

LEAF IMPRESSIONS FROM THE NEYVELI LIGNITE DEPOSITS, TAMIL NADU INDIA

ANIL AGARWAL

Birbal Sahni Institute of Palaeobotany, Lucknow - 226 007

Three leaf impressions, showing close resemblance with the extant genera, viz., *Randia* Linn. of Rubiaceae *Excoecaria* Linn. of Euphorbiaceae and *Melodinus* of Apocynaceae have been described from the Neyveli Lignite deposits, Tamil Nadu, India. They have been named as *Randia neyveliensis* sp. nov. *Excoecaria preagallocha* sp. nov. and *Melodinus japonicus* Tanai (1970) respectively.

The Neyveli Lignite in South Arcot district, Tamil Nadu is a largest deposit of Lignite in India and contains both micro and megafossils. The later consists of carbonised woods and leaf impressions/compressions. The study on carbonised woods has been made by different workers. As a result a number of fossil woods have been reported showing their close resemblance with the modern taxa *Hopea*, *Gluta*, *Carallia*, *Diospyros*, *Cordia Parinari*, *Bouea*, *Altingia*, *Bauhinia* and *Dracaena* (Ambwani 1982; Awasthi 1984; Awasthi & Agarwal 1987; Agarwal 1989, 1990). On the other hand the study of leaf impressions is very meagre, only few preliminary reports were made. Singh & Mathew (1954) and Jacob & Jacob (1954) have mentioned the occurrence of leaves of angiosperms in the Neyveli Lignite. Chatterjee & Bhattacharya (1965) also described a compressed bark/leaf sheath of a palm like tree from here.

MATERIALS AND METHODS

In order to reconstruct the palaeovegetation and palaeoecology of this region a number of leaf impressions have been collected from Neyveli Lignite. Their detailed study was done and consulted the Herbaria of National Botanical Research Institute, Lucknow and Forest Research Institute, Dehradun for their identification. Of these, only three leaf impressions could be identified and described here in detail.

SYSTEMATIC DESCRIPTION

Family - Rubiaceae

Genus - *Randia* Linn.

Randia neyveliensis sp. nov.

(Pl. 1, Fig 1)

Material - This species is based on a single, complete leaf impression.

Description - Leaf simple, symmetrical, narrow obovate lamina length 13.5 cm maximum width 5.8 cm; apex rounded; base acute, cuneate; margin entire; petiole indistinct; texture coriaceous; venation pinnate, simple craspedodromous; primary vein (1°) single, prominent, thicker in lower part, moderate, almost straight, slightly curved at the tip, secondary veins (2°) 7 pairs with angle of divergence acute (60°) moderate, alternate, 1.8-2.7 cm apart, uniformly curved, usually unbranched; tertiary veins (3°) partly preserved.

Affinities - The most characteristic features of the present leaf impression like obovate shape, rounded apex, cuneate base and simple craspedodromous venation indicate its resemblance with the modern leaves of *Randia uliginosa* Retz. of the family Rubiaceae (Forest Research Institute, Herbarium sheet No. 22350). Three species of fossil leaves of *Randia* have so far been recorded. These are *Randia prodroma* Ung. from the Miocene of Sarmatsalzhausen in Germany (Salomon, 1934), *R. gossferiana* (Kschun) from the Tertiary of Klamrungebietes Germany (Menzel, 1920) and *R. mohavensis* Axelrod (1950) from the Miocene of Kinnick, Techachapi, North America (LaMotte, 1952).

As the present Neyveli fossil is different from all these known species of *Randia* Linn., it has been assigned to a new species *Randia neyveliensis*, *Randia uliginosa* Retz. (Syn. *G. uliginosa* Roxb.) with which fossil shows close resemblance, is a small tree and grows in all dry districts of eastern, central and southern India.

Holotype - BSIP Museum No. 36590

Age - Miocene

Family - Euphorbiaceae

Genus - *Excoecaria* Linn.

leaves of *Excoecaria agallocha* Linn. (Forest Research Institute Museum sheet no. 17672, 2985/17243).

So far only one fossil leaf resembling the genus *Excoecaria* is described as *E. palaeocrenulata* (Awasthi & Prasad, 1990) from the Siwalik of Suraikhola, Nepal. This Siwalik leaf differs from the present fossil in having crenulate margin in comparison to almost entire margin in this specimen. Therefore, a new name *E. preagallocha* sp. nov. has been given to it, the specific epithet indicating its similarity with *E. agallocha*. *E. agallocha* which is compared with the fossil leaf, is a small to moderate sized tree occurring in Sunderban, Andaman and on the coast of Burma and Ceylon. It is found in the tidal forest on both sides of the peninsula of India (Brandis, 1971, p 585).

Holotype - BSIP Museum No. 36591

Age - Miocene

Family - Apocynaceae

Genus *Melodinus* Forst

Melodinus japonicus Tanai, 1970

(Pl. 2 Fig. 5)

Material - This specimen is based on single leaf impression.

Description - Leaf simple, symmetrical, elliptic, lamina length 3.7 cm; preserved maximum width 2.6 cm; apex broken; base wide acute, normal, margin entire; texture chartaceous; petiole 1.6 cm long; venation pinnate, cucamptrodromous; primary veins (1°) single, prominent, moderate almost straight; secondary veins (2°) 9 pairs visible, angle of divergence wide acute to nearly right angle, 0.3-0.6 cm apart, usually alternate, closely placed, unbranched, further details could not be seen.

Affinities - The above characteristic features of the fossil leaf undoubtedly indicate its affinity with *Melodinus monogynus* Roxb. of the family Apocynaceae.

A fossil leaf showing close resemblance with the leaves of *M. monogynus* Roxb. has already been described by Tanai (1970) from Tertiary of Japan and also exhibits similar characters as of the present fossil leaf. Hence, this Neyveli specimen has been assigned to the same.

Melodinus monogynus Roxb. with which the fossil leaf shows close resemblance now grows in Assam, Khasi hills, Manipur and in Malaya peninsula (Brandis, 1971).



Plate - 1

1. *Randia neyveliensis* - A fossil leaf in natural size.
2. *Randia uliginosa* - A modern leaf in natural size showing similarity with the fossil leaf.

Excoecaria preagallocha sp. nov.
(Pl. 2, Figs 1,3).

Material - This species is based on two well preserved leaf impressions; one is almost complete and other one is with basal part only.

Description - Leaf simple, symmetrical, elliptic, preserved lamina length 4-6 cm, maximum width 4 cm, apex broken; base wide acute; margin almost entire; texture thick chartaceous; petiole not preserved; venation pinnate, brachidodromous; primary vein (1°) single, prominent, stout, almost straight; secondary veins (2°) more than 10 pairs visible, 0.3-1 cm apart, angle of divergence nearly at right angle, uniformly curved, usually unbranched; inter-secondary veins present, simple; higher order venation not clear.

Affinities - The most important characters of the fossil, viz., elliptic shape, wide acute apex, brochidodromous venation, closely placed secondary veins with nearly right angle of divergence and presence of intersecondary veins directly indicate its affinity with the modern

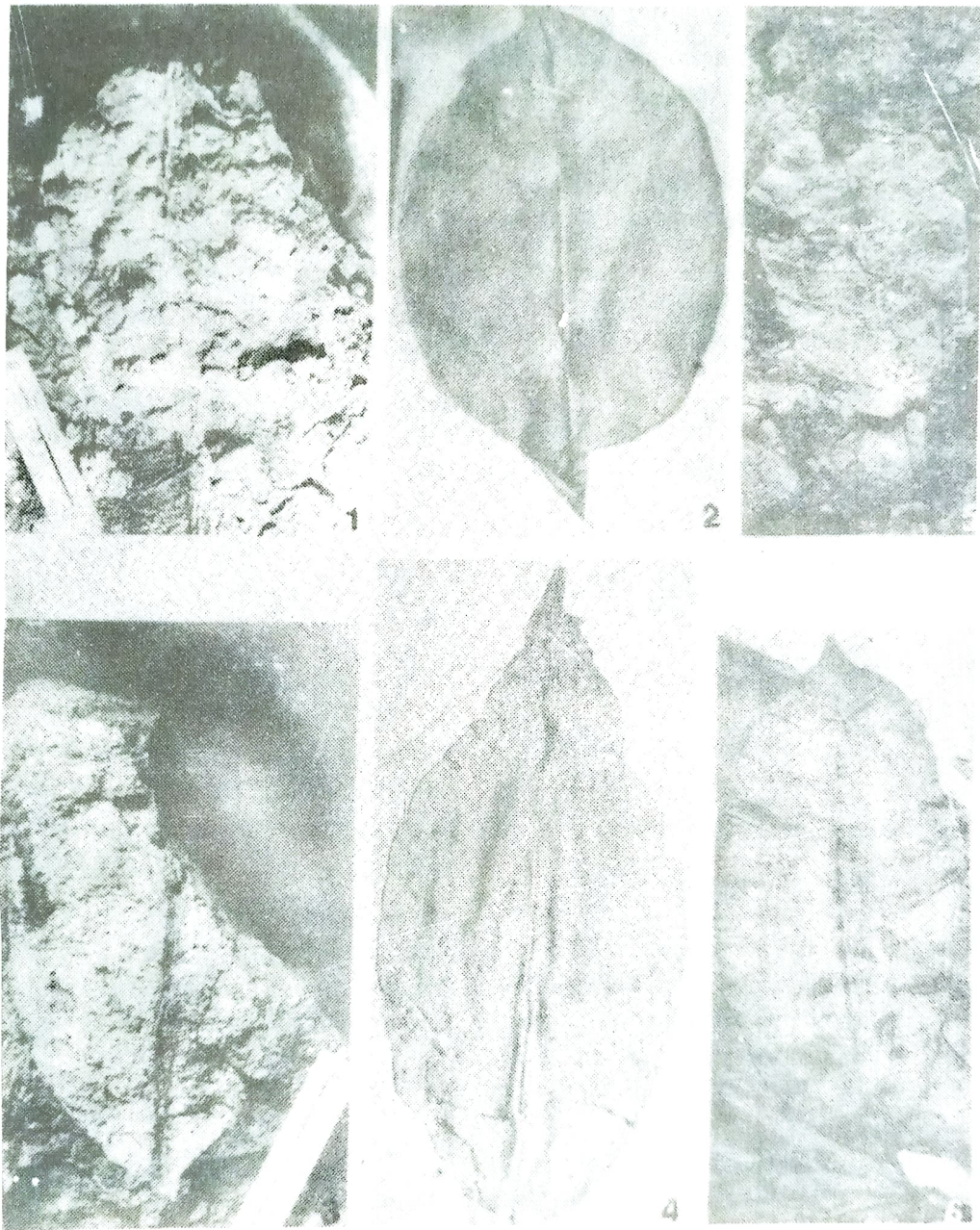


Plate - 2

- 1 & 3. *Excoecaria preagallocha* - Fossil leaves in natural size.
- 2 & 4. *Excoecaria agallocha* - Modern leaves in natural size showing similarity with the fossil leaves.
- 5. *Melodinus japonicus* Tanai, 1970 - A fossil leaf in natural size.
- 6. *Melodinus monogynous* - A modern leaf in natural size showing similarity with the fossil leaf.

Specimen - BSIP Museum No. 36592.

Age - Miocene

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