Flora of Nepal
नेपालका वनस्पति

Vitaceae

Vitaceae: Webedition 1 (2017)

http://data.rbge.org.uk/publications/FloraofNepal/library/Vitaceae/1

Editors
Mark F. Watson, Shinobu Akiyama, Hiroshi Ikeda, Colin A. Pendry,
Keshab R. Rajbhandari, Krishna K. Shrestha

Authors
Anna Trias Blasi

Genera in this account

Published on 5 May 2017 by Royal Botanic Garden Edinburgh, 20a Inverleith Row, Edinburgh, EH2 5LR, UK

This PDF Webedition will be permanently available and citable using the URL specified at the top of this page. Family accounts have numbered pages so indivdual pages can be cited. Previous and future editions can also be accessed via the project website (www.floraofnepal.org/PDFLibrary).

Appendices
1: Illustration plates
2: Format, abbreviations and categories used in Flora of Nepal

See printed volumes of the Flora of Nepal (www.rbge.org.uk/publications/floraofnepal) and the project website (www.floraofnepal.org) for further information on the Flora of Nepal and acknowledgement of the institutes and people involved with this international collaborative project.

Royal Botanic Garden Edinburgh

Vitaceae

Anna Trias Blasi

Woody or herbaceous climbers. Hermaphroditic, or polygamo-dioecious. Stems generally conspicuously lenticellate, bark sometimes shredding. Tendrils simple, bifurcate, 2–14 branched (adhesive discs on each tip in *Parthenocissus* and *Tetrastigma obtectum*), usually leaf-opposed, rarely absent, sometimes associated with the inflorescence. Leaves petiolate, simple and palmately veined or digitately or pedately compound, lobed or unlobed, usually with 'pearl glands' (small multicellular, stalked, caducous spherical structures), margin variously toothed. Inflorescences paniculate, corymbose or thyrsoid, leaf-opposed, pseudo-terminal, or axillary. Flowers small, generally pedicellate, sometimes subsessile, actinomorphic, hypogynous, 4–5-merous. Calyx cupuliform, sometimes with 4–5 small lobes. Petals valvate, 4–5, free or connate and forming a calyptra, apex generally cucullate. Stamens 4–5, antepetalous, anthers medifixed dehiscing longitudinally, tetrasporangiate. Disc intrastaminal, cupular or anular, entire or lobed, mostly adnate to the ovary; sometimes inconspicuous. Ovary superior, 2-locular; style simple, stigma mostly inconspicuous, sometimes capitate or discoid, 4-lobed in *Tetrastigma*. Fruit a 1–4-seeded berry, seeds endotestal with an abaxial chalazal knot and an adaxial raphe.

A family of approximately 14 genera and 900 species distributed pantropically in Asia, Africa, Australia, the Neotropics and the Pacific with some species in temperate areas. Eight genera and 27 species in Nepal, including 2 cultivated species.

Key to Genera

1a Petals united; forming a calyptra (hood structure) and dropping off as a unit at anthesis. Leaves simple ..... **1. *Vitis***
b Petals free. Leaves simple or compound 2

2a Inflorescence associated with a tendril ..... **2. *Ampelocissus***
b Inflorescence not associated with a tendril 3

3a Stigma generally 4-lobed. Flowers unisexual ..... **3. *Tetrastigma***
b Stigma inconspicuous, sometimes capitate or discoid. Flowers bisexual 4

4a Flowers 4-merous 5
b Flowers 5-merous 6

5a Inflorescence axillary or terminal. Leaves compound. Fruits 2-4-seeded ..... **4. *Cayratia***
b Inflorescence leaf-opposed. Leaves simple. Fruits generally 1-seeded ..... **5. *Cissus***

6a Leaves simple. Floral disc conspicuous, forming a ring below the fruit ..... **6. *Ampelopsis***
b Leaves compound. Floral disc inconspicuous, not forming a ring below the fruit 7

7a Tendrils 3–14-branched with adhesive discs at the end of each tip. Leaves 3-foliolate ..... **7. *Parthenocissus***
b Tendrils 2–3-branched without adhesive discs at the end of each tip. Leaves 5-foliolate ..... **8. *Yua***

1. *Vitis* L., Sp. Pl. 1:202 (1753).

Woody climbers, polygamo-dioecious. Stem with shredding bark. Tendrils usually 2-furcate, leaf-opposed, sometimes associated with the inflorescence, without adhesive discs. Leaves simple, sometimes lobed. Inflorescence leaf-opposed, paniculate. Flowers bisexual and unisexual, 5-merous. Calyx cupuliform or 5–dentate. Petals 5, united at the apex, separating at the base and shed together as a calyptra. Stamens 5, abortive in female flowers. Disc annular or 5-lobed, fused to the ovary, ovary rudimentary in male flowers. Style conical, short, stigma inconspicuous. Fruit 2–4-seeded, globose. Seeds obovoid to pyriform, adaxial side 2-furrowed, abaxial side 1-furrowed with a rounded, spathulate or elliptic chalazal knot.

About 65 species, mainly in the northern hemisphere with some species extending into subtropical SAmerica and Asia. Three species native to Nepal, with one species, the grape, cultivated.

Vitis includes *V. vinifera*, the grape, which is economically important both as a fresh or dried fruit and as the basis of the wine industry. It is cultivated in the Tarai and can be distinguished by its leaves which are oval to suborbicular, shallowly to deeply 3**–**5-lobed with a deeply cordate base and deeply and irregularly toothed margin. Its fruits are 15–25 mm in diameter.

Key to Species

1a Leaves oval to suborbicular, shallowly to deeply 3- or 5-lobed, base deeply cordate, margin deeply and irregularly toothed. Fruits 15–25 mm in diameter ..... ***V. vinifera***
b Leaves ovate to shallowly 3-lobed, base shallowly cordate to truncate, margin serrate to serrulate. Fruits up to 10 mm in diameter .....2.

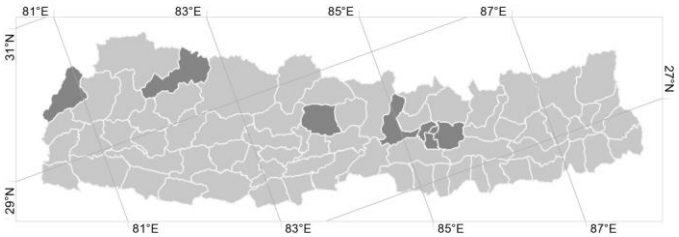
2a Stems glabrous. Lower surface of leaf glabrous with some tufts of arachnoid hairs. Inflorescence 2–7 cm**1. *V. flexuosa***
b Stems hairy. Lower surface of leaf densely hairy. Inflorescence at least 7 cm long .....3.

3a Petioles, inflorescence peduncles and lower side of the leaves densely hairy with ferruginous arachnoid hairs. Stems densely hairy with ferruginous arachnoid hairs becoming floccose to glabrate. Pedicels up to 2.5 mm before the calyptra is shed .....**2. *V. heyneana***
b Petioles, inflorescence peduncles and lower side of the leaves densely hairy with appressed villous hairs, and scattered arachnoid hairs. Stems densely villous and with scattered arachnoid hairs, but neither floccose nor glabrate. Pedicel more than (2.5–)3 mm before the calyptra is shed .....**3. *V. pedicellata***

1. *Vitis flexuosa* Thunb., Trans. Linn. Soc. London 2:103 (1794).
Vitis parvifolia Roxb.; *V. purani* Buch.-Ham. ex D.Don; *V. wallichii* DC.

Climber. Stem glabrous, bark peeling. Tendrils 2-furcate, to 13 cm, glabrous. Petioles 0.5–4 cm. Leaves ovate, sometimes 3-lobed, 1.5–7 × 1.5–5 cm, base cordate to truncate, apex acute to acuminate, margin serrate, puberulent on veins above with a tuft of arachnoid hairs at the base of the mibrid, glabrous below with tufts of arachnoid hairs near the veins. Inflorescence a panicle of umbellate fascicles, 2–7 cm, not associated with the tendril, peduncle 0.5–5 cm, sparsely hairy with arachnoid hairs, pedicels 1–3 mm. Calyx cupuliform, entire, sinuate, glabrous. Petals 1 mm, glabrous. Filaments filiform, 1–1.5 mm, anthers ellipsoid, 0.75 mm. Disc ring-shaped, 0.5 mm wide, glabrous. Style very short. Fruit globose, 5–7 mm in diameter, glabrous, smooth, base attenuate. Seeds 2–4, obovoid, 4–5 × 3–4 mm, adaxial side with 2 pits at either side of the raphe, abaxial side convex with an elliptic chalazal knot.

Distribution: W Himalaya, E Himalaya, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 1000–2200 m.

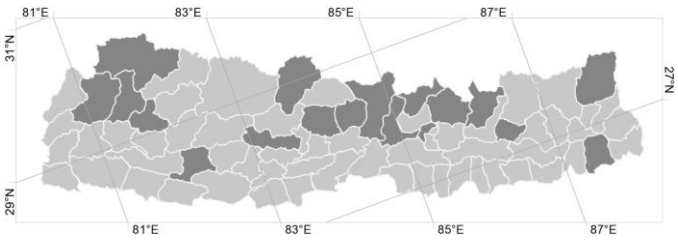
Ecology: Montane forests. Often in open areas.

Flowering: March–May. **Fruiting:** May–September.

2. *Vitis heyneana* Roem. & Schult., Syst. Veg.ed.16 5:318 (1819).
Vitis jacquemontii R.N.Parker; *V. lanata* Roxb.

Climber. Young stems densely hairy with ferruginous arachnoid hairs, becoming flocculose to glabrescent. Tendrils 2-furcate, to 14 cm, glabrescent to flocculose with ferruginous arachnoid hairs, sometimes associated with the inflorescence. Petioles 2–6 cm. Leaves ovate, 4–16 × 4–15 cm, base truncate to cordate, apex acute to acuminate, margin serrate, sparsely hairy above with ferruginous arachnoid hairs, becoming flocculose, densely hairy below with ferruginous arachnoid hairs. Inflorescence a pyramidal panicle, 7–22 cm, sometimes associated with the tendril; peduncle 1.5 –7 cm, densely hairy with ferruginous arachnoid hairs, pedicel 1–2.5 mm, extending to 4 mm after the calyptra is shed. Calyx cupuliform, entire, sinuate, glabrous. Petals 2 mm, glabrous. Filaments filiform, 1.5–2 mm; anthers oblongoid, 0.5 mm. Disc ring-shaped, 0.5 mm wide, glabrous. Style conical, 0.1 mm. Fruit globose, to 1 cm in diameter, glabrous, smooth, base attenuate. Seeds 1–3, obovoid, 4–5 × 3–4 mm, adaxial side angular with 2 oblong pits at either side of the raphe, abaxial side convex with a spathulate chalazal knot.
Fig. 1a-d

Distribution: W Himalaya, E Himalaya, Tibetan Plateau, Assam-Burma, S Asia and E Asia.



Altitudinal range: 900–2500 m.

Ecology: Subtropical and montane forests, often in riparian areas.

Flowering: April–July. **Fruiting:** May–October.

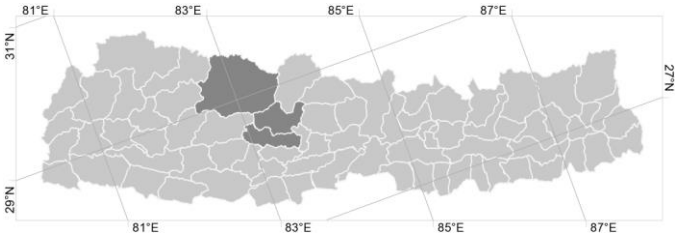
Vitis heyneana and *V. jacquemontii* are very similar and the

only major difference between them is the density of the indumentum on the lower surface of the leaf. Although differences in seed morphology have been proposed to separate them, this was not observed in this study and *V. heyneana and V. jacquemontii* are treated as conspecific.

3. *Vitis pedicellata* M.A.Lawson, Fl. Brit. India 1[3]:650 (1875).

Climber. Stem densely villous and with scattered arachnoid hairs. Tendrils to 10 cm, densely villous, slender and unbranched when associated with the inflorescence, otherwise 2-furcate, slender to robust. Petioles 5–8 cm. Leaves ovate, 5–20 × 4.5–11 cm, base cordate, apex acute to acuminate, margin serrate, glabrous above with some villous hairs on the veins, densely appressed villous hairy below with scattered arachnoid hairs. Inflorescence a panicle of rounded umbellate fascicles, 5–11 cm, sometimes associated with the tendril, peduncle 3–6 cm, densely hairy with villous and scattered arachnoid hairs, pedicel (2.5–)3–4 mm, increasing to 4.5 mm after the calyptra is shed. Calyx cupuliform, entire, sinuate, glabrous. Petals 1.7–2 mm, glabrous. Filaments filiform, 1.7–3 mm; anthers ellipsoid, 0.7–1 mm. Disc ring-shaped, 0.5–0.75 mm wide, glabrous. Style short. Fruit globose, 6–8 mm in diameter, glabrous, smooth, base attenuate. Seeds 1–3, obovoid, 4–5 × 3–4 mm, abaxial side convex with a rounded chalazal knot.

Distribution: W Himalaya and E Himalaya.



Altitudinal range: 2100–2500 m.

Ecology: Often in riparian areas.

Flowering: April–May. **Fruiting:** June.

2. *Ampelocissus* Planch. nom cons., Vigne Amer. Vitic. Eur. 8:371 (1884).

Woody to herbaceous climbers. Stem glabrous or floccose. Tendrils simple or 2- to 3- furcate, generally leaf-opposed, borne beside the inflorescence at the end of a common peduncle, without adhesive discs. Leaves simple or 3-foliolate, sometimes lobed. Inflorescence leaf-opposed, with a common peduncle from which inflorescence and tendril are born, thyrses or umbellate corymbs. Flowers bisexual, usually 5-merous. Calyx cupuliform, entire to shallowly lobed. Petals 5, free, spreading at anthesis, cucullate. Stamens 5. Disc 5-lobed or with 5-10 vertical ridges, adnate to the ovary. Style short, conical, stigma rarely conspicuous. Fruit 1-4-seeded, globose, ovoid to obovoid. Seeds oblong, oval, obovoid to ellipsoid, adaxial side flattened or angular, raphe usually linear, abaxial side usually convex with an elliptic, circular or spathulate chalazal knot.

Worldwide 95 species, predominantly in the Old World tropics, with 4 species in C America and the Caribbean. Five species in Nepal.

Key to Species

1a Leaves compound ..... **1. *A. divaricata***
b Leaves simple (sometimes lobed) ..... 2.

2a Stems, petioles and leaves conspicuously hairy ..... 3.
b Stems, petioles and leaves mostly glabrous or very sparsely hairy ..... 4.

3a Stems and petioles with arachnoid hairs and dark erect glandular hairs. Inflorescence an elongate thyrse **2. *A. barbata***
b Stems and petioles with arachnoid hairs, never with dark erect glandular hairs. Inflorescence an umbellate corymb ..... **3. *A. rugosa***

4a Leaf blade generally pentagonal or slightly 5-lobed. Inflorescence a pyramidal thyrse. Calyx entire ..... **4. *A. latifolia***
b Leaf blade ovate to orbicular, neither angled nor lobed. Inflorescence an umbellate corymb. Calyx 5-notched ..... 5.

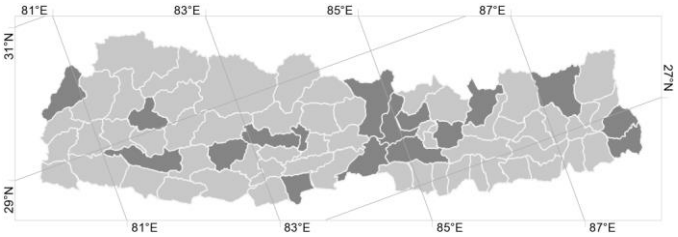
5a Leaf blade ovate to orbicular, neither angled nor lobed. Inflorescence an umbellate corymb. Calyx 5-notched ..... **5. *A. sikkimensis***

1. *Ampelocissus divaricata* (Wall. ex M.A.Lawson) Planch., Vigne Amer. Vitic. Eur. 8:375.

Vitis divaricata Wall. ex M.A.Lawson Fl. Brit. India 1[3]:657 (1875)..

Herbaceous climber. Stem terete to slightly flattened, slightly ridged, hairy with pale arachnoid hairs becoming floccose when mature. Tendrils 2- or 3-furcate, peduncle 3–13 cm, each branch 3–8 cm. Leaves 3-foliolate; petioles 1–14 cm, petiolules 0.5–5.5 cm; leaflets elliptic to ovate, 2–20 × 0.75–10 cm, lateral leaflets often oblique, base rounded to attenuate, apex acuminate to acute with a small mucronulate tip, margin dentate, sometimes ciliate, sparsely to densely hairy above with arachnoid and simple hairs, densely hairy below with pale to rusty arachnoid hairs, secondary veins 3–6 pairs. Inflorescence usually a dichotomous, lax, corymb, to 7 cm; peduncle 6–16 cm, rachis densely hairy, pedicels 0.5–1.25. Calyx cupuliform, entire, sinuate to sub-lobate, glabrous to slightly puberulent. Petals ovate, 1–1.5 mm. Filaments filiform, 0.5–1 mm, anthers orbicular, 0.5 mm. Ovary adnate to the disc; disc with 5–10 lobules, 0.5–1 mm across. Style conical, 0.2–0.5 mm. Fruit globose to ovoid, 7–8 × 9–10 mm. Seeds 2–4, oval to oblong, 6–8 × 4–6 mm, adaxial raphe protruding forming 2 sides, abaxial side with a circular to elliptic chalazal knot.
Fig. 2f-g

Distribution: W Himalaya, E Himalaya, S Asia and SE Asia.



Altitudinal range: 100–2000 m.

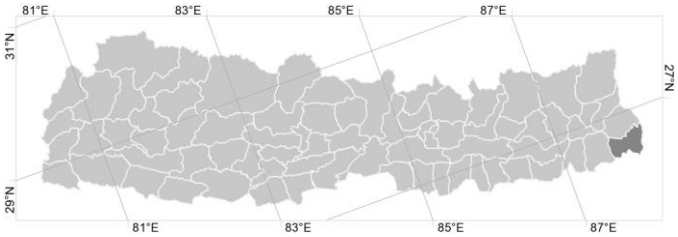
Ecology: Climbing on rocks and shrubs in shady areas in forests and scrub.

Flowering: July–September. **Fruiting:** July–October.

2. ***Ampelocissus barbata*** (Wall.) Planch., Vigne Amer. Vitic. Eur. 8(12):375 (1884).
Vitis barbata Wall. in Roxb., Fl. Ind. (Roxburgh) 2:478 (1824)..

Woody climber. Stem terete, with pale arachnoid hairs and dark erect glandular hairs. Tendrils 2-furcate, peduncle 6–14 cm, each branch 7–15 cm. Leaves simple; petioles 5–20 cm; leaf blade cordate to reniform, sometimes slightly 3-lobed, 10–26 × 6–22 cm, base cordate to auriculate, apex acute to apiculate, margin dentate with unequal teeth, glabrous above with scattered arachnoid hairs and glandular hairs, arachnoid hairy below with some glandular hairs, primary veins 5(–7), secondary veins 4–7 pairs .Inflorescence an elongate, lax thyrse, 3–15 cm, peduncle 7–16 cm, rachis densely hairy, uppermost axis hairy with arachnoid hairs and papillae, pedicel 0.5–1 mm. Calyx cupuliform, entire to sublobed, sinuate, glabrous to slightly puberulent. Petals ovate, 1.25–1.5 mm. Filaments filiform, 0.75–1.25 mm, anthers elliptic, 0.4–0.6 mm. Ovary adnate with disc, disc with 4–5 vertical ridges, 0.5–1 × 0.5–1 mm. Style broadly conical, 0.2–0.5 mm. Fruit globose, 1–1.2 × 0.9–1 cm. Seeds 3 or 4, oblong, 6–8 × 3–6 mm, adaxial raphe protruding forming 2 sides, abaxial side with an elliptic chalazal knot.

Distribution: E Himalaya, Assam-Burma, S Asia and SE Asia.



Altitudinal range: 150–1500 m.

Ecology: Secondary subtropical forests.

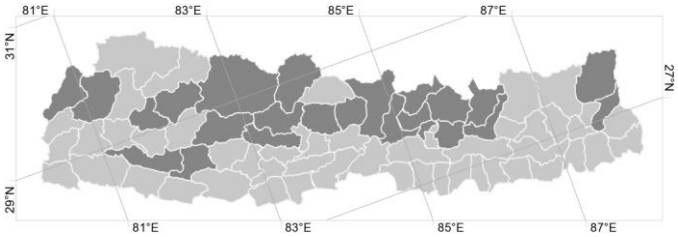
Flowering: March–July. **Fruiting:** July–August.

Although 4-merous flowers have been reported for Ampelocissus barbata elsewhere in S Asia and SE Asia, all of the Nepalese specimens examined have 5-merous flowers.

3. ***Ampelocissus rugosa*** (Wall. ex Roxb.) Planch., Vigne Amer. Vitic. Eur.:374 (1884).
Vitis rugosa Wall. ex Roxb. in Roxb., Fl. Ind. (Roxburgh) 2:480 (1824).; *Vitis lanata* var. *rugosa* (Wall. ex Roxb.) M.A.Lawson; *V. nervosa* M.A.Lawson

Climber. Stem terete, ridged, hairy with arachnoid hairs becoming floccose. Tendrils bifurcate, ca. 14 cm. Leaves simple; petioles 2–17 cm; leaf blade cordate to shallowly 3–7-lobed, 10–35 × 10–30 cm, base deeply cordate, apices acute, margin denticulate, hairy above, densely ferruginous arachnoid below, primary veins 5, secondary veins 5–7 pairs. Inflorescence a divaricate, umbellate corymb, peduncle 3–15 cm, rachis densely hairy, pedicels 0.5–2 mm. Calyx cupuliform, entire, sinuate, puberulent. Petals 5, broadly ovate, 1–1.5 mm. Filaments filiform, 1–1.25 mm, anthers, orbicular, 0.4–0.6 mm. Ovary adnate with disc, disc with 10 vertical ridges, 0.5–1 mm across. Style broadly conical, 0.3–0.4 mm. Fruit globose, 5–10 mm in diameter. Seeds 2–4, obovoid to ellipsoid, 5–7 × 3–5 mm, adaxial side with a broad linear raphe, abaxial side with a circular chalazal knot and fissures from the centre to the margin.

Distribution: W Himalaya, E Himalaya, Assam-Burma and SE Asia.



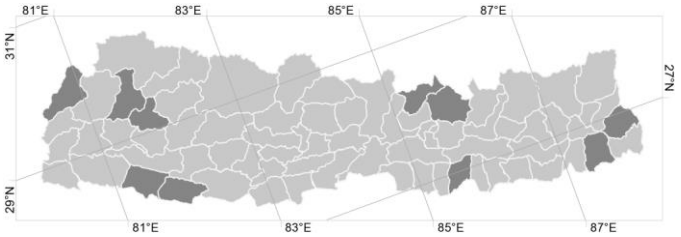
Altitudinal range: 800–2800 m.

Ecology: Shady areas in secondary subtropical forests and in open scrub.

Flowering: April–July. **Fruiting:** July–August.

4. ***Ampelocissus latifolia*** (Roxb.) Planch., Vigne Amer. Vitic. Eur.:374 (1884).
Vitis latifolia Roxb. in Roxb., Fl. Ind. (Roxburgh) 2:474 (1824).; *Ampelopsis lalifolia* (Roxb.) Tausch; *Vitis montana* M.A.Lawson

Climber. Stem terete, slightly ridged, generally glabrous, sometimes sparsely arachnoid or puberulent. Tendrils 2- or 3-furcate, 9–15 cm. Leaves simple; petioles 3–12 cm; leaf blade pentagonal to slightly 5-lobed, 9–30 × 9–26 cm, base deeply cordate, apices acute to acuminate, margin irregularly dentate, the teeth with a mucronate apex; glabrous above and below except on the sparsely arachnoid or puberulent veins, primary veins 5, secondary veins 3–4 pairs. Inflorescence a pyramidal thyrse, 3–14 cm, peduncle 5–10 cm, rachis glabrous to sparsely puberulent, pedicels subsessile to 1.25 mm. Calyx cupuliform, entire, glabrous. Petals ovate, 1–1.5 mm. Filaments filiform, 1–1.25 mm, anthers elliptic, 0.4–0.5 mm. Ovary adnate to the disc; disc with 5 marked lobes, 1–1.5 mm across. Style conical, 0.2–0.3 mm. Fruit globose, 6–9 × 7–9 mm. Seeds 2–4, oval to oblong, 6–7 × 4–5 mm, adaxial raphe protruding forming 2 sides with a groove in each of them, abaxial side with an oblong to elliptic chalazal knot and fissures from the centre to the margin.



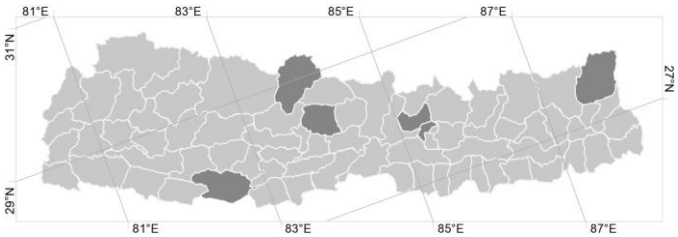
Altitudinal range: 150–2200 m.

Flowering: May–September. **Fruiting:** July–October.

5. ***Ampelocissus sikkimensis*** (M.A.Lawson) Planch., Vigne Amer. Vitic. Eur. 8:375.
Vitis sikkimensis M.A.Lawson Fl. Brit. India 1[3]:650 (1875)..

Slender climber. Stem terete, generally glabrous, sometimes sparsely arachnoid or floccose on the nodes. Tendrils bifurcate, 7–8 cm. Leaves simple; petioles 3–9 cm; leaf blade ovate to orbicular, 6–30 × 4–25 cm, base deeply cordate, apex sharply acuminate, margin serrulate; glabrous above with a tuft of arachnoid hairs at the petiole insertion,glabrous below; primary veins 5, secondary veins 5 or 6 pairs. Inflorescence a dense, umbellate corymb, 3–5 cm, peduncle 7.5–9 cm, pedicels subsessile. Calyx 5-notched, glabrous. Petals ovate, 1.5–1.75 mm. Filaments filiform, 1 mm, anthers elliptic, 0.5 mm. Ovary adnate to the disc; disc with 5 lobes, 1–1.5 mm across. Style conical, 0.2–0.3 mm. Fruit globose to obovoid, 5–7 mm in diameter. Seeds 2–4, obovoid to ellipsoid, 4–5 × 2–3 mm, adaxial side with a linear raphe, abaxial side with a spathulate chalazal knot.

Distribution: E Himalaya, Assam-Burma and E Asia.



Altitudinal range: 200–1900 m.

Ecology: Subtropical forests.

Flowering: July–August. **Fruiting:** August–November.

3. *Tetrastigma* (Miq.) Planch.

Vitis sect. *Tetrastigma* Miq..

Large woody climbers, rarely herbaceous, polygamo-dioecious. Stem verrucose to smooth to striate, densely puberulent, glabrous or glabrescent. Tendrils simple or branched, leaf-opposed, never associated with the inflorescence, with or without adhesive discs. Leaves palmately or pedately, 3–7-foliolate. Inflorescence usually axillary, umbellate corymbs. Flowers unisexual, 4-merous. Calyx cupuliform, entire to shallowly 4-lobed. Petals 4, free, spreading at anthesis, cucullate, sometimes with a dorsal spur at the apex. Stamens 4, short and abortive in female flowers. Disc well developed, generally 4-lobed in male flowers, inconspicuous in female flowers. Style conspicuous or inconspicuous, cylindrical to conical, stigma 4-lobed. Fruit 1-4-seeded, globose, turbinate. Seeds ellipsoid, obovoid, oblongoid, obcordate, pyriform, adaxial side with linear raphe, abaxial side with linear, oblong, ovate, spathulate or orbicular chalazal knot.

About 90 species from tropical and subtropical Asia to Australasia. Seven species in Nepal.

Key to Species

1a All leaves 3-foliolate ..... 2.
b At least some leaves 5-7-foliolate ..... 4.

2a Petal apex with a 1 mm long spur on the dorsal side. Style cylindrical, 0.5 mm. Stigma 4-cleft with lobes 0.2–0.4 mm long ..... **1. *T. dubium***
b Petal apex without a spur or with a spur up to 0.5 mm. Style absent to conical, always less than 0.5 mm. Stigma 4-lobed with lobes up to 0.2 mm long ..... 3.

3a Inflorescence (4.5–)7–10 cm. Petal apex with a spur 0.05–0.1 mm. Stem puberulent to glabrescent, never verrucose ..... **2. *T. bracteolatum***
b Inflorescence 2–4 cm. Petal apex slightly raised, but lacking a spur. Stem glabrous, verrucose . **3. *T. leucostaphylum***

4a Leaves palmate. Tendrils radially branched into 6–11 branches each ending with a swollen pad. Pedicels 3–6 mm. Flower buds 2–2.5 mm ..... **4. *T. obtectum***
b Leaves pedate. Tendrils simple or bifurcate without swollen pads at the endings. Pedicels less than 3 mm. Flower buds less than 2 mm long ..... 5.

5a Tendrils bifurcate. Leaves always 5-foliolate ..... 6.
b Tendrils unbranched. Leaves 3-, 5- or 7-foliolate ..... 7.

6a Robust climber. Inflorescence 5–13 cm. Style 0.75–1 mm. Petals farinose, apex thickened. Fruits turbinate ..... **5. *T. rumicispermum***
b Slender climber. Inflorescence 1–3 cm. Stigm sessile. Petals glabrous, apex with short point 0.05–0.1 mm long or a dorsal spur to 1 mm. Fruits globose ..... **6. *T. serrulatum***

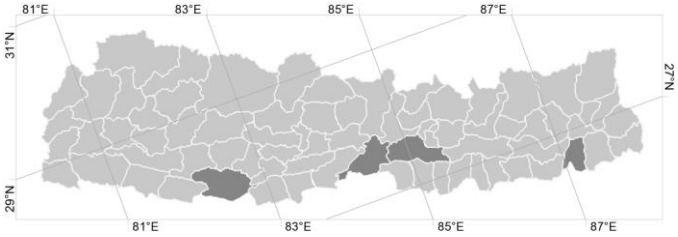
7a Inflorescence lax, 8–15 cm. Inflorescence peduncle 6–11 cm. Leaves 5- or 7-foliolate ..... **7. *T. alpinianum***
b Inflorescence dense, 2–4 cm. Inflorescence peduncle 0.5–4 cm. Leaves 3- or 5-foliolate ..... 8.

8a Petal apex with a 1 mm spur. Style cylindrical, 0.5 mm. Stigma 4-cleft with 0.2–0.4 mm lobes. Fruits 5–10 mm in diameter. Petiole without pulvinus ..... **1. *T. dubium***
b Petal apex slightly raised but lacking a spur. Style absent to conical, never exceeding 0.5 mm. Stigma 4-lobed with lobes up to 0.2 mm. Fruits 10–25 mm in diameter. Petiole with pulvinus ..... **3. *T. leucostaphylum***

1. *Tetrastigma dubium* (M.A.Lawson) Planch., Monogr. Phan. 5(2):437 (1887).
Vitis dubia M.A.Lawson Fl. Brit. India 1[3]:661 (1875).; *Vitis oxyphylla* Wall. ex Prain

Slender climber. Stem terete, sparsely verrucose, striate, glabrous. Tendrils simple, without a swollen pad at the tip, 7–9 cm. Leaves 3-foliolate or pedately 5-foliolate, petioles 3–8 cm × 1.5 mm, terminal petiolule 1.25–2 cm, lateral petiolules 1–1.5 cm, terminal leaflet elliptic to sub-ovate, 8–13 × 3–4 cm, base cuneate, lateral leaflets obliquely ovate, 4.5–13 × 2–4.5 cm, apex acuminate, margin distantly serrate, glabrous above and below. Inflorescence corymbose, compact, 2–4 cm, peduncle 0.5–2 cm, densely puberulent, pedicels 0.5–3 mm, densely puberulent. Calyx distinctly 4-lobed, margin entire, apex acute, each lobe 0.5–0.75 mm, acute, densely puberulent. Petals ovate to oblong, 1–1.75 × 0.75–1 mm, with apical dorsal spur 1 mm, densely puberulent. Filaments filiform, broadening at the base, 0.75 mm, anthers ellipsoid, 0.5 mm. Disc cupular 4-lobed, 0.5 mm wide, glabrous. Style cylindrical, 0.5 mm. Fruit globose, 5–10 mm in diameter, glabrous, smooth, base attenuate. Seeds 2–4, ellipsoid, 5–7 × 3–4 mm, adaxial raphe linear forming 2 deep grooves, abaxial side convex with an oblong chalazal knot and striate sides.

Distribution: E Himalaya, Tibetan Plateau, Assam-Burma and SE Asia.



Altitudinal range: 100–1800 m.

Ecology: Subtropical forests including *Shorea robusta* forest, often in riparian areas.

Flowering: March–May. **Fruiting:** April–November.

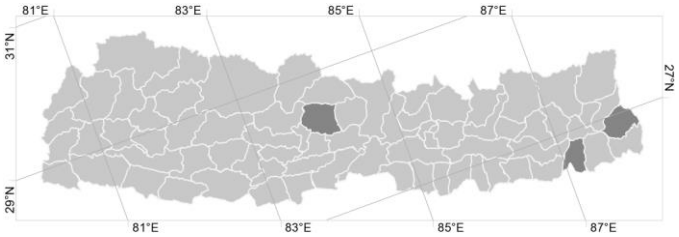
Tetrastigma dubium is close to *T. bracteolatum* but can be distinguished from it by its glabrous indumentum, more compact inflorescence, petal with a longer dorsal spur and

stigma with longer lobes. Although *Vitis oxyphylla* has previously been cited as a synonym of *Vitis bractolata* (*T. bracteolatum*), examination of type material confirms that it is conspecific with *T. dubium*.

2. *Tetrastigma bracteolatum* (Wall.) Planch., Monogr. Phan. 5(2):428 (1887).
Vitis bracteolata Wall. in Roxb., Fl. Ind. (Roxburgh) 2:483 (1824)..

Slender climber. Stem terete, smooth, young stems densely puberulent, mature stems glabrescent. Tendrils simple, robust, without a swollen pad at the tip, 7–15 cm. Leaves 3-foliolate, petiole 3–7 cm × 1–2 mm, terminal petiolule 0.3–1 cm, lateral petiolules 0.2–1 cm, terminal leaflet oval to elliptic, 5–14 × 2.5–7 cm, base cuneate to rounded, lateral leaflets obliquely ovate, 3.5–12 × 3–6 cm, apex acute to acuminate, margin distantly serrate, glabrous apart from scattered hairs on veins below. Inflorescence corymbose, (4.5–)7–10 cm, peduncle 2–5 cm, densely puberulent, pedicels 1–2 mm, densely puberulent. Calyx distinctly 4-lobed, margin entire, each lobe 0.2–0.3 mm, acute, densely puberulent. Petals ovate to oblong, 1 × 1 mm, with apical dorsal spur 0.05–0.1 mm, densely puberulent. Filaments filiform, broadening at the base, 0.5–0.75 mm, anthers ellipsoid, 0.25–0.5 mm. Disc membranous, 4-lobed, 0.5 mm wide, glabrous. Style inconspicuous. Fruit globose, 5–8 mm in diameter, glabrous, smooth, base attenuate. Seeds 1–2, obovoid, 5–6 × 5 mm, adaxial raphe grooved forming 2 striate sides, abaxial side convex with an oblong chalazal knot.

Distribution: E Himalaya, Assam-Burma and S Asia.



Altitudinal range: 250–1000 m.

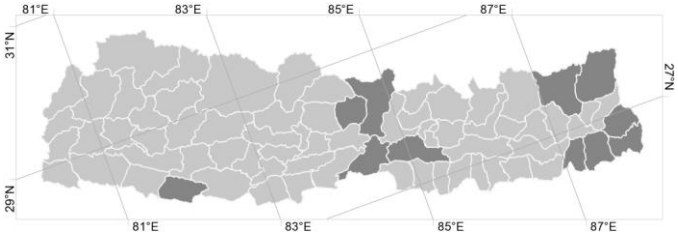
Ecology: Subtropical forests.

Flowering: August–October. **Fruiting:** October–March.

3. *Tetrastigma leucostaphylum* (Dennst.) Alston, Taxon 26:539 (1977).
Cissus leucostaphyla Dennst. Schlüssel Hortus Malab.:33 (1818).; ; *Vitis hookeri* M.A.Lawson

Robust climber. Stem terete, sparsely verrucose, striate, glabrous to glabrescent, mature stems compressed, flaky. Tendrils simple, without a swollen pad at the tip, 7–15 cm Leaves 3-foliolate to pedately 5-foliolate, slightly coriaceous, petioles 4–11 cm, with an enlarged pulvinus, terminal petiolule 2 cm, lateral petiolules 1.5 cm, terminal leaflet elliptic, oval to sub-ovate, 7–20 × 3.5–7 cm, base cuneate to attenuate; lateral leaflet obliquely elliptic to ovate, 5–18 × 2.5–6.5 cm, apex acuminate, margin distantly serrate, glabrous above and below. Inflorescence corymbose, compact, 2–4 cm, peduncle 1.5–4 cm, densely puberulent, pedicels 2–3 mm, densely puberulent. Calyx distinctly 4-lobed, margin entire, apex acute, each lobe 0.5 mm, acute, densely puberulent. Petals, ovate, 1.25–2 × 0.5 mm, dorsal apex slightly raised but with no spur, densely puberulent. Filaments filiform, 1–1.25 mm, anthers oblongoid, 0.5–0.75 mm. Disc 4-lobed, 1 mm wide, glabrous. Style conical to sessile, 0.25–0.5 mm. Fruit globose, 1–2.5 cm in diameter, glabrous, smooth, base attenuate. Seeds 2–4, oblongoid to obovoid, 7–10 × 5–7 mm, adaxial raphe linear with 2 striate sides, abaxial side with a linear to ovate chalazal knot.

Distribution: E Himalaya, Assam-Burma, S Asia and SE Asia.



Altitudinal range: 200–1600 m.

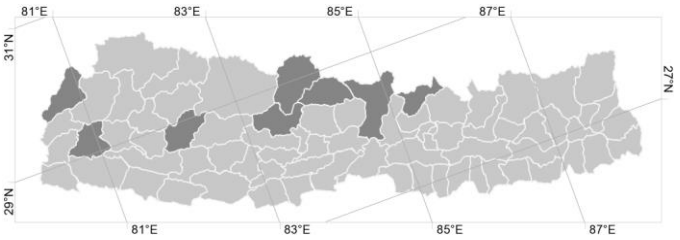
Ecology: Subtropical forests, often in riparian areas.

Flowering: March–April. **Fruiting:** March–September.

4. *Tetrastigma obtectum* (Wall. ex M.A.Lawson) Planch. ex Franch., Bull. Soc. Bot. France 33:458 (1886).
Vitis obtecta Wall. ex M.A.Lawson Fl. Brit. India 1[3]:657 (1875).; *Vitis burmanica* Collett & Hemsl.

Slender climber. Stem terete, verrucose, glabrescent to villous, with adventitious roots at nodes. Tendrils radiately branched with 6–11 branches, each ending in a swollen pad, peduncle 0.5–1 cm, wiry, coiling tightly. Leaves digitately 5-foliolate, petioles 2–10 cm, petiolules subsessile to 0.3–0.5 cm, leaflets oval to obovate, 2–10 × 1–4 cm, base attenuate, apex acute, margin serrate with cuspidate teeth, glabrous above and below with some hairs at the base of the veins, sometimes densely villous. Inflorescence umbellate, corymbose, 2–5 cm, peduncle united with leaf petiole, 0.5–3.5 cm, densely villous, pedicels 3–5 mm, sparsely villous. Calyx cupuliform, margin ciliate. Petals ovate to oblong, 2–2.5 × 1 mm, slightly hooded, glabrous. Filaments filiform, 2–2.5 mm, anthers orbicular, 0.5 mm. Disc conical, with 4 small lobes, 1 mm wide, glabrous. Style nearly absent, cylindrical. Fruit globose, 5–12 mm in diameter, glabrous, smooth, base attenuate. Seeds 1–2, obovoid, 5–7 × 5 mm, adaxial raphe linear, abaxial side rugose with an orbicular to oblong chalazal knot.
Fig. 2h-m

Distribution: W Himalaya, E Himalaya and E Asia.



Altitudinal range: 300–2000 m.

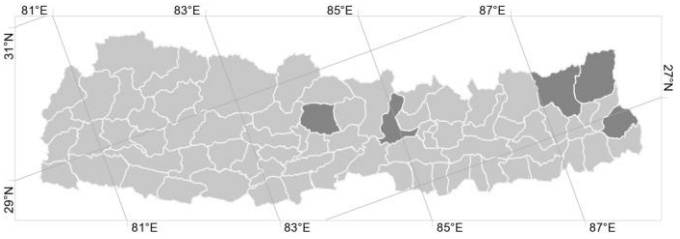
Ecology: Subtropical forests.

Flowering: April–May. **Fruiting:** May–October.

5. ***Tetrastigma rumicispermum*** (M.A.Lawson) Planch., Monogr. Phan. 5(2):429 (1887).
Vitis rumicisperma M.A.Lawson Fl. Brit. India 1[3]:661 (1875)..

Large climber. Stem terete, young stems densely verrucose, glabrous, mature stems verrucose. Tendrils bifurcate, without a swollen pad at the tip, to 20 cm. Leaves pedately 5-foliolate, petioles 2.5–10 cm, terminal petiolule 1–1.5 cm, lateral petiolules 0.2–1 cm, leaflets oval to obovate, 2.5–12 × 1–4.5 cm, base attenuate, oblique in lateral leaflets, apex acuminate, margin serrate with small pointed mucronate teeth, glabrous above and below. Inflorescence corymbose, 5–13 cm, peduncle 3–5 cm, puberulent or glabrescent, pedicels 1–1.5 mm, densely puberulent. Calyx cupuliform, margin undulate and ciliate, densely puberulent. Petals ovate, 1–1.5 × 1 mm, apex thickened, slightly hooded, farinose. Filaments filiform, 0.5–0.75 mm, anthers ellipsoid, 0.25–0.5 mm. Disc membranous, conical, 1–1.25 mm wide, glabrous. Style cylindrical, slender, 0.75–1 mm. Fruit turbinate, 7.5–10 × 5–7 mm, glabrous, smooth, base attenuate. Seeds 1–4, obcordate, 7–8 × 5 mm, adaxial raphe sharply ridged forming 2 flattened sides, abaxial side rugose and convex with an oblong chalazal knot.

Distribution: E Himalaya, Assam-Burma, S Asia and SE Asia.



Altitudinal range: 900–2100 m.

Ecology: Warm subtropical forests.

Flowering: April–June. **Fruiting:** July–November.

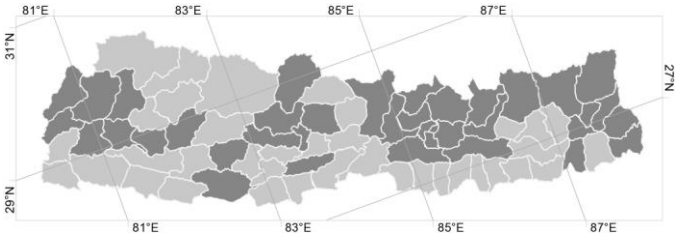
Tetrastigma corymbosum is similar to *T. rumicispermum*, but glabrous throughout. It occurs in Darjeeling, but has not yet been recorded from Nepal.

6. ***Tetrastigma serrulatum*** (Roxb.) Planch., Monogr. Phan. 5(2):432 (1887).
Cissus serrulata Roxb. Fl. Ind. (Roxburgh) 1:432 (1820).; *Cissus napaulensis* DC.; *Tetrastigma indicum* Maulik; *Vitis affinis* Gagnep. ex Osmaston; *V. capriolata* D.Don

panilahare

Slender climber Stem terete, slightly striate, glabrous. Tendrils bifurcate, wiry, without a swollen pad at the tip, to 12 cm. Leaves pedately 5-foliolate, petioles 1–5 cm, petiolules 0.2–0.7 cm, leaflets elliptic, lanceolate to obovate, 1.5–10 × 0.7–3 cm, base attenuate to rounded, oblique in lateral leaflet, apex acuminate to acute, margin distantly serrate sometimes with sharp teeth, glabrous above and below with minute hairs on the veins. Inflorescence umbellate, 1–3 cm, peduncle 2–4 cm, densely puberulent, pedicel 2 mm, densely puberulent. Calyx cupuliform, margin ciliate, minute. Petals ovate, 1–1.5 × 1 mm, dorsal side of apex with a short point 0.05–0.1 mm or spur to 1 mm, glabrous. Filaments filiform, 1 mm, anthers ellipsoid, 0.5 mm. Disc conical, 0.75–1 mm wide, glabrous. Style inconspicuous. Fruit globose, 5–8 mm in diameter, glabrous, smooth, base attenuate. Seeds 1–2, pyriform, plano-convex, 4–5 mm in diameter, adaxial raphe grooved, abaxial side convex with a spathulate chalazal knot.

Distribution: W Himalaya, E Himalaya, Tibetan Plateau, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 500–2900 m.

Ecology: Commonly found in temperate forests and occasionally in subtropical forests.

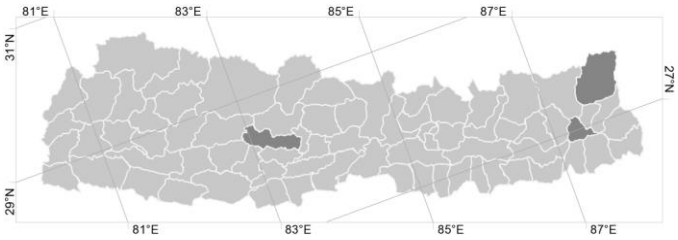
Flowering: March–June. **Fruiting:** July–October.

7. ***Tetrastigma alpinianum*** (Collett & Hemsl.) Momiy., Bull. Univ. Mus. Univ. Tokyo 2:79 (1971).
Vitis apliniana Collett & Hemsl. J. Linn. Soc., Bot. 28:35 (1890)..

Robust climber. Stem terete, verrucose, striate, glabrous. Tendrils unbranched, robust, without a swollen pad at the tip. Leaves 5–7-foliolate, petioles 4–11 cm, terminal petiolule 1–12 cm, lateral petiolules 0.3–1.5 cm; leaflets thickly coriaceous, oval to oblanceolate, 7–15 × 3–7 cm, base attenuate, lateral leaflets oblique, apex acuminate, margin coarsely and distantly serrate, glabrous above and below. Inflorescence lax, umbellate, 8–15 cm, peduncle 6–11 cm, densely puberulent, pedicels 1.5–4 mm, densely puberulent. Calyx cupuliform,

margin entire, minute, densely puberulent. Petals ovate, 1.5–2 × 0.75–1 mm, with small dorsal pointed tip, densely puberulent. Filaments filiform, broadening at the base, 1–1.5 mm, anthers orbicular, 0.5 mm. Disc 4-lobed, 1 mm wide, glabrous. Style thick. Fruit not seen.

Distribution: E Himalaya and Assam-Burma.



Altitudinal range: 600–1900 m.

Ecology: Subtropical forests.

Flowering: March–April. **Fruiting:** Unknown.

4. *Cayratia* Juss. nom cons., Dict. Sci. Nat., ed. 2 10:103 (1818).

Herbaceous climbers. Stem sparsely pubescent to glabrescent and glabrous, ridged. Tendrils generally branched, leaf-opposed, never associated with the inflorescence, without adhesive discs. Leaves 3-foliolate or pedately 5-foliolate, hairy to glabrous; leaflets petiolulate, terminal leaflet usually the largest. Inflorescence axillary, corymbose. Flowers bisexual, 4-merous. Calyx cupuliform, entire or rarely shallowly lobed. Petals 4, free, spreading at anthesis, cucullate. Stamens 4. Disc distinctly 4-lobed, adnate to the ovary. Style conspicuous, conical; stigma inconspicuous. Fruit 2–4-seeded, globose or subglobose. Seeds obovate or oblong, with adaxial side with 2 sides, angular, abaxial side convex with a linear chalazal knot.

About 60 species in tropical and subtropical Asia, Africa, Australia and the Pacific. Two species in Nepal.

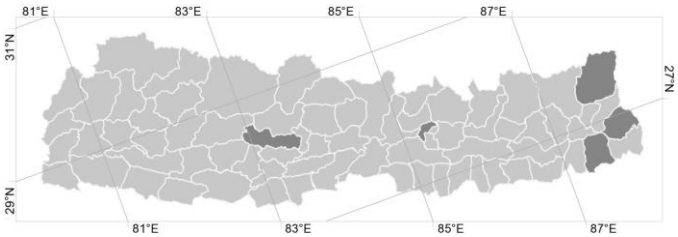
Key to Species

1a Leaves 5-foliolate. Tendrils mostly 2-furcate, sometimes 3-furcate. Leaf margins serrate ..... **1. *C. japonica***
b Leaves 3-foliolate. Tendrils 3-5-furcate. Leaf margins dentate to crenate ..... **2. *C. trifolia***

1. *Cayratia japonica* (Thunb.) Gagnep., Notul. Syst. [Paris] 1:349 (1911).
Vitis japonica Thunb. Fl. Jap.:104 (1784).; *Cissus japonica* (Thunb.) Willd.; *Vitis mollis* Wall. ex M.A.Lawson; *V. tenuifolia* Wight & Arn.

Slender herbaceous climber. Stem terete to sub-terete, branched, sparsely pubescent, sometimes appearing glabrescent, ridged. Tendrils 2(or 3)-furcate, peduncle 2–10 cm, then bifurcating and coiling, 1–5 cm, glabrous to pubescent. Leaves pedately 5–foliolate; petiole 1–9 cm, terminal petiolule 0.5–2.5 cm, lateral petiolules 2–15 mm long then bifurcating, subsessile to 2–5 mm; terminal leaflet ovate-lanceolate to elliptic, 2.5–11 × 1.5–5 cm, base cuneate to rounded; lateral leaflet blade ovate, elliptic to obovate, 1.5–7 × 1–3 cm, base slightly oblique; margin serrate, apex acute, acuminate to cuspidate; almost glabrous to completely hairy above, glabrous to densely villous below, venation pinnate, secondary veins 3–9 pairs. Inflorescence axillary, mostly dividing dichotomously, (2–)4–15 × (4–)6–22 cm, lax; peduncle 3–10 cm, glabrous or pubescent, upper axis densely puberulent, pedicel 0.75–2.5 mm, puberulent. Calyx cupuliform, entire to sub-lobed, margin sinuate, 0.5–1 mm across, puberulent. Petals ovate, 1.5–2 × 1–2 mm, papillose to puberulent. Filaments compressed, 1–1.25 mm, anthers elliptic, medifixed, 0.5–1 mm. Ovary 0.5–1 × 1–2 mm, glabrous. Style conical, 0.4–0.75 mm. Fruit sub-globose, 5–10 mm diameter, glabrous, smooth, base attenuate. Seeds obovoid, 3.5–8 × 2.5–5 mm, adaxial face with two sides, abaxial side convex with a linear chalazal knot.
Fig. 1k-m

Distribution: E Himalaya, Assam-Burma, S Asia, E Asia, SE Asia and Australasia.



Altitudinal range: 60–2000 m.

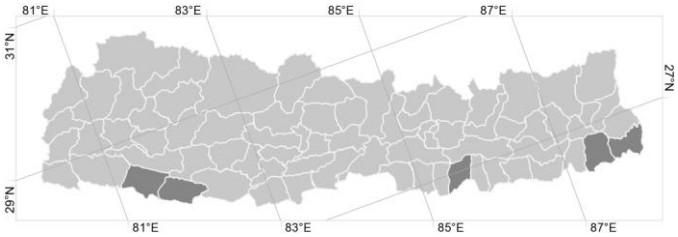
Ecology: Subtropical forests.

Flowering: March–July. **Fruiting:** August–November.

2. *Cayratia trifolia* (L.) Domin, Biblioth. Bot. 89:371 (1927).
Vitis trifolia L. Sp. Pl. 1:203 (1753).; *Cissus carnosa* Lam.

Herbaceous climber. Stem terete, branched, hairy to glabrous, slightly ridged. Tendrils 3–5-furcate, 2.5–13 cm, indumentum as on stem. Leaves 3-foliolate; petiole 1–6 cm, terminal petiolule 0.5–2.5 cm, lateral petiolules 2–8 mm; terminal leaflet elliptic to sub-ovate, 2–10 × 1–7 cm, base cuneate to rounded; lateral leaflets 2.5–7 × 2–6 cm, base oblique, apex acute, margin dentate to crenate; almost glabrous to densely hairy above, moderately to densely hairy below, venation pinnate, secondary veins 4–8 pairs. Inflorescence axillary, mostly dividing dichotomously, lax, 2–12 cm; peduncle 1.5–8 cm, indumentum as on stem, pedicel 1–4 mm, hairy. Calyx cupuliform, entire to sublobed, margin sinuate, indumenutm as in pedicel. Petals ovate, 2–2.25 × 1–1.5 mm, sparsely to densely puberulent. Filaments filiform, 0.75–1 mm,anthers orbicular to oblong, medifixed, 0.4–0.75 mm. Ovary 0.5–1.25 mm across, glabrous. Style conical, slender, 0.5–0.75 mm. Fruit subglobose, 5–10 mm diameter, glabrous, smooth, base attenuate. Seeds obovoid, 5–6 × 4.5–5 mm, adaxial face with two sides, angular, with a linear raphe, abaxial side convex with a linear to elliptic chalazal knot, side ribbed.

Distribution: W Himalaya, Assam-Burma, S Asia, E Asia, SE Asia and Australasia.



Altitudinal range: 200–1000 m.

Ecology: Subtropical forests including *Shorea robusta* forest.

Flowering: February–September. **Fruiting:** May–December.

5. *Cissus* L., Sp. Pl. 1:117 (1753).

Woody to herbaceous climbers. Stem hispid with ferruginous T-shaped hairs to puberulent or glabrous, cracked or striate. Tendrils simple or 2- to 3-furcate, leaf-opposed, never associated with the inflorescence, without adhesive discs. Leaves simple. Inflorescence leaf-opposed or rarely terminal, compound, generally umbellate corymbose. Flowers bisexual, 4-merous. Calyx cupuliform sometimes gibbous, entire or rarely shallowly 4-lobed. Petals 4, free, spreading at anthesis, cucullate. Stamens 4. Disc well developed, undulate or 4-lobed, adnate to the ovary. Style conspicuous, conical, stigma rarely conspicuous. Fruit 1-seeded, globose, obovoid, pyriform to ellipsoid. Seed pyriform, with an encircling raphe.

A pantropical genus of about 350 species, with a few temperate species. Five species native to Nepal and one introduced species.

Cissus quadrangularis is cultivated in Nepal, but is probably native to India, and has a long history of use for bone fractures in Ayurvedic medicine. It is a very distinctive species, with succulent pendulous photosynthetic stems which are constricted at the nodes and often leafless.

Key to Species

1a Stems succulent, pendulous, quadrangular and constricted at the nodes. Leaves deciduous..... ***C. quadrangularis***
b Stems not succulent, pendulous, quadrangular or constricted at the nodes. Leaves evergreen.....2.

2a Leaves glabrous above .....3.
b Leaves hairy above .....4.

3a Herbaceous climber. Upper side of the leaves with whitish blotches. Tendrils wiry. Stem not glaucous. Petals not contorted at the apex. Calyx gibbous ..... **1. *C. discolor***
b Woody climber. Upper side of the leaves evenly coloured. Tendrils robust. Stems glaucous. Petals contorted at the apex. Calyx not gibbous ..... **2. *C. repens***

4a Lower side of the leaves sparsely covered with hairs, denser on veins. Petals glabrous..... **3. *C. assamica***
b Lower side of the leaves uniformly hairy. Petals hairy.....5.

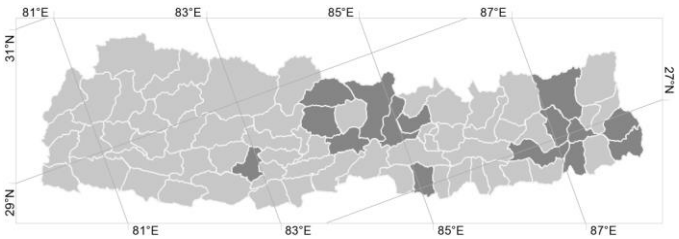
5a Lower side of the leaves with uniseriate multicellular pale hairs and some small unicellular T-shaped hairs. Petals puberulent. Stipules glabrous..... **4. *C. adnata***
b Lower side of the leaves with ferruginous T-shaped hairs with twisted arms. Petals with T-shaped hairs. Stipules hairy ..... **5. *C. repanda***

Vitaceae

1. *Cissus discolor* Blume, Bijdr. Fl. Ned. Ind. [4]:181 (1825).
Cissus javana DC.; *Vitis discolor* (Blume) Dalzell

Herbaceous climber. Stem terete to slightly 4-ridged, purplish, striate, glabrous to puberulent, denser at nodes. Tendrils bifurcate, slender and wiry, leaf-opposed, cylindrical, 7–18 cm, glabrous. Stipules 2, ovate, 3–4 × 2.5–4 mm, slightly hairy or glabrous, papyraceous. Petioles 0.5–4 cm. Leaves purple below and sometimes with white elongated blotches above, ovate to lanceolate, 7–18 × 3–8 cm, base cordate to sub-truncate, apex apiculate, margin serrulate with minute mucronate teeth, generally glabrous above and below, sometimes sparsely puberulent on venation. Inflorescence leaf-opposed, umbellate, to 4 cm, peduncle 0.25–1.5 cm, sparsely puberulent, pedicels 2–4 mm, glabrous. Calyx cupuliform, gibbous, entire, 0.8–1.5 mm across, glabrous. Petals ovate, 1.5–2 × 0.75–1 mm, glabrous. Filaments filiform, 0.6–0.75 mm, anthers ovoid, 0.4–0.6 mm. Ovary 0.8–1 mm across, glabrous. Disc with 4 very distinct rounded lobes. Style terete, broadening at the base, 0.4–0.8 mm, stigma slightly expanded but mostly inconspicuous. Fruit globose with a minute tip, 4–6 × 4–6 mm, glabrous, smooth, base attenuate. Seeds 4–5 × 3–4 mm, encircling raphe with ridges.

Distribution: E Himalaya, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 400–1600 m.

Ecology: Evergreen forests, disturbed secondary forests, generally in shady areas.

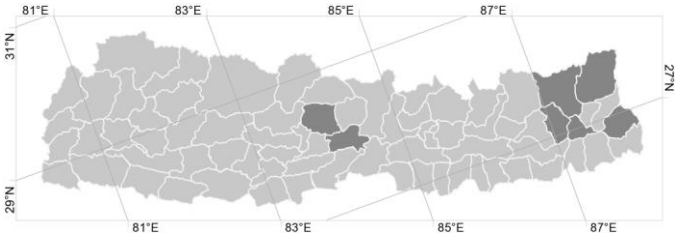
Flowering: July–September. **Fruiting:** August–November.

Cissus discolor is characterised by its obscurely 4-ridged, glabrescent stem, the minute, almost invisible papillae (0.05–0.1 mm) on the stem, wiry tendrils, white blotches on the lower surfaces of the leaves and its calyx which is gibbous on one side.

2. *Cissus repens* Lam., Encycl. 2(2):31 (1788).
Cissus cordata Roxb. *nom. superfl.*; *Vitis repens* (Lam.) Wight & Arn.

Robust, woody climber. Stem terete to slightly angular, generally glaucous, glabrous, striate. Tendrils bifurcate, robust, leaf-opposed, cylindrical, 10–20 cm, glabrous. Stipules 2, oblong, 3 × 4–5 mm, glabrous, scarious. Petioles 2–12 cm. Leaves ovate, 6–15 (–22) × 4–11 (–20) cm, base cordate, apex acute to acuminat, margin serrulate, glabrous above and below. Inflorescence leaf-opposed, umbellate, to 8 cm, elongate, peduncle to 5 cm, glabrous, pedicels 3–6 mm, hairy or glabrescent. Calyx cupuliform, entire, margin sinuate, 2–2.5 mm across, glabrous. Petals ovate, slightly contorted, 2–2.5 × 1–1.5 mm, glabrous. Filaments compressed, 0.75–1.5 mm, anthers orbicular, 0.4–0.75 mm. Ovary 1.5–2 mm across, glabrous. Disc with 4 very distinct rounded lobes. Style conical, 0.5–0.8 mm, stigma slightly conspicuous. Fruit ellipsoid-pyriform, 4–5 × 4–5 mm, glabrous, smooth, base attenuate. Seeds 5–6 × 3–4 mm, rather smooth, sparsely ribbed.

Distribution: E Himalaya, S Asia, E Asia, SE Asia and Australasia.



Altitudinal range: 200–1500 m.

Ecology: Subtropical forests.

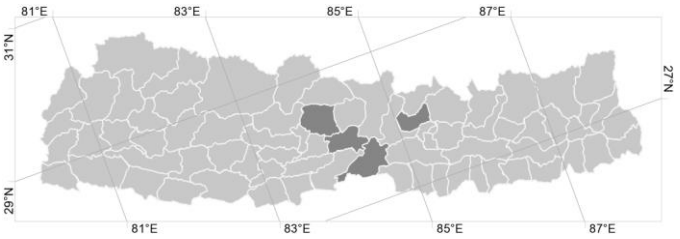
Flowering: July–October. **Fruiting:** August–December.

Cissus repens is close to *C. discolor,* but they can be distinguished because *C. discolor* has whitish blotches on the lower surface of the leaves, the calyx is gibbous on one side, the petals are not contorted at the tip and the stems are purplish; while *C. repens* has uniformly-coloured leaves, the calyx is not gibbous, the petals are contorted at the tip and the stems are glaucous.

3. *Cissus assamica* (M.A.Lawson) Craib, Kew Bull.:31 (1911).
Vitis assamica M.A.Lawson Fl. Brit. India 1[3]:648 (1875)..

Climber. Stem subangular, sometimes cracked and striate, sparsely hispid with ferruginous T-shaped hairs. Tendrils unbranched, 5–10 cm, sparsely hispid with indumenutm as on the stem. Stipules 2, oval, 2–3 × 2–2.5 mm, scarious, glabrous. Petioles 2–8 cm. Leaves suborbicular to subovate, 5–13 × 3–9 cm, base cordate, apex apiculate, margin serrulate with minute teeth, sparsely hispid above and below with T-shaped ferruginous hairs, denser on the veins below. Inflorescence leaf-opposed, umbellate, elongate, 3–6 cm; peduncle 2–3.5 cm, hairy with T- shaped ferruginous hairs, pedicels to 1–3 mm, glabrous. Calyx sublobate, 1.5–2 mm across, glabrous. Petals ovate, 1.5–2 × 0.5–1.25 mm, glabrous. Filaments compressed, 1–1.5 mm, anthers orbicular, 0.5 mm. Ovary 1–1.5 × 1–1.5 mm, glabrous. Disc with 4 very distinct rounded lobes. Style terete, to 1 mm. Fruit obovoid, 6–8 × 5–7 mm, glabrous, base attenuate. Seed 5–7 × 4–6 mm, smooth with adaxial side raphe protruding.
Fig. 2a-d

Distribution: E Himalaya, Tibetan Plateau, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 400–1200 m.

Ecology: Subtropical forests.

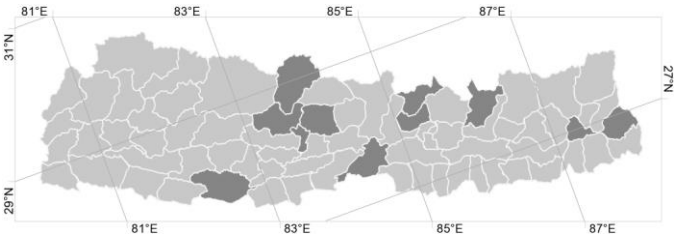
Flowering: June–September. **Fruiting:** August–November.

See *Cissus adnata* for the differences between it and *C. assamica*.

4. *Cissus adnata* Roxb., Fl. Ind. (Roxburgh) 1:423 (1820).
Vitis adnata (Roxb.) Wall. ex Wight & Arn.

Climber. Stem terete, striate, hairy. Tendrils bifurcate, 9–14 cm, hairy. Stipules 2, cordate to oval, 1.5–3 × 1.5–2.5 mm, gibbous at the centre, glabrous. Petioles to 2–5 cm. Leaves ovate, 5–12 × 5–10 cm, base cordate, apex acuminate to mucronate, margin serrulate with minute mucronate teeth, glabrous or hairy on the veins above, moderately to densely hairy below, including some small T-shaped hairs. Inflorescence leaf-opposed, umbellate, corymbose, 2–5 cm, peduncle 2–4 cm, densely hairy, pedicels 2–2.5 mm, densely puberulent. Calyx cupuliform, entire, sinuate, ca. 1.5 mm across, densely puberulent. Petals ovate, 1–1.5 × 0.75–1.25 mm, densely puberulent. Filaments filiform, 0.5–1 mm, anthers orbicular, 0.4–0.5 × 0.3–0.5 mm. Ovary 1–1.25 mm across, densely hairy around the base of the style. Disc with 4 very distinct rounded lobes. Style terete, broadening at the base, 0.4–0.5 mm. Fruit globose with a minute tip, 6–7 × 5–6 mm, glabrous, smooth, base attenuate. Seed flattened at the sides, 6–7 × 5 mm, rather smooth with a groove along the perimeter.

Distribution: E Himalaya, Assam-Burma, S Asia, E Asia, SE Asia and Australasia.



Altitudinal range: 200–1600 m.

Ecology: Subtropical to warm temperate forests in both shady and open locations.

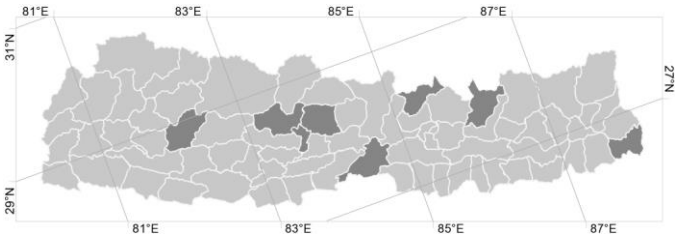
Flowering: April–July. **Fruiting:** August–October.

There has been much confusion about the species limits of *Cissus adnata* and several related taxa. Out of these species, only *C. adnata* and *C. assamica* occur in Nepal, and they can be distinguished by their trichomes. On the lower surface of *C. adnata* leaves there are two types of trichomes, multicellular, uniseriate, unbranched trichomes predominantly associated with the veins and short unicellular, 2-armed (or T-shaped) trichomes and the apex of the ovary is pubescent. In *C. assamica* leaves the trichomes are unicellular, 2-armed and associated with the main veins, and the apex of the ovary is glabrous.

5. *Cissus repanda* Vahl, Symb. Bot. 3:18 (1794).
Vitis repanda (Vahl) Wight & Arn.; *V. rosea* Royle

Robust, woody climber. Stem terete, hairy with T-shaped ferruginous hairs, older stems sometimes cracking, greyish, glabrous. Tendrils racemosely 2- or 3-furcate, robust, leaf-opposed, cylindrical, to 12 cm, glabrous to hairy as in young stem. Stipules 2, ovoid, 2.5–4 × 1.5–3.5 mm, densely hairy. Petioles 2–5 cm. Leaves ovate to suborbicular, 5–14 × 5–12 cm, base deeply cordate, apex acute to acuminate, margin serrulate, hairy above and below, particularly on veins and margin. Inflorescence leaf-opposed or terminal, umbellate, to 5–12 cm, elongate, peduncle to 6 cm and pedicels 2–5 mm, densely hairy with ferruginous hairs. Calyx cupuliform, entire, 1.5–2 mm across, densely hairy with T-shaped hairs. Petals ovate, 1.5–2 × 1–1.25 mm, densely hairy with T-shaped hairs to 1.5 mm. Filaments filiform, 0.75–1.25 mm, anthers orbicular, 0.4–0.6 mm. Ovary 1.25–1.75 mm across, glabrous to ferruginously hairy at the base of the style. Disc with 4 very distinct rounded lobes. Style conical, 0.5–0.75 mm. Fruit ellipsoid-pyriform, 8–10 × 4–6 mm, glabrous, smooth, base attenuate. Seeds 7–8 × 4–5 mm, rather smooth except for the encircling raphe.
Fig. 2e

Distribution: E Himalaya, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 600–2000 m.

Ecology: Subtropical forests, often in forest margins and scrub.

Flowering: February–June. **Fruiting:** May–August.

6. *Ampelopsis* Michx., Fl. Bor.-Amer. 1:159 (1803).

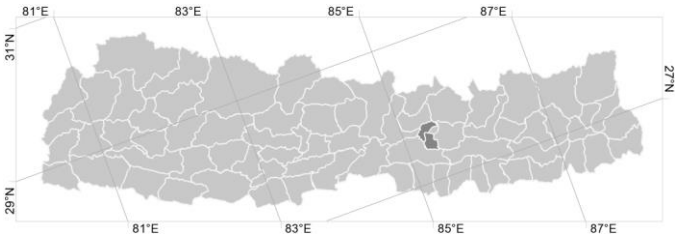
Woody climbers. Stem densely puberulent to glabrescent. Tendrils simple or branched, leaf-opposed, never associated with the inflorescence, without adhesive discs. Leaves simple. Inflorescence leaf-opposed, corymbose. Flowers bisexual, 5-merous. Calyx cupuliform, sinuate to entire. Petals 5, free, spreading at anthesis, cucullate. Stamens 5, within the cucullate petal, inserted at the base of the disc. Disc cupular, fused to the ovary, forming a disc at the base of the fruit. Style slender, stigma inconspicuous, subcapitate. Fruit 2–4 seeded, obovoid. Seeds obovoid, adaxial side angular with a linear raphe, abaxial side convex with spathulate chalazal knot.

About 25 species in temperate and subtropical Asia and N and C America. One species in Nepal.

1. *Ampelopsis glandulosa* (Wall. ex Roxb.) Momiy., Bull. Univ. Mus. Univ. Tokyo 2:78 (1971).
Vitis glandulosa Wall. ex Roxb. in Roxb., Fl. Ind. (Roxburgh) 2:479 (1824).; *Ampelopsis heterophylla* Siebold & Zucc. *later homonym*; *A. heterophylla* var. *hancei* subvar. *wallichii* Planch.

Climber. Stem terete, slender, densely puberulent to glabrescent. Tendrils 2- or 3-furcate. Petiole 1–6 cm. Leaf blade ovate to 3-lobed, 3–15 × 2–15 cm, base cordate, apex acuminate, margin crenate to serrate; sparsely puberulent above, pubescent below, especially on veins. Inflorescence 2.5–7 cm, peduncle 2–5 cm, densely puberulent, pedicels 0.5–3 mm, densely puberulent. Calyx cupuliform, entire to sub-lobed, sinuate, glabrous. Petals ovate, 1–1.5 × 0.5 mm, apex cucullate, glabrous. Filaments filiform, 0.75–1 mm; anthers ellipsoid. Ovary adnate to the cupular disc, 1–1.5 mm wide, glabrous. Style conical, 0.5–1 mm. Fruit globose, to 7 mm in diameter, glabrous, smooth, base attenuate, with 2 rings at the base, one the persistent calyx and the other the disc. Seeds obovoid, 5–6 × 4–5 mm, adaxial side angular with 2 pits at either side of the raphe, abaxial side convex with a spathulate chalazal knot.
Fig. 2n

Distribution: E Himalaya, Assam-Burma, E Asia and SE Asia.



Altitudinal range: 600–1700 m.

Ecology: Subtropical forests.

Flowering: May–June. **Fruiting:** June–July.

7. *Parthenocissus* Planch. nom cons., in A.DC., Monogr. Phan. 5(2):447 (1887).

Woody climbers, deciduous. Young stems villous to glabrous, old stems rough and furrowed, lenticellate. Tendrils 3–14-divided, leaf-opposed, never associated with the inflorescence, each branch ending with an adhesive disc. Leaves 3-foliolate. Inflorescence leaf-opposed or terminal, corymbose. Flowers bisexual, 5-merous. Calyx cupuliform, generally entire. Petals 5, free, spreading at anthesis, cucullate with bifid appendage. Stamens 5. Disc inconspicuous, fused to the ovary. Style short, stigma subcapitate to inconspicuous. Fruit 1–4-seeded, globose. Seeds with raised adaxial raphe, abaxial side convex with a rounded chalazal knot.

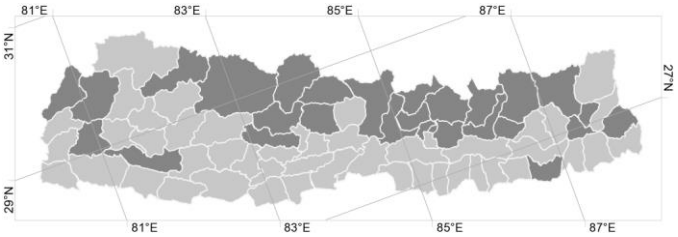
About 15 species in E Asia and N America. One species in Nepal.

1. *Parthenocissus semicordata* (Wall.) Planch., Monogr. Phan. 5(2):451 (1887).
Vitis semicordata Wall. in Roxb., Fl. Ind. (Roxburgh) 2:481 (1824).; *Ampelopsis himalayana* Royle; *Vitis himalayana* var. *semicordata* (Wall.) M.A.Lawson

Darme lahara

Robust climber. Stem terete, young stems villous to glabrous, old stems rough and furrowed, lenticellate. Tendrils 3–14-branched, wiry, glabrous. Leaves 3-foliolate; petiole 3.5–15 cm, petiolules subsessile to 1 cm, terminal leaflet obovate, ovate to oval, 5–17 × 2.5–12 cm, base attenuate to oblique, apex acuminate to apiculate; lateral leaflets oblique (inner side obovate, outer side cordate-ovate), 5–16 × 2.5–9 cm, margin serrate with minute mucronate teeth, glabrous above, villous below, especially on veins, secondary veins 5–10 pairs. Inflorescence a corymb, dividing dichotomously, peduncle 2–5 cm, generally glabrous, pedicels 1–3 mm, glabrous. Calyx cupuliform, entire, margin sinuate, glabrous. Petals ovate, 2–3 × 0.75–1.5 mm, apex cucullate with a bifid membranous appendage at the tip covering the anther and almost half the length of the petal, glabrous. Filaments compressed, broadening at the base, 1–3 mm, anthers ovate, 0.75–1 mm. Ovary spherical, with 5 rounded lobes, 0.75–1.5 mm across, glabrous. Style conical, 0.5–0.75 mm. Fruit globose, 4–7 mm diameter, glabrous, smooth, base attenuate. Seeds obcordate, 4–6 × 3.5–5 mm, abaxial side convex with a circular chalazal knot.
Fig. 1e

Distribution: W Himalaya, E Himalaya, Tibetan Plateau, Assam-Burma, S Asia, E Asia and SE Asia.



Altitudinal range: 600–3600 m.

Ecology: Subtropical and temperate forests.

Flowering: May–July. **Fruiting:** July–October.

8. *Yua* C.L.Li, Acta Bot. Yunnan. 12(1):2 (1990).

Deciduous, woody climbers. Stem with conspicuous lenticels. Tendrils usually 2-furcate, leaf-opposed, never associated with the inflorescence, without adhesive discs. Leaves digitately 5-foliolate. Inflorescence leaf-opposed, corymbose. Flowers bisexual, 5-merous. Calyx cupuliform, entire or sinuate. Petals 5, free, spreading at anthesis, cucullate. Stamens 5. Disc inconspicuous, fused to the ovary. Style conspicuous; stigma inconspicuous. Fruit 1–4-seeded, globose. Seeds obovoid to pyriform, adaxial side with a central groove, abaxial side convex with an elliptic chalazal knot.

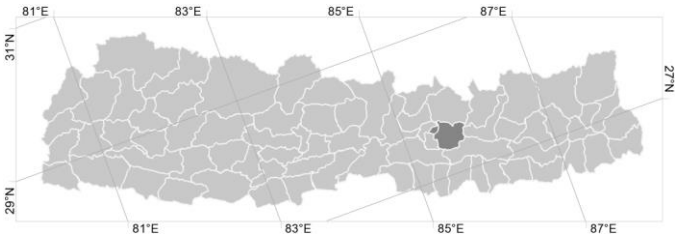
Two species in China. One species in Nepal and India.

Although the species now placed in *Yua* were originally described in both *Cayratia* and *Parthenocissus* they are more closely related to the latter. *Yua* is distinguished on the basis of significant differences in tendril and inflorescence morphology and its distinctiveness is confirmed by molecular studies.

1. *Yua thomsonii* (M.A.Lawson) C.L.Li, Acta Bot. Yunnan. 12(1):5 (1990).
Vitis thomsonii M.A.Lawson Fl. Brit. India 1[3]:657 (1875).; *Cayratia thomsonii* (M.A.Lawson) Suess.; *C. thomsonii* (M.A.Lawson) Suess.; *Parthenocissus thomsonii* (M.A.Lawson) Planch.; *Psedera thomsonii* (M.A.Lawson) D.E.Stuntz

Climber. Stem terete, striate, glabrous. Tendrils 2–furcate, slender. Petioles 1.5–9 cm, petiolules 0.2–1.5 mm. Leaflets obovate to lanceolate, 2–10 × 1–5 cm, base cuneate, apex acute to acuminate, margin serrulate with minute mucronate teeth, glabrous above and below with scattered hooked hairs on the primary veins. Inflorescence 2–5 cm, peduncle 1–2.5 cm, glabrous, pedicel 1–4 mm. Calyx cupuliform, entire, glabrous. Petals oblong, 2–3 mm, glabrous Filaments to 2.5 mm; anthers elliptic, to 1.5 mm. Ovary adnate to the disc; disc inconspicuous, to 1 mm across, glabrous Style conical, slender, 0.5–0.6 mm. Fruit .globose to obovoid, 5–7 mm in diameter, glabrous, smooth, base attenuate. Seeds 2–4, obovoid, 4–6 × 3–4 mm, adaxial side with a central groove, abaxial side convex with an elliptic chalazal knot.
Fig. 1f-j

Distribution: E Himalaya, Assam-Burma and E Asia.



Altitudinal range: 200–2500 m.

Ecology: Mostly in montane forests.

Flowering: April–July. **Fruiting:** July–October.

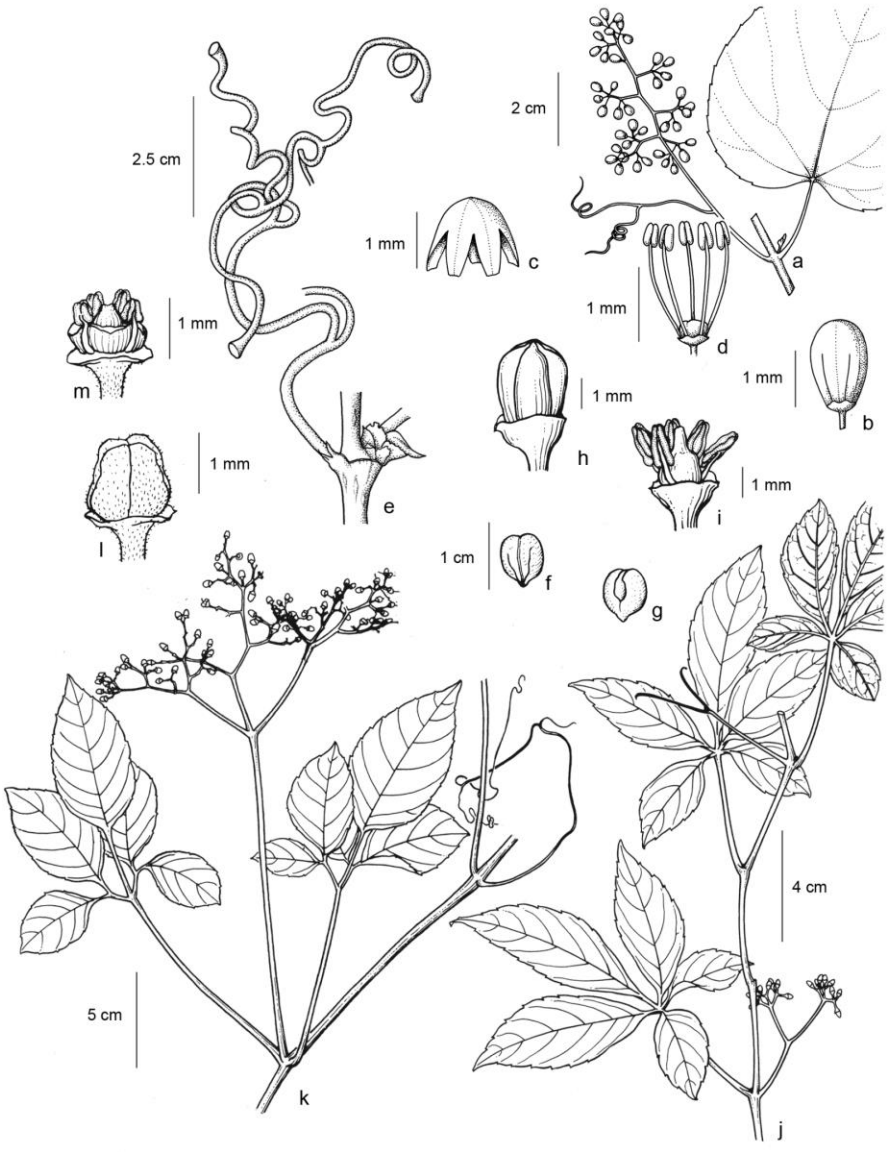


Fig. 1.
VITACEAE. **Vitis heyneana**: a, flowering branch; b, flower bud; c, petals; d, male flower after anthesis. **Parthenocissus semicordata**: e, tendril. **Yua thomsonii**: f. adaxial view of seed; g, abaxial view of seed; h, flower bud; i, flower with petals removed; j, flowering branch. **Cayratia japonica**: k, flowering branch; l, flower bud; m, flower with petals removed.

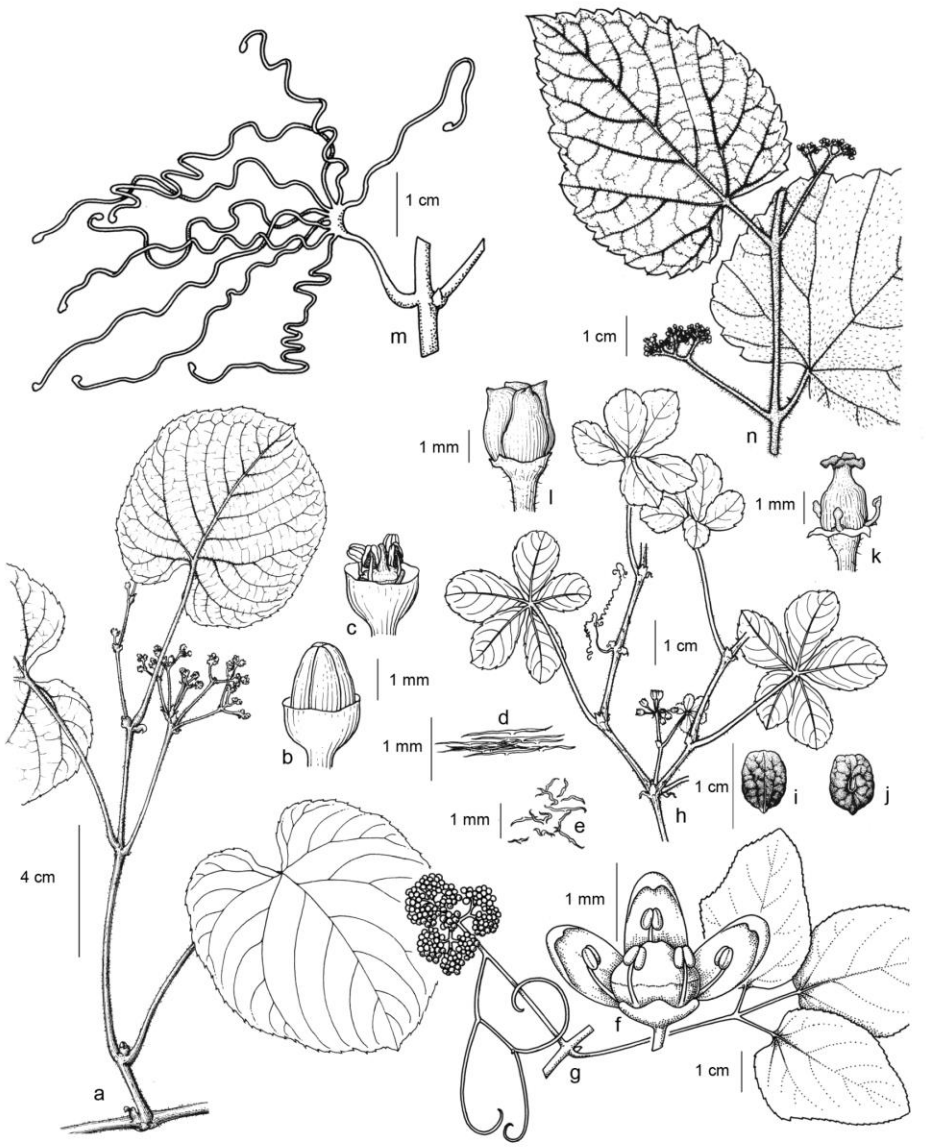


Fig. 2.
VITACEAE. **Cissus assamica:** a, flowering branch; b, flower bud; c, flower bud with petals removed; d, hairs from lower surface of leaf. **Cissus repanda**: e, hairs from abaxial surface of leaf. **Ampelocissus divaricata**: f, flower bud with two petals removed; g, flowering branch. **Tetrastigma obtectum**: h, flowering branch; I, adaxial view of the seed; j, abaxial view of the seed; k, male flower with petals removed; l, flower bud; m, tendril. **Ampelopsis glandulosa**: n, flowering branch.

Illustration Accreditation

The editors are pleased to credit the artwork from the following artists and sources used by Bhaskar Adhikari when composing the illustrations used in this volume. ‘FOB’ refers to *Flora of Bhutan* (Grierson, Long & Noltie, 1983–2002. Royal Botanic Garden Edinburgh); ‘FOCI’ refers to *Flora of China Illustrations* (Wu, Raven & Hong, 1998–ongoing. Science Press (Beijing) & Missouri Botanical Garden Press); and ‘FRPS’ refers to *Flora Reipublicae Popularis Sinicae* (1959–2004. Science Press (Beijing)). The copyright holders of these three publications, Science Press (Beijing), Missouri Botanical Garden Press, and Royal Botanic Garden Edinburgh, are thanked for permission to reproduce these illustrations, and for their generosity in making the images available in digital format

Fig. 1

	FOCI 9: 140. FRPS 37: 386, pl. 59. 1985.-Zhang Taili
a-d	FOB 2(1): 149. Mary Bates
e	Claire Banks
f-j	FOC 12: 167. FRPS 48(2): pl. 5. 1998.-Gu Jian
k-m	FOC 12: 174. FRPS 48(2): pl. 12. 1998.-Gu Jian

Fig. 2

a-e	FOC 12: 172. FRPS 48(2): pl. 10. 1998.-Gu Jian
f-g	FOB 2(1): 149. Mary Bates
h-m	FOC 12: 182. FRPS 48(2): pl. 20. 1998.-Gu Jian
n	FOC 12: 168. FRPS 48(2): pl. 6. 1998.-Gu Jian

How to use this pdf web edition

This Web-edition pdf document forms part of a set of Flora accounts for families and genera that have been finalized, including those in volumes yet to be printed. These pdf documents are made accessible via the *Flora of Nepal* website (www.floraofnepal.org) and will be periodically updated in numbered versions, permanently available and citable.

Flora of Nepal takes an innovative approach to Flora writing, with an underlying data base system managing the *Flora of Nepal Knowledge Base* from which the printed volumes and the 'online Flora' (www.floraofnepal.org) are generated. The Internet-accessible dataset augments the printed Flora by presenting all herbarium specimen data, detailed taxonomic information (such as full nomenclatural references and typification), distribution maps with point occurrences and images used when preparing the Flora. Much of this information is accumulated as a normal part of taxonomic working practices when undertaking a floristic revision, but it is usually lost to a wider audience as it is rarely included in the traditional printed Flora.

Flora of Nepal includes all native and fully naturalized vascular plants recorded within the political borders of Nepal, including brief references to agricultural and horticultural plants as appropriate. For pragmatic reasons the arrangement of families in the printed *Flora of Nepal* follows a modified Englerian sequence, closely following that of the *Flora of China* and, to a lesser extent, the *Flora of Bhutan*.[1, 2] In recent years the world view on the arrangement of families has radically changed following overwhelming phylogenetic evidence. The emergent family-level classification, now in its third iteration as APG III, is reasonably stable and widely accepted.[3] It has not been possible to alter the family sequence in *Flora of Nepal* printed volumes midway through the project, but as the data are stored separately in a database, the families can be reorganized electronically at a later date to reflect alternative classifications. Circumscription of families and genera, however, generally does follow a contemporary understanding of their relationships, except where group experts advise otherwise. Genera and species are treated in taxonomic order, or if there is disagreement then morphologically similar species are usually grouped together or occasionally listed alphabetically. Infraspecific taxa are always presented in alphabetical order. Intermediate ranks, such as subfamily, tribe, subgenus, section and series, are only used when they are useful in the treatment of large families or genera.

Information on nomenclature and classification is given for all accepted scientific names and synonyms pertaining to Nepal and nearby regions. Emphasis is given to those names listed in the primary checklists for Nepal: *Enumeration of the Flowering Plants of* Nepal,[4] *Annotated Checklist of the Flowering Plants of* Nepal,[5] and *Flowering Plants of Nepal (Phanerogams)*.[6] At the generic level, synonyms widely used in the Asian literature are included. Full bibliographic citation with authorship is given for all accepted names and their basionyms at the rank of genus and below. As far as possible, the bibliographic citations of all accepted names and their basionyms have been verified with the original literature. The basionym precedes all other synonyms, which are listed alphabetically. Misapplied names (misidentifications encountered in the literature) are not included in synonymy, but are discussed in the supporting information at the end of a taxon. Authors of plant names follow the standard forms given in *Authors of Plant Names* and its continuously updated online supplement (www.ipni.org).[7] Bibliographic references are given using the standard abbreviations in BPH-2 for serial publications (journals and periodicals) and in TL-2 (and its supplements) for books.[8, 9] In some cases books were published in several fascicles on different dates, sometimes over different years, but not indicated as such in the printed work. Date of publication is critical for establishing nomenclatural priority, and so it is important to be precise when citing names published in such works. The fascicle composition and publication dates of these often complex cases are clearly explained in TL-2, but the standard abbreviation does not differentiate between them. In these instances the TL-2 abbreviation has been amended with brackets to clearly indicate which fascicle is being referred to, for example Wallich, N., Pl. As. Rar. 2[8]. 1831. Books and periodicals not included in these two standard references have been abbreviated according to the recommendation in Appendix A of BPH-2.

Where a taxon has a widely recognized local name this is given in Devanagri script, followed by its transliteration into the Latin alphabet and the language of the vernacular name in parentheses ‘( )’. One local name is given in the printed Flora, whereas multiple alternative vernacular names in different languages may be included in the *Flora of Nepal Knowledge Base* and made available

online. Separate indexes to vernacular names in Devanagri, their Latin transliterations and scientific names are included at the end of each volume.

Descriptions are given for all taxa (family, genus, species, infraspecies and occasionally intermediate ranks) and wherever possible are based on primary observations and measurements made on specimens from Nepal. If no such material was available to authors, descriptions are taken from specimens from adjacent countries or secondary sources, and annotated as such. Most descriptions are about 150 words long, but exceptionally they are shorter or longer depending on the complexity of the taxon being described. For species with more than one infraspecific taxon, a full description is given for the species and short diagnoses for the lower taxa. Descriptions aim to be consistent and parallel between taxa of the same rank within a higher taxon. Authors were asked to standardize descriptive terms using the definitions given in *Plant Identification Terminology*.[10] If a single measurement is given it refers to length, and if width is also given it is in the format length × width. Ranges are separated by an en-dash (–) and discontinuous states by the word 'or'. Exceptional measurements are given in parentheses '( )'. Taxon statistics and short statements on worldwide distribution are provided for families and genera, with summary statistics of lower taxa represented in Nepal.

Identification keys are dichotomous and presented in a bracketed format, with all elements strictly parallel between the two leads of each couplet. Keys are artificial and not intended to reflect any taxonomic classification. There is usually a single key to genera within a family, combining flowering, fruiting and vegetative characters, but where this is unwieldy separate keys are given for flowering and fruiting material (e.g. Cruciferae, Rosaceae). Keys are also given for species within a genus and taxa within a species. Figures are provided to aid identification by illustrating the diagnostic characters of each family and genus, and for large genera variation in major morphological features is represented.

The geographic distribution within Nepal is indicated for each species and infraspecific taxon at the political district level by a shaded distribution map. The distribution maps are evidence-based, produced from the *Flora of Nepal Knowledge Base* using locality information taken from authenticated herbarium specimens and records of plants *in situ* made by credible observers. Ideally all specimens identified by authors should be geo-referenced and databased when they are preparing *Flora of Nepal* accounts, but where this is not possible a minimum of one specimen per district is required. Sometimes the distribution of a species is greater than the sum of the distribution maps of its infraspecific taxa. This is a result of some herbarium specimens only being identifiable to species level. Occasionally species are known only from poorly localised collections, especially those from the early 19th century. For example, Wallich often only gave 'Napalia' as the locality for many of his 1820–1821 collections. These specimens are most likely to have come from the Kathmandu Valley, known as the 'Nepal Valley' or just 'Nepal' at that time, but they might also have been collected during his inward and outward journeys from India via Hetauda, or by pilgrims going north to 'Gossainthan' (Gossainkund). It is therefore impossible to be sure of the correct district and in such cases this is noted in the supporting information and the map omitted. The *Flora of Nepal* website gives access to the underlying distribution and specimen information through an interactive dot map plotting all geo-referenced occurrence records and a listing of all material recorded.

Distribution for species and infraspecific taxa occurring outside Nepal is indicated by a list of geographical regions, with the resolution becoming coarser with increasing distance from Nepal. In order to utilise information contained within other published Floras these areas are defined according to political borders, with countries or provinces grouped to form regions that have some underlying biogeographic basis. For example, although the Tibetan Plateau extends into parts of Sichuan and Yunnan, we limit it to Xizang and Qinghai. *Flora of Nepal* takes no stance on any politically disputed border areas and is following the current international mapping convention of using the 'lines of control' to delineate its regions. The names used for the regions are intended to be descriptive and non-political. The regions are:

W Himalaya	India (Jammu & Kashmir, Himachal Pradesh, Uttarakhand), northern Pakistan (Khyber Pakhtunkhwa, previously known as North West Frontier Province).
E Himalaya	Sikkim, Darjeeling, Bhutan, NE India (Arunachal Pradesh).
Tibetan Plateau	China (Xizang, Qinghai).
Assam-Burma	Assam, Nagaland, Manipur, Myanmar.

S Asia	Eastern Pakistan (Punjab, Sind, Islamabad), Peninsular India, Sri Lanka, Bangladesh, Maldives.
E Asia	China (excluding Xizang, Xinjiang, Qinghai), Korea, Japan, Taiwan.
SE Asia	Thailand, Laos, Cambodia, Vietnam, Malaysia, Indonesia, Philippines, New Guinea.
N Asia	China (Xinjiang), Russia, Mongolia.
C Asia	Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, Kyrgyzstan.
SW Asia	Afghanistan, western Pakistan (Baluchistan, Federally Administered Tribal Areas), Iran, Middle East, Arabian Peninsula, Turkey, Azerbaijan, Armenia, Georgia.
Asia	collective term for all above areas of Asia.
Europe	includes Ukraine, Belarus, Baltic republics.
Africa	includes Madagascar.
N America	includes C America south to Panama.
S America	south of Panama.
Australasia	Australia, New Zealand, Pacific Islands.
Cosmopolitan	collective term for a generally worldwide distribution.

Altitudes (elevation above sea level) are based on herbarium specimen data or records from credible observers. They are given to the nearest 100 m rounded up or down, with exceptional altitudes given in parentheses '( )'. Likewise, flowering and fruiting times are based on specimens collected from Nepal, or on material from adjacent regions if these data are lacking and a note is provided to explain this. The short statement on the ecological preference of each species and infraspecific taxon is mostly taken from herbarium specimen data. Currently these often lack detail, a reflection of the shortcomings of poor-quality data recorded by the past collectors of herbarium material, but these will improve with more field studies.

Supplementary information is given at the end of a taxon account discussing taxonomic issues, highlighting spot characters useful for identification, noting similar species that could cause confusion, and detailing the misapplication of names. Summary information is provided for ethnobotanical and other uses, but this is not intended to be exhaustive and is derived from secondary sources, such as *Plants and People of Nepal* and *A Compendium of Medicinal Plants of* Nepal.[11, 12]

Abbreviations

Standard abbreviations for the International System of Units (SI) are used for measurements. Herbaria are cited using the standard abbreviation in *Index Herbariorum*.[13] Other abbreviations used in the text include:

C	central.
ca.	*circa* – about, approximately.
comb. nov.	*combinatio nova* – new combination of name and epithet.
dbh	diameter at breast height – measured on tree trunks at 1.3 m above the ground.
E	east, eastern.
et al.	*et alia* – and others.
fig.	figure.
N	north, northern.
nom. cons.	*nomen conservandum* – name officially conserved in ICBN.[14]
nom. illegit.	*nomen illegitimum* – illegitimate name, according to ICBN.[14]
nom. inval.	*nomen invalidum* – invalid name, according to ICBN.[14]
nom. nud.	*nomen nudum* – name lacking a description, or reference to an effectively published description, and so invalid according to ICBN.[14]
nom. rej.	*nomen rejiciendum* – name officially rejected in ICBN.[14]
nom. superfl.	*nomen superfluum* – name superfluous when published, and so illegitimate according to ICBN.[14]
pl.	plate.
q.v.	*quod vide* – which see.
S	south, southern.
s.l.	*sensu lato* – for a taxon treated in a broad sense.
s.s.	*sensu stricto* – for a taxon treated in a narrow sense.

sect.	section.
subfam.	subfamily.
subgen.	subgenus.
subsp.	subspecies.
subvar.	subvariety.
syn.	synonym
var.	variety.
W	west, western.
>	greater than
<	less than

References

1 Wu, Z.Y., Raven, P.H. & Hong, D.Y. (1994–ongoing). *Flora of China*, Science Press (Beijing) & Missouri Botanical Garden Press, St Louis [available online at flora.huh.harvard.edu/china].

2 Grierson, A.J.C., Long, D.G. & Noltie, H.J. (1983–2002). *Flora of Bhutan*, Royal Botanic Garden Edinburgh, Edinburgh.

3 Angiosperm Phylogeny Group III (2009). 'An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants': APG III. Bot. J. Linn. Soc. 161: 105–21.

4 Hara, H., Stearn, W.T., Williams, W.T. & Chater, A.O. (1978, 1979, 1982). *An Enumeration of the Flowering Plants of Nepal*, 3 volumes, Trustees of the British Museum (Natural History), London.

5 Press, R., Shrestha, K.K. & Sutton, D.A. (2000). *Annotated Checklist of Flowering Plants of Nepal*, Natural History Museum: London & Tribhuvan University, Kathmandu [updated version available online at efloras.org].

6 Singh, A.P., Bista, M.S., Adhikari, M.K. & Rajbhandari, K.R. (2001). *Flowering Plants of Nepal (Phanergams)*, HM Government of Nepal, Ministry of Forests, Department of Medicinal Plants, Kathmandu.

7 Brummit, R.K. & Powell, C.E. (1992). *Authors of Plant Names*, Royal Botanic Gardens, Kew, London [available online with revisions at www.ipni.org].

8 Bridson, G.D.R. & Smith, E.R. (1991). *Botanico-Periodicum-Huntianum*, ed. 2, Hunt Institute for Botanical Documentation, Pittsburgh.

9 Stafleu, F.A., Cowan, R.S. & Mennega, E. (1973–1988). *Taxonomic Literature*, ed. 2 (TL-2), Bonn, Scheltma & Holkema, Utrecht/Antwerpen; dr. W. Junk b.v., The Hague/Boston [available online at tl2.idcpublishers.info].

10 Harris, J.G. & Harris, M.W. (2001). *Plant Identification Terminology*, ed. 2, Spring Lake Publishing, Utah.

11 Manandhar, N.P. (2002). *Plants and People of Nepal*, Timber Press, Oregon.

12 Baral, S.R. & Kurmi, P.P. (2006). *A Compendium of Medicinal Plants in Nepal*, Mass Printing Press, Kathmandu.

13 Holmgren, P.K., Holmgren, N.H. & Barnett, L.C. (eds) (1990). *Index Herbariorum. Part 1: The Herbaria of the World*. ed. 8. New York Botanic Garden: New York. [available online with revisions at sweetgum.nybg.org/ih].

14 McNeill, J., Barrie, F.R., Burdet, H.M., Demoulin, V., Hawksworth, D.L., Marhold, K., Nicolson, D.H., Prado, J., Silva, P.C., Skog, J.E., Wiersema, J.H. & Turland, N.J. (eds) (2006). *International Code of Botanical Nomenclature (Vienna Code)*, Regnum Vegetabile 146. Gantner, Ruggell.