

## Two new fossil fruits from Oligocene sediments of Makum Coalfield, Assam, India

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**Two new fossil fruits belonging to *Sterculia* of Sterculiaceae and *Barringtonia* of Lecythidaceae are described from the Oligocene sediments of Makum Coalfield, Assam, India. These fruits are reported for the first time not only from the Oligocene of Assam but from the Tertiary of India. Their presence supports the view that evergreen to littoral and swamp forests existed there during the time of deposition.**

DURING an excursion to the Makum Coalfield in 1993, a number of plant remains including leaf, fruit and seed impressions/compressions were collected, out of which two fruits belonging to *Sterculia* of Sterculiaceae and *Barringtonia* of Lecythidaceae are described here.

Makum coalfield (27°15'N; 90°40'E), located<sup>1</sup> in the Tinsukia District of Assam, is considered as one of the largest Tertiary coal deposits of India. The sediments of Tikak Parbat Formation are exposed there and are considered Oligocene in age<sup>2</sup>. The formation comprises

alternations of sandstone, siltstone, mudstone, carbonaceous shales and coal seams. The fruits were collected from the shales.

A few years back, several fruits belonging to *Mesua* of Clusiaceae<sup>1</sup> and *Entada* and *Leguminocarpon* of Fabaceae<sup>3</sup> were described from this coalfield. Recently<sup>4</sup>, the fruits of *Nypa* have also been recorded from here.

The present findings are important in the sense that fruits of *Sterculia* and *Barringtonia* are reported from India for the first time. In addition, the latter is ecologically very important as it is a good climatic indicator.

The specimens were first cleared and photographed. Then they were studied under the low power microscope. The specimens are deposited in the museum of the Birbal Sahni Institute of Palaeobotany, Lucknow.

### Systematic Description

Family: Sterculiaceae

Genus: *Sterculia* Linn.

*Sterculia palaeovillosa* sp. nov.

Figure 1 a.

**Description:** Fruit simple, dry, dehiscent, follicular; follicles radiating, sessile, five in number, connate at base, each about 4.5 cm in length and 1.8–2.7 cm in breadth, symmetrical, elliptic; texture leathery, margin entire.

**Holotype:** Specimen No. BSIP 38668.

**Horizon and Locality:** Tikak Parbat Formation; Makum Coalfield, Tinsukia District, Assam.

**Age:** Oligocene.

**Affinities:** The above characters of the fossil indicate that it closely resembles the fruit of *Sterculia* Linn. of Sterculiaceae. After a detailed comparison with different species of the genus at the Forest Research Institute, Dehradun, it was found that it shows maximum resemblance with the fruit of *S. villosa* (FRI Herb. Sheet No. 8640), especially in the shape and size (Figure 1 b).

The fossil has been named as *Sterculia palaeovillosa* sp. nov., indicating its close similarity with *S. villosa*.

Family: Lecythidaceae

Genus: *Barringtonia* Forst.

*Barringtonia preracemosa* sp. nov.

Figure 2 a.

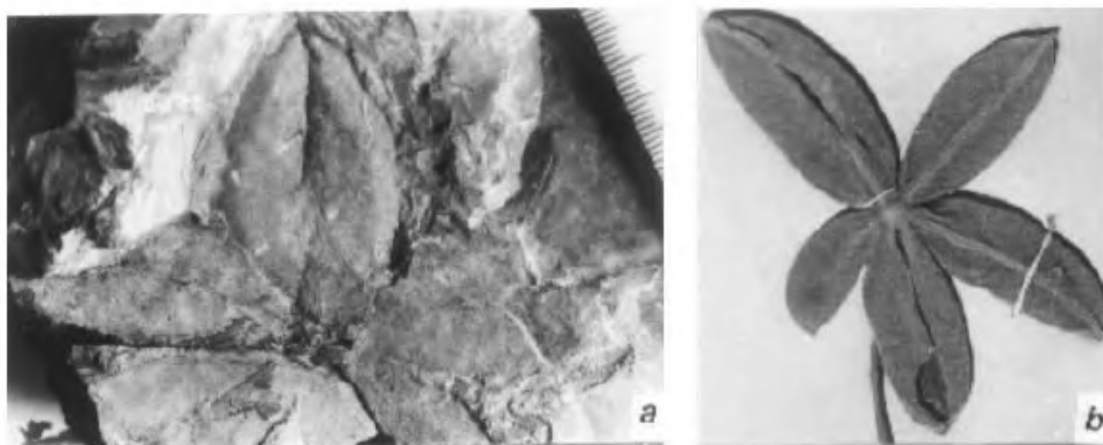
**Description:** Fruit simple, indehiscent, fleshy, single seeded berry; preserved length 5.4 cm, preserved width 3.1 cm; seed ovoid, 4.5 × 2.8 cm, the base covered with pericarp which is represented by endocarp only, mesocarp being fleshy is not preserved; preserved width of the wall 1–3 mm.

**Holotype:** Specimen No. BSIP 38669.

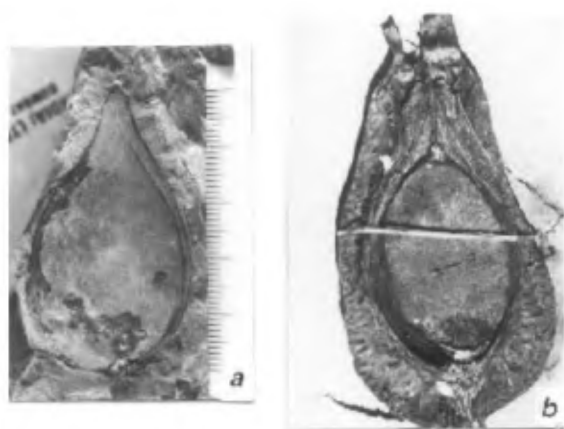
**Horizon and Locality:** Tikak Parbat Formation; Makum Coalfield, Tinsukia District, Assam.

**Age:** Oligocene.

**Affinities:** The above characters of the fossil indicate affinities with *Barringtonia* Forst<sup>5</sup>. After comparison with a number of species of the genus available at the Forest Research Institute, Dehradun the fossil shows



**Figure 1.** *a*, A fruit of *Sterculia palaeovillosa* sp. nov. in natural size showing shape and size of follicles; *b*, The modern fruit of *Sterculia villosa* in natural size showing similar follicles.



**Figure 2.** *a*, A fruit of *Barringtonia preracemosa* sp. nov. in natural size showing indehiscent single seeded berry; *b*, The modern fruit of *Barringtonia racemosa* in natural size showing similar nature of the fruit.

close resemblance with the fruit of *B. racemosa* Blume especially in its shape and size (Figure 2 *b*).

The fossil is named here as *Barringtonia preracemosa* sp. nov., indicating its close resemblance with *B. racemosa*.

*Sterculia* is a genus of trees or shrubs, consists of about 60 species distributed in the tropics of both hemispheres but especially abundant in the tropical Asia. *S. villosa*, with which the fossil shows maximum resemblance, is found in the Northeast India, Bengal, Malabar and the tropical Himalaya from Kumaun eastwards.

Though the fossil wood of *Sterculia villosa*, is already known as *Sterculinium dattai* (Prakash and Tripathi)

Guleria<sup>6</sup> from the Tipam Sandstone Formation (Middle Miocene) of the Cachar District of Assam, the present finding not only confirms the presence of the genus in the State but also traces its antiquity since Oligocene.

*Barringtonia* consists of about 20 species found in Asia, Africa, Australia and Polynesia, often near the sea. *B. racemosa* with which the fossil shows close resemblance, is found on the sea coast of Malabar and Coromandal in Western India and from Sunderbans to Malacca and Andamans in the east. It is an evergreen tree attaining 50 ft height, restricted to inundated flood plains or tidal river beds or in swampy localities along inland lakes or rivers. It is usually associated with *Nypa*, *Sonneratia*, *Heritiera* and *Myristica*, etc. which are already known from the Tertiary of Assam. Thus its presence supports the view<sup>3</sup> that evergreen to littoral and swamp forests existed there during Oligocene.

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