

SOLMS-LAUBACHIA Muschler, Notes Roy. Bot. Gard. Edinburgh 5: 205. 1912.

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Tribe: Euclidiaceae de Candolle, Mém. Mus. Hist. Nat. 7(1): 236. 1821.

Name derivation: for Hermann Maximilian Carl Ludwig Friedrich zu Solms-laubach (23

December 1842 – 24 November 1915), German botanist and former director of the botanical garden in Göttingen.

Type species: *Solms-laubachia pulcherrima* Muschler.

Desideria Pampanini, Bull. Soc. Bot. Ital. 1926: 111. 1926. Type: *Desideria mirabilis* Pamp.

Ermaniopsis H. Hara, J. Jap. Bot. 49: 198. 1974. Type: *Ermaniopsis pumila* H. Hara.

Oreoblastus Suslova, Bot. Zhurn. (Moscow & Leningrad) 57: 648. 1972. Type: *Oreoblastus flabellatus* (Regel) Suslova (based on *Parrya flabellata* Regel).

Herbs, perennial, sometimes pulvinate, with branched caudex covered with petioles of previous years. **Trichomes** absent or simple, rarely short-stalked, 2-rayed. **Multicellular glands** absent. **Stems** absent or present and simple, leafy or leafless. **Basal leaves** petiolate, rosulate, simple, entire or 3–9(–11)-toothed, pinnately or palmately veined; cauline leaves absent or similar to basal ones and short petiolate to subsessile, not auriculate. **Racemes** (3–)6–30-flowered, bracteate or ebracteate, corymbose, with straight rachis, elongating or not in fruit, sometimes flowers solitary on long pedicels originating from center of rosette. **Sepals** oblong to ovate, free or united, persistent or deciduous, erect, equal, base of inner pair not saccate; petals purple, blue, pink, or rarely white, erect at base with flaring blade, longer than sepals; blade suborbicular, obovate, to spatulate, apex obtuse to emarginate; claw subequalling or longer than sepals, glabrous, unappendaged, entire. **Stamens** 6, included, erect, tetradynamous; filaments wingless, unappendaged, glabrous, free, dilated or not at base; anthers oblong-linear to ovate, not apiculate at apex. **Nectar glands** 2 and lateral, or confluent and subtending bases of all filaments; median nectaries absent or present; ovules 6–30(–70) per ovary; placentation parietal. **Fruit** dehiscent silique or silicle, linear, oblong, ovate, or lanceolate, latiseptate, readily detached at maturity from pedicel, rectangular in cross section, not inflated, unsegmented; valves papery, reticulate veined, with a prominent midvein and marginal veins, glabrous or pubescent, smooth, not keeled, unappendaged, adnate with replum at fruit apex, margin angled; gynophore absent; replum rounded, concealed by connate valve margins; septum complete or rarely perforated or reduced to a rim, membranous, not veined, rarely absent; style obsolete, rarely to 1 mm; stigma capitate, entire or 2-lobed, lobes not decurrent. **Seeds** uniseriate or biseriate, wingless, broadly ovate to suborbicular or oblong, flattened; seed coat reticulate, rugose, or papillate, not mucilaginous when wetted; cotyledons accumbent. $x = 7$.

Twenty-six species: Afghanistan, Bhutan, China (Gansu, Qinghai, Sichuan, Xinjiang, Xizang (Tibet), Yunnan), India (Himachal Pradesh, Kashmir, Punjab, Sikkim), Kyrgyzstan, Nepal, Pakistan, and Tajikistan.

References: Al-Shehbaz (2001a), Al-Shehbaz & Yang (2001), Yue et al. (2003, 2004, 2005, 2008).

[SEE INTERACTIVE KEY TO THE SPECIES](#)

1. *Solms-laubachia angustifolia* J. P. Yue, Al-Shehbaz & H. Sun, Ann. Missouri Bot. Gard. 95: 532. 2008. TYPE: China, Sichuan, Yading Xian, Xianuoduoji, 28°23'N, 100°23'E, 4,530 m, 10 Sep 2002, J. P. Yue 0250 (holotype, KUN!; isotype, MO!).

Herbs perennial, pulvinate, 2–6 cm tall; caudex covered with petioles of previous years.

Trichomes absent. Basal leaves rosulate; blade linear, (2–)2.5–5.5(–7.7) cm × 0.3–1(–1.3) mm, not ciliate, grooved adaxially, sparsely pubescent, base attenuate, margin entire; petioles 0.4–1.5

cm, thickened, not ciliate; cauline leaves absent. Flowers solitary; fruiting pedicel originate from axils of basal rosette, 1.0–1.7 cm. Ovules 14–22 per ovary. Fruit linear to narrowly oblong, 1.6–4.2(–4.8) cm × (4–)4.5–8 mm; valves glabrous, obscurely reticulate veined; septum complete; style (1–)1.2–1.6 mm; stigma entire to slightly 2-lobed. Seeds biseriate, broadly ovate to suborbicular, 2.1–3.4 × 1.2–2.8 mm. $2n = 14$.

Flowering: Aug–Sep.

Habitat: scree.

Distribution: China (Sichuan).

2. *Solms-laubachia baiogoinensis* (K. C. Kuan & C. H. An) J. P. Yue, Al-Shehbaz & H. Sun, *Ann. Missouri Bot. Gard.* 95: 532. 2008; *Christolea baiogoinensis* K. C. Kuan & C. H. An in C. Y. Wu, *Fl. Xizang*. 2: 388. 1985; *Desideria baiogoinensis* (K. C. Kuan & C. H. An) Al-Shehbaz, *Ann. Missouri Bot. Gard.* 87: 561. 2001. TYPE: China, Xizang, Baiogoin, 5,100 m, 18 Jun 1976, K. Y. Lang 9460 (holotype, PE!; isotype, PE!).

Herbs perennial, scapose, villous. Trichomes simple and short-stalked forked, straight, to 1 mm. Stems absent. Basal leaves subfleshy; petiole 0.4–1.6 cm, persistent, villous, ciliate, somewhat papery at base; leaf blade broadly ovate, suborbicular, or obovate, 4–8 × 3–6 mm, villous, base obtuse to cuneate, margin 3–7-toothed, apex acute; cauline leaves absent. Flowers solitary from basal rosette; fruiting pedicel ascending-divaricate, straight, 0.5–2 cm, villous. Sepals free, oblong, 4–6 × 1.5–2.5 mm, usually persistent, pilose, base not saccate, margin membranous; petals purplish, broadly obovate, 7–1.2 cm × 3.5–4.5 mm, apex subemarginate; claw 4–6 mm; filaments white, dilated at base, toothless, median pairs 3.5–5 mm, lateral pair 2–2.5 mm; anthers 1–1.2 mm; ovules 15–20 per locule. Fruit ovate to lanceolate, 1–2.5 cm × 6–9 mm, flattened, sessile, straight; valves prominently reticulate veined; replum and valves villous; septum complete; style 0.5–1 mm; stigma capitate, 2-lobed. Seeds oblong, 1.5–2 × 0.8–1.1.

Flowering: Jun–Jul.

Habitat: open sand, gravel.

Elevation: 4700–5600.

Distribution: China (Qinghai, Xizang).

3. *Solms-laubachia calcicola* J. P. Yue, Al-Shehbaz & H. Sun, *Ann. Missouri Bot. Gard.* 95: 532. 2008. TYPE: China, Xizang, Riwoqe Xian, Machala, 31°24'N, 96°40'E, 4,770 m, 10 Aug 2004, D. E. Boufford, J. H. Chen, S. L. Kelley, J. Li, R. H. Ree, H. Sun, J. P. Yue & Y. H. Zhang 31975 (holotype, KUN!; isotypes, A!, MO!).

Herbs perennial, scapose, pulvinate, 2–5 cm tall; caudex compactly branched, covered with petioles of previous years. Trichomes absent. Basal leaves rosulate; blade linear to lanceolate, (1.8–)2.3–4.1(–4.4) cm × 1.9–2.5 mm, glabrous or sparsely pubescent with straight trichomes, not ciliate, base attenuate, margin entire; petioles (5.7–)6.5–8.9(–9.2) mm, thickened; cauline leaves absent. Flowers solitary; fruiting pedicels originate from axils of basal rosette, 3–3.5(–5) cm. Sepals free, oblong, 6.2–6.9 × 2.6–3.2 mm; petals turquoise blue, obovate, 1.5–1.8 × 0.6–1 cm; median filaments 3.8–4.5 mm; anthers 1–1.8 mm; ovules 18–28 per ovary. Fruit narrowly ovate to lanceolate, 1.1–2.3(–2.5) cm × 5.1–8.9(–9.2) mm, glabrous or sparsely pubescent; valves prominently reticulate veined; septum complete; style 0.5–1.5 mm; stigma slightly 2-lobed. Seeds oblong, uniseriate to biseriate, 2–2.5 × (1.2–)1.3–1.5(–1.7) mm.

Flowering: Aug.
Habitat: rock crevices.
Elevation: 4700–4800 m.
Distribution: China (Xizang).

- 4. *Solms-laubachia eurycarpa*** (Maximowicz) Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 169. 1955; *Parrya eurycarpa* Maximowicz, Fl. Tangut. 1: 56. 1889. TYPE: China, Tibet, near Jagem-Gol, 20 Jul 1884, *N. M. Przewalski s.n.* (holotype, LE!; isotype, PE!).
- Solms-laubachia pulcherrima* Muschl. var. *latifolia* O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 11: 229. 1931; *Solms-laubachia latifolia* (O. E. Schulz) Y. Z. Lan & T. Y. Cheo, Acta Phytotax. Sin. 19: 477. 1981. TYPE: China, SW Sichuan, Mount Konka, Risonquembra, Konkaling, 4,475 m, Jun-Aug 1928, *J. F. C. Rock 16870* (lectotype, designated by Al-Shehbaz & Yang, 2001: 375), B!; isolectotypes, E!, US!, W!).
- Solms-laubachia doliocarpa* Y. Z. Lan & T. Y. Cheo, Acta Phytotax. Sin. 19: 477. 1981. TYPE: China, Sichuan, Zoige, 4,300 m, 4 Aug 1960, *Sichuan Drug Plant Expedition 20279* (holotype, NAS [as HJ]!).
- Solms-laubachia eurycarpa* var. *brevistipes* Y. Z. Lan & T. Y. Cheo, Acta Phytotax. Sin. 19: 476. 1981. TYPE: China, Qinghai, Nanggen, 4,400 m, 9 Jul 1965, *Y. C. Yang 1121* (holotype, HNWP [as HQ]!; isotype, HNWP!).
- Solms-laubachia eurycarpa* var. *lasiophylla* R. F. Huang in S. W. Liu, Fl. Qinghaiica 1: 510. 1997. TYPE: China, Qinghai, Hen Xian, Waisxan Amishan, 19 Jul 1972, 4,100–4,200 m, *P. C. Kuo 9908* (holotype, HNWP [as NWBI]!).
- Solms-laubachia gamosepala* Al-Shehbaz & G. Yang, Harvard Pap. Bot. 5: 380. 2001. TYPE: China, Yunnan: Deqen, Beima Shan, N side of road, 28°23'N, 99°01'E, 4,700 m, 30 Jun 1994, limestone scree, *Alpine Garden Society Expedition to China ACE 855* (holotype, K!).
- Herbs perennial, scapose, 3–12 cm tall, sparsely pilose; caudex covered with petioles of previous years. Trichomes simple, 0.2–0.5 mm. Petioles of basal leaves often purplish, (0.7–)1–5(–8) cm, thickened and subcorky, persistent, shortly ciliate; leaf blade oblanceolate, broadly spatulate, oblong, or lanceolate, (1–)1.5–5(–6.5) × (0.7–)1–1.6(–2.3) cm, somewhat fleshy and drying subleathery, glabrous or sparsely pubescent, base attenuate to cuneate, margin entire, apex obtuse to rounded; cauline leaves absent. Flowers solitary; fruiting pedicel erect to ascending, (0.5–)1–3(–5) cm. Sepals oblong, 2.5–3.5 × ca. 1 mm, united, membranous at apex, subapically sparsely pilose; petals white, drying pink, oblanceolate, 5–6 × 1.5–2 mm; claw ca. 3 mm; filaments of median staminal pairs ca. 4 mm, those of lateral pair ca. 3 mm; anthers 0.7–0.9 mm; ovules 10–16 per locule. Fruit lanceolate to linear-lanceolate, (3.5–)5–8.5(–11) × (0.7–)0.9–1.4(–1.8) cm; valves glabrous or sparsely pilose, with a prominent midvein and obscure lateral ones; septum complete; style obsolete to 2 mm; stigma entire to slightly lobed. Seeds biseriate, broadly ovate, reticulate, 3–4.5 × 2–3 mm. Flowering: Jun–Aug.
Habitat: scree slopes, gravelly areas, cliffs, rocky slopes, alpine meadows, glacier margin.
Elevation: 3800–4900 m.
Distribution: China (Gansu, Qinghai, Sichuan, Xizang, Yunnan).

- 5. *Solms-laubachia flabellata*** (Regel) J. P. Yue, Al-Shehbaz & H. Sun, Ann. Missouri Bot. Gard. 95: 533. 2008; *Parrya flabellata* Regel, Bull. Soc. Imp. Naturalistes Moscou 43: 261. 1870; *Ermania flabellata* (Regel) O. E. Schulz, Bot. Jahrb. Syst. 66: 98. 1933. *Christolea*

flabellata (Regel) N. Busch in Komarov, Fl. URSS 8: 330. 1939; *Oreoblastus flabellatus* (Regel) Suslova, Bot. Zhurn. (Moscow & Leningrad) 57: 651. 1972; *Desideria flabellata* (Regel) Al-Shehbaz, Ann. Missouri Bot. Gard. 87: 558. 2001. TYPE: Kyrgyzstan, southern Tian Shan, Dschaman-Daban, Sewerzow s.n. (holotype, LE!).

Christolea pinnatifida R. F. Huang, Acta Phytotax. Sin. 35: 556. 1997. TYPE: China, Qinghai, Maqen, Anyemaqen Mt., 4,800 m, 25 Jun 1981, R. F. Huang CG-81-154 (holotype, HNWP!).

Herbs perennial, 4–15 cm tall, not canescent. Trichomes simple, straight, to 1.5 mm. Stems distinct, simple, densely pilose. Basal leaves subfleshy; petiole 2–7 mm, pilose; leaf blade flabellate to broadly obovate, rarely spatulate, 0.6–2.5 × 0.3–2.5 cm, pilose, base cuneate to attenuate, margin (3–)5–9(–11)-toothed, rarely lowermost entire, apex acute; teeth to 10 × 3 mm; cauline leaves similar to basal. Racemes 7–12-flowered, ebracteate; fruiting pedicels ascending, straight to curved, (0.5–)0.7–1.5(–2.5) mm, spreading pilose. Sepals free, narrowly oblong, 5–8 × 1.5–2.5 mm, often persistent, pilose, base not saccate, margin membranous; petals purple, broadly spatulate, 1.1–1.5 cm × 3.5–6 mm, apex subemarginate; claw 7–9 mm; filaments white to mauve, slightly dilated at base, median pairs 4.5–6 mm, lateral pair 3–4 mm; anthers oblong, 0.9–1.3 mm; ovules 7–12 per locule. Fruit lanceolate to lanceolate-linear, (1.7–)2.5–3.5(–4.5) cm × 2.5–5 mm, strongly flattened; valves pilose, distinctly veined; septum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, 1.3–2 × 0.9–1.2 mm, uniseriate, minutely reticulate.

Flowering: Jul–Aug.

Habitat: alpine gravelly slopes, moraine slopes, bare grounds by glaciers.

Elevation: 3300–5100 m.

Distribution: Afghanistan, China (Qinghai, Xinjiang), Kyrgyzstan, Tajikistan.

6. *Solms-laubachia grandiflora* J. P. Yue, Al-Shehbaz & H. Sun, Ann. Missouri Bot. Gard. 95: 533. 2008. TYPE: China, Sichuan, Xiancheng Xian, Rizhaosheng Shan, 29°6′N, 99°41′32″E, 4,650 m, 15 Jul 2004, D. E. Boufford, J. H. Chen, S. L. Kelley, J. Li, R. H. Ree, H. Sun, J. P. Yue & Y. H. Zhang 30727 (holotype, KUN!; isotypes, A!, MO!).

Herbs perennial, scapose, pulvinate, 3–7 cm tall; caudex covered with petioles of previous years. Basal leaves rosulate; blade linear to linear-lanceolate, (1.2–)1.8–4.5(–5.4) cm × 1.5–2.3(–2.9) mm, glabrous or sparsely pubescent, ciliate, base attenuate, margin entire; petioles (5.2–)6.8–8.2(–10.2) mm, thickened; cauline leaves absent. Fruiting pedicels solitary from basal rosette, 1.6–2.5(–3.2) cm. Sepals free or united, oblong, 6.1–7.7 × 2–2.9 mm; petals pink, obovate, 1.6–2.5 × (0.6–)0.8–0.9(–1.2) cm; median filaments 4.5–5.6 mm; anthers 1.3–2 mm; ovules 14–24 per ovary. Fruit oblong to oblong-linear, 1–3.4(–4.8) cm × 4–11 mm, glabrous or sparsely pubescent; valves obscurely reticulate veined; septum complete; style 1.1–2.1 mm; stigma slightly 2-lobed. Seeds biseriate, broadly ovate to suborbicular, 2.4–3.6 × (1.6–)1.8–2.8(–3) mm.

Flowering: Jul.

Habitat: scree slopes.

Elevation: 4600–4700 m.

Distribution: China (Sichuan).

7. *Solms-laubachia haranensis* (Al-Shehbaz) J. P. Yue, Al-Shehbaz & H. Sun, Ann. Missouri Bot. Gard. 95: 534. 2008; *Desideria haranensis* Al-Shehbaz, Ann. Missouri Bot. Gard. 87:

559. 2001 (replacement name for *Ermaniopsis pumila* H. Hara, J. Jap. Bot. 49: 200. 1974, non *Solms-laubachia pumila* (Kurz) F. Dvořák, Folia Fac. Sci. Nat. Univ. Purkynianae Brun. Biol. Biol. 13(4): 24. 1972). TYPE: Nepal, ca. 5 mi SW of Saldanggaon, 26 Jun 1952, very loose scree, 19,500 ft [5,944 m], N. Polunin, W. R. Sykes & L. H. J. Williams 24 (holotype, BM!; isotypes, A!, BM!, E!).

Herbs perennial, scapose, 2–6 cm tall. Trichomes simple, straight, to 0.5 mm, mixed on leaves with short-stalked unequally branched forked ones. Stems erect, simple, pilose to hirsute. Basal leaves fleshy, persistent; petiole 2–12 mm, sparsely to densely pilose with simple trichomes, ciliate at base, not expanded or papery at base; leaf blade broadly ovate, suborbicular, to obovate, 3–13 × 3–11 mm, sparsely to densely pubescent, base cuneate or obtuse, margin 1–5-toothed, apex obtuse; cauline leaves absent. Racemes 3–8-flowered, ebracteate; fruiting pedicels divaricate, straight, 4–12 mm, pilose. Sepals free, oblong, 3.5–4.5 × 1.7–2 mm, caducous, pilose, base not saccate, margin membranous; petals white tinged with greenish blue, obovate, 6.5–8 × 3–4 mm, apex obtuse; claw 3–4 mm; filaments white, flattened and subapically toothed, median pairs 3–4 mm, lateral pair 2–3 mm; anthers oblong, 0.9–1.1 mm; ovules 5–7 per locule. Immature fruit linear, flattened, sessile, straight, retrorsely pilose; septum complete; stylelike glabrous apex to 1.5 mm; stigma capitate, subentire. Seeds not seen.

Flowering: Jun.

Habitat: scree slopes.

Elevation: 5400–6400 m.

Distribution: Nepal.

8. *Solms-laubachia himalayensis* (Cambess.) J. P. Yue, Al-Shehbaz & H. Sun, Ann. Missouri Bot. Gard. 95: 534. 2008. *Cheiranthus himalayensis* Cambess. in Jacquem., Voy. Bot. 4: 14. 1844. *Ermania himalayensis* (Cambess.) O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 9: 1080. 1927. *Oreoblastus himalayensis* (Cambess.) Suslova, Bot. Zhurn. (Moscow & Leningrad) 57: 652. 1972. *Desideria himalayensis* (Cambess.) Al-Shehbaz, Ann. Missouri Bot. Gard. 87: 555. 2001. TYPE: [W Xizang] “in declivitate orientali jugi vulgò Kioubrungghauti in Tartariâ sinensi,” V. Jacquemont 1782 (holotype, P!; isotypes, K!, P!).

Herbs perennial, 4–20 cm tall, densely pilose throughout to subglabrous. Trichomes simple, to 1.5 mm. Stems simple, pilose to glabrous. Basal leaves not fleshy, pilose to glabrous, persistent; petiole 0.4–1.6(–3) cm, not ciliate; leaf blade broadly obovate to spatulate, 4–14 × 3–9 mm, base cuneate to attenuate, margin (3–)5-toothed, apex acute; cauline leaves similar to basal or linear to lanceolate, 5–17 × 1–4 mm, often entire, short petiolate to sessile. Racemes 6–25-flowered, bracteate throughout; bracts similar to stem leaves but smaller, sometimes adnate to pedicel; fruiting pedicels ascending, straight or curved, 3–10 mm, pilose or glabrous. Sepals free, oblong, 3–4 × 1.2–1.5 mm, caducous, pilose or with a terminal tuft of hairs, base not saccate, margin membranous; petals purple or lilac with yellowish center, broadly spatulate, (6–)6.5–8 × 3–4 mm, apex subemarginate; claw 3–4 mm; filaments white, slightly dilated at base, median pairs 3–4 mm, lateral pair 2–4 mm; anthers ovate, ca. 0.6 mm; ovules 7–12 per locule. Fruit lanceolate to lanceolate-linear, (1.7–)2–3.5(–4) cm × (3–)4–6 mm, strongly flattened; valves pilose or glabrous, distinctly veined; septum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, (1.5–)1.8–2(–2.3) × 1–1.4 mm, biseriate, minutely reticulate.

Flowering: Jun–Aug.

Habitat: alpine tundra, open hills, sandstone scree.

Elevation: 4300–5700 m.

Distribution: China (Qinghai, Xizang), India (Himachal Pradesh, Punjab), Kashmir, Nepal.

9. *Solms-laubachia incana* (Ovczinnikov) J. P. Yue, Al-Shehbaz & H. Sun, *Ann. Missouri Bot. Gard.* 95: 534. 2008. *Christolea incana* Ovczinnikov, *Sovetsk. Bot.* 1941(1 & 2): 151. 1941. *Ermania incana* (Ovczinnikov) Botschantzev, *Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R.* 17: 164. 1955. *Oreoblastus incanus* (Ovczinnikov) Suslova, *Bot. Zhurn. (Moscow & Leningrad)* 57: 652. 1972. *Desideria incana* (Ovczinnikov) Al-Shehbaz, *Ann. Missouri Bot. Gard.* 57: 558. 2001. TYPE: Tajikistan, Darvaz: Mt. Masar, glacier Abdul Gassan, 11,000–12,000 ft [3,353–3,658 m], 23 Jul 1899, *V. I. Lipsky 1936* (holotype, LE!).

Herbs perennial, 4–15 cm tall, canescent, densely tomentose throughout. Trichomes short-stalked forked and simple, to 1 mm. Stems simple, tomentose. Basal leaves subfleshy, canescent, densely tomentose, persistent; petiole 0.5–2 mm, not ciliate, not expanded or papery at base; leaf blade broadly obovate to spatulate, 4–13 × 2–8 mm, base cuneate to attenuate, margin 3(–5)-toothed or entire on sterile branches, apex acute; cauline leaves similar to basal. Racemes 6–20-flowered, only basally bracteate; fruiting pedicels ascending, straight, 2–7 mm, tomentose. Sepals free, narrowly oblong, 5–7 × 1.5–2 mm, caducous, densely tomentose, base not saccate, margin membranous; petals purple with paler or yellowish base, spatulate, 12–18 × 4–6 mm, apex rounded; claw 7–10 mm; filaments white, slightly dilated at base, median pairs 5–6 mm, lateral pair 3–4 mm; anthers narrowly oblong, 1.2–1.5 mm; ovules 25–35 per locule. Fruit linear, 3–6.5 cm × 2.5–3.5 mm, strongly flattened; valves tomentose, distinctly veined; septum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, oblong, 1.2–1.5 × 0.7–1 mm, minutely reticulate. Flowering: Jul.

Habitat: alpine gravelly areas.

Elevation: 3300–4600 m.

Distribution: Tajikistan.

10. *Solms-laubachia jafrii* (Al-Shehbaz) J. P. Yue, Al-Shehbaz & H. Sun, *Ann. Missouri Bot. Gard.* 95: 534. 2008; *Phaeonychium jafrii* Al-Shehbaz, *Nordic J. Bot.* 20: 160. 2000. TYPE: China, Xizang [Tibet]: hills E of Lhasa, 14,000 ft [4,267 m], 14 Jun 1942, on rock faces, *F. Ludlow & G. Sherriff 8714* (holotype, BM!).

Herbs perennial, 8–30 cm tall; caudex stout, woody, few to many branched, to 3 cm in diam., covered with petiolar bases of previous years. Trichomes simple mixed with stalked to sessile ones, crisped, flattened. Stems erect, simple and to 25 from caudex, tomentose. Basal leaves rosulate; petiole 1–5(–7) cm, ciliate with simple trichomes to 2 mm, becoming thickened and corky, to 6 mm wide at base; leaf blade broadly ovate to oblong, occasionally lanceolate to oblanceolate, 1–5.5(–7) × (0.7–)1–2.5 cm, green, subtomentose, base cuneate to attenuate, margin entire, apex obtuse to acute; cauline leaves absent. Racemes (8–)12–35-flowered, ebracteate; fruiting pedicel suberect to ascending, straight, (0.3–)0.6–1.5(–2.5) cm, tomentose. Sepals oblong, 3–4 × 1.5–2 mm, tomentose, persistent, margin membranous; petals pink to white flushed basally with purplish, obovate, 6.5–10 × 4–5 mm, apex obtuse; claw 3–4 mm; filaments purple; median pairs 3–4 mm; lateral pair 2–2.5 mm; anthers oblong, 0.9–1.1 mm; ovules 5–8 per locule. Fruit linear, (0.9–)1.5–2.5(–3.5) cm × 1.5–2 mm, slightly flattened, sessile, straight; valves finely tomentose, with a distinct midvein and marginal veins; style 0.3–0.7 mm; stigma

capitate, entire. Seeds brown to blackish, oblong, $2-2.5 \times 0.9-1.1$ m, slightly flattened, distally margined; funicles often filiform and to 3 mm.

Flowering: Jul–Sep.

Habitat: scrub, cliff ledges, steep rocky hillsides.

Elevation: 4000–4900 m.

Distribution: Bhutan, China (Xizang), Nepal.

11. *Solms-laubachia lanata* Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 171. 1955. TYPE: China, Tibet [Xizang], near Yerpa Monastery, 14,000 ft [4,267 m], Aug 1821, R. S. Kennedy 9 (holotype, K!).

Herbs perennial, scapose, 2–8 cm tall, densely lanate; caudex with some petiolar remains of previous years. Trichomes simple, to 1.5 mm. Petioles of basal leaves 0.5–2 cm, antrorsely lanate, papery, persistent, often ciliate at least basally; leaf blade broadly spatulate, oblong, to obovate, $1.2-4 \times (0.5-)$ 0.7–1.7 cm, antrorsely lanate, base cuneate to attenuate, margin entire, apex rounded to obtuse; cauline leaves absent. Flowers not seen; fruiting pedicel solitary, erect to ascending, 1.5–3.5 cm; ovules 5–10 per locule. Fruit lanceolate to lanceolate-oblong, $1.8-3.2 \times 0.7-1.5$ cm; valves sparsely to densely to lanate, prominently reticulate veined; septum complete; style 0.5–2 mm; stigma entire to slightly lobed. Seeds biseriate, broadly ovate to suborbicular, rugose, $2-3.5 \times 1.5-3$ mm.

Flowering: Jul.

Habitat: grasslands, meadows.

Elevation: 4000–5000 m.

Distribution: China (Xizang).

12. *Solms-laubachia linearifolia* (W. W. Smith) O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 9: 477. 1926; *Parrya linearifolia* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 11: 219. 1919, non *P. linearifolia* Pavlov, Vestnik Akad. Nauk Kazak. S.S.R. 1: 29. 1949. TYPE: China, Yunnan, Beima Shan, Mekong-Yangtze divide, 28°20'N, 14,500 ft [4,420 m], Aug 1914, G. Forrest 13,235 (lectotype, here designated, E!; isotype, E!).

Solms-laubachia linearifolia var. *leiocarpa* O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 9: 477. 1926. TYPE: China, NW Yunnan, Mt. Peimashan, Mekong-Yangtze divide between Atuntze & Pungtzera, Jun 1923, J. F. C. Rock 9304 (lectotype designated by Al-Shehbaz & Yang (2001), B!; isolectotypes, E!, GH!, US!).

Herbs 3–10 cm tall, sparsely to densely pilose with straight trichomes to 1.5 mm; caudex covered with petioles of previous years. Petioles of basal leaves (0.4–)0.8–2(–3) cm, papery, persistent, ciliate; leaf blade linear to lanceolate- or oblanceolate-linear, rarely lanceolate, (1–)1.8–4.5(–6) cm \times (1.5–)2–3.5(–5) mm, sparsely to densely pilose, ciliate, base attenuate, margin entire, apex acute to obtuse; cauline leaves absent. Flowers solitary; fruiting pedicel erect to ascending, 1.5–3.5(–5) cm. Sepals oblong to oblong-linear, 5–8(–10) \times 1.5–2 mm, pubescent; petals purple, pink, to deep or turquoise blue, obovate to broadly so, (1.2–)1.5–2.2(–2.5) cm \times (4–)6–8(–12) mm; claw 0.8–1.3 mm; filaments of median staminal pairs (3–)3.5–5(–6) mm, those of lateral pair 2–3.5 mm; anthers 1.2–1.5 mm; ovules 7–10 per locule. Fruit lanceolate to linear-lanceolate, (3–)4.5–6.5(–8) cm \times 6–11 mm; valves glabrous to pilose at least at margin, obscurely reticulate veined; septum complete; style obsolete; stigma entire to slightly lobed. Seeds uniseriate, broadly ovate to suborbicular, minutely reticulate, $3.5-5 \times 2.5-3.5$ mm.

Flowering: May–Jul.

Habitat: scree, stony slopes, moraine, among rocks, sandy slopes, cliff crevices, wet limestone meadows.

Elevation: 3400–4700 m.

Distribution: China (Sichuan, Xizang, Yunnan).

13. *Solms-laubachia linearis* (N. Busch) J. P. Yue, Al-Shehbaz & H. Sun, *Ann. Missouri Bot. Gard.* 95: 535. 2008; *Christolea linearis* N. Busch in Komarov, *Fl. URSS.* 8: 636. 1939; *Ermania linearis* (N. Busch) Botschantzev, *Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R.* 17: 166. 1955; *Oreoblastus linearis* (N. Busch) Suslova, *Bot. Zhurn. (Moscow & Leningrad)* 57: 652. 1972; *Desideria linearis* (N. Busch) Al-Shehbaz, *Ann. Missouri Bot. Gard.* 57: 556. 2001. TYPE: Tajikistan, Pamir, Schugnan, Abchary, 2 Aug 1904, B. Fedtschenko s.n. (holotype, LE!).

Ermania parkeri O. E. Schulz, *Repert. Sp. Nov. Regni Veg.* 31: 333. 1933; *Christolea parkeri* (O. E. Schulz) Jafri, *Notes Roy. Bot. Gard. Edinburgh* 22: 52. 1955; *Oreoblastus parkeri* (O. E. Schulz) Suslova, *Bot. Zhurn. (Moscow & Leningrad)* 57: 653. 1972. TYPE: Kashmir: Sonamarg, Luderwas, 13,000 ft [3,962 m], 11 Aug 1928, R. R. Stewart 9874A (holotype, B!).

Ermania kashmiriana Dar & Naqshi, *J. Bombay Nat. Hist. Soc.* 87: 274. 1990. TYPE: Kashmir: Shalimar, Sonamarg (Sind Valley), 3,900 m, 20 Aug 1983, G. H. Dar 7786 (holotype, KASH not seen).

Ermania kachrooi Dar & Naqshi, *J. Bombay Nat. Hist. Soc.* 87: 277. 1990. TYPE: Kashmir: Baltal, Sonamarg (Sind Valley), 3,200 m, 2 Sep 1982, G. H. Dar 3934 (holotype, KASH not seen; isotypes, KASH not seen, MO!).

Herbs perennial, 4–15 cm tall, densely pilose throughout to subglabrous. Trichomes simple, to 1.5 mm. Stems simple, pilose to glabrous. Basal leaves not fleshy, pilose to glabrous, persistent; petiole 2–7(–12) mm, not ciliate; leaf blade broadly obovate to spatulate, 4–15 × 2–12 mm, base cuneate to attenuate, margin 3–5-toothed or rarely entire, apex acute; cauline leaves similar to basal or linear to lanceolate, 5–10 × 1–3 mm, often entire, short petiolate to sessile. Racemes 8–20-flowered, bracteate throughout; bracts similar to stem leaves but smaller, often adnate to pedicel; fruiting pedicels ascending, straight, 2–8(–12) mm, pilose or glabrous. Sepals free, oblong to ovate, 2–3 × 1–1.5 mm, caducous, pilose or with a terminal tuft of hairs, base not saccate, margin membranous; petals purple or lavender with paler base, narrowly spatulate, 4–5(–5.5) × 1.5–2.5 mm, apex rounded; claw 2–2.5 mm; filaments white, slightly dilated at base, median pairs 2.5–3.5 mm, lateral pair 1.8–2.5 mm; anthers ovate, 0.4–0.5 mm; ovules 8–13 per locule. Fruit linear, (1.5–)2–3.5(–4.2) cm × (0.8–)1–1.7(–2) mm, flattened; valves pilose or glabrous, distinctly veined; septum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, 0.8–1.1 × 0.5–0.8 mm, uniseriate, minutely reticulate.

Flowering: Jun–Aug.

Habitat: gravelly or sandy slopes, scree, gravelly moraine below glacier.

Elevation: 3200–6200 m.

Distribution: China (Xinjiang, Xizang), Kashmir, Nepal, Tajikistan.

14. *Solms-laubachia mieheorum* (Al-Shehbaz) J. P. Yue, Al-Shehbaz & H. Sun, *Ann. Missouri Bot. Gard.* 95: 535. 2008; *Desideria mieheorum* Al-Shehbaz, *Novon* 15: 1. 2005. TYPE:

China, Tibet [Xizang], Chang La, N of Sangsang, 29°41'N, 86°43'E, pioneer on frost debris, 5,480–5,600 m, 15 Sep 2003, G. & S. Miehe 03-112-21 (holotype, MO!).

Herbs perennial, 5–15 cm tall, densely pilose throughout, not canescent; caudex thick, covered with leaf remains of previous years; stems simple. Trichomes simple, straight, 1–2 mm. Leaves basal and cauline, not fleshy; petiole 2–4.5 cm, pilose; leaf blade broadly obovate to spatulate, 1.5–3 × 0.7–1.5 cm, pilose, base cuneate to attenuate, margins dentate, apex acute. Racemes 5- to 9-flowered, ebracteate; fruiting pedicels slender, ascending, straight to curved, 0.8–2.5 cm long, spreading pilose. Sepals free, oblong, 5–6 × 1.5–2 mm, often persistent to fruit maturity, densely pilose, base not saccate, margins membranous; petals blue, broadly spatulate, 10–13 × 3–4 mm, apex obtuse; claw 6–7 mm; filaments slightly dilated at base, median pair 5–6 mm long, lateral pair 3–4 mm; anthers oblong, 1–1.3 mm; ovules 10–16 per ovary. Fruit lanceolate to lanceolate-linear, 1.5–4 cm × 5–8 mm, strongly flattened parallel to septum; valves densely pilose, distinctly veined; septum complete, membranous; style slender, 5–7 mm, glabrous; stigma entire; seeds dark brown, ovate, 2.5–3 × 1.5–2 mm, biseriate, minutely reticulate; cotyledon accumbent.

Flowering: Aug–Sep.

Elevation: 5400–5600 m.

Distribution: China (Xizang).

15. *Solms-laubachia minor* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math. Naturwiss. Kl. 59: 246. 1922. TYPE: China, Sichuan, Mt. Holoscha, 27°48'N, between Yenyuen & Kwapi, 4,325 m, 18 May 1914, H. F. Handel-Mazzetti 2318 (holotype, WU!; isotypes, E!, P!, W!).

Herbs perennial, scapose, 1–2.5 cm tall, glabrous; caudex covered with curling leaves of previous years. Trichomes absent. Petioles of basal leaves 2–5 mm, thickened, persistent, not ciliate; leaf blade filiform to narrowly linear, 2.5–10(–1.5) × 0.3–1 mm, long ciliate, often grooved adaxially, base attenuate, margin entire, apex subacute; cauline leaves absent. Flowers solitary; fruiting pedicel erect to ascending, 2–7(–10) mm. Sepals oblong to oblong-linear, 4.5–5.5 × 1–1.5 mm, free; petals pink, obovate, 1–1.2 cm × 3.5–5 mm; claw 6–7 mm; filaments of median staminal pairs 3–4 mm, those of lateral pair 2–2.5 mm; anthers 1.2–1.5 mm; ovules 6–8 per locule. Fruit lanceolate, 1.5–2 cm × 4–5 mm; valves densely subhirsute, obscurely veined; septum complete or perforated; style 0.5–1 mm; stigma entire. Seeds biseriate, suborbicular, minutely reticulate, 1–1.5 mm in diam. Flowering: May–Jun.

Habitat: rocky crevices, cliff ledges, alpine meadows, scree, sandy areas.

Elevation: 3500–4600.

Distribution: China (Sichuan).

16. *Solms-laubachia mirabilis* (Pampanini) J. P. Yue, Al-Shehbaz & H. Sun, Ann. Missouri

Bot. Gard. 95: 535. 2008; *Desideria mirabilis* Pampanini, Bull. Soc. Bot. Ital. 1926: 111.

1926. *Christolea mirabilis* (Pamp.) Jafri, Fl. West Pakistan 55: 160. 1973. TYPE: Kashmir, Karakorum, above Caracash Valley, Chisil Gilgha Pass, 5,360 m, 28 Jun 1914, G. Dainelli & O. Marinelli 2 (lectotype designated by Al-Shehbaz (2001a), FI, FI photo at HB!).

Christolea scaposa Jafri, Notes Roy. Bot. Gard. Edinburgh 22: 58. 1955. TYPE: Kashmir, Shaksgam Valley, 4,950 m, 3 Jul 1926, R. C. Clifford 7 (holotype, K!).

Christolea karakorumensis Y. H. Wu & C. H. An, Acta Phytotax. Sin. 32: 577. 1994. TYPE: China, Xinjiang, Pishan [Guma], Shexianwan, 5,250 m, 25 Jul 1989, *Karakorum-Kunlun Expedition 5100* (holotype, HNWP [as NWBI]!).

Desideria pamirica Suslova, Novosti Sist. Vyssh. Rast. 10: 163. 1973; *Christolea suslovaeana* Jafri, Fl. West Pakistan 55: 158. 1973, replacement name for *D. pamirica* non *Christolea pamirica* Korshinsky, Mém. Acad. Imp. Sci. Saint Pétersbourg, ser. 8, 4: 89. 1896. TYPE: Tajikistan, Pamir, above Czecekty, near Zor, 4,900 m, 10 Aug. 1970, *T. Suslova s.n.* (holotype, LE!).

Herbs perennial, 2–10 cm tall. Trichomes simple and to 1.5 mm, rarely mixed with forked ones. Stems distinct, simple, densely pilose. Basal leaves subfleshy; petiole 3–15 mm, densely pilose, not expanded or papery at base; leaf blade flabellate to spatulate-orbicular, (2–)5–15 × 3–9(–15) mm, pilose, base cuneate, margins 8- to 10-toothed, apex acute; teeth to 8 mm; cauline leaves similar to basal. Racemes 8- to 20-flowered, ebracteate; fruiting pedicels ascending, straight to curved, 5–10 mm, spreading pilose. Sepals united, (2.5–)3.5–5.5 × 1.5–2.5(–3) mm, persistent, densely pilose, base not saccate, margins membranous; petals purple to purplish green with yellowish base, obovate, 5–8 × (1.5–)2.5–3 mm, apex obtuse; claw 2.5–4 mm; filaments white, slightly dilated at base, median pairs (3–)4–5 mm, lateral pair (2–)2.5–3.5 mm; anthers oblong, 0.5–0.8 mm; ovules 12–18 per ovary. Fruit linear, 1–2(–3) cm × ca. 2 mm, slightly flattened to subterete; valves pilose, distinctly veined; septum perforate or reduced to a narrow rim, membranous; style obsolete to 0.7 mm; stigma 2-lobed. Seeds oblong, 1.5–1.8 × 0.8–1 mm, papillate.

Flowering: Jul–Aug.

Habitat: gravelly slopes.

Elevation: 4000–5000 m.

Distribution: China (Xinjiang), Kashmir, Tajikistan.

17. *Solms-laubachia nepalensis* (H. Hara) J. P. Yue, Al-Shehbaz & H. Sun, Ann. Missouri Bot. Gard. 95: 535. 2008; *Desideria nepalensis* H. Hara, J. Jap. Bot. 50: 264. 1975. TYPE: Nepal, Barum Valley, 17,700 ft [5,394 m], 26 May 1954, *L. W. Swan 71-72* (holotype, BM!).

Herbs perennial, scapose, 2–3 cm tall. Trichomes simple, straight, to 1 mm. Stems minute, simple, glabrous. Basal leaves subfleshy; petiole 2–5 mm, sparsely pilose with simple trichomes, ciliate at base, not expanded or papery at base; leaf blade broadly obovate to subflabellate, 2–3 × 1–3 mm, densely pubescent, base cuneate, margin 3–5-toothed, apex acute; cauline leaves absent. Raceme 2–4-flowered; fruiting pedicels ascending, straight, 3–5 mm, arising from basal rosette, spreading pilose. Sepals united, 5–6 × 3–4 mm, densely pilose, persistent, base not saccate, margin membranous; petals ?purplish, obovate, 11–13 × 5–6 mm, apex obtuse; claw 6–7 mm; filaments 4–5.5 mm, slightly dilated at base, median pairs 4.5–5.5 mm, lateral pair 3–4 mm; anthers oblong, 0.9–1.1 mm. Fruits of previous season esepat. Seeds not seen.

Flowering: May.

Elevation: ca. 5400 ft.

Distribution: Nepal.

Notes: known only from the type collection.

18. *Solms-laubachia platycarpa* (J. D. Hooker & Thomson) Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 171. 1955; *Parrya platycarpa* J. D. Hooker & Thomson, J. Linn. Soc., Bot. 5: 136. 1861, non *P. platycarpa* Rydberg, Bull. Torrey Bot. Club 39: 326. 1912. TYPE: India, Sikkim, alpine region, 17,000 ft [5,182 m], *J. D. Hooker s.n.* (holotype, K!).

Parrya finchiana Dunn, Bull. Misc. Inform. Kew 1927: 247. 1927. TYPE: Tibet, along Chongphu torrent, ca. 20 miles NE of Mt. Everest, 17,000 ft. [5,182 m], 8 Jun 1922, *E. F. Norton 41* (holotype, K!).

Solms-laubachia orbiculata Y. Z. Lan & T. Y. Cheo, Acta Phytotax. Sin. 19: 473. 1981. TYPE: China, Xizang, Cona, 5,020 m, 20 Jul 1975, *C. Y. Wu & S. K. Chen 75-1129* (holotype, HNWP [as HQ]!; isotype, KUN!).

Herbs perennial, (2–)4–10(–15) cm tall, glabrous to densely pubescent; caudex covered with petioles of previous years. Trichomes, simple, straight to crisped, retrorse, to 1.1 mm. Petioles of basal leaves (0.5–)1.5–3(–6) cm, ciliate, thickened and subcorky, persistent, often ciliate at least basally; leaf blade lanceolate, elliptic, oblanceolate, or spatulate, rarely broadly obovate, suborbicular, or linear-oblanceolate, (0.5–)1–3.5(–5) cm × 2–7(–10) mm, glabrous to densely pilose, sometimes only sparsely so at leaf apex and petiole base, base cuneate to attenuate, margin entire, apex acute to rounded; cauline leaves 1 or 2, much narrower than basal ones, sessile. Raceme 4–10-flowered; fruiting pedicel divaricate-ascending, 3–10(–15) mm. Sepals oblong to oblong-linear, 4.5–6.5(–8) × 1.5–2 mm, glabrous or pilose; petals pale blue to purple, obovate, (1–)1.2–1.5(–1.7) cm × 4–5 mm; claw 6–9 mm; filaments of median staminal pairs 3–4 mm, those of lateral pair 2–2.5 mm; anthers 1–1.5 mm; ovules 5–10 per locule. Fruit elliptic, oblong, to broadly ovate, (1–)1.5–3 × (0.8–)1–1.7 cm; valves glabrous or short pilose, prominently reticulate veined; septum complete; style 0.5–3 mm; stigma entire to slightly lobed. Seeds biseriate, broadly ovate to suborbicular, papillate, 2.5–3.5 × 1.7–2.2 mm.

Flowering: Jun–Jul.

Habitat: rocky ravines, cliff ledges, beneath boulders, stony hillsides.

Elevation: 4200–5800 m.

Distribution: Bhutan, China (Xizang), India (Sikkim).

19. *Solms-laubachia prolifera* (Maximowicz) J. P. Yue, Al-Shehbaz & H. Sun, Ann. Missouri Bot. Gard. 95: 536. 2008; *Parrya prolifera* Maximowicz, Fl. Tangutica 56. 1889; *Ermania prolifera* (Maximowicz) O. E. Schulz, Bot. Jahrb. Syst. 66: 98. 1933; *Christolea prolifera* (Maximowicz) Ovczinnikov, Sovetsk. Bot. 1941(1 & 2): 151. 1941; *C. prolifera* (Maximowicz) Jafri, Notes Roy. Bot. Gard. Edinburgh 22: 53. 1955. *Desideria prolifera* (Maximowicz) Al-Shehbaz, Ann. Missouri Bot. Gard. 87: 559. 2001. TYPE: China, Tibet, Kon-chun-ua, 14,500 ft., 3 Jul 1884, *N. M. Przewalski s.n.* (holotype, LE!; isotypes, K!, P!, PE!).

Herbs perennial, scapose, villous to pilose. Trichomes simple, straight, to 1.5 mm. Stems absent. Basal leaves subfleshy; petiole (0.2–)0.8–2(–3) cm, persistent, sparsely to densely pilose or villous, ciliate, somewhat papery at base; leaf blade broadly ovate, suborbicular, obovate, to spatulate, 2–10(–15) × 2–9(–12) mm, villous or pilose, base obtuse to cuneate, margin (3–)5–9-toothed, rarely subentire, apex subacute; cauline leaves absent. Flowers solitary from basal rosette; fruiting pedicels ascending-divaricate, straight, (0.2–)0.5–1.5(–2.5) cm,

villous. Sepals free, oblong, 6–7 × 2–2.5 mm, usually persistent, pilose, base not saccate, margin membranous; petals purplish green, broadly obovate, 1.1–1.4 cm × 4–5 mm, apex subemarginate; claw 6–7 mm; filaments white, dilated at base, toothless, median pairs 4–6 mm, lateral pair 3–4 mm; anthers 1.2–1.6 mm. Fruit linear to linear-lanceolate, (2.5)4–6.5(–7.2) cm × (3–)4–5 mm, flattened, sessile, straight; replum and valves pilose to villous; septum complete; style obsolete; stigma capitate, 2-lobed. Seeds oblong, 2.5–3.5 × 1.4–1.7.

Flowering: Jul–Aug.

Habitat: scree slopes, siliceous shist.

Elevation: 4700–5900 m.

Distribution: China (Qinghai, Xizang).

20. *Solms-laubachia pulcherrima* Muschl., Notes Roy. Bot. Gard. Edinburgh 5: 206. 1912.

TYPE: China, NW Yunnan, E flank of Lichiang Range, 27°20' N, 12,000 ft [3,658 m], May 1906, *G. Forrest 2164* (holotype, B!; isotypes, BM!, E!, P!).

Pegaeophyton sinense (Hemsl.) Hayek & Hand.-Mazz. var. *stenophyllum* O. E. Schulz, Notizbl. Bot. Gart. Berlin-Dahlem 9: 477. 1926. TYPE: China, Yunnan, Yangtze watershed, Prefect. Distr. of Likiang, E slope of Likiang snow range, 5,300 m, 11 Aug. 1922, *J. F.C. Rock 5719* (holotype, B!; isotypes, E!, GH!, P!, US!).

Parrya ciliaris Bureau & Franchet, J. Bot. (Morot) 5: 20. 1891; *Solms-laubachia ciliaris* (Bureau & Franchet) Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 169. 1955. TYPE: China, Tibet, route de Batang, 12 May 1890, *M. Bonvalot & H. d'Orléans* s.n. (holotype, P!).

Herbs 3–9 cm tall, glabrous to sparsely pubescent with crisped trichomes rarely to 1 mm; caudex covered with petioles of previous years. Petioles of basal leaves 0.7–2 cm, thickened, persistent, not ciliate; leaf blade lanceolate to oblanceolate or linear, (0.5–)1.5–5.5(–7.5) cm × (1.5–)3–5(–7) mm, glabrous to sparsely pubescent with crisped trichomes, ciliate, base attenuate, margin entire, apex acute to obtuse; cauline leaves absent. Flowers solitary; fruiting pedicel erect to ascending, 1.5–4.5(–5.5) cm. Sepals oblong to oblong-linear, 5–8(–10) × 1.5–2 mm, pubescent; petals pink, to light or turquoise blue, obovate to broadly so, (1.5–)1.7–2(–2.5) cm × (5–)6.5–8(–10) mm; claw (0.7–)1–1.5 mm; filaments of median staminal pairs 4–5.5 mm, those of lateral pair 2.5–3.5 mm; anthers 1.4–1.6 mm; ovules 8–10 per locule. Fruit lanceolate, 2.5–3.5(–4.5) cm × 7–11 mm; valves glabrous or sparsely pilose along margin, reticulate veined; septum complete; style obsolete; stigma entire to slightly lobed. Seeds biseriolate, broadly ovate to orbicular, reticulate, 2.5–3.5 × 2–2.5 mm.

Flowering: May–Jul.

Habitat: scree, boulders, stony outcrop, limestone gravel or rock, crevices of limestone cliffs, stony moist meadows.

Elevation: 3300–5200 m.

Distribution: China (Sichuan, Xizang, Yunnan).

21. *Solms-laubachia pumila* (Kurz) F. Dvořák, Folia Fac. Sci. Nat. Univ. Purkyniane Brun. Biol. 13(4): 24. 1972; *Parrya pumila* Kurz, Flora 55: 285. 1872. *Christolea pumila* (Kurz) Jafri, Fl. West Pakistan 55: 157. 1973; *Vvedenskeyella pumila* (Kurz) Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 17: 176. 1955; *Desideria pumila* (Kurz) Al-

Shehbaz, Ann. Missouri Bot. Gard. 87: 560. 2001. TYPE: Kashmir, Rupschu, 15,000–18,000 ft [4,572–5,486 m], *F. Stoliczka* s.n. (holotype, CAL; isotype, K!).

Ermania koelzii O. E. Schulz, Repert. Sp. Nov. Regni Veg. 31: 332. 1933. TYPE: Kashmir. Rupschu, Kyensa La, 19,000 ft [5,791 m], 9 Jul 1931, W. Koelz 2231 (holotype, B!).

Ermania bifaria Botschantzev, Bot. Zhurn. (Moscow & Leningrad) 41: 730. 1956; *Oreoblastus bifarius* (Botschantzev) Suslova, Bot. Zhurn. (Moscow & Leningrad) 57: 652. 1972. TYPE: China, Xinjiang, Kuen-Lun, Humboldt Range, Ulan-Bulak, 4,200 m, 30 Jun 1894, W. Roborowski s.n. (holotype, LE!).

Herbs perennial, scapose, pilose to tomentose. Trichomes simple, straight, to 0.5 mm, mixed on leaves with short-stalked forked ones. Stems absent. Basal leaves fleshy; petiole 2–10 mm, persistent, densely pilose with simple trichomes, ciliate, expanded and papery at base; leaf blade broadly ovate, suborbicular, obovate, to spatulate, 2–14 × 1–11 mm, densely tomentose or pilose, base obtuse, margin 3–7-toothed to repand, apex obtuse; cauline leaves absent. Flowers solitary from basal rosette; fruiting pedicels ascending-divaricate, straight, 3–10 mm, pilose. Sepals free, oblong, 3–4 × 1.5–2 mm, caducous, pilose, base not saccate, margin membranous; petals creamy white to purplish green, broadly obovate, 6–8 × 3–4.5 mm, apex subemarginate; claw 3–4 mm; filaments white, dilated at base, toothless, median pairs 3–4 mm, lateral pair 2–2.5 mm; anthers narrowly oblong, 0.9–1.2 mm; ovules ca. 7 per locule. Immature fruit linear to linear-lanceolate, 1–2 cm × 2–3 mm, flattened, sessile, straight, retrorsely pilose along replum; valves glabrous; septum complete; style obsolete; stigma capitate, 2-lobed. Seeds not seen.

Flowering: Jun–Jul.

Habitat: limestone, mica schist,

Elevation: 4200–5700 m.

Distribution: China (Xinjiang, Xizang), Kashmir.

22. *Solms-laubachia retropilosa* Botschantzev, Bot. Mater. Gerb. Bot. Inst. Komarova Akad.

Nauk S.S.S.R. 17: 171. 1955. TYPE: China, Tibet (as Sikkan), between Toutan & Lamaja, Alabosan (Ngarolak), 27 May 1893, V. Kaschkarov s.n. (holotype, LE!; isotype, PE!).

Solms-laubachia floribunda Y. Z. Lan & T. Y. Cheo, Acta Phytotax. Sin. 19: 475. 1981. TYPE: China, Xizang, Zogang, 5,100 m, 3 Jul 1976, *Qinghai-Xizang Expedition 12173* (holotype, PE [as HC]!; isotypes, HNWP!, KUN!, NAS!).

Herbs perennial, scapose, 3–10 cm tall, densely lanate with trichomes to 1.5 mm; caudex covered with petioles of previous years. Petioles of basal leaves (0.3–)1–3(–4) cm, retrorsely lanate, papery, persistent, often ciliate at least basally; leaf blade linear-lanceolate to linear-oblongate, rarely oblanceolate, (0.6–)1.2–4.5(–6) cm × 1.5–5(–7) mm, retrorsely lanate, base attenuate, margin entire, apex acute to obtuse; cauline leaves absent. Flowers solitary; fruiting pedicel erect to ascending, (1.5–)2.5–5(–7) cm. Sepals oblong to oblong-linear, 5–8 × 1.5–2.5 mm, lanate; petals purplish, broadly obovate, (1–)1.2–1.8 cm × (5–)6–7(–9) mm; claw 5–9 mm; filaments of median staminal pairs 3.5–5 mm, those of lateral pair 2–3 mm; anthers 1.2–1.5 mm; ovules 5–10 per locule. Fruit lanceolate, oblong, to broadly ovate, (1–)2–5.2(–6) × (0.6–)0.9–1.5(–2) cm; valves glabrous to lanate, obscurely reticulate veined; septum complete; style obsolete; stigma entire to slightly lobed. Seeds biseriolate, broadly ovate to suborbicular, rugose, 3–4.5(–5) × (2–)2.5–3 mm.

Flowering: May–Jul.

Habitat: scree, open scrub.

Elevation: 4200–5100 m.

Distribution: China (Sichuan, Xizang, Yunnan).

23. *Solms-laubachia stewartii* (T. Anderson) J. P. Yue, Al-Shehbaz & H. Sun, *Ann. Missouri Bot. Gard.* 95: 536. 2008; *Cheiranthus stewartii* T. Anderson in J. D. Hooker, *Fl. Brit. India* 1: 132. 1872; *Ermania stewartii* (T. Anderson) O. E. Schulz, *Bot. Jahrb. Syst.* 66: 98. 1933; *Christolea stewartii* (T. Anderson) Jafri, *Notes Roy. Bot. Gard. Edinburgh* 22: 53. 1955; *Oreoblastus stewartii* (T. Anderson) Suslova, *Bot. Zhurn. (Moscow & Leningrad)* 57: 653. 1972; *Desideria stewartii* (T. Anderson) Al-Shehbaz, *Ann. Missouri Bot. Gard.* 87: 556. 2001. TYPE: Kashmir, Ladak, 15,000–16,500 ft [4,572–5,029 m], *J. L. Stewart s.n.* (holotype, K!; isotype, E!).

Herbs perennial, 8–20 cm tall, densely pilose. Trichomes stalked, forked, rarely some simple near the stem base. Stems simple, pilose or glabrous. Basal leaves subfleshy, pilose, persistent; petiole 2–10 mm, not ciliate; leaf blade broadly obovate to spatulate, 2–15 × 2–10 mm, base cuneate to attenuate, margin 3–5-toothed or entire, apex acute; cauline leaves similar to basal or linear to lanceolate, often entire. Racemes 8–15-flowered, bracteate throughout; bracts similar to stem leaves but smaller, often adnate to pedicel; fruiting pedicels ascending, straight or slightly curved, 4–12 mm, pilose with forked trichomes. Sepals free, caducous; petals not seen; ovules 7–12 per locule. Fruit lanceolate to lanceolate-linear, 1.7–3.5 cm × 3–5 mm, strongly flattened; valves pilose or glabrous, distinctly veined; septum complete, membranous; style obsolete; stigma 2-lobed. Seeds brown, ovate, 1.4–2.2 × 0.8–1.1 mm, biseriate, minutely reticulate.

Habitat: scree slope.

Elevation: 4100–5300.

Distribution: China (Xizang), India (Himachal Pradesh, Punjab), Kashmir.

24. *Solms-laubachia sunhangiana* J. P. Yue & Al-Shehbaz, *Ann. Missouri Bot. Gard.* 95: 536. 2008. TYPE: China, Sichuan, Jiulong Xian, Tanggu Xiang, NW of city of Jiulong, Wuxu Hai (Wuxu Lake), 29°9′11″N, 101°24′25″E, *Abies*, *Picea*, *Quercus* forest with *Rhododendron* understory & open grazed dry and boggy meadows, crevices of rocks, 4,175 m, 22 Jun 2005, *D. E. Boufford, J. H. Chen, S. L. Kelley, J. Li, R. H. Ree, H. Sun, J. P. Yue & Y. H. Zhang* 33464 (holotype, KUN!; isotypes, A!, MO!).

Herbs perennial, pulvinate, 1–3 cm tall; caudex covered with petioles and intact leaves of previous years. Basal leaves rosulate; blade linear to linear-oblong, 0.8–2.5 cm × 1–2.5 mm, grooved proximally, sparsely pubescent, not ciliate, base attenuate, margin entire; petioles 3.5–5.5 mm, thickened; cauline leaves absent. Fruiting pedicels solitary from basal rosette, 0.8–1.2 cm. Sepals free, oblong, 2–3 × 1–1.2 mm, sparsely pilose; petals ca. 6 mm; anthers ca. 1 mm; ovules 8 to 12 per ovary. Fruit linear-lanceolate to linear, 1.6–2.5 cm × 2.8–3.2 mm; valves pubescent, obscurely reticulate veined; septum complete; style 0.6–1.0 mm; stigma strongly 2-lobed. Seeds ovate-oblong, reticulate, ca. 2.5 × 1.5 mm.

Flowering: Jun.

Habitat: forests understory, open boggy meadows, rock crevices.

Elevation: ca. 4200 m.

Distribution: China (Sichuan).

25. *Solms-laubachia xerophyta* (W. W. Smith) Comber, Notes Roy. Bot. Gard. Edinburgh 18: 249. 1934. *Parrya xerophyta* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 217. 1920. TYPE: China, Yunnan, NE of Chungtien, 27°55'N, Jul 1918, *G. Forrest 16444* (holotype, E!; isotypes, E!, K!, P!, W!).

Herbs 3–10 cm tall, subglabrous to pilose with trichomes (1–)2–3 mm; caudex covered with petioles of previous years. Petioles of basal leaves 0.7–2(–2.5) cm, thickened, persistent, ciliate pilose; leaf blade filiform to narrowly linear, (1.5–)2–5.5(–7.5) cm × 0.3–1(–1.5) mm, long ciliate to glabrous, often grooved adaxially, base attenuate, margin entire, apex subacute; cauline leaves absent. Flowers solitary. Fruiting pedicel erect to ascending, (1–)1.5–3.5(–4.5) cm. Sepals oblong to oblong-linear, 6–8 × 1.5–2.5 mm, united or free; petals pink to blue, obovate, (1.5–)1.7–2.2 cm × 5–8 mm; claw 7–12 mm; filaments of median staminal pairs 3.5–5 mm, those of lateral pair 2–3 mm; anthers 1.5–1.8 mm; ovules 6–10 per locule. Fruit lanceolate to linear-lanceolate, (1.5–)2–5.5(–7) cm × 5–8 mm; valves glabrous to pilose, obscurely veined; septum complete; style obsolete; stigma entire to slightly lobed. Seeds biseriate, broadly ovate to suborbicular, minutely reticulate, 2–4 × 2–3 mm. Flowering: Jun–Aug.

Habitat: among rocks, cliff ledges, stony meadows, scree.

Elevation: 3700–5200 m.

Distribution: China (Sichuan, Yunnan).

26. *Solms-laubachia zhongdianensis* J. P. Yue, Al-Shehbaz & H. Sun, Acta Bot. Fennici 42: 156. 2005. TYPE: China, Yunnan, Shangri-la Co., Mt. Shika, scree, sandy areas, 27°47'N, 99°35'E, ca. 4,450 m, 27 Sep 2001, *J. P. Yue 154* (holotype, KUN!; isotype, MO!).

Herbs perennial, scapose, 1.4–4 cm tall, densely pilose; caudex covered with petioles of previous years. Trichomes simple, 0.9–3.5 mm. Petioles of basal leaves 0.8–7.5(–9) cm, papery, persistent, ciliate pilose, with a distinct midvein and membranous margin; leaf blade filiform to narrowly linear, (3.5–)4.2–21(–22) × 0.7–2(–3) mm, long ciliate, often grooved adaxially, base attenuate, margin entire, apex subacute; cauline leaves absent. Flowers solitary; fruiting pedicel erect to ascending, 1–7(–10) mm. Sepals oblong to oblong-linear, 4.5–7.3 × 1–1.8 mm, free, densely pilose; petals pink to purple, obovate, 1.3–2 cm × 3.5–5.5 mm; claw 6–8.5 mm; filaments of median staminal pairs 5.5–6 mm, those of lateral pair 4–4.5 mm; anthers 1.5–2 mm; ovules 4–12 per locule. Fruit lanceolate, (2.5–)3.3–5.5(–8) cm × 5–8 mm; valves densely subhirsute, obscurely veined; septum complete or perforated; style 2.8–3.4; stigma slightly lobed. Seeds uniseriate to biseriate, suborbicular, minutely reticulate, 2.4–4.3 mm in diam.

Flowering: May–Jul.

Habitat: scree slopes, sandy areas.

Elevation: 3200–4500 m.

Distribution: China (Yunnan).