New angiosperm pollen from subsurface Early Palaeogene sediments of Barmer District, Rajasthan, India

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Two new monosulcate pollen genera, viz., *Kapurdipollenites* and *Retiverrumonosulcites* are identified from the subsurface Palaeogene sediments near Kapurdi and Jalipa, Barmer District, Rajasthan. *Kapurdipollenites* is a zonisulcate pollen having verrucate, baculate or gemmate exine. *Retiverrumonosulcites* is monosulcate with verrucate, or clavate exine. These pollen show affinity with those found in some members of Arecaceae.

Key-words—Palynology, Angiospermous pollen, Barmer Basin, Palaeocene-Eocene (India).

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सारांश

राजस्थान (भारत) में बाड़मेर जनपद की प्रारम्भिक पूर्व-तृतीयक कालीन उपसतह से नये आवृतबीजी परागकण

सूर्यकान्तमणि त्रिपाठी

राजस्थान में बाड़मेर जनपद में कपूर्डी एवं जालिपा के समीप पूर्व-तृतीयक उपसतही अवसादों से ***कपूर्डीपोलिनाइटिस*** एवं ***रेटिवेरुमोनोसल्काइटिस*** नामक दो नयी एक खांची प्रजातियों का अभिनिर्धारण किया गया है। ***कपूर्डीपोलिनाइटिस*** किणकी, वाकुलामय अथवा जेमायुक्त बाह्यचोल से युक्त वलयखांची परागकण है जबकि ***रेटिवेरुमोनोसल्काइटिस*** किणकी अथवा मुग्दराकार बाह्यचोल से युक्त एकखांची परागकण है। ये परागकण अरेकेसी कुल के कुछ सदस्यों से सजातीयता व्यक्त करते हैं।

ROCK samples from bore-holes (Text-figure 1) drilled near Kapurdi and Jalipa (latitudes 25°45′ to 26° and longitudes 71° to 71°45′) near Barmer, Rajasthan have yielded rich Palaeocene-Eocene palynoflora. Morphological study of this palynoflora led to the identification of two new forms which have been described in this paper. Slides and negatives of the figured specimens have been deposited in the Repository of the Birbal Sahni Institute of Palaeobotany, Lucknow.

SYSTEMATIC DESCRIPTION

Genus—*Kapurdipollenites* gen. nov.

Type species—*Kapurdipollenites gemmatus* gen. et sp. nov.

Generic diagnosis—Pollen grains spherical to subspherical; monosulcate, zonisulcate, sulcus long, dividing the grain into two parts. Exine moderately thick, foveolate, imperfectly tectate, foveolate surface covered with densely or sparsely placed verrucae, gemmae or baculae.

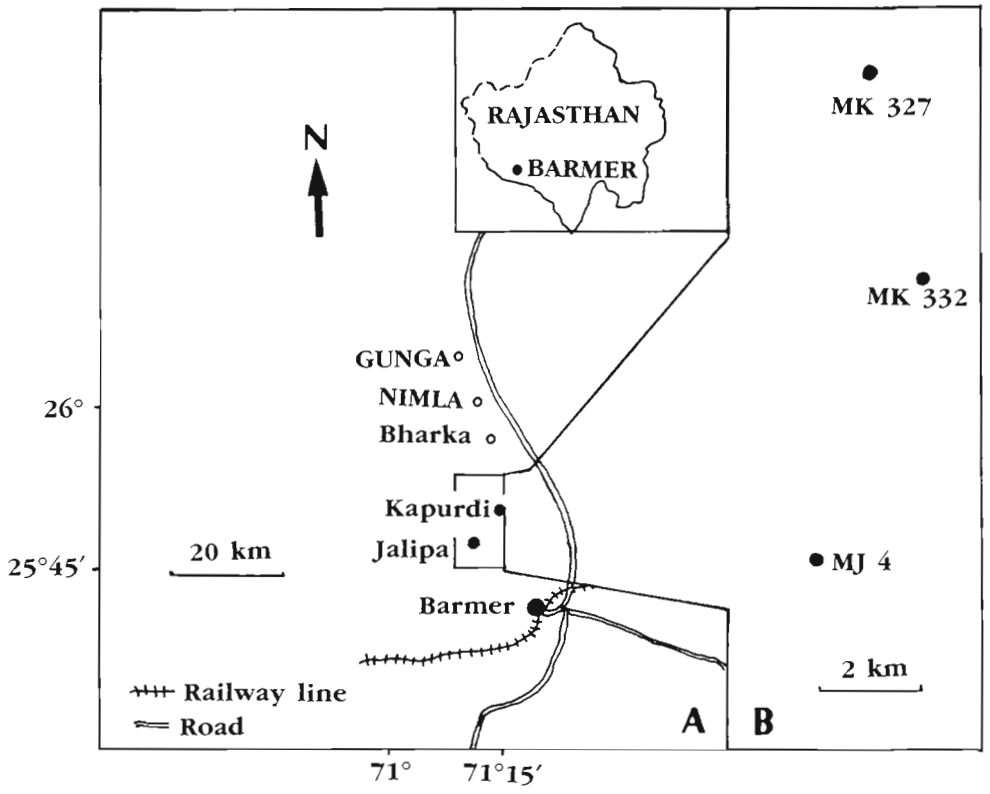
Comparison—The present genus compares with *Proxapertites* van der Hammen 1956 and *Assamialetes* Singh emend. Singh & Tripathi 1986 in having a long zonisulcus and a small union area between two almost equal halves. In these genera the exine is psilate, foveolate or microreticulate to coarsely reticulate and no other sculptural elements are present over the foveolate or reticulate surface of exine which is a diagnostic feature of *Kapurdipollenites*. *Paravuripollis* Rao & Ramanujam 1978 is also a zonisulcate pollen with clavate-pilate ornamentation but can be differentiated in being smaller in size and psilate areas between the sculptural elements. *Spinizonocolpites* Muller 1968 also differs from the present genus in having longer baculate or echinate sculptural elements.

Kapurdipollenites gemmatus gen. et sp. nov.

Pl. 1, figs 1-4

Holotype—Pl. 1, fig. 1; size 75 × 70 µm; Slide no. BSIP 10892; coordinates: 105.5 × 74.9.

Type locality—Well MJ-4 (depth 100 m from ground level), Jalipa, Barmer District, Rajasthan.



Text-figure 1—A, Map showing the area of investigation; **B,** location of well sections from where the samples have been collected.

Diagnosis—Pollen grains spherical to subspherical; monosulcate, sulcus long, peripheral. Exine moderately thick, foveolate, incompletely tectate, perforate surface of exine covered with closely placed verrucae and gemmae.

Kapurdipollenites baculatus sp. nov.

Pl. 2, figs 5-7

Holotype—Pl. 2, fig. 5; size 75 × 70 µm (excluding baculae); Slide no. BSIP 10894; coordinates: 101.4 × 68.4.

Type locality—Well MK-332 (depth 420 m from ground level), Kapurdi, Barmer District, Rajasthan.

Diagnosis—Pollen grains spherical to subspherical, 70-75 × 65-70 µm. Monosulcate, sulcus long, dividing the pollen into two more or less equal halves. Exine about 2 µm thick, sexine thicker than nexine, foveolate with incomplete tectum, foveolate surface of exine possessing sparsely placed baculae and verrucae, baculae/verrucae 3-6 µm long and 2 µm wide.

Comparison—*Kapurdipollenites baculatus* differs from *K. gemmatus* sp. nov. in having sparsely placed verrucae. *Spinizonocolpites baculatus* Muller 1968, although possesses a single long equatorial aperture, is oval in shape and bears long, closely placed baculae, whereas in *K. baculatus* sp. nov. the exine bears sparsely placed verrucae and short baculae.

Genus—*Retiverrumonosulcites* gen. nov.

Type species—*Retiverrumonosulcites barmerensis* gen. et sp. nov.

Generic diagnosis—Pollen grains subspherical to oval; monosulcate. Sulcus not extending up to the poles, with thickened lips. Exine microreticulate, possessing verrucae or clavae of varying sizes over the microreticulate surface.

Comparison—*Retiverrumonosulcites* gen. nov. resembles *Clavatipollenites* Couper, *Clavapalmidites* Rao & Ramanujam, *Gemmamonocolpites* van der Hammen & Garcia de Mutis and *Racemonocolpites* (van der Hammen) ex Gonzalez Guzman superficially in exhibiting similar looking exine ornamentation but differs from these genera in apertural characters. *Clavatipollenites* Couper 1958 is monosulcate having two layered exine with closely placed pila on ektexine. *Retiverrumonosulcites* gen. nov. is different from this genus in having thickened apertural margin and also in possessing verrucate or baculate ornamentation on the microreticulate surface. *Clavapalmidites* Rao & Ramanujam 1978 differs from the present form in having long colpus and densely placed clavae or baculae. *Gemmamonocolpites* van der Hammen &

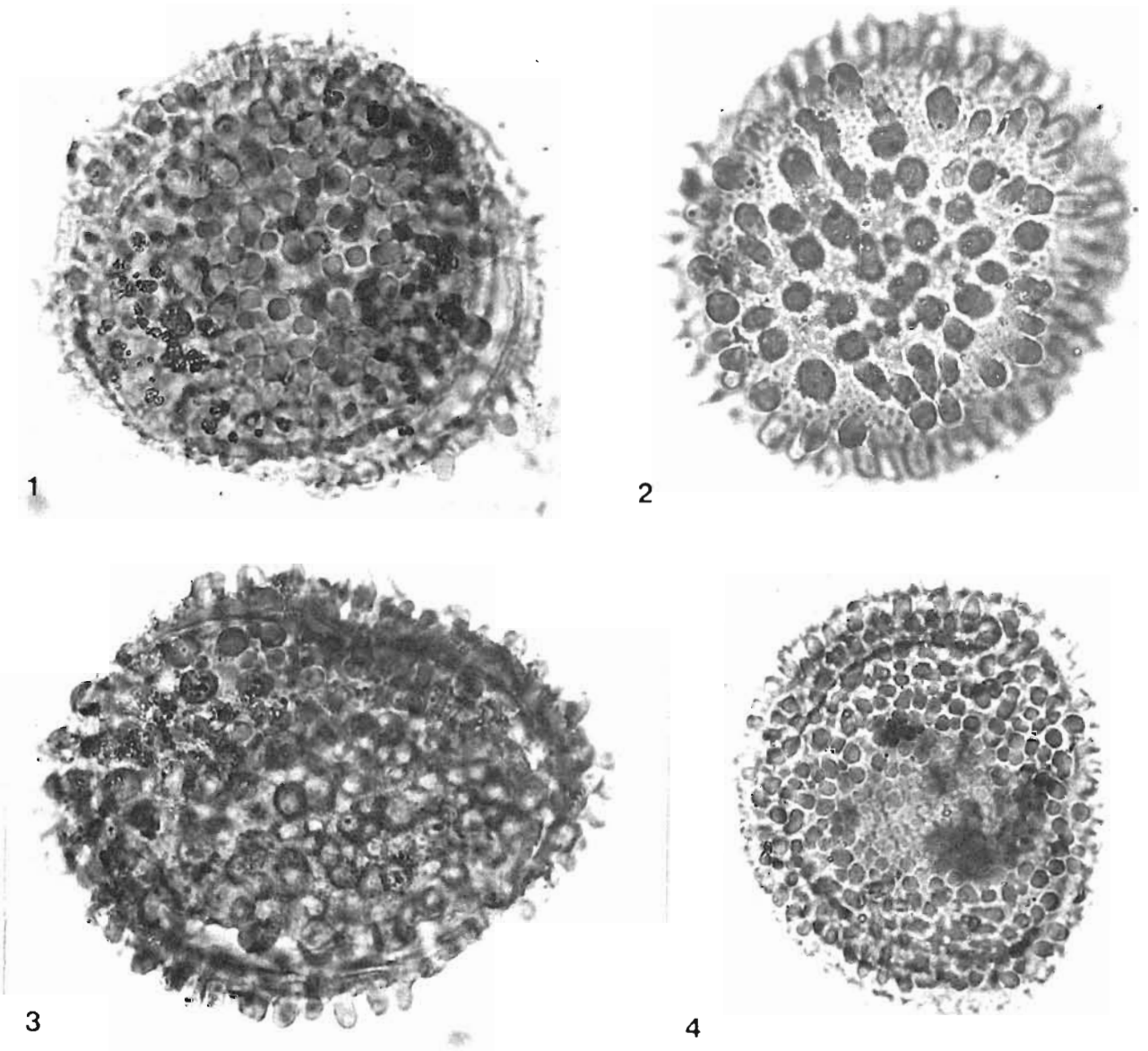


PLATE 1

(All photomicrographs are magnified × Ca 1000. Coordinates of specimens in slides refer to the stage of Leitz Laborlux microscope no. 513547).

1-4 *Kapurdipollenites gemmatus* gen et sp nov
1 Slide no BSIP 10892, Coordinates : 105 5 × 74.9
2 Slide no BSIP 10895, Coordinates : 110 4 × 70 5
3. Slide no. BSIP 10893; Coordinates . 98 1 × 50 7
4. Slide no BSIP 10891, Coordinates 111.6 × 56 4

Garcia de Mutis 1965 is gemmate but in this form the gemmae are locally grouped forming incomplete reticulations. *Racemonocolpites* (van der Hammen, 1954) ex Gonzalez Guzman 1967 is also monocolpate but exhibits closely placed gemmate, baculate-clavate sculpture, hence, is different from the present genus. *Neocouperipollis* Kar & Kumar 1987 has smaller aperture and bears only echinate ornamentation.

Retiverrumonosulcites barmerensis gen. et sp. nov

Pl. 2, figs 1-4

Holotype—Pl. 2, figs 1, 2; size 47 × 54 µm (excluding processes); Slide no. BSIP 10888; coordinates: 107.8 × 65.4.

Type locality—Well MJ-4 (depth 160 m from ground level) Jalipa, Barmer District, Rajasthan.

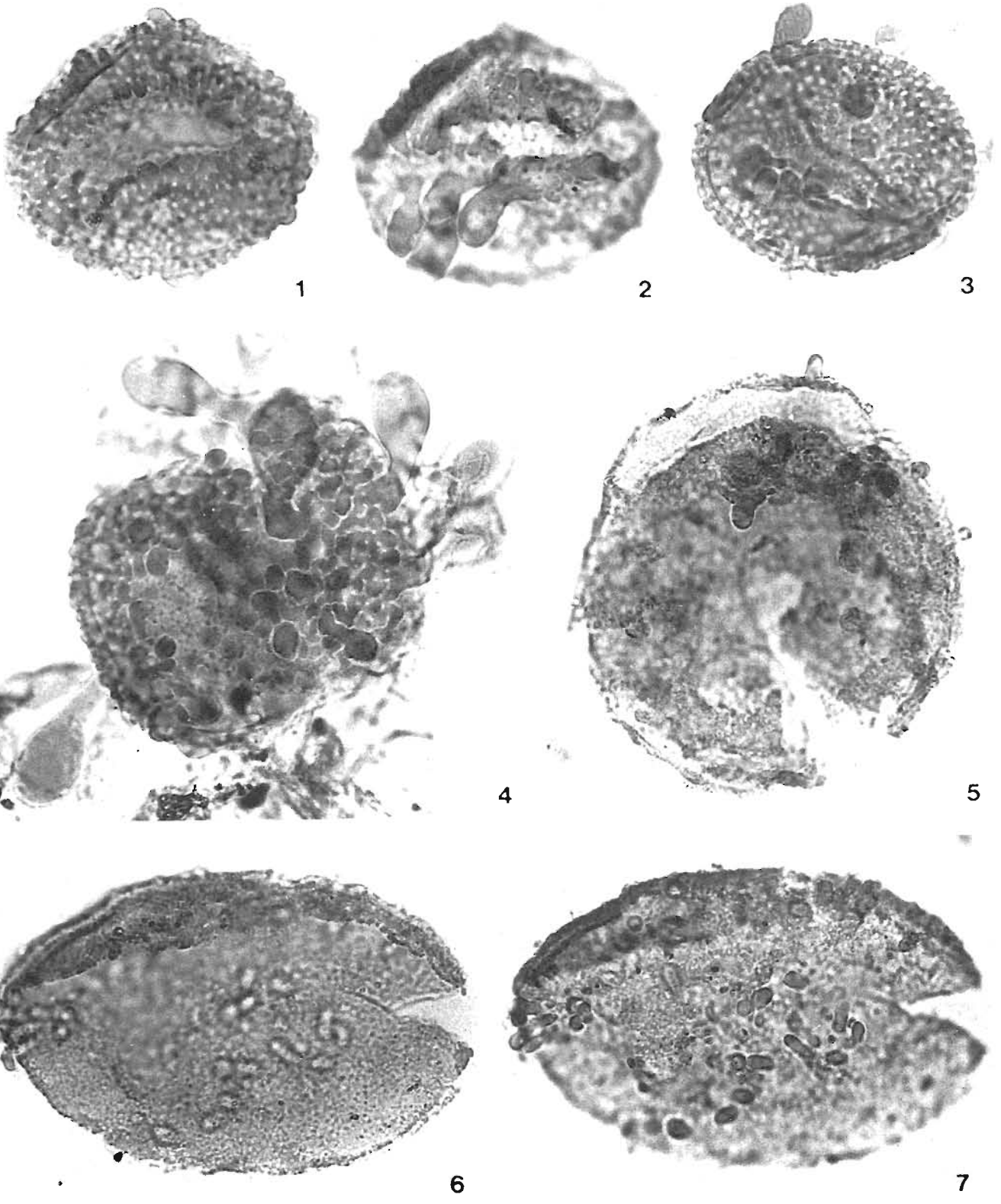


PLATE 2

Diagnosis—Pollen grains ovoidal in shape, 43-48 × 58 µm (excluding processes) in size. Monosulcate, sulcus not reaching up to the poles, possessing thickened lips. Exine 2-4 µm thick, microreticulate, muri about 1 µm across, lumina about 1 µm thick. Verrucae (2-5 µm in diameter) and clavae (7-23 µm long, 5-10 µm in diameter at distal part) present over the microreticulate surface.

Affinity—Arecaceae.

DISCUSSION

Zonisulcate pollen, viz., *Proxapertites* and *Assamialetes* are abundant in the Indian Palaeocene sediments and on the basis of their occurrence several palynological zones have been established in the Bengal Basin (Baksi & Deb, 1980) and Meghalaya and Assam (Sah & Dutta, 1974; Sah & Singh, 1974; Mehrotra, 1981). This indicates that plants producing these pollen were common during Palaeocene in this region. These pollen exhibit a large range of variation in exinal and apertural characters. In most of them sulcus is very long and only a small area of attachment between the two halves is left. For this reason split half parts of these pollen alongwith the complete grains have registered their frequent records in the Indian Early Tertiary sediments.

Proxapertites is psilate to microfoveolate and zonisulcate. *Assamialetes* is a coarsely reticulate, zonisulcate form and the two halves of this pollen get separated very easily. This pollen was previously considered as inaperturate (Sah & Dutta, 1966; Singh, 1975) but was later established as a zonisulcate form (Singh & Tripathi, 1986). The genus *Kapurdipollenites* gen. nov. is also zonisulcate and resembles *Assamialetes* in apertural characters, a feature considered as genetically controlled.

Zonisulcate pollen have been assigned to different genera and species mainly on the basis of exinal characters. Muller (1974) and Ambwani and Kar (1988) suggested transfer of some reticulate, zonisulcate taxa described under *Assamialetes* to *Proxapertites* but Singh and Tripathi (1986) maintained a separate status of both these genera. Therefore, in view of the stratigraphical potential of these pollen a careful detailed study of this group is suggested.

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PLATE 2

(All photomicrographs are magnified × Ca. 1000. Coordinates of specimens in slides refer to the stage of Leitz Laborlux microscope no. 513547).

1-4. *Retiverrumonosulcites barmerensis* gen. et sp. nov.
1,2. Slide no. BSIP 10888; Coordinates : 105.4 × 55.2
3. Slide no. BSIP 10890; Coordinates : 110.4 × 45.3
4. Slide no. BSIP 10888; Coordinates : 109.8 × 54.10

5-7. *Kapurdipollenites baculatus* sp. nov.
5. Slide no. BSIP 10894; Coordinates : 101.4 × 68.4
6,7. Slide no. BSIP 10893; Coordinates : 102.5 × 51.6