopodocarpites</i>	— 10.6 "
<i>Sulcatisporites</i>	— 9.6 "
<i>Apiculatisporis</i>	— 4.0 "

The remaining genera are rare or even in traces as indicated in the Histogram I.

MIOFLORISTIC COMPARISONS

Comparison of the present miospore assemblage with that of Talchir Stage

Surange & Lele (1956) have illustrated some miospores from Talchirs of Giridih Coalfield and similarly Datta (1957) has also worked out some Talchir Shales from Jhagra-Khand Area, M.P., but the work of Potonié & Lele (1961) on Talchir beds of South Rewa Gondwana Basin is quite informative and hence forms the basis of such comparison.

In the miospore assemblage in Talchir beds of South Rewa Gondwana Basin the following genera are well represented:

Parasaccites, *Leiotriletes*, *Cyclogranisporites*, *Verrucosisporites*, *Lophotriletes*, *Apiculatisporis*, *Horriditriletes*, *Plicatipollenites*, *Virkkipollenites*, *Potoniopsisporites*, *Cuneatisporites*, *Lunatisporites*, *Ginkgocycadophytus* and *Quadrisporites*.

The two assemblages under discussion are comparable with each other, in spite of the fact that they show their individuality.

Qualitatively as well, there is a great degree of similarity between the two assemblages, as indicated by the following genera which are common to both:

Leiotriletes, *Punctatisporites*, *Cyclogranisporites*, *Lophotriletes*, *Horriditriletes*, *Parasaccites*, *Potoniopsisporites*, *Plicatipollenites*, *Virkkipollenites*, *Rhizomaspora*, *Striatopodocarpites*, *Faunipollenites*, *Vesicaspora*, *Sul-*

catisporites, *Ginkgocycadophytus* and *Quadrisporites*.

However, the prominence of *Punctatisporites*, *Faunipollenites* and *Sulcatisporites* and rarity of *Plicatipollenites*, *Potoniopsisporites* and *Ginkgocycadophytus* in the present assemblage, distinguish it from that of South Rewa Basin.

The presence of *Indotriradites* although in traces, in the present assemblage and its absence from the Talchir beds of South Rewa is also interesting to note.

Comparison of the present miospore assemblage with that of Karharbari Stage

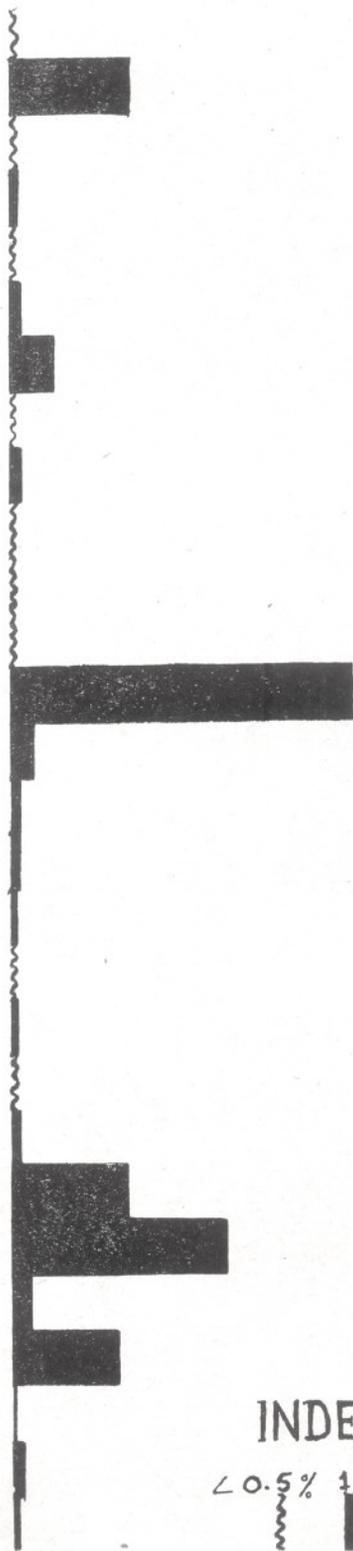
From the works of Sen (1953) and Virkki (1946) we know about the miospore assemblage in Karharbari Stage of India. The work by Maithy (1965) on the *Sporae Dispersae* of Karharbari beds in Giridih Coalfield is based upon the recent lines in sporology and hence taken here for comparison.

The miospore assemblage in the Karharbari beds of Giridih Coalfield resembles the present assemblage in the incidence of *Parasaccites*. But at the same time the prominence of the genera *Potoniopsisporites*, *Plicatipollenites* and *Crucisaccites* in the former (MAITHY, 1965) and their rarity in the latter, and the fairly well representation of the genus *Punctatisporites* in the latter and its rarity in the former reflect the distinctive nature of the two. However, the other important genera as: *Leiotriletes*, *Cyclogranisporites*, *Lophotriletes*, *Horriditriletes*, *Cyclobaculisporites*, *Virkkipollenites*, *Cuneatisporites*, *Rhizomaspora*, *Striatopodocarpites*, *Faunipollenites*, *Sulcatisporites* and *Ginkgocycadophytus* show a more or less similar behaviour which may be even variable but only within a range. This indicates the trends of similarity in these two assemblages. Moreover, we see that almost all the important genera found in the coals from Talcher Coalfield under study have been reported from the above mentioned Karharbari beds.

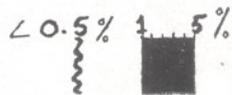
The genera *Quadrisporites* and *Indotriradites* are, however, so far not known from the latter but at the same time they are sporadic in the former and hence are of little importance in the present comparison.

Thus, we see that in the prominence of the genus *Punctatisporites*, in the rarity of

LEIOTRILETES
 PUNCTATISPORITES
 RETUSOTRILETES
 CYCLOGRANISPORITES
 VERRUCOSISPORITES
 LOPHOTRILETES
 APICULATISPORIS
 HORRIDITRILETES
 CYCLOBACULISPORITES
 INDOTRIRADITES
 LATOSPORITES
 DENSIPOLLENITES
 PARASACCITES
 POTONIEISPORITES
 PLICATIPOLLENITES
 VIRKKIPOLLENITES
 CRUCISACCITES
 CUNEATISPORITES
 ILLINITES
 RHIZOMASPORA
 LUNATISPORITES
 STRIATOPODOCARPITES
 FAUNIPOLLENITES
 VESICASPORA
 SULCATISPORITES
 WELWITSCHIAPIITES
 GINKGOCYCADOPHYTUS
 QUADRISPORITES



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the genera *Plicatipollenites*, *Potonieisporites* and *Crucisaccites* and in the presence (very meager) of *Indotriradites* and *Quadrisporites*, the mioflora in the coals of Talcher Coalfield differs from that of the Karharbari stage, but at the same time, the similarities in the incidences of a large number of genera and the over all qualitatively comparable pictures, are very much suggestive of a close palynological relationship.

Comparison of the Present Miospore assemblage with those of Korba and West Bokaro Coalfields (Barakar Stage)

The detailed account of dispersed miospores in Korba Coalfield has been dealt with by Bharadwaj & Tiwari (1964) and Tiwari (1965).

Qualitatively, the following important genera are absent from the present assemblage while they are present in the coals of Korba Coalfield:

Acanthotriletes, *Dentatispora*, *Lueckisporites*, *Fimbriaesporites*, *Korbapollenites*, *Primuspollenites*, *Diretculoidispora*, *Stroter-sporites*, *Decussatisporites*, and *Maculata-sporites*

Genera like *Quadrisporites* and *Crucisaccites* are absent from Korba-assemblages but they are sparsely present in the coals under study.

Sporologically, the Korba Coalfield has been divided into two horizons (TIWARI, 1965-KA, KB). The miospore assemblage in the lower horizon (KA) is characteristic in having *Dentatispora* and *Indotriradites* as the prominent genera, thus differs from the present assemblage, but at the same time in the fair presence of the genera *Punctatisporites* and *Parasaccites* they resemble each other to some extent. The mioflora in the upper horizon (KB) of Korba is still different from the present association, by virtue of the prominence of *Faunipollenites*

and *Sulcatisporites* apart from other differences.

Thus, in spite of the fact that the miospore assemblage under study shows some resemblance with that of lower horizon of Korba Coalfield, the incoming of many new forms in abundance, particularly horizontal and reticuloid striations bearing disaccate pollen, and zonate as well as sculptured trilete spores as listed above, reflects a diversified course and points out the quantitative as well as qualitative differences.

Sporologically West Bokaro Coalfield is all the more different from the coals under study. The introduction of *Barakarites*, and *Indospora*, the prominence of striatiti and *Sulcatisporites*, and the rarity of *Parasaccites* in West Bokaro coals, differentiate the two assemblages strongly.

CONCLUSIONS

The preceding brief account shows that the coals of Talcher Coalfield contain a diversified mioflora. The comparisons of this assemblage with those in some of the other beds reveal interesting similarities as well as differences, but still the Talcher flora has its own characteristic association of miospore genera consisting of *Parasaccites* — the most dominant form, *Faunipollenites*, *Striatopodocarpites*, *Punctatisporites*, *Sulcatisporites*, *Vesicaspora*, and *Apiculatisporis* — as the subdominant genera, and *Lophotriletes*, *Cyclobaculisporites*, *Potonieisporites*, *Plicatipollenites*, *Ginkgocycadophytus*, *Quadrisporites* and *Indotriradites* as rare genera. The assemblage on the whole is intermediate between the miofloras of Krahbari Stage and that of lower horizon (KA, see TIWARI, 1965) in Korba Coalfield.

ACKNOWLEDGEMENTS

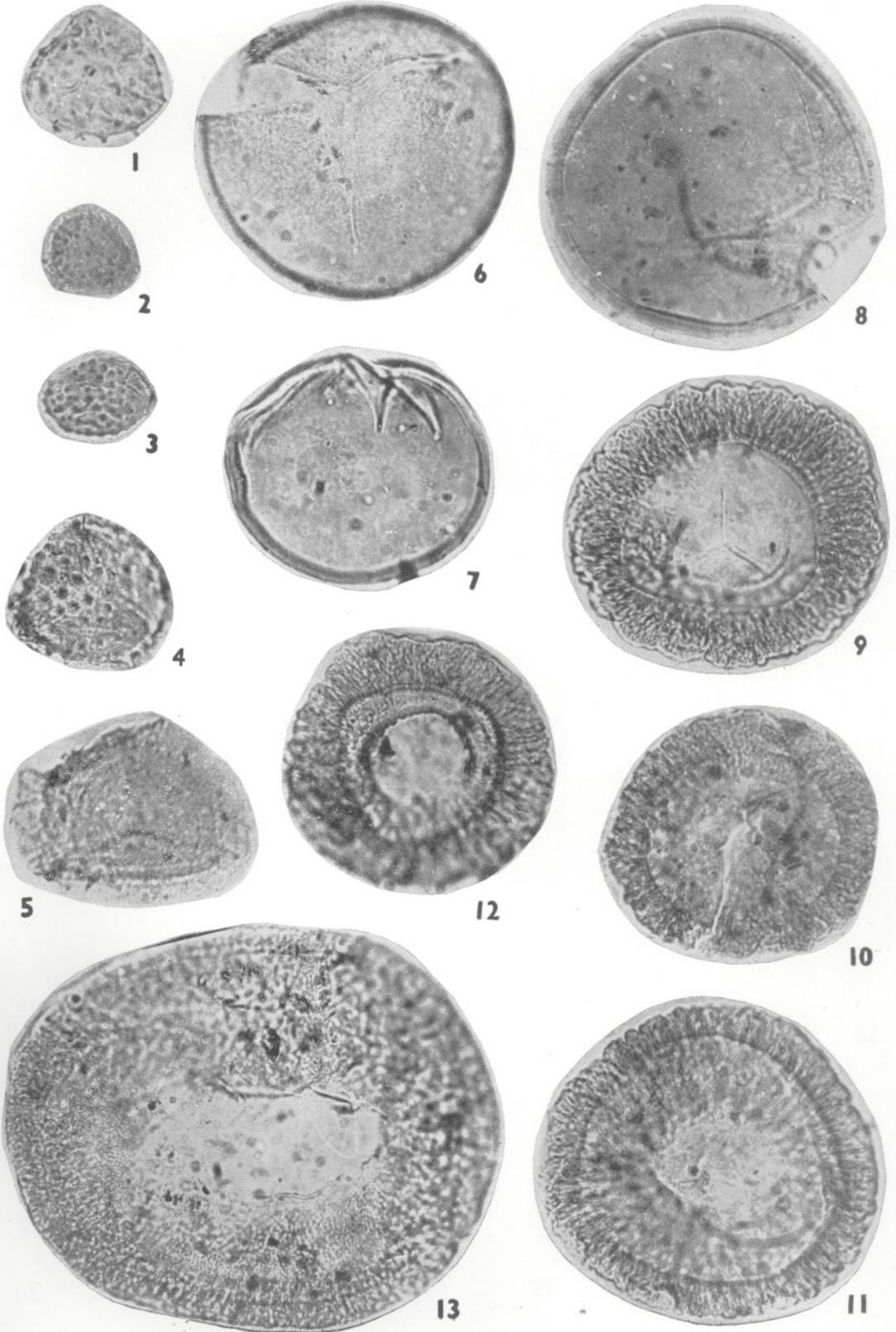
We are thankful to Dr. D. C. Bharadwaj for very useful suggestions and discussion.

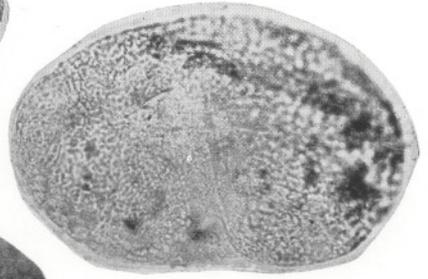
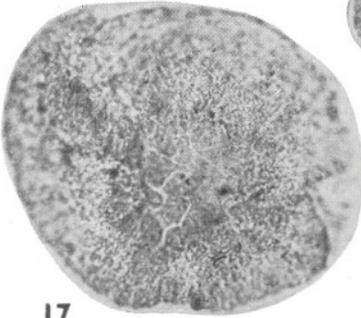
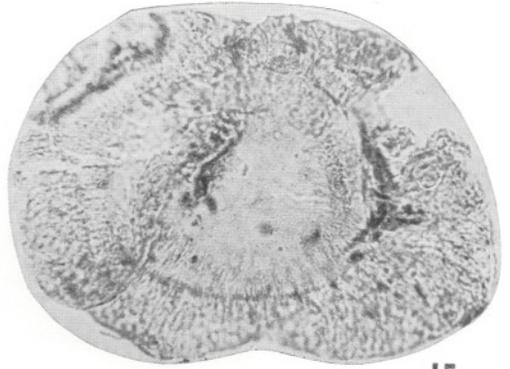
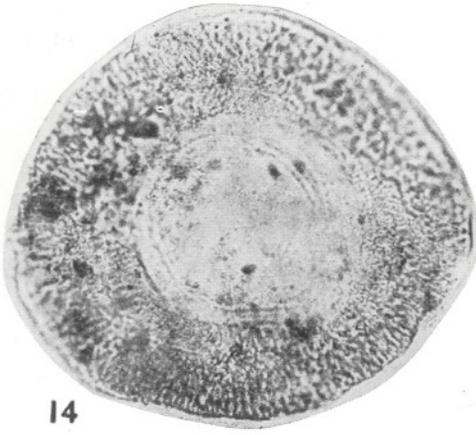
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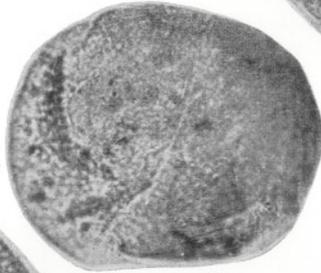
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EXPLANATION OF PLATES

(All figures are 500 ×)

PLATE 1

1. *Lophotrilites*. Ph. No. 254/3.
- 2-3. *Apiculatisporis*. Ph. No. 253/26, 253/28.
4. cf. *Horriditrilites*. Ph. No. 252/27.
5. *Indotriradites*. Ph. No. 386/12.
- 6-8. *Punctatisporites*. Ph. Nos. 251/21, 250/1, 255/9.
- 9-11. *Parasaccites*. Ph. Nos. 253/29, 254/6, 253/13.
12. *Virkkipollenites*. Ph. No. 254/21.
13. Cf. *Crucisaccites*. Ph. No. 251/7.

PLATE 2

14. *Plicatipollenites*. Ph. No. 251/29.
- 15, 16. *Potoniisporites*. Ph. Nos. 251/24, 253/14.
17. *Rhizomaspora*. Ph. No. 257/26.
18. *Lunatisporites*. Ph. No. 253/16.
19. *Striatopodocarpites*. Ph. No. 251/17.
20. *Faunipollenites*. Ph. No. 252/28.
21. *Sulcatisporites*. Ph. No. 250/17.
22. *Vesicaspora*. Ph. No. 252/20.
- 23-25. *Quadrifidites*. Ph. Nos. 386/21, 386/16.