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## Report of a new fossil capsular fruit *Lufocarpon intertrappea* from the Deccan intertrappean beds of Maraipatan, Chandrapur District, Maharashtra, India

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### Abstract

The present paper deals with the description of a new genus of petrified capsular fruit from the Deccan Intertrappean beds of Marai Patan, Tahsil-Jiwati, Dist.-Chandrapur, Maharashtra, India. The fruit is simple elongated oval in shape, unilocular, stalked, single seeded, capsular fruit. The pericarp shows lines of dehiscence and is differentiated into epicarp, mesocarp and endocarp. Seed coat is single layered and is not differentiated into testa and tegmen. Embryo is not preserved while endospermic cells are well preserved. A hook like apical beak with two cavities is present at the apex of the fruit. It measures about 7 mm in length and is 5 mm in width. Pericarp is well preserved and moderately thick. It measures about 500  $\mu$ m in thickness, epicarp is 2 to 3 layers of thick walled sclerenchymatous cells measure about 95  $\mu$ m in thickness. Mesocarp is single layer of thick walled sclerenchymatous cells and measures about 200  $\mu$ m in thickness. Endocarp is measures about 200  $\mu$ m in thickness. It is made up of 8-10 layers of thin walled elongated cells. Finally summing up the comparison and discussion on the described fossil fruit it can be concluded that the present specimen under investigation does not resemble any of the living capsular fruits as well as recorded fossil flora. Hence it is named as *Lufocarpon intertrappea* gen. et sp. nov. The generic name is being after the Latin name for hooked fruit whereas specific name indicates the Deccan Intertappean locality from where the material was collected.

**Keywords:** Capsular fruit, testa, tegmen, apical beak, deccan intertap

### Introduction

From the Deccan Intertrappean beds many unilocular fruits have been reported, such as *kremocarpon aquatica*, *Kremocarpon indicum* (upadhye, 1979) <sup>[14]</sup>, *Juglandiocarpon agashii* (Adhao, 1986) <sup>[1]</sup>, *Ceratocarpon spinosa* (Adhao, 1986) <sup>[1]</sup>, *Wingospermocarpon mohgaonse* (Sheikh & Kapgate, 1984) <sup>[13]</sup>, *Mahabaleocarpon deccanii* (Chawhan, 1987) <sup>[2]</sup>, *Paradkarocarpon indicum* (Wazalwar, 1990), *Uniloculocarpon singhpurii* (Qureshi S Parveen, 2016) <sup>[12]</sup>, *Unispermospinocarpon keriensis* (Kapgate D.K. and Paliwal Pratibha A., 2017). The Present fruit is the new finding of the unilocular fruit from Maraipatan a locality of the Deccan Intertappean beds of Chandrapur District, Maharashtra state, India

### Material and Method

The material was collected from Maraipatan, a locality of the Deccan Intertappean beds of Chandrapur District, Maharashtra state, India. In longitudinal section I got the material in part and counterpart when it was broken. A hydrofluoric acid is used for etching and after washing with water elongated, oval in shape, stalked fruit with central cavity was seen. A serial peeling was taken along longitudinal plane. The Canada balsam was used as a mountant. Thus the fruit shows all the morphological and anatomical details. Capture Pro 4.6 exe software was used for measurement and photography of material.

### Description

**General Description:** The fruit is elongated, oval in shape, stalked and measures 7 mm in length and 5 mm in width. It is single seeded, unilocular, capsular fruit. In it embryo is not preserved and endospermic cells are seen.

The pericarp is well preserved and showing epicarp, mesocarp and endocarp (plate I, photo 2). A hook like long apical beak is present at the apex of fruit. At the base the beak is some broad with two cavities. The following anatomical details are seen in the above fruit.

**Pericarp:** The pericarp is well preserved and measures about 500 µm in thickness. It is differentiated into epicarp, mesocarp and endocarp. The pericarp shows lines of dehiscence (Plate I, photo 2, 3).

**Epicarp:** It is the outermost layer of the fruit wall and measures about 95 µm in thickness containing 2 to 3 layers of thick walled sclerenchymatous cells (Plate I, photo 2).

**Mesocarp:** It is the middle layer of the fruit wall and measures about 200 µm in thickness containing 10-12 layers of thick walled sclerenchymatous cells (Plate I, photo 2).

**Endocarp:** It is the innermost layer of the fruit wall and measures about 200 µm in thickness containing 8-10 layers of thin walled elongated cells (Plate I, photo 2).

**Locule:** A single locule with well preserved single seed is seen in longitudinal section. The diameter of locule is 6.5 X 4.5 mm in size (Plate I, photo 1).

**Seed:** A single seed of this fossil material measures about 6.5 X 4.5 mm as broad as locule. The seed is large with seed coat. The seed coat is fused with fruit wall and is not differentiated into testa and tegmen. The embryo is not preserved while endospermic cells are well preserved (Plate I, photo 1).

**Seed Coat:** The seed coat is single layer thick and fused with fruit wall. It is not differentiated into testa and tegmen (Plate I, photo 1).

**Stalk:** A fruit with single stalk is seen which is measures about 300-400 µm in length 500-600 µm in width (Plate I, photo 4).

**Apical Beak:** A hook like long apical beak is present at the apex of fruit. At the base the beak, it is somewhat broad with two cavities (Plate I, photo 5).

### Discussion and Identification

The above described specimen is identified with help of following important details.

1. The fruit is unilocular, capsular, and single seeded with hook like apical beak.
2. It is elongated oval in shape and stalked.
3. The pericarp shows lines of dehiscence with epicarp, mesocarp and endocarp differentiation.
4. The seed coat is single layered without differentiation.
5. The embryo is not preserved while endospermic cells are well preserved.
6. At the apex of the fruit the hook like apical beak with two cavities is present at its base.

All these characters described in the fruit shows that it was formed from unilocular, unicarpellary, apocarpous ovary. This fruit is found to be capsular because of its dehiscent fruit wall.

### Comparison with fossil fruit

This fossil fruit shows great variation from the previously described unilocular fossil fruits in number of characters. The *Kremocarpon indicum* (Upadhye, 1979) <sup>[14]</sup> *Kremocarpon aquatica* (Kate, 1974) <sup>[3]</sup> are unilocular, fibrous berries with papillate projections on the tough epicarp while the present fruit is capsular with apical hook and stalked. *Ceratocarpon spinosa* (Adhao, 1986) <sup>[1]</sup> is achenial with one locular, one seeded with spines all over the surface of the fruit while the present fruit is capsular with apical hook and stalked. *Juglandiocarpon agashii* (Adhao, 1986) <sup>[1]</sup> is unilocular, single seeded fruit with feathery wings. The fruit wall shows epicarp with air chamber, fibrous mesocarp and stony endocarp while the present fruit is capsular with apical hook and stalked. *Wingospermocarpon mohgaonse* (Sheikh & Kapgate, 1984) <sup>[13]</sup> is unilocular, capsular, winged seed, with free central placentation of the seeds while the present fruit is capsular with apical hook and stalked. *Mahabaleocarpon deccanii* (Chawhan, 1987) <sup>[2]</sup> is unilocular, single seeded, pulpy, indehiscent, baccate type of fruit while the present fruit is capsular with apical hook and stalked. *Paradkarocarpon indicum* (Wazalwar, 1990) is unilocular, seed coat soft with arechyma and made up of parenchymatous cell while the present fruit is capsular with apical hook and stalked. *Uniloculocarpon singhpurii* (Qureshi S Parveen, 2016) <sup>[12]</sup> is simple elongated, oval in shape, sessile, unilocular, one seeded capsular fruit with loculicidal dehiscence while the present fruit is stalked with apical hook and stalked. *Unispermospinocarpon keriensis* (Kapgate D.K. and Paliwal Pratibha A., 2016) <sup>[10]</sup> is small, elliptical, unilocular, single seeded, dehiscent, capsular and stalked with spines are found all over the fruit wall while the present fruit capsular with only apical hook and stalked.

### Comparison with modern taxa

For assigning this fossil fruit to proper family, it was also compared with living genera of modern dicot and monocot families. For this reason it is compared with the modern families having presence of unilocular, single seeded, spiny fruit to trace its affinities with nearest living families like Rubiaceae, Ceratophyllaceae, Elaeocarpaceae, Caprifoliaceae, Asteraceae, Zygophyllaceae, Phytolaccaceae, Cyperaceae.

In family Rubiaceae (*Cephalanthus occidentals*) and family Ceratophyllaceae (*Ceratophyllum*); are having moderately long spine and so many in number while present fruit shows single apical spine with two cavities at its base. In family Elaeocarpaceae (*Sloanea*) is having many seeds with spiny fruit while present fruit have single seed with single apical spine with two cavities at its base. Family Caprifoliaceae (*Kolkwitzia*) is having fruit with persistent calyx and spines are long and many in number while present fruit is without persistent calyx and single spine at its apex. A family Asteraceae (*Glaucophora*) show spiny fruit, the fruit is differs in having unequal size of spines while present fruit shows single spines with two cavities at the base of spine. In family Zygophyllaceae (*Seetzenia*) is having the seeds, thick testa with three skins, the outer membranous, the middle one cellular and mucous while the inner coriaceous while such structures are absent in present fruit. In (*Tribulus cistoides*) is having the long spines and hairs are present on the fruit wall while in present fruit the spines are long with cavities and hairs are absent on the pericarp. In Phytolaccaceae

(*Petiveria alliacea* L.) a gynoecium is monocarpellary, laterally compressed, tomentose with four or six apical bristles. The fruit is achene type with a coriaceous pericarp adhered to the seed and is erect, linear and laterally compressed, with a membranous coat while present fruit shows single seed and single apical spine with two cavities at its base. In Cyperaceae (*Cyperus eragrostis*) fruit has three-sided shape with single apical beak and short stalk but our fruit is not have three-sided shape; in (*Carex*) The perigynium often terminates in a beak, which can be short or long, straight or curved, and may have one or two teeth at the tip such type of teeth are absent in our fruit; in (*Fimbristylis*) The two-branched style, which is part of the gynoecium, may remain attached to the apex of the fruit but our fruit contain single beak. This fossil fruit is very tough to compare with the modern dicotyledonous monocot families because it differs in many aspects. From the above discussion it is concluded that there is no resemblance of this fossil fruit with any of the living families and reported fossils. Hence this fossil fruit is named as *Lufocarpon intertrappea* gen. et sp. nov. The generic name is according to the latin name for hooked fruit and specific name indicates the Deccan Intertappean locality from where this fossil material was collected.

### Diagnosis

#### *Lufocarpon intertrappea* gen. nov.

The fruit is capsular, unilocular, stalked and single seeded. A hook like long apical beak is present at the apex of fruit. At the base the beak, it is somewhat broad with two cavities.

#### *Lufocarpon intertrappea* gen. et sp. nov.

The fruit elongated, oval in shape, stalked, unilocular, single seeded and capsular. The pericarp shows lines of dehiscence and is differentiated into epicarp, mesocarp and endocarp. The seed coat is single layered and is not differentiated. The

embryo is not preserved while the endospermic cells are well preserved. At the apex of the fruit, a hook like apical beak with two cavities is present at its base. It measures about 7 mm in length and is 5 mm in width. Pericarp is well preserved and moderately thick. It measures about 500  $\mu$ m in thickness, epicarp is 2 to 3 layers of thick walled sclerenchymatous celled and measure about 95  $\mu$ m in thickness. Mesocarp is single layered of thick walled with sclerenchymatous cells and measures about 200  $\mu$ m in thickness. The endocarp measures about 200  $\mu$ m in thickness. It is made up of 8-10 layers of thin walled elongated cells.

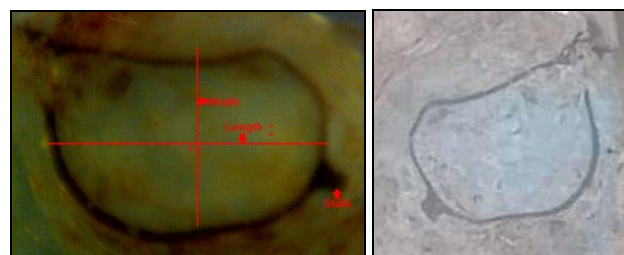
**Holotype:** SWP/Ang. Fruit/Deposited in Department of Botany, Dr. Ambedkar College, Chandrapur.

**Horizon:** Deccan Intertappean beds.

**Locality:** Maraipatan, Tahsil- Jiwati, Dist. Chandrapur, Maharashtra, India.

**Age:?** Uppermost Cretaceous.

### Plate I Photo 1-5



1 (Fruit-X20)

1 (Fruit-X20)

**Photo 1:** L. S. of Fruit showing length and width of fruit.....X20.

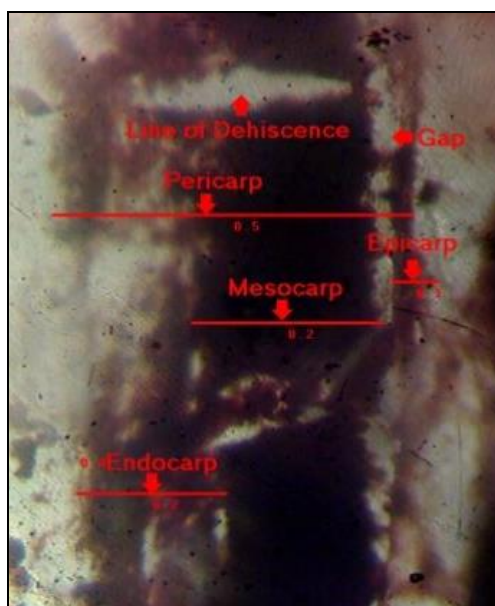


**Photo 2:** L. S. of Pericarp showing epicarp, mesocarp and endocarp.....X200.

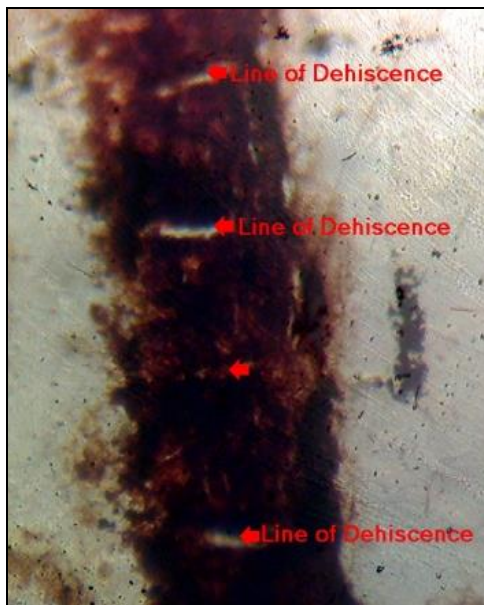


**Photo 3:** L. S. Pricarp with line of Dehiscence.....X200

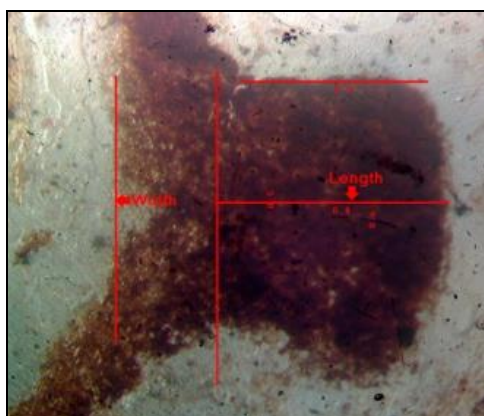


**Photo 4:** Stalk of Fruit.....X40

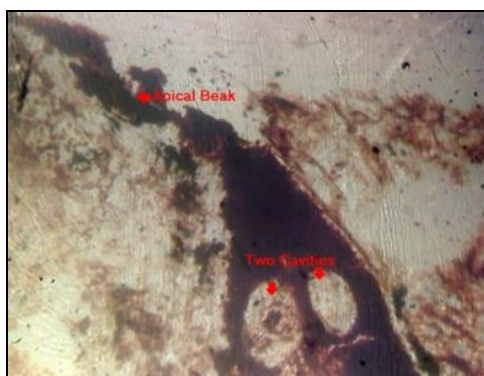


**Photo 5:** Apical Beak with two cavities k.....X40

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