# A petrified flower from the Deccan Intertrappean beds of Mohgaonkalan, Madhya Pradesh, India

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The paper presents a description of petrified, monocot flower from Deccan Intertrappean beds exposed at Mohgaonkalan, Chhindwara District, Madhya Pradesh. The flower is sessile, ebracteate, bisexual, hypogynous, actinomorphic and 4.10 mm long and 2.28 mm broad. Perianth in two whorls. Stamens epiphyllous, dorsifixed. Pollen monosulcate, smooth walled. Ovary tricarpellary, syncarpous, superior. The specimen shows affinities with the family Liliaceae, hence named as *Liliaceopushpum deccanii* gen. et sp. nov. the specific name is after the Deccan Intertrappean beds.

***Key-words*** – Fossil flower, Liliaceae, Deccan Intertrappean.

## INTRODUCTION

SO far many angiospermic petrified flowers have been reported from Deccan Intertrappean beds of Mohgaonkalan. Among these *Sahnianthus parijai* (Shukla, 1944) was the first flower, after that Verma (1956) and Prakash (1956) redescribed *Sahnipushpum* and instituted two species *Sahnipushpum shuklai* (Verma, 1956) and *Sahnipushpum glandulosum* (Prakash, 1956); both of them are now considered as synonyms to each other (Prakash & Jain, 1964). The other known flowers are *Sahnianthus dinecterium* (Shukla, 1958), *Chitaleypushpum mohgaoense* (Paradkar, 1971), *Raoanthus intertrappea* (Chitaley & Patel, 1973), *Deccananthus savitrii* (Chitaley & Kate, 1972) and *Mohgaoanthus deccanii* (Dixit, 1984), Liliaceous inflorescence (Bonde & Kumaran 2000), *Monocotylostrobus bracteatus* (Bande, 1993) and *Flosfenina intetrappea*, *Flosvirulis deccanensis* (Kar et al, 2003), but the present flower is distinct from all the known flowers in having distinct characters.

The description of flower is based on a specimen collected from well known locality of Mohgaonkalan, Chhindwara District, Madhya Pradesh. After breaking the chert a flower like body was exposed. Serial sections of it were taken for anatomical detail by peel technique.

## DESCRIPTION

Flower was exposed in oblique manner with its apical and basal part juxtaposed to each other (Text figs. 1-4, Pl. 1, Fig.1). It is sessile, ebracteate actinomorphic, monochlamydous, urceolate, bisexual with epiphyllous stamens, three angled and six locular ovary.

Flower is 4.10 mm long and 2.28 mm broad in the middle. The perianth is oval; placed in two whorls, outer is polyphyllous formed by fusion of 3 unequal segments which are free at the apex and inner gamophyllous, thus showing the actinomorphic nature of the flower. (Text figs. 3-7; PI.1, Figs. 2-5). Perianth measures 245 µm thick and shows 3-4 layers of parenchymatous cells, outer most forms epidermis with cuticle followed by 3-4 layers of parenchymatous cells and inner epidermal layer with thin cuticle.

The serial sections show triandrous condition of the flower having three anthers (Text fig. 5; Pl. 1, Fig. 3). Anthers are epiphyllous and dorsifixed (Text fig. 7; Pl.1, Fig. 4) and arranged in single level. Anthers are two lobed and four locular and are 700-720 µm long and 400-450 µm broad (Text fig. 5; Pl. 1, Fig. 3).

The pollen sacs contain mature pollen grains, ready for dehiscence. Pollen grains are 12-25 x 25-35 µm, prolate, monocolpate, psilate, they are

triangular in polar view and appear compressed in equitoral view (PL. 2, Fig.1).

Initially ovary was adnate to the perianth lobes only on one side (Text Fig. 2,3; P1, I, Fig.1,2), no stalk was observed but later on it separates from the perianth and is tri-carpellary, syncarpous and superior (Text fig. 3; P1, 1, Figs.1, 2) thus, gynoecium consists of tricarpellary pistil but after few sections due to the formation of false septae it becomes six locular (Text figs. 6, 7; P1, 2, Fig. 2). The ovary is superior, 1.1 mm in length and 1.0 mm in diameter; stigma is simple, bilobed and is separated from the style (Text figs. 8, 9, P1. 2, Fig. 3).

## COMPARISON AND DISCUSSION

The specimen, a petrified flower, 4.10 mm long and 2.28 mm wide is sessile, hermaphrodite, hypogynous, ebracteate, actinomorphic with two whorls of perianth; 3 stamens, epiphyllous, dorsifixed; pollen grains prolate, monocolpate, smooth walled; pistil tricarpellary, sessile, ovary with axile placentation and stigma bilobed.

The structure of the pollen grains typically monocolpate and tricarpellary gynoecium brings it closer to monocotyledons. It is comparable with the genera of family Juncaceae and Liliaceae. In Juncaceae flowers are bisexual or unisexual, perianth of 3-6 segments in two whorls, stamens 6 and carpels 3-6 (Johnson, 1931) but difference lies in nature of pollen grains and number of stamens in this family. The pollen grains are in tetrahedral tetrads while flower under consideration shows monocolpate nature of pollen grains.

In Liliaceae flowers there are regular or irregular hypogynous or perigynous, bisexual or unisexual, trimerous, perianth is differentiated into calyx and corolla, stamens 6 rarely 3 in two whorls, gynoecium 3 carpellate, syncarpous, pollen grains usually monosulcate, less frequently trichotomosulcate, 2-sulcate (Erdtman, 1971).

The fossil is comparable with the flower of family Liliaceae, hence it is compared with different genera of family Liliaceae. In *Dracaena* Linn. where perianth is corolline, tubular, stamens 6, adnate to the base of the perianth, anthers versatile and ovary 3-celled, *Asparagus* Linn. perianth petaloid, 6-partite, funnel shaped, stamens 6, adnate to the base of the perianth segments, filaments free and ovary 3-celled.

*Disporum* Salisb. perianth is narrowly campanulate, deciduous; lobes 6, petaloid, subequal, stamens 6 and free hypogynous, anthers dorsifixed and ovary 3-celled. *Gloriosa* Linn. perianth petaloid, persistent, segments 6, stamens 6, hypogynous, anthers linear dorsifixed, versatile and ovary 3-celled. *Asphodelus* Linn. perianth petaloid, marcescent segments 6, free or shortly connate below. Stamens 6, hypogynous filaments dialated at the base; anthers versatile, and ovary 3-celled.

From above description, it is clear that present flower does not show resemblance with any genns of family Liliaceae, as in present flower perianth is arranged in two whorls, outer polyphyllous, inner gamophyllous. Stamens 3, dorsifixed, trilocular ovary becomes 6 locular due to false partition.

The fossil flowers known from Deccan Intertrappean beds show dicotyledonous affinities except the flower of *Deccananthus savitrii* (Chitaley & Kate, 1974), *Monocotylostrobus bracteatus* (Bande,1993), liliaceous inflorescence (Bonde & Kumaran 2000) which suggests the monocotyledonous affinity. *Deccananthus savitrii* is characterized by two whorls of perianth, six stamens at two levels, trichotomosulcate pollen and tricarpellary, syncarpous gynoecium, ovary trilocular having axile placentation, however in the present flower though the perianth whorls are two but the stamens are three in numbers. Pollen grains are monosulcate or monocolpate; further in the specimen gynoecium is tricarpellary, syncarpous having false septation, in between one seeded part at

**PLATE-1**

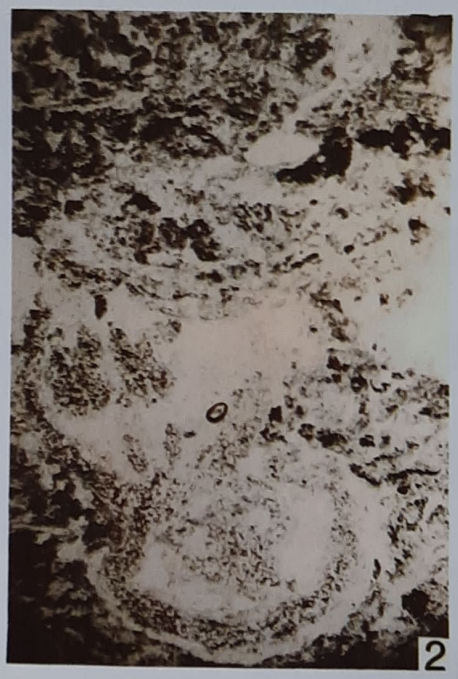
1-2 Oblique t.s. of flower, showing adnation of ovary with 3 locules. x 45

3 Oblique t.s. of flower to show 3 stamens. x 45

4 Oblique t.s. of flower to show dorsifixed epiphyllous stamens with six locular ovary. x 45

5 Later stage of flower showing anthers and stigma. x 45.


1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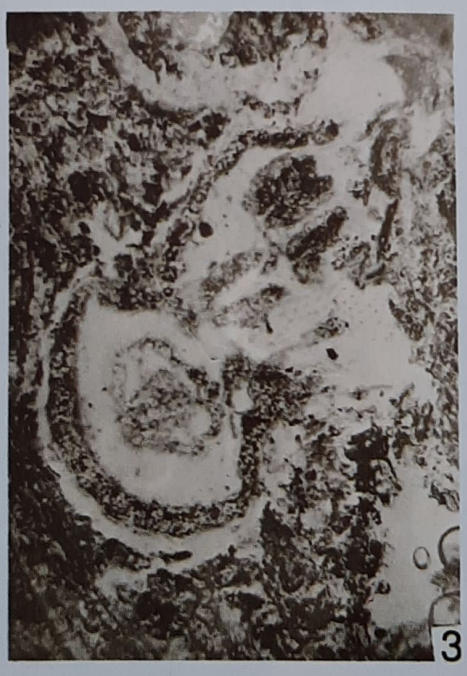
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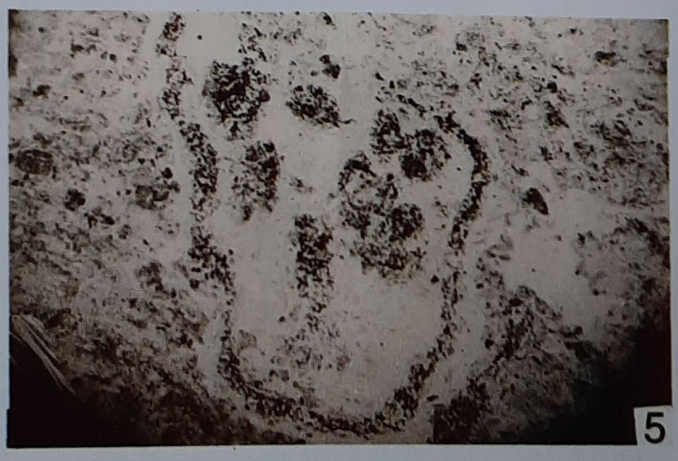
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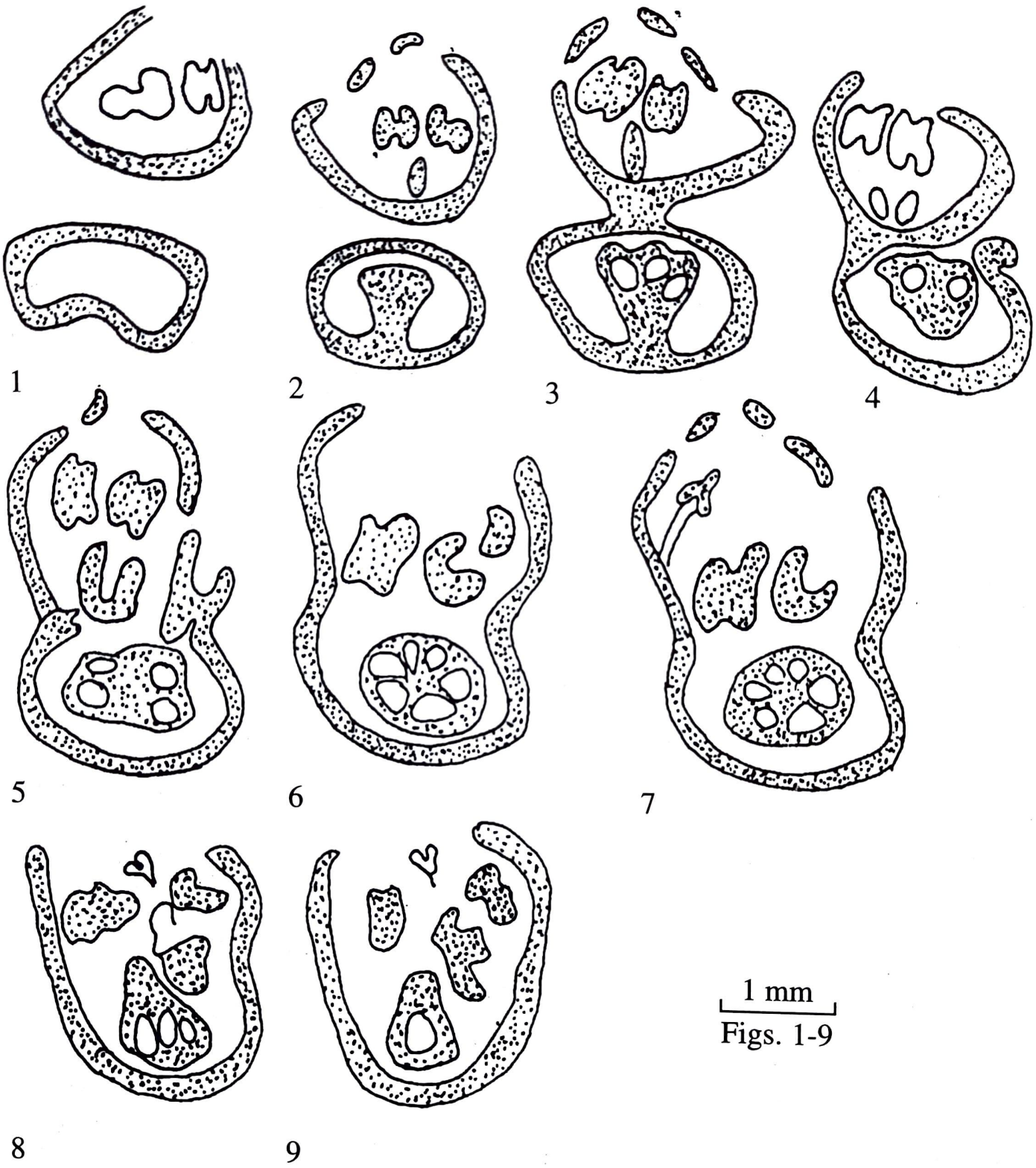
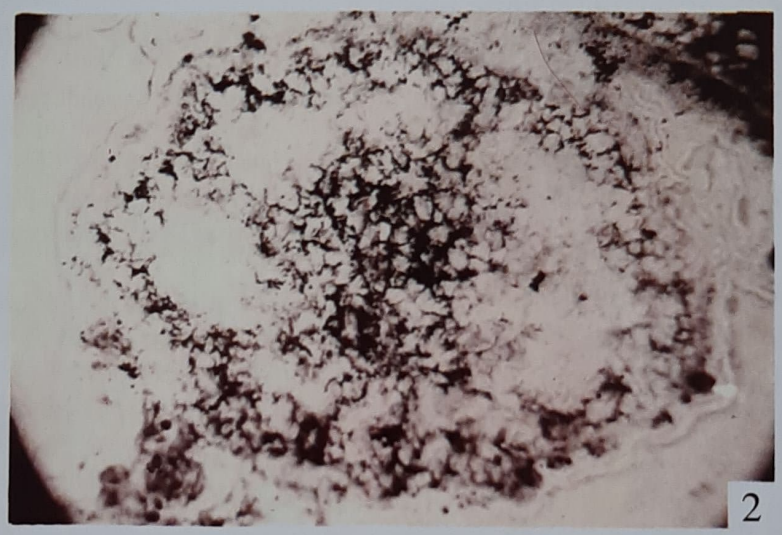



Text-figs. : 1-2 : Oblique t.s. of flower; 3 : Oblique t.s. of flower to show adnation of ovary and stamens; 4-5 : Oblique t.s. of flower showing presence of three stamens; 6 : Oblique t.s. showing six locular ovary and three stamens; 7 : Oblique t.s. of flower showing dorsifixed epiphyllous stamens and six locular ovary and unequal lobes of perianth; 8-9 : Later stages of flower showing anthers and stigma.

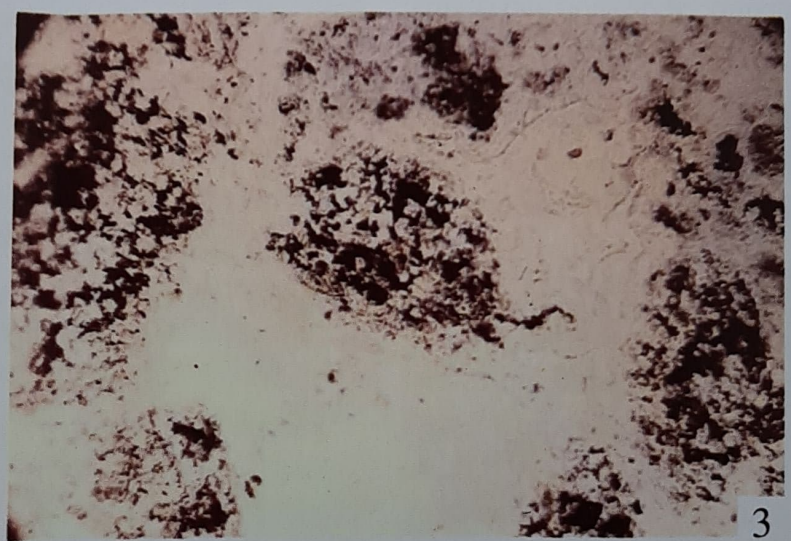




**PLATE-2**

1. Pollen grains magnified. X 750
2. T.S. through ovary. X 750
3. Stigma magnified. X 750..

later stages, making the ovary hexalocular. *Monocotylostrobus bracteatus* is a liliaceous inflorescence bearing unisexual flowers, thus varying from the present flower. It is also not comparable with liliaceous inflorescence (Bonde & Kumaran 1993). All these characters suggest the affinity of the fossil flower to the family Liliaceae, although it can not be assigned to any specific genera.

## DIAGNOSIS

***Liliaceopushpum*** gen. nov.

Flower monocotyledonous, sessile, actinomorphic, ebracteate, hypogynous, bisexual, perianth in two whorls; androecium with 3 stamens, epiphyllous, dorsifixed, ovary tricarpellary, syncarpous, sessile; placentation axile.

***Liliaceopushpum deccanii*** gen. et sp. nov.

Flower petrified, sessile, ebracteate, bisexual, hypogynous, actinomorphic, 4.10 mm long and 2.28 mm broad. Perianth in two whorls, outer polyphyllous and inner gamophyllous having tips free. Stamen 700-720 μm long and 400-450 μm broad, anthers dorsifixed. Pollen not clear, 12-25 x 25-35 μm, prolate, monocolpate, smooth walled. Ovary tricarpellary syncarpous superior, style short and stigma bilobed.

*Holotype* : Specimen MOH/SDN/Botany Department, Institute of Science, Nagpur.

*Locality* : Mohgaonkalan, District Chhindwara, Madhya Pradesh.

*Horizon* : Deccan Intertrappean Beds.

*Age* : Tertiary.

## REFERENCES


Bande, M B 1993. Further observation on the structure and affinities of *Monocotylostrobus bracteatus* Lakhanpal, Prakash and Bande from the Deccan Intertrappean beds of India. *Palaeobotanist* 42(1) : 78-85.

Bonde, S D & Kumaran, K. N 2000. A lliaceous inflorescence from the Deccan Intertrappean beds of India. *Curr. Sci.* **65** : 776-778.

Chitaley, S D & Kate, VR 1972. *Deccananthus savitrii* gen. et sp. nov., a new petrified flower from the Intertrappean series of India. *Palaeobotanist* **21** : 317-320

Chitaley, S D and Patel, M Z 1973. *Raoanthus intertrappea,* a new petrified flower from India. *Palaeontographica* **153** : 141-149.

Dixit, V P 1984. Palaeobotanical studies of Deccan Intertrappeans. *Ph.D. Thesis, Nagpur University, Nagpur.*

Johnson, A.M. 1931. Taxonomy of the flowering plants. The Century Co., New York.

Kar, R K, Ambwani, K, Sahni, A & Sharma, P 2003. Unisexual flowers from the Deccan Intertrappean Bed of Madhya Pradesh, India. *Palaeobotanist* **52** : 73-79.

Paradkar, S A 1971. *Chitaleypushpum mohgaoense* gen. et sp. nov., from the Deccan Intertrappean beds of India. *Palaeobotanist* **20** : 334.

Prakash, U. 1956. On the structure and affinities of *Sahnipushpum glandulosum* sp. nov., from the Deccan Intertrappean Series. *Palaeobotanist* **4** : 91-100.

Prakash, U & Jain S K 1964. Further observations on *Sahnipushpum shuklai. Palaeobotanist* **12** : 128-138.

Shukla, V B 1944, On *Sahnianthus* a new genus of petrified flower from Intertrappean beds of Mohgaonkalan in the Deccan and its relation with the fruit *Enigmocarpon parijai* Sahni, from the same locality. *Proc. Natn. Acad. Sci. India* **14** : 1-31.

Shukla, V B 1950. *Sahnipushpum* gen. et sp. nov. and other plant remains from the Deccan Intertrappeans. *J. Ind. bot. Soc.* **29** : 29.

Shukla, V B 1958. *Sahnianthus dinecterium* sp. nov. a new species of the petrified flower from the Eocene beds of the Deccan. *J. palaeont. Soc. India* **3** : 114-118.

Verma, J.K. 1956. On a new petrified flower, *Sahnipushpum shuklai* sp. nov., from the Intertrappean beds of Mohgaonkalan in the Deccan. *J. palaentol. Soc. India* **2** : 131-141.