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# First record of the genus *Culcitites* Appert from India and its significance

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The genus *Culcitites* Appert has been recorded from the Dubrajpur Formation exposed at Khatangi Hill, Bihar. The genus is characterised by bipinnate fronds, deltoid-rhomboidal sterile pinnules and sphenopteroid venation. Fertile pinnules are comparatively small and possess an acroscopic marginal sorus terminating on vein ending, indusium being pouch-like in shape.

**Key-words**—Megafossils, *Culcitites*, Dicksoniaceae, Dubrajpur Formation, ?Late Jurassic (India).

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## साराँश

भारत से कल्सिटाइटिस अपर्ट प्रजाति का प्रथम अभिलेख तथा इसका महत्व

जयश्री बैनर्जी

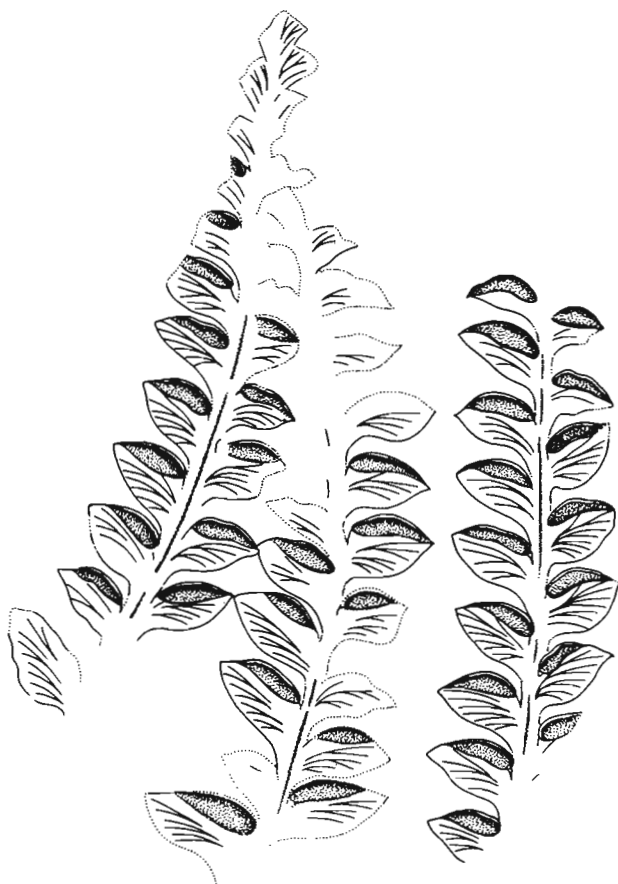
बिहार की खातंगी पहाड़ियों में विगोपित दुबराजपुर शैल-समूह से कल्सिटाइटिस अपर्ट प्रजाति अभिलिखित की गई है। यह प्रजाति द्विपिच्छाकार प्रपर्णों, त्रिकोणाकार-चतुष्कोणी बन्ध पिच्छकाओं तथा स्फीनॉप्टेरॉयडी शिराविन्यास से अभिलक्षित है। अबन्ध पिच्छकायें अपेक्षाकृत छोटी तथा शिराओं के अन्तिम सिरे पर अग्रोन्मुख उपांत बीजाणुधानीपुंज से युक्त हैं और इनमें सोरसछद थैलाकार है।

THE genus *Culcitites* was instituted by Appert (1973) due to its close resemblance with the extant genus *Culcita* (*Balantium*). The genus *Culcita* was placed by Bower (1926) in sub-family Dicksonieae of Dicksoniaceae, whereas, Holttum and Sen (1961) placed *Culcita* together with *Thyrsopteris* in sub-family Thyrsopteroidoideae of Cyatheaceae. However, Harris (1961) included *Thyrsopteris* and *Coniopteris* in sub-family Thyrsopterideae of Dicksoniaceae. Appert (1973) placed *Culcitites* in sub-family Thyrsopterideae of Dicksoniaceae.

Known fossil representatives of Dicksoniaceae

from India are *Coniopteris* Brongniart and *Dicksonia* L' Heritier. *Coniopteris* differs by its cup-shaped indusium of stalked sorus and sterile pinnae with basicopic aphlaebi, whereas *Dicksonia* differs from *Culcitites* mainly by pectopteroid venation of pinnules and bilipped indusium.

Specimens of *Culcitites* reported here were collected from the *Ptilophyllum* bearing beds (Dubrajpur Formation) of Khatangi Hill (24° 30' 16" N by 87° 27' 20" E), Rajmahal Hills, Bihar. They are preserved as impressions on light grey shales. The stratigraphic section and map have recently been



**Text-figure 1**—*Culcitites madagascariensis* Appert, fertile frond showing abaxial indusium and venation of pinnules, Specimen no. BSIP 36218-A,  $\times 4$ .

published by Sen-Gupta (1984).

### Family—DICKSONIACEAE

#### Genus—*Culcitites* Appert 1973

#### *Culcitites madagascariensis* Appert

Pl. 1, figs 1-7; Text-fig. 1

1965 ?*Thinnfeldia* sp., Sah, p. 219, pl. 1, fig. 3.

1965 *Microphylopteris* sp., Sah, p. 219, pl. 1, fig. 5.

**Description** (Size of the leaf unknown, for description purpose assumed to be bipinnate)—Fronds atleast bipinnate, sterile and fertile pinnules

more or less similar, asymmetrical. Sterile pinnae mostly found detached, in juvenile fronds pinnae found attached to pinna rachis. Pinnules alternate to subopposite, emerging at an angle of  $40^{\circ}$ - $60^{\circ}$ , usually about 5 mm apart, linear-lanceolate in shape, largest available pinna 5 cm long and 1.6 cm broad, size gradually decreasing towards distal end. Pinnules and pinnules proximally alternate, distally becoming sub-opposite. Pinnules arising at an angle of  $50^{\circ}$ - $60^{\circ}$ , deltoid to rhomboidal in shape, imparipinnate, larger at the middle region, typically 3.5-9 mm long, 2.5-6 mm wide, acroscopic basal margin constricted, basicopic margin decurrent, lateral margin entire to variously lobed, mostly first acroscopic lobe deeply dissected than the others. Venation sphenopteroid, mid-vein arising from ultimate rachis slightly more towards basicopic side of basal margin, laterals mostly twice forked.

Fertile pinnules generally comparatively small, deltoid, margin entire, 2-3 mm long, 1.5-2 mm broad, basal pinnules rhomboidal with lobed to wavy margin. Each pinnule bearing a marginal indusiate sori on its acroscopic half, indusium horizontally placed, pouch-like in shape, usually 2 mm long and 1.5 mm broad, adaxial indusium seems to be continuation of lamina. Details of receptacle and sporangium unknown.

**Collection**—Specimen nos. BSIP 36217, 36218 A, B, 36219A, B and 36220.

**Remarks**—The specimens exactly match with *Culcitites madagascariensis* described by Appert (1973) from the Upper Jurassic of Manamana Massif, South West Madagascar. However, text-figure 35 of Appert shows two sori at the base of a pinnule which seem to be a developmental feature showing the stage of maturity of the fronds.

In having a single marginal sori *C. madagascariensis* compares with *Dicksonia kendalli* described by Harris (1961) from Jurassic of Yorkshire which differs by comparatively small pinnules and oval to reniform sori. *Dicksonia speciosa* Sharma 1975 differs by its inverted sori and the venation pattern of the pinnules.

Occurrence of two lipped indusium of the sori first appeared in Jurassic members of Dicksoniaceae

### PLATE 1



1. *Culcitites madagascariensis* Appert, fertile frond showing acroscopic indusiate sori, specimen no. BSIP 36218-A,  $\times 1$ .
2. Counterpart of the above specimen, Specimen no. BSIP 36218-B,  $\times 1$
3. A part of sterile pinna showing shape and venation of pinnules, Specimen no. BSIP 36219-A,  $\times 2$ .
4. Enlargement of fig. 1 showing venation and pouch-shaped indusium,  $\times 8$ .
5. Detached sterile pinnae showing variations in size and shape of pinnules, Specimen no. BSIP 36219-A,  $\times 1$ .
6. Fertile frond showing morphological variation of the pinnules, Specimen no. BSIP 36218-A,  $\times 4$ .
7. Counterpart of the above specimen, Specimen no. BSIP 36218-B,  $\times 4$ .

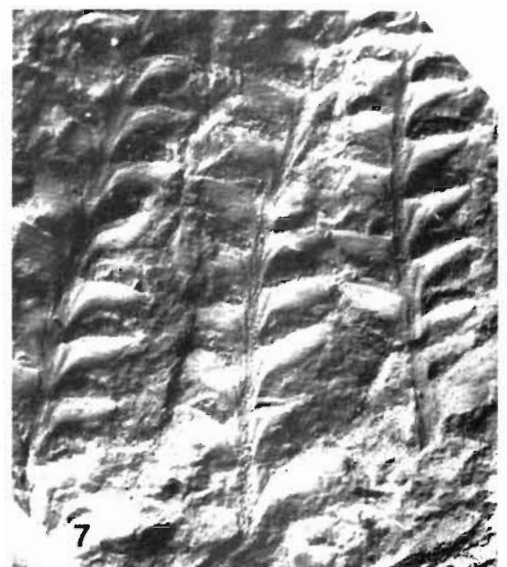
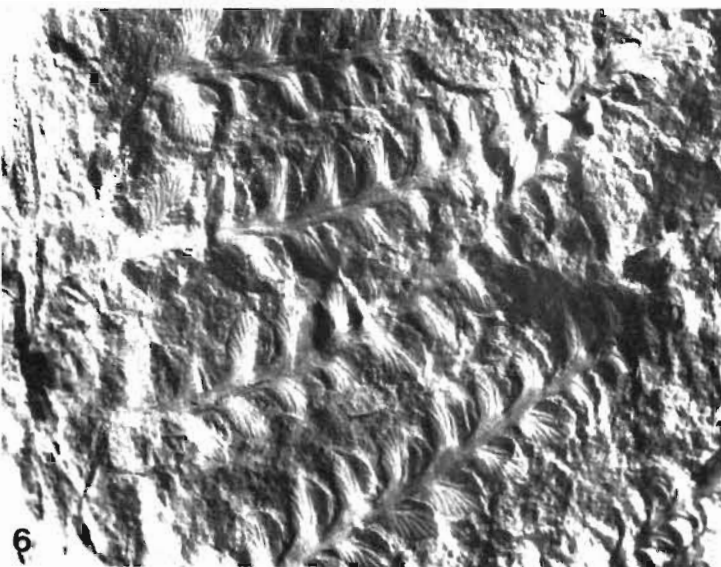
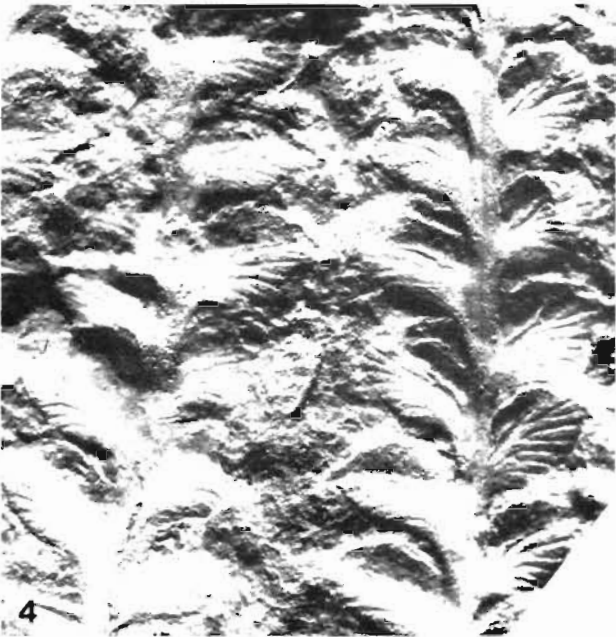
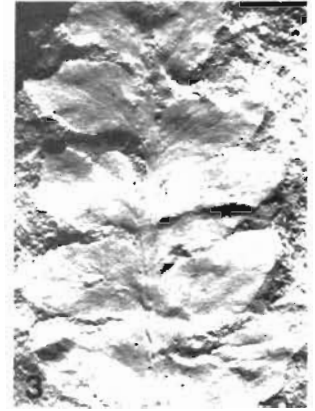
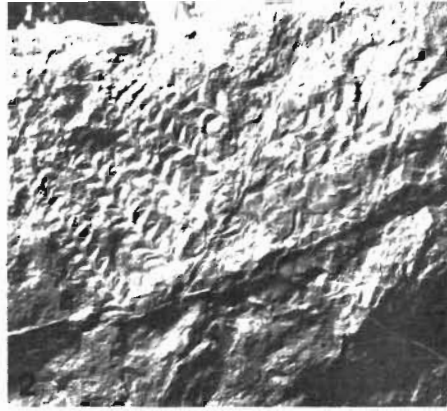
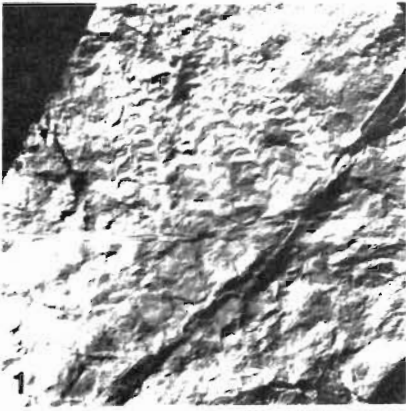


PLATE 1

and perhaps evolved from a primitive marginal sorus. According to Harris (1961) the genus *Coniopteris* either has a cup-shaped indusium or a flattened lobed one. On the contrary, Krassilov (1978) suggested a two-lipped indusium in most species of *Coniopteris*. The genus *Culcitites* is more akin to the extant genus *Culcita* in having two-lipped indusium which forms pouch-like indusial chamber. Retention of this ancestral character, i.e. two-lipped marginal indusium in the early stage of development of cup-shaped indusium in *Thyrsopteris*, as suggested by Bower (1926), provides a clue to its phyletic relationship with the genera *Culcitites* and *Coniopteris*. Appert (1973) also suggested relationship of some fossil and recent members of Dicksoniaceae with the monotypic extant genus *Thyrsopteris*.

Sah (1965) assigned a ? Lower Jurassic age to the *Ptilophyllum* bearing beds of Khatangi Hill. Sah and Shah (1974) suggested a Lower-Middle Jurassic age. The genus *Culcitites* is, so far, known only from the Upper Jurassic of Madagascar. This bed may be contemporaneous to the Late Jurassic/Early Cretaceous subsurface palynozone D-E of Dubrajpur Formation (Tiwari *et al.*, 1983).

As all the extant species of the genus *Culcita* are presently distributed in tropical-subtropical region only, it is probable that a similar climate prevailed in Rajmahal area during Late Jurassic.

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