

23. CRASSULACEAE

10 genera and ca 70 species in India; 5 genera and 15 species in Lahaul-Spiti.

Key to Genera

1. Stamens as many as petals --5. *Tillaea*
1. Stamens twice as many as petals:
 2. Ovary sessile, not attenuate at the base, mostly basally syncarpic:
 3. Radical leaves scaly --2. *Rhodiola*
 3. Radical leaves not scaly:
 4. Radical leaves present, forming a conspicuous rosette. Petals apparently basally connate --3. *Rosularia*
 4. Radical leaves mostly absent, if present then the petals entirely free --4. *Sedum*
 2. Ovary stipitate-attenuate at the base, wholly apocarpic and orthocarpic --1. *Hylotelephium*

2. RHODIOLA Linn.

ca 12 species in India; 8 in Lahaul-Spiti.

Note: Formerly treated as a section of the genus *Sedum* Linn. (*sens. lat.*). Now considered as a distinct genus (Fu, 1965; Ohba, 1976).

Key to Species

1. Rhizome cylindrical, 2-3 cm across.
Calyx-lobes 6-9 mm long --8. *R. wallichiana*
1. Rhizome slender, 3-5 cm across.
Calyx-lobes 2.0-3.5 mm long:
 2. Rhizome densely surrounded by tufts of the former years old flowering stem:
 3. Cymes 4-20-flowered. Petals rose-purple

3. Cymes 5-1-flowered.
Petals red --5. *R. quadrifida*
2. Rhizome usually lacking the remains of the former years old flowering stems, or if present then not tufted:
4. Flowers hermaphrodite, the pistil opposite to the petals --6. *R. sinuata*
4. Flowers dioecious, in the female the pistil opposite to the calyx-lobes:
5. Inflorescence mostly ebracteate.
Flowers sessile --3. *R. heterodonta*
5. Inflorescence more or less bracteate.
Flowers subsessile to pedicellate:
6. Ovary straight and not conspicuously out-curved in the upperpart:
7. Leaves typically to broadly elliptic, usually minutely crenulate to erose. The remains of old stems purplish-brown --2. *R. crenulata*
7. Leaves very narrowly obovate to narrowly elliptic or ovate, \pm entire to remotely denticulate along the margins of the upper half. The remains of the old stems stramineous --4. *R. imbricata*
6. Ovary straight but abruptly and conspicuously outcurved in the upper part --1. *R. bupleuroides*

1. ***R. bupleuroides*** (Wall. ex Hook. f. & Thoms.) Fu in Acta Phytotax. Sin. Addit. 1: 124. 1965; Singh & Bhattacharyya in J. Econ. Tax. Bot. 3: 632. 1982. *Sedum bupleuroides* Wall. ex Hook. f. & Thoms. in J. Linn. Soc. Bot. 2: 98. 1858; Fl. Brit. Ind. 2: 418. 1878; Fl. Himach. Prad. 1: 274. 1984. *S. elongatum* Wall. ex Hook. f. & Thoms. in J. Linn. Soc. Bot. 2: 98. 1858; Fl. Brit. Ind. 2: 419. 1878; High Alt. Flow. Pls. 105. 1975. *S. hookeri* Balak. in J. Bombay nat. Hist. Soc. 67: 59. 1970.

Glabrous, perennial herbs, 15-40 cm tall. Rootstock thick, with a crown of scales from the axils of which arise the flowering stems. Leaves alternate, sessile to shortly petiolate, narrowly to

broadly elliptic, nearly circular or oblong-ovate, margins entire or somewhat remotely and irregularly serrate. Flowers numerous, in terminal loose corymbs or cymes, purplish-red or dull purplish-red. Sepals linear-lanceolate. Petals lanceolate.

Fls. & Frts. : July - September.

Rare in rock-crevices. Jispa, Aswal 10390.

- 2 **R. crenulata** (Hook. f. & Thoms.) Ohba in J. Jap. Bot. 51: 386. 1976. *Sedum crenulatum* Hook. f. & Thoms. in J. Linn. Soc. Bot. 2: 96. 1858; Fl. Brit. Ind. 2: 417. 1878; High Alt. Flow. Pls. 105. 1975; Fl. Himach. Prad. 1: 275. 1984

Perennial herbs, upto 20 cm tall. Rhizome thick, subcylindrical. Flowering stems simple, usually fastigate, glabrous, terete. Leaves alternate, imbricate, more or less indistinctly petiolate, broadly elliptic, rounded at the apex, round or obtuse at the base, ± entire. Inflorescence terminal, 20-40-flowered, dense and compact, forming simple corymbose fascicles, surrounded by the upper cauline leaves and bracts. Follicles dirty red or brown, erect.

Fls. & Frts. : June - August.

Frequent in rock-crevices. Baralacha La, Aswal 10717.

3. **R. heterodonta** (Hook. f. & Thoms.) A. Boriss. in Komarov, Fl. USSR. 9. 32. 1939. *Sedum heterodontum* Hook. f. & Thoms. in J. Linn. Soc. Bot. 2: 95. 1858; Fl. Brit. Ind. 2: 417. 1878; High Alt. Flow. Pls. 105. 1975; Fl. Himach. Prad. 1: 275. 1984.

Erect, simple, glabrous, thick, rhizomatous, perennial herbs, upto 40 cm tall. Leaves alternate, more or less remotely arranged throughout the stem, sessile, glabrous, triangular or triangular-broadly pentagonal-ovate, acute or obtuse at apex, shallowly cordate to more or less auriculate at the base, coarsely toothed to entire along the margins. Flowers sessile or subsessile, yellowish to greenish-white, in very dense, compact, terminal compound corymbs. Sepals linear. Petals narrowly rhombic-elliptic to oblong. Follicles brown.

Fls. & Frts. : June - August.

Frequent on rocks. **Shetigar** (Spiti), *Aswal* 6598.

4. **R. imbricata** Edgew. in *Trans. Linn. Soc.* 20: 47. 1846; Singh in *J. Econ. Tax. Bot.* 3: 625. 1982. *Sedum imbricata* (Edgew.) Walp. in *Ann. Bot. Syst.* 1: 325. 1848; Ohba in *Ohashi, Fl. East. Himal.* 3: 306. 1975. *S. imbricatum* Hook. f. & Thoms. in *J. Linn. Soc. Bot.* 2: 101. 1858. *S. rhodiola auct.* non DC.: Clarke in *Hook. f. Fl. Brit. Ind.* 2: 417. 1878.

Erect, perennial herbs, 10-25 cm tall. Leaves lanceolate to elliptic, imbricate, entire, glabrous, acute, rounded at the base, sessile. Flowers yellow, pedicellate, in terminal, involucrate, compact, compound corymbs. Follicles brown erect, slightly outcurved at the tips. Seeds reddish brown, ellipsoid.

Fls. & Frts. : June - August.

Rare on stony slopes. Rohtang slope, *Aswal* 10535.

5. **R. quadrifida** (Pallas) Fisch. & Mey. in Schrenk, *Enum. Pl.* Nov. 1: 69. 1841; Webb in *Tutin et al. Fl. Europ.* 1: 363. 1964. *Sedum quadrifidum* Pallas, *Reise* 3: 730. t. 6. f. 1. 1776; Clarke in *Hook. f. Fl. Brit. Ind.* 2: 418. 1878; High Alt. *Flow. Pls.* 105. 1975; Ohba in *Ohashi, Fl. East. Himal.* 3: 345. 1975. *S. asiaticum* (D. Don) DC. *Prodr.* 3: 401. 1828; Clarke in *Hook. f. loc. cit.* 2: 419. 1878, *p.p.*

Erect, perennial herbs, usually less than 5 cm tall in the aerial parts. Rhizomes thick. Flowering stems 2-10, simple, glabrous. Leaves alternate, arranged throughout on the stems, sessile, linear or linear-elliptic, rounded or obtuse at the apex. Inflorescence usually reduced to a single terminal flower. Flowers red or yellow, dioecious. Follicles erect, reddish-brown.

Fls. & Frts. : June - August.

Rare in rock-crevices. Kiber (Spiti), *Aswal* 6877.

6. **R. sinuata** (Royle ex Edgew.) Fu in *Acta Phytotax. Sin.* *Addit.* 1: 127. 1965. *Sedum sinuatum* Royle ex Edgew. in

Trans. Linn. Soc. 20: 47. 1846. *S. linearifolium* Royle, Illustr. Bot. Himal. 222. t. 48. f. 1. 1835; Clarke in Hook. f. Fl. Brit. Ind. 2: 420. 1878 (incl. var. *pauciflorum*); Rau, High Alt. Flow. Pls. 105. 1975; Chowdhery & Wadhwa, Fl. Himach. Prad. 1: 276. 1984. *S. linearifolium* var. *sinuatum* (Royle ex Edgew.) R. Hamet in Acta Hort. Gotob. 2: 394. 1926; Rau, *loc. cit.* 105. 1975; Chowdhery & Wadhwa *loc. cit.* 276. 1984. *S. trifidum* Wall. ex Hook. f. & Thoms. in J. Linn. Soc. Bot. 2: 100. 1858 (*nom. illegit.*), *p.p.*; Clarke in Hook. f. *Loc. cit.* 2: 420. 1878, *p.p.*

Perennial herbs, usually 15-25 cm tall. Rhizomes slender, scaly. Flowering stems 1-5 from each apex of rhizome, ascending or suberect, glabrous, simple, pale yellowish-green. Leaves alternate, widely spreading, sessile, narrowly obovate to linear-obovate, nearly entire, acute at the apex, long-attenuate at the base. Flowers white tinged with pink, in terminal 1-12-flowered simple corymbs. Bracts linear-obovate or linear-ovate.

Fls. & Frts : July - October.

Frequent in moist-shady situations. Khoksar-Rohtang, Aswal 10661.

7. ***R. tibetica*** (Hook. f. & Thoms.) Fu in Acta Phytotax. Sin. Addit. 1: 121. 1965; Ohba in J. Fac. Sci. Univ. Tokyo 3(12): 190. 1978; Singh & Bhattacharyya in J. Econ. Tax. Bot. 3: 303. 1982. *Sedum tibeticum* Hook. f. & Thoms. in J. Linn. Soc. Bot. 2: 96. 1858; Clarke in Hook. f. Fl. Brit. Ind. 2: 418. 1878; High Alt. Flow. Pls. 105. 1975; Fl. Himach. Prad. 1: 278. 1984. *S. tibeticum* var. *stracheyi* Clarke in Hook. f. *loc. cit.* 2: 418. 1878.

Glabrous, perennial herbs. Rhizomes stout, almost erect, with a crown of scales, from which arise the annual flowering stems. Stems 10-25 cm tall, simple, leafy. Leaves oblong or ovate-oblong, almost entire. Flowers rose-purple, in 5-20-flowered terminal corymbs. Follicles not narrowed gradually at the base. Seeds oblong-ellipsoid, compressed.

Fls. & Frts.: July - September.

Common on stony alpine slopes. Baralacha La, Aswal 11003.

8. **R. wallichiana** (Hook.) Fu in Acta Phytotax. Sin. Addit. 1:125. 1965; Singh & Bhattacharyya in J. Econ. Tax. Bot. 3:631. 1982. *Sedum wallichianum* Hook. Icon. Pl. 7. t. 604. 1844; .Fl. Himach. Prad. 1:278. 1984. *S. crassipes* Wall. ex Hook. f. & Thoms. in J. Linn. Soc. Bot. 2:99. 1858. *S. asiaticum* auct. non DC. : Clarke in Hook. f. Fl. Brit. Ind. 2:419. 1878 (incl. var. *wallichianum*).

Suberect or ascending, glabrous, perennial, thick, rhizomatous herbs, upto 30 cm tall. Leaves alternate, rather densely arranged throughout, sessile, thick, usually linear or narrowly ovate, obtuse, long-attenuate at base, remotely and irregularly crenulate in the upper half, but nearly entire in the lower half. Flowers yellowish-white, in dense globose or hemispherical bracteate terminal corymbose fascicles. Sepals 6.0-8.5 mm long, green, glabrous, lobed. Petals 7-11 mm long, some-what fleshy, glabrous.

Fls. & Frts. : July - September.

Common on stony alpine slopes and in rock-crevices. Rohtang Pass, Aswal 10524.

3. ROSULARIA (DC.) Stapf

ca 5 species in India; 2 in Lahaul-Spiti.

Note : The genus *Rosularia* was first proposed by de Candolle (1828) as a section of the genus *Umbilicus* Linn. Stapf (1923) regarded it as a distinct genus. Berger (1930) first published the conspectus of the genus in his 'synoptic revision of Crassulaceae'. Since then, Borissova (1939), Jansson in Jansson & Rechinger (1970), Chamberlani & Muirhead (1972) and H. Ohba (1977) adopted *Rosularia* in their regional revision of *Crassulaceae*. On the other hand R. Hamet (1929), reduced *Rosularia* into the genus *Sedum*, and also Froderstrom (1930-35) treated it as a member of *Sedum*, in which he distributed