

**FASCICLES
OF
FLORA OF INDIA**

FASCICLE 9

ACERACEAE

M. P. NAYAR AND ANUKUL DATTA



**BOTANICAL SURVEY OF INDIA
P. O. BOTANIC GARDEN
HOWRAH-711103**

EDITORIAL BOARD

DR. S. K. JAIN	<i>Chairman</i>
DR. N. C. NAIR	<i>Member</i>
DR. M. P. NAYAR	<i>"</i>
DR. B. D. SHARMA	<i>"</i>
DR. V. S. AGARWAL	<i>"</i>
DR. K. THOTHATHRI	<i>Secretary</i>

**FASCICLES
OF
FLORA OF INDIA**

FASCICLE 9

ACERACEAE

M. P. NAYAR AND ANUKUL DATTA



**BOTANICAL SURVEY OF INDIA
P. O. BOTANIC GARDEN
HOWRAH-711103**

© Government of India 1982

Price : Rs. 10.00 ; £ 1.50 ; \$ 3.00

Printed by N. Lahiri at Loyal Art Press Private Ltd., 164, Lenin Sarani, Calcutta-700013
and Published by the Director, Botanical Survey of India
P.O. Botanic Garden, Howrah-711103.

C O N T E N T S

ACERACEAE : GENUS—ACER	1-20
(M. P. NAYAR AND ANUKUL DATTA)	
INDEX TO SCIENTIFIC NAMES	21
INDEX TO LOCAL NAMES	22

Date of Publication : 30th August, 1982

ACERACEAE†

A. L. de Juss. Gen. Pl. 250. 1789 (*Acera*).

M. P. NAYAR AND ANUKUL DATTA*

Trees or shrubs, unarmed, non-laticiferous. Leaves opposite, exstipulate, simple or compound. Inflorescence corymbose-fasciculate, racemose or fasciculate, terminal or lateral. Flowers andro-monoecious, andro-dioecious or dioecious, actinomorphic, usually 4-5-merous. Sepals free. Petals sometimes none. Disc annular, lobed. Stamens 4-12, often 8, hypogynous or perigynous; filaments free, filiform; anthers 2-loculed, versatile, oblong or linear, longitudinally dehiscent. Ovary superior, bilobed, 2-loculed, compressed; ovules 2 in each loculus; style 1 or 2, 2-armed, free or connate; stigmas 2, filiform. Fruit a samara, mericarps 2, winged on the outer side, 1-2-seeded. Seeds campylotropous, exalbuminous, testa thin. Embryo with flat or plicate cotyledons.

Pollen: Tricolporate, occasionally tricolporate, isopolar, prolate to nearly spheroidal. Apocolpia 2-9 μm in dia. Colpi 2-10 μm broad with tapering ends, colpal membrane smooth or slightly granular. Ora circular if present. Sexine striate, rugulose, granular or reticulate. Lirae, rugulae and muri generally rounded, 0.5-1.5 μm wide. Grains tectate. Bacula distinct [Biesboer in Grana 15 (1-3): 19-27. 1975].

Genera 2 and species ca. 120 distributed in the temperate northern hemisphere and tropical and subtropical Asia. *Acer* occurs in India; *Dipteronia* is endemic to Central China.

ACER

Linn. Sp. Pl. 1054. 1753 et Gen. Pl. ed. 5:474. 1754; Hiern in Hook. f. Fl. Brit. Ind. 1:692-696. 1875; Pax in Engler & Prantl's Pflanzenr. IV. 163. 8:1-80. 1902; E. Murray, Monogr. Aceraceae 1-337. 1970.

Trees, rarely shrubs, with perulate buds ; usually deciduous, rarely evergreen. Leaves petiolate, palmately 3-7-lobed or entire or pinnately

† Editor for the Family Aceraceae : S. K. JAIN, Botanical Survey of India, Howrah-711103.

* Botanical Survey of India, Howrah-711103.

3-7 (9)-foliate. Inflorescence in 2-4 leafy terminal branches or in leafless lateral or terminal branches. Petals equal to or shorter than sepals, often yellowish-green. Disc rarely reduced or absent, often intrastaminal, rarely extrastaminal or having stamens on the middle. Anthers introrse, in male flowers exserted, in bisexual flowers included. Ovules collateral or superposed. Seed in each locule very often solitary through abortion.

Distrib.: ca. 118 species occurring in the temperate North America, N. W. Africa, Asia and Malesian islands; 16 species in India.

Key to the species

1a. Plants having either lobed or unlobed leaves, both conditions not present together:

2a. Leaves unlobed:

3a. Inflorescence racemose, pendent:

4a. Leaf margin serrate or deeply serrate; samaras distinctly stalked, 0.7-5.0 cm long:

5a. Samaras 1.8-2.5 cm long; fruit-stalk 0.7-1.0 cm long; petiole 2.5-5.0 cm long; leaf glabrous or glabrate below; flowers 5-merous ...6. *A. hookeri*

5b. Samaras 2.5-5.0 cm long; fruit-stalk 3-5 cm long; petiole 5-7 cm long; leaf canescent or villose below; flowers 4-merous ...14. *A. stachyophyllum*

4b. Leaf margin subentire to finely serrulate; samaras indistinctly stalked or almost sessile, stalk 0.2 cm long

...13. *A. sikkimense*

3b. Inflorescence paniculate or corymbose :

6a. Leaf apex caudate-acuminate; inflorescence lateral
...8. *A. laurinum*

6b. Leaf apex acuminate; inflorescence terminal:

7a. Upper surface of leaf green, lower surface glaucous; petiole 2-7 cm long, usually ca. $\frac{1}{3}$ rd of the lamina length ...9. *A. oblongum*

7b. Upper surface of leaf olive-green, lower surface brownish; petiole 0.7-1.8 cm long; usually ca. $\frac{1}{8}$ th of the lamina length ...7. *A. laevigatum*

2b. Leaves lobed:

8a. Leaves 3-lobed, lobations sometimes obsolete:

9a. Apex of leaf-lobes acuminate, margin entire or obsoletely serrate:

10a. Samaras 2-3 cm long, glabrous; leaves $5-9 \times 8-11$ cm, undersurface glabrescent or glabrous ...12. *A. pentapomicum*

10b. Samaras 5-8 cm, villous; leaves $13-15 \times 14-24$ cm; undersurface of leaves along the nerves villous, glabrescent ...16. *A. thomsonii*

9b. Apex of leaf-lobes cuspidate-serrulate, long caudate; margin deeply dentate ...1. *A. acuminatum*

8b. Leaves 5-lobed, the lower lobations not prominent, sometimes 7-lobed:

11a. Leaf margin entire ...4. *A. cappadocicum*

11b. Leaf margin serrate to remotely serrate:

12a. Samaras erect, the angles of divergence 90° or less than that:

13a. Undersurface of leaves glabrous or glabrescent except at the axils of nerves which are bearded ...2. *A. caesium*

13b. Undersurface of leaves pubescent:

14a. Leaf margin inciso-serrate; apex caudate, inflorescence racemose, erect; samaras $3.0 \text{ cm} \times 1.0-1.5 \text{ cm}$...5. *A. caudatum*

14b. Leaf margin remotely serrate; apex

acuminate, inflorescence lateral, fasciculate-racemose,
pendulous; samaras $4-5 \times 1.5-2.0$ cm

...15. *A. sterculiaceum*

12b. Samaras slanting, the angles of divergence more than 90° :

15a. Leaf lobes deltoid, apex caudate-acuminate, leaf
margin deeply serrate; samara-nutlets elliptic-oblong
...11. *A. pectinatum*

15b. Leaf lobes ovate-caudate or lanceolate-caudate,
leaf margin subentire to serrulate; samara-nutlets
orbicular ...3. *A. campbellii*

1b. Plants having both lobed and unlobed leaves ...10. *A. ×osmastonii*

1. *A. acuminatum* Wallich ex D. Don, Prodr. Fl. Nepal 249. 1825;
R. N. Parker, For. Fl. Punj. 104. 1918; Banerji in Rec. Bot. Surv.
Ind. 19(2): 33. 1966; H. Hara in Hara et Williams, Enum. Fl. Pl.
Nepal 2:97. 1979. *A. caudatum* sensu Hiern in Hook. f. Fl. Brit. Ind.
1:696. 1975 *pro parte*, non-Wallich.

Small to medium-sized deciduous trees, dioecious. Leaves chartaceous, $7.0-12.5 \text{ cm} \times 5-10 \text{ cm}$, often as long as broad, 3-lobed, middle lobe larger than lateral ones, base rounded, subcordate to truncate, 5-nerved. Inflorescence corymbose-racemes, appearing with or after leaves; staminate inflorescence on leafless lateral shoots, pistillate inflorescence terminal on leafy shoots. Stamens 4-6, exserted. Disc extra-staminal. Ovary glabrous; styles elongate; stigma short. Samaras glabrous, wings subparallel or acutely divergent.

Type: Kashmir, *Wallich* 1225 p.p. (CAL !, K).

Fls.: Feb.-Apr., *Frts.:* May-Aug.

Distrib.: INDIA: Garhwal Himalayas, Kumaon, Kashmir, Himachal Pradesh, Uttar Pradesh; NEPAL.

Pollen: Grains subprolate, $25.5 \times 21.2 \mu\text{m}$, exine striate, *ca.* $1.5 \mu\text{m}$ thick, apocolpium dia. *ca.* $3-4 \mu\text{m}$ and colpus length avg. $24.0 \mu\text{m}$ [Biesboer in Grana 15(1-3): 19-27. 1975].

2. *A. caesium* Wallich ex Brandis, For. Fl. N.W. & C. Ind. 111. tab.
21.1874 non *A. caesium* (Reinwardt ex Bl.) Kostermans 1965; Hiern

in Hook. f. Fl. Brit. Ind. 1:695. 1875; R. N. Parker, For. Fl. Punj. 103. 1918; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:97. 1979.

Fig. 1

Kinar (Kash.), *Trekhan*, *Mandar* (Punj.); *Kilu* (Garh.).

Large deciduous trees, 20-25 m tall, andro-monoecious. Dormant flower buds large and prominent. Leaves 8-18 cm \times 10-20 cm, palmately 5-lobed, upper surface green, undersurface characteristic caesio-pruinose; base deeply cordate, 5-nerved, leaf-lobes caudate-acuminate; petioles 6-15 cm long, reddish. Inflorescence corymbose-panicle, erect, terminal, puberulous, appearing after the leaves. Flowers pale greenish-yellow to yellow. Sepals longer than petals. Stamens 8, inserted into the disc, exserted. Ovary pubescent; styles 2, connate half-way up. Samara wings slightly divergent.

Type: North West Himalaya, "7-10,000 ft", Thomas Thomson s. n. (CAL !, K).

Fls.: Mar.-May; *Frts.*: June-Oct.

Distrib.: INDIA: Himalayas, Kashmir, Himachal Pradesh, Uttar Pradesh; PAKISTAN, NEPAL.

Pollen: Grains subprolate, $25.0 \times 22.9 \mu\text{m}$, exine $1.5 \mu\text{m}$ thick, striate, apocolpium dia. $2-3 \mu\text{m}$, colpus length $24.1 \mu\text{m}$ [Biesboer in Grana 15(1-3): 19-27. 1975].

Chr. No.: n=13 (Mehra & Sareen in Taxon 18:440.1969).

Notes: This species is the largest Maple in W. Himalayas, grows at 2130 m-3050 m alt. from Kashmir to Kumaon. The overall colour of the foliage appears bluish-grey which signifies the specific name.

3. *A. campbellii* Hooker f. & Thomson ex Hiern in Hook. f. Fl. Brit. Ind. 1:696. 1875; H. Hara in Fl. E. Himal. 191. 1966; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:97. 1979.

Kabashi (Nep.); *Daom yatli* (Lep.); *Kilok* (Bhut.).

Very tall trees, 12-30 m tall, andro-monoecious. Branches greyish-green or yellow. Leaves palmately 5-7-lobed, chartaceous, broader than

long, 10-12 cm \times 12-15 cm, both surface light green, shining, base truncate-cordate, 5-7-nerved, glabrous or at the axils and along the nerves beneath sparsely pilose. Inflorescence corymbose, terminal, appearing with leaves 5-15 cm long. Flowers 5-merous, greenish-white. Stamens 8, somewhat included, reddish, filament short. Disc extra staminal. Ovary glabrescent. Samaras 1.7-3.0 cm long, glabrous, wings horizontal or divergent.

1a. Lamina truncate at base, margin serrulate, nerves glabrous; inflorescence dense, nuts globular, wings contracted at base on the inner side and abruptly broadened upwards, back slightly curved at the apex, more or less truncate ...var. **campbellii**

1b. Lamina cordate at base, margin serrate, often twice serrate, pubescent at nerves in the lower surface; inflorescence elongate; nuts ovoid, wings slightly contracted at base, gradually expanded upwards, back more or less straight ...var. **serratifolium**

var. **campbellii**

Type: Sikkim Himalaya, *Griffith* 926 (CAL !, K).

Fls.: Apr.-May; *Frts.:* June-Aug.

Distrib.: INDIA: Himalayas, Sikkim, W. Bengal, Arunachal Pradesh; NEPAL.

Uses: Wood moderately hard, shining, extensively used for planking.

Pollen: Grains tricolporate, ca. $28.8 \times 25.2 \mu\text{m}$, prolate spheroidal exine $1.5 \mu\text{m}$, striate, apocolpium dia. ca $2-4 \mu\text{m}$, colpus length avg. $27.2 \mu\text{m}$ [Biesboer in Grana 15 (1-3): 19-27. 1975].

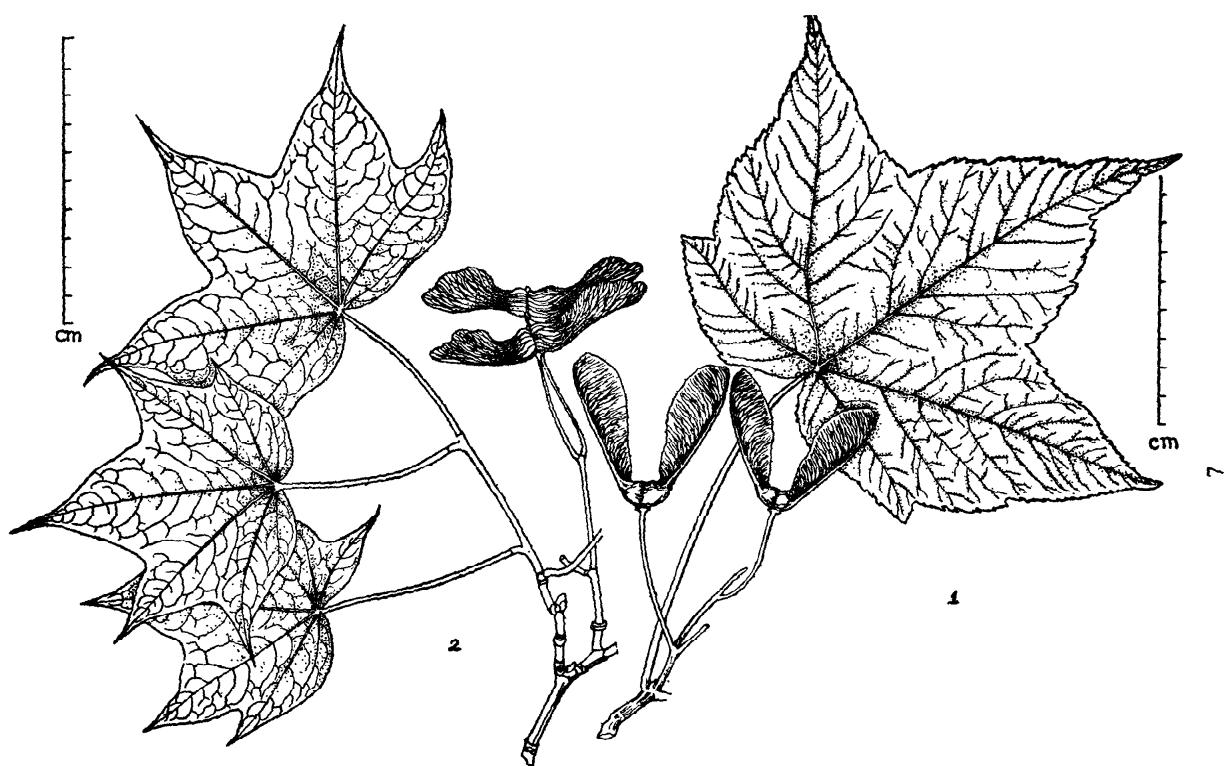
Chr. No.: n=13 (Mehra & Khosla in Taxon 18:218.1969).

var. **serratifolium** Banerji in Journ. Bombay Nat. Hist. Soc. 58(1): 306. 1961; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:97. 1979.

Type: Sikkim, *J. H. Lace* 2250 (CAL !).

Fls.: May-June; *Frts.:* July-Aug.

Distrib.: INDIA: E. Himalaya, Sikkim, W. Bengal; NEPAL, CHINA,



Figs. 1 & 2 : 1. A twig of *Acer caesium* Wallich ex Brandis
2. A twig of *Acer cappadocicum* Gleditsch

4. **A. cappadocicum** Gleditsch in Schrift. Ges. Naturf. Freunde Berl. 6:116. t. 2. 1785; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:98. 1979; *A. pictum* sensu Hiern in Hook. f. Fl. Brit. Ind. 1:696. 1895 non. Thunb.; R. N. Parker, For. Fl. Punj. 105. 1918.

Fig. 2

Tilpattar, Kilpattar (Garh.).

Large deciduous trees, 15-20 m tall. Leaves chartaceous, light green, lustrous, 4-14 cm × 6-20 cm, glabrous, undersurface hairy at the axil of nerves at base, lobes equal, ovate sinuses rounded, apex acuminate, base truncate or sub-cordate, 5-7-nerved; petioles glabrous. Inflorescence corymbose-panicle, terminal, appearing with leaves. Flowers 5-merous, long-stalked, yellowish-green. Sepals and petals 3-4 mm long. Stamens 8, inserted on disc, included. Ovary glabrous, styles 2, free. Samaras 3.5-5.0 cm long, widely divaricate to sub-horizontal, compressed; wings diverging in almost a straight line.

Type: Described from material collected by Gundelsheimer and Tournefort from Cappadocia in N. E. Turkey. *Tournefort* Herb. (P).

Fls.: Apr.-May; *Frts.:* June-Sept.

Distrib.: INDIA: Throughout the Himalayan belt from Kashmir to farthest end of E. Himalaya, Himachal Pradesh, Uttar Pradesh, Sikkim, W. Bengal, Arunachal Pradesh, Meghalaya, Manipur, Mizoram; BHUTAN, NEPAL, PAKISTAN, N. IRAN, N. E. TURKEY, CAUCASUS OF USSR, CHINA, JAPAN.

Uses: The commonest Himalayan Maple. Wood used for making farm implements, poles and bedsteads.

Pollen: Grains subprolate, *ca.* 34.2 × 27.0 μm , exine striate, 2.0 μm thick, apocolpium dia. *ca.* 2-4 μm and colpus length *ca.* 33.1 μm [Biesboer in Grana 15(1-3) : 19-27.1975].

Chr. No.: 2n=26 Wright in Bull. Morris Arb. 8:33-34. 1957).

5. **A. caudatum** Wallich, Pl. Asiat. Rar. 2:4.1830 & 2:28. t. 132. 1831; Hiern in Hook. f. Fl. Brit. Ind. 1:695. 1875; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:98. 1979. *A. papilio* King in Journ. Asiat. Soc. Beng. 65(2): 115. 1896 et in Ann. Roy. Bot. Gard. Calc. 9:17. t. 24. 1901.

Kanzla (Garh.); Khansing, Kabashi (Nep.); Yalishin (Bhut.).

Trees or shrubs, up to 15 m tall, andro-monoecious; branches flaky grey-brown or rust-colored; buds pubescent. Leaves chartaceous, 7.5-15.0 cm \times 8-18 cm, 5-lobed, basal lobes small or often obscure; adult barbate in the axils of nerves below, base cordate, margin inciso-serrate, 5-7-nerved, apex long, linear, cuspidate-serrulate; petioles 5-10 cm long, pubescent. Inflorescence terminal, villose. Flowers 5-merous, yellowish. Stamens 8, exserted. Disc large, extrastaminal. Ovary pubescent; style elongate, stigma short. Samara wings divergent or subparallel, locules carinate-convex.

Type: Kashmir, Wallich 1225 p.p. (Lectotype BM, CAL !, K).

Fls.: Mar.-May; Frts.: July-Oct.

Distrib.: INDIA: Himalayas, Himachal Pradesh, Uttar Pradesh, Sikkim, W. Bengal; BHUTAN, NEPAL, BURMA, S. TIBET, CHINA, KOREA, JAPAN.

Chr. No.: n=13 (Mehra & Sareen in Taxon 18:440. 1969).

6. **A. hookeri** Miquel in Arch. Neerl. Sci. Nat. 2:471.1852; Hiern in Hook. f. Fl. Brit. Ind. 1:694. 1875; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:98.1979.

Lahara Kapasi, Lal Kapasi (Nep.); *Pale* (Lep.).

Trees, 12-16 m tall, andro-monoecious or dioecious; branches green, whitish striped, later grey-brown. Leaves 7-14 cm \times 3.5-8.5 cm, cordate to subcordate, chartaceous or coriaceous, ovate, apex caudate-acuminate to cuspidate, base 5-nerved. Inflorescence appearing with leaves, bracteate, puberulous, brown to greenish-yellow. Flowers, glabrous, yellowish-green. Sepals and petals equal, 2.5-3.0 mm long. Stamens 8, exserted, filaments 1.5-2.0 mm long. Ovary glabrous. Samaras subhorizontal, erect, nuts rounded, glabrous, wings widely divergent, extrorsely falcate or straight.

- 1a. Leaves 7-12 cm \times 3.5-6.5 cm, adult leaf papery or chartaceous, leaf margin biserrate, serrature cuspidate; samara wings extrorsely-falcate or widely divergent ...var. **hookeri**
- 1b. Leaves 10-14 cm \times 5.5-8.5 cm, adult leaf coriaceous, leaf margin imperfectly biserrate, serrature less cuspidate; samara wings straight ...var. **majus**

var. **hookeri**

Type: Sikkim, "8-10,000 ft", *Hooker* 3 (CAL!, BM, K).

Fls.: Apr.-June; *Frts.:* May-Nov.

Distrib.: INDIA: Eastern Himalaya, Arunachal Pradesh, Sikkim, W. Bengal; NEPAL.

Ecol.: Very common in 2250-3180 m alt. range in upper hill forests.

Chr. No.: n=13 (Mehra & Khosla in Taxon 18:218. 1969).

Notes: The seeds of the plant borne by wind are often deposited in crevices or hollows of other large trees and hence the plant grows as an epiphyte.

var. **majus** Pax in Bot. Jahrb. 7:216. 1886.

Type: Kirhi to Rinchinpong, Sikkim, "2-5000 ft", 1. 10. 1862, *T. Anderson* 407 (CAL!, BM).

Frts.: Oct.

Distrib.: INDIA: Endemic to Eastern Himalaya, Sikkim, W. Bengal.

7. **A. laevigatum** Wallich (Wall. Cat. No. 1223. 1829 *nom. nud.*), Pl. Asiat. Rar. 2:3-4. t. 104. 182. 1830; Hiern in Hook. f. Fl. Brit. Ind. 1:693. 1875; H. Hara in Fl. E. Himal. 192. 1966; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:98. 1979.

Thali Kabashi (Nep.), *Tungnyok* (Lep.), *Dieng-than*, *Dieng-Soh-tyrkhum* (Kh.), *Thing-Khim* (Lush.).

Trees, 10-15 m tall, andro-monoecious; branches olive-green or purplish; bark grey, furrowed. Leaves coriaceous, elliptic-oblong or oblong-lanceolate, 7-15 cm × 4-5 cm, prominently reticulate, margin entire to minutely or remotely serrate. Inflorescence appearing with leaves, glabrous. Flowers 5-merous, minute. Sepals purplish-green, 2 mm long. Petals obovate, obtuse, white, equal to sepals. Stamens 5-8, exserted; anthers dorsifixed. Disc extrastaminal. Ovary villose, style elongate. Samaras 2-3 cm long, purplish, wings acutely divergent, straight or somewhat introrsely falcate.

Type: Nepal, Wallich 1223 (CAL !, K).

Fls.: Mar.-July; *Frts.:* May-Aug.

Distrib.: INDIA: Himalayas, Uttar Pradesh, W. Bengal, Arunachal Pradesh, Meghalaya, Nagaland, Manipur; NEPAL, N. BURMA, W. & C. CHINA.

Uses: Wood used as building material.

Chr. No.: n=13 (Mehra & Khosla in Taxon 18 : 218. 1969 and Mehra & Sareen *Ibid.* 441. 1969).

8. *A. laurinum* Hasskarl apud Hoeven de Vriese in Tijdschr. Natuurl. Geschied. Phys. 10:138. 1843; Delendick in Reinwardtia 9(4): 396. 1980; *A. niveum* Blume in Jaarb. K. Nederl. Maatsch. Aanmoed. Twinbouw. 1844:84. 1845; Hiern in Hook. f. Fl. Brit. Ind. 1:693. 1875.

Nabar (Kuki).

Trees, 30-45 m tall, andro-monoecious; bark brownish-grey, reticulately fissured. Leaves coriaceous, 10-16 cm \times 4.0-5.5 cm, upper surface shining dark green, lower surface snow-white or grey, glabrous, ovate-elliptic-oblong, entire, base rounded, 3-nerved. Inflorescence appearing with leaves. Flowers 5-merous, yellowish or yellowish-green. Sepals lanceolate or oblong, white, hairy at the top, 2.5-3.0 mm long. Petals equal to sepals. Stamens 5-8, filaments white, included, inserted on the disc. Ovary pubescent, styles 2, attached only at base. Samaras 4.0-7.5 cm long, glabrous; mericarps unequal, wings erect or divergent, introrsely falcate.

Type: Junghuhn s. n.

Fls.: Aug.-Dec.; *Frts.:* Dec.-Apr.

Distrib.: INDIA: Eastern Himalaya, Assam, Arunachal Pradesh; MALAYSIA, INDONESIA, PHILLIPPINES.

Pollen: Grains subprolate, $26.0 \times 23.3 \mu\text{m}$, exine striate, $1.5 \mu\text{m}$ thick, apocolpium dia. $3-4 \mu\text{m}$ and colpus length $24.2 \mu\text{m}$ [Biesboer in Grana 15 (1-3):19-27. 1975.]

Uses: Occurs in deep humid forests; wood good for making poles.

Chr. No.: n=13 (Mehra & Khosla in Taxon 18:218. 1969).

9. **A. oblongum** Wallich ex DC. Prodr. 1:593. 1824; Hiern in Hook. f. Fl. Brit. Ind. 1:693. 1875; R. N. Parker, For. Fl. Punj. 102. 1918; H. Hara in Fl. E. Himal. 192. 1966; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:98. 1979.

Dieng-Soh-Khru(Kh).; Buzimpala (Nep.).; Kirmoli (Garh.).

Trees evergreen, 15-18 m tall, andro-monoecious, buttressed at base; bark smooth to wrinkled, white and green. Leaves chartaceous or coriaceous, 5-17 cm × 3-7 cm, ovate-lanceolate or oblong, glabrescent, minutely reticulate, base rounded, 3-nerved. Inflorescence appearing with leaves, pubescent, lateral shoots 5-15 cm long. Flowers 5-merous, greenish-white to yellowish-green, 7-8 mm across. Sepals linear or lanceolate, outside barbate, 2-4 mm long. Petals elliptic-lanceolate, equal to or shorter than sepals. Stamens 8, inserted on or inside the disc. Ovary densely pubescent. Samaras 1-3 cm long, wings divergent.

- 1a. Leaves coriaceous, mature leaves dark green above, pale to silvery glaucous beneath, leaf-base obtuse or rounded:
 - 2a. Leaves 10-17 cm × 5-7 cm; samaras 2-3 cm long ...var. **oblongum**
 - 2b. Leaves 5-12 cm × 3-5 cm; samaras 1 cm long ...var. **microcarpum**
- 1b. Leaves membranaceous, dull red or reddish-brown, concolored, leaf-base acute to subacute ...var. **membranaceum**

Fig. 3

var. **oblongum**

Type: Nepal, Wallich 1222 (CAL !, K).

Fls.: Feb.-Apr.; *Frts.:* May-Sept.

Distrib.: INDIA: Himalayas, Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim, Arunachal Pradesh, Meghalaya, Manipur, Nagaland; CHINA, INDOCHINA.

Uses: Wood reddish, used for agricultural equipments.

Chr. No.: n=13 (Mehra & Khosla in Taxon 18: 218. 1969 and Mehra & Sareen *Ibid.* 441. 1969).

var. **microcarpum** Hiern in Hook. f. Fl. Brit. Ind. 1:693. 1875.



Fig. 3 : A twig of *Acer oblongum* var. *oblongum* Wallich ex DC.

Type: Mishmi Hills, *Griffith* 935 (CAL !, BM).

Distrib.: INDIA: Endemic to Himalayan belt, Arunachal Pradesh.

var. **membranaceum** Banerji in *Phytologia* 9(5): 265-266. 1963.

Type: Jharipani, Mussoorie, 29.3.1957, *Banerji s. n.* (CAL !).

Fls.: Mar.-Apr.; *Frts.:* Apr.-Sept.

Distrib.: INDIA: Uttar Pradesh.

10. A. ×osmastonii Gamble in *Bull. Misc. Inform. Roy. Bot. Gard. Kew*: 446. 1908; emend Delendick in *Brittonia* 30(4): 473-476. 1978.

Trees up to 30 m tall, polygamous. Branches olive to purplish-brown. Leaves 12-15 cm × 6-8 cm, glabrous above, thickly reticulate beneath, when lobed with 2-3 lobations in upper half, lobes erect, ovate-lanceolate, apex long, caudate-acuminate, base round or slightly cordate, margin acutely serrate. Inflorescence pedunculate cymes in terminal panicles, 7-10 cm long. Flowers greenish to creamy yellow, 5-merous. Stamens 8, inserted inside the disc, filaments subulate, anthers oblong, minutely papillose. Ovary silky-villose. Samaras erect to divergent.

Type: Salombong, Darjeeling, 27th October, 1903, *B. B. Osmaston s. n.* (CAL !, K).

Fls.: July-Aug.; *Frts.:* Oct.-Nov.

Distrib.: Sikkim Himalaya and Darjeeling Dist. of W. Bengal. Recently collected from Dehra Dun District, *Dakshini* 8089.

Chr. No.: n=13 (Mehra & Khosla in *Taxon* 18:218. 1969).

Notes: Delendick (*loc. cit.*) has reported that the species is a hybrid between two other species of sect. *Palmata* *A. campbelli* Hook. f. & Thoms. (ser. *Sinensis*) and *A. laevigatum* Wallich (ser. *Penninervia*). This was Osmaston's view and Gamble cited it in protologue but did not support it. Delendick reaffirmed Osmaston's observation and concluded that the taxon is a hybrid one (see also Mehra, Khosla & Sareen in *Silvae Genet.* 21:96-102. 1972).

11. *A. pectinatum* Wallich (Wall. Cat. No. 1226. 1829, *nom. nud.*), Nicholson in Gard. Chron. 1881 (1) :365. t. 69. 1881 *nom. illegit.* ex Pax in Bot. Jahrb. 7:249. 1886; H. Hara in Fl. E. Himal. 192:1966 ; H. Hara in Hara et Williams Enum. Fl. Pl. Nepal 2:98. 1979. *A. caudatum* Wallich. f. *pectinatum* Hiern in Hook. f. Fl. Brit. Ind. 1:695. 1875.

Trees, 10-15 m tall, andro-monoecious, branches purplish-brown. Leaves chartaceous, 6-14 cm × 6.5-15.0 cm, 3-(5) lobed, lobes deltoid or ovate-caudate, basal lobes small, often inconspicuous, base deeply cordate, axils of nerves tufted beneath, hairy, petioles 6-10 cm long. Inflorescence racemose, terminal, appearing with leaves. Flowers 5-merous. Sepals purplish-red, petals whitish. Stamens 8, included. Ovary glabrous, stigma pubescent. Samaras glabrous, locules flat, wings horizontal, somewhat introrsely falcate, scarcely or not attenuate at the base.

Type: Gossain Than on the Himalayas, Nepal, Aug. 1821, *Wallich* 1226 (CAL !, K).

Fls.: May-June; *Frts.:* July-Oct.

Distrib.: INDIA: Himalayas, Uttar Pradesh, W. Bengal, Sikkim; NEPAL, S. W. CHINA.

Chr. no.: n=13 (Mehra & Khosla in Taxon 18:218. 1969).

12. *A. pentapomicum* J. L. Stewart ex Brandis, For. Fl. N.W. & C. Ind. 111. 1874; Hiern in Hook. f. Fl. Brit. Ind. 1:694. 1875; R. N. Parker, For. Fl. Punj. 103. 1918.

Small or medium-sized deciduous trees or shrubs, polygamous, trunk dark brownish-grey, smooth, twigs grey or reddish, glabrous. Leaves grey-green above, pale green beneath, base truncate, subcordate or rounded, 3-(5)-nerved, axils of nerves bearded beneath, margin crenate-serrate to subentire; petioles 3.5-10.0 cm long. Inflorescence corymbose-panicle, 3.5-5.0 cm long, glabrous. Flowers 5-merous, appearing with leaves greenish-white. Disc annular, 5-lobed. Stamens 8, 5 in bisexual flowers. Ovary glabrous. Samaras erect, wings divergent to connivent.

Types: Jhelum valley, "3-5000 ft", *J. L. Stewart* 648 (Syntype CAL!, K); Hazara, Khajan valley, "4-5000 ft", *J. L. Stewart* 541 (Syntype CAL!, K) and *J. L. Stewart* 542 (Syntype CAL).

Fls.: Mar.-Apr.; *Frts.:* June onwards.

Distrib.: INDIA: North-West Himalaya, Kashmir to Kumaon ;
PAKISTAN, AFGHANISTAN, TURKESTAN.

Uses: Wood used for agricultural implements.

13. *A. sikkimense* Miquel in Arch. Neerl. Sci. Nat. 2: 471.1852; Hiern in Hook. f. Fl. Brit. Ind. 1:694.1875; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:98. 1979.

Palegnyok (Lep.).

Tall trees, andro-monoecious or dioecious; branches green to reddish-brown or grey. Leaves 9-17 cm × 7-9 cm, ovate, subcoriaceous, glabrous, dark green above, paler beneath, apex caudate to cuspidate, base subcordate to cordate, 5-nerved. Inflorescence appearing with leaves, bracteate, densely spicate. Flowers 5-merous, yellowish-green. Sepals lanceolate, 2 mm long, petals short, 1.5-2.0 mm long. Stamens 8, filament 2.5-3.0 mm long. Ovary glabrous. Samaras 1.5-1.8 cm long, nuts globular, wings divergent, nearly straight, base narrowed.

1a. Leaf margin subentire to entire ...var. **sikkimense**

1b. Leaf margin serrulate ...var. **serrulatum**

var. sikkimense

Type: Sikkim, "7-9000 ft", *Hooker* 4 (CAL !, BM, K).

Fls.: Nov.-Apr.; *Frts.:* Apr.-Aug.

Distrib.: INDIA: Eastern Himalaya, Sikkim, W. Bengal; BHUTAN, NEPAL, W. CHINA.

Chr. No.: n=13 (Mehra & Khosla in Taxon 18:218. 1969).

var. serrulatum Pax in Bot. Jahrb. 7:215. 1886.

Type: Mishmee Hills, *Griffith* 936 (CAL !, K).

Distrib.: INDIA: Eastern Himalaya, Arunachal Pradesh, endemic.

14. *A. stachyophyllum* Hiern in Hook. f. Fl. Brit. Ind. 1:694. 1875; H. Hara in Fl. E. Himal. 2:74. 1971; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:98.1979.

Small dioecious trees. Leaves 9-10 cm \times 3.5-6.0 cm, ovate, submembranaceous, base rounded or broadly cordate, 7-nerved, apex caudate-acuminate. Inflorescence elongate, usually branched, equalling with leaves; pistillate inflorescence terminal, staminate inflorescence lateral. Flowers yellowish. Sepals 3.5-4.0 mm \times 2.0-2.5 mm. Petals membranaceous, 3.2 mm \times 1.8-2.0 mm. Stamens 4, 4.0-4.5 mm long, anthers 1.0-1.5 mm long, dorsifixed, bilobed. Samaras carinate-convex, nuts erect, ovoid, base cuneate, wings introrsely falcate, angles acutely divergent.

Type: Sikkim, "9000 ft", Hooker 5 (CAL !, K).

Fls. May-Aug.; *Frts.* Aug.-Nov.

Distrib.: INDIA: Eastern Himalaya, Sikkim and W. Bengal; BHUTAN, NEPAL, S. TIBET, CHINA.

Pollen: Grains prolate spheroidal, 28.8 \times 27.0 μm , exine ca. 1.5 μm striate, apocolpium dia. ca. 2-3 μm , colpus length 27.3 μm [Biesboer in Grana 15 (1-3): 19-27. 1975].

Chr. No.: n=13 (Mehra & Khosla in Taxon 18: 218. 1969).

15. *A. sterculiaceum* Wallich (Wall. Cat. No. 1224. 1829 *nom. nud.*), Pl. Asiat. Rar. 2:3. t. 105. 1830; H. Hara in Fl. E. Himal. 192. 1966; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:98. 1979; *A. villosum* sensu Wallich (Wall. Cat. 1227. 1829 *nom. nud.*) l.c. 2:4. 1831 (non Presl); Hiern in Hook. f. Fl. Brit. Ind. 1: 695. 1875.

Tall trees, 10-15 m high, dioecious. Branches brownish, young branchlets villose. Leaves subcoriaceous, 12-20 \times 13-22 cm, 3-5 lobed, basal lobes smaller, often obscure, both surfaces dull green, upper glabrate, older leaves rusty-brown, base deeply cordate, 5-7-nerved, apex acuminate; petiole densely villose, 8-15 cm long, canaliculate. Inflorescences pubescent, appearing with or before leaves, lax. Flowers 5-merous, greenish-yellow, bracts woolly, floral stalk villose. Stamens 5-8 (7-10), perigynous, exserted. Ovary greenish-brown, prominent green disc present. Samaras puberulent, brownish, wings erect and parallel.

Type: Nepal, 1821, Wallich 1224 (CAL !, BM, K).

Fls.: Mar.-Apr.; *Frts.:* Apr.-Oct.

Distrib.: INDIA: Himalayas, Jammu and Kashmir, Himachal Pradesh,

Uttar Pradesh, W. Bengal, Assam, Arunachal Pradesh, Manipur; BHUTAN, NEPAL, CHINA.

Chr. No. : n=13 for E. Himalayan Plant (Mehra & Khosla in Taxon 18:218. 1969) & *n=13+0-2B* for W. Himalayan Plant (Mehra & Sareen *Ibid.* 441).

16. *A. thomsonii* Miquel in Arch. Neerl. Sci. Nat. 2:470.1867 ("Thomsonii"); H. Hara in Fl. E. Himal. 193.1966; H. Hara in Hara et Williams, Enum. Fl. Pl. Nepal 2:98.1979. *A. villosum* Wallich var. *thomsonii* (Miquel) Hiern in Hook. f. Fl. Brit. Ind. 1:695.1875.

Fig. 4

Kabashi (Nep. & Beng.).

Large trees, dioecious. Leaves chartaceous or coriaceous, glabrescent, 3-lobed, middle lobes broadly triangular, laterals very short, sinuses between lobes, obtuse, apex shortly acuminate, margin entire, repand or remotely serrate, base cordate, 5-nerved, bright green above, pale green beneath; petiole glabrescent, canaliculate, 5-15 cm long. Inflorescence lateral, spicate-racemose, appearing with leaves, 7.5-21.0 cm long. Flowers 5-merous, yellowish-green. Stamens 6, exserted; filaments glabrous; anthers versatile. Samaras brown, wings straight, broadest above middle, base very narrow.

Type: Sikkim, *Thomson* s. n. (CAL !, K).

Fls.: Nov.-Dec.; *Frts.:* Jan.-July.

Distrib.: INDIA: Himalayas, Himachal Pradesh, Uttar Pradesh, W. Bengal, Sikkim, Arunachal Pradesh, Manipur, Mizoram; BHUTAN, NEPAL, N. BURMA.

Chr. No. : n=13 (Mehra & Khosla in Taxon 18:218.1969).

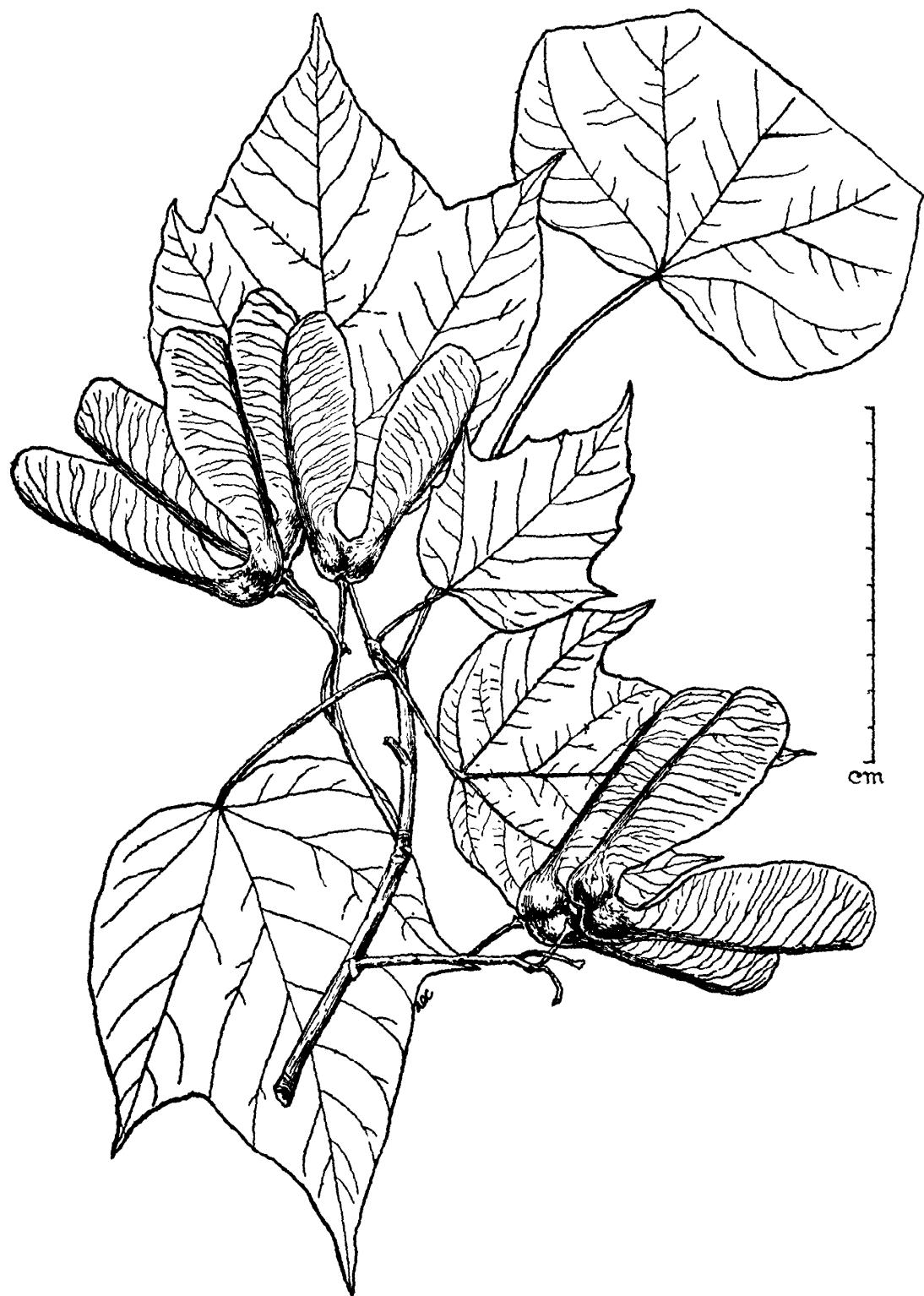
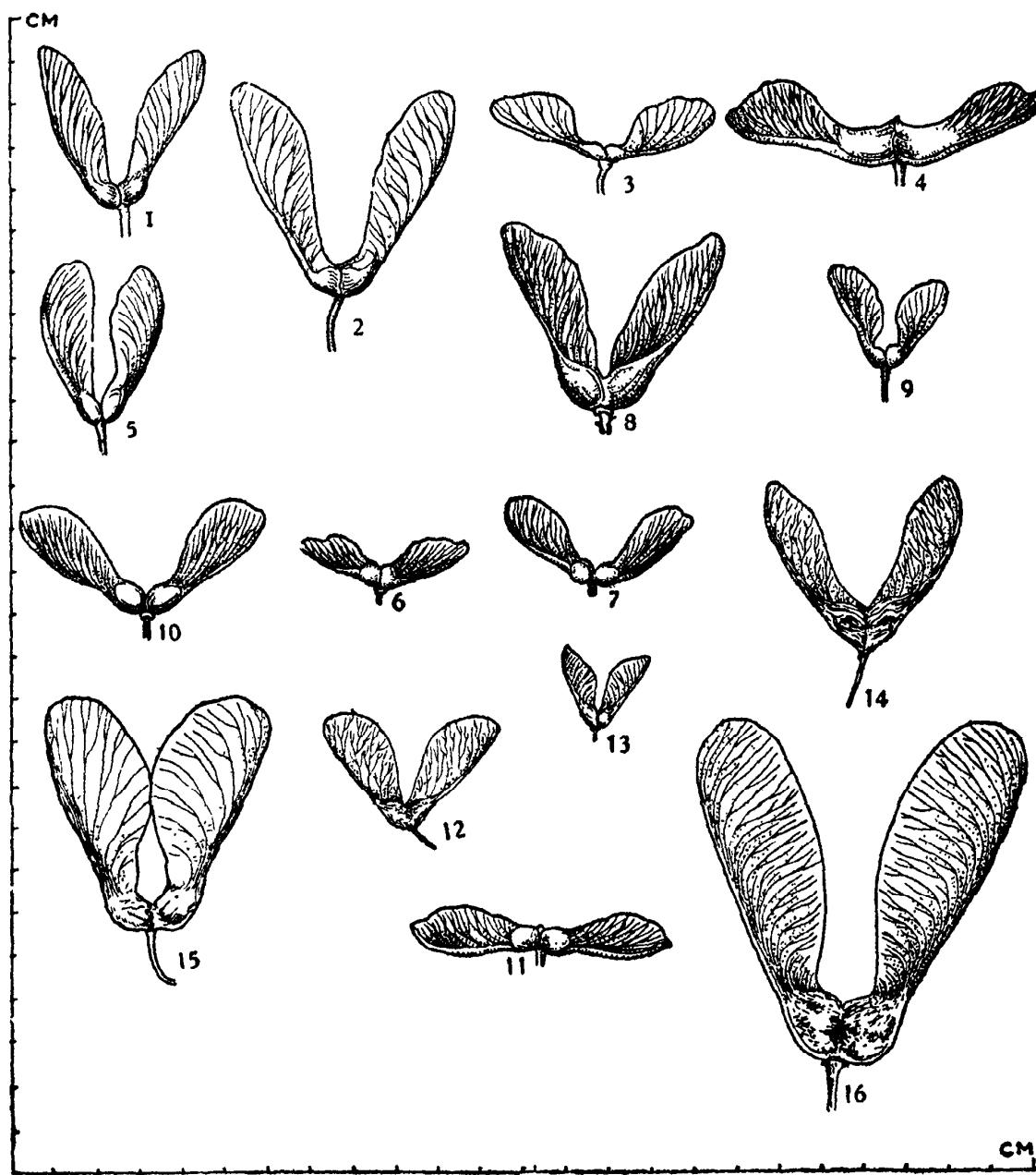


Fig. 4 : A twig of *Acer thomsonii* Miquel



Samaras of Acer : 1. *A. acuminatum* Wallich ex D. Don. 2. *A. caesium* Wallich ex Brandis. 3. *A. campbellii* Hooker f. & Thoms. ex Hiern. 4. *A. cappadocicum* Gleditsch. 5. *A. caudatum* Wallich. 6. *A. hookeri* Miquel. 7. *A. laevigatum* Wallich. 8. *A. laurinum* Hasskarl. 9. *A. oblongum* Wallich ex DC. 10. *A. ×osmastonii* Gamble emend Delendick. 11. *A. pectinatum* Wallich ex Nicholson. 12. *A. pentapomicum* J. L. Stewart ex Brandis. 13. *A. sikkimense* Miquel. 14. *A. stachyophyllum* Hiern. 15. *A. sterculiaceum* Wallich. 16. *A. thomsonii* Miquel.

INDEX TO SCIENTIFIC NAMES

Acer	1	var. microcarpum	12
Acer acuminatum	3, 4, 20	A. ×osmastonii	4, 14, 20
A. caesium	3, 4, 7, 20	A. papilio	8
A. campbellii	4, 5, 14, 20	A. pectinatum	4, 15, 20
var. campbellii	6	A. pentapomicum	3, 15, 20
var. serratifolium	6	A. pictum	8
A. cappadocicum	3, 7, 8, 20	A. sikkimense	2, 16, 20
A. caudatum	3, 8, 20	var. sikkimense	16
<i>A. caudatum f. pectinatum</i>	15	var. serrulatum	16
A. hookeri	2, 9, 20	A. stachyophyllum	2, 16, 20
var. hookeri	9, 10	A. sterculiaceum	4, 17, 20
var. majus	9, 10	A. thomsonii	3, 18, 19, 20
A. laevigatum	3, 10, 14, 20	A. villosum	17
A. laurinum	2, 11, 20	<i>A. villosum var. thomsonii</i>	18
<i>A. niveum</i>	11	Aceraceae	1
A. oblongum	2, 12, 13, 20	Dipteronia	1
var. oblongum	12	Sect. Palmata	14
var. membranaceum	14	Ser. Sinensia	14
		Ser. Penninervia	14

INDEX TO LOCAL NAMES

Buzimpala	12	Kirmoli	12
Daom yatli	5	Lahara Kapasi	9
Dieng-Soh-Khru	12	Lal Kapasi	9
Dieng-Soh-tyrkhum	10	Mandar	5
Dien-than	10	Nabar	11
Kabashi	5, 8, 18	Palegnyok	16
Kanzla	8	Thali Kabashi	10
Khansing	8	Thing-Khim	10
Kiloc	5	Tilpattar	8
Kilu	5	Trekhan	5
Kilpattar	8	Tungnyok	10
Kinar	5	Yalishin	8

FASCICLES OF FLORA OF INDIA

Family	Fascicle	Date of Publication
CORIARIACEAE	1	Oct. 1978
PAEONIACEAE	1	Oct. 1978
DILLENIACEAE*	2	May 1979
POACEAE (TRIBE GARNOTIEAE)	3	Nov. 1979
SIMAROUBACEAE	4	April 1980
BALANITACEAE	4	April 1980
ORCHIDACEAE (GENUS COELOGYNE)	5	June 1980
PITTOSPORACEAE	6	Nov. 1980
LILIACEAE (TRIBE SCILLEAE)	7	Feb. 1981
LEGUMINOSAE (GENUS DERRIS)	8	July 1982