

A petrified capsular fruit *Lagerstroemiocarpon harrisii* gen. et sp. nov. from the Deccan Intertrappean Beds of Mohgaonkalan, Madhya Pradesh, India

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ABSTRACT

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A petrified fruit, *Lagerstroemiocarpon harrisii* gen. et sp. nov., has been described from the Deccan Intertrappean beds of Mohgaonkalan in Chhindwara district, Madhya Pradesh, India. The fruit is well preserved to reveal its anatomical details. It is characterized by hexalocular dicotyledonous capsule having six prominent ridges.

Key-words: *Lagerstroemiocarpon harrisii* gen. et sp. nov., Lythraceae, dicotyledonous fruit, Intertrappean beds, Mohgaonkalan, Madhya Pradesh, India.

INTRODUCTION

Deccan Intertrappean flora of Mohgaonkalan is chiefly in the form of petrifications. However, compressions, impressions and casts are also common. A number of dicotyledonous fruits have been described from Deccan Intertrappean beds. Among these, most commonly found is *Enigmocarpon parijai* Sahnii (1943). Other described fossil fruit are *Indocarpa intertrappea* Jain 1964, *Harrisocarpon sahnii* Chitale & Nambudiri 1973, *Sahnioocarpon harrisii* Chitale & Patil 1973, *Daberocarpon gerhardii*

Chitale & Sheikh 1973 and *Deccanocarpon arnoldii* Paradkar 1975 and *Wingospermocarpon mohgaense* Sheikh & Kapgate 1984.

MATERIAL AND METHOD

Fossiliferous cherts were collected from the well known fossil locality, Mohgaonkalan (Lat. 22° 1' N, Long. 79° 11' E) in Chhindwara district, Madhya Pradesh. These cherts were cut into small pieces. The present fossil specimen was exposed in transverse plane. The serial peel sections of the specimen were prepared and its anatomical characters were studied.

SYSTEMATIC DESCRIPTION

Order: Fabales

Family: Fabaceae

Genus: *Lagerstroemiocarpon* Kokate, Upadhye & Bobade, gen. nov.

***Lagerstroemiocarpon harrisii* Kokate, Upadhye & Bobade, sp. nov.**

Plate 1, figures 1-10, Text-figures 1-6

Fruit capsule hexalocular, more or less spherical, globose with six prominent ridges, measuring 4 x 3 mm in transverse plane. Each loculus contains single seed (Plate 1, figures 1-2, Text-Figures 1-3). Central axis 629 μm in size, six septae run towards periphery forming six loculi. Placentation axile.

Fruit wall or pericarp smooth to wavy in transverse section with six prominent ridges, 185 to 444 μm thick, differentiated into epicarp, mesocarp and endocarp (Plate 1, figures 3, 6, Text-figure 4), epicarp or outermost layer single celled, 16 μm in thickness, cells cubical, slightly elongated and thick walled, cuticle and hairs absent. Mesocarp multilayered, 202 μm in thickness, cells parenchymatous and compactly arranged except at few places where cavities are seen, cavities formed due to dissolution of cell walls, vasculature present at just opposite to the ridges (Plate 1, figure 7, Text-figures 4-5), 6 in number, each measuring 44 x 38 μm , vascular tissue with 2-3 metaxylem and 3-4 protoxylem elements, metaxylem 15-30 μm and protoxylem 8-11 μm in diameter. Phloem not seen. Endocarp 22 μm in thickness, cells thick walled, prominent, larger than epicarp cells, ovoid and vertically stretched.

Septae, six in number, joining the fruit wall with the central axile axis, septae made up of thin walled parenchymatous cells, six ridges present in the fruit wall. When extension of ribs is observed, it is seen that thick walled cells in this region are more than those of fruit wall (Plate 1, figures 4-5, Text-figures 1-3). The central part of fruit is made up of soft, thin walled, parenchymatous cells with some thick walled vascular tissue (Plate 1, figure 4, Text-figure 3).

Loculi six in number, wide at the periphery and narrowing towards the centre, largest locule 1.85 x 1.73

mm, smallest locule 1.40 x 1.11 mm, each locule contains single seed, vertically placed, occupying almost all the space of locule.

Seed considerably large in relation to the size of the fruit, broader towards the peripheral region and narrower at the micropylar region, 1.79 x 1.58 mm, triangular in transverse section (Plate 1, figures 8-9, Text-figures 2-3), attached to central axis in axile placentation. Seed coat in the present fossil specimen is not separated from fruit wall but adherent with it, seed coat membranous and not differentiated into testa and tegmen, single celled layer, cells of seed coat thick walled and rectangular in shape. Inside the seed, there is a dicotyledonous embryo consisting of two large cotyledons (Plate 1, figure 9, Text-figures 2-3, 6). Cotyledons are with finger like projections, showing single layered epidermis of cubical cells, measuring 9 x 5 μm . Radicle is directed towards the central axis. Endosperm cells are not seen (Plate 1, figure 10).

AFFINITIES

The present fossil fruit is characterized by a six celled ovary which is syncarpous and superior with axile placentation. In each loculus, a single, dicotyledonous, non-endospermic seed is present. The seeds are large, completely filling the loculi of fruit. The structure of fruit wall shows typical capsular structure. The presence of thick walled cells in outer and inner zone of fruit wall is prominent. The thick walled cells are also present just opposite the septae justifying the septicidal dehiscence of fruit; seeds might be liberated by the rupture at septal region. These features collectively suggest that the present fossil fruit should be compared with the modern families having capsular fruits. The families having similar characters are Tiliaceae, Malvaceae, Sterculiaceae, Geraniaceae, Elatinaceae, Resedaceae, Clusiaceae, Zygophyllaceae, Rutaceae, Simaroubaceae, Moringaceae, Melastomaceae and Lythraceae. In addition, many other families also have capsular fruits, but only those families having resemblances are considered here. In Tiliaceae, Malvaceae, Sterculiaceae and Geraniaceae, the capsules are mostly pentacarpellary which are loculicidal or schizocarpic dehiscing into or many seeded cocci. In Geraniaceae,

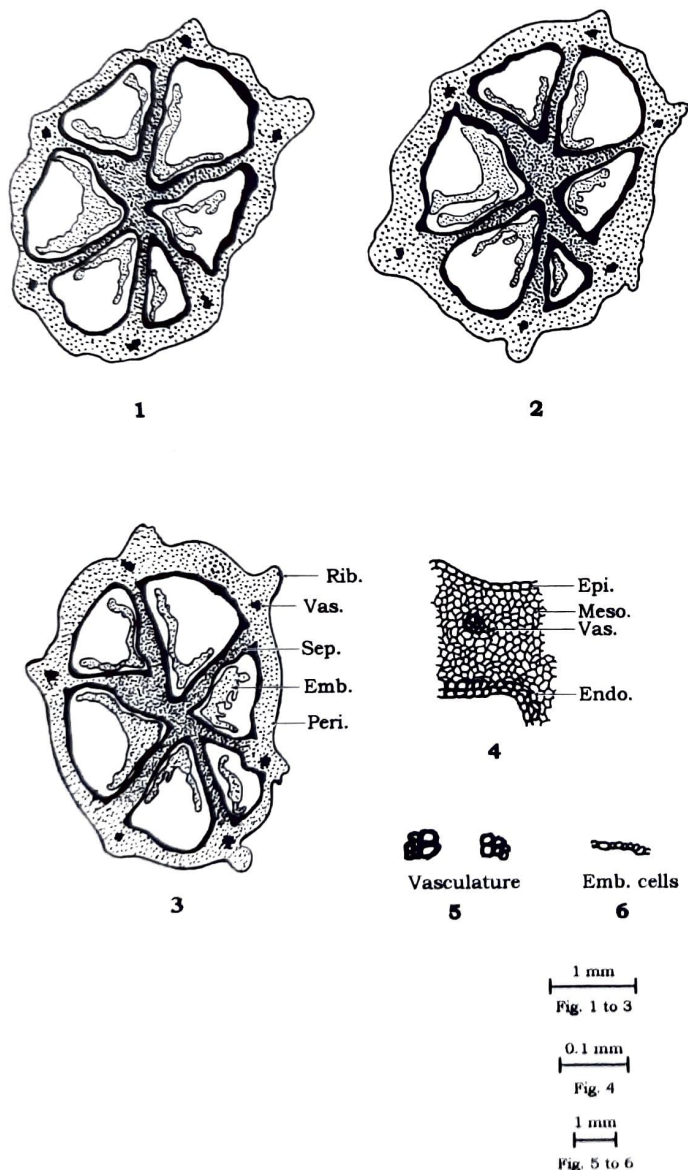
dehiscence is into 3 to 5 pericarps. These conditions are not seen in present fossil fruit. In Malvaceae, *Sida spinosa* has rarely hexalocular capsules but presence of two awns is different from present fossil fruit. In Clusiaceae, *Garcinia indica* has 4-8 celled ovary but fruit is berry and seeds with pulpy aril are different from present fossil specimen. In the family Resedaceae, carpels are 2-6 but ovules are arranged in parietal placentation instead of axile. In Zygophyllaceae and Elatinaceae, the capsules are 4-5 locular and seeds are generally two or more in one locule which is not seen in the present fossil fruit. In the family Rutaceae, the fruits show near resemblance with *Toddalia aculeata* in

having globose capsule with seven locules and solitary seeds but differ in having grooves. The family Moringaceae also has six angled capsule but it is one celled and shows loculicidal dehiscence which is not seen in present fossil specimen. Similarly, family Melastomaceae has 3-6 celled ovary with numerous ovules in each locule. The present fossil specimen also shows resemblances with modern family Simaroubaceae in having 1-6 celled ovary with usually solitary seeds and membranous testa, but does not match in other characters with any genus of the family.

The present fossil fruit shares characters with family Lythraceae. When it is compared with the lythraceous genera, *Ammania*, *Woodfordia*, *Lawsonia* and *Lagerstroemia*, it shows close affinities with the genus *Lagerstroemia*. Like the present fossil fruit, it has hexalocular capsule with six valves and six seeds with membranous testa but still differs in loculicidal dehiscence and many seeds in locules. It seems that fossil fruit is more or less identical with the fruit of *Lagerstroemia* of family Lythraceae. Therefore, the present fossil fruit is named as *Lagerstroemiocarpon harrisii*.

COMPARISON WITH FOSSIL FRUITS

From the above discussion, it is clear that the present fossil fruit is capsular so it is compared with capsular fossil fruit known from the Deccan Intertrappean beds. *Enigmocarpon parijai* (Sahni 1943), 6-12 locular capsule with clear loculicidal dehiscence, differs from present fossil specimen in having large size, loculicidal dehiscence and each locule with two rows of seeds. *Indocarpa intertrappea* Jain 1964 has been compared with present fossil specimen. It shows differences in having tetralocular and many seeded capsule having affinities with Clusiaceae. *Harrisocarpon sahnii* Chitaley & Nambudiri 1973 is capsular fruit with five locules with two seeds in each locule and presence of 5 ribs. *Sahnioocarpon harrisii* Chitaley & Patil 1973 shows near resemblances with present fossil fruit but differs in having 5 locules. *Daberocarpon gerhardii* Chitaley & Sheikh 1973 differs mainly in having ten locules having affinities with the *Malvastrum* (family Malvaceae). *Deccanocarpon arnoldii* Paradkar 1975 shows octalocular capsule



Text-figures 1-6. *Lagerstroemiocarpon harrisii* gen. et sp. nov. 1-3. Serial sections of T.S. of fruit showing six locules with seeds. 4. T.S. of fruit wall showing cellular details. 5. Magnified vascular tissue. 6. Magnified embryonic cells.

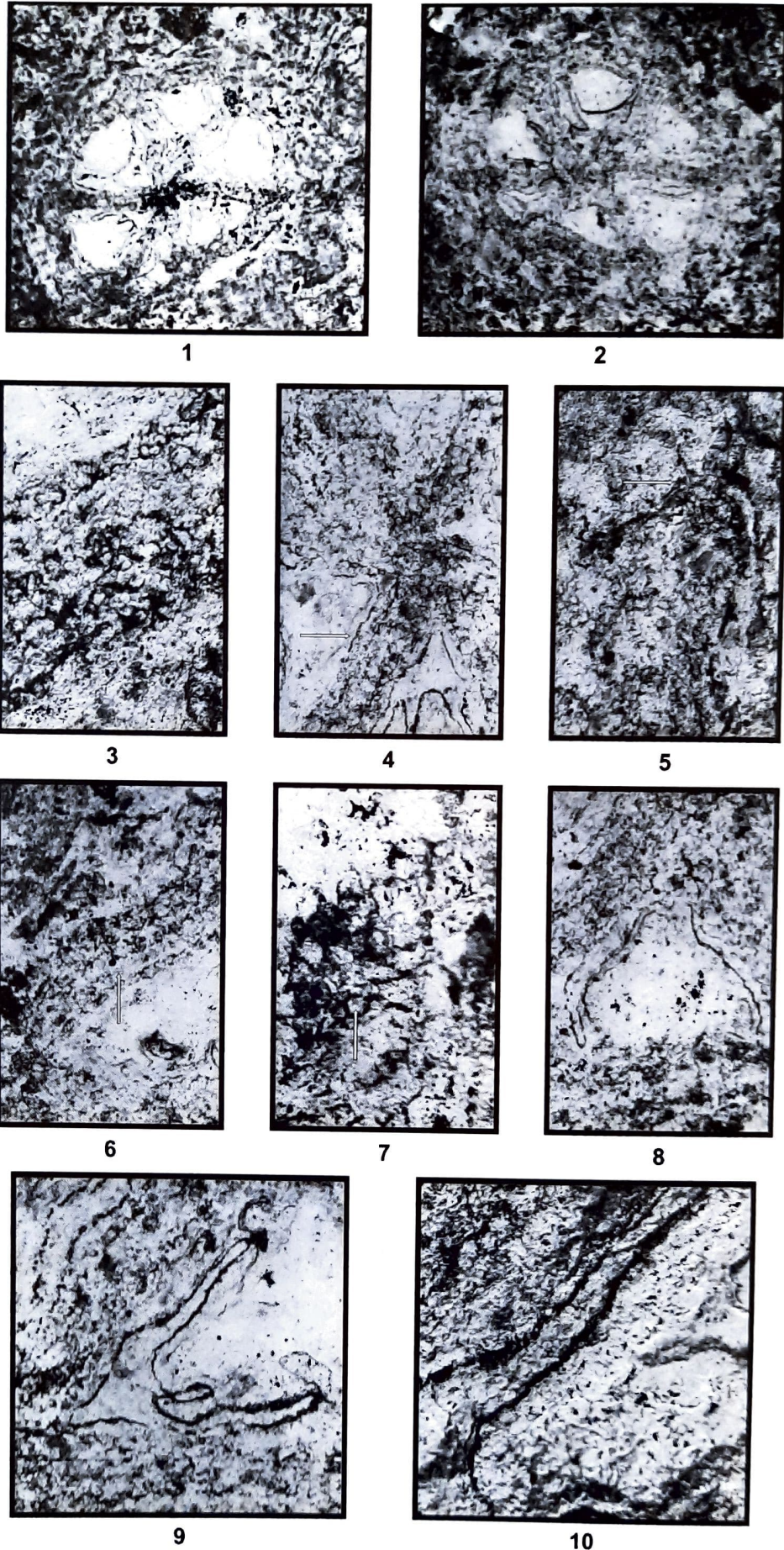


Plate 1

1-10. *Lagerstroemiocarpon harrisii* gen. et sp. nov. 1-2. T.S. of fruit showing six locules and seeds, x20. 3. T.S. of a part of fruit wall, x100. 4. T.S. of central part of fruit, x100. 5. T.S. of a part of fruit showing rib in details, x100. 6. T.S. of fruit showing vascular structure of septum, x100. 7. T.S. of fruit showing vascular tissue in pericarp, x400. 8-9. T.S. of fruit showing seed and embryo with cotyledons, x40. 10. A part of fruit showing epidermal cells of cotyledon, x100.

whereas the present fossil fruit is hexalocular. *Wingospermocarpon mohgaense* Sheikh & Kapgate 1984 differs in having oval unilocular capsule with seven seeds having wings. Since the present fossil fruit is also hexalocular, it is compared with above mentioned fruits. Although it shares some characters but differs in having six ribs. It also differs in the thickness of endocarp. From the above comparison, it is evident that fossil fruit studied here is quite different from the earlier described fossil fruits from the Deccan Intertrappean beds.

DIAGNOSIS

Lagerstroemiocarpon gen. nov.

Fruit dicotyledonous, hexalocular, septicidal capsule with single seed in each locule, seed with membranous seed coat, triangular, placentation axile.

The fossil fruit genus is named after *Lagerstroemia* (family Lythraceae), because it closely resembles fruits of *Lagerstroemia*.

Lagerstroemiocarpon harrisii gen. et sp. nov.

Fruit hexalocular capsule, globose with prominent six ribs, 3-4 mm broad in diameter. Fruit wall 185 to 444 μm thick, differentiated into three zones. Outer zone, single layered, of thick walled cells. Middle zone 202 μm in thickness and multilayered. Inner zone 22 μm in thickness. Six locules with seed measuring 1.79 mm long and 1.58 mm broad. Vasculature in mesocarp shows 1-3 metaxylem and 3-4 protoxylem elements, metaxylem 15-30 μm , protoxylem 8-11 μm . Seeds six, one in each loculus, vertically placed, position on the axile placenta, seed coat membranous, not differentiated

into testa and tegmen, embryo dicotyledonous, two large cotyledons, finger like projections. Radicle directed towards central axis, endosperm cells not seen.

Holotype: MOH/PSK/DICOT FRUIT-I, Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Akola.

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

Horizon and age: Deccan Intertrappean beds, Early Tertiary.

Etymology: The species is named after the eminent palaeobotanist Professor T. M. Harris of the University of Reading, England.

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