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Saxifragaceae

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Genera in this account

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Appendices

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

Saxifragaceae

Shinobu Akiyama, Richard J. Gornall, Bhaskar Adhikari, Colin A. Pendry & Mark F. Watson

Herbs. Stipules present or absent. Leaves simple or compound; basal leaves sometimes rosetted; cauline leaves alternate, rarely opposite. Flowers usually in cymes, panicles or racemes, or solitary, actinomorphic, bisexual or sometimes unisexual. Hypanthium usually present. Sepals 4 or 5. Petals usually 5, free, sometimes absent and then the sepals petaloid. Stamens 5–10, free. Ovary superior or half-inferior, carpels 2 or rarely 3, more or less connate, placentation axile, parietal or marginal in free part, styles 2. Fruit a capsule. Seeds numerous.
Worldwide 30 genera and 625 species with a subcosmopolitan distribution; particularly common in temperate and cold regions of N hemisphere. Seven genera and 106 species in Nepal.

Recent analyses have clearly shown that the traditional, broad circumscription of the Saxifragaceae (e.g. Engler, Pflanzenfam. 18a: 74-226. 1928) is highly polyphyletic. It includes many lineages which are only distantly related and can no longer be maintained (Morgan & Soltis, Ann. Miss. Bot. Gard. 80: 631-660. 1993; Soltis & Soltis, Am. J. Bot. 84: 504-522. 1997).

Key to Genera

1a	Leaves compound	2
b	Leaves simple	3
2a	Leaves pinnate. Flowers ca. 5 mm across	**1. *Rodgersia***
b	Leaves 2- or 3-ternate, the leaflets sometimes pinnate. Flowers 2–3 mm across	**2. *Astilbe***
3a	Petals absent (very rarely present in *Tiarella*)	4
b	Petals present (rarely absent in *Saxifraga*)	5
4a	Flowers in racemes. Carpels unequal in size	**3. *Tiarella***
b	Flowers in cymes, sometimes ± crowded. Carpels of equal size	**4. *Chrysosplenium***
5a	Plants with thick rhizomes. Leaves medium-sized or large, 4–25 cm	**5. *Bergenia***
b	Plants often tufted or caespitose, sometimes creeping at base but then with slender rhizomes. Leaves small, seldom attaining 4 cm	6
6a	Flowering stem leafy. Leaves lacking crystals, distributed along stem, sometimes aggregated toward base, or sometimes forming columnar rosettes	**6. *Saxifraga***
b	Flowering stem leafless. Leaves containing crystals, all arranged in a compact, basal rosette	**7. *Micranthes***

1. *Rodgersia* A.Gray, Mem. Amer. Acad. Arts, Ser. 2 6(1): 389 (1858).

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Robust perennial herbs, rhizomes horizontal, thick and elongate. Stipules linear-lanceolate, acuminate, fused at base to petiole, persistent. Leaves basal and cauline, petiolate, odd-pinnate, alternate, leaflets subsessile to shortly petiolulate. Inflorescence a terminal, many-flowered, lax, paniculate, much-branched cyme, bracts and bracteoles absent. Flowers greenish white to yellowish green, bisexual. Hypanthium obconic, short. Sepals 5, conspicuous, petaloid, spreading. Petals absent. Stamens 10, opposite and between sepals, exserted. Ovary semi-inferior. Carpels 2–3, ovules numerous, placentation axile, styles 2. Capsules 2–3-valved, seeds numerous.

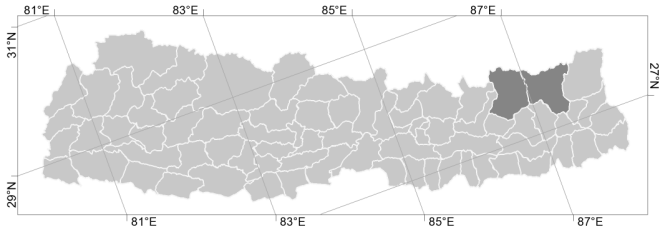
Worldwide five species in E Himalaya and E Asia. One species in Nepal.

1. *Rodgersia nepalensis* Cope ex Cullen, Notes Roy. Bot. Gard. Edinburgh 34: 116 (1975).

Flowering stems 1–1.5(–2) m, villous and glandular pubescent especially above. Rhizome 3–4 cm thick. Stipules brown, 30–40 × 7–10 mm, papery. Basal leaves to 1.5 m, petioles long, 30–40 cm. Leaflets 7–14, oblong-elliptic, 12–40 × 4–12 cm,

base cuneate or rounded often asymmetric, apex shortly acuminate, margin double-serrate upper surface glabrous, lower surface (and rachis) with long (to 2 cm) brown scale-like hairs on veins, petiolules 0–1 cm. Cauline leaves similar but reducing up the stem, the uppermost almost sessile and often 3-foliolate. Inflorescence 30–40 × 30–40 cm, floccose, villous and glandular pubescent. Pedicels 2–10 mm, glandular. Hypanthium 3–4 mm, glandular. Sepals triangular, 3.5–5 × 2–2.5 mm, apex acute or subacuminate, glandular. Stamens greenish white, 5–8 mm, unequal Capsules 7–10 mm, tapering above into the divergent persistent styles.
Fig. 1a-c

Distribution: Nepal and E Himalaya.



Altitudinal range: 2500–3400 m.

Ecology: Mixed temperate broadleaf and coniferous woodland with *Abies*, *Tsuga*, *Rhododendron*, *Pieris* and bamboos, often in moist, humus-rich soil growing amongst shrubs and other tall herbs.

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

Near endemic to Nepal. Predominantly found in north eastern districts of Nepal, but also one collection from central Sikkim (Toong). Morphologically distinct and widely separated geographically from the other species in *Rodgersia* which are found in N Myanmar and SW China (especially Sichuan, Yunnan, SE Xizang) and eastwards to Korea and Japan. The long, brown, scale-like hairs on the stem and leaf rachis, floccose inflorescence branches, glandular sepals and long stamens are quite unlike other members of the genus.

2. *Astilbe* Buch.-Ham. ex D.Don, Prodr. Fl. Nepal.: 210 (1825).

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Perennial herbs, rhizomatous, without stolons or bulbils. Stipules membranous, adnate to petiole base and sheathing stem. Leaves cauline, not in a basal rosette, long petiolate, alternate, bi- or tri-ternate, the leaflets sometimes pinnate, margins biserrate. Inflorescence a terminal, very many-flowered, bracteate panicle. Flowers white or reddish, bisexual, actinomorphic. Hypanthium very small, adnate to base of ovary. Sepals (4–)5, rather petaloid. Petals absent. Stamens 5, opposite sepals. Ovary half-inferior. Carpels 2 or rarely 3, equal, connate at base, ovules many, placentation axile. Styles 2 (rarely 3), free. Fruit a capsule with 2 (rarely 3) equal, ventrally dehiscent valves. Seeds numerous, small, narrowly fusiform.

Worldwide about 20 species in Asia and N America. One species in Nepal.

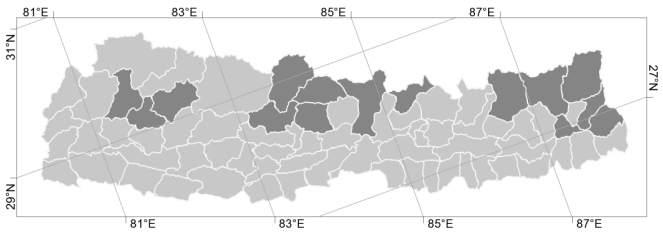
1. *Astilbe rivularis* Buch.-Ham. ex D.Don, Prodr. Fl. Nepal.: 211 (1825).
Spiraea barbata Wall. ex Cambess.

ठूलो औषधी Thulo aushadhi (Nepali).

Plants 0.6–2.5 m. Rhizome thick. Stems brown, long glandular-hairy. Leaves 15–50 cm including petiole. Petiole and petiolules glabrescent to sparsely long brown-pilose with denser tufts at base of petiolules and axes of rachis. Leaflets ovate to elliptic, 4–14 × 2–8 cm, base rounded to cordate, apex acuminate, sparsely brown glandular-hairy above, long brown-pilose and glandular-hairy on veins below. Panicles to 60 cm, rachis pale brown hairy. Bracts 1.5–2 mm, to 3 mm at base of panicle branches. Bracteoles 2, 1 at base of pedicel, 1 towards apex, filiform, ca. 1 mm. Pedicels ca. 2 mm, pale brown hairy. Sepals white to reddish, narrowly ovate, 1.5–2 mm. Stamens ca. 3 mm. Carpels 1–1.5 mm, glabrous. Valves ovoid, 3–4 mm. Seeds ca. 1 mm.

Fig. 1d-g

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



Altitudinal range: 1400–3600 m.

Ecology: *Pinus wallichiana* forests and mixed evergreen and deciduous forests, under shade and in the open.

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

Applied externally to sprains and muscular swellings. The juice is used to treat diarrhoea, dysentery, prolapse of the uterus and haemorrhage.

3. *Tiarella* L., Sp. Pl. 1: 405 (1753).

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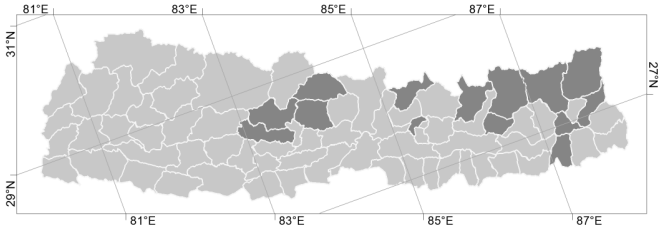
Perennial herbs, rhizomatous, without stolons and bulbils. Stipules membranous, adnate to base of petiole. Leaves basal and cauline, petiolate, simple, alternate, palmately 3–5-lobed, the basal leaves larger with longer petioles, margin irregularly dentate. Inflorescence few- to many-flowered, terminal, a raceme or sparsely-branched panicle. Bracts minute, filiform. Flowers white or pale pink, bisexual, zygomorphic. Hypanthium very small, adnate to base of ovary. Sepals 5, petaloid. Petals absent, rarely 5. Stamens 10. Ovary superior. Carpels 2, unequal, connate at base, ovules many, placentation parietal. Styles 2, free. Fruit a capsule with 2 very unequal, ventrally dehiscent valves. Seeds ellipsoid.

Worldwide three species in the Himalaya, E Asia and N America. One species in Nepal.

1. *Tiarella polyphylla* D.Don, Prodr. Fl. Nepal.: 210 (1825).

Plants 20–45 cm. Stems unbranched, glandular-hairy. Stipules 2–6 mm, margin fimbriate. Petioles 2–12 cm, glandular-hairy. Leaves broadly ovate to almost orbicular, 2–6 × 2.5–6 cm, shallowly lobed, base cordate, apex acute, coarsely hirsute above, glandular-hairy below, especially on veins. Cauline leaves 2 or 3, petioles ca. 1 cm. Raceme 5–20 cm, rachis, bracts and pedicels glandular-hairy. Flowers 6–40. Pedicel ca. 1 cm. Sepals erect, ovate, ca. 3 × 1 mm. Stamens and styles shortly exserted. Stamens 2.5–3 mm. Larger carpel 3.5–4 mm, the smaller 2.5–3 mm. Capsule with larger valve ca. 10 mm, smaller valve ca. 6 mm. Seeds ca. 1 mm.
Fig. 1h-j

Distribution: Nepal, E Himalaya, Tibetan Plateau and E Asia.



Altitudinal range: (2000–)2300–3300(–4000) m.

Ecology: In mixed deciduous and coniferous forest, often with *Tsuga dumosa* and *Pinus wallichiana*.

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

Root juice is used to treat fevers, and leaf juice is applied as hot compress to treat muscular swelling.

4. *Chrysosplenium* L., Sp. Pl. 1: 398 (1753).

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Perennial herbs, rhizomatous or caespitose, often with stolons. Rhizomes either rather stout, densely set with roots and clothed with scales, or more slender, long-creeping and without scales. Stipules absent. Leaves simple, petiolate, opposite or alternate, toothed or lobed. Basal leaves sometimes present, long-petiolate, arising from rhizome, similar to cauline leaves. Lower cauline leaves occasionally scale-like. Flowers small, bisexual, actinomorphic, green, yellow, purplish or brownish, usually in cymes surrounded with bracteal leaves, rarely flowers solitary. Hypanthium funnel- or cup-shaped, more or less adnate to ovary. Sepals 4, one pair overlapping the other in bud, persistent. Petals absent. Disk around style, ± developed, nectariferous. Stamens 8, inserted on margin of hypanthium. Filaments needle-shaped. Anthers 2-locular, laterally dehiscent. Ovary semi-inferior, 1-locular. Carpels 2, connate, with 2 parietal placentae. Styles 2, free. Stigmas punctate. Capsules semi-inferior to semi-superior, 2-lobed, flattened, dehiscent along inner suture. Seeds numerous, oblong to globose with a carina on one side, thick-walled, smooth, sometimes hairy, ridged or minutely papillose.

Worldwide about 55 species in temperate and arctic regions of Eurasia, N Africa, Greenland, and N and S America. Ten species in Nepal.

Key to Species

1a Leaves opposite, at least on sterile branches 2
b Leaves all alternate 3

2a Leaves ovate-rounded to orbicular, up to 1 cm. Flowers 2.5–3.5 mm across. Seeds smooth or minutely papillose under a microscope ..... **1 *C. nepalense***
b Leaves elliptic to broadly ovate, 1–2 cm. Flowers ca. 4 mm across. Seeds conspicuously patently papillose-pilose ..... **2 *C. trichospermum***

3a Stem and leaves villous 4
b Stem and leaves glabrous 5

4a Flowering stems 7–20 cm. Leaves with 14–20 teeth ..... **5 *C. lanuginosum***
b Flowering stems 2–7 cm. Leaves with 3–7 teeth ..... **6 *C. singalilense***

5a Basal leaves arising from rhizome, petioles (1–)3–19 cm 6
b Basal leaves absent, lower cauline leaves sometimes present, scale-like or leaf-like with petioles 1–3 cm 8

6a Stamens 0.6–0.8 mm ..... **7 *C. griffithii***
b Stamens 1–2 mm 7

7a Plants 3–12 cm. Basal leaves with 7–15 lobes ..... **8 *C. nudicaule***
b Plants 13–25 cm. Basal leaves with 17–27 lobes ..... **9 *C. forrestii***

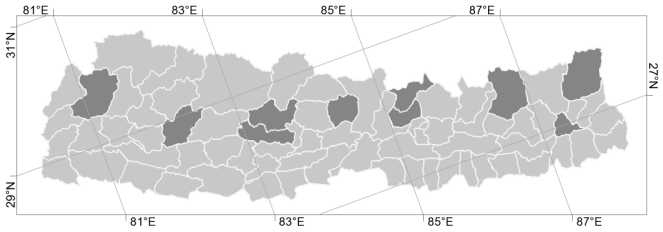
8a Lower cauline leaves scale-like, sessile ..... **4 *C. carnosum***
b Lower cauline leaves leaf-like, petiolate 9

9a Bracteal leaves 10–13 × 8–15 mm. Rhizome without scales ..... **3 *C. uniflorum***
b Bracteal leaves 3–5 × 5–7 mm. Rhizome scaly ..... **10 *C. tenellum***

1. *Chrysosplenium nepalense* D.Don, Prodr. Fl. Nepal.: 210 (1825).

Herbs 6–20 cm, glabrous throughout. Rhizome long-creeping, without scales. Stolons present. Sterile branches well developed. Leaves opposite. Basal leaves absent. Scale leaves absent. Cauline leaves numerous, evenly spaced. Petioles 3–18 mm. Leaves ovate to orbicular, 2–10 × 2–8 mm, base broadly cuneate to truncate, apex obtuse to retuse, margin crenate with 3–12 short teeth. Cyme somewhat lax, 1–2 cm across, 2–7-flowered. Bracteal leaves with 2–10 mm petioles, broadly ovate to orbicular, 4–10 × 3–11 mm, margin crenate. Flowers yellowish green, 2.5–3.5 mm across. Sepals ovate-triangular, ca. 1 mm. Stamens shorter than sepals, 0.6–0.8 mm. Capsule lobes ascending to divergent, ca. 2 mm. Seeds brown, ellipsoid to ovoid, 0.8–1 mm, smooth, lustrous or sometimes with obscure flat ridges.

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



Altitudinal range: 1900–4000 m.

Ecology: Damp ground in shady forests, near streams, on moist rocks.

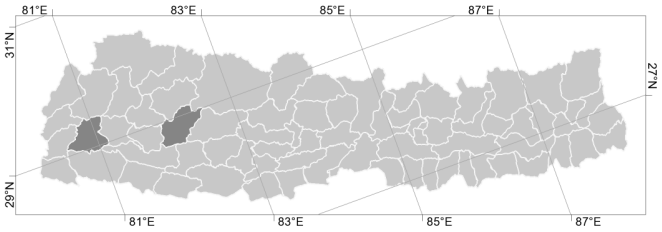
Flowering: April–June. **Fruiting:** April–June.

2. *Chrysosplenium trichospermum* Edgew. ex Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 73 (1857).

Herbs 10–26 cm, glabrous throughout. Rhizome long-creeping, without scales. Stolons poorly developed. Sterile branches well developed. Leaves opposite. Basal leaves absent. Scale leaves absent. Petioles 5–10 mm. Leaves elliptic to ovate, 6–20 × 5–13 mm, base broadly cuneate to attenuate, apex obtuse, margin serrate with 7–11(–15) teeth. Cyme somewhat lax, 1–3 cm across. Bracteal leaves with 2–10 mm petioles, obovate, 8–10 × 5–8 mm. Flowers yellowish green, ca. 4 mm across. Sepals ovate, ca. 2 mm. Stamens ca. 1 mm, slightly

shorter than sepals. Anthers yellow. Capsule lobes ca. 5 mm. Seeds brown, ovoid, ca. 1 mm, conspicuously patently papillose-pilose.

Distribution: Nepal and W Himalaya.



Altitudinal range: 2100–3000 m.

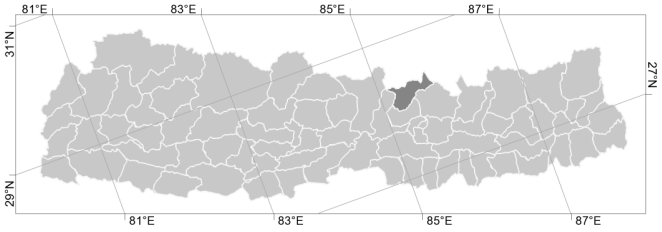
Ecology: On stream-sides and other wet places.

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

3. *Chrysosplenium uniflorum* Maxim., Bull. Acad. Imp. Sci. Saint-Pétersbourg 27: 468 & 472 (1881).

Herbs 3–10 cm, glabrous throughout. Rhizome creeping, without scales. Stolons mainly from axils of lower leaves, very long, filiform, often below ground. Sterile branches absent. Leaves alternate. Basal leaves absent. Scale leaves absent or occasionally present at base of stem, whitish, fleshy, ovate. Cauline leaves several, evenly spaced. Petioles 1–4 cm, longer on lower stem. Leaves reniform to orbicular 5–15 × 8–18 mm, base cordate to broadly cuneate, apex retuse, margin crenate with (6–)8–10(–12) teeth on each side. Upper leaves somewhat congested and smaller with fewer marginal teeth. Cyme dense, 1–3-flowered. Bracteal leaves with ca. 5 mm petioles, ovate, 10–13 × 8–15 mm. Flowers greenish, ca. 5 mm across. Sepals ascending, broadly ovate, ca. 3 mm. Stamens 1.3–1.6 mm. Capsule lobes ca. 1mm. Seeds elliptic, smooth, to 0.9 mm.

Distribution: Nepal, Tibetan Plateau and E Asia.



Altitudinal range: ca. 4000 m.

Ecology: In wet places in *Abies* or *Juniperus* forest or alpine areas.

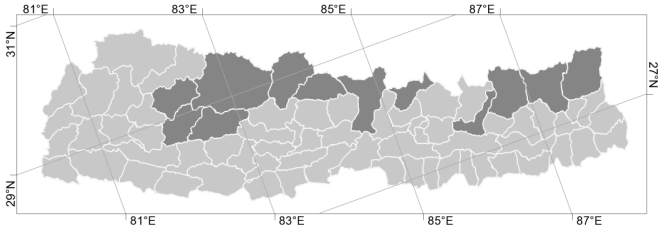
Flowering: May–July. **Fruiting:** May–July.

4. *Chrysosplenium carnosum* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 73 (1857).
Chrysosplenium carnosulum Hook.f. & Thomson ex Maxim.

यहकी-मह Yahkee-mah (Tibetan).

Herbs 7–15 cm, glabrous throughout, often caespitose, with branches arising from leaf axils. Rhizome thick, scaly. Stolons absent. Leaves alternate. Basal leaves absent. Lower cauline leaves scale-like, 3–7 × 2–3 mm. Upper leaves with petioles ca. 1 mm, obovate to spathulate, 5–12 × 3–7 mm, base cuneate, apex obtuse, sometimes retuse, margin crenate with 5–9 teeth. Cyme dense, 1–3 cm across, 2–3-flowered. Bracteal leaves often yellowish, with 1–5 mm petioles, ovate, 5–12 × 3–9 mm, base cuneate, apex obtuse to slightly retuse, margin crenate with 5–9 teeth. Flowers greenish yellow, often brownish or dark purplish, 3–5 mm across. Sepals reniform to rounded, ca. 2 mm. Stamens ca. 1 mm, slightly shorter than sepals. Stamens ca. 1 mm, often purplish. Capsule lobes ca. 3 mm, ovoid. Seeds brown, ovoid, ca. 1 mm, smooth, lustrous, glabrous.

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 3700–5500 m.

Ecology: Alpine grasslands, moist places, scree slopes, earth pockets among boulders.

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

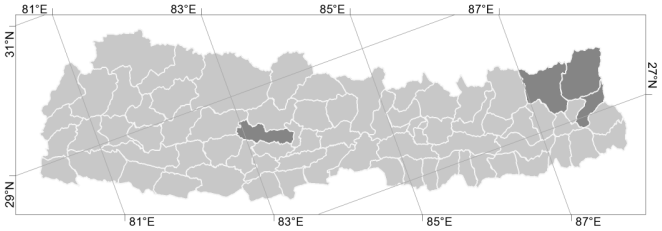
The plant is anti-inflammatory, febrifuge and cholagogue, and used to cure headache and inflammation of the gall bladder.

5. *Chrysosplenium lanuginosum* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 74 (1857).
Chrysosplenium adoxoides Hook.f. & Thomson ex Maxim.; *Saxifraga adoxoides* Griff.

Herbs, 7–20 cm, villous with long, soft, rusty-brown (when dry), spreading hairs. Rhizome long-creeping, sometimes with filiform stolons. Leaves alternate. Basal leaves absent. Scale leaves absent. Sterile branches well-developed, densely villous above, with leaves crowded in upper part, petioles1–5 cm, blade ovate to orbicular, 1–3 × 1–2 cm, base broadly cuneate to rounded, apex obtuse, margin crenate with 14–16 teeth, margins crenate with coarse, flattish, emarginate teeth, pubescent above and on margins. Cauline leaves 1–3, with petioles 5–20 mm, broadly ovate to reniform, 10–20 × 4–20 mm, base cuneate, sometimes truncate, margin minutely crenate with ca. 20 teeth, both surfaces sparsely pilose. Cyme lax, 3–5 cm, branched, ca. 10-flowered. Bracteal leaves green, with 2–12 mm petioles, ovate 2–10 × 2–12 mm, base broadly cuneate, apex obtuse, margin crenate with 4–6 teeth, both

surfaces pilose to glabrous. Flowers 3.5–5 mm across, lower ones long pedicellate. Sepals green, ovate, ca. 1 × 2 mm, glabrous. Stamens ca. 0.5 mm. Capsule lobes ovoid, 3–4 mm. Seeds brown, ovoid, less than 1 mm, smooth (very minutely papillose under microscope).

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



Altitudinal range: 2700–3500 m.

Ecology: Shady wet forest, on rocks.

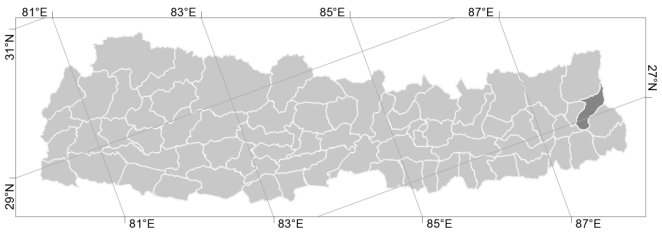
Flowering: April–June. **Fruiting:** April–June.

Chrysosplenium lanuginosum is unlikely to be confused with any of the other Nepalese species because of its rusty-brown villous indumentum and sterile branches with leaves which are very much larger than the leaves on fertile stems.

6. *Chrysosplenium singalilense* H.Hara, J. Jap. Bot. 36: 77 (1961).

Slender herbs, 2–7 cm, more or less rusty-brown pubescent throughout. Rhizome short creeping. Leaves alternate. Scale leaves absent. Basal leaves with petioles 3–5(–10) mm, blade ovate to orbicular, 2.5–5(–6) × 3–6(–8) mm, base truncate to rounded, margin crenate with 3–7 teeth, sparsely pubescent. Cauline leaves 2 or 3, similar to basal leaves but smaller. Cyme lax, ca. 1 cm across, (1–)2–6-flowered. Bracteal leaves with 2–8 mm petioles, depressed ovate, 2–5 mm, with 3–5 crenate teeth. Flowers yellow, 3–4 mm across. Sepals patent, ovate, 1–1.6(–2) mm. Stamens 0.5–0.7 mm long. Capsules subinferior. Seed brown, oval, ca. 0.6 × 0.4 mm, very minutely papillate under microscope.

Distribution: Nepal and E Himalaya.



Altitudinal range: ca. 3900 m.

Ecology: Mossy stony slopes.

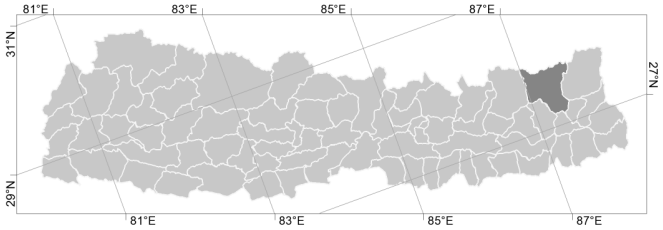
Flowering: May–June. **Fruiting:** May–June.

A near endemic to Nepal, known only from the type specimen *Kanai et al. 764 p.p.* (TI) from Singalila and *Shakya & Bhattacharya 2387* (KATH) probably from Dhading. The latter is a little larger in its leaves and flowers and its identity is uncertain.

7. *Chrysosplenium griffithii* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 74 (1857).

Herbs 10–17 cm, almost glabrous, sometimes with scattered rusty-brown hairs. Rhizome stout, scaly. Often caespitose, without stolons. Leaves alternate. Scale leaves absent. Basal leaf often present, with 8–10 cm petiole, reniform, 1.5–2 × 2–3 cm, base deeply cordate, margin 7–13-lobed, lobe apex usually retuse, both surfaces glabrous. Cauline leaves alternate, 1–3, with 1–3 cm petioles, similar to basal leaf. Cyme lax, branched, 1–2 cm across, 5–13-flowered. Bracteal leaves greenish, smaller than cauline leaves, with 2–5 mm petioles, ovate, 5–15 × 5–20 mm, base cordate to broadly cuneate, margin 3–9-lobed, lobe apex obtuse, glabrous. Flowers greenish, 4–6 mm across. Sepals patent, rhombic-ovate, 2–5 mm, glabrous. Stamens 0.6–0.8 mm. Capsules semi-superior. Seeds oval, 0.7–0.9 mm, smooth, lustrous. Fig. 2a-c

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: ca. 3600 m.

Ecology: Wet rocks in ravines or woods, or in alpine meadows.

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

In Nepal *Chrysosplenium griffithii* is known only from *Swan 475-474* (BM) from Sankhuwasaba. It is close to *C. forrestii* Diels, but the leaves of the latter have more lobes which have squarish rather than rounded apices. *Chrysosplenium nudicaule* Bunge is similar but smaller and its cyme and cauline leaf are much more congested at the apex of the flowering stem.

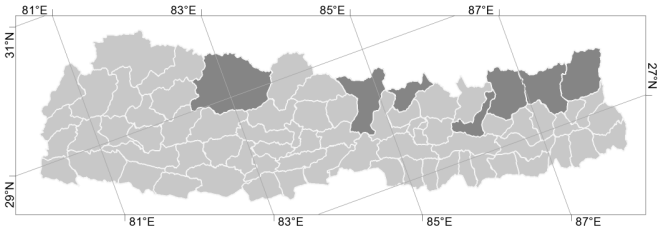
8. *Chrysosplenium nudicaule* Bunge, Fl. Altaic. 2: 114 (1830).

Chrysosplenium nudicaule var. ***intermedium*** H.Hara, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 7: 65, pl. 13A (1957).

Herbs, 3–13 cm, almost glabrous. Rhizome thick, scaly. Stolons long filiform. Sterile branches absent. Leaves alternate. Scale leaves absent. Basal leaves 1 or 2, with 1–7 cm petioles, reniform, 3–8 × 8–15 mm, base deeply cordate, apex rounded,

margin with 7–15 lobes, lobes rectangular, apex obtuse, sometimes overlapping. Cauline leaf absent or 1, very close to cyme, with 2–5 cm petiole, broadly ovate to reniform, 5–10 × 3–10 mm, base cuneate, margin crenate with 3–7 lobes, lobes rounded, glabrous. Cyme very dense, 1–3 cm, 2–6-flowered. Bracteal leaves greenish, similar to cauline leaf. Flowers 4–5 mm across. Sepals obovate to rhombic, 1–2 mm, glabrous. Stamens ca. 1 mm; anthers yellow. Capsule subsuperior, ca. 1.5 mm. Seed brown, oval, ca. 0.9 mm, shiny.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 3700–4600 m.

Ecology: Along streams in shady forests or alpine areas.

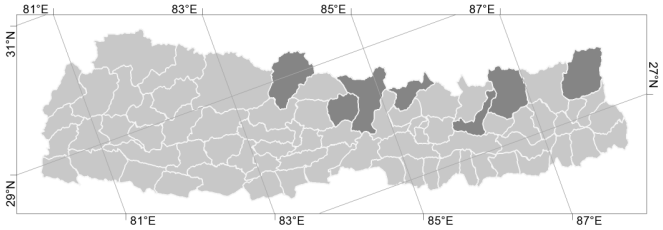
Flowering: June–October. **Fruiting:** June–October.

Chrysosplenium nudicaule var. *intermedium* is similar to *C. forrestii* Diels and *C. griffithii* Hook.f. & Thomson but smaller and its cyme and cauline leaf are much more congested at the apex of the flowering stem. Var. *intermedium* differs from the N Asian var. *nudicaule* in having a cauline leaf, larger flowers and longer stamens

9. *Chrysosplenium forrestii* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 282 (1912).

Herbs 13–23 cm, glabrous. Rhizome creeping, thick, scaly. Stolons absent. Leaves alternate. Scale leaves absent. Basal leaves 0–2, with 5–19 cm petioles, reniform, 1–3 × 1–6 cm, base cordate, apex rounded, margin crenate with 15–23 lobes, apex of lobe usually retuse, both surfaces sparsely pubescent to glabrous. Cauline leaf 1, with 5–15 mm petiole, blade reniform to broadly ovate, 1.3–2.5 × 2–4.5 cm, base subcordate to cuneate, margin crenate with 7–15 lobes, apex of lobe retuse, sometimes obtuse, both surfaces sparsely pubescent. Cyme dense, 1–4 cm 8–14-flowered. Bracteal leaves with 2–5 mm petiole, reniform to orbicular, 1–2.3 × 1–3.5 cm, base cuneate, margin crenate with 7–17 lobes, apex obtuse, sometimes retuse, sparsely pubescent. Inner leaves large often bright yellow at anthesis, reniform. Flowers yellow, ca. 4 mm across. Sepals reniform to rounded, ca. 3 × 3 mm, apex minutely crenate, glabrous. Stamens 8, ca. 2 mm. Style ca. 8 mm. Capsule lobes 1.5 mm. Seed brown, ovoid, ca. 0.9 mm, shiny.

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



Altitudinal range: 3600–4800 m.

Ecology: Moist alpine grasslands, small ravines, among boulders.

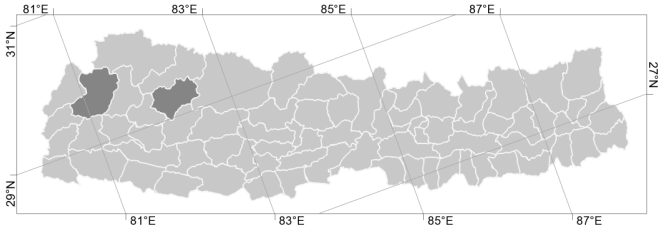
Flowering: June–October. **Fruiting:** June–October.

Chrysosplenium forrestii is close to *C. griffithii* Hook.f. & Thomson but the leaves of the latter have fewer lobes which have rounded rather than squarish apices and are more spreading. *Chrysosplenium nudicaule* is similar but smaller and its cyme and cauline leaf are much more congested at the apex of the flowering stem.

10. *Chrysosplenium tenellum* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 73 (1857).

Slender herbs, 4–9 cm, glabrous, often matted. Rhizome short, slender, scaly. Stolons from lower axils, filiform, with small leaves. Leaves alternate. Basal leaves absent. Scale leaves absent. Cauline leaves several, some clustered around lower stem, with 0.5–3 cm petioles, longest on lower leaves, reniform to orbicular, 3–10 × 3–15 mm, base cordate, margin irregularly 3–7-lobed, lobe apex retuse, glabrous. Cyme very lax, 5–10 mm across, 1–5(–6)-flowered. Bracteal leaves with 1–5 mm petioles, broadly ovate to reniform, 3–5 × 5–7 mm, base broadly cuneate, margin 3–5-lobed, lobe apex obtuse. Flowers yellowish green, 3.5–5 mm across. Sepals patent, reniform, ca. 2 mm, base narrowed, glabrous. Stamens ca. 0.5 mm. Seeds red-brown, oval, ca. 6 mm, smooth, glabrous.

Distribution: Nepal, W Himalaya and E Himalaya.



Altitudinal range: 2700–4300 m.

Ecology: Moist places.

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

This diminutive species is probably very under collected and is likely to occur in E Nepal.

5. *Bergenia* Moench, Methodus: 664 (1794).

Shinobu Akiyama & Colin A. Pendry

Perennial herbs, without stolons or bulbils, with thick rhizomes and forming large clumps. Stipule membranous, adnate to base of petiole, sheathing stem. Leaves all basal, simple, alternate, entire, petiolate, margin entire or dentate. Inflorescence a few-flowered panicle with cymose branches and a single large basal bract. Individual flowers with or without bracts. Flowers white to reddish purple, bisexual, actinomorphic. Hypanthium cup-shaped, free from the ovary. Sepals 5, not petaloid. Petals 5(–6), white, pink or purplish red. Stamens 10, filaments needle-shaped. Ovary half-inferior. Carpels 2, equal, connate at base, ovules many, placentation axile below, marginal above. Styles 2, free. Fruit a 2-valved capsule dehiscing ventrally. Seeds numerous, flattened, ovoid.

Ten species in Asia. Two species in Nepal.

Key to Species

1a Leaf blade elliptic to ovate-elliptic, margins glabrous or ciliate near base. Petals deep purplish red to bright pink ..... **1 *B. purpurascens***

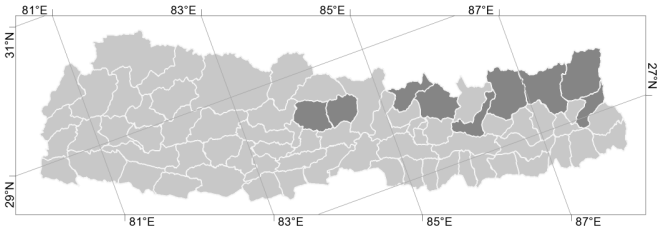
b Leaf orbicular to broadly obovate, margins ciliate. Petals white tinged pink..... **2 *B. ciliata***

1. *Bergenia purpurascens* (Hook.f. & Thomson) Engl., Bot. Zeitung [Berlin] 26: 841 (1868).
Saxifraga purpurascens Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 61 (1857).

लि-गा-दुर Li-ga-dur (Tibetan).

Plants 7–55 cm. Rhizome scales with entire margins. Flowering stems reddish brown, thick, glandular-hairy. Stipules 3.5–5 cm, margin entire. Petioles 1.5–10 cm. Leaves elliptic to ovate-elliptic, 7–25 × 5–17 cm, base cuneate to rounded, apex rounded, margins entire or shallowly sinuate or glandular-denticulate, glabrous or ciliate near base, glandular punctate. Peduncle, pedicel, hypanthium and calyx deep purplish or brownish red, glandular or glandular-hairy. Basal bract 1–3 cm, inflorescence bracts (3–)6–11 mm. Flowers 1–8, nodding. Pedicels 8–20 mm. Hypanthium 3–6 mm. Sepals oblong, 5–8 mm, apex rounded, entire. Petals deep purplish red to bright pink, broadly spathulate to obovate, 15–25 × 7–9 mm, tapering into a basal claw 2–3 mm. Stamens 9–14 mm. Ovary 6–7 mm. Styles 5–6 mm. Capsule 14–20 mm. Seeds 1.5–2 mm.
Fig. 2d-g

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



Altitudinal range: 3200–4700 m.

Ecology: Alpine meadows and among dwarf shrubs.

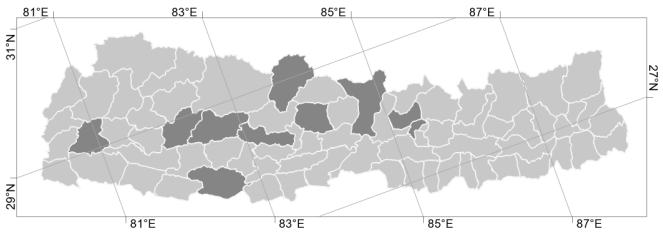
Flowering: May–July. **Fruiting:** August–September.

2. *Bergenia ciliata* (Haw.) Sternb., Revis. Saxifrag. Suppl.2: 2 (1831).
Megasea ciliata Haw., Saxifrag. Enum.: 7 (1821); *Saxifraga ciliata* Royle; *S. pacumbis* Buch.-Ham. ex D.Don nom. inval.

पाषनभेद Pakhanbhed (Nepali).

Plants 5–25 cm. Rhizome scales with ciliate margins. Flowering stems green to reddish, thick, sparsely glandular. Stipules 0.5–2.5 cm, margin ciliate. Petioles 1–6 cm. Leaves orbicular to broadly obovate, 4–15(–30) × 4–14(–25) cm, base rounded to cordate, apex rounded, margins finely denticulate and ciliate, glabrous or sparsely pubescent on both surfaces. Peduncle, pedicel, hypanthium and calyx green to reddish, glabrous to sparsely glandular. Basal bract 7–20 mm, inflorescence bracts absent. Flowers 1–20, erect or spreading. Pedicels 2–18 mm. Hypanthium 3–7 mm. Sepals oblong, 3–6 mm, apex rounded, margin denticulate or ciliate. Petals pink or white tinged pink, spreading, obovate 11–15 × 7–13 mm, base with a claw 1.5–2 mm. Stamens 6–12 mm. Ovary 5–8 mm. Styles 4–6 mm. Capsule 9–15 mm. Seeds 1.5–2 mm.

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



Juice or powder of the whole plant is taken to treat urinary problems. Juice of the rhizome is taken in cases of

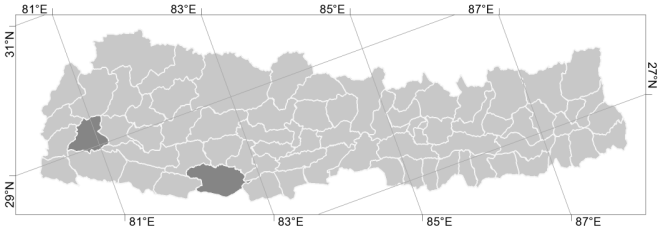
haemorrhoids, asthma and urinary problems and the rhizome is also used as an anthelmintic.

1a Leaves pubescent at least below . forma ***ciliata***
b Leaves glabrous on both surfaces ..... forma ***ligulata***

Bergenia ciliata (Haw.) Sternb. forma ***ciliata***

Leaves sometimes pubescent above, always below.

Distribution: Nepal and W Himalaya.



Altitudinal range: 900–2500 m.

Ecology: *Quercus* forest.

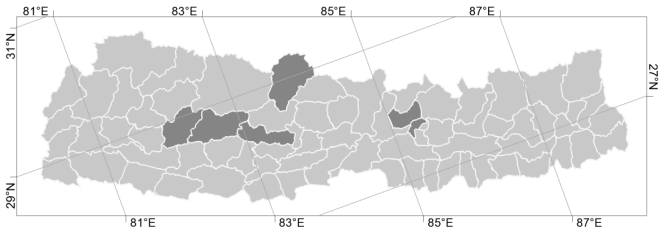
Flowering: March–May.

This forma is apparently undercollected in Nepal.

Bergenia ciliata forma ***ligulata*** (Wall.) Yeo, Kew Bull. 20: 134 (1966).
Saxifraga ligulata Wall., Asiat. Res. 13: 398, pl. s.n.[11] (1820).

Leaves glabrous on both surfaces.

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



Altitudinal range: 1300–3200 m.

Ecology: *Quercus* and *Pinus* forests.

Flowering: March–May.

6. *Saxifraga* L., Sp. Pl. 1: 398 (1753).

Shinobu Akiyama & Richard J. Gornall

Perennial herbs. Stems caespitose or simple, solitary or grouped into tufts, mats or cushions. Stolons sometimes present. Stipules absent. Leaves usually alternate, rarely opposite, in basal rosettes and/or on stems, petiolate or not, blade simple, margin entire, lobed or dentate, variously pubescent with glandular or eglandular hairs, chalk glands sometimes present. Flowering stems variously pubescent with glandular or eglandular hairs, usually leafy. Inflorescence a solitary flower or a few- to many-flowered bracteate cyme. Flowers usually bisexual, sometimes unisexual and plants then dioecious, actinomorphic, rarely zygomorphic. Hypanthium cup-shaped to saucer-shaped. Sepals 5, free, sometimes with chalk glands. Petals 5, free, often yellow or white, sometimes pink or red to purple, margin usually entire, callose or not. Stamens 8 or 10, free, filaments subulate to linear. Nectary sometimes well developed as an annular or semiannular disk. Ovary superior to inferior, 2-carpellate, carpels fused at base or along the entire placental region, 2-locular, ovules many, placentation axile, integuments 2. Styles 2, free, stigma capitate. Fruit a 2-valved dehiscent capsule. Seeds many, small.

Worldwide about 460 species, in temperate regions of Asia, Europe, N America and S America (Andes). 87 species (21 endemic) in Nepal.

Few collections are made of fruiting material, so it is not possible to give fruiting times for most species. The following taxa have been recorded from Nepal but are probably not present. *Saxifraga cernua* L. was recorded from Nepal by Baehni (Candollea 16: 215. 1958) based on *Zimmerman 1368*, *1506* (G). We have not seen these but given the localities (Beding and Menlungtse) we suspect a misidentification or misapplication of the name. *Saxifraga flagellaris* var. *stenosepala* (Royle) Hultén was recorded as such from Nepal by Kitamura (Fauna Fl. Nepal Himalaya: 144. 1955) based on a collection by Nakao, 30 June 1953 (KYO), which we have not seen. The name, however, is a synonym of *S. setigera* Pursh, an American species, and we strongly suspect a misidentification. *Saxifraga duthiei* Gand. was originally collected from the western Himalaya (Karakorum), and although this species has been recorded from Nepal (Bull. Dept. Med. Pl. Nepal 7: 83. 1976), we have seen no specimens. *S. ramulosa* Wall. ex Ser.: this species was published based on the specimen from ‘Nepal Bhuddringth, Kamroop’, but the locality was actually Surinagar (Garhwal) and not Nepal (Hara, Enum. Fl. Pl. Nepal 2: 154. 1979), and it is yet to be found in Nepal.

Key to Sections

1a Leaves with sunken submarginal or subapical chalk glands on upper surface, bearing calcareous deposits ..... **3. *S.*** sect. ***Porphyrion***
b Leaves without chalk glands 2

2a Leaves usually entire. Petals usually yellow, occasionally white or pink to red or purple ..... **1. *S.*** sect. ***Ciliatae***
b Leaves usually conspicuously toothed or lobed. Petals usually white or pink to red or purple, rarely yellow 3

3a Leaves with petiole at least 2× length of lamina. Ovary superior ..... **2. *S.*** sect. ***Mesogyne***
b Leaves with petiole equalling or shorter than lamina. Ovary inferior ..... **4. *S.*** sect. ***Saxifraga***

1. *Saxifraga* sect. ***Ciliatae*** Haw.

Plants caespitose, many branched, forming mats or cushions, or with stems erect. Rhizome sometimes with leafy buds or stoloniferous. Leaves alternate (except in *S. contraria* Harry Sm.), without chalk glands. Petals usually yellow, rarely white or pink to red or purple, often with calloses. Stamens 10. Ovary superior to semi-inferior.

Key to Species

1a Stem nodes glabrous or only with straight, glandular hairs, glands brown or black 2
b At least lower stem nodes and petiole bases with brown, crisped, villous hairs (mostly eglandular) 36

2a Basal leaf axils producing filiform (not leafy) stolons 3
b Basal leaf axils rarely stoloniferous, but if so then stolons leafy, not filiform 12

3a Petals shorter than or only slightly exceeding sepals 4
b Petals at least 1.5× as long as sepals 7

4a Stolons arising from axils of median leaves 5
b Stolons arising only from axils of basal leaves 6

5a Flowers bisexual. Petals 3–6 mm ..... **50. *S. tentaculata***
b Flowers dioecious. Petals 2.5–3.5 mm ..... **51. *S. neopropagulifera***

6a Upper surface of basal leaves glabrous ..... **52. *S. consanguinea***
b Upper surface of basal leaves densely glandular-pubescent ..... **53. *S. pilifera***

7a Pedicels at least 3× as long as cauline leaves. Cyme lax, many-flowered ..... **49. *S. brunonis***
b Pedicels mostly less than 2× as long as cauline leaves. Cyme corymbose, compact or flower solitary 8

8a Stolons arising from axils of median leaves 9
b Stolons arising only from axils of basal leaves 10

9a Flowers bisexual. Petals 3–6 mm long ..... **50. *S. tentaculata***
b Flowers dioecious. Petals 2.5–3.5 mm long ..... **51. *S. neopropagulifera***

10a Margin of basal leaves slender-ciliate, often glandular, longest hairs less than 0.5 mm ..... **46. *S. stenophylla***
b Margin of basal leaves coarsely eglandular setose-ciliate, longest bristles 0.5–1 mm 11

11a Inflorescence of 1–3 flowers, not obviously umbellate. Stem leaves shorter than or equalling the basal leaves ..... **47. *S. mucronulata***
b Inflorescence of more than 3 flowers, umbellate. Stem leaves longer than or equalling the basal leaves ..... **48. *S. mucronulatoides***

12a Leaves often shiny, leathery. Leafy buds produced in axils of cauline leaves, or rhizome scales, sometimes developing into short, sterile shoots. Petals white or yellow 13
b Leaves not shiny, carnose. Long sterile shoots sometimes arising from axils of basal leaves. Petals yellow 21

13a Leaf margin coarsely toothed or lobed 14
b Leaf margin entire 16

Saxifragaceae

14a Leafy buds conspicuous in axils of upper cauline leaves or bracts. Sepals reflexed in fruit. Petals white **40. *S. strigosa***
b Leafy buds conspicuous or inconspicuous in axils of lower and basal leaves. Sepals erect or spreading in fruit. Petals yellow 15

15a Median stem leaves distributed evenly, each usually with 3–5 apical lobes ..... **38. *S. hispidula***
b Median leaves aggregated, often into a rosette, each with several teeth ..... **39. *S. substrigosa***

16a Upper surface of leaves pubescent 17
b Upper surface of leaves glabrous 18

17a Upper surface of leaves strigose. Petals clawed ..... **38. *S. hispidula***
b Upper surface of leaves sparingly pubescent. Petals tapered at base ..... **45. *S. jaljalensis***

18a Stem often prostrate, many-branched from the middle ..... **41. *S. filicaulis***
b Stem usually erect, simple or branched only at base 19

19a Broadest leaves at least 3 mm wide. Petals 2-callose ..... **43. *S. wallichiana***
b Broadest leaves to 3 mm wide. Petals not callose 20

20a Stem branched at base. At least some leaves recurved ..... **42. *S. serrula***
b Stem simple. Leaves straight ..... **44. *S. brachypoda***

21a Plants forming well-defined basal leaf rosette at anthesis. Inflorescence usually several-flowered 22
b Plants without a well-defined basal leaf rosette at anthesis (stem with axillary shoots forming mats or cushions, or simple). Inflorescence 1(or 2–5)-flowered 23

22a Margin of basal leaves setose-ciliate. Inflorescence (1 or)2- or 3-flowered. Petals spotted ..... **64. *S. punctulata***
b Margin of basal leaves entire. Inflorescence 2–10-flowered. Petals without spots ..... **65. *S. umbellulata***

23a Margin of lower leaves glabrous 24
b Margin of lower leaves glandular- or eglandular-ciliate 26

24a Leaves opposite, occasionally alternate on young shoots ..... **61. *S. contraria***
b Leaves alternate 25

25a Petals yellow, elliptic ca. 4 × 1.5 mm ..... **60. *S. engleriana***
b Petals green, obovate, ca. 2.3 × 1.1 mm ..... **63. *S. microphylla***

26a Margin of leaves glandular-ciliate 27
b Margin of leaves eglandular-ciliate 29

27a Flowering stem submerged in foliage, even in fruit ..... **57. *S. jacquemontiana***
b Flowering stem visible, flowers clearly overtopping foliage 28

28a At least some leaves with short, glandular hairs. Sepals reflexed ..... **58. *S. stella-aurea***
b Lower leaves with long, curly, glandular and eglandular hairs at least at margin. Sepals erect ..... **59. *S. llonakhensis***

29a Nectary a conspicuous disk surrounding ovary 30
b Nectary tissue obscure 32

30a Leaves opposite, occasionally some alternate on young shoots ..... **61. *S. contraria***
b Leaves alternate 31

31a Petals yellow, elliptic, ca. 4 × 1.5 mm ..... **60. *S. engleriana***
b Petals green, obovate, ca. 2.3 × 1.1 mm ..... **63. *S. microphylla***

32a Petals white, unspotted ..... **54. *S. williamsii***
b Petals yellow, often spotted orange 33

33a Sepals spreading to reflexed 34

b Sepals erect 35

34a Sepals to 3 × 1.5 mm ..... **58. *S. stella-aurea***
b Sepals to 1.5 × 1 mm ..... **62. *S. nanella***

35a Margin of leaves setose-ciliate. Pedicels to 10 mm ..... **55. *S. perpusilla***
b Apical margin of leaves fimbriate. Flowers sessile ..... **56. *S. hemisphaerica***

36a Pedicels with brown, crisped, villous hairs only 37
b Pedicels with black-tipped glandular hairs, occasionally with brown, crisped villous hairs or glabrous 48

37a Basal leaves absent at anthesis ..... **12. *S. sikkimensis***
b Basal leaves present at anthesis 38

38a Upper surface of basal leaves brown crisped villous 39
b Upper surface of basal leaves glabrous 41

39a Sepals pubescent on outer surface ..... **37. *S. sinomontana***
b Sepals glabrous on outer surface 40

40a Petals 6.5–7.5 mm, longer than sepals, yellow ..... **13. *S. lamninamensis***
b Petals 3.5–4 mm, not or scarcely exceeding sepals, greenish ..... **33. *S. hirculoides***

41a Basal leaves without a well-defined petiole, blade linear-oblong, to 1 mm wide 42
b Basal leaves clearly petiolate, blade narrowly elliptic to ovate or lanceolate, more than 1 mm wide 43

42a Leaves broadened at base, clasping stem ..... **29. *S. matta-viridis***
b Leaves tapered at base, not clasping stem ..... **30. *S. saginoides***

43a Ovary with a conspicuous nectary disk ..... **32. *S. tangutica***
b Ovary without a conspicuous nectary disk 44

44a Margin of sepals glabrous or glandular-pubescent 45
b Margin of sepals brown crisped villous 46

45a Margin of sepals densely glandular-pubescent. Petals to 6.4 mm ..... **31. *S. parva***
b Margin of sepals glabrous or sparsely glandular-pubescent. Petals more than 6 mm ..... **34. *S. elliptica***

46a Lower outer surface and lower margin of petals brown crisped villous ..... **35. *S. montanella***
b Petals glabrous 47

47a Petals not callose ..... **36. *S. namdoensis***
b Petals callose ..... **37. *S. sinomontana***

48a Leaves often glaucous, with prominent submarginal vein running from proximal to distal ends. Basal or proximal leaves glandular-pubescent or glabrous below, ± glabrous above 49
b Leaves not glaucous, without prominent submarginal vein running from proximal to distal ends. Leaf pubescence variable 62

49a Basal leaves persistent, mostly present at flowering time 50
b Basal leaves caducous, mostly absent at flowering time 55

50a Basal leaf blade oblanceolate, attenuate at base ..... **7. *S. rolwalingensis***
b Basal leaf blade ovate to broadly ovate, cuneate to rounded or cordate at base 51

51a Lower median cauline leaves petiolate ..... **5. *S. hookeri***
b Lower median cauline leaves sessile 52

52a Cauline leaves rounded at base, not amplexicaul ..... **1. *S. diversifolia***
b At least some cauline leaves cordate at base, amplexicaul 53

Saxifragaceae

53a Median cauline leaves 2–3.5 cm. Stems densely brown crisped villous proximally ..... **2. *S. parnassifolia***
b Median cauline leaves 0.8–2 cm. Stems glabrous proximally 54

54a Median cauline leaves glabrous ..... **3. *S. sphaeradena***
b Median cauline leaves pubescent ..... **4. *S. dhwojii***

55a Lower cauline leaves sessile 56
b Lower cauline leaves petiolate 58

56a Lower cauline leaves oblanceolate. Stems glabrous in median part ..... **8. *S. moorcroftiana***
b Lower cauline leaves elliptic or ovate to narrowly so. Stems pale brown crisped villous in median part, often densely so 57

57a Cauline leaves ovate to narrowly so. Inflorescence with more than 10 flowers ..... **9. *S. kingiana***
b Cauline leaves elliptic. Flowers 1 or 2 ..... **10. *S. kingdonii***

58a Pedicel with at least some brown crisped villous hairs 59
b Pedicel glandular-pubescent 60

59a Flowers usually solitary, rarely 2. Rootstock without stolons ..... **12. *S. sikkimensis***
b Flowers up to 10. Rootstock often with leafy stolons ..... **13. *S. lamninamensis***

60a Petals red ..... **11. *S. excellens***
b Petals yellow 61

61a Blade of lower cauline leaves lanceolate. Petals 10–15 mm ..... **6. *S. latiflora***
b Blade of lower cauline leaves oblanceolate. Petals 7.5–8.5 mm ..... **7. *S. rolwalingensis***

62a Basal leaves caducous, absent at flowering ..... **14. *S. amabilis***
b Basal leaves persistent, mostly present at flowering 63

63a Upper surface of basal leaves glabrous 64
b Upper surface of basal leaves variously pubescent 69

64a Pedicels glabrous ..... **15. *S. lepida***
b Pedicels glandular-pubescent 65

65a Inflorescence 3–7-flowered ..... **28. *S. nigroglandulifera***
b Flower solitary 66

66a Flowering stem apparently leafless ..... **23. *S. caveana***
b Flowering stem leafy 67

67a Apex of basal leaves aristulate ..... **25. *S. aristulata***
b Apex of basal leaves obtuse to acute 68

68a Basal leaves 10–25 mm. Sepals oblong to elliptic ..... **16. *S. mallae***
b Basal leaves 3–8 mm. Sepals ovate ..... **17. *S. nakaoi***

69a Basal leaves with long, slightly wavy, eglandular hairs adaxially and marginally ..... **21. *S. cordigera***
b Basal leaves shortly glandular-pubescent or eglandular hispid adaxially 70

70a Petals oblong to narrowly obovate, ca. 3× as long as wide 71
b Petals ovate to elliptic to obovate, to 2× as long as wide 73

71a Basal leaves spatulate, without a well-defined petiole. Flower usually solitary ..... **26. *S. lychnitis***
b Basal leaves petiolate. Flowers 1–7 72

72a Upper surface of basal leaves glandular-pubescent ..... **27. *S. viscidula***
b Upper surface of basal leaves glabrous or sparingly pubescent ..... **28. *S. nigroglandulifera***

73a Pedicel glabrous..... **18. *S. glabricaulis***
b Pedicel short glandular-pubescent.....74

74a Upper surface of basal leaves shortly glandular-pubescent.....**24. *S. harae***
b Upper surface of basal leaves eglandular hispid.....75

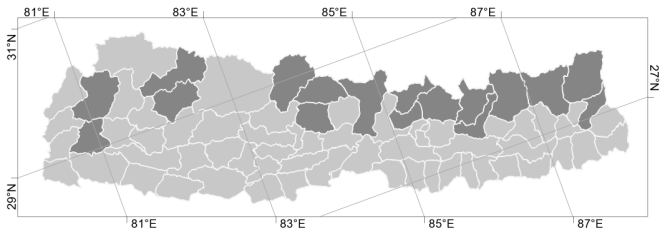
75a Stems 3–5 cm ..... **22. *S. palpebrata***
b Stems 4–12 cm 76

76a Petals ca. 7.5 mm..... **19. *S. zimmermannii***
b Petals 5–6 mm ..... **20. *S. ganeshii***

1. *Saxifraga diversifolia* Wall. ex Ser., in DC., Prodr. 4: 44 (1830).

Stems caespitose or simple, erect, sometimes forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 2.5–10(–13) cm, brown crisped eglandular or glandular-villous. Blade ovate, 1.5–7 × 1–4.6 cm, base rounded to cordate, apex acute, margin brown crisped villous, both surfaces glabrous or brown crisped villous. Median cauline leaves sessile, ovate to narrowly ovate, 1–6.3 × 0.4–4 cm, base rounded, apex acute, margin brown crisped eglandular-villous at base, both surfaces glabrous or pubescent. Upper cauline leaves smaller, margin shortly brown glandular-pubescent, both surfaces glabrous. Flowering stems 10–45 cm, basal parts brown crisped eglandular or glandular-villous or glabrous, most densely shortly brown glandular-pubescent above, bulbils absent. Flowers 3–10 (or more), in a corymbose cyme, bisexual. Pedicels 6–15 mm, shortly brown glandular-pubescent. Sepals reflexed, elliptic to ovate, 3–6 × 1.3–4 mm, outer surface and margin shortly brown glandular-pubescent or glabrous, veins 3–5, free or partly confluent. Petals yellow, obovate, 5–8 × 2–6 mm, base narrowed, apex obtuse, not callose. Stamens 4–5.5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into conical, 1–1.5 mm styles.

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 2400–4800 m.

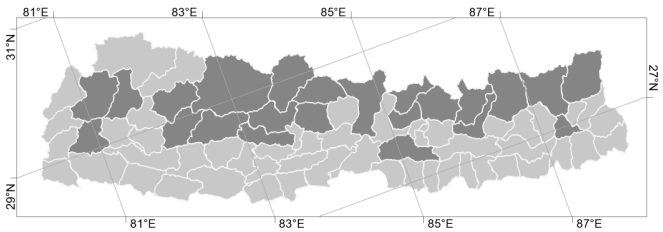
Ecology: Mid hills to alpine.

Flowering: July–September.

2. *Saxifraga parnassifolia* D.Don, Trans. Linn. Soc. London 13(2): 405 (1821).
Saxifraga diversifolia var. *parnassifolia* (D.Don) Ser.

Stems caespitose or simple, erect, often forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 1.5–8 cm, brown crisped eglandular- or glandular-villous. Blade ovate, 2–6.5 × 1.5–4.5 cm, base rounded to cordate, apex acute to obtuse, both surfaces and margin brown crisped villous. Median cauline leaves sessile, ovate, (1–)2–3.5 × (0.8–)1.5–2.5 cm, base cordate, amplexicaul, apex acute to obtuse, both surfaces and margin brown glandular-pubescent, or both surfaces glabrous or nearly so. Upper cauline leaves smaller, both surfaces and margin shortly brown glandular-pubescent or lower surface glabrous. Flowering stems (8–)15–50 cm, brown crisped eglandular- or glandular-villous at base, brown crisped glandular-villous or glabrous in median part, densely short brown glandular-pubescent above, bulbils absent. Flowers 3–10 (or more) in a corymbose cyme, bisexual. Pedicels 5–30 mm, shortly brown glandular-pubescent. Sepals erect to spreading, narrowly ovate, 3–4 × 1.5–2 mm, apex obtuse to subacute, outer surface and margin shortly brown glandular-pubescent, veins 3, confluent near apex. Petals yellow, obovate, 6–8 × 3.5–4 mm, base contracted into a claw ca. 1 mm, apex obtuse, 4-callose. Stamens 2–3 mm. Nectary band obscure. Ovary semi-inferior, carpels fused for about half their length, contracted into slender, ca. 3 mm styles.

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 1400–4900 m.

Ecology: Mid hills to alpine.

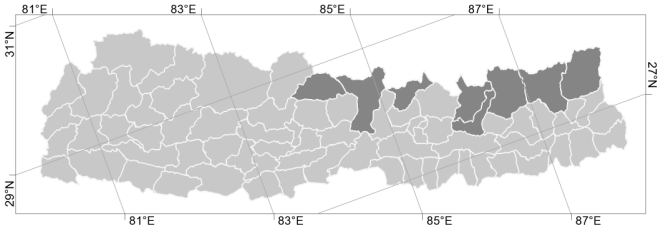
Flowering: July–September. **Fruiting:** September.

3. *Saxifraga sphaeradena* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 235, pl. 15B fig. 4a (1960).

Stems caespitose or simple, erect, often forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate.

Petiole 1–7 cm, glabrous or brown crisped villous. Blade ovate, 10–20(–30) × 6–15(–20) mm, base rounded to cordate, apex acute, both surfaces glabrous. Cauline leaves sessile, cordate to ovate, 8–20(–30) × 5–15(–20) mm, base cordate, amplexicaul, apex acute, margin brown crisped villous at base or glabrous, both surfaces glabrous. Uppermost cauline leaves margin shortly blackish glandular-pubescent. Flowering stems 8–20(–30) cm, lower parts glabrous, shortly blackish glandular-pubescent above, bulbils absent. Flowers solitary or to 3(–5) in a cyme, dioecious. Pedicels 5–30 mm, shortly blackish glandular-pubescent. Sepals spreading, ovate, ca. 4 × 2 mm, apex obtuse, margin blackish glandular-pubescent, both surfaces glabrous, veins 3–6, confluent. Petals yellow, obovate, ca. 7 × 5 mm, base without a claw, apex obtuse, not callose. Stamens ca. 7 mm in male flowers. Nectary band obscure. Ovary (female flowers only) almost superior, carpels fused for more than half their length, tapered into ca. 1.5 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 3300–4800 m.

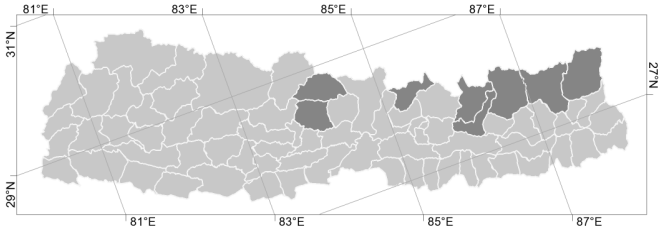
Ecology: Mid hills to alpine, in masses on rocks, on stony hill slopes.

Flowering: July–September.

4. *Saxifraga dhwojii* (Harry Sm.) S.Akiyama & H.Ohba, Bull. Natl. Sci. Mus., Tokyo, B. 33(3/4): 97 (2007).
Saxifraga sphaeradena subsp. *dhwojii* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 236, pl. 4 fig. e (1960).

Stems caespitose or simple, erect, often forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole ca. 10 mm, glabrous or brown crisped villous at least near the base. Blade ovate, 8–10 × 5–7 mm, base rounded to cordate, apex acute, adaxial surface eglandular-pubescent. Cauline leaves sessile, cordate to ovate, 5–12 × 3–6 mm, base cordate, amplexicaul, apex acute, margin brown crisped villous at base or glabrous, upper surface eglandular-pubescent or glabrous. Uppermost cauline leaves margin shortly blackish glandular-pubescent. Flowering stems 5–12 cm, lower parts glabrous or sparingly eglandular-brown-pubescent, shortly black glandular-pubescent above, bulbils absent. Flowers solitary. Pedicels 12–35 mm, shortly blackish glandular-pubescent. Sepals spreading, ovate, 3–3.5 × 1.5–2 mm, apex obtuse, margin blackish glandular-pubescent, adaxial surface black glandular-pubescent proximally, veins 3–6, confluent. Petals yellow, ovate to obovate, 4–7 × 4–5 mm, base with a claw 1–1.5 mm, apex rounded, 2–4 callose. Stamens 3–4 mm. Nectary band obscure. Ovary semi-inferior, carpels fused for more than half their length, tapered into ca. 1.5 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 3600–4500 m.

Ecology: Alpine.

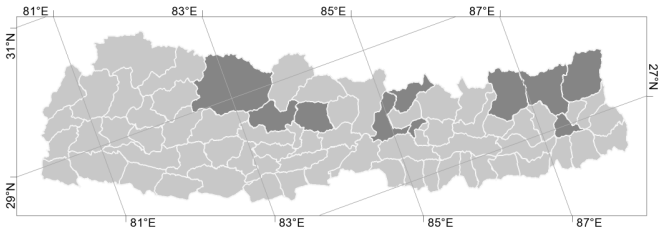
Flowering: September.

An imperfectly known species that appears also to be closely related to *Saxifraga parnassiifolia* D.Don.

5. *Saxifraga hookeri* Engl. & Irmsch., Bot. Jahrb. Syst. 48: 582 (1912).
Saxifraga corymbosa Hook.f. & Thomson.

Stems caespitose or simple, erect, forming clumps. Stolons absent. Leaves alternate. Basal and lower cauline leaves sometimes absent at anthesis, petiolate. Petiole to 4 cm, brown crisped villous. Blade elliptic to ovate, 15–20 × 8–10 mm, base cuneate to rounded, apex acute, margin brown crisped villous, both surfaces pubescent. Median cauline leaves shortly petiolate to sessile, smaller than lower leaves, blade ovate to narrowly ovate, base brown crisped villous, apex acute, both surfaces pubescent or sometimes glabrous above. Upper cauline leaves sessile, lanceolate to narrowly elliptic, upper surface and margin short blackish glandular-pubescent. Flowering stems 12–30(–45) cm, brown crisped villous, mostly shortly blackish glandular-pubescent in upper parts, sometimes glabrous, bulbils absent. Flowers (1–)3–12 in a corymbose cyme, bisexual. Pedicels 3–20 mm, shortly blackish glandular-pubescent. Sepals spreading, lanceolate to ovate, 3–4 × 1–2 mm, apex acute, outer surface and sometimes margin short blackish glandular-pubescent, veins 3, free. Petals yellow, minutely spotted orange, obovate, 6–8 × 3–4 mm, base contracted to a claw, apex obtuse, 3–4-callose. Stamens 3–5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into conical ca. 1 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 3000–4600 m.

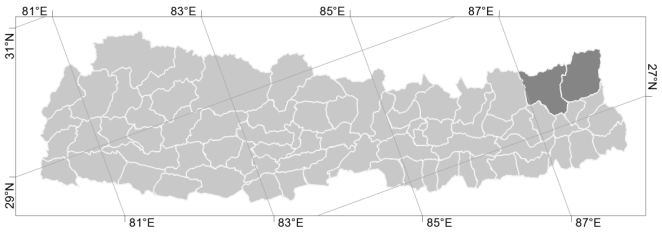
Ecology: Alpine, open slopes, stony ground.

Flowering: July–September.

6. *Saxifraga latiflora* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 71 (1857).

Stems caespitose or simple, erect, forming clumps. Stolons absent. Leaves alternate. Basal leaves often absent at flowering. Lower cauline leaves petiolate Petiole 1–4 cm, brown crisped villous, sheathing in basal leaves. Blade lanceolate, 2–4 × 0.6–1.2 cm, base attenuate, apex acute, margin brown crisped glandular-villous, texture herbaceous, both surfaces brown crisped glandular-villous. Middle and upper cauline leaves sessile, similar to but smaller than the lower leaves. Flowering stems 6–15 cm, glabrous at base, mostly brown crisped glandular-villous above, bulbils absent. Flowers usually solitary, rarely 2–4, bisexual. Pedicels 3–10 mm, brown crisped glandular-villous. Sepals erect, ovate, ca. 7 × 4 mm, apex obtuse, outer surface and margin brown glandular-ciliate, veins 3–5, confluent near apex. Petals yellow, ovate, 10–15 × 6–10 mm, base with a short claw, apex subacute to obtuse, many-callose. Stamens 3.5–5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into ca. 1 mm styles.

Distribution: Nepal and E Himalaya.



Altitudinal range: 4100–4600 m.

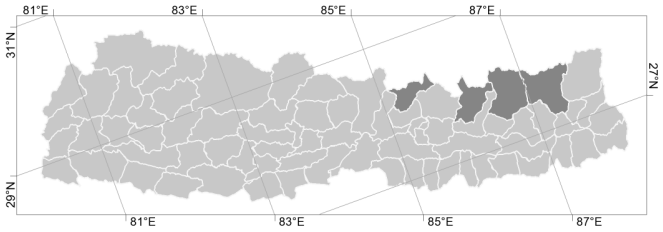
Ecology: Alpine.

Flowering: July–August.

7. *Saxifraga rolwalingensis* H.Ohba, J. Jap. Bot. 59(12): 360 (1984).

Stems caespitose or simple, erect, forming clumps. Stolons absent. Leaves alternate. Basal leaves somewhat persistent. Lower cauline leaves petiolate or almost sessile. Blade oblanceolate, 3.5–6 × 0.7–0.9 cm, base attenuate, apex acute, lower surface brown crisped villous, upper surface glabrous. Median and upper cauline leaves sessile, ovate to lanceolate, smaller than lower leaves, base rounded, truncate to cordate, lower surface brown crisped villous or glabrous, upper surface glabrous. Flowering stems (8–)14–25(–35) cm, brown crisped villous towards base, glabrous in median part, glandular-pubescent above, bulbils absent. Flowers (1–)3–5, in a cyme, bisexual. Pedicels to 2 cm, long glandular-pubescent. Sepals spreading, ovate to broadly oblong, 4–5 × 2–3.5(–4) mm, apex obtuse, margin short blackish glandular-pubescent, veins 3–5, confluent. Petals yellow, spotted orange, narrowly obovate, 7.5–8.5 × 5–6.2 mm, base attenuate, apex rounded, not callose. Stamens ca. 3 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into ca. 1 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 4000–4600 m.

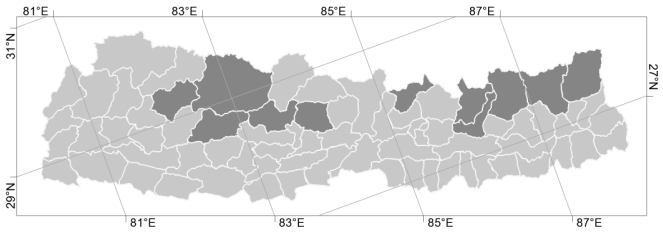
Ecology: Open, stony slopes.

Flowering: September.

8. *Saxifraga moorcroftiana* (Ser.) Wall. ex Sternb., Revis. Saxifrag. Suppl.2: 28, pl. 24 (1831).
Saxifraga diversifolia var. *moorcroftiana* Ser., Prodr. 4: 44 (1830); *Hirculus moorcroftianus* (Ser.) Losinsk.; *Saxifraga lysimachioides* Klotzsch.

Stems caespitose or simple, erect, forming clumps. Stolons absent. Leaves alternate. Basal leaves usually absent at flowering time. Cauline leaves usually sessile, reducing upwards, the basal-most ones caducous. Lower cauline leaves oblanceolate to oblong, 2–6 × 0.6–1.5 cm, base cuneate, apex acute, lower surface pubescent, upper surface and margin glabrous. Median cauline leaves lanceolate, base rounded to cordate or amplexicaul, apex acute, glabrous, uppermost leaves marginally sparsely glandular-pubescent. Flowering stems 12–50 cm, brown crisped villous towards base, nearly glabrous in median part, brown glandular-pubescent above, bulbils absent. Flowers (1 or)2–6(–10) in a corymbose cyme, bisexual. Pedicel 7–25 mm, glandular-pubescent. Sepals erect to spreading, ovate, ca. 4 × 3 mm, apex rounded to obtuse, outer surface glabrous, margin shortly black glandular-pubescent, veins 3–5, median 3 confluent near apex. Petals yellow, obovate, 7–10 × 3.5–6 mm, base without a claw, apex rounded, 2-callose. Stamens 5–6 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into ca. 1 mm styles.

Distribution: Nepal, W Himalaya, E Himalaya, Tibetan Plateau and E Asia.



Altitudinal range: 3500–4600(–4900) m.

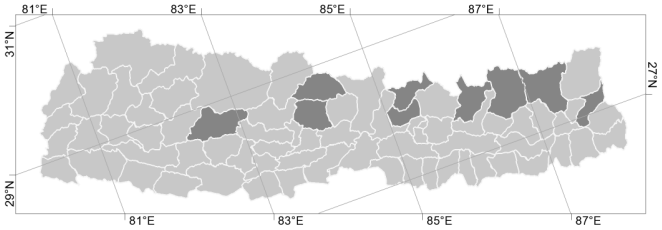
Ecology: Alpine, open slopes.

Flowering: July–September.

9. *Saxifraga kingiana* Engl. & Irmsch., Bot. Jahrb. Syst. 48: 610 (1912).
Saxifraga gageana Engl. & Irmsch. later homonym, non W.W.Sm.

Stems caespitose or simple, erect, forming clumps. Stolons absent. Leaves alternate. Basal leaves absent at flowering time. Cauline leaves sessile, lanceolate to ovate, to 3.5–5.5 × 1.8–3.2 cm, base cordate, amplexicaul, apex acute to acuminate, margin entire, both surfaces and margin villous (glandular in upper leaves). Basal and upper leaves smaller than the median, most lower leaves caducous. Flowering stems to 70 cm, densely pale brown crisped villous towards base, pale brown glandular-villous above, bulbils absent. Flowers numerous in a pryamidal cyme, terminal and in axils of upper leaves, bisexual. Pedicels 8–20 mm, pale brown glandular-villous. Sepals spreading, ovate, 5–6.5 × 3–4.5 mm, apex acute, pale brown slightly glandular crisped villous, on outer surface, apex and margin, veins 3, confluent near apex. Petals yellow, obovate to suborbicular, 7–10 × 4–8 mm, base with a short claw, apex obtuse, very finely several-callose. Stamens 4–5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into conical ca. 1.5 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 2900–4400 m.

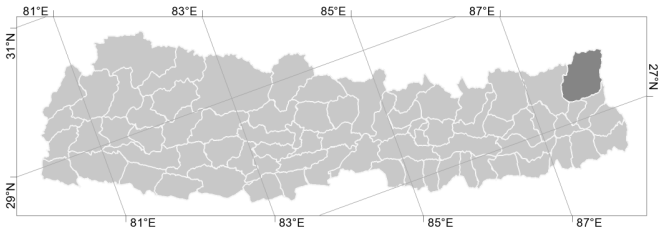
Ecology: Alpine, rock slopes, scree slopes, stony places.

Flowering: July–August(–September).

10. *Saxifraga kingdonii* C.Marquand, J. Linn. Soc., Bot. 48: 179 (1929).
Saxifraga nayari Wadhwa.

Stems caespitose or simple, erect, forming clumps. Stolons absent. Leaves alternate. Basal leaves absent at flowering time. Basal leaves mostly caducous, with petiole 3–5 mm, blade elliptic to broadly ovate, 5–12 × 4–5 mm, both surfaces and margin crisped-rufous hairy. Cauline leaves sessile, elliptic, 4.5 × 2.5 mm, reducing in size upwards, apex obtuse, both surfaces eglandular-pilose, sometimes densely so, margin pilose, sometimes sparingly. Flowering stems ca. 25 cm, rufous-pubescent, proximally eglandular, distally glandular. Flower solitary, or cyme 2-flowered. Pedicels glandular-villous. Sepals erect to spreading, oblong to broadly ovate, 6.5–10 × 2.5–7 mm, abaxially and marginally glandular- or eglandular-villous; veins 3–5, partly confluent at apex. Petals yellow to orange, elliptic, (6–)8–12 × 5–9 mm, base truncate to a short claw, several-callose, 5–7-veined. Stamens ca. 6 mm. Ovary subsuperior, carpels fused for more than half their length, encircled at base by a conspicuous nectary band, tapered into conical styles.

Distribution: Nepal, Tibetan Plateau and Assam-Burma.



Altitudinal range: ca. 4000 m.

Ecology: Mountain slopes.

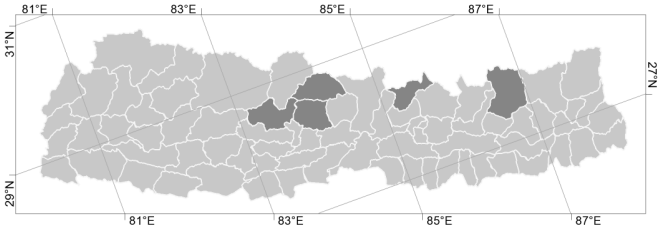
Flowering: September.

Known in Nepal from only a single collection (*Binns et al*. *BMW126*, Yalung. KATH). Specimens that are less pilose and with leaves and petals less broadly elliptic (as here) were distinguished as *Saxifraga nayarii* Wadhwa, but the distinction is not convincing.

11. *Saxifraga excellens* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 230, pl. 13B fig. 1t (1960).

Stems caespitose or simple, erect, sometimes forming clumps. Stolons absent. Leaves alternate. Basal leaves absent or sometimes present, similar to lower cauline leaves but smaller. Lower cauline leaves petiolate. Petiole 1–7 cm, long brown crisped pubescent, sometimes winged and amplexicaul. Blade obovate-elliptic, 7–9.5 × 4–5.3 cm, margin and lower surface long brown crisped pubescent, upper surface sparsely pubescent, Median and upper cauline leaves sessile, broadly elliptic, 7–13 × 4–6.5 cm, base rounded to amplexicaul, apex obtuse, margin and lower surface long brown crisped pubescent, upper surface sparsely pubescent. Flowering stems 15–40 cm, basal parts glabrous, brown crisped eglandular-villous above, bulbils absent. Flowers 2–10 in a cyme, bisexual. Pedicel 3–20 mm, glandular- or eglandular-pubescent. Sepals erect, broadly ovate, ca. 4.5 × 3.5 mm, apex obtuse, very minutely laciniate, margin glandular-pubescent or glabrescent at base, outer surface glabrous, veins 5, median 3 confluent. Petals reddish purple, obovate, 9–12 × 6–10 mm, base gradually narrowed, apex rounded, not callose. Stamens ca. 6 mm. Ovary almost superior, carpels fused for more than half their length, tapered into conical 1–2 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 3600–4700 m.

Ecology: In *Abies* forest to alpine habitats, under overhanging boulders, on mossy rocks.

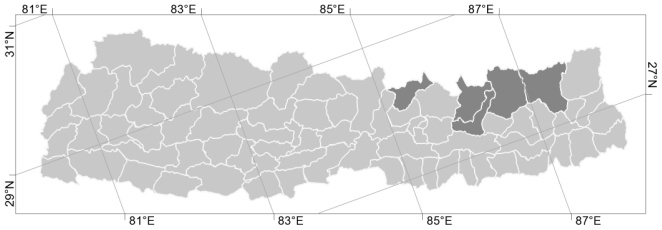
Flowering: August–September.

Although endemic it is known from at least eight localities.

12. *Saxifraga sikkimensis* Engl., Bot. Jahrb. Syst. 48: 573 (1912).
Saxifraga bertholdii Baehni.

Stems caespitose, simple, erect, forming clumps. Stolons absent. Leaves alternate. Basal leaves absent at flowering time. Lower leaves petiolate, upper leaves sessile. Petiole 3–12(–15) mm, brown crisped villous. Blade lanceolate to ovate, 6–14 × 2–5 mm, base rounded to cuneate, attenuate into petiole, apex acute, margin entire, sometimes with brown hairs, texture herbaceous, upper surface glabrous or pubescent, lower surface usually glabrous or rarely sparsely pubescent. Flowering stems 6–20 cm, brown crisped villous, leaves 6–12, bulbils absent. Flowers usually solitary, rarely 2, bisexual. Pedicels 5–20 mm, brown crisped villous, sometimes sparingly so. Sepals spreading, oblong-elliptic, 3–4 × 2–2.5 mm, apex rounded, margin and adaxial surface glabrous, veins 3, free. Petals yellow, obovate, 6–10 × 3–7 mm, base with a short claw, apex obtuse to slightly retuse, finely 2-callose or not. Stamens 3–5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into ca. 1 mm styles.

Distribution: Nepal, E Himalaya and Assam-Burma.



Altitudinal range: 3200–4600(–5200) m.

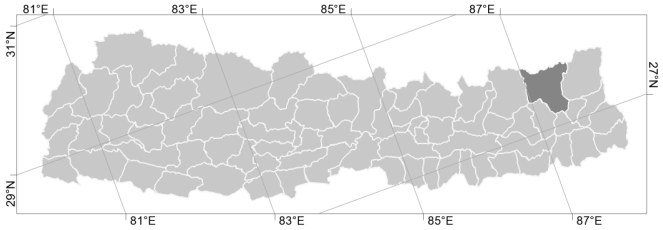
Ecology: Alpine, shrubby banks, sandy slopes.

Flowering: August–October.

13. *Saxifraga lamninamensis* H.Ohba, J. Jap. Bot. 59: 362 (1984).

Stems caespitose or simple, erect, often producing stoloniferous leafy shoots from axillary buds on rhizome. Leaves alternate. Basal and lower cauline leaves petiolate. Petiole 10–20 mm, brown crisped villous. Blade lanceolate, 15–20 × 5–10 mm, base attenuate, apex acute, margin brown crisped villous, both surfaces pubescent. Median and upper cauline leaves sessile, similar to but smaller than lower leaves, margin brown crisped villous at base, both surfaces glabrous to sparsely pubescent. Flowering stems 10–25 cm, sparsely crisped brown eglandular villous, bulbils absent. Flowers (1–)4–5(–10) in a cyme, bisexual. Pedicels ca. 4 cm, glandular-pubescent. Sepals erect to spreading, linear-oblong to oblong, 4–4.5 × 1.8–2 mm, apex obtuse, glabrous, veins 3, confluent. Petals yellow, obovate-oblong to narrowly oblong, 6.5–7.5 × 3.5–4 mm, base attenuate, apex rounded, not callose. Stamens 4–5 mm. Ovary almost superior, carpels fused for more than half their length, tapered into ca. 1mm styles.

Distribution: Nepal and E Himalaya.



Altitudinal range: 3200–4200 m.

Ecology: Alpine.

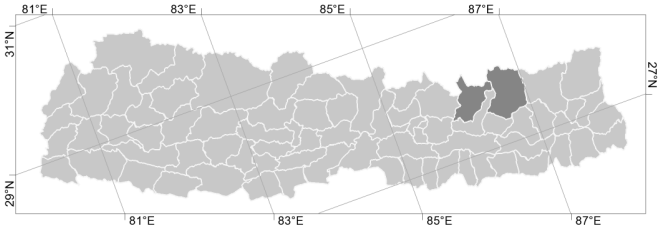
Flowering: August.

14. *Saxifraga amabilis* H.Ohba & Wakab., J. Jap. Bot. 62: 162 (1987).

Stems caespitose, many-branched, forming mats. Stolons absent. Leaves alternate. Basal leaves absent at time of flowering. Cauline leaves sessile, oblanceolate to narrowly ovate, 4–5 × 1.5–2.2(–2.5) mm, base cuneate, apex aristate in lower leaves, obtuse to acute with or without glandular hairs in median and upper leaves, margin hispid in lower leaves, glandular-pubescent in upper leaves, both surfaces glabrous. Flowering stems 3–5 cm, glabrous at base, blackish-glandular-pubescent above, bulbils absent. Flower solitary, bisexual. Pedicels glandular-pubescent. Sepals erect or ascending, oblong to oblong-spatulate, 4–5 × 2–2.5 mm, apex apiculate to acute with or without a glandular hair, outer surface and margin blackish glandular-pubescent, veins usually 3, confluent. Petals yellow, spotted orange at base, obovate, 5–6.5 × 3–4 mm, base narrowed into a claw, apex rounded. Stamens 3–3.5 mm. Nectary band obscure. Ovary superior, carpels fused for more than half their length, tapered into slender ca. 1 mm styles.

Distribution: Endemic to Nepal.

Saxifragaceae



Altitudinal range: 4000–4600 m.

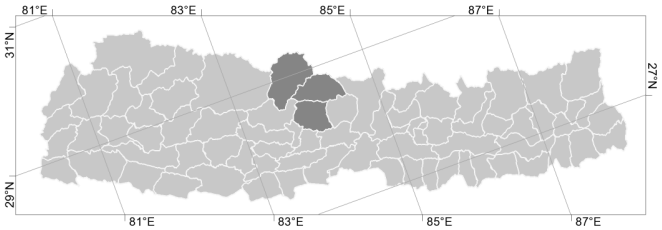
Ecology: Alpine.

Flowering: July–August(–September).

15. *Saxifraga lepida* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 239, pl. 17A (1960).

Stems caespitose or simple, erect, forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole to 15 mm, glabrous or sparsely pubescent. Blade lanceolate-linear to lanceolate, 5–15 × 0.6–2 mm, base attenuate, apex obtuse to subacute, both surfaces glabrous. Lower cauline leaves petiolate, median and upper leaves sessile. Cauline leaves linear, 5–13 × ca. 1 mm, smaller above, both surfaces glabrous or pubescent. Flowering stems 3.5–8 cm, glabrous except brown crisped hairs in axils, leaves 3–8, bulbils absent. Flowers solitary, unisexual. Pedicels 15–30 mm, glabrous. Sepals spreading or reflexed at anthesis, elliptic, 2.5–3.5 × 1.5–1.6 mm, apex obtuse, margin glabrous or sparsely brown crisped pubescent, outer surface glabrous, veins 3, confluent. Petals yellow, rotund-obovate to obovate, 6–7.5 × 4–4.2 mm, base with a short claw, apex rounded, not callose. Stamens ca. 3.5 mm. Nectary band obscure. Ovary in female flowers almost superior, carpels fused for more than half their length, tapered into ca. 1 mm styles.

Distribution: Nepal and E Himalaya.



Altitudinal range: 3100–4300 m.

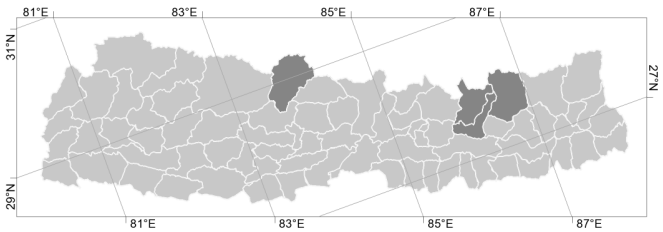
Ecology: Alpine, grassy ravines.

Flowering: August.

16. *Saxifraga mallae* H.Ohba & Wakab., J. Jap. Bot. 62: 165 (1987).

Stems caespitose, simple, erect, sometimes in clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 1–2.5 cm, glabrous or very rarely brown crisped villous. Blade linear to linear-lanceolate, 10–25 × 0.6–2 mm, glabrous. Lower cauline leaves petiolate, upper leaves sessile. Leaves decreasing in size upwards, apex obtuse, glabrous or very rarely brown crisped villous at base. Flowering stems 3–8 cm, lower parts glabrous, shortly black glandular-pubescent above, bulbils absent. Flowers solitary, sometimes unisexual. Pedicels shortly blackish glandular-pubescent. Sepals spreading at anthesis, narrowly oblong to broadly lanceolate, 3–4 × 1–2 mm, apex obtuse, glabrous or just margin blackish glandular-pubescent, veins 3, confluent. Petals yellow, often spotted yellow, obovate, 7–9 × 4–5 mm, base cuneate to attenuate, apex rounded, not callose. Stamens 3–4 mm (male flowers). Nectary band obscure. Ovary superior, carpels fused for more than half their length, tapered into ca. 1 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 3900–5000 m.

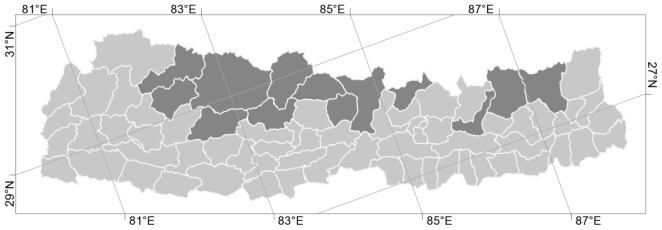
Ecology: Alpine.

Flowering: July–August(–September).

17. *Saxifraga nakaoi* Kitam., in H.Kihara, Fauna Fl. Nepal Himalaya: 144, fig. 25 (1955).
Saxifraga breviglandulosa Harry Sm. nom. nud.

Stems caespitose, branched, forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 1–2 cm, pale brown crisped pubescent. Blade narrowly ovate to ovate-lanceolate, 3–8 × 1.5–2.5 mm, base attenuate into petiole, apex acute, surfaces glabrous. Lower cauline leaves petiolate, upper leaves sessile, blade similar to basal leaves, lanceolate 6–12 × 1.5–2 mm, somewhat decreasing in size upwards. Flowering stems 5–12 cm, lower parts glabrate except nodes with brown crisped hairs, dark brown glandular-pubescent above, bulbils absent. Flowers solitary, functionally unisexual. Pedicels 5–15 mm, densely black glandular-pubescent. Sepals spreading at anthesis, ovate, 3–3.5 × 1–2 mm, apex acute, proximal margin black glandular-pubescent, outer surface glabrous, veins 3–5, confluent. Petals yellow, broadly obovate, 6.5–8 × 4–5 mm, base cuneate, apex rounded, 2–4 callose. Stamens 3.5–4 mm in male flowers. Nectary band obscure. Ovary superior, carpels fused for more than half their length, abruptly tapered into styles. Styles 1–1.5 mm in female flowers.

Distribution: Nepal, W Himalaya and E Himalaya.



Altitudinal range: 3500–5200 m.

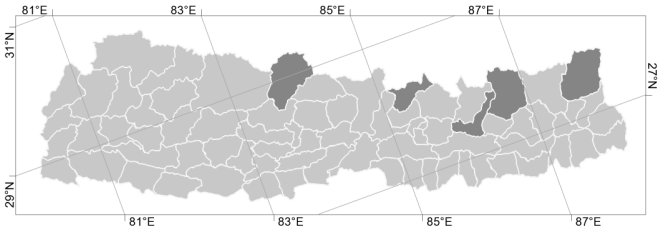
Ecology: Alpine, open grass slopes, open stony cliffs.

Flowering: July–August(–September).

18. *Saxifraga glabricaulis* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 241, pl. 18A fig. 7 (1960).
Saxifraga palpebrata var. *parceciliata* Engl. & Irmsch.

Stems caespitose, many-branched, forming cushions. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole to 10 mm, margin eglandular or glandular hispid. Blade ovate to elliptic, 2–3 × 1–2 mm, base attenuate, apex obtuse to acute, margin eglandular hispid, upper surface eglandular hispid, lower surface glabrous. Lower cauline leaves shortly petiolate, upper leaves sessile. Blade elliptic, 4–5 × 1–2 mm, base cuneate, apex obtuse, margin eglandular hispid, upper surface eglandular hispid. Flowering stems 2–4 cm, glabrous, bulbils absent. Flowers solitary, unisexual. Pedicels 1–5 mm, glabrous. Sepals erect to spreading, ovate, 3–4 × 1–3 mm, apex obtuse, glabrous, veins 3–6, confluent. Petals yellow, elliptic, ca. 8 × 5.5 mm, base narrowed into a claw ca. 1.5 mm, apex obtuse, 2–4 callose. Stamens 2–3.5 mm in male flowers (smaller and sterile in female flowers). Nectary a prominent annular disk. Ovary superior, carpels fused for more than half their length, narrowed into divergent styles. Styles ca. 1.5 mm in female flowers.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4100–4500 m.

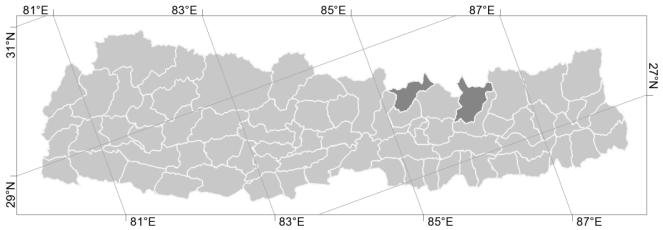
Ecology: Alpine, sandy ground, on rocks.

Flowering: July–August(–September).

19. *Saxifraga zimmermannii* Baehni, Candollea 16: 226 (1958).

Stems caespitose, branched, forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 4–6 mm, glabrous or sparsely brown crisped villous. Blade ovate to narrowly ovate, 10–20 × 0.6–5 mm, base rounded to tapered, apex obtuse, margin long-ciliate, both surfaces long eglandular villous. Cauline leaves sessile, oblong-lanceolate, apex obtuse, glabrous, brown crisped villous at nodes. Flowering stems 7–12 cm, lower parts glabrate, shortly black glandular-pubescent above, bulbils absent. Flowers solitary or 2 in a cyme. Pedicels 5–13 mm, shortly black glandular-pubescent. Sepals erect at anthesis, elliptic-ovate, ca. 4 × 2.5 mm, apex obtuse, glabrous, veins 3. Petals yellow, obovate, 7.5–8 × 4–4.5 mm, base cuneate, apex obtuse, not callose. Stamens ca. 4 mm. Nectary obscure. Ovary superior, carpels fused for more than half their length, narrowed into ca. 1.5 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: (3600–)4000–4500 m.

Ecology: Alpine.

Flowering: August–September.

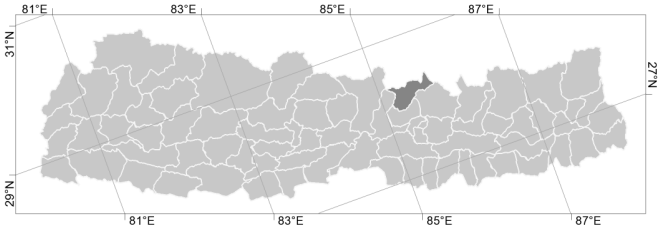
A narrow endemic known with certainty only from the type collection (*Zimmerman 1436*, G, BM).

20. *Saxifraga ganeshii* H.Ohba & S.Akiyama, J. Jap. Bot. 74: 223 (1999).

Stems caespitose. Stolons absent. Leaves alternate. Basal leaves petiolate, Petiole to 15 mm, sparsely pubescent. Blade ovate-lanceolate to lanceolate, 5–15 × 2.5–5 mm, base narrowed into petiole, apex obtuse, upper surface and margin pale brown crisped pubescent, lower surface glabrous. Lower cauline leaves shortly petiolate, upper leaves sessile. Blade narrowly ovate-elliptic to elliptic, 3–8 × 2–3 mm, reducing in size upwards, pale brown crisped pubescent and sometimes pale brown glandular-pubescent. Flowering stems 4–11 cm, sparsely pale brown pubescent throughout, densely brown crisped villous in leaf axils, pale brown glandular-pubescent above, bulbils absent. Flowers solitary, bisexual. Pedicels up to 2 mm, pale brown glandular and sparsely pale brown crisped pubescent. Sepals oblong, ca. 3 × 2.5–3 mm, apex obtuse, margin pale brown crisped eglandular or glandular-pubescent, both surfaces glabrous. Petals yellow, unspotted, broadly elliptic, 5–6 × 3.5–4.5 mm, base contracted into a very short claw, apex slightly retuse to obtuse, (3 or)4-callose. Ovary superior, carpels fused for more than half their length, narrowed into styles.

Distribution: Endemic to Nepal.

Saxifragaceae



Altitudinal range: ca. 4250 m.

Ecology: Alpine.

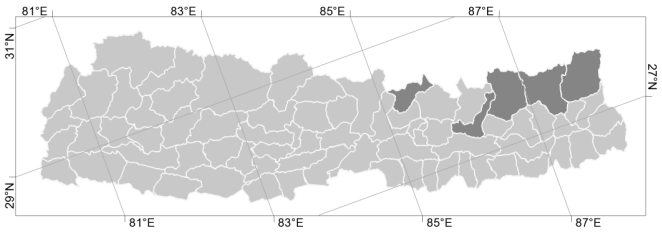
Flowering: August.

Known only from the type collection from Rasuwa (*Miyamoto et al. 9420122*, A, TNS).

21. *Saxifraga cordigera* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 68 (1857).

Stems caespitose, simple or many-branched, forming cushions or mats. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole ca. 5 mm, margin brown eglandular crisped villous. Blade ovate to obovate, ca. 3 × 2 mm, base attenuate, apex obtuse, margin brown eglandular crisped villous, upper surface villous or glabrous, lower surface glabrous. Cauline leaves sessile, lowest leaves elliptic, median and upper leaves ovate, 4–7 × 3–4 mm, base cordate, apex obtuse to subacute, margin long brownish villous (hairs longer than 1 mm), both surfaces glabrous or lower surface sparsely villous. Flowering stems 2–6 cm, brown crisped villous, bulbils absent. Flower solitary, bisexual. Pedicels 2–8 mm, eglandular crisped villous. Sepals erect, elliptic to obovate, 2.5–4 × 1.5–2 mm, apex obtuse, outer surface glabrous, margin villous-pubescent, veins 3–5, confluent near apex. Petals yellow, orange spotted, obovate, 5–8 × 2.5–4.5 mm, base contracted to a claw, apex obtuse, not callose. Stamens ca. 1.5 mm. Nectary band obscure. Ovary superior, carpels fused for more than half their length, contracted into 0.5–0.75 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 3900–5100 m.

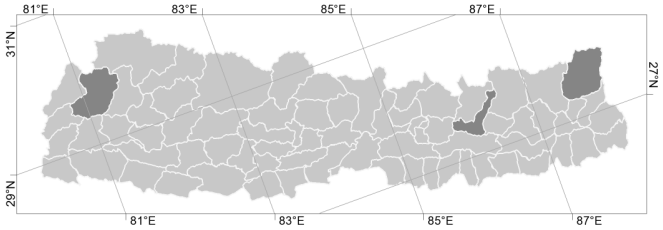
Ecology: Alpine, on rocks, among rocks, rocky slopes.

Flowering: July–August(–September).

22. *Saxifraga palpebrata* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 67 (1857).

Stems caespitose, simple or sometimes many-branched, forming cushions. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 5–15 mm, villous-ciliate. Blade spatulate, 4–10 × 2–5 mm, base tapered, apex obtuse, margin and upper surface villous, lower surface glabrous. Lower cauline leaves shortly petiolate, upper leaves sessile, similar to basal leaves, oblong to ovate, ca. 4.5 mm. Flowering stems 3–10 cm, glandular-villous, bulbils absent. Flowers solitary, bisexual or perhaps sometimes female only, subsessile. Pedicels 1–3 mm, villous. Sepals erect or spreading, broadly oblong to ovate, 4–5 × 2–3 mm, apex obtuse, surfaces and margin glabrous, veins 3, confluent. Petals yellow, obovate, 6–7 × 4–5 mm in male flowers, ca. 5.5 mm in female flowers, base cuneate or with a short claw, apex rounded, not callose. Stamens 3–4 mm. Nectary disk prominent, annular. Ovary superior, carpels fused for more than half their length, tapered into conical, ca. 1 mm styles.

Distribution: Nepal, W Himalaya and E Himalaya.



Altitudinal range: 4100–4200 m.

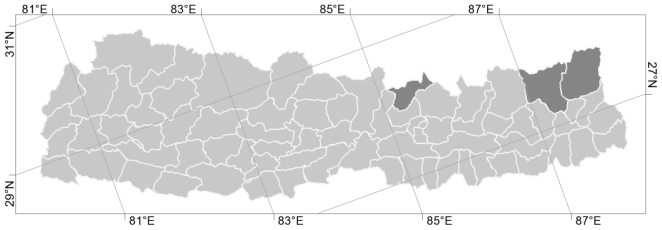
Ecology: Alpine.

Flowering: August.

23. *Saxifraga caveana* W.W.Sm., Rec. Bot. Surv. India 4(5): 193 (1911).
Saxifraga diapensia Harry Sm.

Stems caespitose, many-branched, forming mats or cushions. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 3–10 mm, margin crisped glandular-villous towards base. Blade oblong to ovate, 4–10 × 1.1–5 mm, base cuneate, apex subacute, glabrous. Flowering stems 2.5–4.5 cm, dark brown glandular-pubescent, leafless but with bracts, bulbils absent. Flowers solitary, bisexual. Pedicels 1–2(–7) cm, dark brown glandular-pubescent. Sepals spreading to reflexed, ovate to lanceolate, gibbous, 4–6 × 2–4 mm, apex subacute, outer surface and margin dark brown glandular-pubescent or glabrous, veins 3, confluent near apex. Petals yellow, elliptic to obovate-elliptic, 7–10 × 4–6 mm, base with a claw, 0.8–1 mm, apex retuse, sometimes 2-callose. Stamens 5–6 mm. Nectary band obscure. Ovary superior, carpels fused for more than half their length, tapered into conical, 1–2 mm styles.
Fig. 3a-d

Distribution: Nepal and E Himalaya.



Altitudinal range: 4200–5000 m.

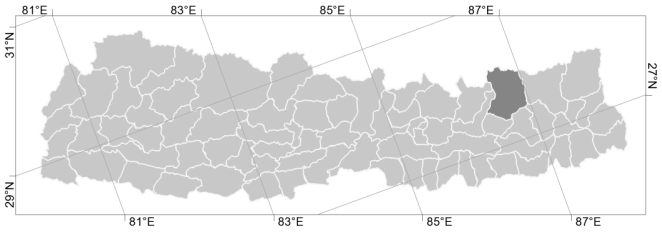
Ecology: Alpine.

Flowering: July–August.

24. *Saxifraga harae* H.Ohba & Wakab., J. Jap. Bot. 62: 163 (1987).

Stems caespitose, many-branched, forming mats. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole ca. 8 mm, margin eglandular brown crisped villous. Blade linear-spatulate to linear-rhombic, 3–8 × 1.5 mm, base attenuate, apex acute, both surfaces and margin shortly glandular-pubescent. Median and upper cauline leaves sessile, rhombic to linear, 4–8 × 0.7–1.5 mm, both surfaces and margin shortly glandular-pubescent, margin brown crisped villous at base. Flowering stems 4–5 cm, brown glandular-pubescent, bulbils absent. Flowers solitary, bisexual. Pedicels shortly glandular-pubescent. Sepals suberect, oblong-ovate, 3–4 × 2–2.5 mm, apex obtuse, margin shortly glandular-pubescent, outer surface sparsely glandular-pubescent, veins 3, usually confluent. Petals yellow, spotted orange, broadly oblong to oblong, 6–8 × 3–5 mm, base constricted into a claw 0.5–1 mm, apex rounded, not callose. Stamens 2.5–4 mm. Nectary band obscure. Ovary superior, carpels fused for more than half their length, narrowed into styles.

Distribution: Endemic to Nepal.



Altitudinal range: 3900–5000 m.

Ecology: Alpine, on rocks, rock slopes.

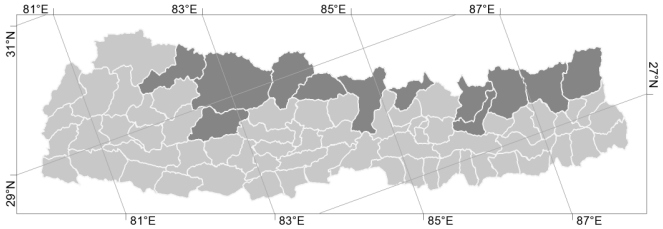
Flowering: August–September.

Apparently restricted to Solu Khumbu district, but collected there at least eight times.

25. *Saxifraga aristulata* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 68 (1857).
Hirculus aristulata (Hook.f. & Thomson) Losinsk.

Stems caespitose, usually many-branched, forming clumps, mats or cushions, sometimes simple. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole ca. 3 mm, margin brown crisped glandular-pubescent. Blade linear, 3–8 × 0.5–1 mm, base attenuate into petiole, apex acute, aristate, both surfaces glabrous. Lower cauline leaves petiolate, median and upper leaves sessile. Petiole 1–2 mm. Blade linear-lanceolate 5–8 × 0.5–1 mm, apex aristate, margin brown glandular-pubescent at base, both surfaces glabrous. Flowering stems 2–5(–10) cm, crisped brown glandular-pubescent at base and the middle, dark brown glandular-pubescent above, bulbils absent. Flowers solitary, bisexual. Pedicels 4–15 mm, black glandular-pubescent or glabrous. Sepals erect, then spreading to reflexed, elliptic to ovate, 2–2.5 × 1–1.2 mm, apex obtuse or acute, glabrous, veins 3, confluent near apex. Petals yellow, elliptic, 3.5–5 × 1.5–2 mm, base with a claw ca. 0.5 mm, apex obtuse to acute, 2-callose. Stamens 2–3 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into ca. 1.5 mm styles.
Fig. 3e-i

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 3500–5200 m.

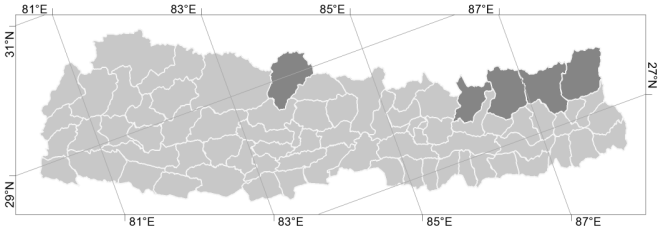
Ecology: Alpine, scree slopes, stony slopes, grassy slopes.

Flowering: August–September.

26. *Saxifraga lychnitis* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 68 (1857).

Stems caespitose or simple, erect, sometimes forming clumps. Stolons absent. Leaves alternate. Basal leaves aggregated into a rosette, sessile, elliptic, 5–10 × 3–5 mm, base attenuate, apex acute, both surfaces and margin eglandular or glandular brown villous. Cauline leaves sessile, elliptic to narrowly elliptic, 7–15 × 2–7 mm, base cuneate, apex acute, surfaces and margin brown glandular-pubescent. Flowering stems 3–8 cm, lower parts eglandular brown villous, glandular brown villous above, bulbils absent. Flowers solitary, usually nodding, bisexual. Pedicels 2–5 mm, densely glandular-pubescent. Sepals erect, oblong-lanceolate, 4–7 × 1.5–3 mm, apex acute to obtuse, outer surface and margin densely glandular-pubescent, veins 3, confluent near apex. Petals yellow, oblong, 8–15 × 2–3 mm, base with a claw, apex obtuse, not callose. Stamens 3–4 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into 1.5–2 mm styles.
Fig. 3j-n

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 3900–5300 m.

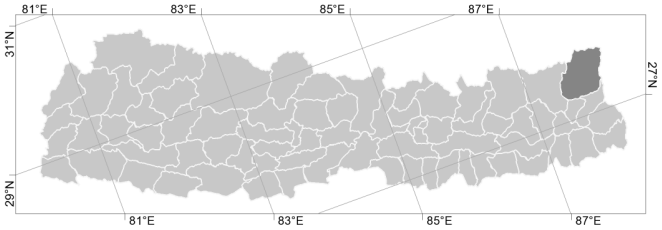
Ecology: Alpine, on rocks, open mossy places.

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

27. *Saxifraga viscidula* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 69 (1857).

Stems caespitose or simple, erect, sometimes forming clumps. Stolons absent. Leaves alternate. Basal leaves aggregated into a rosette, sometimes absent at anthesis. Petiole 5–10 mm. Blade oblong to elliptic, 5–10 × 3–5 mm, base attenuate, apex acute, both surfaces and margin eglandular- or brown glandular-pubescent. Cauline leaves sessile, ascending, oblong-elliptic, 3–6 × 1.5–2.5 mm, base tapered, apex acute or obtuse, both surfaces and margin brown glandular-pubescent. Flowering stems 5–12 cm, lower parts and nodes eglandular brown villous, black glandular-pubescent above, bulbils absent. Flowers 1–3, in a cyme, bisexual. Pedicels 10–20 mm, densely glandular-pubescent. Sepals erect or spreading, oblong-ovate, 5–6 × 1.5–2.5 mm, apex obtuse, margin and outer surface black glandular-pubescent, veins 3. Petals yellow, linear-oblong, 10–15 × 2–3 mm, base contracted to a short claw, apex obtuse, margin minutely glandular-pubescent, 2-callose. Stamens 3–4 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into 1.5–2 mm styles.

Distribution: Nepal, W Himalaya and E Himalaya.



Altitudinal range: 4000–4900 m.

Ecology: Alpine, on rocks and in meadows.

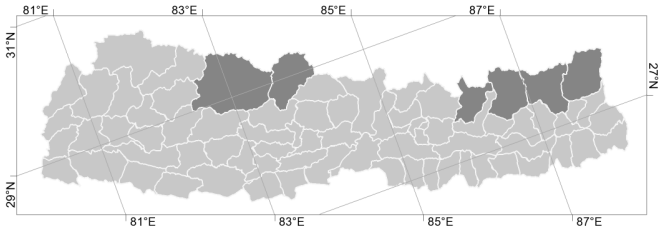
Flowering: July–September. **Fruiting:** September–October.

28. *Saxifraga nigroglandulifera* N.P.Balakr., J. Bombay Nat. Hist. Soc. 67: 59 (1970).

Hirculus nutans (Hook.f. & Thomson) Losinsk.; *Saxifraga nutans* Hook.f. & Thomson.

Stems caespitose or simple, erect, sometimes forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 1–5 cm, margin crisped villous. Blade elliptic to ovate, 10–35 × 5–15 mm, base tapered or truncate to rounded, apex acute to obtuse, margin crisped villous, upper surface glabrous or sometimes sparsely pubescent, lower surface glabrous. Lower cauline leaves petiolate, upper leaves sessile. Cauline leaves similar to basal leaves but smaller, margin crisped villous. Flowering stems 5–24 cm, sparsely brown crisped villous at lower leaf axils, densely black glandular-pubescent above, bulbils absent. Flowers 2–7, somewhat secund in a raceme-like cyme, usually nodding, bisexual. Pedicels 3–8 mm, densely dark brown glandular-pubescent. Sepals erect, ovate to ovate-lanceolate, 3–5 × 1.5–2 mm, apex obtuse or acute, margin and outer surface dark brown glandular-pubescent, veins 3–6, free. Petals yellow, oblanceolate, 7–8 × 2.5–3 mm, base tapered, apex rounded, not callose. Stamens 4–7 mm. Ovary semi-inferior, carpels fused for more than half their length, tapered into 1–1.5 mm styles.
Fig. 3o-r

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4000–4800 m.

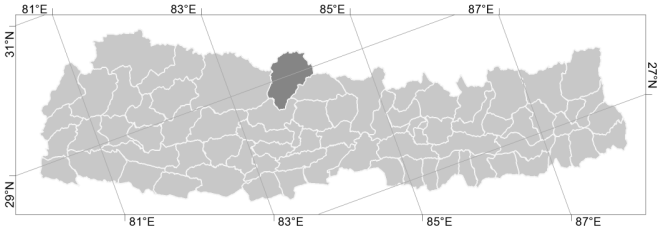
Ecology: Alpine, wet soil slopes, grassy places on rocky slopes.

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

29. *Saxifraga matta-viridis* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 243, 8 fig. e (1960).

Stems caespitose, many-branched, forming moss-like mats scarcely more than 1 cm. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole ca. 1 mm, margin membranous, broadening and clasping stem, fimbriate. Blade linear, subcylindric, 4–5 × 0.5–0.75 mm, base narrowed to petiole, apex obtuse to subacute or acute, margin and surfaces glabrous. Cauline leaves similar to basal but wider, up to 1 mm across. Flowering stems 3 mm, glabrous, leaves 2 or 3, bulbils absent. Flowers solitary, bisexual. Pedicels 1–2 mm, glabrous or very sparingly brown-crisped villous. Sepals erect, lanceolate to ovate-lanceolate, 2–3.5 × 0.75–1 mm, apex subacute, margin and surfaces glabrous, veins 3, confluent. Petals yellow, narrowly obovate, 2.5–3.5 × 1.5 mm, base tapered, apex obtuse, not callose. Stamens 1.5–2 mm. Nectary a somewhat conspicuous fleshy disk. Ovary almost superior, carpels fused for more than half their length, tapered into 0.75 mm styles.

Distribution: Nepal and E Himalaya.



Altitudinal range: ca. 3500 m.

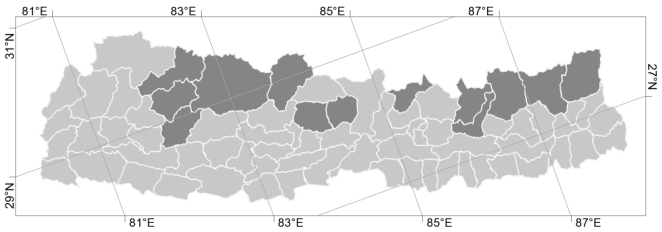
Ecology: Alpine, on open hillside.

Flowering: July–August.

30. *Saxifraga saginoides* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 68 (1857).
Hirculus saginoides (Hook.f. & Thomson) Losinsk.

Stems densely caespitose, many-branched, forming dense cushions. Stolons absent. Leaves alternate. Basal leaves slightly dilated at base forming a petiole. Petiole 2–4 mm, margin brown crisped glandular-villous. Blade suboblong, 3–4 × ca. 1 mm, apex subobtuse, glabrous. Cauline leaves linear, ca. 6 × 1 mm, base narrowed into petiole, apex obtuse, margin brown crisped villous at base, both surfaces glabrous. Flowering stems to 15 mm, mostly embedded in the cushion, crisped brown eglandular villous, bulbils absent. Flowers solitary, bisexual or sometimes unisexual. Pedicels up to 1 mm, densely crisped brown eglandular villous. Sepals erect, elliptic, ca. 3.5 × 1–1.7 mm, apex obtuse, glabrous, veins 3–4, free. Petals yellow, ovate to elliptic, 3–4 × 1–1.5 mm, base contracted into a claw 0.5–1 mm, apex obtuse, not callose. Stamens 1–2 mm. Nectary band obscure. Ovary almost superior, carpels fused for half their length, narrowed into ca. 0.75 mm styles.
Fig. 4o-s

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 4100–5300 m.

Ecology: Alpine, rock slopes, scree slopes, stony places.

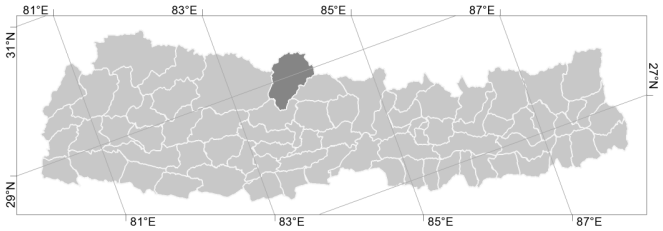
Flowering: July–September. **Fruiting:** September.

At least some populations appear to be dioecious.

31. *Saxifraga parva* Hemsl., J. Linn. Soc., Bot. 30: 112 (1895).

Stems caespitose or simple, erect. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 4–9 mm, margin sparsely crisped glandular-villous. Blade ovate-elliptic to oblong, 4–4.5 × 1.5–2 mm, base attenuate, apex obtuse, glabrous or margin brown crisped glandular-villous. Cauline leaves 3–10, lowermost ones petiolate. Petiole 2–4.5 mm, margin crisped glandular-villous at base. Blade similar to basal leaves, ovate to oblong, 3.5–7 × 1.5–2 mm, glabrous or margin sparsely brown crisped pubescent. Upper cauline leaves sessile, oblong to lanceolate to linear-oblanceolate, 5–8 × 1.2–3.2 mm, margin crisped glandular-villous. Flowering stems 0.7–4.5 cm, brown crisped glandular-villous, bulbils absent. Flowers solitary, bisexual. Pedicels 1–3 mm, brown crisped glandular-villous. Sepals erect, elliptic to ovate, 2–3.6 × 1–2.3 mm, apex obtuse, margin glandular-pubescent, glabrous, veins 3, free. Petals reddish outside, yellow inside, obovate to elliptic, 2.3–6.4 × 1.3–4.7 mm, base with 0.2–1 mm claw, apex obtuse, 2-callose. Stamens 3–5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into 1–1.5 mm styles.
Fig. 3s-w

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4700–5000 m.

Ecology: Alpine.

Flowering: July–August.

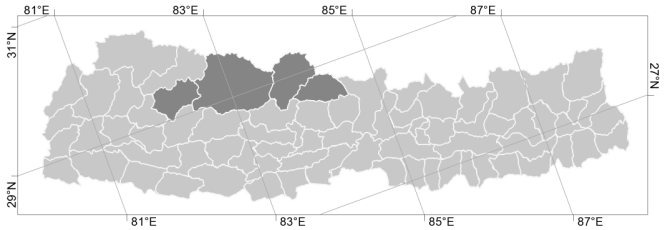
Saxifraga parva is known in Nepal only from *Stainton, Sykes & Williams 2358* (BM), but there is some doubt about the identity of this specimen and whether it may actually be *S. tibetica* Losink.

32. *Saxifraga tangutica* Engl., Bull. Acad. Imp. Sci. Saint-Pétersbourg 29: 115 (1883).
Hirculus tangutica (Engl.) Losinsk.; *Saxifraga hirculus* var. *subdioica* C.B.Clarke; *S. montana* var. *subdioica* (C.B.Clarke) C.Marquand; *S. subdioica* (C.B.Clarke) Engl. ex W.W.Sm. & Cave.

Stems caespitose or simple, erect, sometimes forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 8–30 mm, base brown crisped villous. Blade lanceolate, 8–15 × 3–5 mm, apex obtuse or acute, margin sparsely brown crisped villous, both surfaces glabrous, upper surface rarely brown crisped villous. Cauline leaves almost sessile, lanceolate, 5–8 × 1–3 mm, margin sparsely brown crisped villous, both surfaces glabrous. Flowering stems 3–12 cm, crisped brown eglandular villous, bulbils absent. Flowers in

3–8-flowered cymes, apparently unisexual. Pedicels 3–7 mm, densely brown crisped eglandular villous. Sepals erect, eventually reflexed, ovate, 2–3 × 1–2 mm, apex obtuse, margin brown crisped villous, outer surface brown crisped villous, veins 3–5, free. Petals purple on outside, yellow within, elliptic, 2–3 × ca. 1 mm, base with a 0.3-0.8 mm claw, apex obtuse, 2-callose. Stamens 1–2 mm. Nectary a conspicuous annular disk. Ovary nearly inferior, carpels fused for more than half their length, tapered into conical, ca. 1 mm styles.

Distribution: W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 4300–5400 m.

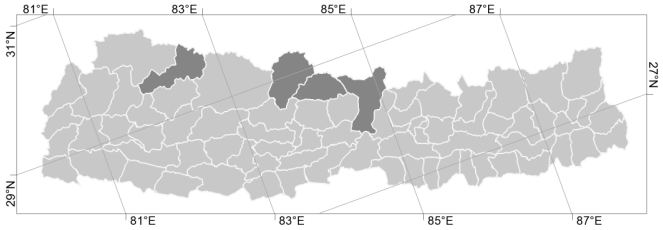
Ecology: Alpine, on stony slopes.

Flowering: July–August(–September). **Fruiting:** September.

33. *Saxifraga hirculoides* Decne., in Jacquem., Voy. Inde 4(1): 67, pl. 78.1 (1841).
Saxifraga hirculus var. *hirculoides* (Decne.) C.B.Clarke.

Stems caespitose or simple, erect, sometimes forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 7–30 mm, brown crisped villous. Blade ovate to narrowly elliptic, 7.5–9 × 4–8 mm, base attenuate, apex subacute, margin sparingly brown crisped villous. Cauline leaves 3–6, similar to basal leaves, lowermost petiolate, otherwise sessile. Blade oblong, 5.5–20 × 1.3–5 mm, margin brown crisped villous. Flowering stems 1.3–17 cm, brown crisped villous, bulbils absent. Flowers solitary or 2–4 in a cyme, bisexual. Pedicels 3–10 mm, densely crisped brown eglandular villous. Sepals erect, broadly ovate to broadly elliptic, 2.4–3 × 2.2–2.5 mm, apex obtuse, margin crisped brown eglandular villous, outer surface glabrous or sparingly crisped brown eglandular villous, veins 3, free. Petals pale yellow-green or green, elliptic or ovate to obovate, 3.5–4 × 2–3.3 mm, base with a 0.2–0.6 mm claw, apex obtuse, margin crisped brown eglandular villous, not callose. Stamens 2–3 mm. Nectary a conspicuous annular disk. Ovary semi-inferior, carpels fused for more than half their length, narrowed into 0.5 mm styles.

Distribution: Nepal, W Himalaya and Tibetan Plateau.



Altitudinal range: 4200–5100 m.

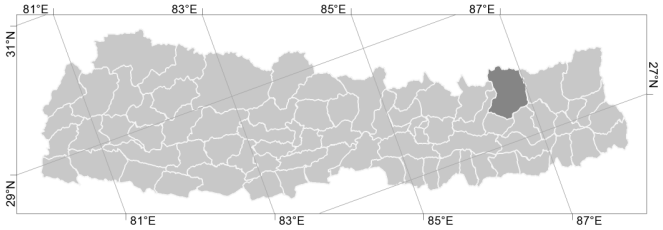
Ecology: Alpine, among boulders on barren slopes, in scree, moist banks.

Flowering: July–August.

34. *Saxifraga elliptica* Engl. & Irmsch., Bot. Jahrb. Syst. 48: 585 (1912).

Stems caespitose, simple or many-branched, forming mats. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 3–7.5 mm, margin brown crisped glandular-villous. Blade elliptic to ovate-lanceolate, 5–9 × 2–4 mm, base tapered, apex obtuse to acute, lower surface tinged purple, glabrous or eglandular villous. Lower cauline leaves petiolate, upper leaves sessile. Blade linear-oblong to ovate, (2–)4–5 × 1–2 mm, base tapered, apex obtuse to acute, margin eglandular villous, surfaces glabrous or glabrate. Flowering stems 3–7 cm, brown glandular crisped villous, bulbils absent. Flowers solitary, bisexual. Pedicels 3–14 mm, brown crisped glandular-villous. Sepals erect, then spreading to reflexed, broadly ovate to elliptic or oblong, 2–3.2 × 1–2.2 mm, leathery, glabrous or sometimes glandular-pubescent at margin, veins 3, free. Petals yellow, obovate to broadly obovate to broadly elliptic, (4–)6–8.6 × (2.5–)4–5.3 mm, base with a 1.1–1.2 mm claw, apex rounded to retuse, 2-callose. Stamens 3–5 mm. Ovary superior, carpels fused for more than half their length, narrowed into ca. 0.5 mm styles.
Fig. 4a-f

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4200–4300 m.

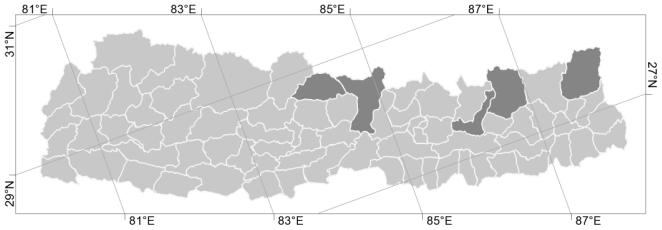
Ecology: Alpine.

Flowering: July–September.

35. *Saxifraga montanella* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 238, pl. 16B fig. 6 (1960).

Stems caespitose or simple, erect, often forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 3–12 mm, margin brown crisped villous. Blade ovate to lanceolate, 4–10 × 2–5 mm, base cuneate to rounded, margin brown crisped villous, apex acute, lower surface glabrous, upper surface brown crisped villous. Lowermost cauline leaves petiolate or sessile. Blade lanceolate to elliptic to oblong, 4–11 × 1.3–5 mm, base cuneate to rounded, apex obtuse to acute, margin brown crisped villous, lower surface glabrous, upper surface brown crisped villous in lower leaves, glabrate in upper leaves. Flowering stems 2–10 cm, brown crisped villous, bulbils absent. Flower solitary, bisexual. Pedicels 5–30 mm, brown eglandular or glandular crisped villous. Sepals spreading, ovate to elliptic, 2.8–3.5 × 2.3 mm, apex obtuse, outer surface glabrous, margin brown crisped villous, veins 3–9, free. Petals yellow, ovate to obovate, 5–6 × 2.5–4 mm, base with a 0.5–0.7 mm claw, apex obtuse or retuse, 2-callose. Stamens 2–5 mm. Ovary almost superior, carpels fused for more than half their length, tapered into 1–1.5 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4100–4800 m.

Ecology: Alpine, on cliffs.

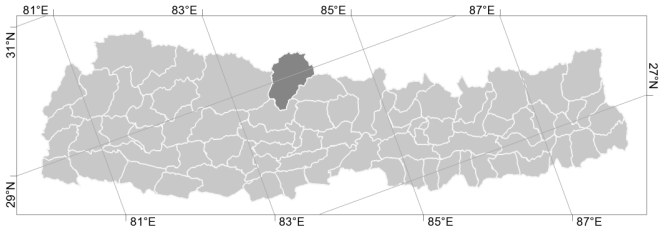
Flowering: July–August.

At least some collections are functionally dioecious.

36. *Saxifraga namdoensis* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 237, pl. 16A fig. 5 (1960).

Stems caespitose, erect, forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 1–5 cm, base sparsely brown crisped pubescent. Blade lanceolate, 10–30 × 5–9 mm, base tapered, apex subacute, margin and both surfaces glabrous. Lowermost cauline leaves petiolate, otherwise sessile. Blade lanceolate to narrowly elliptic,15–30 × 4–9 mm, decreasing in size upwards, margin sparsely brown crisped pubescent, surfaces glabrous. Flowering stems 8–25 cm, lower parts glabrate except in axils, densely brown crisped villous above, leaves 6–9, bulbils absent. Flowers 2–4 in a cyme, bisexual. Pedicels 5–20 mm, densely brown crisped villous or glabrescent. Sepals more or less spreading at anthesis, ovate to oblong, 4–5 × 2.5–4 mm, apex rounded, margin densely brown crisped villous, outer surface glabrous or very sparsely brown crisped villous, veins 5–7, confluent. Petals yellow, obovate-elliptic to broadly elliptic, 5.5–11 × 4–7 mm, base without a claw or with a very short claw (0.1–0.2 mm), apex rounded, not callose. Stamens ca. 5 mm. Nectary band inconspicuous. Ovary subsuperior, carpels fused for more than half their length, tapered abruptly into ca. 1 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 4500–4700 m.

Ecology: Alpine, on grass banks of streams, meadows.

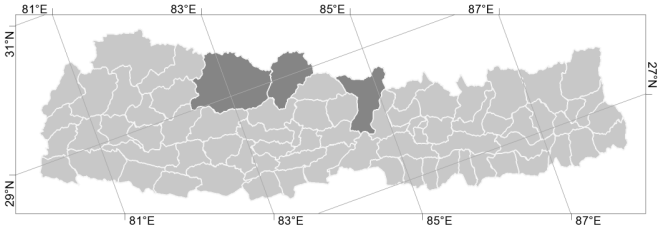
Flowering: August.

Very close to *Saxifraga sinomontana* J.T.Pan & Gornall, but appears to differ in its more laxly branched inflorescence with more numerous flowers.

37. *Saxifraga sinomontana* J.T.Pan & Gornall, Novon 10: 377 (2000).
Hirculus montanus (Harry Sm.) Losinsk.; *Saxifraga hirculus* var. *indica* C.B.Clarke; *S. montana* Harry Sm.; *S. montana* forma *rubra* Harry Sm.

Stems caespitose or simple, erect, sometimes forming clumps. Stolons absent. Leaves alternate. Basal leaves petiolate. Petiole 7–10 mm, margin brown crisped pubescent. Blade elliptic-lanceolate to elliptic, 5–20 × 2–6 mm, base attenuate, apex acute to subacute, margin glabrous or sparingly brown crisped pubescent, both surfaces glabrous. Lower cauline leaves petiolate, upper leaves sessile. Blade lanceolate to linear, 5–8 × 1–1.5 mm, base, apex obtuse or acute, margin sparsely brown crisped pubescent, both surfaces glabrous. Flowering stems 3–25 cm, lower parts sparsely brown crisped pubescent, densely so above, bulbils absent. Flowers 1–3, in a cyme, bisexual. Pedicels 5–15 mm, densely crisped brown eglandular villous. Sepals erect, oblong-obovate, 4–5 × 2–3 mm, apex obtuse, margin densely crisped brown eglandular villous, outer surface usually glabrous, veins 5–8, free. Petals yellow (rarely red), orange spotted, broadly obovate, 6–12 × 4–7 mm, base truncate or with a short claw up to 0.5 mm, apex obtuse to rounded, 2-callose. Stamens 4–5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into 1–2 mm styles.

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 4100–5000 m.

Ecology: Alpine, open stony slopes, on soil ground.

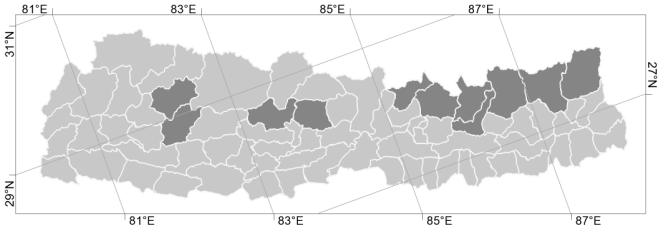
Flowering: July–August(–September).

Saxifraga montana forma *rubra* refers to plants with red petals. However the petals of these plants are smaller (ca. 5 × 2 mm) than is usually the case in *S. sinomontana* and dry greenish-tinged purple. Such plants may be allied more with *S. hirculoides* Decne.

38. *Saxifraga hispidula* D.Don, Trans. Linn. Soc. London 13(2): 380 (1822).
Hirculus hispidulus (D.Don) Losinsk.; *Saxifraga evolvuloides* Wall. ex Ser.; *S. hispidula* var. *dentata* Franch.

Stems caespitose or simple, branched towards the base, leafy throughout. Stolons absent. Leaves alternate. Leafy buds usually present in at least some axils. Lower cauline leaves smaller than median ones. Median cauline leaves sessile, ovate to elliptic, 3–12 × 1–6 mm, base rounded, apex acute, aristate, margin with 1 or 2 bristle-pointed teeth on each side, sometimes entire, eglandular-ciliate, both surfaces eglandular- or glandular-strigose. Flowering stems, 3–15 cm, eglandular- or glandular-pubescent, distally glandular-pubescent, leafy. Flowers usually solitary, occasionally up to 4, in a cyme, bisexual. Pedicels 5–10 mm, densely glandular-pubescent. Sepals erect to spreading, ovate, 2.5–4.5 × 1.5–2.5 mm, apex acute, bristle-pointed, outer surface and margin eglandular- or glandular-pubescent, veins 3–8, confluent. Petals yellow, 5–7 × 3–4 mm, base contracted into a ca. 0.6 mm claw, apex obtuse, 2-callose. Stamens 3–4 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into conical, 0.5–1 mm styles.
Fig. 4g-j

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



Altitudinal range: 3000–4500 m.

Ecology: Alpine, on cliffs, in forests.

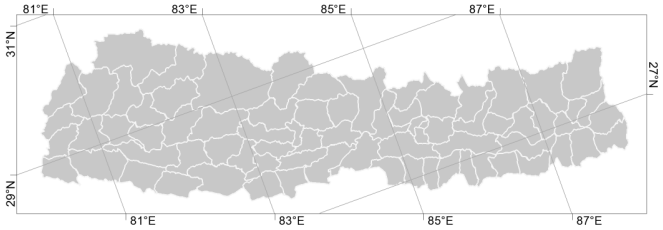
Flowering: July–September.

In Nepal plants with toothed leaves (var. *dentata*) appear to be more common than those with entire leaves (var. *hispidula*).

39. *Saxifraga substrigosa* J.T.Pan, in C.Y.Wu, Fl. Xizang. 2: 463 (1985).
Saxifraga bumthangensis Wadhwa ex Grierson nom. nud.

Stems caespitose, branched or simple, erect. Stolons absent. Leaves alternate. Leafy buds inconspicuous, in axils of at least lower leaves, sometimes developing into sterile, leafy shoots by anthesis. Lowest leaves less than half the size of median leaves, caducous. Median cauline leaves ovate or obovate to oblong, 10–30 × 5–10 mm, base cuneate, margin 5- or 6-serrate, both surfaces strigose, apex acute. Upper cauline leaves reduced. Flowering stems usually simple, sometimes branched proximally, 10–30 cm tall, eglandular villous below, glandular pubescent towards apex. Cyme ca. 5 cm, 2–10-flowered. Pedicel ca. 10 mm, glandular pubescent. Sepals erect, ovate, 2.6–3 × 1.4–1.8 mm, abaxially glandular pubescent, margin glabrous; veins 5–8, confluent at apex. Petals yellow, obovate, 6.5–7 × 3.5–4 mm, ca. 6-callose, base gradually narrowed into a ca. 1.5 mm claw, apex obtuse, 3–8-veined. Stamens ca. 3.5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into ca. 1.5 mm styles.
Fig. 4k-n

Distribution: Nepal and E Asia.



Altitudinal range: 2700–4200 m.

Ecology: Mixed forests, forest margins, alpine meadows and rock crevices.

Flowering: July–September.

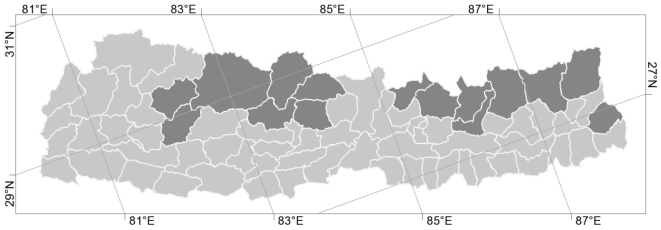
The record for Nepal is based on *Skully s.n.* (K) which lacks all collection details and so cannot be mapped. The ecological information has been taken from Pan *et al.* (Fl. China 8: 317. 2001).

40. *Saxifraga strigosa* Wall. ex Ser., in DC., Prodr. 4: 41 (1830).
Hirculus strigosus (Wall. ex Ser.) Losinsk.

Stems caespitose, branched or simple, erect. Stolons absent. Leaves alternate. Leafy buds present in axils of rosette leaves and bracts, often replacing flowers. Lower cauline leaves of flowering stem less than half the size of median ones. Median cauline leaves aggregated into a rosette, subsessile or short-

petiolate, elliptic to obovate, 10–20 × 5–10 mm, base cuneate to attenuate, apex acute, aristate, margin 2–3-aristate-dentate, both surfaces strigose. Upper cauline leaves smaller than median ones. Flowering stems 6–25 cm, eglandular crisped-villous towards base, blackish glandular-pubescent above. Flowers solitary or 3–10, in a cyme, bisexual. Pedicels 5–15 mm, black glandular-pubescent. Sepals spreading to reflexed, ovate to narrowly ovate, 1.5–2 × 1–1.5 mm, apex acute, outer surface strigose, margin somewhat glabrous, veins 3–7, confluent. Petals white, spotted reddish brown and yellow, ovate to elliptic, 4–5.5 × 1.5–2.5 mm, base contracted to a claw, apex acute to obtuse, 2–4 callose. Stamens 2–4 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into 0.5–2 mm styles. Fig. 5a-d

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



Altitudinal range: 2100–3700(–4200) m.

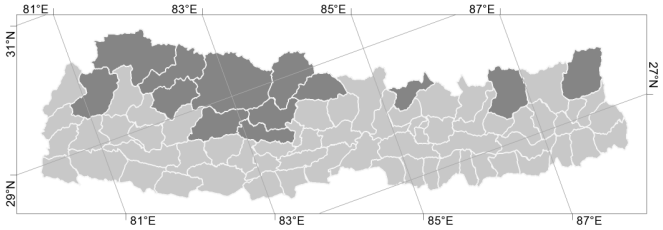
Ecology: Forest margin, meadows, rock crevices.

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

41. *Saxifraga filicaulis* Wall. ex Ser., in DC., Prodr. 4: 46 (1830).
Hirculus filicaulis (Wall. ex Ser.) Losinsk.

Stems caespitose, many-branched, erect or trailing, forming clumps or mats, leafy throughout. Stolons absent. Leaves alternate. Leafy buds present in axils, often developing into short shoots. Lower cauline leaves scale-like. Median and upper cauline leaves sessile, linear, 3–10 × 1–2 mm, apex acute, aristate, margin recurved, eglandular- or glandular-ciliate, both surfaces usually glabrous. Flowering stems 8–12 cm, eglandular-pubescent or basal parts nearly glabrous, glandular-pubescent above. Flowers usually solitary, or up to 3, in a cyme, bisexual. Pedicels 3–5(–7) mm, glandular-pubescent. Sepals erect to spreading, ovate, 2–2.5 × 1–2 mm, apex acute to obtuse, outer surface glandular-pubescent, margin often glabrous, veins 3–5, confluent. Petals yellow, elliptic to obovate, 4–5.5 × 2–3 mm, base contracted into a ca. 1mm claw, apex obtuse, 2-callose. Stamens 3–4 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into slender, ca. 2 mm styles. Fig. 5e-h

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



Altitudinal range: (2300–)3000–4500 m.

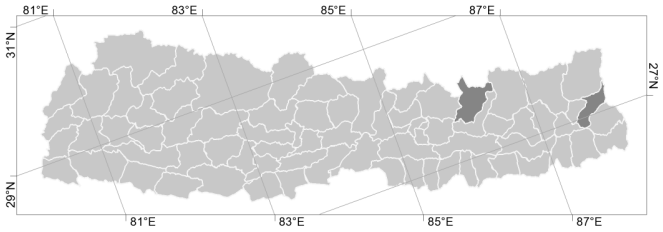
Ecology: On cliffs, grassy and rocky slopes.

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

42. *Saxifraga serrula* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 252, pl. 21A fig. 13 f (1960).

Stems caespitose, many-branched, erect or trailing, forming clumps or mats, leafy throughout. Stolons absent. Leaves alternate. Leaf buds present in leaf axils. Median cauline leaves larger than basal and upper ones, linear, 6–10 × 1–1.5 mm, apex acute, bristle-pointed, margin eglandular (rarely glandular) ciliate, both surfaces glabrous. Flowering stems 4–20 cm, densely glandular-pubescent above. Flowers solitary, bisexual. Pedicels 5–15 mm, densely glandular-pubescent. Sepals ovate, 3–4 × 2–3 mm, apex acute, bristle-pointed, margin glandular or eglandular-pubescent, both surfaces glabrous, veins 3, free. Petals yellow, elliptic to ovate, 5–7.5 × 3–4 mm, base constricted into a ca. 1 mm claw, apex obtuse, margin entire, not callose. Stamens 4–5 mm. Nectary obscure. Ovary superior, carpels fused for more than half their length, tapered into conical, ca. 1.5 mm styles.

Distribution: Nepal, E Himalaya and E Asia.



Altitudinal range: 2800–3500 m.

Ecology: Alpine, on dry soil.

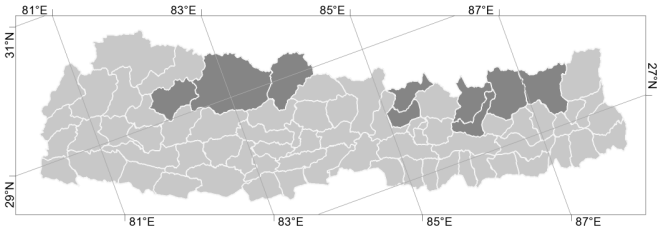
Flowering: July–September.

43. *Saxifraga wallichiana* Sternb., Revis. Saxifrag. Suppl.2: 21, pl. 22 (1831).
Saxifraga brachypoda var. *fimbriata* (Wall. ex Ser.) Engl. & Irmsch.; *S. fimbriata* Wall. ex Ser. later homonym, non D.Don.

Stems caespitose or simple, erect, leafy throughout. Stolons absent. Leaves alternate. Leafy buds present in axils of leaves and bracts. Median cauline leaves larger than lower and upper leaves, ovate to lanceolate, (6–)8–15 × 2.5–4.5(–5) mm, base slightly cordate to truncate, apex acute, margin cartilaginous,

shiny, eglandular- or glandular-ciliate, both surfaces glabrous. Flowering stems 8–25 cm, upper parts densely glandular-pubescent. Flowers usually solitary, bisexual. Pedicels 3–6 mm, densely black glandular-pubescent. Sepals erect, ovate to narrowly ovate, (3–)3.5–4.5 × 2–3 mm, apex acute, outer surface glabrous or sparsely glandular-pubescent, margin sparsely glandular-ciliate, veins 3–7, partly or fully confluent. Petals yellow, elliptic to obovate, 6.5–8 × 2.5–4 mm, base contracted into a 1 mm claw or attenuate, apex obtuse, margin very finely laciniate or entire, 2-callose. Stamens 4–4.5 mm. Nectary band obscure. Ovary almost superior, carpels fused for half their length, tapered into slender, 2–2.5 mm styles.

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



Altitudinal range: 3300–4600(–5000) m.

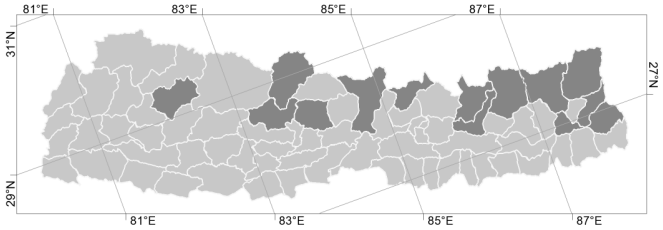
Ecology: Alpine, on rocky slopes.

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

44. *Saxifraga brachypoda* D.Don, Trans. Linn. Soc. London 13(2): 378 (1822).
Hirculus brachypodus (D.Don) Losinsk.; *Saxifraga glandulosa* Wall. ex DC.

Stems simple or caespitose, often forming clumps, leafy throughout. Stolons absent. Leaves alternate. Leafy buds present in leaf axils. Median cauline leaves larger than basal and upper leaves, lanceolate, 7–12(–15) × (1–)1.5–2.5(–3) mm, base subcordate to truncate, apex acute, margin eglandular- or glandular-ciliate, both surfaces glabrous, shiny. Flowering stems 4–19(–26) cm, glandular-pubescent towards apex. Flowers solitary, bisexual. Pedicels 8–19(–25) mm, densely glandular-pubescent. Sepals erect to spreading, ovate, (3–)4–5 × (1.5–)2.5–3.5 mm, apex acute, margin sparingly glandular-pubescent, outer surface glabrous, or glandular-pubescent, veins 3–7, free or partly or fully confluent. Petals yellow, elliptic to ovate, 5–8 × 3.5–5 mm, base contracted into a 0.6–1 mm claw, apex obtuse, margin very finely laciniate or entire, not callose. Stamens 4–5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into conical, ca. 1.5 mm styles.

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



Altitudinal range: (2500–)3300–5000 m.

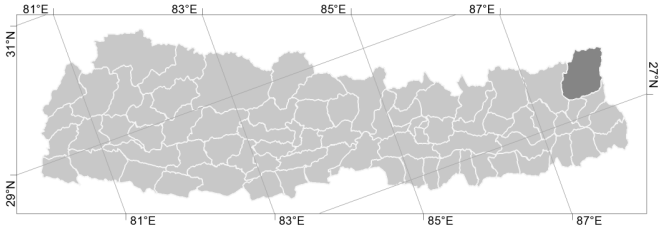
Ecology: Subalpine, alpine, rocky slopes.

Flowering: (July–)August–October. **Fruiting:** September–October.

45. *Saxifraga jaljalensis* H.Ohba & S.Akiyama, Univ. Mus. Univ. Tokyo Nat. Cult. 4: 31 (1992).

Stems simple. Stolons absent. Leaves alternate. Bulbils present in leaf and bract axils. Basal rosette leaves narrowly spatulate to linear-oblanceolate, 7–10 mm, base gradually attenuate, apex rounded, upper surface sparingly pubescent, lower surface glabrous. Cauline leaves linear to linear-oblanceolate, to 3 mm long. Flowering stems to 2 cm. Flowers solitary, bisexual. Sepals spreading, narrowly oblong, 2–3 × ca. 1 mm, apex obtuse. Petals yellow with orange spots towards the base, obovate, 4–5 × 3.5–4 mm, base attenuate, apex rounded. Stamens ca. 2mm. Nectary band obscure. Carpels fused for more than half their length, styles ca. 1.5 mm.

Distribution: Endemic to Nepal.



Altitudinal range: ca. 4300 m.

Ecology: Alpine, steep rocky slopes.

Flowering: August.

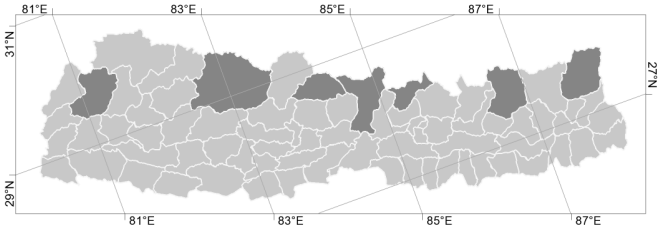
Apparently known only from the type collection from the Jaljale Himal (*Ohba et al. 9110380*, TI).

46. *Saxifraga stenophylla* Royle, Ill. Bot. Himal. Mts. [7]: 227, pl. 50 fig. 1 (1835).
Saxifraga flagellaris subsp. *hoffmeisteri* (Klotzsch) Hultén; *S. hoffmeisteri* Klotzsch; *S. stenophylla* subsp. *hoffmeisteri* (Klotzsch) H.Hara.

Stems simple, erect or caespitose, sometimes forming small clumps. Stolons arising from axils of basal leaves, sparsely glandular-pubescent, apex usually gemmiferous. Leaves alternate. Basal leaves aggregated into a rosette, sessile,

narrowly elliptic to subspatulate, 8–13 × 2–4.5 mm, apex acute, glandular, margin slender glandular-ciliate, leathery, both surfaces somewhat glandular-pubescent. Cauline leaves on flowering stem similar to basal leaves, remote or overlapping, 5.5–11 × 1.5–3 mm. Flowering stems 5–18 cm, densely glandular-pubescent. Flowers solitary or 2 or 3 in a cyme, bisexual. Pedicels 6–14 mm, densely glandular-pubescent. Sepals erect, ovate to lanceolate, 4–6 × 1.2–3 mm, apex usually mucronate, somewhat fleshy, outer surface and margin glandular-pubescent, veins 5–9, partly or fully confluent. Petals red to yellow, obovate to broadly obovate to elliptic, 8–12 × 4.5–7.5 mm, base without a claw, apex obtuse, not callose. Stamens 4–5.7 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into ca. 1.5 mm styles.
Fig. 5i-m

Distribution: Nepal, W Himalaya, Tibetan Plateau and SW Asia.



Altitudinal range: 4300–5400(–5700) m.

Ecology: Alpine, scree, grassland.

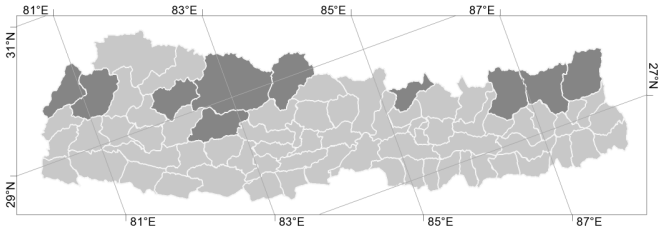
Flowering: July–August.

Plants with crowded, overlapping cauline leaves that overtop the solitary flower may be recognized as subsp. *hoffmeisteri*.

47. *Saxifraga mucronulata* Royle, Ill. Bot. Himal. Mts. [7]: 227 (1835).
Saxifraga flagellaris subsp. *mucronulata* (Royle) Engl. & Irmsch.; *S. flagellaris* var. *mucronulata* (Royle) C.B.Clarke; *S. spinulosa* Royle.

Stems simple, erect or caespitose, sometimes forming small clumps. Stolons arising from axils of basal leaves, sometimes from axils of median cauline leaves, glandular-pubescent. Leaves alternate. Basal leaves aggregated into a rosette, spatulate to linear-spatulate, 8–9.5 × 1.6–2 mm, base attenuate, apex mucronate, margin denticulate-ciliate, both surfaces glabrous. Cauline leaves of flowering stem similar to basal leaves, often decreasing in size upwards, margin eglandular- or glandular-ciliate. Flowering stems 2–9 cm, glandular-pubescent. Flowers 1–6(–10) in a cyme, bisexual. Pedicels to 5 mm, glandular-pubescent. Sepals erect, ovate, ca. 2.5 × 1 mm, apex subacuminate, outer surface and margin glandular-pubescent, veins 3, free or partly confluent. Petals yellow to orange, obovate, 4–5 × 2.5–3 mm, base contracted to a claw, apex obtuse, not callose. Stamens 1–3 mm. Nectary band obscure. Ovary semi-inferior, carpels fused for more than half their length, narrowed into 0.8–1 mm styles.
Fig. 5n-r

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 3700–4800 m.

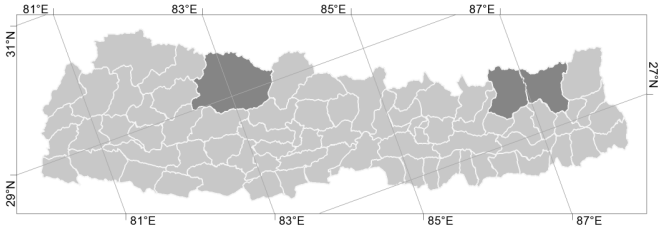
Ecology: Alpine, scree slopes.

Flowering: July–August.

48. *Saxifraga mucronulatoides* J.T.Pan, Acta Phytotax. Sin. 29: 223 (1991).
Saxifraga flagellaris subsp. *sikkimensis* Hultén; *S. mucronulata* subsp. *sikkimensis* (Hultén) H.Hara.

Stems simple, erect or caespitose, sometimes forming small clumps. Stolons arising from axils of basal leaves, glandular-pubescent. Leaves alternate. Basal leaves aggregated into a rosette, spatulate to linear-spatulate, 8–15 × 1.5–3 mm, base attenuate, apex aristate, both surfaces glabrous, margin denticulate-ciliate. Cauline leaves of flowering stem linear to linear-spatulate, sometimes longer than basal leaves, both surfaces and margin eglandular- or glandular-pubescent. Flowering stems 2.5–6 cm, glandular-pubescent. Flowers (4 or)5–10 in an umbellate cyme, bisexual. Pedicels 3–4 mm, glandular-pubescent. Sepals erect, ovate to lanceolate, 2.5–3.5 × 0.75–1 mm, apex acute, often aristate, outer surface and margin glandular-pubescent, veins 4 or 5, confluent. Petals yellow to orange, obovate to spatulate, 4.5–7 × 2.5–3 mm, base contracted to a claw, apex obtuse, 2-callose. Stamens 1.5–2.5 mm. Nectary band obscure. Ovary semi-inferior, carpels fused for more than half their length, narrowed into 1–1.5 mm styles.
Fig. 6a-d

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4500–5100 m.

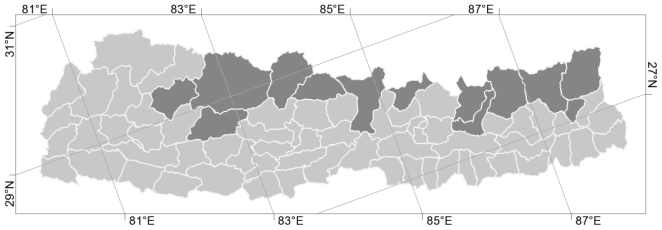
Ecology: Alpine, scree slopes.

Flowering: July–August.

49. *Saxifraga brunonis* Wall. ex Ser., in DC., Prodr. 4: 45 (1830).
Hirculus brunonianus Losinsk.; *Saxifraga brunoniana* Wall. ex Sternb. nom. illegit.

Stems caespitose or simple, sometimes forming mats. Stolons arising from axils of basal leaves, sparsely glandular-pubescent. Leaves alternate. Basal leaves aggregated into a rosette, grey-green, shiny, oblong-ensiform, 6–8 × 1–1.5 mm, apex cartilaginous aristate, hairs sometimes gland-tipped, margin cartilaginous setose-ciliate, both surfaces glabrous. Cauline leaves of flowering stem remote, similar to basal leaves, decreasing in size upwards. Flowering stems 6–9 cm, glabrous at base, sparsely glandular-pubescent above. Flowers 1–3, in a cyme, bisexual. Pedicels 1.2–3 cm, sparsely glandular-pubescent. Sepals spreading, ovate, 1.2–2 × 1–1.5 mm, apex obtuse, outer surface and margin glabrous, veins 3–5, free or partly or fully confluent. Petals yellow, sometimes spotted orange, elliptic, 6–7 × 2–3.5 mm, base cuneate or tapered to a short claw, apex rounded, obscurely 2-callose. Stamens 3–4 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, narrowed into 1–1.2 mm styles.
Fig. 6e-i

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: (1400–)2400–5600 m.

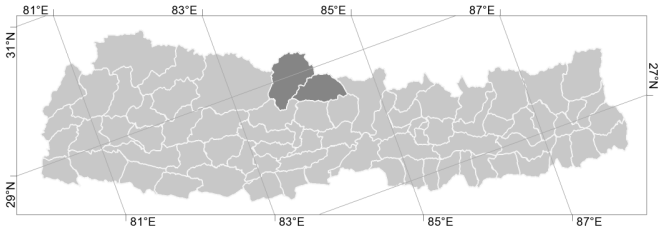
Ecology: Mainly subalpine and alpine, sandy places near streams.

Flowering: July–August.

50. *Saxifraga tentaculata* C.E.C.Fisch., Bull. Misc. Inform. Kew 1940: 295 (1941).

Stems simple, erect or caespitose. Stolons arising from axils of median cauline leaves, glabrous or sparsely glandular-pubescent. Leaves alternate, sessile, tending to be aggregated into loose rosettes in lower and upper parts of flowering stem, upper surface green, lower surface red, oblanceolate, 5–10 × 2–3 mm, base attenuate, apex obtuse, margin glandular-pubescent or glabrous, both surfaces glabrous. Flowering stems 2.5–5 cm, glabrous towards base, glandular-pubescent towards apex. Flowers 1–2, in a cyme, bisexual. Pedicel 5–10 mm, glandular-pubescent. Sepals erect, ovate, 2–3 × 1.5–3 mm, apex obtuse, outer surface glandular-pubescent or glabrous, margin glandular or eglandular-pubescent; veins 3. Petals yellow, spotted red, elliptic to obovate or ovate, 3–6 × 1–2.5 mm, base clawed, apex obtuse, not callose. Stamens 2.5–4 mm. Nectary band obscure. Ovary almost inferior, carpels fused more than half the length, narrowed into 1 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 3500–4800 m.

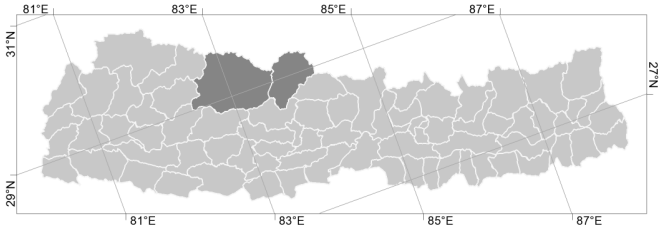
Ecology: Alpine, rock slopes, scree, stony places.

Flowering: July–August(–September). **Fruiting:** September.

51. *Saxifraga neopropagulifera* H.Hara, J. Jap. Bot. 51(1): 7 (1976).

Stems simple or caespitose, erect, sometimes forming mats. Stolons arising from axils of median cauline leaves, glabrous. Leaves alternate, tending to be aggregated into loose rosettes in lower and upper parts of flowering stem. Rosulate leaves oblong-spatulate, 3–8 × 1.3–3 mm, margin ciliolate. Cauline leaves obovate or oblong-spatulate, 3–10 × 1–3 mm, base attenuate, apex subobtuse, margin shortly eglandular-ciliate, both surfaces glabrous. Flowering stems 1–12 cm, glabrate. Flowers 1–3 in a cyme, dioecious. Pedicel 2–6 mm, glandular-pubescent. Male flowers 6–8 mm diameter, female ones smaller. Sepals erect, oblong-ovate, 2.2–3 × 1–1.5 mm, apex obtuse, glabrous or minutely glandular-pubescent, veins 3, confluent. Petals yellow, oblong-ovate, 2.5–3.5 × 1–1.5 mm, base distinctly clawed, apex subobtuse, 2-callose. Stamens ca. 2.5 mm in male flowers and shorter than stigma and sterile, in female ones. Nectary band obscure. Ovary (female flowers only) almost inferior, carpels fused for more than half their length, narrowed to ca. 1 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 4500–5600 m.

Ecology: Alpine areas on loose scree.

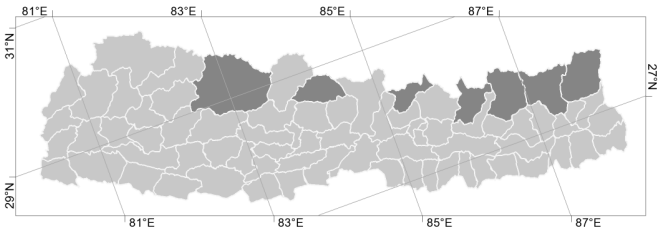
Flowering: July–August.

A narrow endemic restricted to Dolpo and Mustang.

52. *Saxifraga consanguinea* W.W.Sm., Notes Roy. Bot. Gard. Edinburgh 8: 132 (1913).

Stems simple, erect or caespitose, sometimes forming small clumps. Stolons arising from axils of basal leaves, sparsely glandular-pubescent. Leaves alternate, sessile. Basal leaves aggregated into a rosette, narrowly elliptic to oblanceolate, 4.5–9 × 1–2 mm, apex mucronate, margin eglandular- or glandular-ciliate, both surfaces glabrous. Cauline leaves of flowering stem elliptic to oblanceolate, 5–12 × 1–2 mm, apex mucronate, margin eglandular- or glandular-pubescent, both surfaces glabrous. Flowering stems 1.5–2.5 cm, glandular-pubescent. Flowers 1–10, in a cyme, unisexual (at least in some populations). Pedicels to 5 mm, glandular-pubescent. Sepals erect, ovate, 1.8–2.5 × 1–1.5 mm, apex obtuse to acute, outer surface glabrous or glandular-pubescent, margin sparsely glandular-pubescent, veins 3–5 confluent or not. Petals red, pink or yellow, elliptic, 1.5–2.5 × 1–1.5 mm, base contracted to a claw, apex obtuse, 2-callose. Stamens 1.5–2 mm in male flowers, shorter and sterile in females. Nectary a conspicuous, annular disk. Ovary (in females) semi-inferior, carpels fused for more than half their length, narrowed into ca. 1 mm styles.
Fig. 6j-n

Distribution: Nepal and Tibetan Plateau.



Altitudinal range: 4400–5200 m.

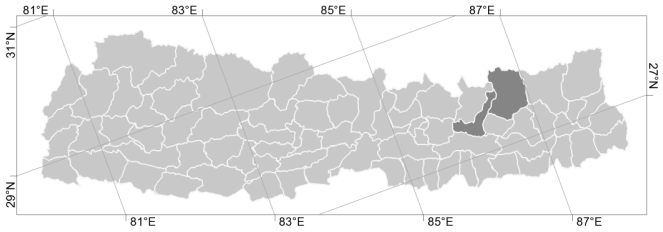
Ecology: Alpine, on ground.

Flowering: (June–)July–August(–September).

53. *Saxifraga pilifera* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 66 (1857).

Stems simple, erect or caespitose, sometimes forming small clumps. Stolons arising from axils of basal leaves, sparsely glandular-pubescent or glabrous. Leaves alternate. Basal leaves aggregated into a rosette, elliptic to oblanceolate, 5–8 × 1.5–3 mm, base attenuate, apex acute, both surfaces and margin shortly glandular-pubescent. Cauline leaves of flowering stem similar to basal. Flowering stems 2–8 cm, densely glandular-pubescent. Flowers 2–12, in a cyme, dioecious (at least in some populations). Pedicels 1–2(–5) mm, glandular-pubescent. Sepals erect, ovate, 2–2.5 × 1–1.2 mm, apex acute, outer surface and margin glandular-pubescent, veins 3–5 free or partly confluent. Petals pale green and red, or red, obovate, 2–3 × 1–1.5 mm, usually overlapping, base narrowed, apex obtuse, 2-callose. Stamens 1.5–2 mm. Nectary band obscure. Ovary semi-inferior, carpels fused for more than half their length, narrowed into ca. 1 mm styles.

Distribution: Nepal and E Himalaya.



Altitudinal range: 4500–4800 m.

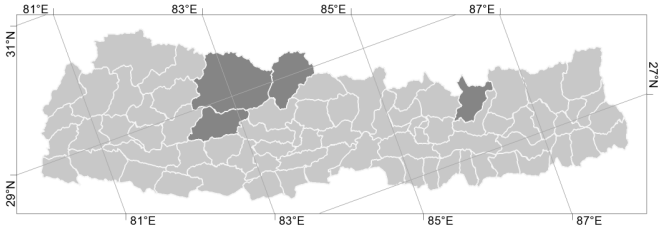
Ecology: Alpine.

Flowering: July–August.

54. *Saxifraga williamsii* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 100, pl. 3 fig. i (1958).

Stems caespitose, many-branched, crowded leafy shoots forming cushions. Stolons absent. Leaves alternate. Cauline leaves loosely arranged or in some parts dense, linear to obovate-linear, 4–5 × 1.7 mm, apex obtuse, margin setose-ciliate, somewhat fleshy, surfaces glabrous. Flowering stem to 3 mm, embedded in vegetative cushion, bulbils absent. Flowers solitary, bisexual. Pedicels up to 1 mm, glabrous. Sepals erect, spreading in fruit, rounded to ovate or broadly ovate, 2.5–4 × 2.5–3 mm, apex obtuse to subacute, margin patchily setose-ciliate, outer surface glabrous, veins 3, partly confluent. Petals white, orbicular, 6–8.5 × 5–5.5 mm, base abruptly narrowed to a ca. 2 mm claw, apex rounded, occasionally emarginate, not callose, persistent. Stamens 3.5–4 mm, anthers brown. Nectary band obscure. Ovary almost superior, carpels fused for half their length, narrowed into ca. 1.5 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 4000–5100 m.

Ecology: Alpine, open grass slopes.

Flowering: June–August.

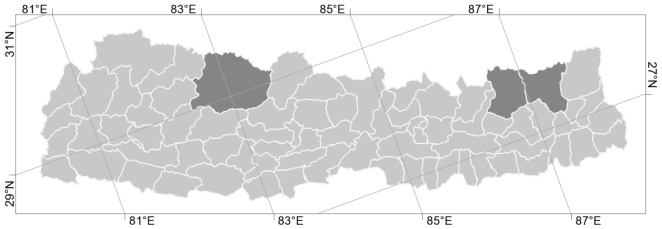
Sufficiently morphologically similar at first glance to be confused with members of section *Porphyrion*. However, *Saxifraga williamsii* lacks the chalk glands characteristic of that section and moreover, has the finely striate pollen surface typical of section *Ciliatae*.

Saxifragaceae

55. *Saxifraga perpusilla* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 72 (1857).

Stems caespitose, many-branched, crowded leafy shoots forming cushions. Stolons absent. Leaves alternate sessile. Cauline leaves aggregated towards base into a rosette, obovate, ca. 2.6 × 1 mm, apex obtuse, margin white fimbriate, herbaceous, lower surface white pubescent towards apex, upper surface glabrous. Flowering stems 10–20 mm, embedded in cushion, bulbils absent. Flowers solitary, bisexual. Pedicels 5–8 mm, densely short glandular-pubescent. Sepals erect or ascending, broadly ovate to oblong, ca. 1.5 × 1.1 mm, apex scarious fimbriate, margin white glandular or eglandular-pubescent, outer surface white glandular-pubescent, veins 3, confluent. Petals yellow, elliptic to oblong, ca. 3–4 × 1–1.5 mm, base with a claw, apex obtuse, not callose. Stamens 2–2.5 mm. Nectary band obscure. Ovary semi-inferior, carpels fused for more than half their length, tapered into conical ca. 0.75 mm styles.
Fig. 6o-r

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4700–5300(–5600) m.

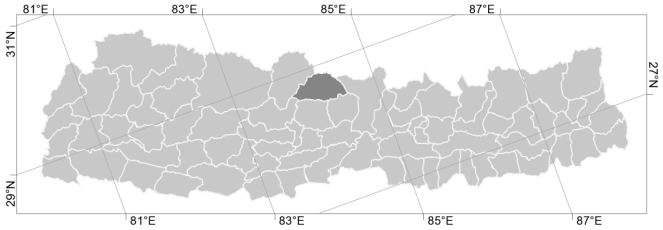
Ecology: Alpine, scree, rocky bare places.

Flowering: July–September.

56. *Saxifraga hemisphaerica* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 62 (1857).

Stems caespitose, many-branched, crowded leafy shoots forming cushions. Stolons absent. Leaves alternate. Cauline leaves imbricate, aggregated into a rosette, subspatulate, concave above, ca. 3 × 1 mm, apex obtuse, margin setose ciliate at base, fimbriate at the apex, somewhat fleshy, both surfaces glabrous. Flowering stems embedded among rosette leaves, not visible, 2–5 cm, bulbils absent. Flower solitary, unisexual, sessile. Pedicels less than 0.5 mm, glandular-pubescent. Sepals erect, linear-oblong, ca. 1 × 0.7 mm, apex scarious fimbriate, margin glandular-ciliate at base, somewhat fleshy, outer surface glabrate, veins 3–7, confluent. Petals yellow, 2.5–3.5 × ca. 1 mm, base with a claw, apex obtuse to acute, 2-callose or absent. Stamens ca. 2 mm in male flowers, female flowers with staminodes shorter than sepals. Nectary a prominent, annular disk. Ovary inferior, carpels fused for more than half their length, tapered into conical, up to 1 mm styles.
Fig. 6s-x

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 4500–5100 m.

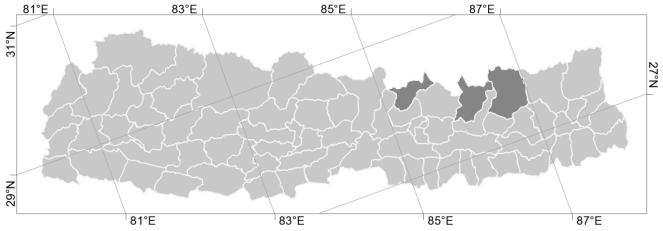
Ecology: Alpine.

Flowering: July–August.

57. *Saxifraga jacquemontiana* Decne., in Jacquem., Voy. Inde 4(1): 68, pl. 78 fig. 2 (1841).

Stems caespitose, many-branched, crowded leafy shoots forming cushions. Stolons absent. Leaves alternate. Cauline leaves persistent, aggregated distally into a terminal rosette, elliptic, ca. 3.3 × 1.6 mm, apex obtuse, margin glandular-pubescent, somewhat fleshy, lower surface glandular-pubescent, upper surface sparingly so. Flowering stems 10–15 mm, embedded among rosette leaves, not or only slightly visible, glandular-pubescent, bulbils absent. Flowers solitary, bisexual. Pedicels 0.5–5 mm, glandular-pubescent. Sepals erect to spreading, ovate, ca. 2.8 × 1.8 mm, apex obtuse, margin glandular-pubescent, outer surface glandular-pubescent, veins 3, confluent. Petals yellow, obovate, ca. 5 × 2.5–3 mm, base with a ca. 0.7 mm claw, apex rounded to subacute, 2-callose. Stamens 2–3.5 mm. Nectary band obscure. Ovary semi-inferior, carpels fused for about half their length, tapered into slender, 1–1.5 mm styles.
Fig. 7a-e

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 4600–5300 m.

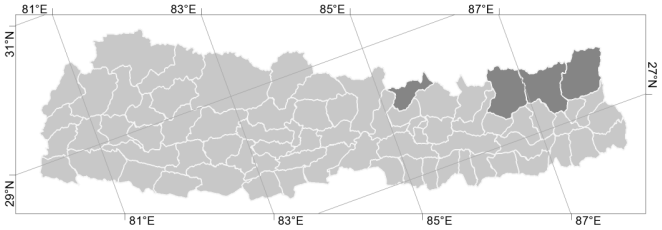
Ecology: Alpine.

Flowering: July–August.

58. *Saxifraga stella-aurea* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 72 (1857).
Saxifraga jacquemontiana var. *stella-aurea* (Hook.f. & Thomson) C.B.Clarke; *S. stella-aurea* var. *polyadena* Harry Sm.

Stems caespitose, many-branched, crowded leafy shoots forming cushions. Stolons absent. Leaves alternate. Cauline leaves aggregated below into a columnar cluster, sessile, spatulate to elliptic, 3–5 × 1.5–1.8 mm, apex obtuse, margin glandular- or eglandular-ciliate or glabrous, somewhat fleshy, both surfaces glabrous. Flowering stems 2–4 cm, dark brown glandular-pubescent, bulbils absent. Flowers solitary, bisexual. Pedicels 1–3 cm, glandular-pubescent. Sepals reflexed, elliptic to ovate, ca. 3 × 1.5 mm, apex obtuse to acute, sparsely glandular-pubescent or glabrous below, veins 3–6, free or partly or fully confluent. Petals yellow, spotted orange at base, ovate to elliptic, 3.5–4.5 × ca. 2 mm, base with a claw, apex obtuse, obscurely 2-callose. Stamens 4–4.3 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into ca. 1 mm styles.
Fig. 7f-i

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



Altitudinal range: 4000–4700(–5300) m.

Ecology: Alpine.

Flowering: July–August.

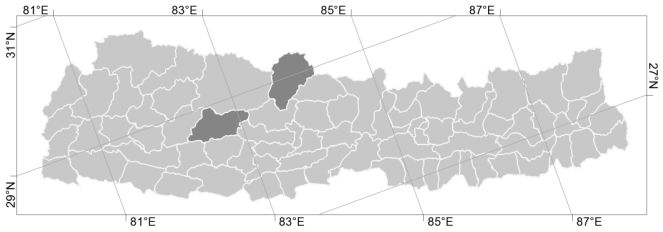
This species is somewhat variable, and plants with larger petals (usually greater than 4 × 2 mm) and glandular-pubescent sepals have been referred to var. *polyadena*. However, since mixed populations and intermediates occur, we have refrained from recognizing any infraspecific taxa.

59. *Saxifraga llonakhensis* W.W.Sm., Rec. Bot. Surv. India 4: 192 (1911).

Stems caespitose, leafy shoots branched forming mats. Stolons absent. Leaves alternate. Basal leaves oblanceolate-linear, 5.2–8 × ca. 1 mm, apex mucronate, margin setose-villous, somewhat fleshy, both surfaces glabrous or eglandular- or glandular-villous. Cauline leaves oblong to linear, 2.8–5 × 0.6–1.6 mm, margin dark brown glandular-ciliate, apex obtuse, fleshy, both surfaces glabrous or dark brown glandular-pubescent. Flowering stems 4.2–9 cm, dark brown glandular-pubescent, bulbils absent. Flower solitary, rarely 2 or 3 in a cyme, bisexual. Pedicels slender, 8–15 mm, dark brown glandular-villous. Sepals erect, broadly ovate to triangular-ovate, 2–2.5 × 1.2–2.3 mm, apex obtuse, margin dark brown glandular-pubescent, leathery, outer surface dark brown glandular-pubescent, veins 3–5, free. Petals yellow, obscurely orange-yellow spotted, pandurate-oblong, 6.2–9.2 × 2–3.1 mm, base usually rounded to cuneate, with a 0.2–1 mm claw, apex obtuse, 4–6-callose. Stamens ca. 4.5 mm. Nectary band obscure. Ovary almost superior, carpels fused for about half their length, tapered into slender, up to 2 mm styles.

Fig. 7j-n

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



Altitudinal range: 4200–5200 m.

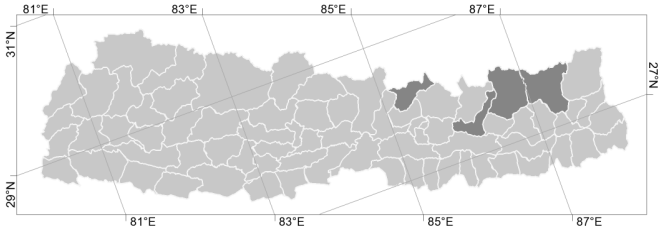
Ecology: Alpine, open stony slopes.

Flowering: July–August.

60. *Saxifraga engleriana* Harry Sm., Repert. Spec. Nov. Regni Veg. 20: 16 (1924).

Stems creeping, many-branched, forming small clumps or mats. Stolons absent. Leaves alternate, sessile. Cauline leaves clustered into a rosette near middle of stem, remote towards base and apex, obovate, ca. 3 × 1.5 mm, base cuneate, apex obtuse, fleshy, both surfaces usually glabrous. Flowering stems 1.5–8 cm, glabrous towards base, eglandular pale brown crisped pubescent above, without long crisped hairs in axils. Flower solitary, bisexual. Pedicels 4–7 mm, eglandular crisped pubescent. Sepals erect at first, then spreading, ovate to elliptic, 2–2.5 × 1.2–1.5 mm, apex obtuse, fleshy, glabrous, veins 3, confluent. Petals yellow, elliptic 3–4 × 1.5–2 mm, base narrowed into a claw, apex obtuse to subacute, 2-callose. Stamens 2.5–4 mm. Nectary a conspicuous annular disk. Ovary almost superior, carpels fused for more than half their length, tapered into slender, 1–2 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4400–5000 m.

Ecology: Alpine.

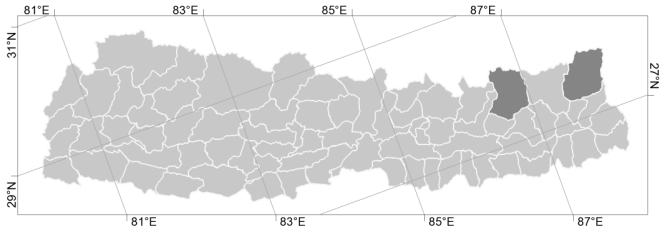
Flowering: July–August.

61. *Saxifraga contraria* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 252, 14 fig. a (1960).

Stems caespitose, shoots many-branched, sometimes forming loose mats. Stolons absent. Cauline leaves opposite,

occasionally some alternate on young shoots, aggregated into a rosette. Blade elliptic, ca. 2 × 1 mm, apex obtuse, margin glabrous, occasionally setose-ciliate, fleshy, both surfaces glabrous. Flowering stems 1–5 cm, glabrous towards base, white pubescent above. Flowers solitary, bisexual. Pedicels 1–5 mm, white pubescent. Sepals spreading, subovate, 1.5–1.8 × 1–1.5 mm, apex obtuse, fleshy, glabrous, veins 3, free. Petals yellow, narrowly ovate to elliptic 2–3.5 × 1–1.3 mm, base contracted into a ca. 0.5 mm claw, apex retuse, 2-callose. Stamens ca. 2 mm. Nectary a conspicuous annular disk. Ovary semi-inferior, carpels fused for more than half their length, tapered into conical, ca. 0.5 mm styles.
Fig. 7o-r

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4500–5300 m.

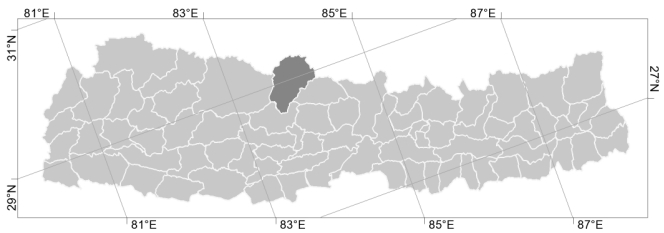
Ecology: Alpine, among stones beside streams.

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

62. *Saxifraga nanella* Engl. & Irmsch., Bot. Jahrb. Syst. 50: 44 (1914).

Stems caespitose, with branched leafy shoots, sometimes forming loose cushions. Stolons absent. Leaves alternate. Cauline leaves mostly caducous towards base, somewhat aggregated above, obovate, 3–4.5 × 1–1.5 mm, apex obtuse, margin eglandular-ciliate, somewhat fleshy, both surfaces glabrous. Flowering stems 1.5–4 cm, brown glandular-pubescent. Flowers solitary (or rarely 2), bisexual. Pedicels 6–12 mm, sparsely glandular-pubescent. Sepals spreading to reflexed, ovate, 1.3–1.5 × 0.8–1 mm, apex obtuse, margin glabrous, somewhat fleshy, outer surface glandular or eglandular-pubescent, veins 3–5, partly or fully confluent. Petals yellow, spotted orange, oblong, 4–6 × 1.5–2 mm, base with a short claw, apex obtuse to acute, not or 2-callose. Stamens ca. 3–4 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into conical, ca. 1 mm styles.

Distribution: Nepal, E Himalaya, Tibetan Plateau and E Asia.



Altitudinal range: 4500–5000 m.

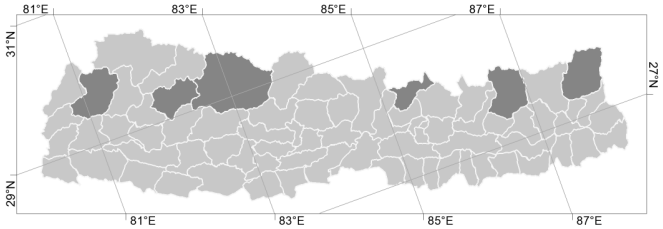
Ecology: Alpine, scree.

Flowering: July–August.

63. *Saxifraga microphylla* Royle ex Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 72 (1857).
Saxifraga microviridis H.Hara.

Stems creeping, many-branched, forming loose mats. Stolons absent. Leaves alternate, sessile. Cauline leaves often clustered into a rosette near the middle of stem, remote towards ends, or remote throughout, oblong, ca. 3 × 1.5 mm, base cuneate, apex obtuse, fleshy, both surfaces glabrous. Flowering stems to 2.5 cm, glabrous towards base, eglandular pale brown glandular-pubescent above, Flowers solitary, bisexual. Pedicels 1–3 mm, densely eglandular-crisped pubescent. Sepals erect, elliptic, ca. 1.8 × 1.2–1.5 mm, apex obtuse, fleshy, glabrous, veins 3, confluent. Petals green, obovate, 2–2.5 × 1–1.5 mm, base cuneate, apex obtuse, not callose. Stamens 2–3 mm. Nectary a conspicuous, annular disk. Ovary semi-inferior, carpels fused for more than half their length, tapered into 0.5 mm styles.

Distribution: Nepal and E Himalaya.



Altitudinal range: 3900–5600 m.

Ecology: Alpine.

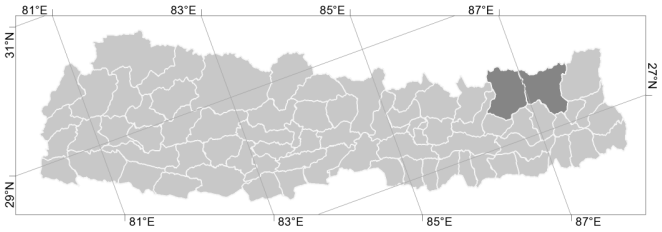
Flowering: July–August.

64. *Saxifraga punctulata* Engl., Bot. Jahrb. Syst. 48: 601 (1912).

Stems caespitose or simple, erect. Stolons absent. Leaves alternate. Basal leaves forming a rosette, blade spatulate, 4–7 × 1.5–2 mm, fleshy, apex obtuse, margin cartilaginous, eglandular setose ciliate, upper surface glabrous, pustulate towards apex. Cauline leaves aggregated at stem tip, oblanceolate, 4–6 × 1–1.2 mm, apex obtuse to acute, margin blackish glandular-pubescent, both surfaces blackish glandular-pubescent, upper surface pustulate at apex. Flowering stems 1.5–4 cm, blackish glandular-pubescent. Flowers solitary or 2–4 in an umbellate cyme, bisexual. Pedicels 1–2.5 cm, blackish glandular-pubescent. Sepals erect to spreading, ovate to triangular, 2–2.5 × 2–2.5 mm, apex acute, outer surface and margin blackish glandular-pubescent, veins 5, confluent. Petals pale creamy white, with yellow and purple spots near base, elliptic, 7–9 × 3–5 mm, base abruptly narrowed into a ca. 0.6 mm claw, apex obtuse, not or

obscurely callose. Stamens 3–4 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into conical, ca. 0.5 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 4500–4900(–5800) m.

Ecology: Alpine.

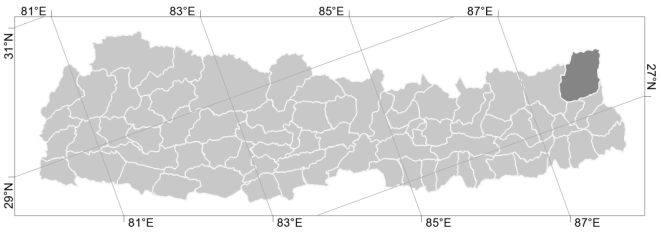
Flowering: July–August.

65. *Saxifraga umbellulata* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 71 (1857).

सून-चू-टेग Sun-chu-teg (Tibetan).

Stems simple, erect. Leaves alternate. Basal leaves aggregated into a rosette, spatulate, 6–14 × 1.5–3 mm, apex obtuse, margin glabrous, upper surface glabrous, somewhat pustulate towards apex. Cauline leaves oblong to subspatulate, 4.5–6.6 × 1.5–2 mm, margin brown glandular-pubescent, both surfaces brown glandular-pubescent or upper surface glabrous. Flowering stems up to 6 cm, brown glandular-pubescent. Flowers 2–23 in an umbellate cyme, bisexual. Pedicels 5–17 mm, brown glandular-pubescent. Sepals usually erect, ovate to narrowly triangular-ovate, (1.5–)2.2–3.5 × 1–1.3 mm, apex subobtuse to acute, outer surface and margin brown glandular-pubescent, veins 3, free. Petals yellow, sometimes with orange streaks, spathulate, 6.5–9 × 2–3 mm, base with a claw 0.4–0.5 mm, apex rounded to acute, 2-callose. Stamens 3–3.5 mm. Nectary band obscure. Ovary almost superior, carpels fused for more than half their length, tapered into slender, ca. 2 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: ca. 3700 m.

Ecology: Alpine, on rocks.

Flowering: July–August.

Pan *et al.* (Fl. China 8: 331. 2001) included *SAxifraga pasumensis* Marquand & Airy-Shaw, *S. muricola* Marquand & Airy-Shaw and *S. lhasana* H. Sm. within *S. umbellulata*. The differences between these species are summarised in that work. Here, we prefer to take a narrower view of the variation and the taxon described above is *S. umbellulata s.s.* We have seen no Nepalese specimens of the other taxa.

2. *Saxifraga* sect. ***Mesogyne*** Sternb.

Plants caespitose, with erect stems arising from a bulbiliferous rhizome, not forming cushions or mats and not stoloniferous. Leaves alternate. Chalk glands absent. Nectary a band of tissue encircling the base of the ovary, not disc-shaped. Petals white, without calloses. Stamens 10. Ovary superior.

Key to Species

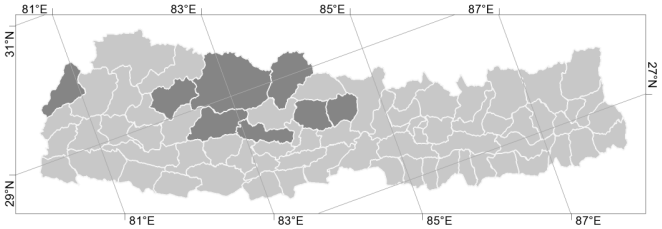
1a	Leaf teeth or lobes mostly blunt	**66. *S. asarifolia***
b	Leaf teeth acute	2
2a	Bulbils absent from axils of cauline leaves	**67. *S. sibirica***
b	Bulbils (minute, less than 0.5 mm) present in axils of cauline leaves	**68. *S. granulifera***

66. *Saxifraga asarifolia* Sternb., Revis. Saxifrag. Suppl.2: 33, pl. 24 (1831).
Saxifraga odontophylla Wall. ex Hook.f. & Thomson.

Stems caespitose, erect, arising from a bulbiliferous rhizome. Leaves alternate. Petiole of basal leaf 3–12(–15) cm. Blade suborbicular to reniform, 1.5–4.5 × 3–6 cm, base deeply cordate, apex obtuse, margin crenate with (7–)9–17 rounded teeth, ciliate, upper surface sparsely eglandular-pubescent, lower surface usually purplish. Cauline leaves similar to basal leaves, decreasing in size upwards, teeth more acute, axillary bulbils absent. Flowering stems 7–20(–30) cm, sparsely brownish or whitish villous. Flowers 2–10 in a lax cyme, bisexual. Pedicels 3–25 mm, glandular-pubescent. Sepals

erect to spreading, ovate to oblong-ovate, 3.5–5 × ca. 2 mm, apex acute, outer surface and margin glandular-pubescent, veins 3–5, confluent near apex. Petals white, sometimes spotted or flushed reddish within, obovate, 8–12 × 6–8 mm, narrowed at the base, apex rounded. Stamens 3–4 mm, anthers reddish or orange. Ovary superior, carpels fused for more than half their length, narrowed into 2 mm styles.

Distribution: Nepal, W Himalaya and E Himalaya.



Altitudinal range: 3600–4600 m.

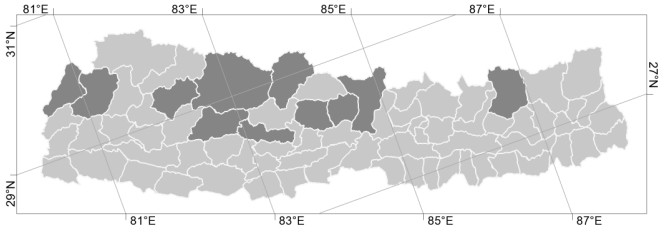
Ecology: Alpine meadows.

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

67. *Saxifraga sibirica* L., Syst. Nat., ed. 10, 2: 1027 (1759).
Saxifraga odontophylla Wall. ex Sternb.

Stems caespitose, erect, arising from a bulbiliferous rhizome. Leaves alternate. Petiole of basal leaf 1–4 cm, glandular-pubescent. Blade reniform, 6–8 × 8–12 mm, base cordate to truncate, apex obtuse, margin 5–7-lobed, upper surface and margin glandular-pubescent, lower surface glabrous. Cauline leaves similar to basal leaves, decreasing in size upwards, ultimately 3-lobed to entire and sessile, both surfaces glandular-pubescent or glabrous, margin glandular-pubescent; axillary bulbils absent. Flowering stems 6–15 cm, densely glandular-pubescent. Flowers 2–5, in a lax cyme, bisexual. Pedicels slender, 8–20 mm, glandular-pubescent. Sepals erect, lanceolate, 4–5 × 1–2 mm, apex obtuse to subacute, outer surface and margin glandular-pubescent, veins 3, confluent. Petals white, obovate-cuneate, 8–12 × 3–4 mm, base attenuate, apex rounded. Stamens 3–5 mm, anthers cream or white. Ovary superior, carpels fused up to half their length, narrowed into 1–2 mm styles.
Fig. 8a-c

Distribution: Nepal, W Himalaya, E Himalaya, Tibetan Plateau, E Asia, N Asia and Europe.



Altitudinal range: 3200–5000(–5800) m.

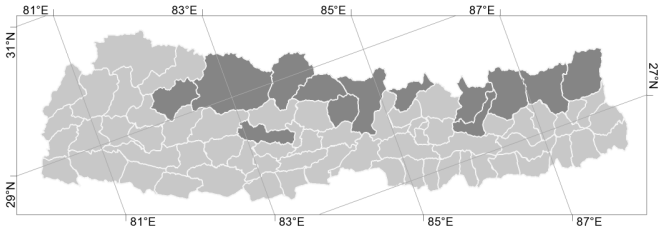
Ecology: Alpine meadows and pastures.

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

68. *Saxifraga granulifera* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 259, pl. 21B (1960).
Saxifraga sibirica var. *bulbifera* Harry Sm.

Stems caespitose, erect, arising from a bulbiliferous rhizome. Leaves alternate. Petiole of basal leaf 1.5–4 cm, glandular-pubescent. Blade reniform, 5–12 × 8–15 mm, base cordate or truncate, apex acute, 5–9-lobed, lobes broadly ovate to triangular-ovate, both surfaces nearly glabrous, margin glandular-pubescent. Cauline leaves similar to basal leaves, decreasing in size upwards, ultimately sessile, axillary bulbils present, 0.2–0.5 mm, reddish brown. Flowering stems 10–15 cm, sparsely glandular-pubescent. Flowers 1(–5) in a lax cyme, bisexual. Pedicels slender, 1–7 cm, glandular-pubescent. Sepals erect, ovate or narrowly ovate to lanceolate, 1.2–2.5 × ca. 1 mm, acute to subacute, outer surface and margin red-glandular pubescent, veins 3, confluent. Petals white, obovate-cuneate to oblanceolate, (5–)7–12 × 2–2.5(–4) mm, base attenuate, apex obtuse to rounded. Stamens 3.5–5 mm, anthers purple. Ovary superior, carpels fused for more than half their length, narrowed into slender, ca. 2.5 mm styles.

Distribution: Nepal, W Himalaya, E Himalaya, Tibetan Plateau and E Asia.



Altitudinal range: (2700–)3100–4350(–5000) m.

Ecology: Alpine, mossy boulders, cliffs, among rocks.

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

3. *Saxifraga* sect. ***Porphyrion*** Tausch

Plants caespitose, many branched, forming mats or cushions. Rhizome neither bulbiliferous nor stoloniferous. Leaves alternate or opposite, with chalk glands on the upper surface near the margin and apex, glands surrounded by white crystalline deposits. Petals white or pink to red or purple, without calloses. Stamens 8 or 10. Ovary superior to semi-inferior.

Key to Species

1a Leaves opposite. Flowers white, solitary (1–3-flowered in *Saxifraga roylei*)....2
b Leaves alternate. Flowers white to pink or red, 1–several....5

2a Bases of opposite pair of leaves joining at an acute angle, margin denticulate-ciliate ....**72. *S. roylei***
b Bases of opposite pair of leaves confluent, margin glabrous 3

3a Flowers sessile or subsessile. Stems forming large usually loose mat-like tufts. Leaves hardly imbricate or imbricate only at top of stems, 3–3.5 mm ....**70. *S. georgei***
b Pedicels longer than 5 mm. Shoots columnar, forming small sparse tufts. Leaves densely imbricate, 2–2.5 mm 4

4a Sepal veins confluent. Sepal chalk gland absent ....**69. *S. alpigena***
b Sepal veins free. Sepal chalk gland present ....**71. *S. quadrifaria***

5a Flowers 2–several (solitary only in dwarfed specimens) 6
b Flowers solitary 11

6a Sepals with 1–3 chalk glands....7
b Sepals without chalk glands....8

7a Petals 3–5.5 mm, white or pale pink. Leaf apex obtuse to subacute, subtruncate, often appearing horseshoe-like ....**81. *S. andersonii***
b Petals ca. 6.5 mm, deep rose. Leaf apex acute ....**82. *S. rhodopetala***

8a Leaf chalk glands ca. 7. Flowering stems up to ca. 3 cm. Plant forming a tight cushion 9
b Leaf chalk glands more than 9. Flowering stems at least 5 cm. Plant forming a loose cushion 10

9a Sepal veins confluent. Leaves 5–6 mm, apical quarter much thickened .... **83. *S. afghanica***
b Sepal veins free. Leaves 7–8 mm, apex not thickened ....**85. *S. micans***

10a Leaves at least 10 mm ....**84. *S. cinerea***
b Leaves up to 7 mm....**86. *S. stolitzkae***

11a Leaves with several chalk glands....12
b Leaves with 1 chalk gland (sometimes obscure in *Saxifraga subsessiliflora*)....14

12a Leaves imbricate only at top of stems. Shoots forming a loose mat....**78. *S. poluninana***
b Leaves imbricate throughout. Shoots forming tight cushions 13

13a Sepals ovate, obtuse, up to 3mm, sparingly glandular-pubescent ....**79. *S. mira***
b Sepals narrowly triangular, acute, longer than 4 mm, densely glandular pubsecent.... **80. *S. staintonii***

14a Leaf apex obtuse, not thickened, chalk gland subapical 15
b Leaf apex truncate-triquetrous with chalk gland set in the tip....16

15a Petals pink or lilac ....**76. *S. lowndesii***
b Petals white....**77. *S. subsessiliflora***

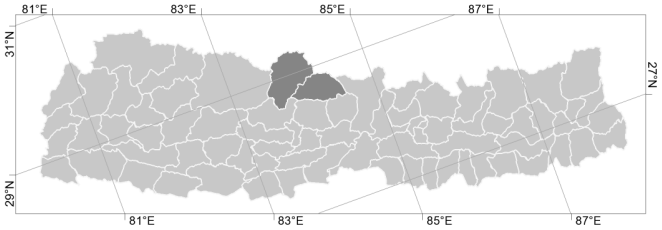
16a Leaf apex cartilaginous-fimbriate ....**73. *S. hypostoma***
b Leaf apex glabrous....17

17a Leaf with base slightly dilated, glandular-pubescent and apex minutely apiculate .... **74. *S. kumaunensis***
b Leafwith base tapered, denticulate-ciliate and apex obtuse.... **75. *S. pulvinaria***

69. *Saxifraga alpigena* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 97, 1 fig. i (1958).

Plants caespitose, many-branched, crowded leafy shoots 4 mm diameter, forming loose cushions. Leaves on vegetative shoots opposite, tightly imbricate, sessile, ovate to obovate, 1.5–2.5 × 1–2 mm, apex obtuse, thickened, margin of leaf-pairs confluent, glabrous, cartilaginous, both surfaces glabrous, chalk gland solitary. Flowering stems 5–15 mm above cushion surface, glandular-pubescent, leaves 1 or 2. Flowers solitary, bisexual. Pedicels 2–5 mm, glandular-pubescent. Sepals erect, ovate, ca. 2 mm, apex obtuse, outer surface and margin glandular-pubescent, veins 3, confluent near apex. Petals white, ca. 6 × 4 mm, limb orbicular, base narrowed to a claw, apex rounded. Stamens 8, 1.7–2.7 mm, anthers red-brown. Nectary band obscure. Ovary semi-inferior, carpels fused only at base, narrowed into ca. 1 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 3400–4200 m.

Ecology: Alpine shingle and moraine, amongst rocks.

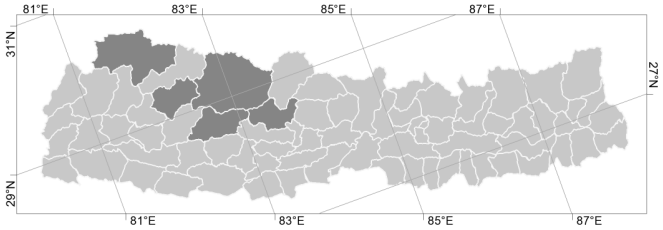
Flowering: June.

An endemic only known from a few collections.

70. *Saxifraga georgei* J.Anthony, Notes Roy. Bot. Gard. Edinburgh 18: 33 (1933).

Plants caespitose, many-branched, crowded leafy shoots forming hemispherical cushions. Leaves on vegetative shoots opposite, spreading, sessile, broadly ovate, 3–4 × 1.5–2 mm, apex obtuse, recurved, margin of opposite leaf-pairs confluent, quite thick, both surfaces glabrous, chalk gland solitary. Flower stems 5–10 mm, glandular- and eglandular-pubescent. Flowers solitary, bisexual. Pedicels 1–3 mm. Sepals erect, broadly ovate, 1.5–2 × 1.5–2 mm, apex subobtuse, glabrous or sparingly glandular-pubescent on outer surface and basal margin, veins 3, confluent near apex or not, chalk gland solitary. Petals white to very pale pink, obovate, 3–5 × 2–3 mm, base contracted into a claw, apex obtuse. Stamens 8, equalling or longer than sepals, anthers brownish to blackish. Nectary band obscure. Ovary semi-inferior, carpels fused for about half thier length, tapering into erect, 2.5–3 mm styles.

Distribution: Nepal, E Himalaya, Tibetan Plateau and E Asia.



Altitudinal range: 3900–5400 m.

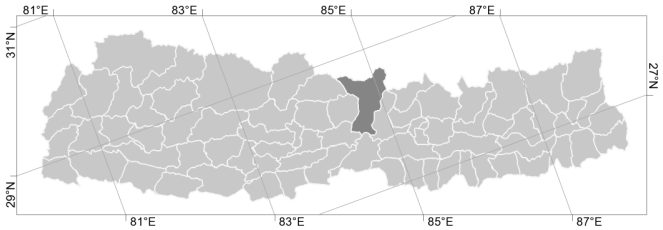
Ecology: Alpine, on wet rocks, under overhanging rocks, on boulders.

Flowering: May–July.

71. *Saxifraga quadrifaria* Engl. & Irmsch., in Engl., Pflanzenr. IV. 117(Heft 69): 575 (1919).

Plants caespitose, many-branched, crowded leafy shoots forming pulvinate cushions. Leaves on vegetative shoots opposite, tightly imbricate, sessile, ovate, 2–2.5 × 1–1.5 mm, apex subtruncate-triquetrous, margin of leaf-pairs forming an acute angle, denticulate-ciliate, both surfaces glabrous, chalk gland solitary. Flowering stems 5–6 mm above cushion surface, glandular-pubescent, leaves 0 or 1. Flowers solitary, bisexual. Pedicels 5–6 mm, glandular-pubescent. Sepals erect, ovate, 1.5–2 × ca. 1 mm, apex subacute, outer surface and margin glandular-pubescent, veins 3, free. Petals white, 4–6 × 2 mm, limb narrowly obovate, base attenuate, apex rounded. Stamens 8, 2–3 mm, anthers red-brown. Nectary band obscure. Ovary semi-inferior, carpels fused only at base, narrowed into ca. 1 mm styles.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: ca. 4100 m.

Ecology: Alpine.

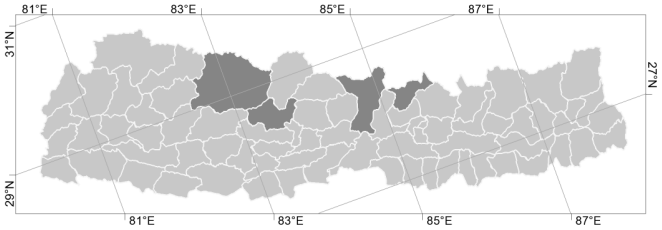
Flowering: June.

Described from Tibet and recorded from Nepal by Kitamura (Fauna Fl. Nepal Himalaya: 146. 1955), based on material collected by Nakao (3 June 1953) from Manaslu (probably KYO), but not seen by the authors. Alpine plant enthusiasts, however, report seeing either it or putative hybrids involving it in Nepal.

72. *Saxifraga roylei* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 95, 1 fig. o (1958).

Plants caespitose, many-branched, crowded leafy shoots forming cushions. Leaves on vegetative stems opposite, loosely arranged or imbricate above, ascending, not or slightly recurved towards apex, sessile, ovate- or obovate-linear, to 3.5 mm, apex subacute, usually minutely mucronulate, margin of opposite leaf-pairs meeting at an acute angle, not confluent, somewhat leathery, both surfaces glabrous, margin denticulate-ciliate at base, chalk gland solitary. Flowering stems 10–15 mm, much shorter than vegetative shoots, with long, fine glandular hairs, leaves 3 or 4, distant. Flower solitary or 2–3 in a cyme, bisexual. Pedicels 2–3 mm, glandular-pubescent. Sepals erect, ovate, 2–2.5 × 1.5 mm, apex subacute, margin and outer surface sparingly glandular pubescent, veins 3, confluent near apex, minute solitary chalk gland near apex. Petals white, ca. 4.6 × 3.2 mm, limb suborbicular, base abruptly narrowed to a claw, apex rounded. Stamens 10, ca. 3 mm, anthers reddish. Nectary obscure. Ovary semi-inferior, carpels fused only at base, tapering into erect, 2.5–3 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 3200–3800 m.

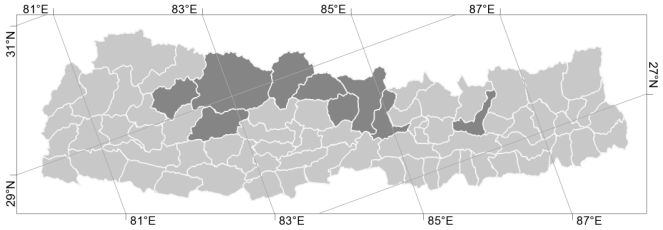
Ecology: Alpine, streamsides and ledges on rock faces.

Flowering: June.

73. *Saxifraga hypostoma* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 103, 4 fig. d (1958).

Plants caespitose, many-branched, crowded leafy shoots forming pale green cushions. Leaves on vegetative shoots alternate, imbricate, sessile, ovate to oblong, 1.5–3 × 1 mm, apex truncate, triquetrous, margin eglandular-ciliate, cartilaginous-laciniate towards apex, both surfaces glabrous, chalk gland solitary, subapical. Flowering stems very short, embedded among vegetative shoots, glabrous, leaves 3 or 4. Flowers solitary, bisexual. Pedicels 0.5–3 mm, sparingly glandular-pubescent. Sepals erect, ovate, ca. 1.5 × 1.5 mm, apex obtuse, outer surface glabrous, margin glandular-villous-pubescent, veins 3, confluent near apex, chalk gland absent. Petals white, orbicular-obtriangular, 3–4 × 2.5–4 mm, base tapered into a short claw, apex rounded. Stamens 10, 1–1.5 mm, anthers red. Nectary band obscure. Ovary semi-inferior, carpels fused for about half their length, abruptly tapered into erect, ca. 1 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 3900–5300 m.

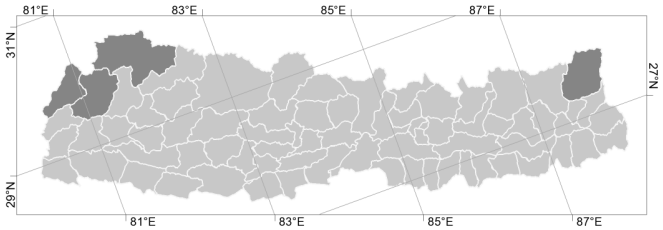
Ecology: Alpine regions on or amongst rocks, rock ledges, scree.

Flowering: (May–)June–September.

74. *Saxifraga kumaunensis* Engl., in Engl., Pflanzenr. IV. 117(Heft 69): 576, fig. 119 (1919).

Plants caespitose, many-branched, crowded obconical leafy shoots, to 10 mm diameter, forming cushions. Leaves on vegetative shoots alternate, densely imbricate, appressed to the stem, sessile, oblong, 2.5–4 × 1–1.2 mm, apex obtuse, mucronulate, leathery, both surfaces glabrous, margin glabrous towards apex, ciliate on dilated leaf-base, chalk gland solitary. Flowering stems to 10 mm, glandular and eglandular-pubescent, leaves 4 or 5. Flowers solitary, bisexual. Pedicels 1–2 mm. Sepals erect to spreading, broadly ovate, 1.5–2 × ca. 1.2 mm, apex obtuse, outer surface glabrous, margin glandular-pubescent, veins 3, free, chalk gland solitary. Petals white, obovate, ca. 4 × 2.5 mm, base cuneate or tapered into a short claw, apex rounded. Stamens 10, ca. 2 mm, anthers red-brown. Nectary band obscure. Ovary semi-inferior, carpels fused only at base, tapered into erect, ca. 2 mm styles.

Distribution: Nepal and W Himalaya.



Altitudinal range: 3300–4800 m.

Ecology: Alpine, rock crevices.

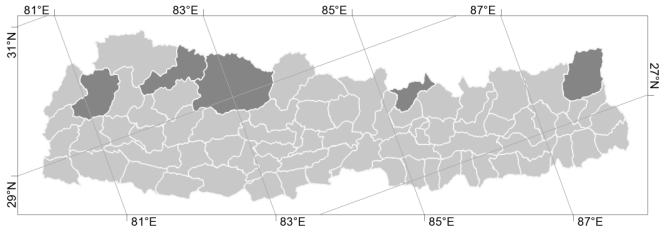
Flowering: May–July.

75. *Saxifraga pulvinaria* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 105, pl. 4 fig. m (1958).
Saxifraga imbricata Royle.

Plants caespitose, many-branched, crowded columnar leafy shoots, 5–6 mm diameter, forming cushions. Leaves on vegetative shoots alternate, imbricate, sessile, appressed to stem, linear-oblong, 3.5–5 × 1–2 mm, apex truncate, triquetrous, somewhat leathery, both surfaces glabrous, margin

denticulate-ciliate, chalk gland solitary. Flowering stems embedded among vegetative shoots, ca. 15 mm, sparingly glandular-pubescent. Flowers solitary, bisexual, sessile. Sepals erect, subtriangular-ovate to broadly ovate, 1.5–2 × 1.3–1.4 mm, apex obtuse to acute, outer surface glabrous, margin glandular-pubescent, veins 3, confluent or not near apex, chalk gland solitary. Petals white, obovate to oblanceolate or oblong, 3.5–5.3 × 2–3 mm, base gradually narrowed to a claw, apex obtuse or rounded to retuse. Stamens 10, ca. 2 mm, anthers yellow. Nectary obscure. Ovary semi-inferior, carpels fused only at base, tapered into erect, 1–2 mm styles.
Fig. 8d-h

Distribution: Nepal and W Himalaya.



Altitudinal range: 3800–5900 m.

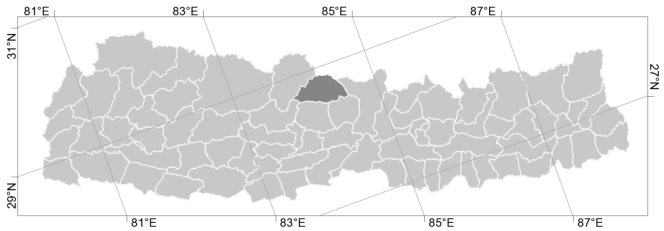
Ecology: Alpine, stony slopes, rock crevices, cliffs.

Flowering: April–July(–August).

76. *Saxifraga lowndesii* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 106, 5 fig. d (1958).

Plants caespitose, many-branched, crowded, decumbent, leafy shoots 7–9 mm diameter, forming mats or loose cushions. Leaves on vegetative shoots alternate, loosely imbricate, sessile, obovate-linear, 5–7 × 2–2.5 mm, apex obtuse or retuse, margin cartilaginous, both surfaces glabrous, margin sparingly glandular-pubescent at base, chalk gland solitary. Flowering stems 2 mm, scarcely exceeding subtending vegetative shoots, glabrous. Flowers solitary, bisexual. Pedicels ca. 1 mm. Sepals erect to spreading, broadly ovate, ca. 2.5 × 3 mm, apex rounded, margin glandular-ciliate, both surfaces glabrous, veins 3–5, confluent, chalk glands 1 or 2. Petals rose-lilac or white, suborbicular, 6–8 × 4–7 mm, base narrowed to a claw, apex truncate. Stamens 10, 3–4.5 mm, anthers red-brown. Nectary band obscure. Ovary semi-inferior, carpels fused only at base, tapered into erect, 2–2.5 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 3800–4200 m.

Ecology: Alpine, among rocks.

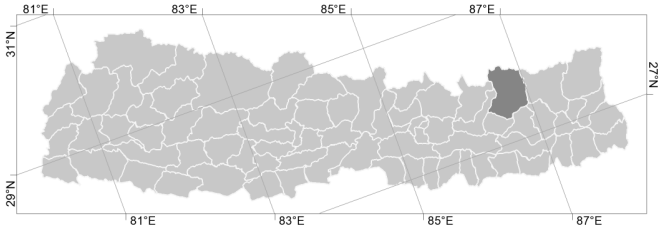
Flowering: June. **Fruiting:** July.

A poorly recorded endemic known from Sabche Khola and an unlocalised collection from E Nepal (*Swan 421*, BM).

77. *Saxifraga subsessiliflora* Engl. & Irmsch., in Engl., Pflanzenr. IV. 117(Heft 69): 573 (1919).
Saxifraga lolaensis Harry Sm.; *S. matta-florida* Harry Sm.

Plants caespitose, many-branched, crowded cylindrical leafy shoots forming cushions. Leaves on vegetative shoots alternate, densely imbricate, sessile, appressed to the stem, oblong-obovate, 3–6 × 1–2.5 mm, slightly keeled towards base on lower surface, apex obtuse to acute, not thickened, both surfaces glabrous, margin minutely glandular-ciliate or glabrous, chalk gland solitary. Flowering stems embedded among vegetative shoots, 1–1.5 mm, subglabrous. Flowers solitary, bisexual, sessile. Sepals erect or ascending, ovate, 2–2.5 × ca. 1.5 mm, apex obtuse, both surfaces glabrous, margin glandular-pubescent, veins 3, confluent near apex, chalk gland solitary. Petals white, oblong-obovate, 3–5 × ca. 1.5 mm, base cuneate, apex rounded. Stamens 10, 2–2.5 mm, anthers reddish brown. Nectary inconspicuous. Ovary semi-inferior, carpels fused for half their length, tapered into free, thick, ca. 1 mm styles.
Fig. 8i-m

Distribution: Nepal and E Himalaya.



Altitudinal range: 4400–4600 m.

Ecology: Alpine.

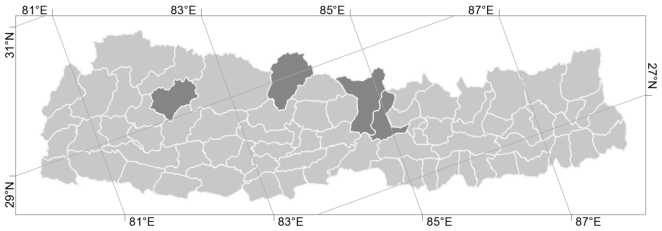
Flowering: June.

78. *Saxifraga poluninana* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 114, pl. 8 fig. h (1958).

Plants caespitose, many-branched, woody at base, decumbent leafy shoots, 10–13 mm diameter, forming cushions. Leaves on vegetative shoots alternate, densely packed, long-persistent, spreading, recurved, sessile, linear, 5–6.2 × ca. 1.5 mm, apex subacute, somewhat thickened, both surfaces glabrous, margin denticulate-ciliate in basal third, chalk glands 5–7, submarginal from apex downwards. Flowering stems 5–25 mm, glandular-pubescent, leaves 3–4. Flowers solitary, bisexual. Pedicels 1–2 mm, glandular-pubescent. Sepals erect, ovate, 3–4 × 1.5–2.5 mm, apex obtuse to acute, recurved, outer surface and margin densely glandular-pubescent except

at the apex, veins 3, confluent, chalk gland 1, inconspicuous. Petals white to pink, obovate to suborbicular, 8–10 × 4–5 mm, base gradually narrowed, apex rounded. Stamens 10, 4–5 mm, anthers dark red. Nectary obscure. Ovary semi-inferior, carpels fused only at base, tapered into erect, 3–4 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 3200–3500 m.

Ecology: Alpine, crevices on rocks beside streams, usually in shade.

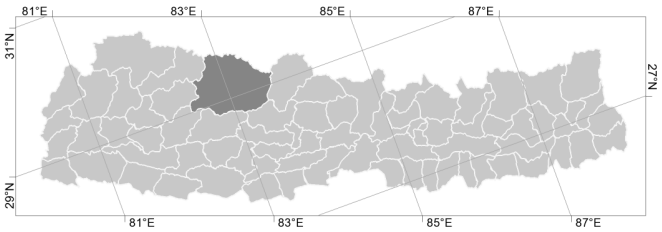
Flowering: May.

Believed to hybridize with *Saxifraga cinerea* Harry Sm. where their respective geographical and altitudinal ranges overlap. Records at lower altitude (2000 m) require confirmation.

79. *Saxifraga mira* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 114, 8 fig. d (1958).

Plants caespitose, many-branched, woody at base, crowded, decumbent leafy shoots to 10 mm diameter, forming cushions. Leaves on vegetative shoots alternate, densely packed, long-persistent, spreading, sessile, linear-oblong, 5–6.5 × 2–2.5 mm, apex obtuse or acute, thick, both surfaces glabrous, margin denticulate-ciliate in upper third, chalk glands 5–7, submarginal from apex downwards. Flowering stems 6–8 mm, densely glandular-pubescent, leaves 2–3. Flowers solitary, bisexual. Pedicels 1–2 mm. Sepals erect, broadly ovate, ca. 3 × 3 mm, apex obtuse, outer surface minutely glandular-pubescent towards base, margin minutely glandular-pubescent, veins 3, free, chalk glands absent. Petals white or rose pink, orbicular, 7–7.5 × 5–6 mm, base abruptly tapered into a short claw ca. 1.3 mm, apex rounded. Stamens 10, 3–4.5 mm, anthers yellow. Nectary band inconspicuous. Ovary semi-inferior, carpels fused only at base, tapered into erect, 3–4 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: ca. 4400 m.

Ecology: Alpine, on cliffs, often on shaded north-facing rock faces.

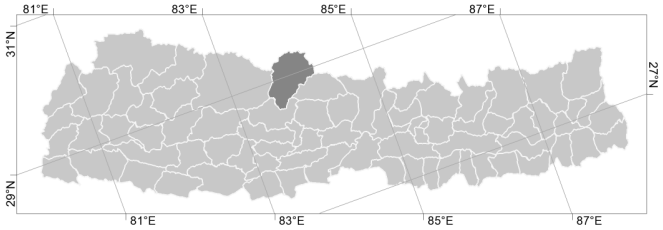
Flowering: June.

An endemic only known from the type collection, *Polunin, Sykes and Williams 1094* (BM, E) on the Barbung Khola.

80. *Saxifraga staintonii* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 118, pl. 13 fig. j (1958).

Plants caespitose, many-branched, somewhat woody at base, crowded leafy shoots up to 13 mm diameter, forming cushions. Leaves on vegetative shoots alternate, imbricate, ascending or spreading to recurved, sessile, linear-oblong, ca. 9 × 2 mm, apex acute to acuminate, leathery, both surfaces glabrous, margin denticulate-ciliate on slightly dilated leaf-base, chalk glands 9–13, submarginal from apex downwards. Flowering stems ca. 5 cm, long glandular-hairy, leaves 7–9. Flowers solitary, bisexual. Pedicels 10–15 mm, glandular-pubescent. Sepals erect, apex recurved, ovate to narrowly triangular, 4–4.5 × ca. 2 mm, apex acute, narrowly membranous, outer surface and margin glandular-pubescent, veins 3, confluent near apex, chalk gland subapical, solitary. Petals white, narrowly obovate, ca. 10 × 4 mm, base gradually narrowed, apex rounded. Stamens 10, ca. 4 mm, anthers yellow. Nectary obscure. Ovary semi-inferior, carpels fused only at base, tapered into ca. 2 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: ca. 4800 m.

Ecology: Alpine, on steep rocks.

Flowering: August.

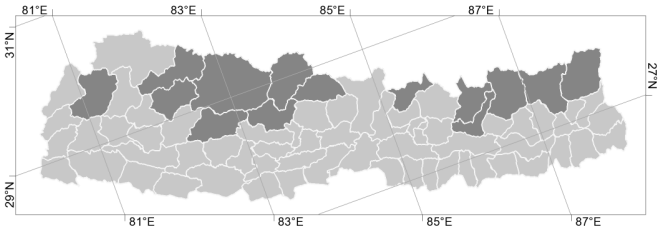
Apparently known only from the type collection, *Stainton, Sykes & Williams 7276* (BM) from Samargaon.

81. *Saxifraga andersonii* Engl., Bot. Jahrb. Syst. 48: 609 (1912).

Plants caespitose, many-branched, somewhat woody at base, crowded leafy shoots 8–12 mm diameter, forming compact cushions. Leaves on vegetative shoots alternate, densely packed, aggregated into an apical rosette, sessile, obovate to oblong to oblanceolate-linear or oblong-spatulate, 5–10 × 1.2–2.6(–3) mm, apex obtuse to subacute, recurved, leathery, both surfaces glabrous, margin ciliate at base, chalk glands 3–7. Flowering stems ca. 3 cm, glandular-pubescent, leaves 4–8. Flowering stem leaves oblanceolate-linear to oblong-spatulate,

5–6 × 1.5–1.8 mm, apex somewhat recurved, chalk glands 3–7, both surfaces glabrous, margin ciliate at base. Flowers (1 or)2–7 in a cyme, bisexual. Pedicels to 4 mm in flower, elongating to 10 mm in fruit, minutely glandular-pubescent. Sepals reflexed, ovate, 1.5–2 × 1–1.5 mm, apex obtuse, outer surface and margin sparsely glandular-pubescent, veins 3, confluent at apex, chalk gland solitary near apex. Petals white, oblong-obovate, 3–5 × 1.5–3.5 mm, base narrowed to a claw, apex obtuse. Stamens 10, 2–3 mm, anthers reddish to blackish. Nectary band obscure. Ovary semi-inferior, carpels fused only at base, tapered into erect, ca. 3 mm styles.
Fig. 8n-r

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 3400–5500 m.

Ecology: Alpine, on soil slopes, rocky slopes, rocks, crevices, gravels, moraine.

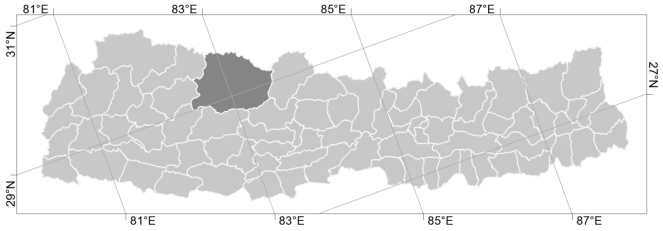
Flowering: May–July. **Fruiting:** August–October.

Putative hybrids with *Saxifraga hypostoma* Harry Sm. (*S*. x *tukuchensis* J. Bürgel) are common in central Nepal, where the parents meet. *Saxifraga* x *hetenbeliana* J. Bürgel is believed to be the result of crossing with *S. pulvinaria* Harry Sm. Field observations suggest also that hybridization with *S. lowndesii* Harry Sm. may occur where their respective geographical and altitudinal ranges overlap. Putative hybrids with *S. quadrifaria* Engl. & Irmsch. have also been observed, and one of the products of this hybrid combination is said to be *S. alpigena* Harry Sm. (q.v.). Experimental evidence is needed in support of all these suggestions.

82. *Saxifraga rhodopetala* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 124, 12 fig. e (1958).

Plants caespitose, many-branched, woody at base, leafy shoots, ca. 13 mm diameter, forming cushions. Leaves on vegetative shoots alternate, densely packed, spreading, recurved, sessile, linear to obovate-linear, ca. 5 mm, apex subacute to acute, thick, both surfaces glabrous, margin denticulate-ciliate in basal third, long-persistent, chalk glands 5–11. Flowering stems 3–4 cm, densely glandular-pubescent, leaves 5 or 6. Flowers 5–9 in a cyme, bisexual. Pedicels 1–8 mm. Sepals erect, ovate, ca. 3 × 1.5–2 mm, apex obtuse, outer surface and margin densely glandular-pubescent except at apex, veins 3, confluent, chalk glands 1–3. Petals deep rose, narrowly obovate, ca. 6.5 × 2.5 mm, apex obtuse, base gradually narrowed. Stamens 10, 5 mm. Nectary obscure. Ovary semi-inferior, carpels fused only at base, tapered into erect, ca. 3 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 3900–4600 m.

Ecology: Alpine, cliff faces, rock ledges and stony slopes.

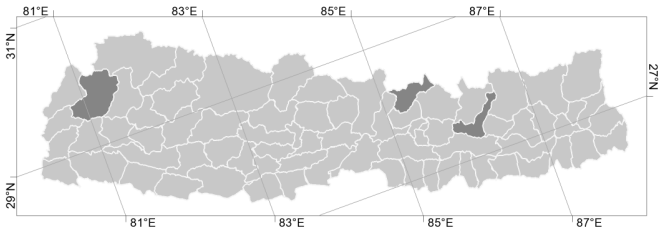
Flowering: June. **Fruiting:** September.

A narrow endemic known from the type collection near Phoksundo Tal (*Stainton, Sykes and Williams 2196*, BM, E) and from Lulo Khola (*Polunin, Sykes & Williams 3472*, BM, E)

83. *Saxifraga afghanica* Aitch. & Hemsl., J. Linn. Soc., Bot. 18: 56 (1880).

Plants caespitose, many-branched, crowded leafy shoots, ca. 10 mm diameter, forming cushions. Leaves on vegetative shoots alternate, loosely imbricate, sessile, oblong to subspatulate, 4–7 × 1.3–2 mm, apex obtuse, slightly recurved, leathery, margin narrowly cartilaginous, both surfaces glabrous, margin denticulate-ciliate towards base, chalk glands 3–8. Flowering stems 8–25 mm, glandular-pubescent, leaves several. Flowers (2 or)3–4 in a cyme, rarely solitary, bisexual. Pedicels to 2 mm, glandular and eglandular-pubescent. Sepals erect, oblong, 2–3 × 1–1.4 mm, apex obtuse, outer surface and margin sparsely glandular-pubescent, veins 3, free, chalk gland 1. Petals rose, obovate, ca. 5 × 2.5–3.3 mm, base gradually narrowed into a long claw, apex obtuse. Stamens 10, 3–3.5 mm, anthers red. Nectary band obscure. Ovary semi-inferior, carpels fused for half their length, narrowed into the erect, 1.5–2 mm styles.

Distribution: Nepal, W Himalaya, Tibetan Plateau and SW Asia.



Altitudinal range: 4600–4800 m.

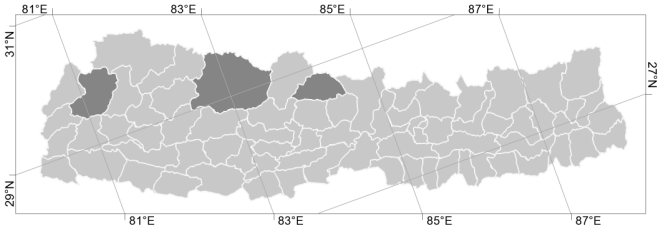
Ecology: Alpine, on rocks.

Flowering: May–June.

84. *Saxifraga cinerea* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 128, 14 fig. k (1958).

Plants caespitose, many-branched, woody at base, crowded leafy shoots, ca. 20 mm diameter, forming loose cushions. Leaves on vegetative shoots alternate, sessile, linear, 10–12 × 1.5–2 mm, apex acute, recurved, leathery, margin with a narrow cartilaginous border, both surfaces glabrous, margin denticulate-ciliate in the basal part, chalk glands 13–18. Flowering stems up to 8 cm, densely glandular-pubescent, leaves ca. 5, shorter than internodes. Flowers 2–6 in a cyme, bisexual. Pedicels 2–10 mm, dark brown glandular-pubescent. Sepals erect, ovate, ca. 3 × 1.5–2 mm, apex subacute, outer surface and margin glandular-pubescent, veins 3, free, chalk gland absent. Petals pure white, obovate, 8–10 × ca. 6 mm, base gradually narrowed, apex obtuse. Stamens 10, ca. 3.5 mm. Nectary band obscure. Ovary semi-inferior, carpels fused only at base, tapered into 1–1.5 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: 2700–3300 m.

Ecology: Stony banks and among rocks.

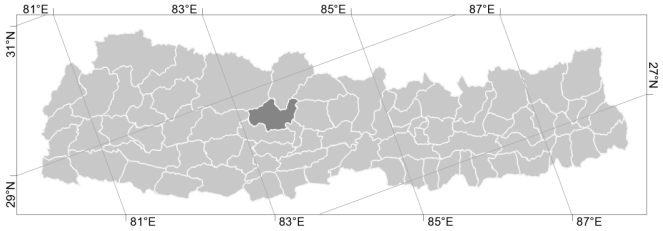
Flowering: April–June. **Fruiting:** July.

Hybridizes with *Saxifraga poluninana* Harry Sm. in areas where their geographical and altitudinal ranges overlap. It has been claimed that both *S. micans* Harry Sm. and *S. staintonii* Harry Sm. are of hybrid origin with this parentage.

85. *Saxifraga micans* Harry Sm., Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 126, pl. 12 fig. i (1958).

Plants caespitose, many-branched, woody at base, crowded leafy shoots, 11–13 mm diameter, forming cushions. Leaves on vegetative shoots alternate, densely imbricate towards stem tips, silvery, sessile, linear, 6–9 × 1.5–2 mm, apex acute, thickened, both surfaces glabrous, margin denticulate-ciliate in lower quarter, chalk glands 7. Flowering stems 2–3 cm, densely shortly brown glandular-pubescent, leaves 4–6. Flowers 3 or 4 in a cyme, bisexual. Pedicels 2–4 mm, dark brown glandular-pubescent. Sepals erect, ovate to broadly ovate, 2–3 × 1.5–2.5 mm, apex obtuse, outer surface and margin short glandular-pubescent, veins 4 or 5, free, the median ones terminating in 1–3 chalk glands. Petals white to tinged with pink, obovate to suborbicular, 9–12.5 × 6–8.5 mm, base gradually narrowed, apex rounded. Stamens 10, 3–4 mm, anthers red-brown. Nectary band inconspicuous. Ovary semi-inferior, carpels fused only at base, tapered into 2–2.5 mm styles.

Distribution: Endemic to Nepal.



Altitudinal range: ca. 3800 m.

Ecology: Alpine, on rock faces.

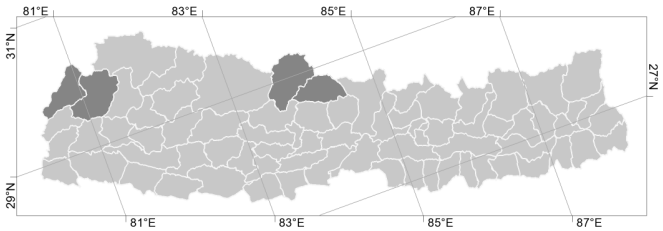
Flowering: June.

An endemic only known from the type collection, *Stainton, Sykes & Williams 3074* (BM, E) near Gurjakhani, Myagdi District.

86. *Saxifraga stolitzkae* Duthie ex Engl. & Irmsch., in Engl., Pflanzenr. IV. 117(Heft 69): 569, fig. 116D (1919).

Plants caespitose, many-branched, somewhat woody at base, crowded, ascending, leafy shoots 12–15 mm diameter, forming cushions. Leaves on vegetative shoots alternate, imbricate, aggregated tips into rosettes, sessile, almost linear, 4–7 × 1.3–2 mm, apex obtuse to subacute, recurved, leathery, both surfaces glabrous, margin denticulate-ciliate at base, chalk glands 7–13 in the upper half to three quarters. Flowering stems 5–8 cm, densely glandular-pubescent, leaves up to 12. Flowers 3–8 in a subumbellate cyme, bisexual. Pedicels 2–10 mm, dark-brown glandular-pubescent. Sepals erect, ovate, ca. 3 × 1 mm, outer surface and margin glandular-pubescent, veins 3, free, chalk gland solitary. Petals pink, obovate, 5–6 × 2.5–3.5 mm, base gradually narrowed into a claw, apex obtuse. Stamens 10, 3–3.5 mm, anthers reddish. Nectary band obscure. Ovary semi-inferior, carpels fused for half their length, tapered into erect, 1.5–2.5 mm styles.

Distribution: Nepal and W Himalaya.



Altitudinal range: 3000–4000(–4300) m.

Ecology: Alpine, on rocks.

Flowering: May–September.

Saxifragaceae

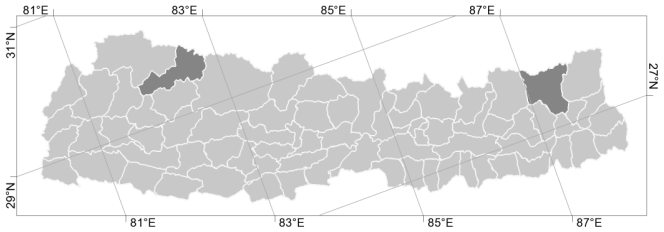
4. *Saxifraga* sect. *Saxifraga*

Plants caespitose, many branched, forming mats or cushions. Rhizome neither bulbiliferous nor stoloniferous. Leaves alternate, without chalk glands. Petals white, without calloses. Stamens 10. Ovary inferior.

87. *Saxifraga coarctata* W.W.Sm., Rec. Bot. Surv. India 4: 194 (1911).
Saxifraga humilis Engl. & Irmsch.

Plants caespitose, many-branched, forming dense cushions. Basal leaves aggregated into rosettes, subspatulate, 7–15 × 1.5–4 mm, apex acute, margin entire or 2- or 3-dentate, glandular-pubescent, both surfaces usually glabrous. Cauline leaves oblanceolate, 5–15 × 1.5–3 mm, base attenuate, apex acute, margin entire, lanate-ciliate, both surfaces glabrous. Flowering stems 1.5–4 cm, embedded in cushion at anthesis, elongating in fruit, densely glandular-pubescent, bulbils absent. Flowers solitary, bisexual. Pedicel to 5 mm, glandular-pubescent. Sepals erect, ovate, 2–2.5 × ca. 1.5 mm, apex obtuse, outer surface and margin glandular-pubescent, veins 3, more or less confluent near apex. Petals white, obovate to oblong, 3–4 × 2–2.5 mm, base cuneate, apex obtuse. Stamens 2–2.5 mm. Nectary band obscure. Ovary subinferior, carpels fused for more than half their length, styles erect, ca. 1.5 mm. Fig. 8s-v

Distribution: Nepal, W Himalaya and Tibetan Plateau.



Altitudinal range: 4400–4900 m.

Ecology: Alpine.

Flowering: July–August.

7. *Micranthes* Haw., Syn. Pl. Succ.: 320 (1812).

Shinobu Akiyama & Richard J. Gornall

Perennial herbs. Stems caespitose or simple. Stolons absent. Stipules absent. Leaves alternate, in basal rosettes, petiolate or not, containing crystals (druses), chalk glands absent; blade simple, margin entire or dentate, glabrous or variously pubescent. Flowering stems glandular- or eglandular-pubescent, usually leafless, rarely with leaf-like bracts. Inflorescence a solitary flower or a few- to many-flowered bracteate cyme. Flowers bisexual, actinomorphic, rarely slightly zygomorphic. Hypanthium cup-shaped to saucer-shaped. Sepals 5, free. Petals 5, free, white, pink or red to purple, margin entire, not callose. Stamens 10, free, filaments subulate, linear or clavate. Nectary sometimes well developed as an annular disk. Ovary superior to semi-inferior, 2-carpellate, carpels fused for half or less of their length, 2-locular, ovules many, placentation axile, integuments 1. Styles 2, free, stigma capitate. Fruit a 2-valved dehiscent capsule. Seeds many, small.

Worldwide about 80 species in montane and arctic regions of Asia, Europe and N America. Four species in Nepal.

DNA sequence data have shown that *Micranthes* is not part of *Saxifraga* but instead is closer to the monotypic American genera *Cascadia* and *Saxifragodes* (Soltis *et al*. Ann. Miss. Bot. Gard. 88: 669-693. 2001). It can be distinguished morphologically from *Saxifraga* by its leafless flowering stems, carpels that are united to below the middle, reticulate pollen exine and only a single integument.

Key to Species

1a Petals entirely red. Nectary disk annular, conspicuous ..... **1 *M. gageana***
b Petals mainly or entirely white. Nectary disk not conspicuous 2

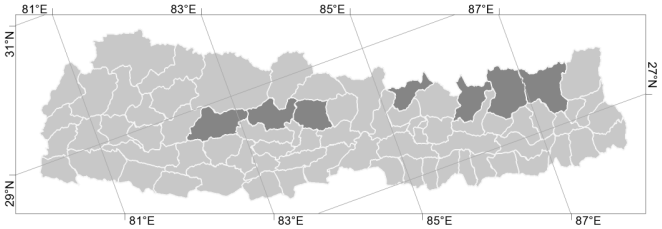
2a Filaments clavate ..... **2 *M. pallida***
b Filaments linear 3

3a Inflorescences not flat-topped at flowering. Petals 3–5 × 2–3 mm ..... **3 *M. pseudopallida***
b Inflorescences flat-topped at flowering. Petals 6.5–10 × 4–6 mm ..... **4 *M. melanocentra***

1. *Micranthes gageana* (W.W.Sm.) Gornall & H.Ohba, Fl. Nepal 3: xviii (2011).
Saxifraga gageana W.W.Sm., Rec. Bot. Surv. India 4: 265 (1911).

Stems caespitose or simple, erect, solitary or forming clumps, 2–5(–8) cm, eglandular or glandular crisped-villous. Leaves petiolate. Petiole 5–15 mm. Blade spatulate to elliptic to ovate, 3–12 × 1.5–5 mm, base cuneate to truncate, apex acute to obtuse, margin entire or serrate, crisped-villous, both surfaces glabrous or sparsely pubescent. Flowers solitary or up to 3. Bracts ovate to linear, 1.5–3 mm, apex acute, margin entire to crenate, glandular-pubescent. Pedicels 6–15 mm, eglandular or glandular crisped-villous. Sepals spreading, purplish, oblong to ovate, 1.5–3 × 1–2 mm, apex rounded, glabrate, veins 3, confluent near apex. Petals red, obovate to ovate, 2–3.5 × 1–2.5 mm, base cuneate, apex rounded. Stamen filaments linear, 3–4 mm, anthers yellow. Nectary a conspicuous annular disk, margin lobed. Ovary up to one third inferior, carpels dark red, fused for half their length, narrowed into styles, styles ca. 1 mm.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 3600–5400 m.

Ecology: Alpine meadows.

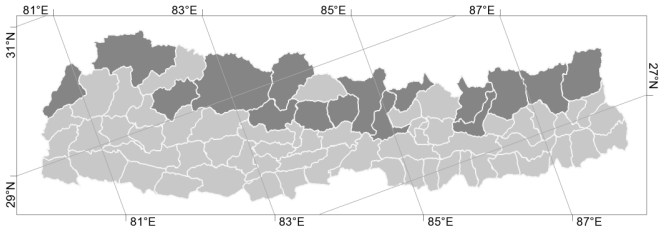
Flowering: July–August.

Although *Micranthes gageana* was treated as a synonym of *Saxifraga melanocentra* Franch. by Pan *et al.* (Fl. China 8: 283. 2001), we prefer to maintain these as distinct species. The distribution of *M. gageana* in China is uncertain.

2. *Micranthes pallida* (Wall. ex Ser.) Losinsk., Izv. Glavn. Bot. Sada S.S.S.R. 27: 601 (1928).
Saxifraga pallida Wall. ex Ser., in DC., Prodr. 4: 38 (1830); *Saxifraga himalaica* M.S.Balakr.; *S. micrantha* Edgew.

Stems caespitose or simple, erect, solitary or forming clumps, (1.5–)7–25 cm, simple, eglandular or glandular crisped-villous. Leaves petiolate. Petiole 1–9 cm, crisped-villous. Blade ovate, 1–3 × 1–2.5 cm, base cuneate to truncate, apex obtuse, margin crenate, crisped pubescent, both surfaces glabrous or adaxially sparsely pubescent. Inflorescences not flat-topped at flowering, 3–many-flowered. Bracts narrowly ovate to ovate, 0.5–3 cm, apex obtuse to acute, margin entire or crenate, pubescent. Pedicels 3–20 mm, eglandular or glandular-pubescent. Sepals spreading to reflexed, ovate, 1–2 × 0.8–1.6 mm, apex obtuse to subacute, glabrous, veins 3–5, confluent near apex. Petals white, with 2 yellow spots near base, ovate, 1.5–4 × 1.2–3 mm, base with a claw, apex acute, obtuse or retuse. Stamen filaments clavate, 1.5–4 mm, anthers violet. Nectary obscure. Ovary up to one third inferior, carpels green, dark purple in fruit, fused for up to half their length, narrowed into conical styles, styles ca. 1 mm.

Distribution: Nepal, E Himalaya and Tibetan Plateau.



Altitudinal range: 3200–4900 m.

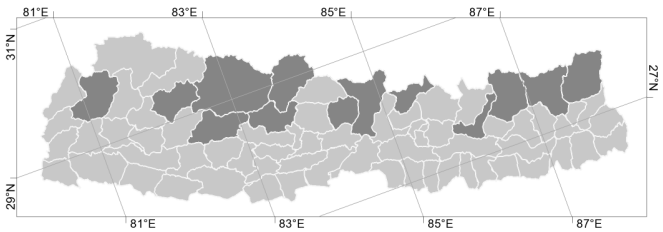
Ecology: Alpine boggy places.

Flowering: July–August.

3. *Micranthes pseudopallida* (Engl. & Irmsch.) Losinsk., Izv. Glavn. Bot. Sada S.S.S.R. 27: 601 (1928).
Saxifraga pseudopallida Engl. & Irmsch., Bot. Jahrb. Syst. 50, Beibl. 114: 40 (1914).

Stems caespitose or simple, erect, solitary or forming clumps, 5–15 cm, eglandular or glandular crisped-villous. Leaves petiolate. Petiole 1–3.5 cm, blade rhombic-ovate to ovate to oblong-ovate, 0.8–3 × 0.5–1.8 cm, base cuneate, apex acute to obtuse, margin crenate-serrate to serrate, sparsely eglandular or glandular-pubescent, both surfaces glabrous or pubescent. Inflorescences not flat-topped at flowering, (1–)2–8-flowered. Bracts ovate to narrowly elliptic, 5–15 × 0.5–10 mm, apex acute, margin serrate or entire, surfaces glabrous or pubescent. Pedicels 3–12 mm, crisped eglandular or glandular-villous. Sepals spreading to reflexed, triangular-ovate, 2.5–3.5 × 1.5–2.5 mm, apex acute, glabrous, veins 3–7, confluent. Petals white, 2 yellow spots near base, ovate to elliptic to obovate, 3–5 × 2–3 mm, base contracted or narrowed into a claw, apex obtuse. Stamen filaments linear, 3–5 mm, anthers dark red. Nectary an obscurely lobed annular band. Ovary semi-inferior, carpels reddish to dark red, fused for half their length, tapered into conical styles, styles 1.5–2 mm.

Distribution: Nepal, W Himalaya, E Himalaya and Tibetan Plateau.



Altitudinal range: 3400–4800 m.

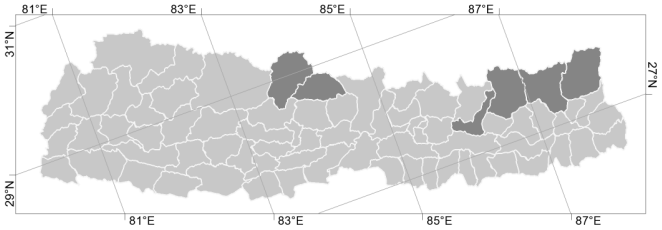
Ecology: Alpine, among boulders near streams.

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

4. *Micranthes melanocentra* (Franch.) Losinsk., Izv. Glavn. Bot. Sada S.S.S.R. 27: 601 (1928).
Saxifraga melanocentra Franch., J. Bot. [Morot] 10: 263 (1896); *Saxifraga atrata* var. *subcorymbosa* Engl.

Stems caespitose or simple, erect, solitary or forming clumps, 3–9 cm, eglandular or glandular crisped-villous. Leaves petiolate. Petiole 1–2 cm. Blade rhombic-ovate to ovate to elliptic, 0.8–2.5 × 0.5–1.8 cm, base cuneate, apex obtuse to acute, margin serrate, sparsely eglandular or glandular-pubescent, both surfaces glabrous or pubescent. Inflorescence (1–)2–6-flowered in a corymbose cyme. Bracts narrowly elliptic, 5–15 × 0.5–1.5 mm, apex acute, margin entire or serrate, surfaces glabrous or pubescent. Pedicels 5–25 mm, eglandular or glandular crisped-villous. Sepals spreading to reflexed, triangular-ovate, 4–6 × 2.5–3 mm, apex acute, glabrous, veins 3–8, confluent. Petals white, 2 yellow spots near base, ovate to elliptic to obovate, 6.5–10 × 4–6 mm, base contracted or narrowed into a claw, apex obtuse to acute. Stamen filaments linear, 6.5–9.5 mm, anthers dark red or black. Nectary an obscurely lobed proximal band. Ovary up to one third inferior, carpels dark red or black, fused for half their length, narrowed into conical styles, styles 1–3 mm.
Fig. 2h-k

Distribution: Nepal, W Himalaya, E Himalaya, Tibetan Plateau and E Asia.



Altitudinal range: 3900–5300 m.

Ecology: Alpine meadows, open shrubland, amongst boulders near streams.

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

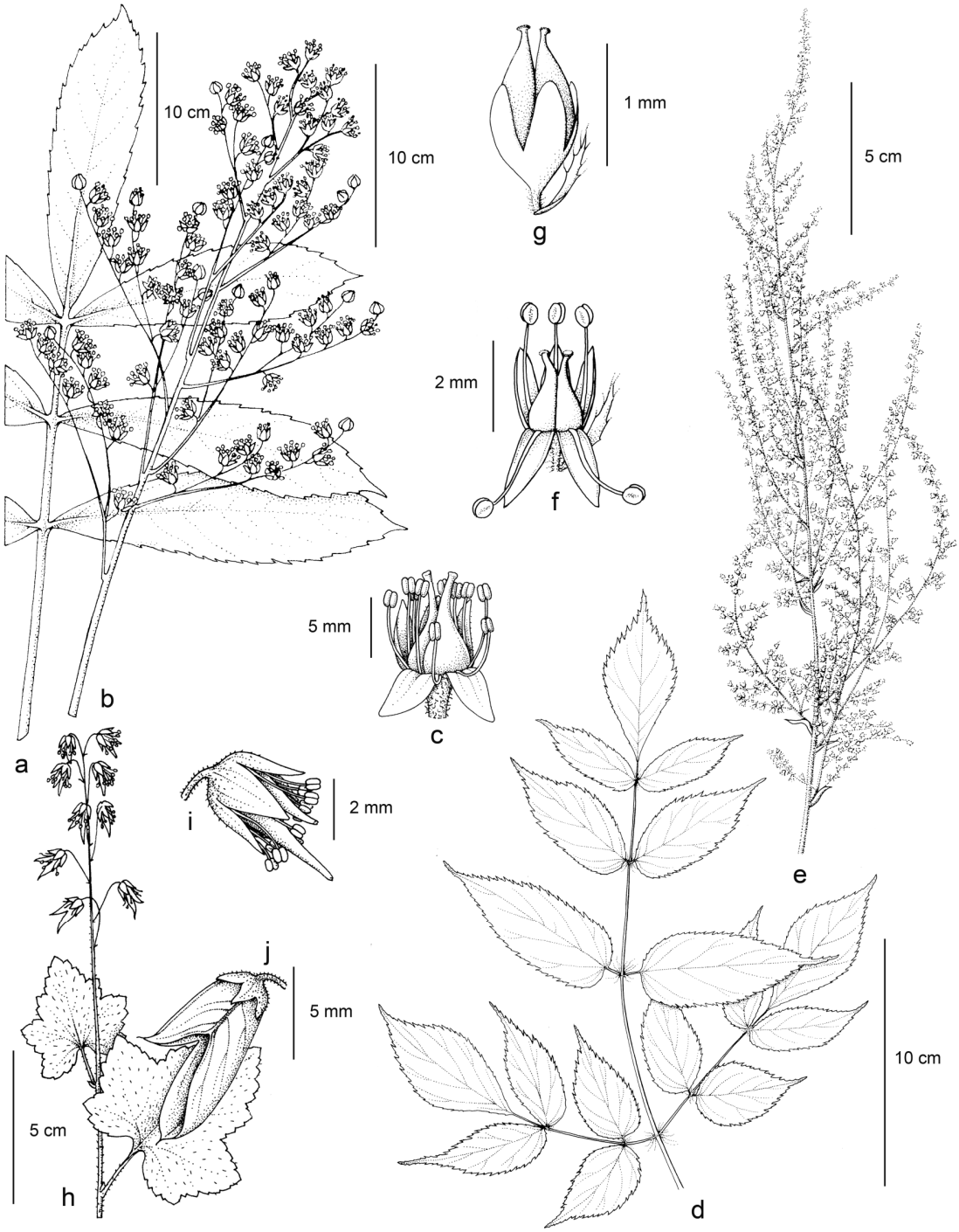


Fig. 1.
SAXIFRAGACEAE. **Rodgersia nepalensis**: a, leaf; b, inflorescence; c, flower with two calyx lobes bent forward. **Astilbe rivularis**: d, leaf; e, inflorescence; f, flower with two calyx lobes bent forward; g, fruit. **Tiarella polyphylla**: h, stem with leaves and inflorescence; i, flower; j, fruit.

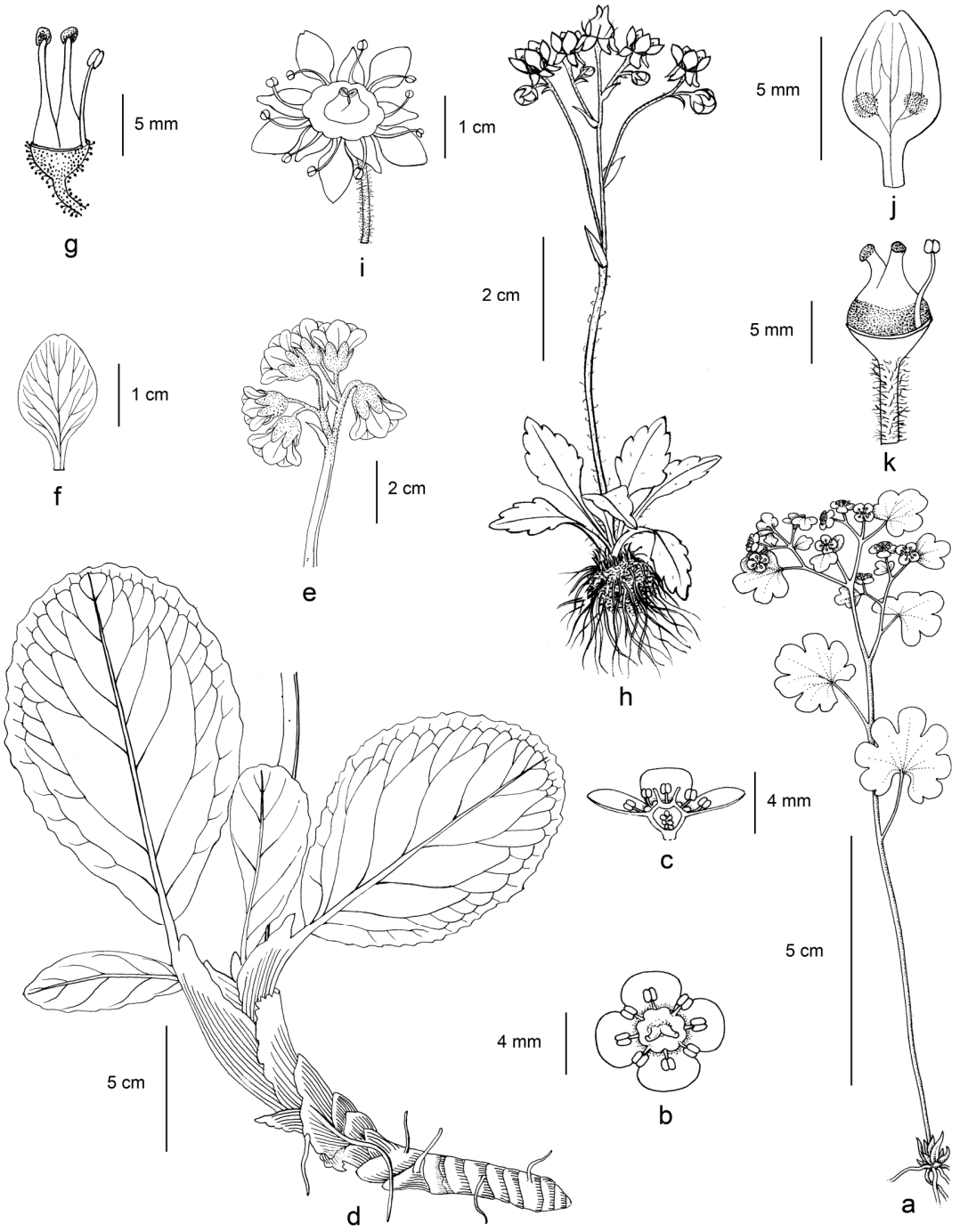


Fig. 2.
SAXIFRAGACEAE. **Chrysosplenium griffithii**: a, flowering plant; b, flower from above; c, longitudinal section of flower. **Bergenia purpurascens**: d, leaves and rhizome; e, inflorescence; f, petal; g, ovary and stamen. **Micranthes melanocentra**: h, flowering plant; i, flower; j, petal; k, ovary and stamen.

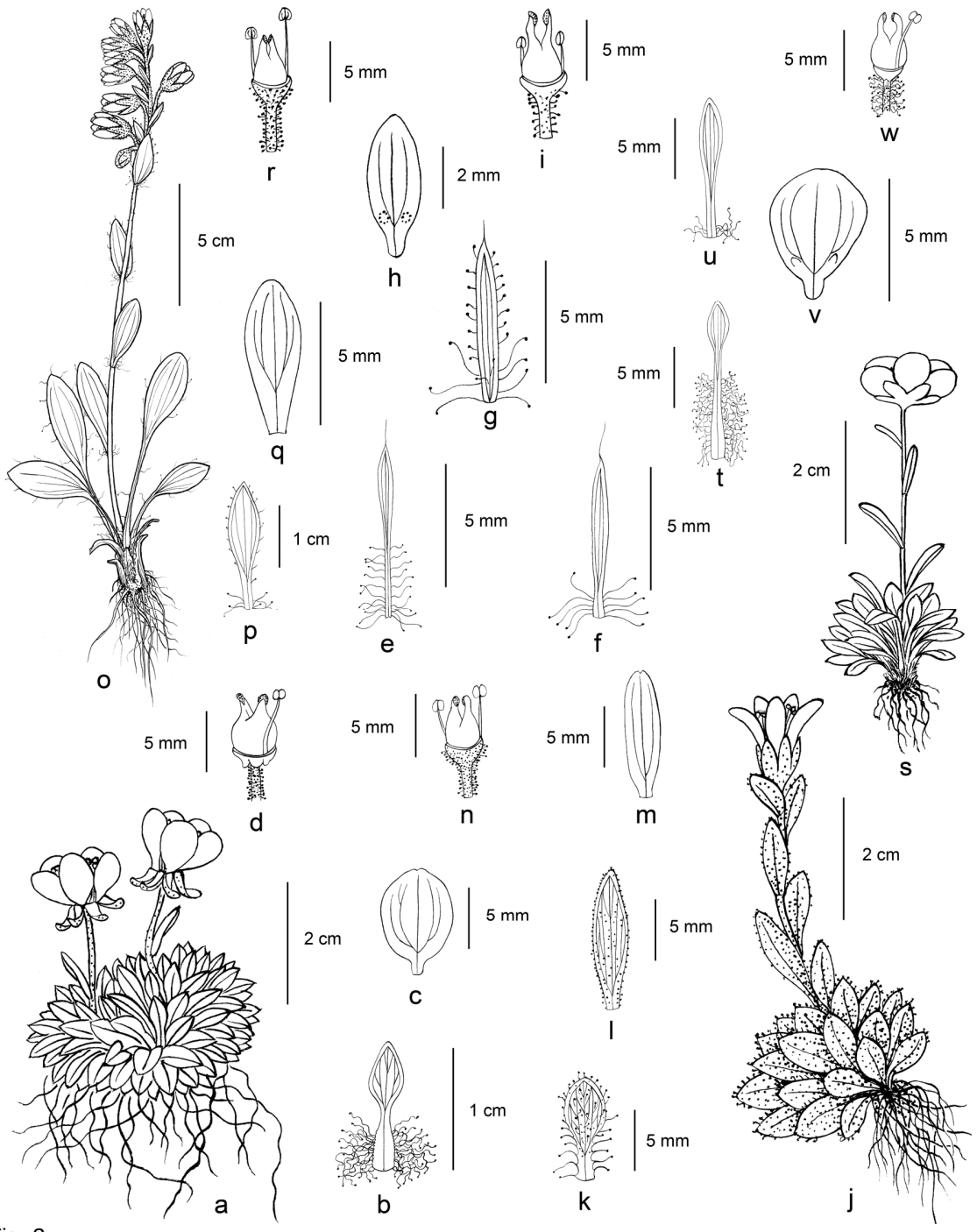


Fig. 3.
SAXIFRAGACEAE. **Saxifraga caveana**: a, flowering plant; b, basal leaf; c, petal; d, ovary and stamen. **Saxifraga aristulata**: e, basal leaf; f, lower cauline leaf; g, upper cauline leaf; h, petal; i, ovary and stamens. **Saxifraga lychnitis**: j, flowering plant; k, basal leaf; l, cauline leaf; m, petal; n, ovary and stamens. **Saxifraga nigroglandulifera**: o, flowering plant; p, cauline leaf; q, petal; r, ovary and stamens. **Saxifraga parva**: s, flowering plant; t, basal leaf; u, cauline leaf; v, petal; w, ovary and stamens.

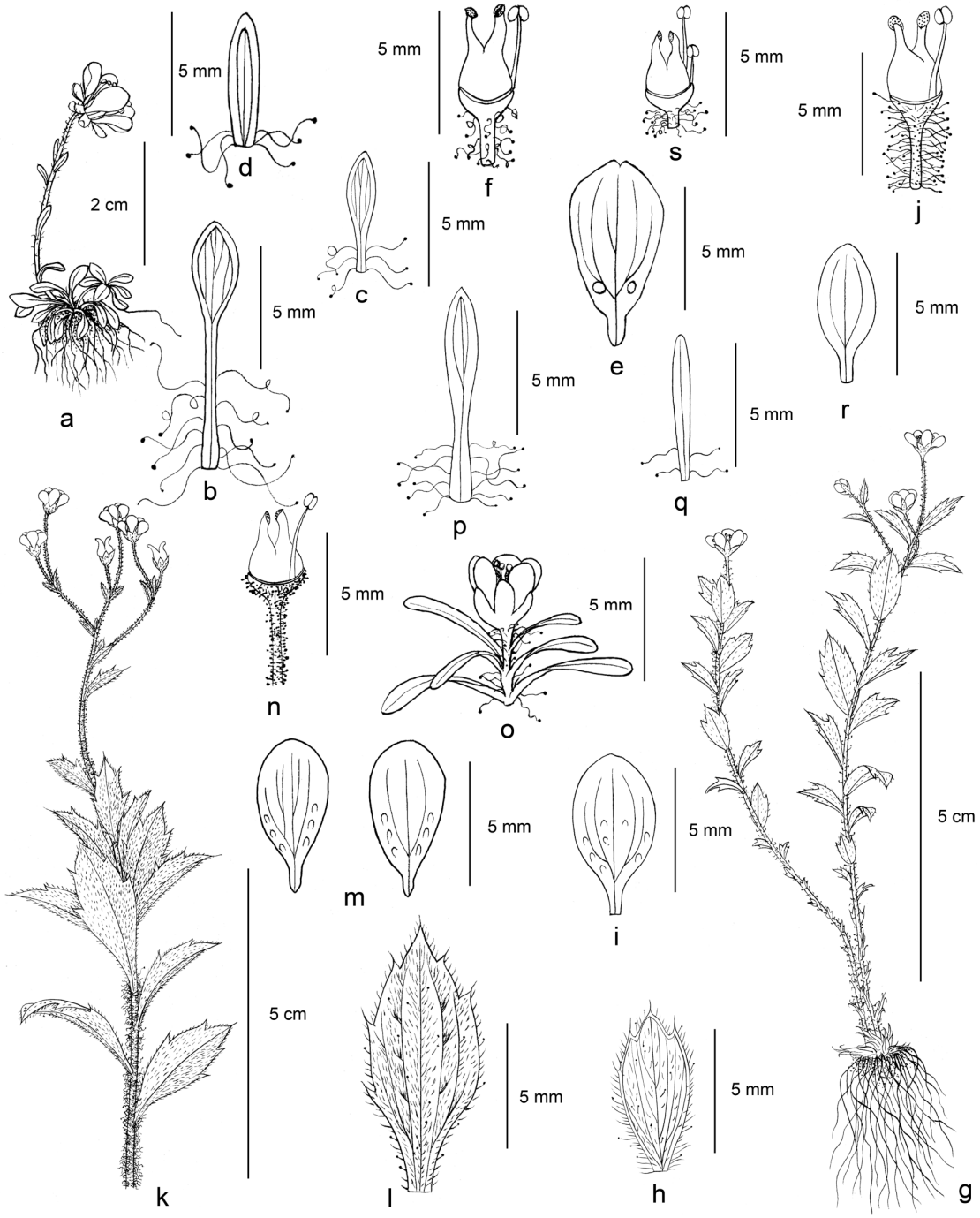


Fig. 4.
SAXIFRAGACEAE. **Saxifraga elliptica**: a, flowering plant; b, basal leaf; c, lower cauline leaf; d, upper cauline leaf; e, petal; f, ovary and stamen. **Saxifraga hispidula**: g, flowering plant; h, leaf; i, petal; j, ovary and stamen. **Saxifraga substrigosa**: k, flowering part of plant; l, leaf; m, petals; n, ovary and stamen. **Saxifraga saginoides**: o, flowering part of plant; p, basal leaf; q, cauline leaf; r, petal; s, ovary and stamens.

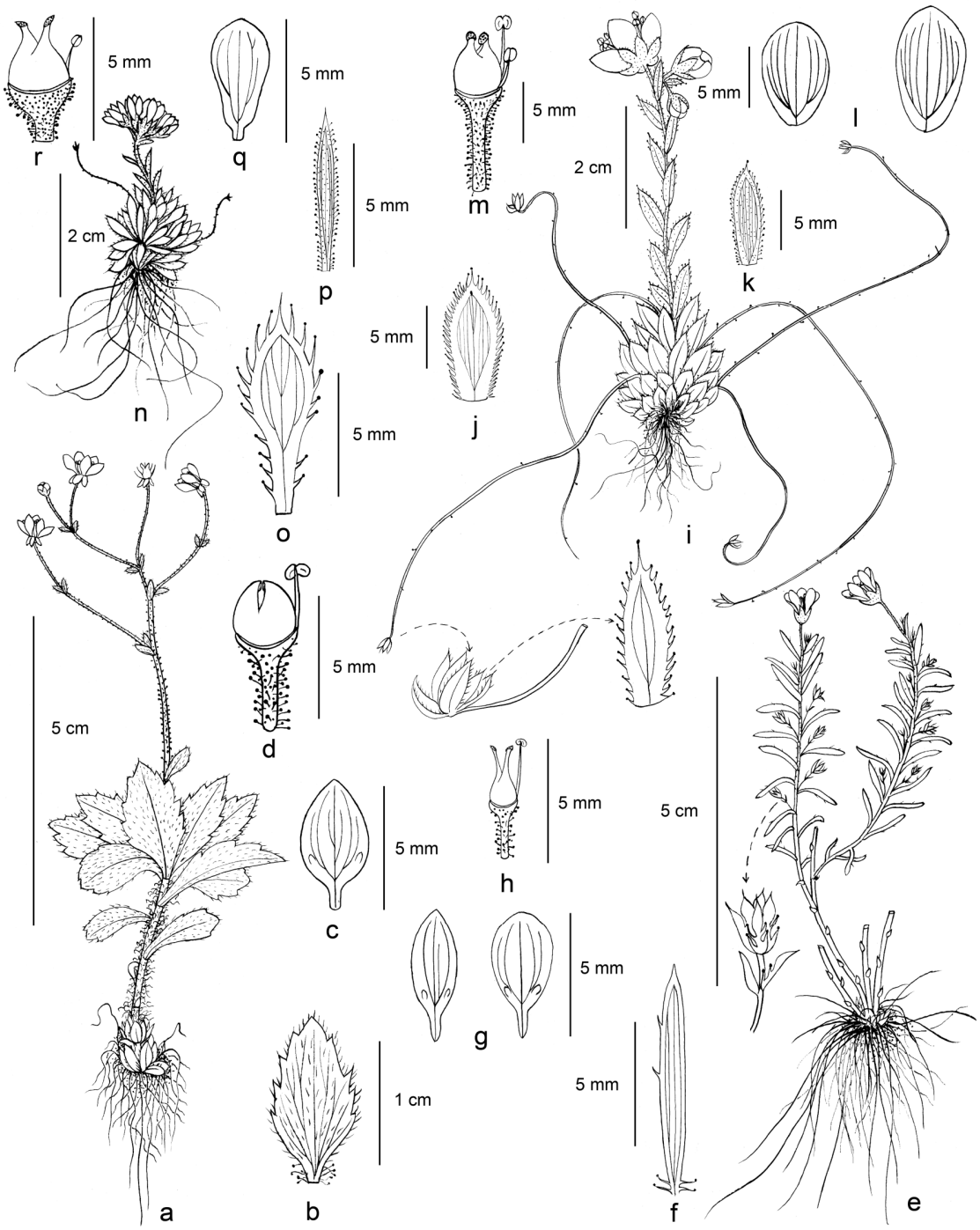


Fig. 5.
SAXIFRAGACEAE. **Saxifraga strigosa**: a, flowering plant; b, leaf; c, petal; d, ovary and stamen. **Saxifraga filicaulis**: e, flowering plant; f, leaf; g, petals; h, ovary and stamen. **Saxifraga stenophylla**: i, flowering plant; j, basal leaf; k, cauline leaf; l, petals; m, ovary and stamens. **Saxifraga mucronulata**: n, flowering plant; o, basal leaf; p, cauline leaf; q, petal; r, ovary and stamen.

Saxifragaceae

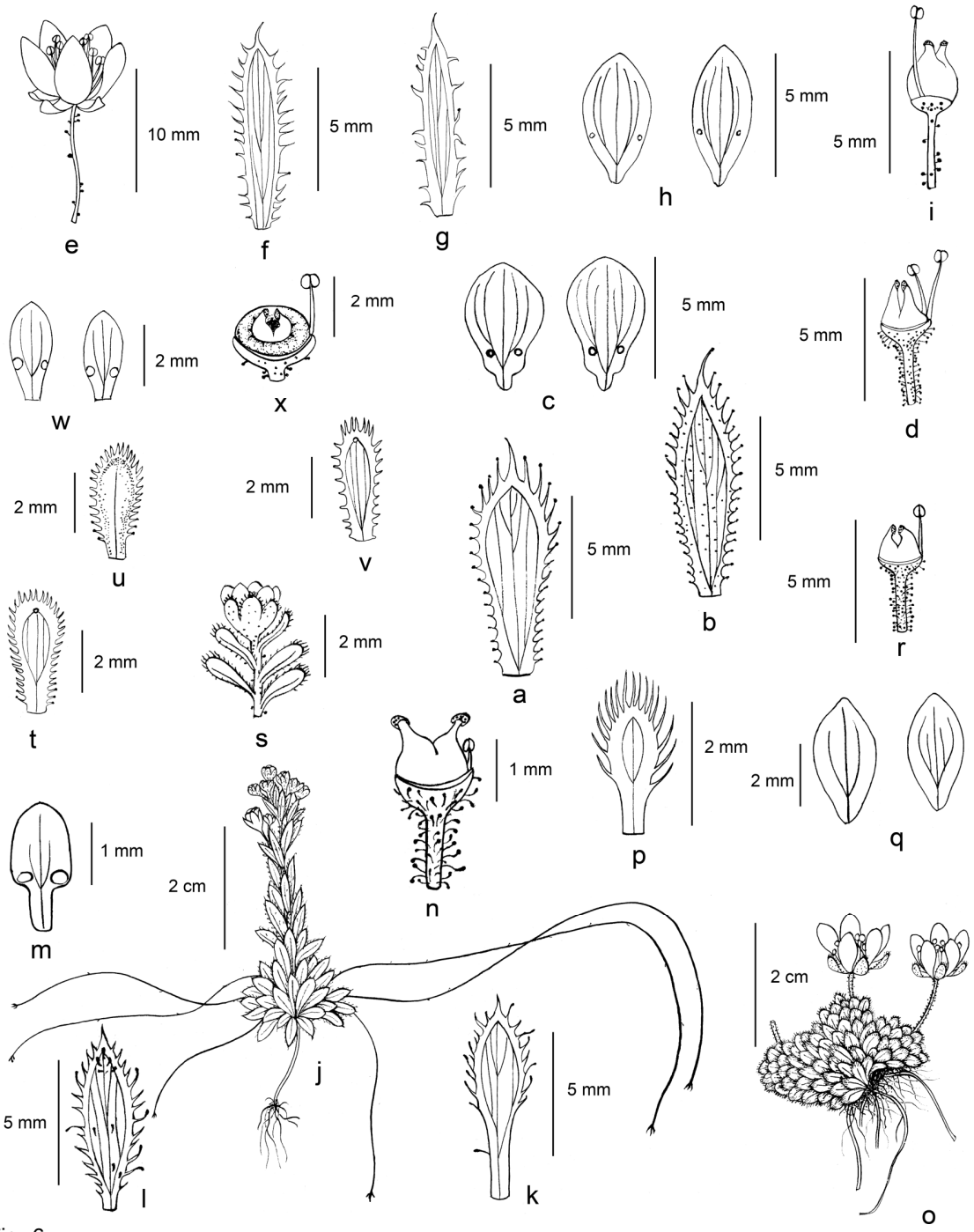


Fig. 6.
SAXIFRAGACEAE. **Saxifraga mucronulatoides**: a, basal leaf; b, cauline leaf; c, petals; d, ovary and stamens. **Saxifraga brunonis**: e, flower; f, basal leaf; g, cauline leaf; h, petals; i, ovary and stamen. **Saxifraga consanguinea**: j, flowering plant; k, basal leaf; l, cauline leaf; m, petal; n, ovary and stamen. **Saxifraga perpusilla**: o, flowering plant; p, leaf; q, petals; r, ovary and stamen. **Saxifraga hemisphaerica**: s, flower with cauline leaf; t, shoot leaf adaxial view; u, shoot leaf abaxial view; v, cauline leaf; w, petals; x, ovary and stamen.

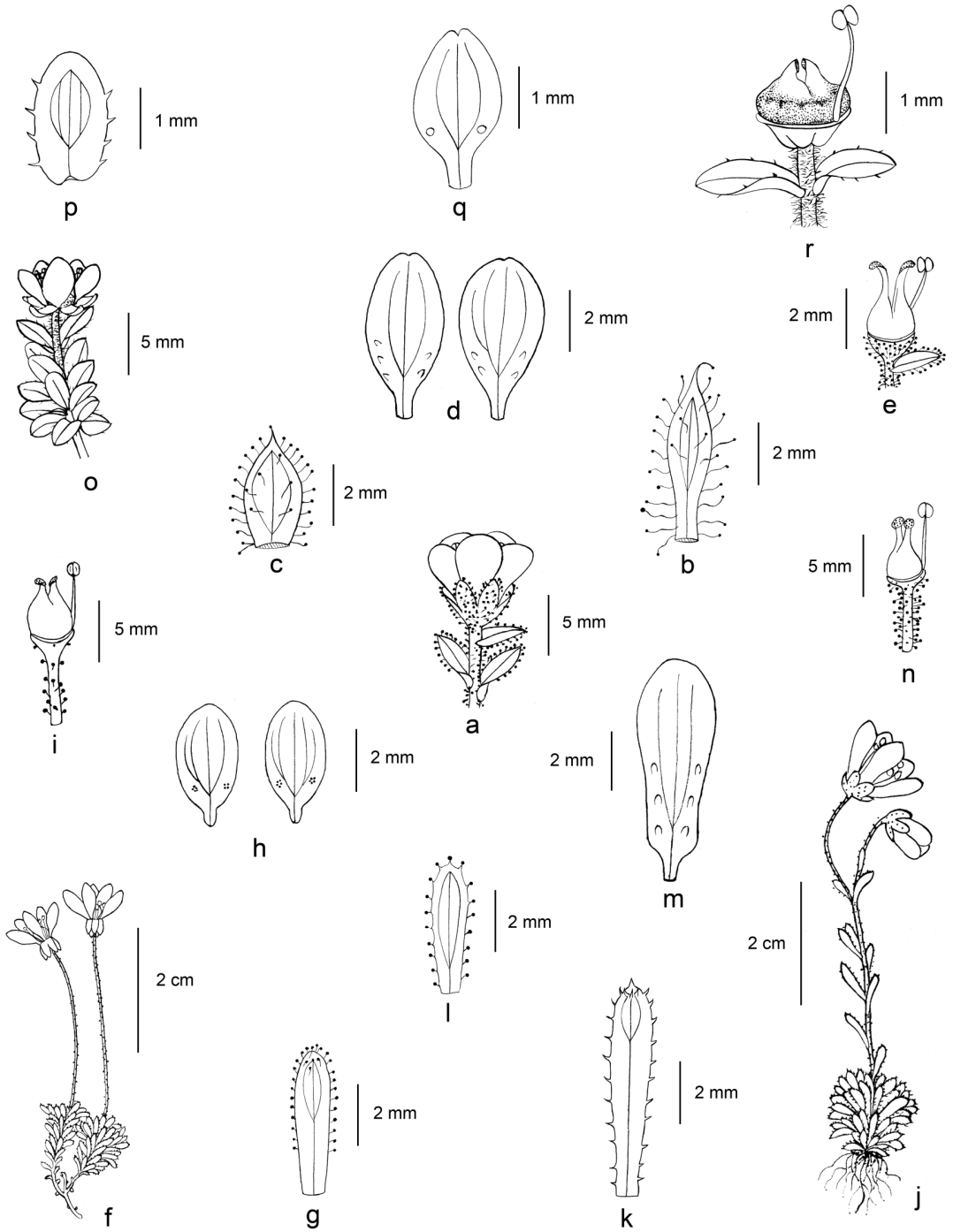


Fig. 7.
SAXIFRAGACEAE. **Saxifraga jacquemontiana**: a, flower and cauline leaf; b, shoot leaf adaxial view; c, cauline leaf; d, petals; e, ovary and stamen. **Saxifraga stella-aurea**: f, flowering plant; g, leaf; h, petals; i, ovary and stamen. **Saxifraga llonakhensis**: j, flowering plant; k, basal leaf; l, cauline leaf; m, petal; n, ovary and stamen. **Saxifraga contraria**: o, stem with flower and cauline leaf; p, leaf; q, petal; r, ovary and stamen.

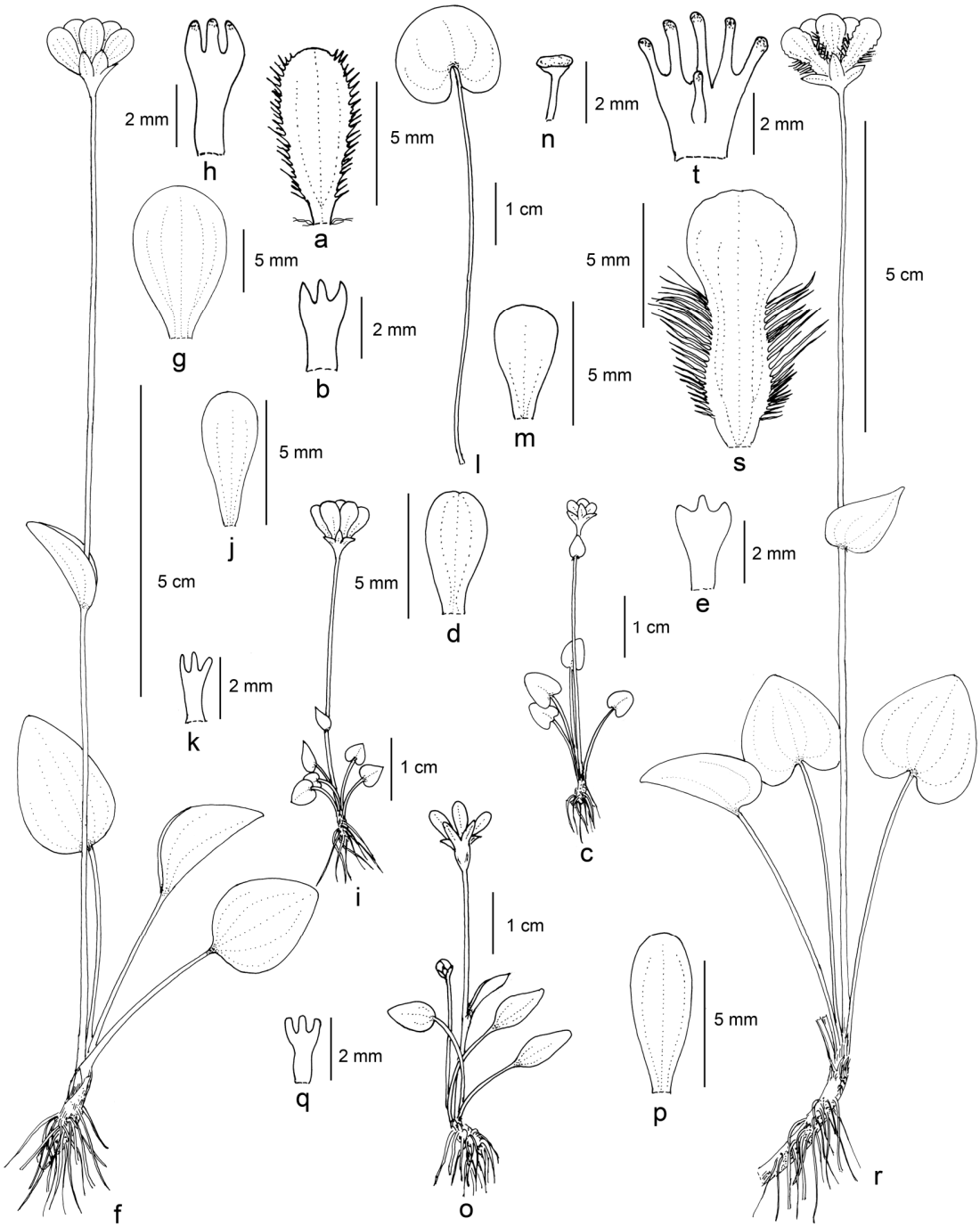


Fig. 8.
SAXIFRAGACEAE. **Saxifraga sibirica**: a, flowering plant; b, petal; c, ovary and stamen. **Saxifraga pulvinaria**: d, flowering plant; e, basal leaf; f, cauline leaf; g, petal; h, ovary and stamen. **Saxifraga subsessiliflora**: i, flowering plant; j, lower shoot leaf; k, upper shoot leaf; l, petals; m, ovary and stamen. **Saxifraga andersonii**: n, flowering plant; o, shoot leaves; p, cauline leaves; r, ovary and stamen. **Saxifraga coarctata**: s, plant with flowers and fruits; t, basal leaf; u, petal; v, ovary and stamen.

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Fig. 1
- a-c FOB 1(3): Fig 35. Mary Bates
- d-g Claire Banks
- h-j FOB 1(3): Fig 35. Mary Bates

Fig. 2
- a-c FOB 1(3): Fig 35. Mary Bates
- d-g FOCI 8: 185. FRPS 34(2): 29, pl. 8. 1992.-Pan Jintang & Wang Ying
- h-k FOCI 8: 190. FRPS 34(2): 81, pl. 17. 1992.-Pan Jintang & Liu Jinjun

Fig. 3
- a-d FOCI 8: 194. FRPS 34(2): 129, pl. 32. 1992.-Pan Jintang & Liu Jinjun
- e-i FOCI 8: 212. FRPS 34(2): 89, pl. 19. 1992.-Pan Jintang & Liu Jinjun
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- s-w FOCI 8: 209. FRPS 34(2): 97, pl. 21. 1992.-Pan Jintang & Liu Jinjun

Fig. 4
- a-f FOCI 8: 209. FRPS 34(2): 97, pl. 21. 1992.-Pan Jintang & Liu Jinjun
- g-j FOCI 8: 215. FRPS 34(2): 157, pl. 40. 1992.-Pan Jintang & Liu Jinjun
- k-n FOCI 8: 216. FRPS 34(2): 154, pl. 39. 1992.-Pan Jintang & Liu Jinjun
- o-s FOCI 8: 209. FRPS 34(2): 97, pl. 21. 1992.-Pan Jintang & Liu Jinjun

Fig. 5
- a-d FOCI 8: 216. FRPS 34(2): 154, pl. 39. 1992.-Pan Jintang & Liu Jinjun
- e-h FOCI 8: 214. FRPS 34(2): 151, pl. 38. 1992.-Pan Jintang & Liu Jinjun
- i-m FOCI 8: 231. FRPS 34(2): 195, pl. 52. 1992.-Pan Jintang & Liu Jinjun
- n-r FOCI 8: 235. FRPS 34(2): 221, pl. 58. 1992.-Pan Jintang & Liu Jinjun

Fig. 6
- a-d FOCI 8: 230. FRPS 34(2): 228, pl. 59. 1992.-Pan Jintang & Liu Jinjun
- e-i FOCI 8: 229. FRPS 34(2): 193, pl. 51. 1992.-Pan Jintang & Liu Jinjun
- j-n FOCI 8: 235. FRPS 34(2): 221, pl. 58. 1992.-Pan Jintang & Liu Jinjun
- o-r FOCI 8: 230. FRPS 34(2): 228, pl. 59. 1992.-Pan Jintang & Liu Jinjun
- s-x FOCI 8: 230. FRPS 34(2): 228, pl. 59. 1992.-Pan Jintang & Liu Jinjun

Fig. 7
- a-e FOCI 8: 236. FRPS 34(2): 206, pl. 55. 1992.-Pan Jintang & Liu Jinjun
- f-i FOCI 8: 222. FRPS 34(2): 177, pl. 46. 1992.-Pan Jintang & Liu Jinjun
- j-n FOCI 8: 226. FRPS 34(2): 167, pl. 43. 1992.-Pan Jintang & Liu Jinjun
- o-r FOCI 8: 205. FRPS 34(2): 198, pl. 53. 1992.-Pan Jintang & Liu Jinjun

Fig. 8
- a-c FOCI 8: 232. FRPS 34(2): 78, pl. 16. 1992.-Pan Jintang & Liu Jinjun
- d-h FOCI 8: 235. FRPS 34(2): 221, pl. 58. 1992.-Pan Jintang & Liu Jinjun
- i-m FOCI 8: 234. FRPS 34(2): 213, pl. 56. 1992.-Pan Jintang & Liu Jinjun
- n-r FOCI 8: 233. FRPS 34(2): 217, pl. 57. 1992.-Pan Jintang & Liu Jinjun
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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

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