Palynodating of subsurface coal measures from Mahadoli area, Wardha Valley Coalfield, Maharashtra, India

A.P. BHATTACHARYYA AND O.S. SARATE

Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow 226 007, India.
Email: ossarate@hotmail.com & ananta_pb@yahoo.com

(Received 12 April 2001; revised version accepted 06 August 2001)

ABSTRACT


Two palynoassemblages have been recorded from the Permian Sequence of Mahadoli area (Borehole WM-14), Wardha Valley Coalfield, Maharashtra. The older palynoassemblage A is *Scheuringipollenites* dominant while the younger palynoassemblage B is characterized by *Parasacciles-Densipollenites* along with striate bisaccates, *Falcisporites* and *Salsangisacciles*. Correlation with palynoassemblages of other coaliferous basins of India and the age of subsurface sediments have been discussed.

Key-words—Palynoassemblage, Barakar, Permian, Wardha Valley Coalfield, India.

INTRODUCTION

The Wardha Valley Coalfield has recently emerged as one of the main resources for coal exploration through Open Cast Mining. The main coal centers are localized in Chandrapur and Yeotmal Districts of Maharashtra. The Directorate of Geology and Mining, Government of Maharashtra is presently engaged in coal exploration in Mahadoli area, (longitudes 78°54'15" and 20°21'45" latitudes) for the possibilities of coal reserves in the virgin tracts of the Coalfield through subsurface study. General stratigraphic succession of Wardha Valley Coalfield, Maharashtra is given below [after Raja Rao, 1982 (fig. 1)].
The borehole passes through Deccan Traps, Lameta, Kamthi and Barakar formations. Grey shale, sandstone, clay and carbonaceous shale characterize the Barakar sediments. The present study has been carried out in order to establish palynological succession and its correlation with other Gondwana Basins of India.

The location of the borehole WM-14 is shown in Fig. 3 and the lithological succession present in the borehole is shown in Fig. 2.

Two palynoassemblages have been recorded from borehole WM-14. The distribution and frequency of spores and pollen of stratigraphic importance have been plotted (see Fig. 4) to show their relative abundance through the entire depth of the borehole. Some important spores and pollen have been illustrated in Pl. 1.

**Palynoassemblage—A**

**Occurrence**—Borehole WM-14 (at 106-118 m depth).

**Lithology**—Grey shale, Carbonaceous shale, Fine-grained sandstone.

*Schweinitzisporites* (32%-26%) is dominant in this assemblage (see Fig. 4) followed by *Ibisporites* (10%). The taxa *Rhizomaspora* (8%) and *Primuspollenites* (8%-3%) are frequently met within this assemblage. Monosaccate genera are represented by *Parasaccites* with maximum occurrence of 18 per cent along with *Caheniasaccites* (11%). Other monosaccates are *Virkkipollenites*, *Crucisaccites* and *Potonieisporites*. Trilete spores are represented only by *Verrucosisporites*, *Tiwariasporis* is present up to 118 m depth. Amongst striate bisaccate pollen, *Striatites* and *Striatopodocarpites* are subdominant forms. *Weylandites* and *Ginkgocladophytes* are found to be 3% each.

The occurrence of spores and pollen at 125 m is meager, hence the percentage frequency could not be estimated. However, on the basis of taxa present, this level is considered to represent a part of the palynoassemblage A.

**Palynoassemblage—B**

**Occurrence**—Borehole WM-14 (at 66-25-76·00 m depth).

**Lithology**—Micaceous sandstone, Carbonaceous shale.

The palynoassemblage is characterized by the dominant presence of *Parasaccites* (21%) along with striate bisaccate genera *Striatopodocarpites* and *Famiiisporites* (15%, each). *Falciisporites* (5%) and *Satsangisaccites* (6%) have also been recorded, along with other nonstriate genera, such as *Alisporites* (2%) and *Platysaccus* (3%). Other monosaccate genera, viz., *Potonieisporites* (3%) and *Densipollinies* (9%) also record their fair occurrence in this assemblage.
Close affinity with Lower Barakar mioflora reported from Godavari Valley coalfields by Srivastava and Jha (1989, 1998). Scheuringipollenites dominant zone has also been recorded from Pathakhera Coalfield, Satpura Basin, Saraté (1986). Agashe and Chitnis (1972) reported Lower Barakar palynoflora from Hindustan-Latpet Colliery containing dominance of Breviriletes and Scheuringipollenites. Similar palynoflora has been recorded by Agashe and Geetha (1979) from Kamptee Coalfield with dominant Scheuringipollenites and striate bisaccate taxa but the present assemblage differs in the presence of monosaccate taxa Parasaccites and Cahelliasaccites in high percentage. The present assemblage is comparable to the palynozone - V of Tiwari and Tripathi (1992).

The Palynoassemblage - B is characterized by the presence of Striatopodocarpites and Faulpollenites (15% each) along with Scheuringipollenites in low percentage. However, Parasaccites (21%) and Denissipollenites (9%), the monosaccate genera are prevalent. The occurrence of Denissipollenites magnicorpus along with striate bisaccates is well established in Late Permian mioflora of Damodar Basin. However, Falcisporites and Satsoangisaccites suggest younger aspect of the palynoassemblage. The recurrence of Parasaccites with striate bisaccate has been reported from Godavari Valley and Supra Barakar Formation in the Son Mahanadi Valley also. The Palynoassemblage – B is closely comparable to Palynozone – 9 of Middle member of Khamti Formation in Godavari Valley (Srivastava, 1992). Similar palynoassemblages have also been recorded from Jaipuram area (Assemblage in the borehole GJP-I; Srivastava & Jha, 1992), Ramaktishnapuram area (in borehole GIRK-25), Bhopalpali area (Palynoassemblage – III, Srivastava & Jha, 1998), Johilla Coalfield, Son Valley (Tiwari & Ram-Awatar 1989), and from Supra Barakar sediments in Son Valley (Assemblage – 5; Tiwari & Ram-Awatar, 1987). The occurrence of

**COMPARISON**

A Scheuringipollenites dominant mioflora has been reported from the lower part of the Barakar Formation in Damodar Basin, Son Mahanadi Basin, Satpura Basin and Godavari Valley coalfields but in the present assemblage it is associated with Parasaccites (18%) along with Cahelliasaccites (11%) and Primuspollenites, thus having a
Parasaccites in high percentage is known from Talchir Formation. Hence, it is possible that Wardha Valley Coalfield experienced a prolonged cooler climate. A cool climate has also been suggested during Upper Permian and Lower Panchet by Tiwari and Tripathi (1988). However, Callumisia has not been observed in the present assemblage. A Permo-Triassic plant microfossil assemblage from sediments of glacial origin have also been reported from Sri Lanka (Dahanayaka et al., 1989).

CONCLUSION

In Mahadoli area, two palynoassemblages have been recorded (Palynoassemblage A & B) below the Deccan Traps, which represent Lower Barakar and Lower Panchet palynofloras, respectively. The absence of intervening palynoassemblages of the Upper Permian could be explained envisaging a break in sedimentation after Lower Barakar. The presence of a Boulder Conglomerate bed at 103.65-103.85 m depth substantiates this observation. The presence of Barakar palynoflora is an indication for the occurrence of Lower Gondwana coals in Mahadoli area, Maharashtra.

Acknowledgements—The authors are thankful to Professor Anshu Kumar Sinha, Director, Birbal Sahni Institute of Palaeobotany, Lucknow for his permission for the publication of these results. We also wish to extend our thanks to Mr RG Deshmukh, Director and Mr SV Savakhande Joint-Director, Directorate of Geology and Mining, Govt. of Maharashtra, Nagpur for the help extended for collection of samples. The authors are also indebted to Dr Suresh C Srivastava for his valuable suggestions and the help extended by Mr PS Katiyar.

REFERENCES

PLATE 1


