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FURTHER STUDY ON *SAHNIANTHUS* FROM DECCAN INTERTRAPPEAN BEDS OF CHINDWARA DISTRICT OF MADHYA PRADESH, INDIA

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ABSTRACT

From two chert specimens collected from Bhutera and Mohgaonkalan of Chhindwara district of Madhya Pradesh, India, four flowers have been described. After comparison with the flowers reported from Deccan Inertrappean beds, it was observed that these flowers showed close similarities with *Sahnianthus parijai* hence, they are kept under the same genus as *Sahnianthus chhindwarai* sp. nov. The specific name has been given after the localities.

Key words : Dicotyledonous flowers; Deccan Intertrappean Beds; Maastritchian; Chert specimens; *Sahnianthus*

Introduction

So far, more than fifteen *Dicotyledonous* flowers have been reported from different localities of Deccan Intertrappean beds of Madhya Pradesh. Such as *Sahnianthus parijai*. (Shukla, 1943;. Chitaley,1955; .Paradkar, 1984; Sakundarwar and Puranik., 2012) *Sahnianthus dinectrianum* (Dayal, 1967) *Sahnipushpum shuklai* (Verma, 1956), *Sahnipushpum glandulosum* (Prakash, *1955;* Prakash, and Jain,1963; Kapgate, et. al 2011) . *Chitaleypushpum mohgaonense* (Paradkar, 1971) and *Chenopodioanthus mohgaonense* (Kapgate, et. Al., 2006). In this communication four well preserved *Sahnianthus* flower species have been described which were collected from Bhutera and Mohgaonkalan of Chhindwara district, Madhya Pradesh, India. All of the previously reported *Sahnianthus* flowers were from Mohgaonkalan; while present species have been described from new locality Bhutera. Therefore, present work again adds more information towards diversity of fossils in Chhindwara district.

Material and Methods

The fossiliferous cherts were collected from Bhutera and Mohgaonkalan of Chhindwara district. After breaking the cherts and itching with hydrofluoric acid fairly well-preserved flower was exposed in longitudinal and plane from Mohgaokalan and a group of three flowers were exposed in various planes. Serial peel sections were taken through their exposed planes with Cellulose Acetate peel Technique (Darrah, 1936; Joy et. Al, 1956; Stewart and Taylor, 1965; Holmes and Lopez, 1986). After that the peels were pressed, mounted on slide in DPX and dried in sun light. The slides were observed under microscope and photographed.

Results and Discussion

Four well-preserved flowers have been described, from two pieces of cherts.

Chert-I:

The flower-1 is small which cut in longitudinal plane, about 7 mm long and 3.4 mm broad in the middle. It is pedicellate, actinomorphic and hypogynous [Fig. 1. (a) to (i)]. The flower has a curved short stalk which measures 1.5 mm in length and 0.90 mm in breadth [fig. 2. (a), (b)]. There is single whorl of perianth forming a cup like covering around the gynoecium. The perianth lobes are 0.7 mm broad consisting of 10-15 cells thick zone of elongated, parenchymatous cells [fig. 2. (a), (b)].

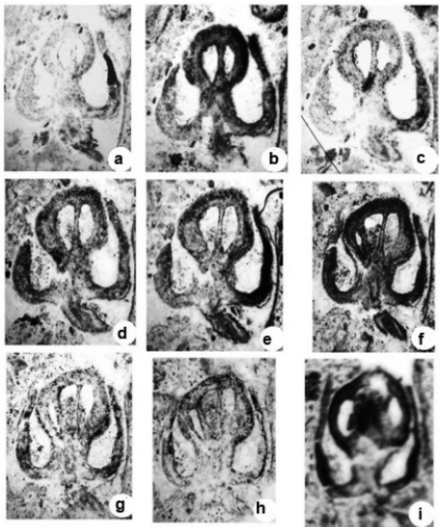

Fig. 1 :. Specimen-I at various stages of appearance showing flower cut in L.S. (30X)

The flower shows gynoecium only. The ovary was observed in the form of one to four locules in serial peels, thus gynoecium is most probably hexa-carpellary and syncarpous. The ovary is almost round in shape [Fig. 2. (b)]. It measures 2 mm 2 mm in size raised on moderately long gynophores [Fig. 2. (a)], which measures about 0.4 mm in length. Overy wall is thick composed of loosely arranged cells. The outer layer is of parenchymatous cells, followed by 2-3 layers of cells which have dark depositions. The locule contains two rows of ovule with axile placentation [Fig. 2. (b)]. Style is very much reduced and small. Stigma is round, almost undifferentiated from the style. There is a nectary like structure in the gibbous portion of the calyx tube at the base of overy stalk [Fig. 2. (a), (b)]

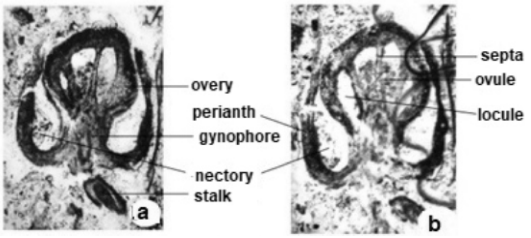

Fig. 2. Flower 1 which cut in longitudinal section (90X)

Chert-II:

In this chert three well-preserved flowers of different size which are exposed in longitudinal, oblique longitudinal and transverse plane. There is one centrally placed large flower and below it, two small flowers on both side are seen; out of them one is cut in T. S. and other in oblique longitudinal plane and in inverted position [Fig.3.(a) to (k)]. They are not far from each other and unfortunately there is no organic connection in between them but structurally and anatomically they are same flower, having variation only in their size.

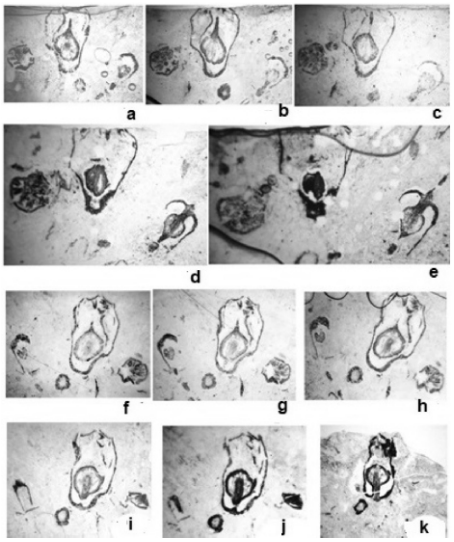

Fig.3 Part of specimen-II at various stages of appearance showing group of three flowers cuts in different plane.[a-c-(30X); (c and d) (45X)]; (f) to (K) Counterpart of specimen II at various stages of appearance showing group of three flowers cuts in different plane. (30X)

Flower 2: The preservation of the flower is excellent. It is cut in longitudinally and measures 3 mm 5 mm. [Fig. 4 (a), (b), (c)]. The hypanthium and essential whorls are both well preserved. Stalk of flower is not seen. It is actinomorphic. Corolla is not seen. Four calyx lobes [Fig. 4.(c)] are seen in Longitudinal section (L.S.) hence it may be 8 lobed, tubular and stamens are inserted on throat of calyx at different height. *Filaments* are short and curved inwards. Attachment of anthers is dorsifixed, episepaluos, oblong and dehiscence is longitudinal [Fig. 4. (b)]. Gynoecium 2 mm long, stigma is not seen [Fig. 4. (a)]. Overy spherical, superior, arise on short stalk, 4 locules are seen which is completely septet. There are two rows of ovule in each locule with axile placentation [Fig. 4. (a), (b), (c)].

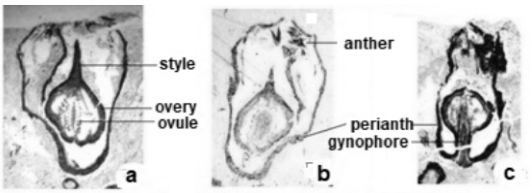

Fig. 4. (a), (b) and (c) showing flower 2 (45X)

Flower 3: This flower is also cut in L. S. near to the flower-1 on lower side. It is small 2.5 mm long and 2 mm broad [fig.5 (a), (b)]. It show well preserved 1.3 mm long stalk. It contains outer cells elongated; rectangular, middle layer cells sclerenchymatous, content dark, inner layer 6-8 cells thick, cells parenchymatous, elongated, vascular strands with sclariform pits [fig.5 (b)]. It is actinomorphic. Perianth is single whorled consists of rectangular cells, elongated, parenchymatous, loosely arranged, few air space at frequent intervals. Perianth lobes are 1.2 long and 0.3 mm broad made up of elongated, parenchymatous cells [fig.5 (b)].

The flower shows gynoecium only. Overy seen in the form of one to three locules in serial peels, thus gynoecium is most probably hexacarpellary and syncarpous. The overy is almost round in shape. It measures 1 mm 1 mm in size. Overy raised on moderately long gynophores which measures about 0.2 mm in length [fig.5 (b)]. Overy wall is thick composed of thick zones of loosely arranged cells [fig.5 (a)]. The outer layer is composed of parenchymatous cells, followed by 2-3 layers of cells which have dark depositions. The locules contain two rows of ovule with axile placentation. The style is very much reduced and small [fig.5 (a)]. Stigma is long, slightly wider than style almost undifferentiated from the style and papillose in nature and simple in form [fig.5 (a)].

Flower- 4: This flower is cut in transvers plane. It is circular in outline, 0.2 mm diameter and supposed to be cut from top [fig.5 (c)]; since there is stigma in centre, papillose in nature and simple in form [fig.5 (c)]. There are eight anthers are cut in T. S. and they are inserted to the calyx [fig.5 (c)]. There are seven calyx lobes in valvate arrangement and incurved. Therefore, stamens are episepalous, inserted in the calyx tube. The attachment of anther on the filament is dorsal [fig.5 (c)]. Corolla is completely absent.

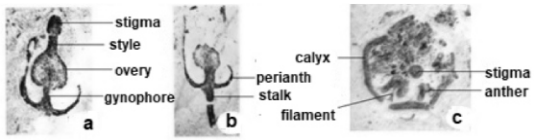

Fig. 5. (a) & (b) flower 3 (45X); (c) flower 4 (90X)

Thus the important features of the specimens examined are : All flowers are pedicelate. Stalk containing outer cells elongated, rectangular and middle layer cells sclerenchymatous, content dark, inner layer 6-8 cells thick, cells parenchymatous, elongated, vascular strands with sclariform pits. Perianth single whorled, cells are rectangular, elongated, parenchymatous, loosely arranged, few air spaces at frequent intervals. There are about seven calyx lobes, valvate in bud. Corolla is absent even in the bud. Stamens are protandrous, exceeding the number of sepals, born at the top of the calyx tube, some of them alternating with sepals. Dehiscence is longitudinal and lateral. Style is long and stigma slightly swollen, papillose and simple. Overy shows 7-8 locule. All septa are equal and loculi represented in the style by an equal number of patches of soft tissue around the stylar canal. Nectary present as a single

scale at the slightly gibbous base of the calyx tube. They are in different stages of growth as is evident from the style length. It is clear from the above discussion that present flower are of dicot and similar to *Sahnianthus.*

Identification

For identification the flowers were compared with the flowers of modern family as well as reported flowers from Deccan Inertrappean beds of India.

Comparison with Modern Families : The affinities of present flowers are tried to match with various families like Lythraceae and Samydaceae with which they show some links. They are similar to Lythraceae in having hypogynous, stalked as in *Lofoensia*, six chambered overy with axile placentation (Lawrence, 1954; Rendle, 1986). But in Lythraceae the flowers are bisexual and the perianth is having hypanthium. These flowers are resemble with family Samydaceae in having actinomorphic symmetry and hypogynous position but differs in having unilocular overy and parietal placentation. These flowers can be brought near to family Samydaceae because flowers in this family are dioecious and polygamous. From above discussion it is clear that these flower does not have complete resembles with modern flowers.

Comparison with Reported Species : These flowers are compared with reported *Sahnianthus* flowers described by different authors, as they are showing more resembles with this flower. The flower *Sahnianthus parijai* is actinomorphic, heterostylous, about 10 mm. long with a slender stalk about 4.5 mm long; calyx 8 lobed, tubular, gibbous at base, calyx 5.5 mm long; corolla not observed. Stamens at least 8, episepalous; anther oblong, 0.75 mm long, dorsifixed, dehiscence longitudinal (extrose); Gynoecium 2.2 mm. long, overy superior, stalked, spherical 1.2 mm. in diameter, 6-8 locules, completely septet, placentation axile; ovules usually 2 rows per locule. Some new conclusions drawn by Chitaley in 1955 [2] on *Sahnianthus* flower such as: 'Flowers is borne on a branched pedicel. But there is no any branched pedicel in present flowers. There are about seven calyx lobes valvate in bud. The calyx tube shows more vascular bundles than the number of calyx lobes. Corolla are absent even in bud. Nectary present as a single scale at the base of calyx tube. Stamens are protandrous, born at the top of calyx tube. Dehiscence is longitudinal and lateral. Overy with varying number of loculi (7, 8, 9, 12 observed). Septa all equal and loculi represented in the style on equal number of soft tissues around stylar canal. Further contribution done by Mahabale and Deshpande (1957). They commented on the affinities of this flower genus and said that it is more liked to Sonnertiacese than Lythraceae, as shown by Shukla (1944). In 1984, Paradkar and Senad (1984) added note on *Sahnianthus* and observed flowers specimens were varying in length from 2.6 to 6.0 mm and 1.2 to 2.8 mm in breadth. The flowers were zygomorphic and not actinomorphic. The perianth tube was swollen in lower middle portion and somewhat constricted on one side only above the ovary without disturbing the erect median style. The presences of petals have been observed as arising from between the sepal teeth lobes. Petals are 1.2 mm long and 0.6 mm broad at distal end. The flower thus had two whorls of perianth. Shukla (1958) observed two nectories in *Sahnianthus* and created new species of *Sahnianthus* as *Sahnianthus dinectrianum.* From the above comparison it is clear that these flowers shows close similarities with *Sahnianthus parijai* Shukla (1943) hence, it is kept under same the genus as *Sahnianthus chhindwarai* sp. nov. The specific name is given after the district of localities.

Diagnosis

Sahnianthus chhindwarai sp. nov.

All flowers are pedicillate, actinomorphic, hypogynous; stalk containing outer cells elongated, rectangular, middle layer cells sclerenchymatous, content dark, inner

layer 6-8 cells thick, cells parenchymatous, elongated, vascular strands with sclariform pits; perianth single whorled, cells rectangular, elongated, parenchymatous, loosely arranged, few air space at frequent intervals; gynoecium stipulate, ovary wall cells loosely arranged, parenchymatous, locule 6-8, ovule in 2 rows; placentation axile, style much reduced, stigma round.

Holotype RWU/Flr./14 & 29/Deposited at Dept. of Botany, J. M. Patel College, Bhandara.

Horizon Deccan Intertrappean Series of Madhya Pradesh, India.

Locality Bhutera and Mohgaonkalan of Chhindwara district.

Age Late Cretaceous (Maastritchian)

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