

PALEOPALYNOLOGICAL STUDIES OF LOWER GONDWANA STRATA WITH PARTICULAR REFERENCE TO CERTAIN COAL SEAMS FROM KAMPTEE COALFIELD, NAGPUR DISTRICT, MAHARASHTRA STATE*

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ABSTRACT

The paper incorporates the sporological analysis carried on so far of seven coal samples taken from major coal seams occurring in bore hole obtained from Kamptee coalfield, Nagpur District, Maharashtra State. They were analysed paleo-palynologically and found to be rich in varied microflora. Some of the most common miospore genera occurring in these coal seams are *Callumispora* Bharadwaj & Srivastava, *Parasaccites* Bharadwaj & Tiwari, *Scheuringipollenites* Tiwari. The miospore assemblages represented in these coal samples possibly indicate their geological age to be Karharbari.

INTRODUCTION

The North-Eastern region of Maharashtra State occupied by Nagpur District, Chandrapur District and Wardha District is lately drawing the attention of geologists, palaeobotanists and coal mining agencies. On account of discovery of fairly rich coal deposits, productive coal seams are presently being mined at Umrer coalfield and Kamptee coalfield in Nagpur District. Coal prospecting work is being carried on by the Central Mining Planning and Design Institute (CMPDI). Kamptee coalfield has shown promising results indicating occurrence of rich coal deposits in that area. The present paper deals with the paleopalynological analysis of coal samples collected from the bore core drilled by CMPDI at Kanhan, 2 Kms South-East of Kamptee coalfield and 22 Kms North West of Nagpur (Maps 1 & 2).

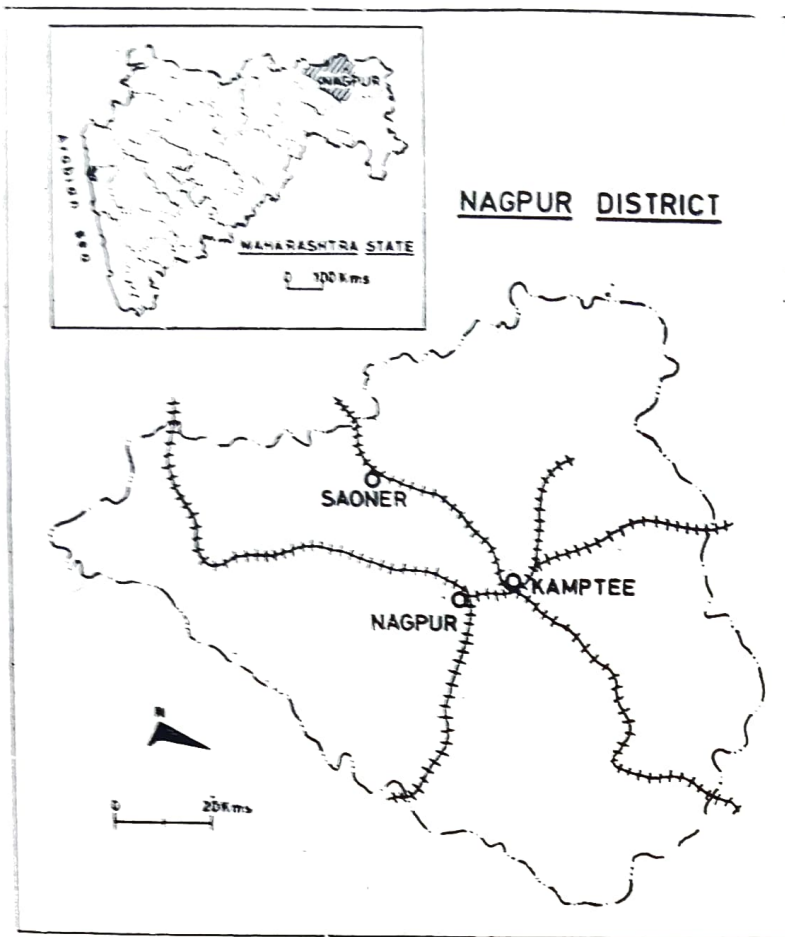
The occurrence of rich and varied microfossils from Kamptee coalfield was reported earlier by AGASHE AND CHITNIS (1974). These microfossils were recovered by them from carbonaceous shale samples associated with coal seams in the bore cores. We have collected coal core samples from several bore holes drilled by CMPDI in Kamptee coalfield. It is intended to undertake thorough paleo-palynological investigation of these coal seams from different bore cores and compare their microflora with the microflora recovered and described in the present account.

MATERIAL AND METHODS

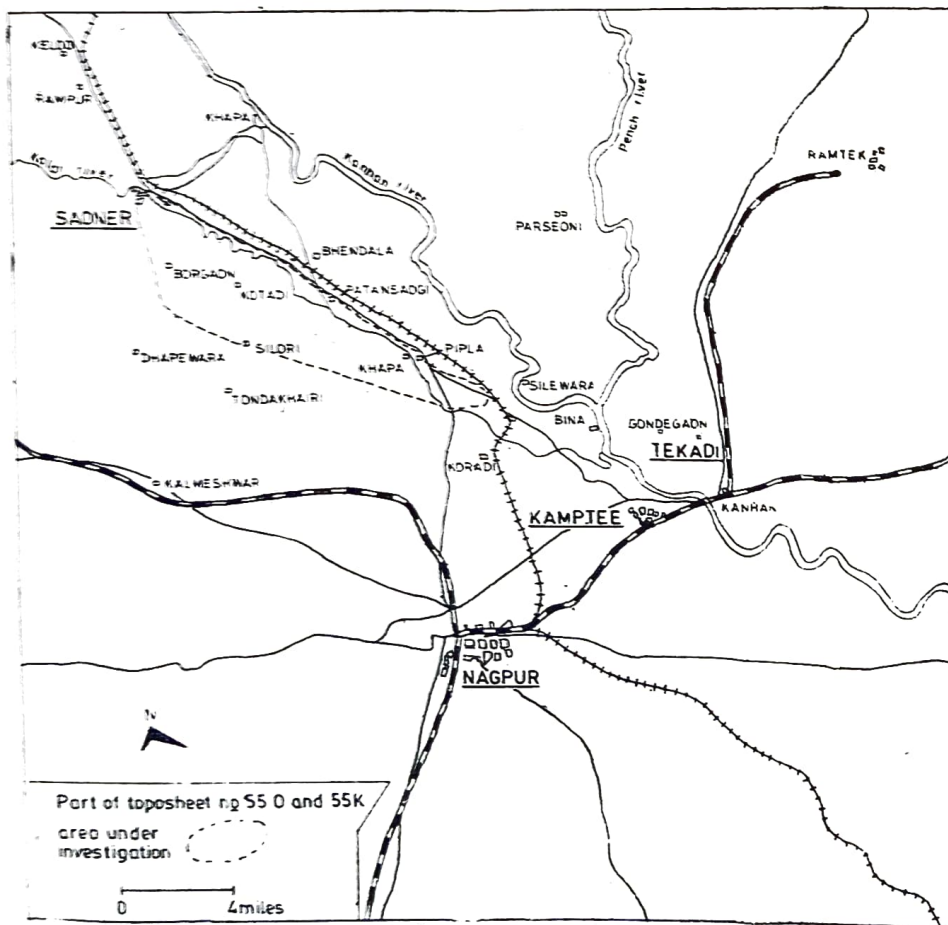
The material analysed in the present study comprises coal samples taken from major coal seams reported in bore core No. CMKMK-7 drilled by the CMPDI at Kanhan.

The bore hole No. CMKMK-7 was drilled upto a depth of 202.80 metres. The bore core taken from this bore hole comprises several coal seams and coal bands. However, for the sake of convenience only the coal seams or coal bands of more than 0.5 metres thickness were taken into consideration for detailed paleo-palynological analysis. Thus, there were 7 major coal seams labelled as KC 1 to KC7 from bottom to top (Fig. 1). The coal samples from the above mentioned coal seams were macerated by adopting

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Map 1



Map 2 The areas under investigation
of
KAMPTEE coal field in Nagpur District

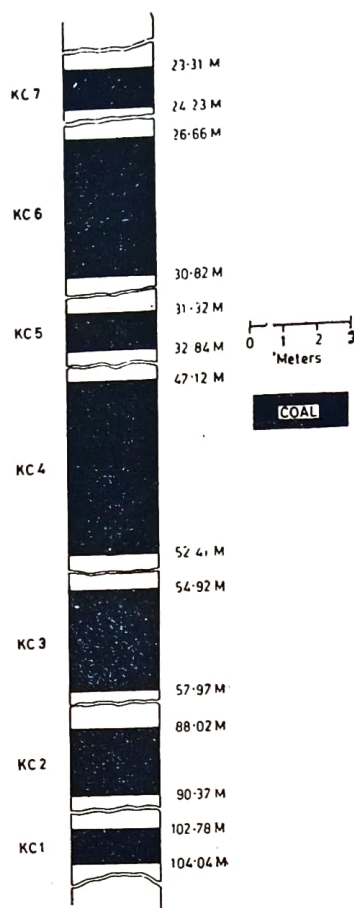


Fig. 1 MAJOR COAL SEAMS
of
BORE HOLE CMKMK-7

standard maceration technique described by BHARADWAJ (1962). However, most of the samples yielded rich assemblage of microfossils after treating them with 50% Nitric acid and further treatment by 10% Potassium hydroxide for about 5-8 minutes. Several slides were prepared from macerated sediments by using glycerine jelly as the mounting medium.

OBSERVATION

The first part of observation consisted of qualitative analysis of coal samples in which about 40 slides prepared from each sample were thoroughly screened. For the classification and identification of miospores the works of POTONIÉ (1956, 58), POTONIÉ AND KREMP (1954), BHARADWAJ (1962), TIWARI (1965), JANSONIUS AND HILLS (1976), and KAR AND BOSE (1976) were referred.

The qualitative analysis carried on so far indicated the occurrence of spores and pollen assigned to the major categories of classification such as Triletes, Monoletes, Monosaccates, Bisaccates, Polyplacates and Tetradites. The percentage representation of different miospore groups in different seams of bore core CMKMK-7 is indicated in Table 1 and the same is represented in Histogram-1 which gives a clear picture of percentage representation of different groups of miospores.

The identification of miospores recovered from coal samples was done only up to the generic level. In all about 37 genera of miospores have been recovered as listed below. Some of the most common and well preserved miospores are illustrated in Plate 1.

Leiotriletes Naumova emend. Potonié & Kremp, 1954

Callumispora Bharadwaj & Srivastava, 1969

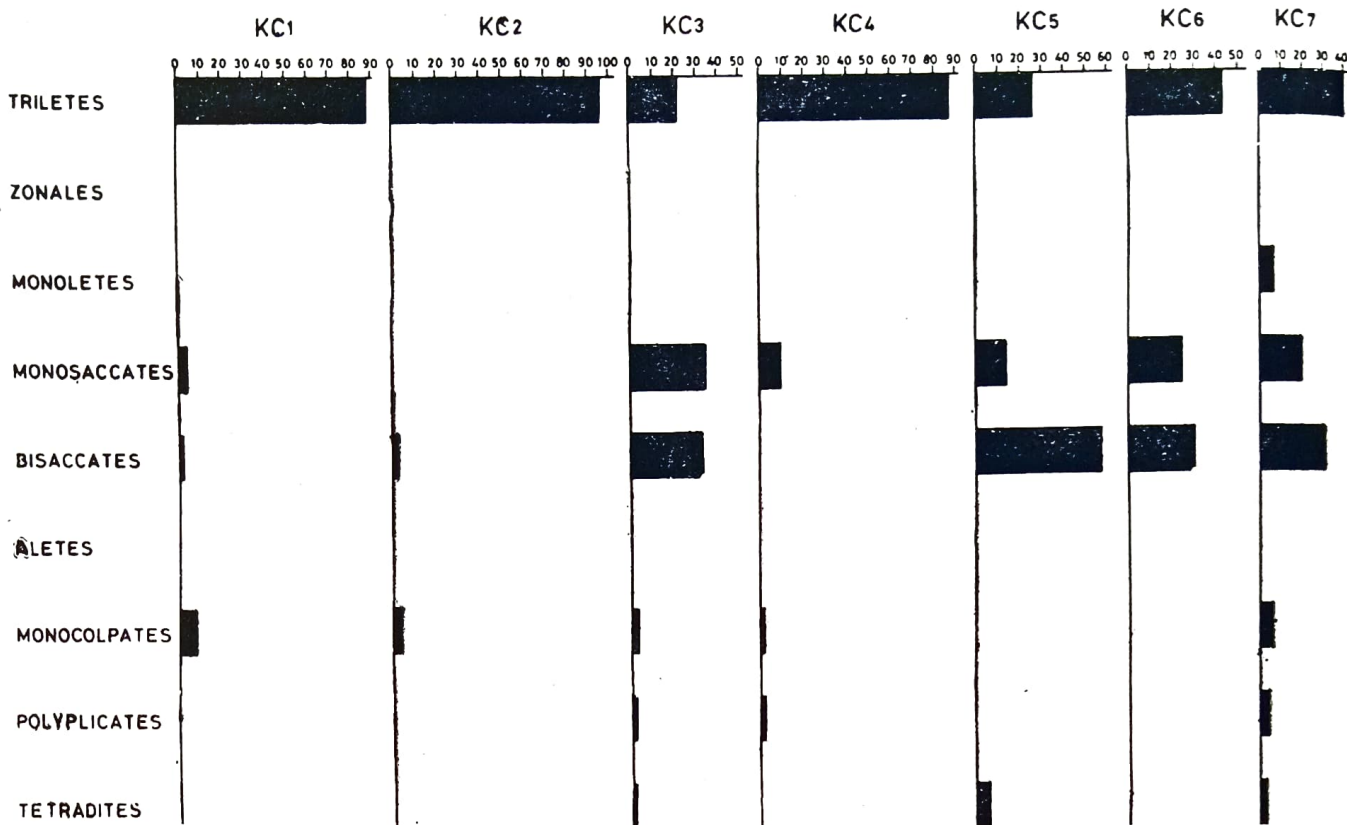
Retusotriletes Naumova, 1963

Calamospora Schopf, Wilson & Bentall, 1944

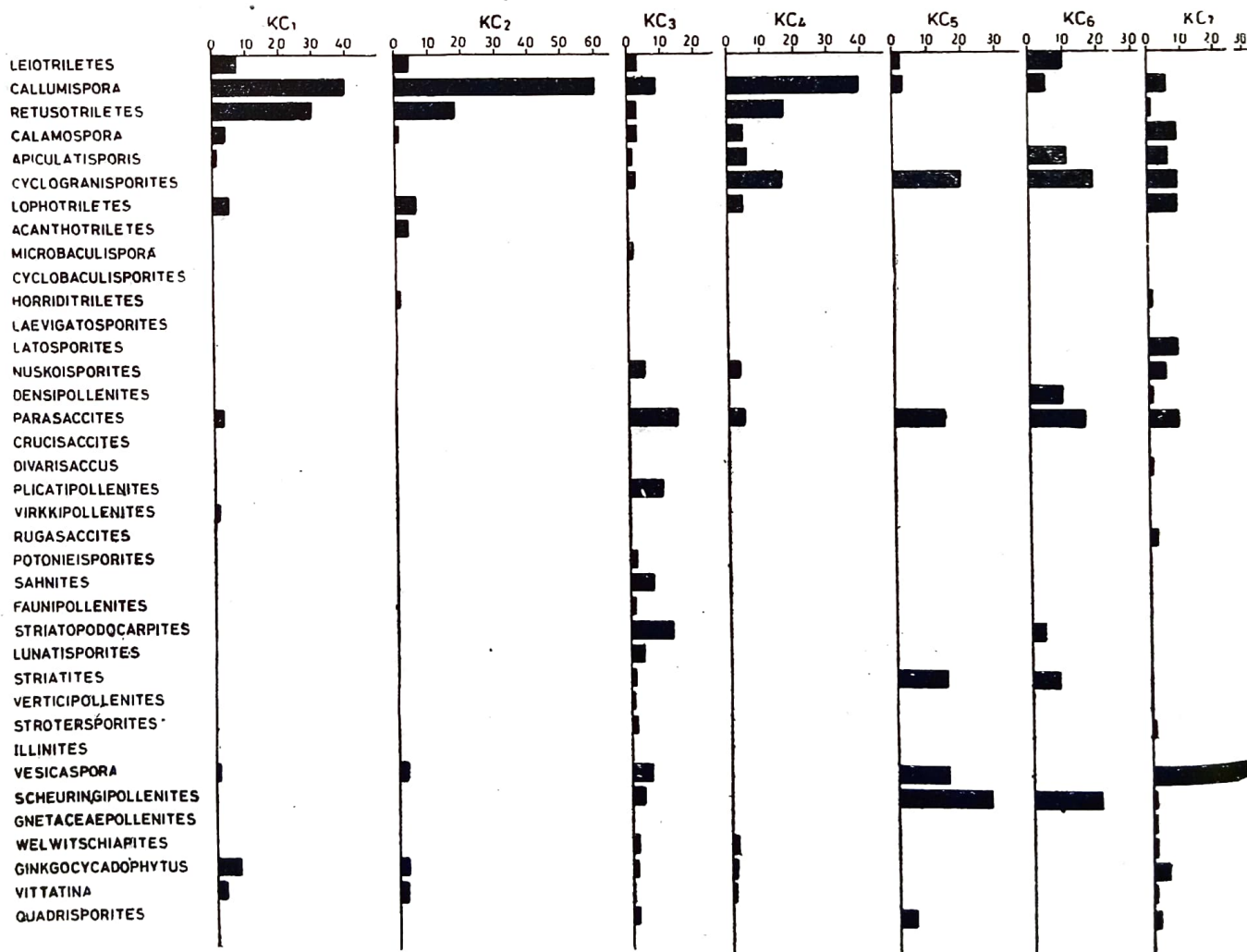
Apiculatisporis Potonié & Kremp, 1956
Cyclogranisporites Potonié & Kremp, 1954
Lophotriletes Naumova, 1937 emend. Potonie & Kremp, 1954
Acanthotriletes Naumova, 1939 ex 1949
Microbaculispora Bharadwaj, 1962
Cyclobaculisporites Bharadwaj, 1955
Horriditriletes Bharadwaj & Salujha, 1964
Laevigatosporites Ibrahim, 1933
Latosporites Potonié & Kremp, 1954
Nuskoidsporites Potonié & Klaus, 1954
Densipollentias Bharadwaj, 1962
Parasaccites Bharadwaj & Tiwari, 1964
Crucisaccites Lele & Maithy, 1964
Divarisaccus Venkatachala & Kar, 1966
Plicatipollenites Lele, 1964
Virkkipollenites Lele, 1964
Rugasaccites Lele & Maithy, 1969
Potonieisporites Bharadwaj, 1954
Sahnites Pant, 1954 ex 1955
Faunipollenites Bharadwaj, 1962
Striatopodocarpites Sedova, 1956
Lunatisporites Leschik emend. Bharadwaj, 1962
Striatites Pant emend. Bharadwaj, 1962
Verticipollenites Bharadwaj, 1962
Strotersporites Wilson, 1962
Illinites Kosanke emend. Potonié & Kremp, 1954
Vesicaspora Schemel emend. Wilson & Venkatachala, 1963
Scheuringipollenites Tiwari, 1973
Gnetaceaepollenites Thiergart, 1937
Welwitschiapites Bolkhovtina 1953 ex Potonié, 1958
Ginkgocycadophytus Samoilovich, 1953
Vittatina Luber emend. Wilson, 1962
Quadrissporites (Hennelly) Potonie' & Lele, 1961

Table 1—Showing percentage of miospore groups in different coal seams of bore hole No. CMKMK—7.

Miospore Group/Coal Seam	KC1	KC2	KC3	KC4	KC5	KC6	KC7
Triletes	87	94	22	88	25	43	41
Monoletes							9
Monosaccates	4		39	9	13	24	18
Bisaccates	1	2	33		57	32	22
Monocolpates	9	4	2	2			6
Polyplicates			2	1			2
Tetradites			2		5		2



Histogram 1 COMPARATIVE HISTOGRAM SHOWING PERCENTAGE OF MIOSPORE GROUPS IN SAMPLES OF BORE HOLE CMKMK-7



Histogram2 COMPARATIVE HISTOGRAM ILLUSTRATING THE PERCENTAGE FREQUENCY OF MIOSPORE GENERA IN SAMPLES OF BORE HOLE CMKMK-7

The second part of observation comprises the quantitative analysis of coal samples wherein the frequency of different miospore genera was calculated after taking into consideration 200 counts of miospores for each sample.

The percentage representation of different miospore genera in different seams of bore core CMKMK-7 is indicated in Table-2, and the same is represented in Histogram-2 which gives a clear picture of relative abundance of different spores and pollen in different seams.

Table 2—Showing the percentage frequency of miospore genera in samples of bore hole No. CMKMK—7.

Miospore Genera/Coal Seams	KC1	KC2	KC3	KC4	KC5	KC6	KC7
<i>Leiotriletes</i>	7	4	3		2	10	
<i>Callumispora</i>	40	60	9	40	3	5	6
<i>Retusotriletes</i>	30	18	3	16			1
<i>Calamospora</i>	4	1	3	5			9
<i>Apiculatisporis</i>	1		1	6		10	6
<i>Cyclogranisporites</i>			2	16	20	18	9
<i>Lophotriletes</i>	5	6		5			9
<i>Acanthotriletes</i>		4					
<i>Microbaculispora</i>			1				
<i>Horridentriletes</i>		1					1
<i>Latosporites</i>							9
<i>Nuskoisporites</i>			5	4			5
<i>Densipollenites</i>						9	1
<i>Parasaccites</i>	3		15	5	13	15	9
<i>Divarisaccus</i>							1
<i>Plicatipollenites</i>			10				
<i>Virkkipollenites</i>	1						
<i>Rugasaccites</i>							2
<i>Potonieisporites</i>			2				
<i>Sahnites</i>			7				
<i>Faunipollenites</i>			1				
<i>Striatopodocarpites</i>			13			4	
<i>Lunatisporites</i>			4				
<i>Striatites</i>			2		15	8	
<i>Verticipollenites</i>			1				
<i>Strotersporites</i>			2				1
<i>Vesicaspora</i>	1	2	6		15		21
<i>Scheuringipollenites</i>			4		27	20	
<i>Gnetaeapollenites</i>							1
<i>Welwitschiapites</i>			2	1			1
<i>Ginkgocycadophytus</i>	7	2	2	1			5
<i>Vittatina</i>	2	2		1			1
<i>Quadrisporites</i>			2		5		2

DISCUSSION

As early as 1867, W. T. BLANFORD had reported the occurrence of Lower Gondwana in Kamptee area. Further, he had postulated the occurrence of Barakar sandstones in between Talchirs and Kamptee sandstones. He was found to be correct as coal beds were struck in Kamptee area and Kamptee colliery was established. Since then CMPDI and other agencies have been carrying on extensive drilling operations in Kamptee coalfield, which extends in a North-Westerly direction from Kanhan towards Saoner and covering an area of about 138 sq. kms. and lies within latitude $21^{\circ} 14'$ and $21^{\circ} 21'$ and longitude $19^{\circ} 4'$ and $79^{\circ} 12'$. The preliminary work on coal prospecting by the above mentioned agencies has proved the occurrence of productive coal seams in Kamptee area. The main purpose of the present investigation was to analyse paleopalynologically coal bearing beds in Kamptee area and use these data for correlation purpose. Generally the productive coal seams of Kamptee area are considered to belong to Barakars. However, by thorough paleopalynological analysis of coal samples collected from coal seams in different bore holes, it is intended to verify the above generalization.

A glance at the Histogram 1 showing percentage of miospore groups in coal seams of Bore hole CMKMK-7 indicates the predominance of triletes and subdominance of monosaccates and bisaccates. Further it is also obvious that triletes go on decreasing as we proceed from lower coal seams KC1, KC2, KC3 and KC4 to upper coal seams KC5, KC6 and KC7. The monosaccates appear to be insignificant in coal seam KC1 and KC2 but in coal seam KC3 they appear to be subdominant. In coal seam KC3 instead of triletes, bisaccates representing 40% of the total population appear to be more dominant.

As far as the percentage representation of miospore genera in coal samples of bore hole CMKMK-7 (Histogram 2) is concerned, among the triletes, the genus *Callumispora* seems to be the most predominant in the assemblage. Next in the order of predominance among the triletes is the genus *Retusotriletes* at least in the coal seams KC1, KC2 and KC4. However, the genus *Cyclogranisporites* is most predominant among triletes in coal seams KC5 and KC6, whereas it is subdominant in KC4 and KC7. As far as monosaccates are concerned, genus *Parasaccites* is represented in all the coal seams except KC2. This genus is most predominant in coal seams KC3 but is subdominant in KC5, KC6 and KC7.

Among the bisaccates, the genus *Scheuringipollenites* appears to be the most predominant in KC5 as represented by 27% of the total population. In contrast to this the genus *Vesicaspora* is most predominant in coal seam KC7 and is represented by 21% of the total population. This genus is subdominant in coal seam KC5.

The real paleoclimatic conclusions of Kamptee coalfield can be drawn only after analysing and studying coal samples of several bore holes from this area. However, palyno-assemblage recovered from the coal seams comprising predominance of *Callumispora* and subdominance of *Parasaccites* indicates glacial conditions (BHARADWAJ, 1973) under which the coal seams were deposited.

The palyno-assemblage of the lower coal seams, i.e. KC1, KC2, KC3 and KC4 dominated by *Callumispora* and subdominated by *Parasaccites* indicates that they belong to the formations older than Barakars and possibly to Karaharbaris. In contrast to this, the palyno-assemblages of upper coal seams KC5, KC6 and KC7 dominated by bisaccates such as *Scheuringipollenites*, indicate that they belong to the Barakar Formation.

We have collected coal samples from 15 bore holes from Kamptee coalfield and they are being investigated paleopalynologically. It is only after the completion of these studies that views regarding paleo-climate and geological age of the coal seams in Kamptee coalfield will be confirmed.