

Late Cretaceous palynofossils from the Deccan Intertrappean beds of Mohgaon-Kalan, Chhindwara District, Madhya Pradesh

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A Late Cretaceous palynofossil assemblage was recovered in association with a variety of dinosaur/avian egg shell fragments, ostracodes, molluscs, fishes and wood pieces from the Deccan Intertrappean beds at a locality about 0.5 km west of the village Mohgaon-Kalan (79°11'E: 22°1'E) in Chhindwara District, Madhya Pradesh. The common species are: *Ariadnaesporites* sp., *Gabonisorites vigourouxii* Boltenhagen (1967), *Spinizonocolpites* Muller (1968), *Matanomadbiasulcites maximus* Kar (1985), *Bacutripurites orluensis* Jan du Chene *et al.* (1978), *Azolla cretacea* Stanley (1965), *Aquilapollenites bengalensis* Baksi & Deb (1981), *Tripuroletes reticulatus* (Pocock) Playford (1971) and *Cicatricosisporites dorogensis* Potonie' & Gelletich (1933).

Key-words—Palynology, Deccan Intertrappean, Cretaceous-Tertiary, India.

INTRODUCTION

THE Deccan Intertrappean/Infratrappean sediments are found generally at the margin of trap province in Gujarat, Rajasthan, Madhya Pradesh and Andhra Pradesh. These beds were presumably deposited in a quieter period when drainage was blocked by previous flows resulting lakes and other watery bodies where aquatic pteridophytes, charophytes, ostracodes, molluscs, fish and other vertebrates flourished. Courtillot *et al.* (1986, 1988, 1990), Baksi (1987), Duncan and Pyle (1988), Hallam (1988), Sahni and Bajpai (1988), Sahni *et al.* (1996), Srinivasan (1996) and others advocate Deccan volcanism to be a major Cretaceous-Tertiary event. In this light, fossils found in the various intertrappean beds are of special significance to demarcate the K-T boundary as they are synchronously developed within the limits of biostratigraphic resolution.

The Intertrappean beds of Mohgaon-Kalan, Chhindwara District, Madhya Pradesh are classic ones from where Sahni and Rode (1937) reported some megafossils. Observing the predominance of angiospermic woods Sahni (1940) postulated a Tertiary age for the Deccan traps. This contention was followed by Prakash (1960), Bande *et al.* (1988) and Bande and Chandra (1990).

Palynological fossils from Mohgaon-Kalan intertrappean beds were first reported by Chitale (1951). Mathur and Sharma (1990) recorded *Azolla cretacea*, *Gabonisorites*, *Aquilapollenites*, *Tripuroletes* etc. from Ranipur Intertrappean beds near Jabalpur and assigned Maestrichtian age for the assemblage. Prakash *et al.* (1990) described palynofossils from the Deccan Intertrappean beds of Padwar also near Jabalpur. This assemblage according to them is very much comparable with the Late Cretaceous palynological association of the Bengal basin described by Baksi and Deb (1981) as it shares many common palynological taxa like *Aquilapollenites bengalensis*, *Azolla cretacea*, *Lycopodiumsporites*, *Podocarpidites*, *Ephedripites*, *Proxapertites* and *Tricolpites*. Sahni *et al.* (1996) in addition to Padwar also reported palynofossils from Naskal and correlated inland, continental, marginal onshore and paralic marine intertrappean sections on the basis of palynofossils and ascribed Late Maestrichtian age.

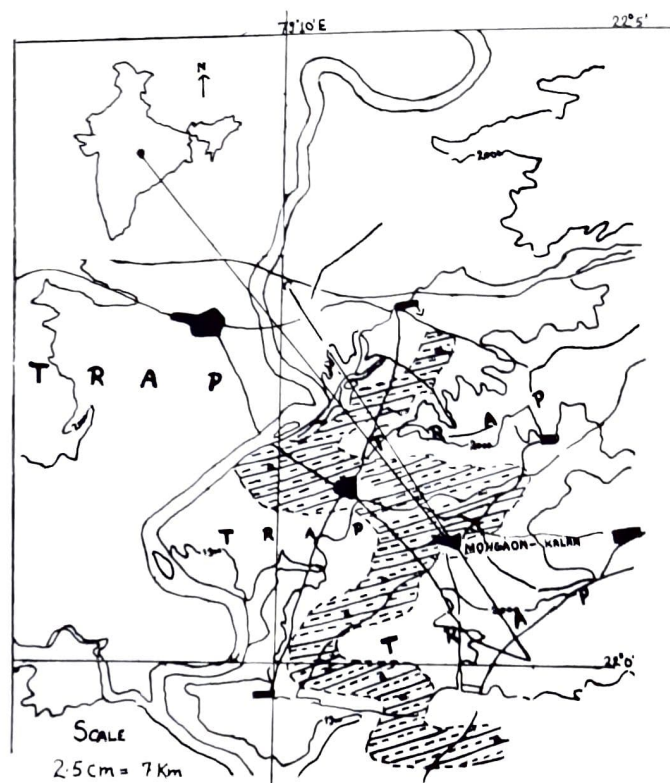
This discrepancy of age of the intertrappean beds on the plant mega- and microfossils in the opinion of Sahni *et al.* (1996) is due to the fact that megafloreal age determinations were largely based on the first occurrence of taxa at the family and generic level and their abundance. The megafossil

workers also did not collect fossils from the measured sections. For this reason, a considerable disagreement in ages ranging from the Late Cretaceous to the Early Eocene, a period of approximately 15 to 20 Ma was found to exist for the intertrappean beds of Mohgaon-Kalan, Chhindwara and Nagpur where the stratigraphy showed no major differences. They are in the opinion that the ages established on the basis of megaflora are wrong and the biostratigraphic implications of intertrappean megaflora may have to be revised.

The Deccan Intertrappean/Infratrappian mammal and dinosaurian remains worked out by Mohabey (1984), Mohabey and Mathur (1989), Bajpai *et al.*, (1990, 1993) from Gujarat; Vianey-Liaud *et al.* (1987), Sahni *et al.*, (1994, 1996), Srinivasan (1996) from Madhya Pradesh and Rao and Yadagiri (1981), Prasad and Sahni (1988), Srinivasan *et al.* (1994) from Andhra Pradesh suggest a Late Cretaceous (Maestrichtian) age. The geophysical studies by Courtillot *et al.* (1986), Venkatesan *et al.* (1993, 1996) of the Deccan trap associated sedimentary rocks also favour a Late Cretaceous rather than an Eocene age.

Material and Method

The intertrappean samples from Mohgaon-Kalan were collected by S.S. from the dump dug out of an unlined water well situated roughly 0.5 km west of the village (79°11'E: 22°1'N'). The intertrappean bed is about 1 m thick and is sand-



Text-fig. 1. Geological map of Mohagaon-Kalan showing the trap and intertrappean sediments (a). Modified after Sahni and Rode, 1937.

wiched between the two basaltic flows (Text-fig 1). The lowermost sediment comprises buff coloured hard chert of .25 m thick with wood fragments; it is overlain by green shale with fresh water pelecypod shell fragments of approximately same thickness. The topmost bed consists of carbonaceous shale and is about .25 m thick (Text-fig. 2). Samples were collected from green and carbonaceous shales

PLATE-1

(All photomicrographs are enlarged *ca.*x500, unless otherwise mentioned)

- | | | | |
|-------|--|----|--|
| 1,4,6 | <i>Triporetetes reticulatus</i> Pocock Slide nos. 11843, Q53; 11844, H28/1; 11845, 024 | 14 | <i>maximus</i> Kar (magnified <i>ca.</i> x 600) Slide no. 11843, G54/2 |
| 2,7 | <i>Aquilapollenites bengalensis</i> Baksi & Deb Slide nos. 11846, R17/2; 11847, M57 | 15 | Showing the barbed glochidia in <i>Azolla</i> (magnified <i>ca.</i> x400) Slide no. 11848, M38 |
| 3 | Tricolpate pollen Slide no. 11846, L38. | 16 | <i>Spinizonocolpites echinatus</i> Muller Slide no. 11850, F29/F |
| 5 | <i>Contignisporites</i> sp. Slide no. 11844, V 32 | 17 | Tricolporate, reticulate pollen Slide no. 11845, W33 |
| 8 | <i>Neocouperipollis kutchensis</i> (Venkatachala & Kar) Kar & Kumar Slide no. 11848, T40 | 18 | <i>Gabonisporites vigourouxii</i> Boltenhagen Slide no. 11848, 052 |
| 9 | <i>Cicatricosisporites</i> sp. 1 Slide no. 1849, S23/4 | 19 | <i>Matanomadbiasulcites maximus</i> Kar Slide no. 11848, L48 |
| 10 | <i>Cicatricosisporites</i> sp. 2 Slide no 11850, M33/4 | 20 | <i>Todisporites major</i> Couper Slide no. 11853, M51 |
| 11 | <i>Ariadnaesporites</i> sp. (magnified <i>ca.</i> x 250) Slide no. 11851, M55/2 | 21 | <i>Tercissus grandis</i> (Tschudy) Kieser & Jan du Chene Slide no. 11854, K43/2 |
| 12 | <i>Bacutripites orluensis</i> Jan du Chene <i>et. al.</i> Slide no. 11852, B20 | 22 | Microspores embedded in massula of <i>Azolla</i> Slide no. 1855, T38/1 |
| 13 | Showing the ornamentational pattern in <i>Matanomadbiasulcites</i> | | Tricolpate, spinose pollen Slide no. 11856, Q9 |

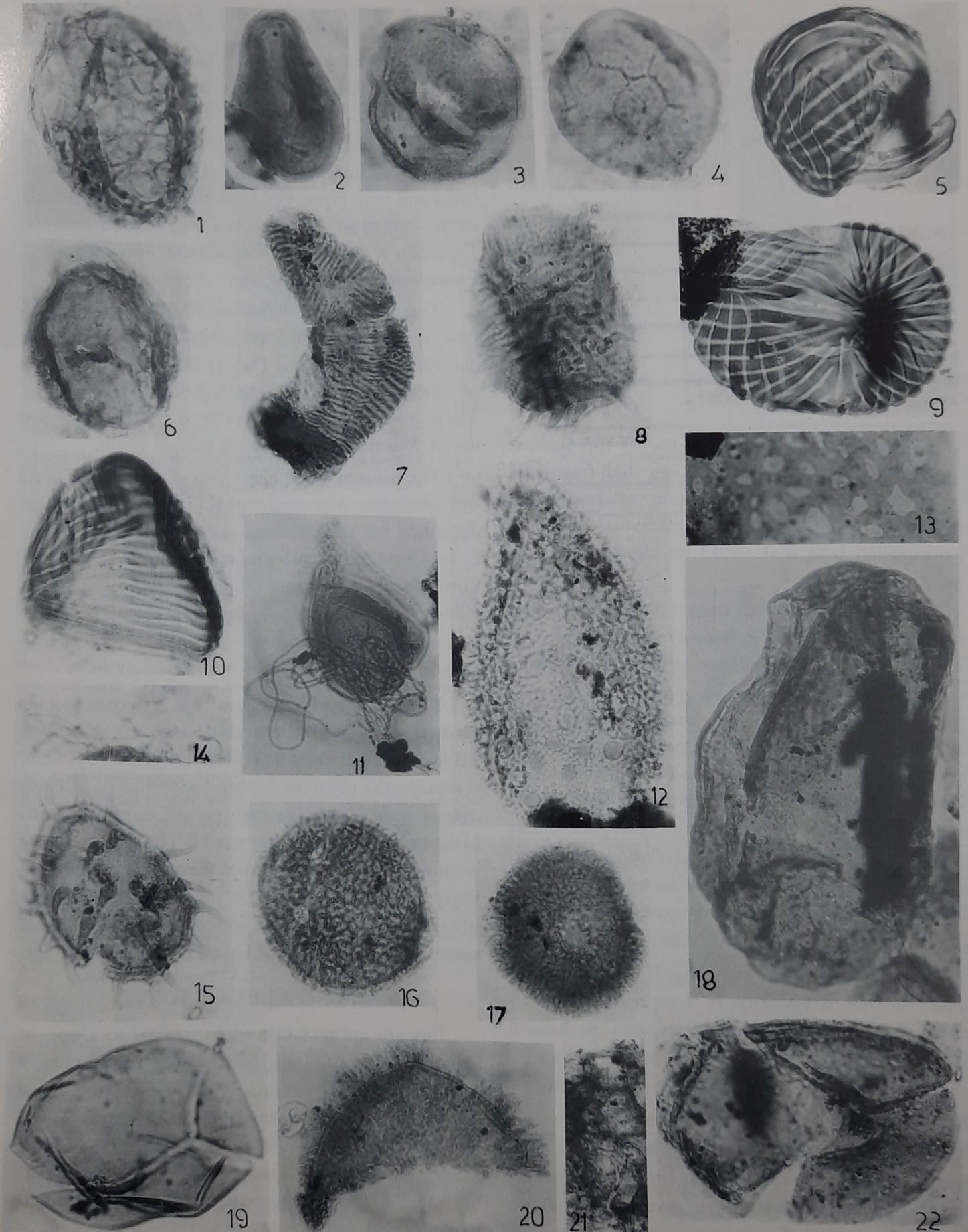
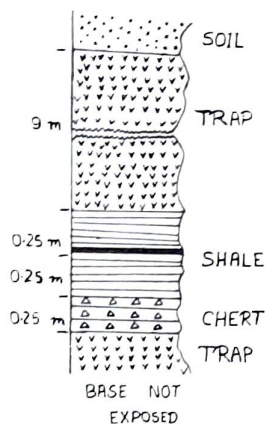


PLATE 1



Text-fig. 2. Showing the litholog of a well situated at Mohgaon-Kalan.

for the present investigation. One of the authors (Srinivasan, 1996) could recover egg shell fragments along with other associated micro vertebrates and ostracodes from the black carbonaceous shale. The spore-pollen taxa that could be identified are as under -

Cyathidites australis Couper (1953), *Todisporites major* Couper (1953), *Triporoletes reticulatus* (Pocock) Playford (1971), *Cicatricosisporites dorogensis* Potonie' & Gelletich (1933), *Cicatricosisporites* spp., *Azolla cretacea* Stanley (1965), *Ariadnaesporites* sp., *Contignisporites* sp., *Gabonisorites vigourouxii* Boltenhagen (1967), *Matanomadbiasulcites maximus* Kar (1985), *Neocouperipollis kutchensis* (Venkatachala & Kar) Kar & Kumar (1986), *Spinizonocolpites echinatus* Muller (1968), *Aquilapollenites bengalensis* Baksi & Deb (1981), *Bacutripurites orluensis* Jan du Chene *et al.* (1978), *Tercissus grandis* (Tschudy) Kieser & Jan du Chene (1979) and *Proteacidites* sp.

The palynological assemblage is rather poor in quality as well as quantity. It is represented by 15 genera and 12 identifiable species, out of these 8 genera and 6 species belong to pteridophytes and 7 genera and 6 species to angiosperms. The gymnospermous pollen is absent in the assemblage.

The palynofossils described by Mathur and Sharma (1990) from the Deccan Intertrappean bed of Ranipur, Madhya Pradesh mostly consist of *Azolla cretacea*, *Gabonisorites*, *Aquilapollenites*,

Triporoletes, *Equisetosporites* and *Echitricolporites maristella*. The present assemblage shows close resemblance to this in having *Azolla cretacea*, *Gabonisorites*, *Aquilapollenites* and *Triporoletes*.

The Padwar intertrappean palynoflora reported by Prakash, Singh and Sahni (1990) is much diversified and rich. However, both the assemblages have some common marker taxa e.g. *Azolla cretacea*, *Triporoletes reticulatus*, *Aquilapollenites bengalensis* and *Spinizonocolpites echinatus*.

The assemblage described here is also comparable to the subsurface assemblage of Bengal basin described by Baksi and Deb (1981) in the presence of *Azolla cretacea* and *Aquilapollenites bengalensis*. These two species are confined to the topmost upper Maestrichtian zone of Bengal basin.

The present assemblage also shows similarity to the subsurface Maestrichtian Kallamedu assemblage described by Venkatachala and Sharma (1974) and Late Cretaceous subsurface sediments around Pondicherry in having *Aquilapollenites bengalensis* (*Striatitripurites cauveriana*), *Azolla cretacea*, *Triporoletes* and *Ariadnaesporites*.

Age of the Assemblage

The stratigraphic range of the different species recovered from the material has been shown in Table 1. Five species viz. *Aquilapollenites bengalensis*, *Gabonisorites vigourouxii*, *Ariadnaesporites* sp., *Azolla cretacea* and *Contignisporites* sp., are confined upto Maestrichtian all over the world. The other species are long ranging and some of them even go beyond Early Eocene. However, on the basis of index fossils of Maestrichtian mentioned above, the present assemblage should be of Late Maestrichtian in age.

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Table-1. Showing the stratigraphic range of the different species recovered from the material.

NAME OF SPECIES	MAESTRICHTIAN	PALAEOCENE	EARLY EOCENE
<i>Aquilapollenites bengalensis</i> Baksi & Deb (1981)			
<i>Gabonisorites vigourouxii</i> Boltenhagen (1967)			
<i>Ariadnaesporites</i> sp			
<i>Azolla cretacea</i> Stanley (1965)			
<i>Contignisporites</i> sp			
<i>Tercissus grandis</i> (Tschudy) Kieser & Jan du Chene (1979)			
<i>Matanomadhiasulcites maximus</i> Kar (1985)			
<i>Spinizonocolpites echinatus</i> Muller (1968)			
<i>Triporoletes reticulatus</i> Pocock (1962)			
<i>Proteacidites</i> sp			
<i>Neocouperipollis kutchensis</i> (Venkatachala & Kar) Kar & Kumar (1986)			
<i>Bacutriporites orluensis</i> Jan du Chene et al. (1978)			
<i>Cicatricosisporites dorogensis</i> Potonie & Gelletich (1933)			
<i>Cyathidites australis</i> Couper (1953)			
<i>Todisporites major</i> Couper (1953)			

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