

A PRELIMINARY SPOROLOGICAL ANALYSIS OF SOME CARBONACEOUS SHALE SAMPLES FROM KAMPTEE COALFIELD, NAGPUR DISTRICT, M.S., INDIA*

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ABSTRACT

The present paper is a part of the paleopalynological investigation of coal bearing beds of Lower Gondwana age occurring in the north-eastern region of Maharashtra State. The paper deals with the sporological analysis of two bore-core carbonaceous shale samples geologically belonging to the Barakar Series of the Damuda System of Lower Gondwana group, collected from Dahegaon camp area in Kamptee Coalfield in Nagpur District. Both core samples have predominance of trilete spore genera such as *Brevitriletes* Bharadwaj & Srivastava and *Lophotriletes* (Naum.) Pot. & Kr. Next in abundance are the bisaccate grains such as *Striatites* (Pant) Bharadwaj and *Sulcatispovites* Bharadwaj.

INTRODUCTION

DURING the last decade paleopalynological studies have been done on various Lower Gondwana strata by several workers (Bharadwaj, 1960, 1968; Bharadwaj & Srivastava, 1969; Lele, 1963; Lele & Maithy, 1963; Navale & Tiwari, 1966; Tiwari, 1967; Kar, 1967). They have analysed coal samples palynologically from the Talchirs, Raniganj, Karharbari and other horizons from various collieries situated mostly in the north-eastern region and M.P. region of India.

A review of literature has indicated that very little work has been done on the palynological studies of coal bearing rocks of Lower Gondwana occurring in Maharashtra State. Hence a research project was undertaken by us to investigate paleobotanically the Lower Gondwana Strata occurring in Maharashtra State. There are four major coalfield areas in Maharashtra State as listed below.

- i. Kamptee Coalfield in Nagpur District.
- ii. Umrer Coalfield in Nagpur District.
- iii. Bokhar Coalfield in Nagpur District.

iv. Wardha Valley Coalfield in Wardha and Chandrapur District.

Presently, 10 coal mines are working in this area and the coal deposits are of second grade as compared to the Jharia grade and are of non-coking variety.

We have made extensive collections of shales containing megafossils and other shale and coal samples for microfossil studies from various coalfields mentioned above and started the palynological analysis of some of the samples (Agashe & Chitnis, 1969, 1971). Recently, N.C.D.C. Ltd. has started drilling operations for prospecting of coal in the Kamptee Coalfield in a place called Dahegaon which is about 9 Km. from Nagpur. The present paper is a preliminary report on the microfossils preserved in two carbonaceous shale-core samples collected from Dahegaon drilling camp area through the kind courtesy of N.C.D.C. Ltd. The results obtained so far are encouraging and it is intended to intensify the palynological studies of these coal bearing beds which will ultimately help in the demarcation of the suspected Karharbaris from the overlying Barakars and other problems of stratigraphic correlation.

MATERIAL AND METHODS

The material used in the present investigation consisted of two fine-grained grey-coloured carbonaceous bore-core samples which have been numbered as S4 and S5. These samples were collected from the freshly drilled bore-cores in N.C.D.C.'s, Dahegaon drilling camp area in Kamptee Coalfield which is about 9 Km. from Nagpur. Sample S4 was taken from an area about a kilometre from where S5 was taken. Sample S5 was taken from a depth

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of 215 meters, whereas sample S4 was taken from a depth of 169 metres.

The maceration of the samples was carried out as per the method described by Bharadwaj (1960). About 50 gm. of material was first subjected to treatment with dilute hydrofluoric acid for few days in order to get rid of siliceous matter. After the hydrofluoric acid treatment the material was washed thoroughly with water and later treated with commercial nitric acid (40%) for 3-4 days. The macerate after washing with water was subjected to treatment with 5% KOH for few minutes. Part of this material was sieved through test sieves No. 150 and No. 300 respectively. The residue on the sieve No. 300 was washed thoroughly in water. In order to separate the lighter organic matter containing spores and pollen grains from heavier matter such as sandy particles, cuticles, etc., a small portion of the residue was taken into a watch glass containing water. The watch glass was shaken gently and the lighter floating organic matter containing spores was drawn off by a pipette. After centrifuging the concentrated spore residue was mounted on slides in glycerine jelly. This material was used for qualitative study. For quantitative study the unsieved material was used. About 1000 counts per sample were taken for quantitative studies. For classification and identification of the spores and pollen grains mainly the work of Potonié (1956, 1958), Potonié & Kremp (1954) and Bharadwaj (1960) was referred.

OBSERVATIONS

Investigations carried on so far indicated that both core samples are rich in various types of well preserved spores and pollen grains. The microfossils recovered from both core samples S4 and S5 appeared to be similar in floristic contents. However, the percentage of individual spores in total population differs markedly in both core samples. The various polospore types recovered and identified so far from these core samples are listed below.

- Punctatisporites* (Ibr.) Pot. & Kr.
- Leiotriletes* (Naum.) Pot. & Kr.
- Callumispora* Bharadwaj & Srivastava
- Lophotriletes* (Naum.) Pot. & Kr.
- Acanthotriletes* (Naum.) Pot. & Kr.
- Brevitriletes* Bharadwaj & Srivastava

- Microbaculispora* Bharadwaj
 - Microfoveolatispora* Bharadwaj
 - Gondisporites* Bharadwaj
 - Latosporites* Pot. & Kr.
 - Lacvigatosporites* (Ibr.) Schopf, Wilson & Bentall
 - Pseudoreticulatispora* Bharadwaj & Srivastava
 - Virkkipollenites* Lele
 - Plicatipollenites* Lele
 - Nuskisporites* Pot. & Kr.
 - Crucisaccites* Lele & Maithy
 - Densipollenites* Bharadwaj
 - Cahenisaccites* Bose & Kar
 - Illinites* (Kos.) Pct. & Kr.
 - Striatites* (Pant) Bharadwaj
 - Verticypollenites* Bharadwaj
 - Faunipollenites* Bharadwaj
 - Lunatisporites* (Lesch) Bharadwaj
 - Sulcatisporites* (Lesch) Bharadwaj
 - Gnetacepollenites* Thiergart
 - Tiwariaspora* Maheshwari & Kar
 - Welwitschiapites* Bolchowit
 - Ginkgocycadophytus* Samoilowitz
- Some of the most significant spore genera are illustrated in Plate 1.

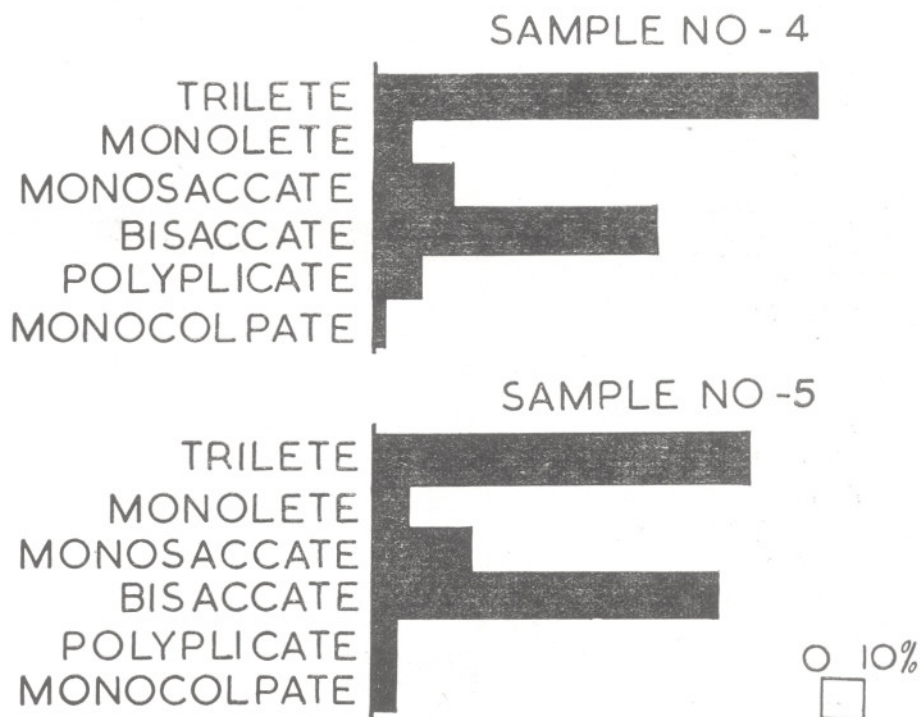
DISCUSSION

The palaeopalynological investigation of the bore-core carbonaceous shale samples has indicated the presence of rich assemblage of microfossils particularly the spores and pollen grains of various kinds. Microflora recovered from these samples is composed of at least 29 different genera of spores and pollen. Both of these samples, i.e. S4 and S5, were studied qualitatively and quantitatively.

The results obtained regarding the representation of different groups of polospores in both samples are shown in Histogram No. 1. It shows that the trilete group of spores is dominant in both samples. Striated bisaccate pollen grains form the subdominant group. Monosaccate, monolete, polylicate and colpate grains are less common. Sample S4 is characterized by 50% triletes and 31% bisaccates in the total population. Whereas sample S5 has 42% triletes and 38% bisaccates in the total population.

The detailed analysis of sample S4 (Histogram No. 2) has shown that among the trilete spores, the genus *Brevitriletes* representing 31.1% of the total population is most dominant. *Lophotriletes* and *Acan-*

HISTOGRAMS ILLUSTRATING A BUNDANCE OF DIFFERENT SPORES & POLLEN GROUPS



HISTOGRAM 1

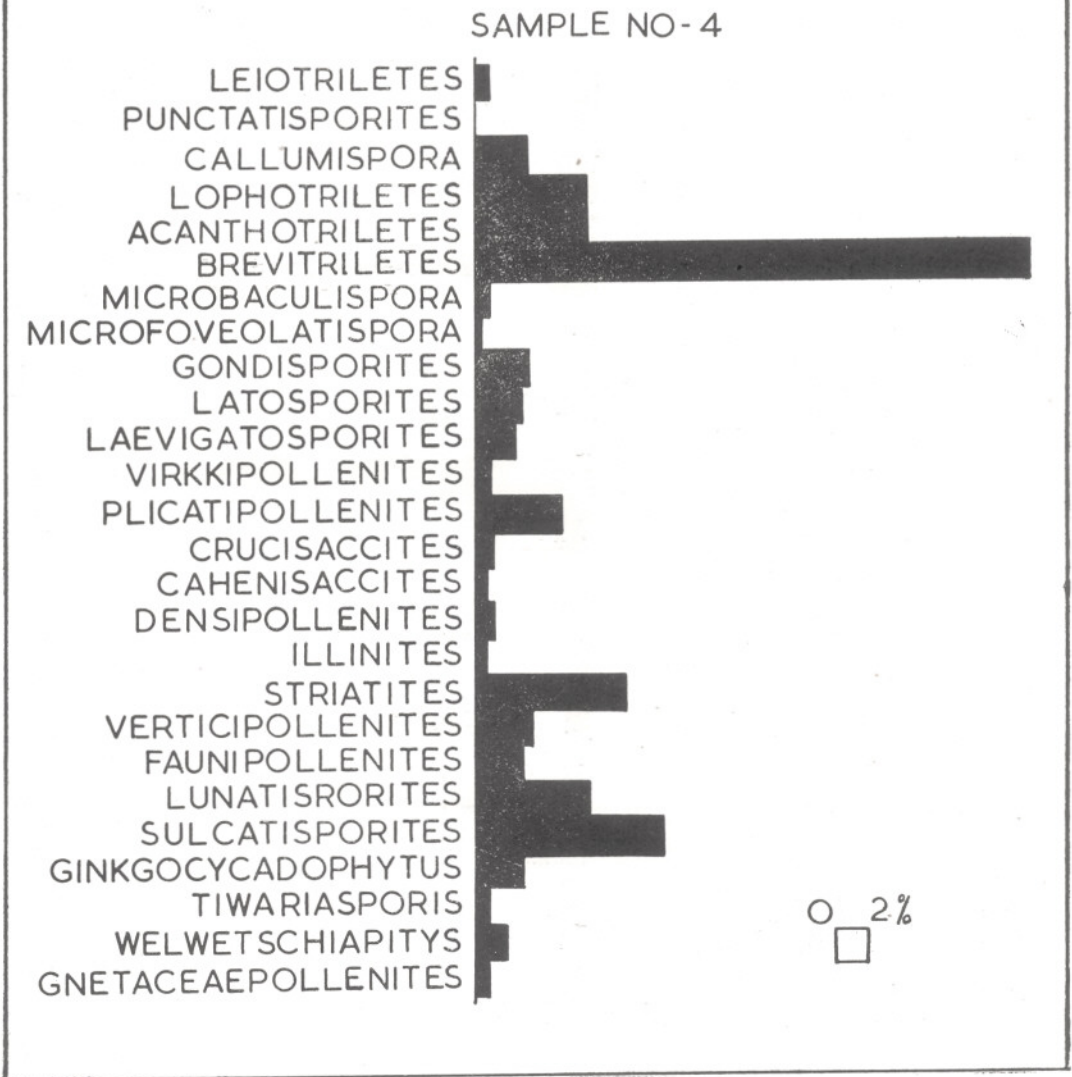
thotriletes together represent 6.2% of the total population. Among the bisaccate grains *Sulcatisporites* and *Striatites* are dominant and represent 10% and 8% of the total assemblage respectively. Monosaccates which form 8.7% of the assemblage are represented by *Virkkipollenites*, *Plicatipollenites*, *Nuskoisporites*. Polylicates which form nearly 5% of total assemblage are represented by genera like *Tiwariaspora*, *Gnetacaepollenites*, etc. Monocolpates form less than 1% of total assemblage.

As shown in Histogram No. 3, sample S5 is characterized by the predominance of trilete genus *Brevitriletes* representing 21.9% of the total assemblage. The

subdominant group of bisaccates representing 38% of the total assemblage consists of *Striatites* (15%), *Faunipollenites* (7.6%), *Lunatisporites* (7%), etc. Monosaccate grains contributing 10% to the total assemblage are represented by *Plicatipollenites* (4.5%), *Virkkipollenites*, *Crucisaccites*, etc. Polylicates and monocolpates are rather insignificant contributors to the total assemblage in sample S5.

Thus the palynological investigation of the bore-core samples S4 and S5 has shown the presence of identical spore and pollen genera with slight differences in their percentages in the total assemblage. In both the samples the series *Apiculati* is dominant.

HISTOGRAM ILLUSTRATING RELATIVE ABUNDANCE OF FOSSIL SPORES & POLLEN GENERA

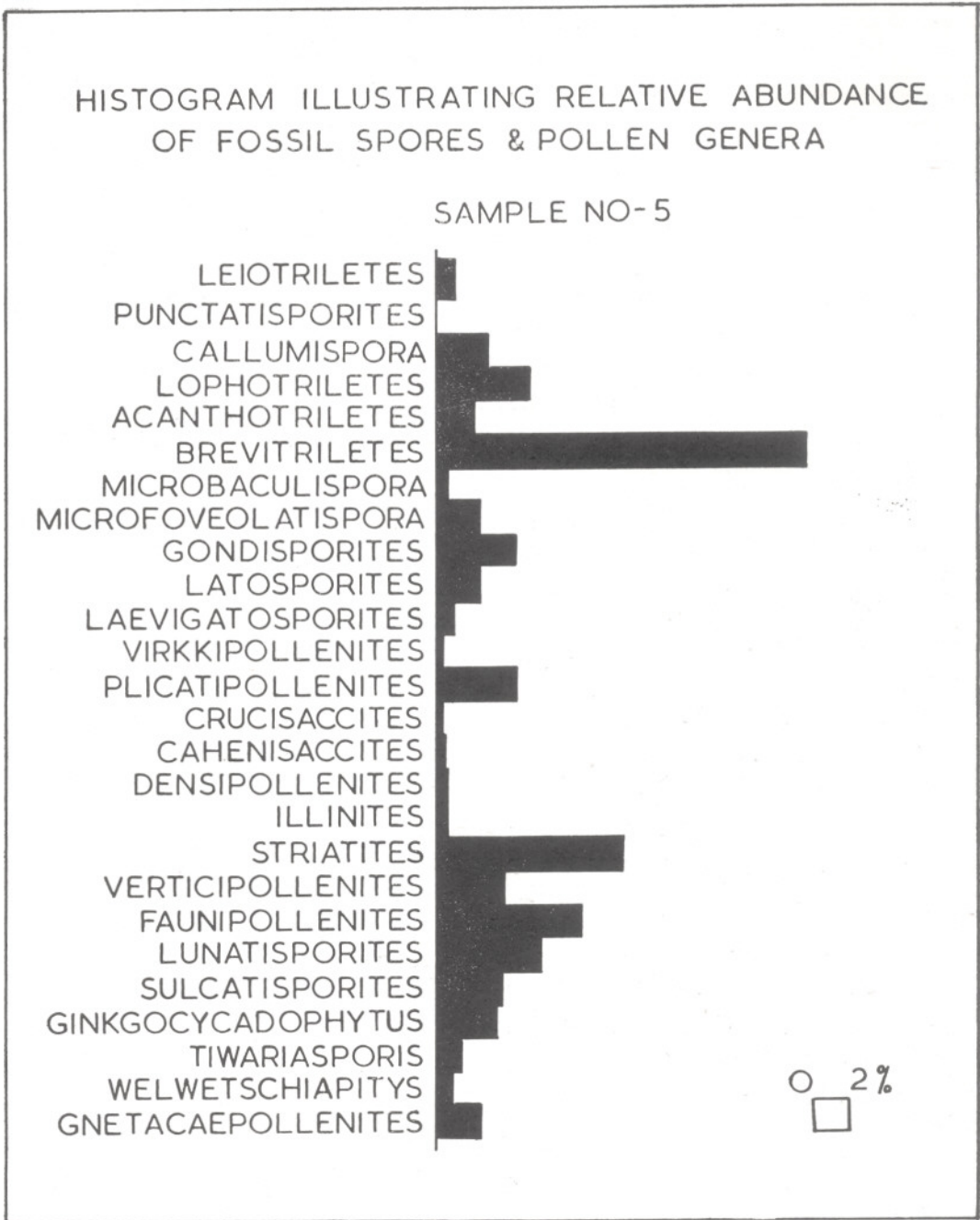


HISTOGRAM 2

However, the subdominant group of bisaccates is represented more commonly by series *Striatiti* and *Disaccitrileti* in sample S4 whereas it is represented mostly by series *Striatiti* in sample S5. The monosaccates, monocolpates and polyplicates are nearly same in both the samples.

CONCLUSIONS

The foregoing account of the paleopalynological investigation of two bore-core carbonaceous shale samples taken from Dahegaon drilling camp area shows the identical mioflora though the samples are



HISTOGRAM 3

from two different borings taken from areas separated by a kilometre. The mioflora is closely comparable, with the mioflora of certain coal seams (Agashe & Chitnis, 1971) from nearby Chandrapur District. This

study has indicated that the paleopalynology of shale samples and coal samples will be of great help in stratigraphic correlation. It is contemplated therefore, to make additional collection of bore-core samples

of coal as well as shale from various drilling areas in the Nagpur District and analyse them palynologically so that the data obtained from this work could be used for the purpose of the correlation of coal seams.

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EXPLANATION OF PLATE

Figs. 1-10 are magnified $\times 500$
Figs. 11-15 are magnified $\times 600$

1. *Lophotriletes* (Naum.) Pot. & Kr. Slide No. S4/Sl. 16.
2. *Lophotriletes* (Naum.) Pot. & Kr. Slide No. S4/Sl. 17.
3. *Acanthotriletes* (Naum.) Pot. & Kar. Slide No. S5/Sl. 18.
4. *Brevitriletes* Bharadwaj & Srivastava Slide No. S4/Sl. 18.
5. *Ginkgocycadophytus* Samoilovich Slide No. S4/Sl. 16.
6. *Laevigatosporites* (Ibr.) Schopf, Wilson & Bentall Slide No. S5/Sl. 5.
7. *Microbaculispora* Bharadwaj Slide No. S4/Sl. 16.
8. *Tiwariaspora* Maheshwari & Kar Slide No. S4/Sl. 18.
9. *Gnetaceaeapollenites* Thiergart Slide No. S4/Sl. 10.
10. *Illinites* (Kosanke) Potonié & Klaus in Pot. & Kar. Slide No. S5/Sl. 5.
11. *Striatites* (Pant) Bharadwaj Slide No. S5/Sl. 11.
12. *Virkkipollenites* Lele Slide No. S4/Sl. 17.
13. *Caheniasaccites* Bose & Kar Slide No. S4/Sl. 13.
14. *Nuskoisporites* Pot. & Kr. Slide No. S4/Sl. 4.
15. *Crucisaccites* Lele & Maithy Slide No. S4/Sl. 4.

