



Ghent University Botanical Garden

in partnership with

Westonbirt
The National
Arboretum

Acer L. and *Dipteronia* Oliv. (Sapindaceae)
VEGETATIVE KEY TO SPECIES IN CULTIVATION

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in collaboration with

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Vegetative identification key.

Introduction:

This key is based on vegetative characteristics, and therefore also of use when flowers and fruits are absent.

- Use a 10x hand lens to check bud scale scars, membranous pocket-like domatia, pubescence, marginal teeth and venation pattern in general.
- Look at the entire plant. Young specimens, shade and strong shoots give an atypical view.
- Beware of hybridisation, especially with plants raised from seed other than wild origin.

Abbreviations used in this key:

- **L/W** = length/width
- **LS** = lower surface
- **US** = upper surface

Taxa treated in this key: → p16.

Taxa referred to synonymy in this key: → p17.

Remarks: → p17.

References:

- herbarium Royal Botanic Gardens Edinburgh
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- JDL herbarium
- living specimens, in various arboreta, botanic gardens and collections
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KEY TO GENERA

Leaves pinnately compound, leaflets 7-13(-15). Current year shoot base with scars scarcely apparent (10× LENS) [samara orbicular or obovate-orbicular]. *Dipteronia*

Leaves simple, OR palmately compound, OR IF pinnately compound then leaflets 3-7(-9). Current year shoot base clearly with 2-many pairs of bud scale scars (10× LENS) [samara wing-like]. *Acer*

KEY TO genus *Dipteronia*

Rachis and petiolules initially green. Lateral petiolule 2-10(-20) mm, often clearly increasing in length from top to base of rachis [samara obovate to orbicular <3 cm]. *D. sinensis*

Rachis and petiolules initially pruinose. Lateral petiolule ≤8 mm, usually +/- equal in length along rachis [samara orbicular ≥5 cm]. *D. dyeriana*

KEY TO GROUPS for genus *Acer*

- 01 a Plant wintergreen AND lamina unlobed or 0-3-lobed, LS often distinctly glaucous. *Oblonga* and *Hyptiocarpa* **GROUP A** → p3
- b Plant deciduous, OR lamina compound or 3-more lobed, OR LS (yellowish)green. 02
- 02 a Leaves predominantly compound. *Negundo*, *Pentaphylla* and *Trifoliata* ... **GROUP B** → p4
- b Leaves always simple. 03
- 03 a Petiole lactiferous (shoots, buds and larger veins may be lactiferous too). 04
- b Petiole not lactiferous OR with translucent sap. 07
- 04 a Second year and older branch wood green, not woody (sometimes red to brown in part, sometimes with bluish bloom). *Macrophylla* and *Platanoidea* **GROUP C** → p4
- b Second year and older branch wood grey to brown and woody, often striate. 05
- 05 a Well developed shoot at base with 8-12 pairs of bud scale scars AND lamina predominantly 3-5-lobed. *Lithocarpa* **GROUP D** → p5
- b Well developed shoot at base with 5-8 pairs of bud scale scars (10× LENS) AND lamina predominantly 3-5-lobed, OR lamina predominantly 5-9-lobed. *Platanoidea* 06
- 06 a Lamina predominantly 3-5-lobed. **GROUP E** → p6
- b Lamina predominantly 5-9-lobed. **GROUP F** → p6
- 07 a Well developed shoot at base with >4 pairs of bud scale scars (10× LENS). (*Acer*, *Ginnala*, *Indivisa*, *Lithocarpa*, *Pubescentia* and *Rubra*) 08
- b Well developed shoot at base with 2-4 pairs of bud scale scars (10× LENS). (*Arguta*, *Glabra*, *Macrantha*, *Palmata*, *Parviflora*, *Spicata* and *Wardiana*) 10

08 a	Lamina unlobed or 0-3-lobed, 5-lobed laminae absent. <i>Acer, Ginnala, Indivisa, Oblonga</i> and <i>Pubescentia</i>	GROUP G → p7
b	Lamina 3-5- <u>OR</u> 5-7-lobed.	09
09 a	Terminal lobe predominantly with 6-numerous teeth/side. <i>Acer, Lithocarpa</i> and <i>Rubra</i>	GROUP H → p8
b	Terminal lobe predominantly with 0-6 teeth/side. <i>Acer, Lithocarpa</i>	GROUP I → p9
10 a	Bud stipitate (10× LENS, remove petiole if necessary). (<i>Arguta, Glabra, Macrantha, Parviflora, Spicata</i> and <i>Wardiana</i>)	11
b	Bud sessile (10× LENS, remove petiole if necessary). <i>Palmata</i>	13
11 a	Lamina LS basal vein axils without membranous pockets (10× LENS). <i>Arguta, Glabra, Macrantha, Parviflora, Spicata</i> and <i>Wardiana</i>	GROUP J → p10
b	Lamina LS basal vein axils, and often also secondary vein axils with (sometimes tiny) membranous pockets (10× LENS). <i>Macrantha</i>	12
12 a	Lamina predominantly unlobed or unlobed to 3-lobed.	GROUP K → p11
b	Lamina predominantly 3-5-lobed or 5-lobed.	GROUP L → p12
13 a	Lamina always unlobed.	GROUP M → p13
b	Lamina unlobed to 3(-more)-lobed.	14
14 a	Lamina unlobed to 3-lobed, <u>OR</u> 3-lobed.	GROUP N → p13
b	Lamina 3-more lobed.	15
15 a	Lamina 3-5(-more)-lobed, 5-lobed lamina <u>ALWAYS</u> present.	GROUP O → p13
b	Lamina 7(-more)-lobed <u>AND</u> 5-lobed lamina absent.	GROUP P → p14

GROUP A (*Oblonga* and *Hyptiocarpa*):
Plant wintergreen AND lamina unlobed or unlobed to 3-lobed, LS often distinctly glaucous.

01 a	Lamina unlobed to 3-lobed.	<i>A. paxii</i>
b	Lamina unlobed (juvenile growth sometimes 3-lobed).	02
02 a	Lamina LS pubescent (10× LENS - fading in autumn).	<i>A. coriaceifolium</i>
b	Lamina LS glabrous (10× LENS).	03
03 a	Lamina midvein length/petiole length ratio 6/1-8/1.	<i>A. pinnatinervium</i>
b	Lamina midvein length/petiole length ratio 2/1-4/1.	04
04 a	Lamina LS secondary veins 5-6/side.	<i>A. laurinum</i>
b	Lamina LS secondary veins 6-8(-more)/side.	05
05 a	Lamina largest width below the middle, acumen with acute point.	<i>A. oblongum</i>
b	Lamina largest width in the middle, acumen with blunt point.	<i>A. albopurpurascens</i>

GROUP B (*Negundo*, *Pentaphylla* and *Trifoliata*):
Leaves predominantly compound.

- 01 a Leaf palmately 5-7-foliolate. ***A. pentaphyllum***
- b Leaf 3-foliolate, OR pinnately 5-9-foliolate. 02
- 02 a Terminal bud covered by 2 green/reddish +/- valvate scales, shoot at base with <5 pairs of irregularly contiguous bud scale scars (×10 LENS). 03
- b Terminal bud covered by ≥4 dark brown/black imbricate scales, shoot at base with >5 pairs of closely contiguous bud scale scars (×10 LENS). 05
- 03 a Second year shoot predominantly brown and fully brown after 2 years. ***A. cissifolium***
- b Second year shoot green (sometimes purplish) and usually so on older branch-wood. ... 04
- 04 a Leaflets always 3, margin predominantly entire to dentate in apical part. ***A. henryi***
- b Leaflets 3-5(-9), IF always 3-foliolate, then margin predominantly serrate to dentate/lobed from below the middle towards apex. ***A. negundo***
- Shoot predominantly glabrous (10× LENS).
- Leaflets 3-7(-9). Margin irregularly lobed or dentate to sub-entire (10× LENS). ***A. negundo* var. *negundo***
- Leaflets 3(-5). Margin regularly coarsely serrate (10× LENS). ***A. negundo* var. *mexicanum***
- Shoot pubescent (10× LENS).
- Leaflets 3(-5), LS glabrous to slightly pubescent on midvein (10× LENS). ***A. negundo* var. *texanum***
- Leaflets 3-7, LS at first densely white pubescent (10× LENS). ***A. negundo* var. *californicum***
- 05 a Petiole glabrous. Leaflet margin +/- regularly serrate, predominantly with ≥10 teeth/side. ***A. mandshuricum***
- b Petiole pubescent. Leaflet margin +/- entire to coarsely and bluntly dentate, or dentate to lobed, predominantly with ≤8 teeth or lobes/side. 06
- 06 a Bark coarse and fibrous, vertically fissured. Leaflet LS pubescence predominantly restricted to midvein and secondary veins (10× LENS). ***A. triflorum***
- b Bark smooth or peeling. Leaflet LS pubescent on venation and surface (10× LENS). 07
- 07 a Bark peeling in papery curls. Lateral leaflet margin irregularly dentate/lobed, with 2-3 teeth or lobes/side usually clearly decreasing in size towards apex. ***A. griseum***
- b Bark +/- smooth, not peeling. Lateral leaflet margin variable: +/- undulate and from entire to shallowly dentate with 3-8 almost equal sized teeth. ***A. maximowiczianum***

GROUP C (*Macrophylla* and *Platanoidea*):
Second year and older branch wood green, not woody.

- 01 a Lamina lobes deeply dentate to (sub)lobed. ***A. macrophyllum***
- b Lamina lobes entire. 02

- 02 a Lamina predominantly unlobed or unlobed to 3-lobed. **A. catalpifolium**
 b Lamina predominantly 3-7-lobed. 03
- 03 a Lamina LS pubescent throughout (10× LENS). 04
 b Lamina LS glabrous, except vein axils (10× LENS). 06
- 04 a Lamina rather variable (0-)3-5-lobed. **A. longipes**
 b Lamina predominantly 5-lobed or 5-7 lobed. 05
- 05 a Lobe apices acuminate, <15 mm. **A. tibetense**
 b Lobe apices caudate, up to 35 mm. **A. cappadocicum** subsp. **sinicum**
- 06 a Crown columnar. **A. lobelii**
 b Crown not columnar. 07
- 07 a Lamina (0-)3-5-lobed. 08
 b Lamina predominantly 5-lobed or 5-7 lobed. 09
- 08 a 5-lobed lamina basal lobes obtuse to acute. **A. chapaense**
 b 5-lobed lamina basal lobes acute to caudate. **A. shenkanense**
- 09 a Terminal lobe predominantly wider than long ('broad shouldered lamina'). **A. amplum**
 b Terminal lobe predominantly longer than wide. 10
- 10 a Lamina predominantly 5-7 lobed. Terminal lobe predominantly <1/2 midvein length.
 **A. cappadocicum** subsp. **cappadocicum**
 b Lamina predominantly 5-lobed. Terminal lobe predominantly >1/2 midvein length.
 **A. cappadocicum** subsp. **sinicum**

GROUP D (*Lithocarpa*):

**Well developed shoot at base with 8-12 pairs of bud scale scars (10× LENS)
 AND lamina predominantly 3-5-lobed.**

- 01 a Petiole very lactiferous (instant dripping sap). 02
 b Petiole slightly lactiferous (sap appears slowly). 03
- 02 a Current year shoot and petiole soon glabrescent (10× LENS). Lamina terminal lobe apex
 caudate [flowers red]. **A. sinopurpurascens**
 b Current year shoot and petiole +/- appressed pubescent (10× LENS). Lamina terminal
 lobe apex acuminate [flowers greenish]. **A. tsinglingense**
- 03 a Terminal lobe with 1-3 teeth/side. **A. amamiense**
 b Terminal lobe with 2-5(-more) teeth/side. **A. diabolicum**

GROUP E (*Platanoidea*):

**Well developed shoot at base with 5-8 pairs of bud scale scars (10× LENS)
AND Lamina 3-5-lobed or 5-lobed.**

- 01 a Lamina LS pubescent (10× LENS). 02
 b Lamina LS glabrous, or pubescence restricted to (basal) vein axils (10× LENS). 05
- 02 a All lobe apices obtuse to acute. ***A. campestre***
 b Terminal and/or lateral lobe apices acute to acuminate or caudate. 03
- 03 a Lobe margins entire. ***A. fulvescens***
 b Lobe margins at least in part dentate. 04
- 04 a Shoot glabrous (10× LENS). Lamina width \leq midvein length. ***A. miaotaiense***
 b Shoot pubescent (10× LENS). Lamina width \geq midvein length. ***A. miyabei***
- 05 a Lamina (0-)3-5-lobed. ***A. tenellum***
 b Lamina predominantly 5-lobed. 06
- 06 a Midvein length predominantly \leq 6 cm. ***A. divergens***
 b Midvein length predominantly 6-10 cm. 07
- 07 a Lamina LS vein axils glabrous (10× LENS). Lobes occasionally dentate. ***A. truncatum***
 b Lamina LS vein axils pubescent (10 × LENS). Lobes entire. 08
- 08 a Lamina base predominantly cordate. ***A. pictum***
 b Lamina base predominantly truncate. ***A. pictum* subsp. *macropterum***

GROUP F (*Platanoidea*):

Lamina 5-9-lobed.

- 01 a Lamina predominantly 7-lobed or 7-9-lobed. 02
 b Lamina predominantly 5-7-lobed. 03
- 02 a Lamina base shallowly to deeply cordate. LS basal vein axils brownish pubescent (10× LENS). ***A. pictum* subsp. *savatieri***
 b Lamina base truncate to sub-cordate. LS basal vein axils pale pubescent (10× LENS).
 ***A. okamotoanum***
- 03 a Terminal lobe margin dentate to occasional dentate. 04
 b Terminal lobe margin always entire. 06
- 04 a Lateral lobe margin consistently dentate. ***A. platanoides***
 b Lateral lobe margin inconsistently dentate. 05

- 05 a Lamina LS vein axils pubescent (10× LENS). **A. turkestanicum**
- b Lamina LS vein axils glabrous (10× LENS). **A. truncatum**
- 06 a Lamina LS glabrous (10× LENS). **A. truncatum**
- b Lamina LS pubescent at least in vein axils (10× LENS). **A. pictum** sensu lato
- Lamina LS pubescent throughout (10× LENS). **A. pictum** subsp. **pictum**
 - Lamina LS glabrous, OR only pubescent in vein axils or along midvein and secondary veins (10× LENS).
 - Lobes shallow to halfway lamina. **A. pictum** subsp. **mono**
 - Lobes ≥halfway lamina.
 - Lamina LS glabrous except secondary vein axils (10× LENS). **A. pictum** subsp. **dissectum**
 - Lamina LS pubescent along veins (10× LENS). **A. pictum** subsp. **dissectum** f. **connivens**

GROUP G (*Acer*, *Ginnala*, *Indivisa*, *Oblonga*, *Pubescentia*):
Lamina unlobed or 0-3-lobed, 5-lobed laminae absent.

- 01 a Lamina apex predominantly obtuse to acute. **02**
- b Lamina apex acute to acuminate. **05**
- 02 a Plant deciduous. Petiole at least in part of foliage >lamina midvein length. **03**
- b Plant (semi-)evergreen. Petiole always <lamina midvein length. **04**
- 03 a Petiole (soon) glabrous (10× LENS). **A. monspessulanum**
- b Petiole pubescent (10× LENS). **A. yui**
- 04 a Midvein length <4 cm. **A. sempervirens**
- b Midvein length 4-6(-more) cm. **A. obtusifolium**
- 05 b Lamina unlobed AND secondary veins 15-25/side. **A. carpinifolium**
- b Lamina unlobed or (0-)3-lobed OR secondary veins <15/side. **06**
- 06 a Lamina 3-lobed AND terminal lobe L/W ratio >2/1. **A. pilosum**
- b Lamina unlobed or (0-)3-lobed AND terminal lobe L/W ratio <2/1. **07**
- 07 a Lamina LS blue-green to grey-green. **08**
- b Lamina LS green. **09**
- 08 a Margin +/- irregularly coarsely serrate, >5 teeth >1 mm/side (10× LENS). .. **A. pycnanthum**
- b Margin entire to finely serrate, teeth predominantly <1 mm (10× LENS). . **A. buergerianum**
- 09 a Midvein length predominantly 12-20 cm. **A. sterculiaceum**
- b Midvein length predominantly 3-12 cm. **A. tataricum**
- Lamina midvein length predominantly <5 cm (strong shoots excluded). **A. tataricum** subsp. **semenovii**
 - Lamina midvein length predominantly 7-12 cm.

- Lamina predominantly unlobed, or with shallow lobes <1 cm deep. **A. tataricum** subsp. **tataricum**
- Lamina predominantly deeply lobed at base. **A. tataricum** subsp. **ginnala**

GROUP H (*Acer*, *Lithocarpa* and *Rubra*):
Lamina 3-5- OR 5-7-lobed.
Terminal lobe with 6-numerous teeth/side.

- 01 a Terminal lobe apex obtuse to acute. **02**
- b Terminal lobe apex acute to acuminate or caudate. **03**
- 02 a Midvein length <7 cm, terminal lobe predominantly $\geq 1/2$ midvein length. **A. granatense**
- b Midvein length 6-12 cm, terminal lobe predominantly <1/2 midvein length. **A. opalus**
 - Mature lamina predominantly >10 cm wide, rather thick, LS densely pubescent. ... **A. opalus** subsp. **obtusatum**
 - Mature lamina predominantly <10 cm wide, rather thin, LS pubescent along veins. **A. opalus** subsp. **opalus**
- 03 a Terminal lobe largest width clearly above its basal third. **04**
- b Terminal lobe largest width at its base or almost so. **07**
- 04 a Terminal bud green. **A. pseudoplatanus**
- b Terminal bud (dark) brown or reddish at least in part. **05**
- 05 a Sinus terminal/lateral lobe rather wide and U-shaped. **A. saccharinum**
- b Sinus terminal/lateral lobe rather narrow and V-shaped. **06**
- 06 a Lamina LS pubescent on venation (10x LENS). **A. diabolicum**
- b Lamina LS pubescence restricted to vein axils (10 x LENS). **A. heldreichii**
 - Terminal lobe LW ratio clearly >2/1. **A. heldreichii** subsp. **heldreichii**
 - Terminal lobe LW ratio predominantly <2/1.
 - Terminal lobe very narrow at its base. **A. heldreichii** subsp. **macropterum**
 - Terminal lobe wide at its base. **A. heldreichii** subsp. **trautvetteri**
- 07 a Bruised lamina emits a pungent scent. **A. sterculiaceum**
 - Midvein length 15-30 cm **AND** margin regularly dentate. **A. sterculiaceum** subsp. **sterculiaceum**
 - Midvein length 10-15 cm **AND** margin irregularly dentate. **A. sterculiaceum** subsp. **franchetii**
- b Bruised lamina emits no pungent scent. **08**
- 08 a Lamina lobe apices conspicuously acuminate to caudate, ≥ 1 cm long. **A. caesium**
 - Lamina (3-)5-7-lobed. Current year (and often 2nd year) shoot prominently bloomed. **A. caesium** subsp. **giraldii**
 - Lamina 3-5-lobed. Current year shoot slightly bloomed. **A. caesium** subsp. **caesium**
- b Lamina lobe apices acute to (sub-)acuminate, <1 cm long. **09**
- 09 a Bud brownish. Lamina often remarkably large, Ø 15-30 cm. **A. velutinum**
- b Bud green or reddish **AND** lamina predominantly smaller. **10**

- 10 a Terminal bud green. Lamina terminal lobe with ≥ 5 secondary veins/side longer than 1 cm. *A. pseudoplatanus*
- b Terminal bud green to reddish. Lamina terminal lobe with < 5 secondary veins/side longer than 1 cm. *A. rubrum*

GROUP I (*Acer* and *Lithocarpa*):
Lamina 3-5- OR 5-7-lobed.
Lamina terminal lobe predominantly with 0-6 teeth/side.

- 01 a Petiole slightly lactiferous (sap appears slowly) OR bruised lamina emits a pungent scent. *A. amamiense*
- b Petiole not lactiferous AND bruised lamina emits no pungent scent. 02
- 02 a Terminal lobe slender, L/W ratio $> 2/1$ *A. heldreichii* subsp. *heldreichii*
- b Terminal lobe rather wide, L/W ratio $< 2/1$ 03
- 03 a Terminal bud green. *A. pseudoplatanus*
- b Terminal bud (dark) brown or reddish at least in part. 04
- 04 a Lamina midvein length predominantly > 10 cm AND lobe apices acuminate. 05
- b Lamina midvein length predominantly < 10 cm OR lobe apices blunt to acute. 07
- 05 a Petiole base stipulate. *A. nigrum*
- b Petiole base without persistent stipules. 06
- 06 a Petiole thick and densely pubescent. *A. skutchii*
- b Petiole slender and glabrous. *A. saccharum*
- 07 a Petiole predominantly \geq midvein length AND terminal lobe base $<$ lobe length (basal lobe apices usually situated as high as or lower than lamina base). 08
- b Petiole predominantly $<$ midvein length, OR terminal lobe base $>$ lobe length (basal lobe apices usually situated clearly above the lamina base). 09
- 08 a Terminal lobe predominantly $\geq 1/2$ midvein length. *A. granatense*
- b Terminal lobe predominantly $< 1/2$ midvein length. *A. hyrcanum*
- Lamina margin with crenate to subrounded teeth. *A. hyrcanum* subsp. *keckianum*
 - Lamina margin with obtuse to acute or acute to acuminate teeth.
 - Lamina LS blue green. *A. hyrcanum* subsp. *intermedium*
 - Lamina LS green: - Lamina lobe apices acute to acuminate. *A. hyrcanum* subsp. *tauricolum*
 - Lamina lobe apices obtuse to acute. *A. hyrcanum* subsp. *hyrcanum*
- 09 a Terminal lobe predominantly $< 1/2$ midvein length. *A. opalus*
- Mature lamina predominantly > 10 cm wide, rather thick, LS densely pubescent. .. *A. opalus* subsp. *obtusatum*
 - Mature lamina predominantly < 10 cm wide, rather thin, LS pubescent along veins. *A. opalus* subsp. *opalus*
- b Terminal lobe predominantly $> 1/2$ midvein length. 10

- 10 a Lamina LS (yellowish)green AND terminal lobe apex acuminate/caudate. ... *A. leucoderme*
 b Lamina LS pale green to greyish green AND terminal lobe apex +/- acute. 11
- 11 a Lamina lobe apices rounded to acute, LS venation pubescent with rather long forward directed hairs. *A. floridanum*
 b Lamina lobe apices rounded, LS venation pubescent with rather short spreading hairs. *A. grandidentatum*

**GROUP J (*Arguta, Glabra, Macrantha, Parviflora, Spicata* and *Wardiana*):
 Lamina LS basal vein axils without membranous pockets (10× LENS).**

- 01 a Lamina unlobed, OR with 2 shallow lateral lobes. 02
 b Lamina 3-5-lobed AND lateral lobes often >2 cm. 04
- 02 a Lamina often with 2 shallow lateral lobes, base truncate to rounded or shallowly cordate. *A. stachyophyllum*
 - Multi-stemmed with invasive suckers from base. Lamina often <5 cm. . *A. stachyophyllum* subsp. *betulifolium*
 - Multi-stemmed. Lamina often >5 cm. *A. stachyophyllum* subsp. *stachyophyllum*
 b Lamina unlobed and base always cordate. 03
- 03 a Tertiary veins deeply impressed on lamina US, elevated on LS. *A. distylum*
 b Tertiary veins rather poorly visible to the naked eye on both sides. *A. sikkimense*
- 04 a Lamina LS pale green to blue-green AND completely glabrous (10× LENS). *A. glabrum*
 - Lamina <6 cm across. *A. glabrum* subsp. *glabrum*
 - Lamina >6 cm across. *A. glabrum* subsp. *douglasii*
 b Lamina LS green to grey-green AND at least pubescent in vein axils (10× LENS). 05
- 05 a Terminal lobe coarsely serrate/dentate, predominantly with ≤15 teeth/side. 06
 b Terminal lobe rather finely serrate to double-serrate, with >15 teeth/side. 08
- 06 a Terminal lobe widening at its base, sinus with lateral lobe wide. *A. spicatum*
 b Terminal lobe narrowing at its base, sinus with lateral lobe narrow. 07
- 07 a Lamina base deeply cordate, midvein length predominantly >10 cm. *A. ukurunduense*
 b Lamina base shallowly cordate, midvein length predominantly <10 cm. *A. barbinerve*
- 08 a Terminal lobe predominantly wider than long. *A. nipponicum*
 b Terminal lobe longer than wide. 09
- 09 a Lamina 3-lobed AND terminal lobe L/W ratio 3/1-2/1. *A. wardii*
 b Lamina unlobed, or (3-)5(-7) lobed AND terminal lobe L/W ratio predominantly <2/1. 10
- 10 a Lamina base truncate to shallowly cordate. *A. acuminatum*
 b Lamina base (deeply) cordate. 11

- 11 a Lamina Ø predominantly >10 cm, petiole 5-15 cm. **A. caudatum**
 b Lamina Ø 5-10 cm, petiole 2-10 cm. **A. argutum**

GROUP K (*Macrantha*):
 Lamina LS vein axils with membranous pockets.
 Lamina predominantly unlobed or unlobed to 3-lobed.

- 01 a 3-lobed lamina with lobes extending +/- from apical half. 02
 b Mature lamina unlobed or with lobes extending from basal half. 03
- 02 a Lamina width predominantly 10 cm and midvein length <15cm **A. chienii**
 b Lamina width 10-15(-more) cm and midvein length 12-25 cm. **A. pensylvanicum**
- 03 a Lamina margin (sub)entire. **A. sikkimense** var. **sikkimense**
 b Lamina margin distinctly serrate. 04
- 04 a Lamina L/W ratio predominantly +/- 2/1. 05
 b Lamina L/W ratio clearly <2/1. 06
- 05 a Lamina 7-14 x 4-8 cm **AND** petiole always red. **A. laxiflorum**
 b Lamina 10 x 4 cm **AND** petiole green (sometimes partly red). **A. caudatifolium**
- 06 a Lamina predominantly distinctly lobed with apices acuminate to caudate. **A. forrestii**
 b Lamina predominately unlobed; **OR IF lobed** then with apices obtuse to acute. 07
- 07 a Midvein length predominantly ≤8 cm. 08
 b Midvein length >8 cm. 09
- 08 a Lamina LS membranous pockets obvious, **ALSO** in secondary/tertiary vein axils (10x LENS). **A. davidii** subsp. **grosseri**
 b Lamina LS membranous pockets restricted to midvein/secondary vein axils (10x LENS).
 **A. crataegifolium**
- 09 a Lamina LS membranous pockets obvious, **ALSO** several in secondary/tertiary vein axils (10x LENS). 10
 b Lamina LS membranous pockets restricted to basal vein axils, or to midvein/secondary vein axils (10x LENS). 11
- 10 a Lateral lobes absent or with apices obtuse and below the middle. . **A. davidii** subsp. **davidii**
 b Lateral lobes with apices acute and at or above the middle. **A. capillipes**
- 11 a Lamina LS membranous pockets obvious in basal and midvein/secondary vein axils (10x LENS). **A. morifolium**
 b Lamina LS membranous pockets predominantly scarcely distinguishable in basal vein axils (10x LENS). **A. sikkimense** var. **serrulatum**

GROUP L (*Macrantha*):
Lamina LS vein axils with membranous pockets.
Lamina predominantly 3-5-lobed or 5-lobed.

- 01 a Lamina with sinus terminal/lateral lobe very narrow to overlapping. 02
 b Lamina with sinus terminal/lateral lobe clearly spreading. 03
- 02 a Terminal lobe L/W ratio predominantly $\geq 2/1$, apex caudate. ***A. micranthum***
 b Terminal lobe L/W ratio clearly $< 2/1$, apex acuminate to +/- caudate. ***A. tschonoskii***
 - Lobes acuminate. Shoot and petiole green to vaguely red. ***A. tschonoskii* subsp. *tschonoskii***
 - Lobes acuminate to +/- caudate. Shoot and petiole red to conspicuously so. . ***A. tschonoskii* subsp. *koreanum***
- 03 a Mature lamina outline always obovate. 04
 b Mature lamina outline variable, from ovate to ovate-orbicular, or ovate to obovate. 05
- 04 a Young shoot green. Lamina midvein length 12-25 cm. ***A. pensylvanicum***
 b Young shoot +/- whitish-blue bloomed. Lamina midvein length < 15 cm. ***A. rufinerve***
- 05 a Larger 5-lobed lamina width 12-15 cm AND outline pentagonal/orbicular. ***A. tegmentosum***
 b Larger 5-lobed lamina width ≤ 12 cm OR outline ovate. 06
- 06 a Lamina LS pubescent along veins (10x LENS). ***A. pectinatum***
 - Mature lamina LS secondary veins pubescent with single hairs. ***A. pectinatum* subsp. *pectinatum***
 - Petiole AND mature lamina LS secondary veins stellate pubescent. ***A. pectinatum* subsp. *taronense***
 b Lamina LS glabrous or almost so, or pubescence restricted to vein axils (10x LENS). .. 07
- 07 a Terminal lobe relatively narrow, L/W ratio +/- 2/1. 08
 b Terminal lobe relatively wide, L/W ratio clearly $< 2/1$, often +/- 1/1. 09
- 08 a Terminal lobe regularly finely serrate. ***A. aff. pectinatum* (e.g. BSWJ 8270, KR 3012)**
 b Terminal lobe irregularly serrate to doubly serrate or lobulate-serrate. ***A. maximowiczii***
- 09 a Bud and petiole US predominantly green. 10
 b Bud and petiole US predominantly red. 11
- 10 a Lamina midvein length predominantly < 8 cm. ***A. davidii* subsp. *grosseri***
 b Lamina midvein length predominantly > 8 cm. ***A. metcalfii***
- 11 a Lamina always 5-lobed. ***A. rubescens***
 b Lamina (0-)3-5-lobed. 12
- 12 a Lamina LS with membranous pockets obvious, also several in tertiary vein axils (10x LENS). ***A. capillipes***
 b Lamina LS with membranous pockets in secondary vein axils but predominantly absent in most tertiary vein axils (10x LENS). ***A. morifolium***

GROUP M (*Palmata*):
Lamina always unlobed.

- 01 a Basal secondary veins ending between lamina basal third and apical half. ... ***A. cordatum***
 b Basal secondary veins ending in lamina basal third. 02
- 02 a Lamina secondary veins predominantly ≤ 6 /side. ***A. fabri***
 b Lamina secondary veins predominantly 7-12/side. ***A. laevigatum***
 - Petiole glabrous. ***A. laevigatum* var. *laevigatum***
 - Petiole pubescent. ***A. laevigatum* var. *salweenense***

GROUP N (*Palmata*):
Lamina unlobed to 3-lobed, OR 3-lobed.

- 01 a Lamina terminal/lateral lobe sinus predominantly in basal third. ***A. tutcheri***
 b Lamina terminal/lateral lobe sinus predominantly above basal third. 02
- 02 a Current year growth lamina with petiole pubescent. ***A. fenzelianum***
 b Current year growth lamina with petiole glabrous. 03
- 03 a Larger mature lamina +/- as long as wide, sometimes wider than long. ***A. wilsonii***
 b Larger mature lamina clearly longer than wide. ***A. calcaratum***

GROUP O (*Palmata*):
Lamina 3-5(-more)-lobed, 5-lobed laminas ALWAYS present.

- 01 a Lamina 3-5-lobed, OR 5-lobed. 02
 b Lamina 5-7-lobed. 06
- 02 a Lamina 3-5-lobed AND base cuneate to subrounded. ***A. wilsonii***
 b Lamina predominantly 5-lobed (sometimes few 3-4-lobed laminas present) AND base truncate to cordate. 03
- 03 a Petiole stout, thick and short: $\leq 1/3$ midvein length, OR basal lobe lowermost margin entire to serrate in apical third (10x LENS). ***A. sinense***
 b Petiole slender: predominantly $\geq 1/2$ midvein length AND basal lobe lowermost margin serrate from base to apex or at least in apical half (10x LENS). 04
- 04 a Lamina US secondary veins clearly impressed (mature lamina basal width predominantly +/- 3/4 total width). ***A. elegantulum***
 b Lamina US secondary veins +/- elevated (mature lamina basal width 1/2-3/4 total width). .. 05

- 05 a Lamina LS basal vein axils clearly pubescent (10× LENS). *A. oliverianum*
 b Lamina LS basal vein axils scarcely pubescent (10× LENS). *A. serrulatum*
- 06 a Petiole densely pubescent. *A. pubipalmatum*
 b Petiole glabrous or almost so. 07
- 07 a Lamina LS veinlets densely pubescent with remarkable tufts (10× LENS). ... *A. erianthum*
 b Lamina LS veinlets glabrous or almost so (10× LENS). 08
- 08 a Midvein length predominantly 3-9 cm. 09
 b Midvein length predominantly 8-15 cm. 10
- 09 a Lamina margin irregularly double serrate (10× LENS). *A. palmatum*
 b Lamina margin regularly simple serrate (10× LENS). *A. amoenum* var. *amoenum*
- 10 a Lamina LS purplish. *A. aff. campbellii*
 b Lamina LS greenish. 11
- 11 a Terminal lobe LS rather finely serrate, with 2-more teeth between two secondary veins or their forks. *A. campbellii*
 b Terminal lobe LS rather coarsely serrate, with 0-1 teeth between two secondary veins or their forks. *A. flabellatum*

GROUP P (*Palmata*):
 Lamina 7(-more)-lobed AND 5-lobed lamina absent.

- 01 a Lamina predominantly 9-13-lobed. 02
 b Lamina predominantly 7-9-lobed. 05
- 02 a Lamina base +/- truncate to (sub)cordate. *A. tenuifolium*
 b Lamina base cordate to deeply cordate. 03
- 03 a Petiole and lamina LS (soon) glabrous, except vein axils (10× LENS). *A. shirasawanum*
 b Petiole AND lamina LS secondary veins pubescent with long hairs (10× LENS). 04
- 04 a Terminal lobe predominantly ≤1/2 midvein length. *A. japonicum*
 b Terminal lobe predominantly >1/2 midvein length. *A. pseudosieboldianum*
 - Lobes 9-11. *A. pseudosieboldianum* subsp. *pseudosieboldianum*
 - Lobes 9-13. *A. pseudosieboldianum* subsp. *takesimensis*
- 05 a Lamina base +/- truncate to (sub)cordate. *A. tenuifolium*
 b Lamina base cordate to deeply cordate. 06
- 06 a Lamina US pubescent with long hairs (10× LENS). *A. duplicatoserratum*
 b Lamina US glabrous or almost so (10× LENS). 07

- 07 a Lamina midvein length predominantly 8-15 cm. 08
 b Lamina midvein length predominantly 3-9 cm. 09
- 08 a Terminal lobe LS rather finely serrate, with 2-more teeth between two secondary veins and their forks. *A. campbellii*
 b Terminal lobe LS rather coarsely serrate, with 0-1 teeth between two secondary veins and their forks. *A. flabellatum*
- 09 a Terminal lobe predominantly <1/2 midvein length. 10
 b Terminal lobe predominantly 1/2-3/4 midvein length. 11
- 10 a Lamina 7-9-lobed. Petiole glabrous (10× LENS). *A. circinatum*
 b Lamina 7-9(-11)-lobed. Petiole clearly pubescent (10× LENS). *A. sieboldianum*
- 11 a Terminal lobe >3/4 midvein length, margin incised double serrate (10× LENS).
 *A. amoenum* var. *matsumurae*
 b Terminal lobe <3/4 midvein length, margin simple serrate (10× LENS). *A. robustum*

Taxa treated in this identification key:

ACER

- A. acuminatum* (Arguta)
- A. albopurpurascens* (Oblonga)
- A. amamiense* (Lithocarpa)
- A. amoenum* (Palmata)
 - var. *amoenum*
 - var. *matsumurae*
- A. amplum* (Platanoidea)
- A. argutum* (Arguta)
- A. barbinerve* (Arguta)
- A. buergerianum* (Oblonga)
- A. caesium* (Acer)
 - subsp. *caesium*
 - subsp. *giraldii*
- A. calcaratum* (Palmata)
- A. campbellii* (Palmata)
- A. aff. campbellii* (Palmata)
- A. campestre* (Platanoidea)
- A. capillipes* (Macrantha)
- A. cappadocicum* (Platanoidea)
 - subsp. *cappadocicum*
 - subsp. *sinicum*
- A. carpinifolium* (Indivisa)
- A. catalpifolium* (Platanoidea)
- A. caudatifolium* (Macrantha)
- A. caudatum* (Spicata)
- A. chapaense* (Platanoidea)
- A. chienii* (Macrantha)
- A. circinatum* (Palmata)
- A. cissifolium* (Negundo)
- A. cordatum* (Oblonga)
- A. coriaceifolium* (Oblonga)
- A. crataegifolium* (Macrantha)
- A. davidii* (Macrantha)
 - subsp. *davidii*
 - subsp. *grosseri*
- A. diabolicum* (Lithocarpa)
- A. distylum* (Parviflora)
- A. divergens* (Platanoidea)
- A. duplicatoserratum* (Palmata)
- A. elegantulum* (Palmata)
- A. erianthum* (Palmata)
- A. fabri* (Palmata)
- A. fenzelianum* (Palmata)
- A. flabellatum* (Palmata)
- A. floridanum* (Acer)
- A. forrestii* (Macrantha)
- A. fulvescens* (Platanoidea)
- A. glabrum* (Glabra)
 - subsp. *douglasii*
 - subsp. *glabrum*
- A. granatense* (Acer)
- A. grandidentatum* (Acer)
- A. griseum* (Trifoliata)
- A. heldreichii* (Acer)
 - subsp. *heldreichii*
 - subsp. *macropterum*
 - subsp. *trautvetteri*
- A. henryi* (Negundo)
- A. hyrcanum* (Acer)
 - subsp. *hyrcanum*
 - subsp. *intermedium*
 - subsp. *keckianum*
 - subsp. *tauricum*
- A. HWJ 569* (Macrantha)
- A. japonicum* (Palmata)
- A. laevigatum* (Palmata)
 - var. *laevigatum*
 - var. *salweenense*
- A. laurinum* (Hyptiocarpa)
- A. laxiflorum* (Macrantha)
- A. leucoderme* (Acer)
- A. lobelii* (Platanoidea)
- A. longipes* (Platanoidea)
- A. macrophyllum* (Macrophylla)
- A. mandshuricum* (Trifoliata)
- A. maximowiczianum* (Trifoliata)
- A. maximowiczii* (Macrantha)
- A. metcalfii* (Macrantha)
- A. miaotaiense* (Platanoidea)
- A. micranthum* (Macrantha)
- A. miyabei* (Platanoidea)
- A. monspessulanum* (Acer)
- A. morifolium* (Macrantha)
- A. negundo* (Negundo)
 - subsp. *californicum*
 - subsp. *mexicanum*
 - subsp. *negundo*
 - subsp. *texanum*
- A. nigrum* (Acer)
- A. nipponicum* (Parviflora)
- A. oblongum* (Oblonga)
- A. obtusifolium* (Acer)
- A. okamotoanum* (Platanoidea)
- A. oliverianum* (Palmata)
- A. opalus* (Acer)
 - subsp. *obtusatum*
 - subsp. *opalus*
- A. palmatum* (Palmata)
- A. paxii* (Oblonga)
- A. pectinatum* (Macrantha)
 - subsp. *pectinatum*
 - subsp. *taronense*
- A. aff. pectinatum* (e.g. BSWJ 8270, KR 3012) (Macrantha)
- A. pensylvanicum* (Macrantha)
- A. pentaphyllum* (Pentaphylla)
- A. pictum* (Platanoidea)
 - subsp. *dissectum*
 - subsp. *dissectum* f. *connivens*
 - subsp. *macropterum*
 - subsp. *mono*
 - subsp. *pictum*
 - subsp. *savatieri*
- A. pilosum* (Pubescentia)
- A. pinnatinervium* (Hyptiocarpa)
- A. platanoides* (Platanoidea)
- A. pseudoplatanus* (Acer)
- A. pseudosieboldianum* (Palmata)
 - subsp. *pseudosieboldianum*
 - subsp. *takesimense*
- A. pubipalmatum* (Palmata)
- A. pycnanthum* (Rubra)
- A. robustum* (Palmata)
- A. rubescens* (Macrantha)
- A. rubrum* (Rubra)
- A. rufinerve* (Macrantha)
- A. saccharinum* (Rubra)
- A. saccharum* (Acer)
- A. sempervirens* (Acer)
- A. serrulatum* (Palmata)
- A. shenkanense* (Platanoidea)
- A. shirasawanum* (Palmata)
- A. sieboldianum* (Palmata)
- A. sikkimense* (Macrantha)
 - var. *serrulatum*
 - var. *sikkimense*
- A. sinense* (Palmata)
- A. sinopurpurascens* (Lithocarpa)
- A. skutchii* (Acer)
- A. spicatum* (Spicata)
- A. stachyophyllum* (Arguta)
 - subsp. *betulifolium*
 - subsp. *stachyophyllum*
- A. sterculiaceum* (Lithocarpa)
 - subsp. *franchetii*
 - subsp. *sterculiaceum*
- A. tataricum* (Ginnala)
 - subsp. *ginnala*
 - subsp. *semenovii*
 - subsp. *tataricum*
- A. tegmentosum* (Macrantha)
- A. tenellum* (Platanoidea)
- A. tenuifolium* (Palmata)
- A. tibetense* (Platanoidea)
- A. triflorum* (Trifoliata)
- A. truncatum* (Platanoidea)
- A. tschonoskii* (Macrantha)
 - subsp. *koreanum*
 - subsp. *tschonoskii*
- A. tsinglingense* (Lithocarpa)
- A. turkestanicum* (Platanoidea)
- A. tutcheri* (Palmata)
- A. ukurunduense* (Spicata)
- A. velutinum* (Acer)
- A. wardii* (Wardiana)
- A. wilsonii* (Palmata)
- A. yui* (Oblonga)

DIPTERONIA

- D. dyeriana*
- D. sinensis*

Taxa referred to synonymy in this identification key:

A. amplum subsp. *catalpifolium* = *A. catalpifolium* (Rehder)
A. campbellii subsp. *flabellatum* = *A. flabellatum* (Flora of China)
A. campbellii subsp. *sinense* = *A. sinense* (Flora of China)
A. campbellii subsp. *wilsonii* = *A. wilsonii* (Flora of China)
A. cappadocicum subsp. *divergens* = *A. divergens* (Flora of Turkey)
A. cappadocicum subsp. *lobelii* = *A. lobelii* (Flora Europaea)
A. cappadocicum subsp. *sinicum* var. *tricaudatum* = *A. shenkanense* (Flora of China)
A. caudatum subsp. *ukurunduense* = *A. ukurunduense* (Flora of China)
A. craibianum = *A. calcaratum* (New Trees)
A. franchetii = *A. sterculiaceum* subsp. *franchetii* (Flora of China/New Trees)
A. ginnala = *A. tataricum* subsp. *ginnala* (Flora of China/New Trees)
A. giraldii = *A. caesium* subsp. *giraldii* (Flora of China/New Trees)
A. grosseri = *A. davidii* subsp. *grosseri* (Flora of China/New Trees)
A. grosseri var. *hersii* = *A. davidii* subsp. *grosseri* (Flora of China/New Trees)
A. komarovii = *A. tschonoskii* subsp. *koreanum* (Maples of the World)
A. mono = *A. pictum* (Flora of China/Flora of Japan/New Trees)
A. morrisonense sensu Li (1963) non Hayata = *A. rubescens* (Maples of the World)
A. negundo var. *interius* = *A. negundo* var. *texanum* (Flora of Missouri)
A. negundo var. *violaceum* = *A. negundo* var. *negundo* (Flora of Missouri)
A. nikoense = *A. maximowiczianum* (New Trees)
A. oliverianum subsp. *formosanum* = *A. serrulatum* (Flora of China)
A. opalus subsp. *hispanicum* = *A. granatense* (Flora Europaea)
A. palmatum subsp. *amoenum* = *A. amoenum* (Flora of Japan)
A. palmatum subsp. *matsumurae* = *A. amoenum* subsp. *matsumurae* (Flora of Japan)
A. palmatum subsp. *palmatum* = *A. palmatum* (Flora of Japan)
A. pectinatum subsp. *forrestii* = *A. forrestii* (Flora of China)
A. pectinatum subsp. *laxiflorum* = *A. laxiflorum* (Flora of China)
A. pectinatum subsp. *maximowiczii* = *A. maximowiczii* (Flora of China)
A. saccharum subsp. *skutchii* = *A. skutchii*. (Yalma L.Vargas-Rodriguez et al. in Brittonia 65/3)
A. saccharum subsp. *grandidentatum* = *A. grandidentatum* (Rehder)
A. saccharum subsp. *leucoderme* = *A. leucoderme* (Rehder)
A. saccharum subsp. *nigrum* = *A. nigrum* (Rehder)
A. schneiderianum = *A. oliverianum* (Flora of China)
A. shirasawanum var. *tenuifolium* = *A. tenuifolium* (Flora of Japan)
A. taronense = *A. pectinatum* subsp. *taronense* (Flora of China/New Trees)
A. trautvetteri = *A. heldreichii* subsp. *trautvetteri* (Maples of the World/New Trees)
A. tschonoskii var. *rubripes* = *A. tschonoskii* subsp. *koreanum* (Maples of the World)

Remarks:

The following taxa are believed to be in cultivation, though the authors require more material, before these can be included in the key:

A. bodinieri
A. hookeri
A. pauciflorum
A. tientaiense

Some plants in cultivation are intermediate in both floral and vegetative parts of *A. forrestii* and *A. laxiflorum*. Further work is required in order to establish the taxonomic relationship between these taxa.

A. pubipalmatum is included in the key, contrary to its treatment as synonym of *A. pauciflorum* in the Flora of China.

Plants in collections under the following names are usually something else:

A. discolor = *A. paxii*
A. erythranthum = *A. laevigatum*
A. heptaphlebium = *A. aff. campbellii*
A. pentapomicum = *A. monspessulanum*
A. reginae-amaliae = *A. sempervirens*
A. taiwanense = aff. *A. campbellii*

