

Leaf-impressions of *Polyalthia* Bl. in the Siwalik sediments of Darjeeling District, West Bengal, India

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THE Siwalik sediments in the area are well exposed and occur continuously from Sivok Khola in the west to Lethi River in the east. Mallet (1875), Bose (1890-91) and Acharyya (1968, 1972) have carried out the lithological study of the area. The Siwalik sections exposed on Sevok Road cutting along the left bank of Tista River are steep and rich in plant fossils. A number of leaf-impressions belonging to Lower Siwaliks were collected from a road cutting on the left bank of Tista River just near Sevok Road Bridge. Similarly, from Ramthi River Section, assigned to Lower Siwalik, a number of fossil leaves preserved in fine grey shales overlying thick sandstones have been collected. A number of leaf-impressions belonging to families Anonaceae, Flacourtiaceae, Dipterocarpaceae, Anacardiaceae, Fabaceae, Combrretaceae, Rubiaceae, Lauraceae, Lythraceae, Xanthophyllaceae and Euphorbiaceae have already been reported from the Ramthi River Section (Antal & Awasthi, 1993). However, there is no record of any plant fossil so far from Sevok Road Section.

The study of recently collected material from Sevok Road and Ramthi River sections reveals the presence of a new fossil leaf belonging to the genus *Polyalthia* of the family Anonaceae which has been described in the present paper.

SYSTEMATIC DESCRIPTION

Family — Anonaceae

Genus — *Polyalthia* Bl.

Polyalthia palaeosimiarum Awasthi & Prasad 1990

Figures 2, 3

This species consists of three specimens, out of them two are almost complete and have been collected from Sivok Road section; the remaining one is from Ramthi River near Oodlabari.

Description — Leaf simple, symmetrical, narrow-oblong to elliptic, preserved size 8 x 3.8 cm and 9.5 x 2.8 cm; apex broken; base acute to obtuse; margin entire; texture chartaceous; petiole 0.2 mm visible in later specimen; venation pinnate, eucamptodromous; primary vein (1°) single, prominent, stout, almost straight; secondary vein (2°) 13 pairs visible, alternate to opposite, 0.5 to 1.2 cm apart, angle of divergence 55° to 70°, moderate acute, lowest two pairs of secondaries arise at more angle, uniformly curved up, unbranched; tertiary veins (3°) fine, angle of origin usually RR, sometimes AO, percurrent, rarely forked, oblique in relation to midvein, predominantly alternate and close to nearly distant; quaternary veins not visible.

Specimen — Nos. BSIP 37414 and 37415.

Locality — Sevok Road cutting on the left Bank of Tista River; Specimen no. 37416 is from the Ramthi River section, Darjeeling District, West Bengal.

Horizon — Lower Siwalik.

Affinities — The characteristic features of the present fossil leaves such as narrow-oblong to elliptic shape, acute to obtuse base, entire margin, eucamptodromous venation, course of secondary veins and percurrent tertiary veins strongly indicate their resemblance with the modern leaves of the genera *Polyalthia* Bl. and *Oxymitra fornicata* Roxb. of the family Anonaceae.



Figure 1. *Polyalthia simiarum* — A modern leaf showing close resemblance with fig. 2; 2. *Polyalthia palaeosimiarum* Awasthi & Prasad — Fossil leaf in natural size showing shape, size and venation pattern. Specimen no. BSIP 37414; 3. *P. palaeosimiarum* — Another fossil leaf in natural size showing variation in shape and size. Specimen no. BSIP 37415.

A critical study of the Herbarium sheets of the above taxa shows that the leaves of *Oxymitra fornicata* Roxb., though show some resemblance in shape and size, etc., can be differentiated from the present fossils in the course of tertiary veins which are comparatively fine and closely placed with sinuous in course. Amongst the various examined species of *Polyalthia*, the leaves of *Polyalthia simiarum* Benth. & Hook. (FRI Herbarium Sheet no. 4153) show closest affinity with the present fossils in shape, size and venation pattern.

The genus *Polyalthia* is known by both fossil woods and leaves. The fossil leaves are known from the Tertiary sediments of Nepal, Germany and America. Of them, *Polyalthia crassipes* Engl. has been described from the Tertiary of Germany (Menzel, 1920) and *P. chaneyi* from the Eocene of North America (Sanborn, 1935). Later, Awasthi and Prasad (1990) reported a fossil leaf—*P. palaeosimiarum* belonging to the modern species *Polyalthia simiarum* Benth. & Hooker f. from the Siwalik sediments of Suraikhola, Nepal. On comparison of the

present fossil leaves with the above known fossil leaves it has been observed that our leaves show closest similarity with *Polyalthia palaeosimiarum* Awasthi & Prasad 1990 reported from Nepal and therefore have been described under it.

Thus the present fossil leaves form the first record from the Siwalik sediments of Darjeeling District, West Bengal, India.

The fossil record of the genus *Polyalthia* Bl. indicates its cosmopolitan distribution during the Tertiary Period. The earliest fossil record of *Polyalthia* goes back to the Eocene. Its fossil woods have been reported from the Tertiary of Middle Java (Schuster, 1911), Deccan Intertrappean beds of Mandla District, Madhya Pradesh, India (Bande, 1973), Tertiary of South-East Asia (Kramer, 1974), and Siwalik sediments of Kalagarh, Uttar Pradesh, India (Prakash, 1978). Further, the records of fossil leaves from the Tertiary of Germany (Menzel, 1920), Eocene of North America (Sanborn,

1935) and Siwalik sediments of Nepal (Awasthi & Prasad, 1990) obviously indicate that the genus *Polyalthia* is continued from the Eocene to the present day.

The extant genus *Polyalthia* Bl. consists of 70 palaeotropical species (Willis, 1973, p. 528). *Polyalthia simiarum*, with which the fossils show closest resemblance, is a tall tree found in Assam, Chittagong Hills in Bangladesh, Myanmar and Andamans (Brandis, 1971; Gamble, 1972).

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