

ON THE POLLENGRAINS AND POLLINATION OF *SAHNIANTHUS*
PARIJAI SHUKLA FROM THE INTERTRAPPEAN BEDS OF
THE DECCAN

J. N. DWIVEDI

T. D. College, Jaunpur (U.P.), India

AND

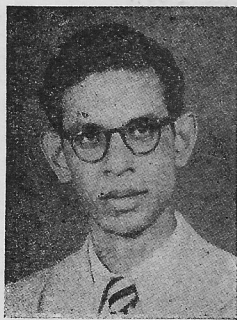
R. K. SHUKLA

Govt. College of Science, Raipur (M.P.), India

ABSTRACT—An excellent specimen of *Sahnianthus* flower exhibiting pollengrains on the stigma, and also early stages of pollination, is described from the Mohgaon Kalan locality. The structure of the pollengrains is now fairly worked out. These are spherical or slightly oval in shape, double walled, having exine and intine, both intact. Both the walls are smooth, exine being comparatively thicker than the intine. Both the walls taken together are 1.05μ thick. Pollengrains vary in size from 13.2μ in diameter (smallest) to $21.1\mu \times 15.8\mu$ (biggest and oval). Most of the pollengrains are unicellular, some bicelled. Some of these show a clear nucleus which measures 2.63μ in diameter. The pollengrain contents are granular. In some cases where the papillate stigmatic surface is covered with pollengrains, germination and formation of tiny pollen tubes amidst stigmatic papillae is also seen.

INTRODUCTION

THE discovery of the pollengrains of *Sahnianthus* was first made by Prof. V. B. Shukla (Shukla, 1941, 1944) when he



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recorded both isolated pollengrains as well as those *in situ*, inside the anthers of *Sahnianthus*. Prof. Shukla has also recorded in these pollengrains the occurrence of some germ pores and even a body resembling nucleus. Since then a large quantity of petrified material of the intertrappean cherts has been collected and sliced by him for various investigations and in one of these slices we came across a *Sahnianthus* flower which besides revealing other floral details showed a remarkable mass of pollengrains (Pl. 15, fig. 1; text-fig. 1) lying just over the stigmatic surface. Some more pollengrains were also found in this flower lying either

scattered or inside the dehisced anthers. The object of the present paper is to record a further detailed study of these pollengrains.

MATERIAL AND METHOD

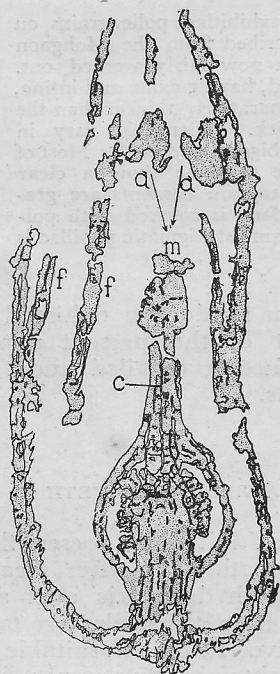
The slice exhibiting the present flower was polished smoothly and after treating this surface with hydrofluoric acid according to adjusted time, the peels were taken with Duco dissolved further in suitable solvents. The peels obtained thus were surprisingly enough extremely thin and could be taken out in fairly large sizes of uniform thickness. These peels could be cut with the ease of tissue paper into desirable size and mounted in canada balsam. Some of these were stained with safranin though unstained sections often gave better results. Dr. Chitale has recorded (Chitale, 1955) that the pollengrains in her material, though collected from the same locality, got completely dissolved in hydrofluoric acid leaving no trace in the peel sections. May be those pollengrains were completely silicified.

Recently, Mr. Verma has also been successful in getting groups of pollen grains in his material of *Sahnipushpam Shuklai* from Mohgaon Kalan (Verma, 1956 a, b), and again in a *Sahnianthus parijai* specimen from the same locality lying in the neighbourhood of a new *Enigmocarpon* fruit (Dwivedi, 1956) numerous pollen grains have been found preserved.

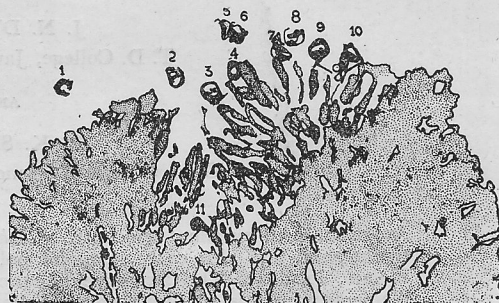
DESCRIPTION

The preservation of the flower is excellent. It measures 6×2 mm. and is cut longitudinally (Pl. 15, fig. 1; text-fig. 1). The hypanthium and the essential whorls are both

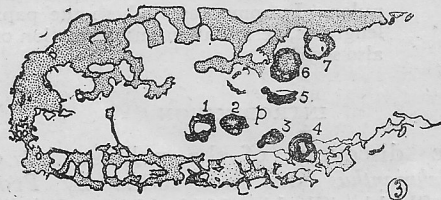
well preserved. Ovary is raised on a short stalk. Style measures 0.92 mm. in length and 0.42 mm. in width at the base and 0.18 mm. at the apex. A clear styler canal is visible direct from stigma to the ovary (Text-fig. 1c). Stigma 0.55 mm. in height and 0.45 mm. in breadth. Only two dehis-



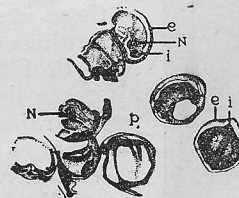
1—*S. Parijai* flower a, two dehisced anthers ; m, pollengrain mass on the stigmatic surface ; c, stylar canal ; f, filaments of stamens (x 3.75).



2—A group of eleven (1-11) pollen grains *in situ* on the stigmatic surface, some with developing pollen tubes (x 47).



3—A pollen sac with pollengrains, p (1-7) inside it, some with germ pores (x 53).



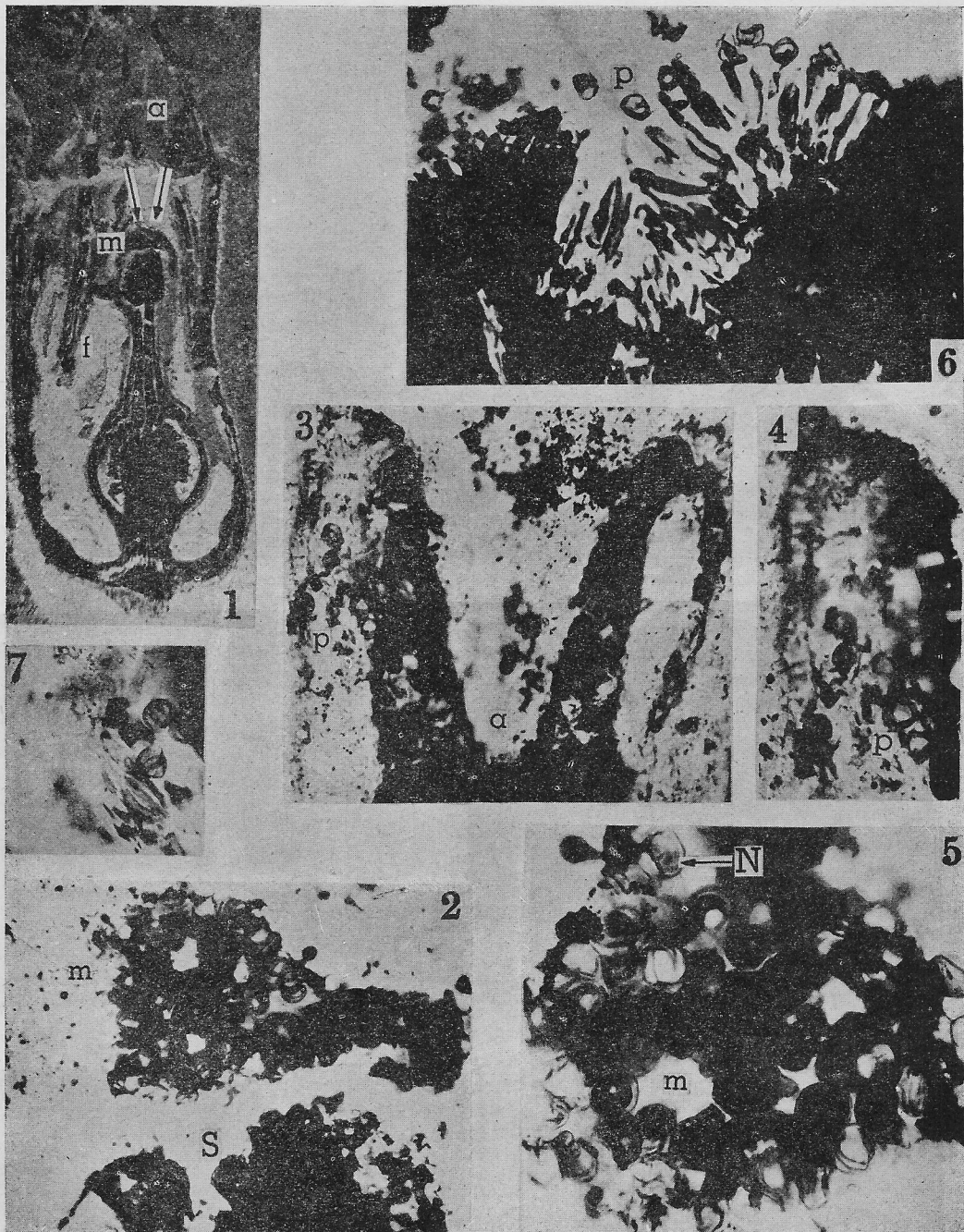
4—A group of pollengrains p from the stigmatic surface, e, exine ; i, intine ; N, nucleus of the pollengrain (x 83).

Text-Figs. 1—4.

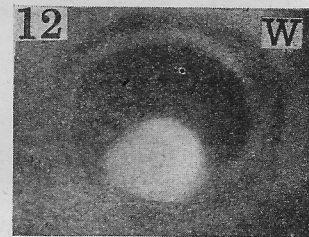
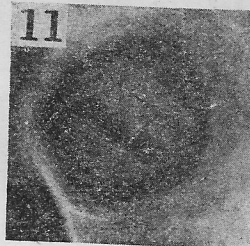
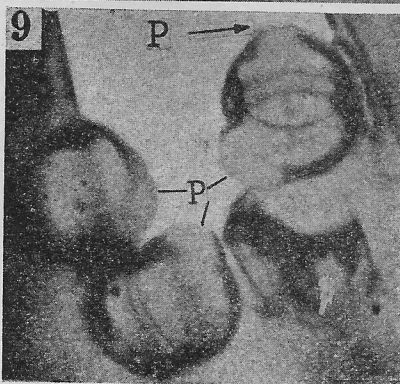
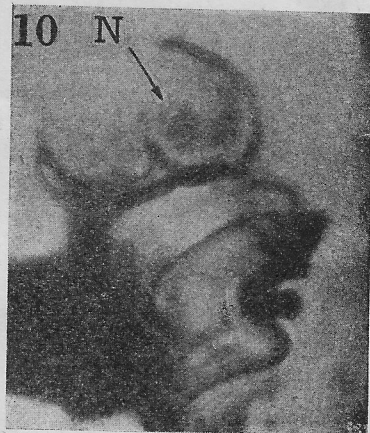
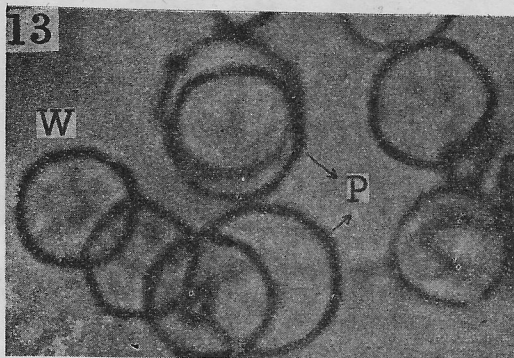
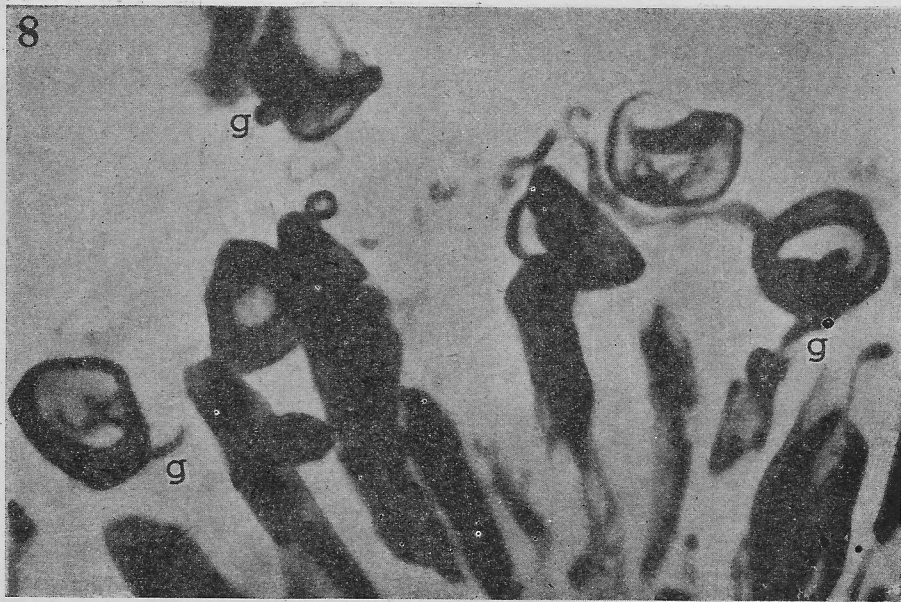
EXPLANATION OF PLATE 15

(The photographs are all from untouched negatives.)

- FIG. 1—Sectional view of the flower *Sahnianthus* with two split up anthers (a), pollengrain mass (m), filament (f). x 15.
 2—A portion of the stigmatic surface (S) with pollengrain mass (m). x 217.
 3—One complete split up anther (a) showing pollengrains (p) inside the anther lobes. x 90.
 4—One enlarged anther lobe with pollengrains (p). x 220.
 5—Pollengrain mass (m) very much enlarged showing a prominent nucleus (N). x 362.
 6—A portion of papillate stigmatic surface with eleven pollengrains (p). x 163.
 7—Four pollengrains from an anther lobe. x 220.



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ced anthers are seen in this section with their detached episepalous filaments (Pl. 15, figs. 1, 3 and 4).

POLLENGRAINS

As mentioned above, quite a few peel sections were taken successively from the slice. These peel sections were like several microtome sections and had an approximate thickness of 0.1 mm. The first peel section showed a mass of pollen grains numbering approximately two hundred lying just a little above the stigmatic surface (Pl. 15, figs. 1, 2 & 5,m). After taking four more peels, the next peel revealed nearly eleven additional pollen grains lying just on the stigmatic papillae (Pl. 15, fig. 6,P; text-fig. 2, 1—11). These two peel sections could thus afford a good opportunity for studying the details of the pollen grains.

Pollengrain mass—The pollengrain mass lying near the stigmatic surface is 0.34×1.7 mm. and comprises nearly two hundred pollen grains (Pl. 15, fig. 5,m). Each pollen grain is round or oval in shape and is mostly bicelled (Pl. 16, fig. 11 & 12). These are always double walled having both exine and intine intact (Pl. 16, figs. 9, 10, 11 & 12 ; text-fig. 4).

Pollengrains lying on the stigmatic surface—These pollen grains are exactly similar to those found in the mass mentioned above and are of four varying sizes : $21.1\mu \times 15.8\mu$; $18.4\mu \times 15.8\mu$; $15.8\mu \times 13.2\mu$ and $13.2\mu \times 13.2\mu$.

The exine seems thicker than the intine (Pl. 16, figs. 8 & 12 ; text-fig. 4). The thickness of both the walls taken together is nearly 1.05μ . The contents of the pollen sac are not much seen except for their granular nature but in a few cases the nucleus too is very well preserved (Pl. 16, fig. 10, text-fig. 4,N). It is nearly round and

measures 2.63μ in diameter. These pollen grains, it may be mentioned, are exactly similar to those occurring inside the antherlobes *in situ* (Pl. 15, figs. 3, 4 & 7; text-fig. 3) as well as those described by Prof. Shukla in his specimen (Shukla, 1944). Mostly the pollen grains are unicellular while some are bicellular (Pl. 16, figs. 11 & 12 ; text-figs. 3 & 4).

These pollen grains very much resemble the pollen grains of the living genus *Ammania* (Pl. 16, fig. 13) and certain other members of the family Lythraceae to which this fossil genus has already been referred by Prof. Shukla (Shukla, 1944). The general form, the germ pores (Pl. 16, fig. 9), the two walls (Pl. 16, figs. 11 & 12), the nucleus (Pl. 16, fig. 10 ; text-fig. 4,N) and the granular nature are some of the features of closest resemblance with the living forms. The only point of difference is their comparatively smaller size.

GERMINATING POLLENGRAINS:

POLLINATION

Though a large number of pollen grains lying in the mass described above were without clear germ pores, those lying on the stigmatic surface developed clear outgrowths. Some of these pollen grains also show indications of tiny pollen tubes (Pl. 15, figs. 6 & Pl. 16, fig. 8 ; text-fig. 2) which being fairly narrow got quite mixed up with the stigmatic papillae. The maximum length of a pollen tube observed was 7.9 u.

ACKNOWLEDGMENT

The authors are extremely grateful to Prof. V. B. Shukla for his kind guidance and also permission for comparing the present specimen with his large collection of the Intertrapean flora.

EXPLANATION OF PLATE 16

(The photographs are all from untouched negatives.)

- Fig. 8—A few stigmatic papillae very much enlarged with germinating pollen grains and germ tubes (g). $\times 730$.
 9—Four pollen grains highly enlarged showing clear swellings of germ pores (P). $\times 750$.
 10—Two pollen grains greatly magnified, one with a clear nucleus (N). $\times 1900$.
 11—A single bicelled pollen grain. $\times 1900$.
 12—A single unicelled pollen grain with its clear two walls (W). $\times 1900$.
 13—A group of living pollen grains of *Ammania* with clear germ pores (P) and their two walls together (W). $\times 560$.

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