

Late Permian mioflora from Pirli - Pavna area, Wardha Valley Coalfield and Katol Sub-basin, Kamptee Coalfield, Maharashtra

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Palynological investigation of 3 boreholes from Pirli - Pavna area, Wardha Valley Coalfield, Chandrapur and Katol Sub-basin of Kamptee Coalfield in western part of Saoner area, Nagpur, Maharashtra shows the presence of 43 genera and 47 species. Boreholes WPP-1 and WPP-3 of Pirli - Pavna area yielded *Faunipollenites* and *Striatites* dominant palynoassemblage at 470.60 - 470.64m and 129.40-62.65m depths respectively. *Klausipollenites* and *Falcisporites* along with diversified polyplicate pollen are present in borehole WPP-1. *Corisaccites* and *Guttulapollenites* are recorded in WPP-3 borehole. Samples of Katol Sub-basin show striate disaccate. *Densipollenites magnicarpus* and *Densipollenites marginalis* assemblage. The palynofloras recovered from two areas are comparable with Raniganj palynoflora of Damodar and Godavari basins.

Key-words—Palynoassemblage, Wardha Valley, Kamptee Coalfield, Palynostratigraphy.

INTRODUCTION

REGIONAL coal exploration was undertaken by Geological Survey of India (GSI) in Pirli - Pavna Area (WPP-1 & 3) of Wardha Valley, Chandrapur and Katol Sub-basin (UMK-3 & 1) in Kamptee Coalfield, Nagpur (Map 1&2). The stratigraphic status encountered in the borehole UMK-3 in Mohapa area of Katol Sub-basin shows that Gondwana sediments underlie below a trap cover of 80m. Studies were undertaken on borehole samples ranging in depth from 151m to 366m. However, palynomorphs are recorded at the depth 151.30 - 151.53m.

Pirli- Pavna area in central part of Wardha Valley Coalfield (borehole WPP-3), north of Dongargaon Village, shows Kamthi Formation at 32.45m depth followed by Motur Formation up to 240.46m and rest down to depth of 304.00m belongs to Barakar Formation. Borehole WPP-1 was drilled near Pavna village.

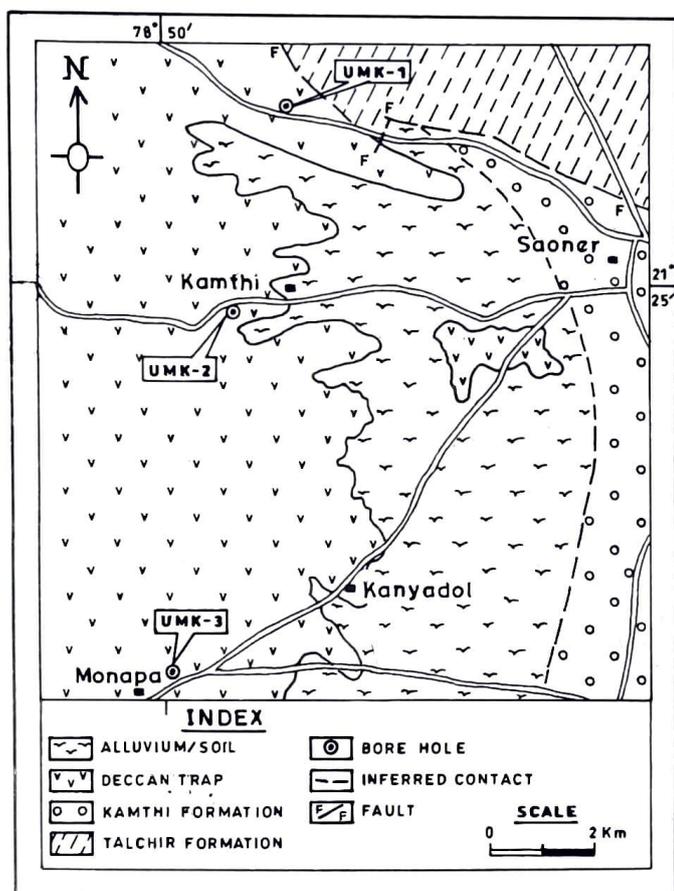
Geology

Wardha Valley is the major coal producing area in Maharashtra. Wardha-Godavari group of coalfield lays south of Satpura. In the Wardha Valley Coalfields Barakar coal measure has been proved underneath

Kamthi rocks. At no places entire geological sequence is exposed. A generalized geological sequence of coal measures in central India is as follows (after Pandey 1973) :

Recent	Alluvium	Black Cotton Soil
		Unconformity
Cretaceous	Lameta Beds	Sandstone, brown-grey, ferruginous shales
		Unconformity
	Kamthi Formation	Red, brown shales
Gondwana (Permian)	Motur Formation	Grey brown chocolate shale
	Barakar Formation	Carbonaceous shale, coal seams
	Talchir Formation	Varve greenish shale
		Unconformity
Precambrian	Purana Sullavi	Sandstone
		Unconformity
Archean	Metamorphics	Gneisses, schist, quartzite

In Katol Sub-basin, the occurrence of thick sedimentary piles below Deccan Traps has been proved through geophysical studies by GSI. The present area is entirely occupied by black cotton soil, Deccan Traps and sporadic exposures of Kamthi sandstones. Yellowish brown, fine to medium-grained, well sorted sandstone and clay are the characteristics of Kamthi



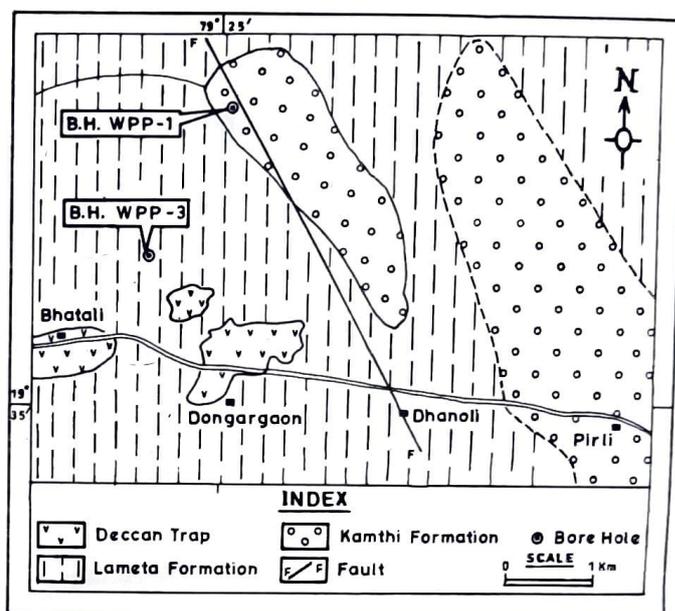
Map-1- Showing location of boreholes in west of Saonar Area, Kamptee Coalfield, Nagpur District, Maharashtra (after Majumdar *et al.* 1999a).

Formation. The general strike of beds is NW-SE with southwesterly dip. Poorly sorted gritty sandstone, devoid of carbonaceous matter represents Barakar Formation.

In Pirli - Pavna area, subsurface coal bearing Gondwana sediments lie under younger Lameta Formation. The subsurface geology in this area is not fully understood at present (Majumdar *et al.* 1999a, b). The strata encountered in the boreholes are not correlatable lithologically due to lack of distinctly differentiated strata. An attempt has been made to correlate the strata on palynological basis.

Sample from Pirli-Pavna area (WPP-1, WPP-3) and Mohapa area (UMK-1, UMK3) were provided by GSI, Warora Camp Maharashtra for palynodating and correlation of strata.

Details of borehole samples of Wardha Valley and



Map-2- Showing location of boreholes from Pirli-Pavna area, Wardha Valley, Chandrapur District, Maharashtra (after Majumdar *et al.* 1999b).

Kamptee coalfields are as follows :

Borehole no	Depth (in m)	Lithology
WPP-3	*62.65-62.69	Grey shale
	73.20-73.22	Carbonaceous shale
	*82.75-82.78	Carbonaceous shale
	*91.50-91.57	Carbonaceous shale
	*120.70-120.75	Carbonaceous shale
WPP-1	*129.40-129.48	Fine-grained carbonaceous shale
	*470-60-470.64	Carbonaceous shale with coal streak
UMK-3	*151.50-151.33	Carbonaceous shale
	243.52	Grey shale
	351.62	Siltstone
	366.5	Grey shale
UMK-2	174-174.05	Grey shale
	245.34	Grey shale
	319.78	Grey shale

* Marked samples yielded palynofossils

Palynological Assemblages

In all 14 samples have been processed for the recovery of palynomorphs. Out of this, only seven samples have yielded spores and pollen. Important spore



Histogram 1. Showing the frequency of spore and pollen in Boreholes of WPP-1, WPP-3 from Pirli-Pavna Area, Wardha Valley Coalfield and UMK-3 from Mohapa area (Katol sub-basin) Kamptee Coalfields, Maharashtra

and pollen genera of stratigraphical importance are illustrated in Plate 1.

Trilete spores — *Horriditriletes curvibaculosus* Bharadwaj & Salujha, 1964; *Lophotriletes* sp., *Anapiculatisporites* sp., *Osmundacidites* sp., *Cyclogranisporites* sp., *Calamospora aplata* Bharadwaj & Salujha, 1964; *Schizosporis* sp., *Cyclobaculisporites* sp.

Monolete spores — *Latosporites colliensis* Balme & Hennelly emend. Venkatachala & Kar, 1968; *Navalesporites spinosus* Ram-Awatar & Sarate, 1984.

Monosaccate pollen — *Densipollenites magnicarpus* Tiwari & Rana, 1981; *D. iendicus* Bharadwaj 1962; *D. invisus*, Bharadwaj & Salujha, 1964; *D. marginalis* Jha, 1996; *D. densus* Bharadwaj & Srivastava, 1969; *Parasaccites obscurus* Tiwari, 1965; *Virkkipollenites mehtae* Lele 1964; *Goubinispora indica* Tiwari & Rana 1981; *Plicatipollenites indicus* Lele 1964.

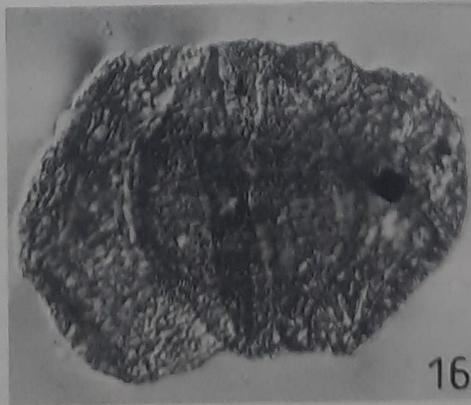
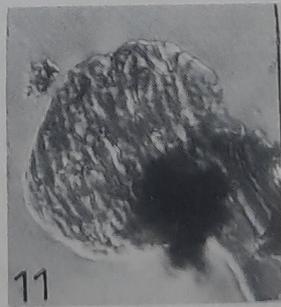
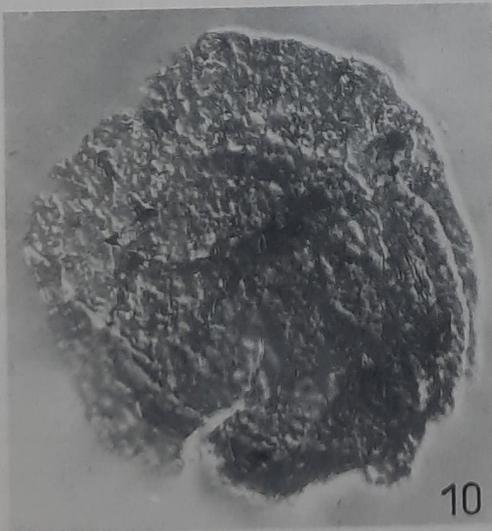
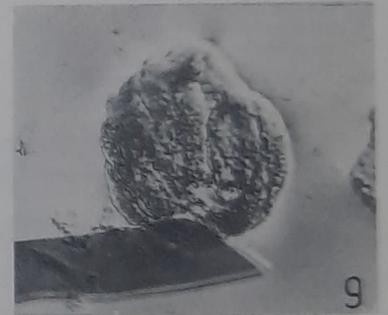
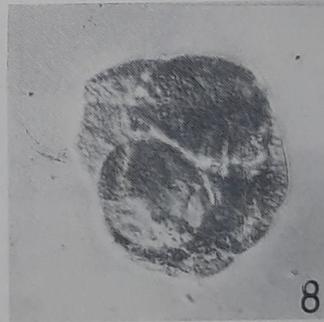
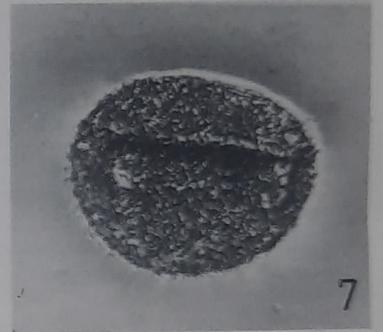
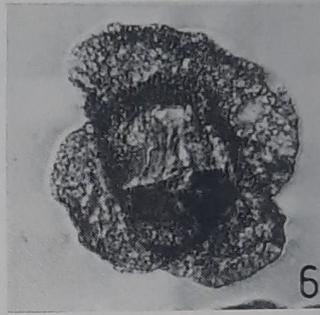
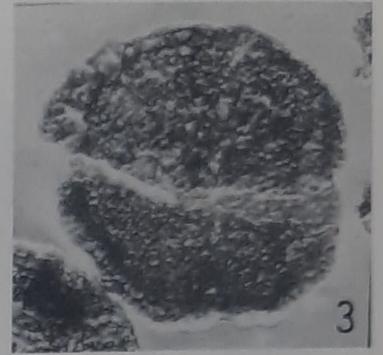
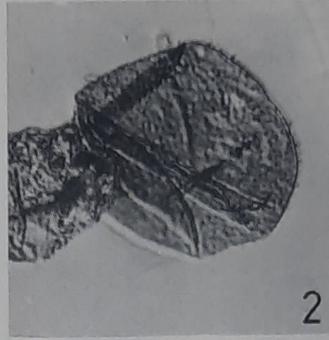
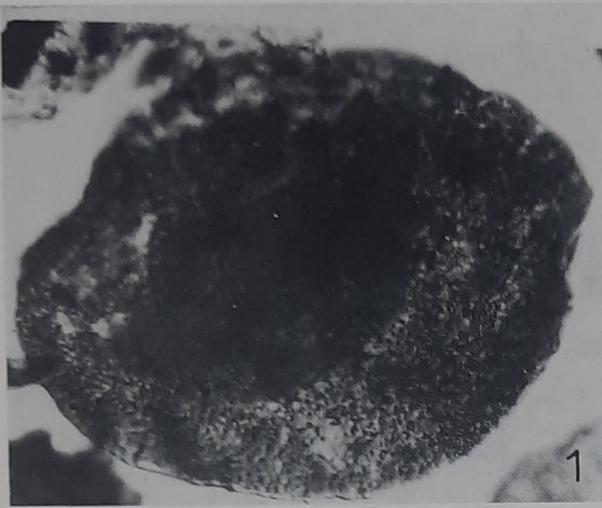
Nonstriate Disaccate pollen — *Cuneatisporites* sp., *Paravesicaspora indica* Bharadwaj & Dwivedi 1981; *Alisporites* sp., *Klausipollenites* sp.,

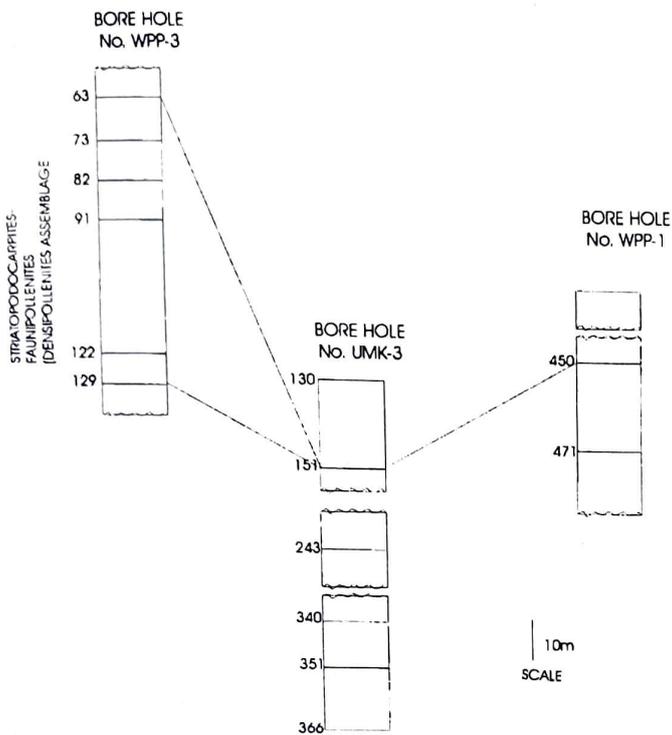
PLATE 1

All photomicrographs have been taken in DIC in Wetzlar Orthoplan and magnified ca x550. Stage readings have been taken by England Finder.

1. *Densipollenites indicus* B.S.I.P. sl. no. 12896 (U37/4);
2. *Osmundacidites* sp B.S.I.P. sl. no. 12897 (L47);
3. *Corisaccites alutas* B.S.I.P. sl. no. 12898 (R 15/2)
4. *Pretricolpipolesporites* sp. B.S.I.P. sl. no. 12896 (Q 38);
5. *Gondwaneaplicates* sp. B.S.I.P. sl. no. 12899 (E27);
6. *Goubinispora indica* B.S.I.P. sl. no. 12900 (O35);
7. *Navalesporites spinosus*. B.S.I.P. sl. no. 12899 (G34/3);

- 8-9. *Guttulapollenites hamonicus* B.S.I.P. sl. no. 12896 L31 (Q15)
10. *Densipollenites marginalis* B.S.I.P. sl. no. 12898 (Q36);
11. *Weylandites lucifer* B.S.I.P. sl. no. 12898 (J24);
12. *Calamospora aplata* B.S.I.P. sl. no. 12896 (S20);
13. *Cyclobaculisporites* sp. B.S.I.P. sl. no. 12896 (S40/4);
14. *Schizosporis* sp. B.S.I.P. sl. no. 12897 (O24/2);
15. *Ginkgocycadophytus cymbatus* B.S.I.P. sl. no. 12898 (J36);
16. *Crescentipollenites fuscus* B.S.I.P. sl. no. 12897 (O 13/4)
17. *Plicatipollenites indicus* B.S.I.P. sl. no. 1291 (M 49).





Text-fig. 1. Palynological correlation of boreholes WPP-3, WPP-1 from Pirli-Pavna area and UMK-3 from Saoner area Katol Sub-basin, Kamptee Coalfield, Maharashtra

Corisaccites alutas Venkatachala & Kar, 1966; *Falcisporis stabilis* Balme, 1970. *Scheuringipollenites tentulus* (Tiwari) Tiwari, 1973; *Platysaccus* sp., *Lueckisporites* sp., *Vesicaspora* sp.

Striate Disaccate Pollen — *Faunipollenites varius* Bharadwaj, 1962; *F. perexiguus* Bharadwaj & Salujha, 1964; *Sbialites tectus* Venkatachala & Kar, 1968; *S. alius* Venkatachala & Kar, 1968; *Crescentipollenites fuscus* (Bharadwaj) Bharadwaj et al., 1974; *Striatopodocarpites decorus* Bharadwaj & Salujha, 1964; *Verticipollenites* sp., *Guttulapollenites hannonicus* Goubin, 1965; *Lahirites* sp., *Strotersporites* sp. *Diblatrites* sp.

Sulcate pollen — *Distriatites* sp. *Ginkgocycadophytus cymbatus* Potoniè & Lele, 1961; *Gnetaceaepollenites* sp., *Weylandites lucifer* (Bharadwaj & Salujha) Foster, 1975; *Pretricolpipollenites* sp., *Marsupipollenites* sp., *Gondwaneaplicates* sp. *Inaperturate* : *Inaperturo pollenites* sp.

Inaperturate pollen — *Inaperturopollenites* sp.

Acritarch — *Leiosphaeridia* sp.

Distribution of spores-pollen in boreholes :

Borehole WPP-1 (470.60 - 470.64 m).

Only one sample at depth 470.60-470.64m yielded palynoflora. The palynoflora is dominated by striate disaccate (42 per cent) being represented *Faunipollenites* (14%), *Striatites* (10%), *Crescentipollenites*, *Striatopodocarpites* and *Verticipollenites*. *Corisaccites* 7% is represented by Sulcate are represented by *Weylandites* (4%) and *Pretricolpipollenites* (3%) along with *Vittatina* and *Marsupipollenites*. *Osmundacidites* (2%) along with *Anapiculatisporites* are common trilete genera. *Klausipollenites* and *Falcisporites* are represented by 3 per cent and 4 per cent respectively. Nonstriate genera, *Paravesicaspora* (10%) and *Cuneatisporites* (7%), are next to striate taxa in abundance.

Borehole WPP - 3 (62 - 129.6m)

Palynoflora of this borehole is dominated by striate disaccate genera, viz., *Faunipollenites* (26% - 65%) and *Striatites* (8-10%), *Crescentipollenites* (3%-5%) and *Striatopodocarpites* (3%-9%). *Lahirites*, *Distriatites*, *Verticipollenites* are impersistant being present < 3 per cent. *Densipollenites* is the dominant monosaccate genus. *D. magnicarpus* have been recorded in this borehole with an average 6.8 per cent. Among nonstriate disaccate *Paravesicaspor* is dominant. Other nonstriate disaccate genera are *Cuneatisporites*, *Klausipollenites* and *Falcisporites*. *Corisaccites* (maximum 8%) has been recorded along with rare occurrence of *Guttulapollenites*. The trilete spores *Cyclobaculisporites*, *Cyclogranisporites* and *Lophotriletes* have been recorded in low frequency. *Weylandites*, though in low percentage is consistently present throughout sequence (see histogram-1). *Navalesporites* is present maximum 5.5 per cent in this assemblage.

Borehole UMK - 3 (151.50-157.33 m)

Borehole monosaccate genus *Densipollenites* (23%) marks its dominance with maximum number of species, like *D. magnicarpus*, *D. invisus*, *D. marginalis*. Dominant striate disaccate genera are represented by *Faunipollenites* (18%) and *Striatites*

(16%). *Crescentipollenites*, *Striatopodocarpites* and *Verticypollenites* are frequent striate disaccate genera in this borehole at this depth. Subdominant nonstriate disaccate are *Paravesicaspora* (15%) along with *Cuneatisporites* and *Alisporites*.

DISCUSSION

Pirli - Pavna area, Wardha Valley Coalfield

The palynoflora from WPP-1 and WPP-3 of Pirli-Pavna area in the central part of Wardha Valley is closely correlatable with the Upper Raniganj mioflora from Damodar Basin. The mioflora is dominated by striate disaccate, mainly *Striatites* and *Faunipollenites*. *Corisaccites* is present at all depths. Occurrence of *Densipollenites* (*D. magnicarpus*), *Navalesporites*, *Osmundacidites* and *Falcisporites* with sulcate pollen suggests similarity with Upper Raniganj palynoflora. In Godavari Valley, similar palynoassemblage has been recorded from Ramakrishnapuram (Srivastava & Jha 1992). The present palynoflora is comparable to Bazargaon Palynozone - 1, Kamptee Coalfield, Nagpur (Srivastava & Bhattacharyya 1996).

Katol Sub-basin, Kamptee Coalfield

In borehole UMK-3 the mioflora is dominant by monosaccate genus *Densipollenites* and striate disaccate being subdominant. *Densipollenites magnicarpus* is prominently present in this assemblage. *Striatites* (16%) is the dominant genus among striate disaccate along with *Crescentipollenites* and *Striatopodocarpites* 4% each. Nonstriate disaccate constitute 29% of the total assemblage. *Corisaccites*, *Guttulapollenites*, *Klausipollenites*, and *Falcisporites* which have been recorded in Pirli-Pavna area are absent from this palynoflora. The palynoflora recorded from Katol Sub-basin is comparable to Upper Raniganj palynoflora of Damodar basin and

palynozone - IX (*Densipollenites magnicarpus*) of Tiwari and Tripathi (1992). Thus the palynoflora studied indicates Late Permian age (see Text-fig. 1).

The present palynological study suggests the probable spread of Upper Permian strata from Bazargaon through Katol Sub-Basin to the Pirli - Pavna area of Kamptee Coalfield in Wardha Valley Coalfield. These sediments lie below the Kamthi Formation equivalent to Lower Triassic, which are intermittently found at various places (as borehole WPP-1) but in other cases they lay below the traps (borehole WPP-3 and UMK-3).

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