

# Further contribution towards petrified flower “*Sahnianthus*” from the Deccan Intertrappean Beds of India.

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## INTRODUCTION:

The present chapter deals with the further investigation of a contribution to the knowledge of a *Sahnianthus* flower, the specimen collected from the Deccan Intertrappean series of Mohgaonkalan, M.P., India. Flowers, being delicate structure, are of rare occurrence in fossil floras. So, from the Deccan Intertrappean series some flowers so far have been reported, they are- *Sahnianthus* (Shukla, 1943[23]; 1944[24]; Chitaley, 1955[2]); *Sahnianthus parijai* (Shukla, 1948[25]; Dwivedi & Shukla, 1958[10]; Paradkar & Senad, 1984[18]; Sakundarwar et al., 2012[21]); *Sahnianthus dinecterium* (Shukla, 1958[27]; Dayal, 1967[7]); *Sahnipushpum* (Shukla, 1950[26]); *Sahnipushpum shukla* (Verma, 1956[29]); Prakash & Jain, 1964[20]; Chitaley, 1964[3]; Ambwani et al., 2001[1]; Kapgate et al., 2011[12]); *Sahnipushpum glandulosum* (Prakash, 1955[19]) *Chitaleypushpum mohgaoense* (Paradkar, 1971[17]; Kokate et al., 2011[15]); *Deccananthus savitrii* (Chitaley & Kate, 1972[4]); *Raoanthus intertrappea* (Chitaley & Patel, 1975[5]); *Flofemia intertrappea* (Kar et al., 2003[9]); *Flofvirulis deccanensis* (Kar et al., 2003[9]); *Mohgaoanthus deccanii* (Dixit, 2003[8]); *Chenopodioanthus mohgaoense* (Kapgate et al., 2006[13]); *Tetranplasandranthus deccanii* (Kapgate et al., 2009[14]). The present flower specimen described here is collected from well known locality Mohgaonkalan, and other such as Keria and Paladaun near Mohgaonkalan, Chhindwara Dist. M.P., India. All the specimens are well preserved, and similar to *Sahnianthus parijai* but exhibits some new characters & hence it is studied out and considered for further study.

## MATERIAL AND METHOD:-

The specimens of this flower had been collected from the Deccan Intertrappean beds of India. The fossils were recovered by physically breaking pieces of chert with hammers, there by exposing three specimens of the flowers longitudinal fractures, unfortunately the counter part of one specimens was missing. Serial sections from each broken surface were prepared by the Cellulose Acetate peel technique. The exposed surface of the specimen was first smoothed by rubbing on a glass plate using a slurry of fine grade carborandum powder. It was then etched with a few drops of 40% hydrofluoric acid and then washed gently in running water to remove all traces of acid. After drying a few drops of butyl acetate were placed on the etched surface with care to prevent entrapping small air bubbles in the peel solution. The specimen was held horizontally allowing the peel solution to spread evenly, and then air-dried for 4–6 hours in a dust free environment. The peel was removed by starting an edge with a scalpel or razor blade and then carefully pulling it off by hand. Resulting peels were immediately placed under pressure in a clamp to flatten. By repeating the same technique a succession of peels were produced. In other instances, peels were prepared from sliced surfaces of the chert by the standard cellulose acetate method (Darrh H.C. [6]). The peels were mounted on microscope slides under cover slips in the usual manner using Canada balsam or D.P.X. synthetic resin and photographed. The camera lucida sketches of the slides were drawn for detailed study of flower cut in transverse and longitudinal plane.

## DESCRIPTION:-

### Specimen No. 1 (L.S. flower no.1)

#### Locality - Mohgaonkalan

The petrified fossilized specimen is nicely preserved and exposed longitudinally. Serial longitudinal peel section was taken only through its part because as its counter part is missing. This flower from its longitudinal plane showing well preserved ovary with ovules, perianth and pedicel but stamens are not observed, (Plate I Fig.1) as observed in other specimens. The flower shows following anatomical details:-

**Flower:-** A flower is 1.5 mm wide (Plate I Fig.1) it's length is not possible to measure unfortunately it's upper part is missing.

**Pedicle:-** Long and prominent ; slightly bent on a side . It is 3.5mm long and 0.38mm wide, thick with vascular tissues seen in L.S. Pedicle has a central vascular cylinder, the detailed structure is clearly visible (Plate I Fig 2). The vasculature and cortical zone is well preserved. They are elongated and straight walled lie in longitudinal rows. No stomata are seen and there is no evidence of any emergence (Plate I Fig 5).

**Bract:-** Not preserved.

**Bracteole:-** Not preserved.

**Perianth:-** It is well preserved but only towards surrounding the ovary so not possible to count the length but it's width is 0.12-0.15mm. Cellular structure fairly well preserved. Outermost is epidermis, this is followed by layers of parenchymatous. The vasculature supply of the calyx is not well observed.

**Androecium:-** Not preserved.

**Gynoecium:-** A carpel consist of spherical ovary and small part of style , the stigma is not preserved. The preserved style part is very short so not possible to measure exact length, it is 0.14 mm wide. The ovary is stalked, superior and 0.95mm in diameter. Ovary is raised on a thick short stalk in which the vascular bundles can be seen. The ovary wall measures 0.13 mm in thickness, differentiated into an outer thick-walled and inner thin-walled region. The ovules are attached to the central axis of the flower indicating the axile placentation, the septa extending upto the base of the style and thus partitioning the ovary completely (Plate I Fig.2). The axis of the placenta is a cylindrical about 0.5 mm in diameter, consisting of a parenchymatous pith (Plate I Fig 2) and cortex. The ovules are arranged in two vertical rows. Ovules are long raised on a short funicle and each on an average is 0.16 mm long.

### **Specimen No. 2 (L.S. flower no.2)**

#### **Locality - Keria**

The longitudinal description of the flower is based on both of sections (part and counterpart) showing nicely preserved gynoecium, perianth, pedicel and ill preserved androecium. The flower is long styled.

**Flower:-** The flower is long, stalked, with nicely preserved gynoecium showing stigma, style and ovary but observed ill-preserved androecium as observed in other specimens. A flower is 8 mm in length and 2.75mm in breadth at the centre.

**Pedicel:-** It is not observed in part section because the section is obliquely longitudinally cut but it appear in counter part section. . It is 1.38mm long and 0.45mm thick in L.S. It consist of epidermis followed by thick walled parenchymatous tissue with centrally situated vascular supply.

**Bract:-** Not preserved.

**Bracteole:-** Not preserved.

**Perianth:-** It is well preserved and measures 6.00 mm long and 0.25 mm broad at base with narrow towards the tip .It is tubular .Cellular structure fairly well preserved. Outermost is epidermis, this is followed by outer 3-4 layers of thick-walled parenchymatous cells and inner 4-5 layers of thin walled parenchymatous cells (Plate I Fig.9).The epiphyllous condition of androecium is observed by identifying the remnant of filament attached the perianth wall at one place . (Plate I Fig.8)

**Androecium:-** Single ill preserved androecium is found near the style and stigma region of the flower (Plate I Fig.6,11).

**Pollen grains:-** Some ill preserved pollen grains are observed inside the anther. The detailed structure is not clear (Plate I Figs.11,12,13).

**Gynoecium:-** It is 4.5 mm in total length comprising a stalked spherical ovary, the elongated style and a capitate stigma. The ovary is raised on a stalk about 0.5 mm long and 0.35 mm in average diameter. Vascular supply is visible in the stalk of the ovary. Style 1.38 mm in length and 0.13 mm in diameter. Stigma oval, 0.75 mm in length and 0.5 mm in diameter. The ovary wall measures 0.14 mm in thickness, differentiated into an outer thick-walled and inner thin-walled layers of parenchymatous region. Placentation is in continuation with the style and appears to be axile. The ovules are arranged in two vertical rows. Ovules are long and narrow, about eight in each row. The ovules are attached to the central axis of the flower indicating the axile placentation, the septa extending upto the base of the style and thus partitioning the ovary completely. The axis of the placenta is a cylindrical about 0.5 mm in diameter, consisting of a parenchymatous pith (Plate I Fig.10) and cortex. The ovules are arranged in two vertical rows. Ovules are long; it is raised on a short funicle and each on an average is 0.16 mm long.

### **Specimen No. 3 (L.S. flower no.3)**

#### **Locality - Paladaun**

The specimen was found longitudinally, the following description of the flower is based on the two sections (part and counterpart) are showing gynoecium, perianth and pedicel. The flower is short styled.

**Flower:-** The flower is medium sized, it is 7.5 mm long and 1.85 mm wide at the middle (Text III Fig.5). After observing both part and counter part the gynoecium region, perianth and pedicel are fairly well preserved and some ill-preserved part of androecium was observed (Plate II Fig.16).

**Pedicel:-** The stalk is not observed on the part section, but on counterpart the stalk is clearly seen and its length increases as further the continuous peel section . It is quite prominent and bent on one side. It measures 1.65 mm long and 0.45 mm in thickness. The cellular structure is clearly observed as observed in other specimens (Plate II Fig.11).

**Bract:-** Not preserved.

**Bracteole:-** Not preserved.

**Perianth:-** It is well preserved and measures 5.75 mm long and 0.26 mm broad at base with narrow towards the tip; it is tubular. Cellular structure fairly well preserved. Outermost is epidermis, this is followed by outer 3-4 layers of thick-walled parenchymatous cells and inner 4-5 layers of thin walled parenchymatous cells (Plate II Fig.12).

**Androecium:-** Not well preserved. But some blackish structure showing the appearance of pollen grains (Plate II Fig.16).

**Gynoecium:-** It is 1.58 mm in total length comprising a stalked spherical ovary, the short style and a capitate stigma. Vascular supply is visible in the stalk of the ovary (Plate II Fig.13). Style short and 0.47 mm in length and 0.35 mm in diameter. Stigma capitate 0.42mm in length and 0.38 mm in diameter. The ovary wall measures 0.1 mm in thickness, differentiated into an outer thick-walled and inner thin-walled layers of parenchymatous region. Placentation is not well preserved but appears axile. The ovules are not observed.

### DISCUSSION, IDENTIFICATION AND COMPARISON:-

The three specimens described above are similar in structure but none of them is quite complete, so all 3 specimens give a connected account of the flower as a whole.

The following important characters are considered for the identification of the flower.

- Flower is pedicellate, actinomorphic, bisexual.
- Perianth gamophyllous of 6-8 members arrange in one whorl, valvate aestivation.
- Anthers 8-12, epipetalous, protandrous, arising from near the top of the calyx tube, some opposite and some of them alternating with perianth, filament short, dorsifixed with four elongated pollen sacs dehiscing longitudinally
- Pollen grains round, tricolpate and psilate.
- Gynoecium with simple stigma; long and short length style and a spherical ovary on a short stalk.
- Ovary superior.

### Comparison with reported fossil dicot flowers:-

The present flower is compared with the reported fossil dicot flowers:-

It is compared with the *Sahnipushpum* (Shukla, 1943[23]; 1944[24]; Chitale, 1955[2]) *Sahnipushpum shuklaii* (Prakash & Jain, 196[20];) *Sahnipushpum glandulosum* (Prakash, 1955[19]) consist of 4-5 locular ovary and presence of glands on perianth and ovary wall while the present specimen with 8 locular ovary with epipetalous anthers and without glands on perianth and ovary wall.

It is compared with *Chitaleypushpum mohgaonse* (Paradkar, 1971[17]), consist of short lengthed flower i.e. 3.5 mm in length and sessile ovary while the present specimen is totally different in having a stalked ovary and it is upto 6.5 mm in length.

It is compared with *Deccananthus savitri* (Chitale & Kate, 1972[4]) which is tricarpeal, stamens 6; and 6 perianth lobe arranged in two whorls, it differs from present flower in having 8 locular ovary; 11-12 stamens and 7-8 perianth lobe arranged in one whorl.

It is also compared with *Raoanthus intertrappea* (Chitale & Patel, 1975[5]) having zygomorphic nature and inferior ovary but present flower is actinomorphic with superior ovary.

It is also compared with *Flofemia intertrappea* and *Flofvirulis deccanensis* (Kar et al., 2003[9]) differs from present in having unisexual female and male flower respectively.

*Mohgaonanthus deccanii* (Dixit, 2003[8]); *Chenopodioanthus mohgaonii* (Kapgate et al., 2006[13]) and *Tetraplasandranthus deccanii* (Kapgate et al., 2009[14]) is different from present flower having polypetalous condition and bicarpeal ovary whereas present flower is gamophyllous with 8 locular ovary.

After comparison with all reported fossil dicot flowers, it shows close resemblance with *Sahnianthus* (Shukla, 1943[23]; 1944[24]; Chitale, 1955[2]).

The present flower is compared in details with different varieties & species of *Sahnianthus* Shukla, 1943[23]; 1944[24]; Chitale, 1955[2] reported from the Deccan Intertrappean series of India. Of all the fossil flowers, present flowers resembles with *Sahnianthus parijai*. (Shukla, 1948[25]; Dwivedi & Shukla, 1958[10]; Paradkar & Senad, 1984[18]; Sakundarwar et al., 2012[21]).

As evident from the above description, the present flowers show following important common characters shared by this flowers & *Sahnianthus parijai*.

- Flower is pedicellate, bisexual, actinomorphic, heterostylous, hypogynous.
- It is observed that the three longitudinal specimens described above are varying 5.5 mm to 8 mm in length and 1.5 mm to 2.75 mm in breadth.
- The perianth lobes are 8, arranged in one whorl, gamophyllous but upper 1/3rd free with valvate aestivation.
- Stamens are 11-12 and epipetalous and are of unequal in length because of their insertion on throat of calyx tube at various heights. Filaments are short and curved inwards. Anthers are dorsifixed with two lobes and 4 pollen sacs.

Connective situated  $1/3^{\text{rd}}$  the distance from the top end of the anther, dehiscence by longitudinal slits Pollen grains were 41  $\mu\text{m}$  in size, smooth, tricolporate, psilate and subprolate.

- Pollen grains are tricolporate and psilate.
- Gynoecium total length 4.4 mm in long styled flower and 1.6 mm in short styled flower. Ovary superior, short stalked, 1.5 mm in diameter, 8 locular, axile placentation, placenta continuous upto the base of the style, ovary completely septate from top to bottom, 2 ovules in each locule.
- Stigma is capitate, styles of varying length; 0.42 mm long in short styled flower and 1.4 mm long in long styled flower.

Apart from these similar features there are certain differences observed between them. *Sahnianthus parijai* has bracts & bracteoles whereas these structures are not observed in present flowers. *Sahnianthus parijai* has nectary at the base of ovary which is not observed in present flower.

Another interesting features is noted regarding the development of anthers i.e. protandrous nature (as stated by Chitale, 1955[2]) is observed in present flowers. It is observed that the anthers develop earlier than the maturation of ovary, thus exhibiting clear protandrous condition of flower (T.S. Sp. no.2), shows mature well developed dehiscent anthers with pollen grains, but the is young, immature. Similarly, in L.S. flowers (L.S. Sp. no. 1,2,3) & in T.S. flower (T.S. Sp. no.1), the all 4 specimens shows matured ovary with well developed ovules, but no observation of anthers; only some traces is found in L.S. Sp. no. 2 & 3. Thus a flower show a clear protandrous condition.

The present fossil flower is compared with another species of *Sahnianthus* flower i.e. *Sahnianthus dinectrianum* but it is different from present flower because of the presence of two nectarines, an epicalyx and probably a corolla; such structures are absent in present flowers.

It is also compared with *Sahnianthus parijai* (Paradkar and Senad, 1984[17]) in all general character. The zygomorphic condition shown by their specimen, is not observed in my all five specimens. I agree in actinomorphic condition given by others. So, It is compared with tribe Nesaceae of family Lythraceae.

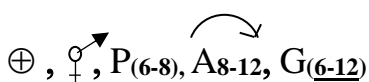
The affinities are also discussed with modern families for taxonomy of *Sahnianthus*. The flower genus of *Sahnianthus* was assigned by Shukla (1944[23]) to the tribe Nesaceae of Lythraceae; because the flower was considered by him as actinomorphic, heterostylous, having episepalous stamens, tubular calyx and superior ovary.

Mahabale and Deshpande (1957[16]) while discussing the affinities of *Sonneratia* with fossil fruit *Enigmocarpon* and flower *Sahnianthus*. There is no gibbous calyx in *Sonneratia* and indefinite stamens are situated on a definite in projected ridge of hypanthium tissue while in *Sahnianthus* stamens of unequal length arise from the calyx (episepalous) but are not situated on an inner ridge of hypanthium tissue. Indefinite stamens distinguish *Sonneratiaceae* from the Lythraceae.

Thus, it is observed that *Sahnianthus* is not a flower of *Sonneratiaceae* as stated by Mahabale and Deshpande. If the fixed character of axile placentation, superior ovary raised on a stalk, the no. of stamens (much less than *Sonneratiaceae*) are taken into account it is evident that *Sahnianthus* represents a flower of Lythraceae.

Thus the above described 3 specimens, collectively give an idea of the different parts of the same flower. On the basis of this data, a tentative floral formula has been reconstructed.

#### FLORAL FORMULA:-



#### REVISED DIAGNOSIS:-

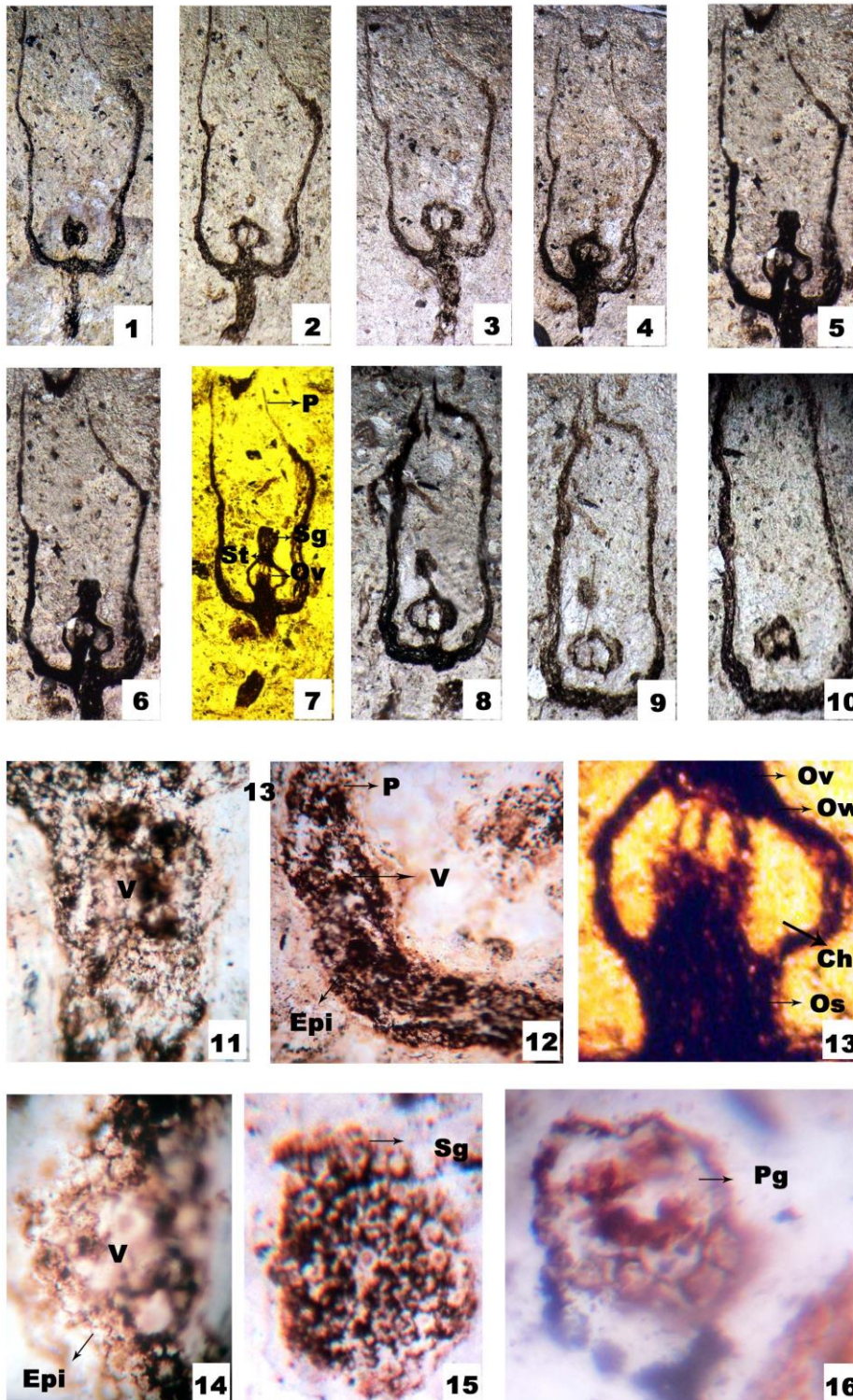
##### *Sahnianthus*

Stalk 3.5x 0.38 mm in size, slightly bent, flower heterostylous, bisexual, hypogynous, actinomorphic, gamophyllous about 5.5 to 8 mm long & 1.5 to 2.75 mm broad at middle. Perianth lobes are 6-8 arranged in one whorl, tubular, valvate and gibbous, dicotyledonous nature. Androecium at least 8-12, protandrous, epipetalous, dorsifixed, 2-lobed, connective situated  $1/3^{\text{rd}}$  the distance from the top end of the anther, dehiscence by longitudinal slits; measures 0.65 -1 mm long & .25-.40 mm thick. Pollen grains spherical, 41  $\mu\text{m}$  in size, smooth, tricolporate, psilate and subprolate. Gynoecium stalked, superior. Styles are of varying length; it is short styled or long styled ; Long style 1.4 mm x 0.13; short style 0.42 x 0.35 mm in size. Stigma capitates, slightly swollen than style, papillose 0.6 to 0.75mm in length and 0.5 to 0.7 mm in diameter.

## REFERENCES:

- [1] Ambwani K., Kar R.K. & Ashok Sahni (2001). Reinvestigation on *Sahnipushpam* Shukla from the Deccan Intertrappean sediments of Madhya Pradesh, India. *Ameghiniana* 38(4): 393–398.
- [2] Chitaley, S.D. (1955). Further contribution to the knowledge of *Sahnianthus*. *J.Ind. Bot. Soc.* 34 (2):121-129.
- [3] Chitaley, S.D. (1964). Further observation in *Sahnipushpam*. *J.Ind. Bot. Soc. XLIII*: 69-74.
- [4] Chitaley, S.D. and Kate V. R. (1972). On a new petrified flower *Deccananthus savitrii* gen. et sp. Nov. from the Deccan Intertrappean beds of India. *Paleobotanist*, 21 (3): 317 – 320.
- [5] Chitaley, S.D. and Patel M. Z. (1975). *Raoanthus intertrappea* a new petrified flower from India. *Palaeontographica*, 153(B): 141 – 149.
- [6] Darrh H.C. (1936). A Peel Method in Palaeobotany. *Harward Uni. Bot. Nus.* Leaflet 4: 69-85.
- [7] Dayal L.R. (1967). Critical remarks of *Sahnianthus dinectrianum* Shukla. *Palaeobotanist*, 15(3):316–317.
- [8] Dixit, V.P. (2003). “*Mohgaioanthus deccanii*” A new petrified flower from Mohgaonkalan, M.P. India. *Botanique*12:36-45.
- [9] Kar R.K, Ambwani K, Sahni A & Sharma P. (2003). Unisexual flowers from the Deccan Intertrappean Beds of Madhya Pradesh, India. *Paleobotanist* 52 (1-3): 73-79.
- [10] Dwivedi J. N. & Shukla R.K. (1958). On the pollen grains and pollination in *Sahnianthus parijai* Shukla from the Intertrappean beds of India. *Jour. Paleont. Soc. India*, 3: 105–108.
- [11] Joy K.W., Willis A. J., & Lacey W.S. (1956). A rapid cellulose peel technique in Palaeobotany. *Annals of Botany* (N.S.) 20: 635-637.
- [12] Kapgate Dashrath, Nilamber Awasthi, Steven Manchester & Shyamla Chitaley (2011). Inflorescence and flowers of *Sahnipushpum*Shukla from Deccan Intertrappean beds of India. *Acta Palaeobotanica* 51(2): 207-227.
- [13] V.D. Kapgate, D. K. Kapgate and M. T. Sheikh (2006). “*Chenopodianthus*” a fossil flower genus from the Deccan Intertrappean Beds of India. *Geophytology*, 36 (1&2): 27-34.
- [14] Kapgate, V. D., Kapgate, D. K. & Sheikh M. T. (2009): Araliaceous fossil flower from Deccan Intertrappean Beds of Madhya Pradesh, India. *Palaeobotanist*, 58(1-3): 67-74.
- [15] Kokate P. S, Patil G.V., Upadhye E.V. and Sarate O. S. (2011). Further observation to the knowledge of *Chitaleypushpam mohgaonse* Paradkar. *Palaeobotanist* 60(2): 345-353.
- [16] Mahabale, T.S. and Deshpande J.V. (1957). The genus *Sonneratia* and its fossil allies. *Palaeobotanist* 6(2): 51-64.
- [17]Paradkar, S.A. (1971). *Chitaleypushpam mohgaonse* gen. et sp. nov. from the Deccan Intertrappean beds of India. *Palaeobotanist*, 20 (3): 334-338.
- [18] Paradkar, S.A. and Senad V.A. (1984). *Sahnianthus parijai* Shukla reinvestigated: 138-146 in Tiwari R.S. et al. (Editor) Proc. 5<sup>th</sup> Indian geophytol. Conf. Lucknow, 1983. Special publ. *Palaeobotanical society*, Lucknow.
- [19] Prakash, U. (1955). On the structure and affinities of *Sahnipushpum glandulosum* sp. nov. from the Deccan Intertrappean series. *Palaeobotanist* 4: 91-100.
- [20] Prakash, U. and Jain R. K. (1964). Further observation on *Sahnipushpam shukla*. *Palaeobotanist* 12 (2): 128-138.
- [21] Sakundarwar, R.S. & Puranik S.D. (2012). Further observation on the structure & affinities *Sahnianthus parijai* from Deccan Intertrappean cherts of M.K. *Botanique*, 16(1) : 74-79.
- [22] Shukla, R.K. (1958). *Sahnianthus dinectrianum* sp. nov. A new species of the petrified flower *Sahnianthus* from the Eocene beds of the Deccan. *Jour. Paleont.Soc. India*, 3: 114 -118.
- [23] Shukla, V.B. (1943). *Sahnianthus* in Palaeobotany in India IV. *J. Ind. Bot. Soc.* 22: 181.
- [24] Shukla, V.B. (1944). On *Sahnianthus* a new petrified flower from Intertrappean beds of Mohgaonkalan and its relation with fruit *Enigmocarpon parijaii* Sahni from the same locality. *Proc. Nat. Acad. Sci. India* 14: 1-39.
- [25] Shukla, V.B. (1948). A new angiosperm flower and gymnosperm ovule from Mohgaonkalan, Paleobotany in India. VI. *Jour. Ind. Bot. Soc.*, 26: 259.
- [26] Shukla V.B. (1950). *Sahnipushpam* gen. nov. and other plant remains from the Deccan Intertrapps. Paleobotany in India. VII. *Jour. Ind. Bot. Soc.*, 29(1): 29.
- [27] Shukla, V.B. (1958). *Sahnianthus dinectrianum* sp. nov. a new species of petrified flower *Sahnianthus* from Eocene beds of Deccan. *J. palaeont soc. India* 3: 114-118.
- [28] Stewart W.W. & Taylor T.N. (1965). The peel technique. In handed B. s. book of Palaeontological Technique, *Kummel & D. Raup*. San Francisco. 224-232.
- [29] Verma J.K. (1956). On a new petrified flower *Sahnipushpam shuklai* sp. nov. from the Deccan Intertrappean beds of M.K, in the Deccan. *Jour. Paleont. Soci. India*, 1: 131–141.

### PLATE - II (L.S. Sp. no. 3)



Specimen No. 1 [L.S. flower no.1 (Fig. 1-5)]

Fig.1 - Flower exposed on fossiliferous chert, cut longitudinally showing pedicel(S), perianth (P), part of Style (St) and ovary (Ov) with ovule (O).

Fig.2 - Upper part of the flower magnified showing perianth (P), and ovary (Ov), ovary wall (Ow) with its internal structure ovules (O) on central axis (A) and its basal part ovary salk (Os) with vasculature (V).

Fig.3 - Few ovules (O) in Magnified showing its attachment i.e. funicle (f).

Fig.4 - Basal part of ovary showing ovary stalk (Os) with vasculature (V).

Fig.5 - Pedicel of flower in L.S. showing its internal structure pith (Pi); vascular bundle (Vb); Epidermis (E) and cortex (C).

**Specimen No. 2 [L.S. flower no.2 (Fig. 6-13)]**

Figs.6-7 - Various stages of Flower cut in L.S. exposed on fossiliferous chert showing Pedicel(S), Perianth(P), Stigma(Sg), Style (St), ovary (Ov) and ill preserved Anthers(An) .

Fig.8 - Magnified perianth lobe showing attachment of anther filament (F).

Fig.9 - Magnified perianth lobe showing epidermis (E) and vasculature (V).

Fig.10- Ovary with numerous ovules (O) on central axis (A) showing ovary wall (Ow); ovary chamber (Ch) and its basal portion ovary stalk (Os).

Fig.11 - Magnified view of anther (An) with pollen grains (Pg).

Fig.12 - Few pollen grains inside the pollen sac (Ps).

Fig.13 - Pollen grains (Pg) in Magnified view.

**Specimen No. 3 (L.S. flower no. 3):-**

Figs.1-10 - Various stages of Flower cut in L.S. exposed on fossiliferous chert showing Pedicel (S), Perianth (P), Stigma (Sg), Style (St), Ovary (Ov) and ill preserved pollen grains (Pg) .

Fig.11 - Pedicel of flower in L.S. showing its internal vasculature (V).

Fig.12 - Perianth (P) lobe showing epidermis (Epi) and vasculature (V) magnified.

Fig.13 - Ovary in magnified view showing ovary wall(Ow), ovary chambers (Ch) and its basal part ovary stalk (Os) and vasculature (V).

Fig.14 - Magnified view of ovary wall (Ow).

Fig.15 - Magnified view of stigma (Sg).

Fig.16 - Pollen grains (Pg) in magnified view.