

7. ASPERULA Linnaeus, Sp. Pl. 1: 103. 1753, nom. cons.

车叶草属 che ye cao shu

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Asperula sect. *Chlorostemma* Lange; *Chlorostemma* (Lange) Fourreau.

Subshrubs, perennial, or annual herbs. Raphides present. Leaves opposite, usually with leaflike stipules in whorls of 4–14, sessile to shortly petiolate, without domatia; leaflike stipules rarely reduced. Inflorescences thyrsoid, paniculiform to capitate, with terminal and often also axillary pedunculate to sessile cymes, bracteate with bracts often fused and sometimes involucrel. Flowers pedicellate to sessile, with prophylls, bisexual, monomorphic. Calyx limb reduced, practically absent. Corolla blue, pink, purple, or yellow to greenish or white, salverform, funnellform, campanulate, or sometimes rotate, glabrous inside; lobes 4 or 5, valvate in bud. Stamens 4 or 5, inserted in corolla tube, exerted (or sometimes included); filaments developed to short; anthers dorsifixed. Ovary inferior (hypanthium), 2-celled, ovules 1 in each cell, erect and axile; stigma globose to clavate, often 2-lobed, included or exerted. Fruit schizocarpous, generally didymous, dry; mericarps 2, indehiscent, with 1 seed, subglobose, ellipsoid-oblong, or reniform, smooth to tuberculate, glabrous to pubescent (but never with uncinat hairs); seeds small, with membranous testa; endosperm corneous; embryo curved; cotyledons leaflike; radicle terete, hypogynous.

About 200 species: widespread throughout N Africa, C and SW Asia, and Europe, extending into Australia and New Zealand, greatest species diversity in the dry regions of SW Asia and the E Mediterranean; two species (one introduced) in China.

The circumscription and relationships of *Asperula* were discussed most recently by Ehrendorfer et al. (Fl. Iranica 176: 105–161. 2005). Short references to the position of the genus within the Rubieae-Rubiinae are found in the introduction to the genus *Galium* of the present volume and its Chinese species are keyed out there.

Originally, the Linnaean genera *Asperula* and *Galium* were separated from each other on the basis of their salverform to campanulate vs. rotate corollas only. Sixty years of critical morphological and later DNA-analytical studies (see Natali et al., Opera Bot. Belg. 7: 193–203. 1996; Soza & Olmstead, Taxon 59: 755–771. 2010) have shown that this differentiation often does not reflect true phylogenetic relationships. In some obvious cases (e.g., *A. odorata* Linnaeus to *G. odoratum* (Linnaeus) Scopoli in *G. sect. Hylaea* (Grisebach) Ehrendorfer or *G. purpureum* Linnaeus to *A. purpurea* (Linnaeus) Ehrendorfer in *A. sect. Thlipthisa* Grisebach), the problem could be solved by a simple nomenclatorial transfer, but in several other cases the problems persist. Even after an effort to redefine the two genera with the help of the presence of prophylls (bracteoles) at the pedicels in *Asperula* vs. their absence in *Galium* (Ehrendorfer et al., Fl. Europaea 4: 3–38. 1976) the two genera are still phylogenetically interdigitated and heterogeneous. Thus, one is still left with a partly provisional classification of *Asperula* as proposed by Ehrendorfer et al. (loc. cit. 2005). Here, we follow FRPS (71(2): 213. 1999) and do not combine the genus *Leptunis* with *Asperula* (as in loc. cit. 2005).

As in *Galium*, the sectional classification of *Asperula* by Ehrendorfer et al. (loc. cit. 2005) does not fully agree with that of Pobedimova et al. (Fl. URSS 23: 205–285. 1958), which was followed by FRPS. In particular, Ehrendorfer et al. (loc. cit. 2005: 131–142, 157–158) placed *A. oppositifolia* in *A. sect. Oppositifoliae* Schishkin ex Schönbeck-Temesy and *A. orientalis* in *A. sect. Asperula* (*A. sect. Sherardiana* Candolle). The two species are keyed out below but are also included in the key to all taxa of Chinese Rubieae found in the present volume under *Galium*.

- 1a. Perennials, with stems originating from a woody rootstock; leaves at all nodes opposite, 3–6(–15) × 0.5–1.5(–3) mm, glabrous, stipules reduced; flowers pink to purple 1. *A. oppositifolia*
- 1b. Herbaceous annuals, with stems from fibrous roots; leaves and leaflike stipules at upper nodes in whorls of 4–8, 1.2–2.5 × 0.2–0.5 cm, glabrous to sparsely hispidulous on lamina and densely antrorsely aculeolate on veins and margins; flowers pale to clear purplish blue 2. *A. orientalis*

1. *Asperula oppositifolia* Regel & Schmalhausen in Regel, Descr. Pl. Nov. Rar. 42. 1882.

对叶车叶草 duì yè chē yè cǎo

Subshrubs, perennial, originating from a woody rootstock. Stems often ± woody at base, up to 40 cm tall, erect, weakly 4-angled, glabrous to puberulent. Leaves opposite, subsessile; blade drying stiffly papery, linear to linear-lanceolate, 3–6(–15) × 0.5–1.5(–3) mm, glabrous throughout or ± hairy, base and apex acute; secondary veins not evident; stipules 2–4 per leaf pair, reduced and never more than 0.3 mm. Inflorescences terminal and axillary, dichasial, branched to 1–4 orders, glabrous to puberulent; peduncles 1–10(–30) mm; bracts linear to narrowly elliptic (i.e., leaflike), 1–4 mm; pedicels 0–3 mm. Corolla pink to purple, funnellform, glabrous to sparsely pilose outside;

tube ca. 2 mm; lobes 4, ovate-oblong, ca. 1.5 mm. Ovary subglobose to narrowly ellipsoid, 0.5–1 mm, glabrous to densely pilosulous. Mericarps ovoid, 1.5–2.5 mm, glabrous to densely pilosulous. Fl. Jun–Jul, fr. Jul–Aug.

Gravel on mountain slopes; ca. 3700 m. Xizang (Zanda) [Afghanistan, Pakistan, Tajikistan].

Asperula oppositifolia is a polymorphic species with several subspecies and belongs to the very variable *A. sect. Oppositifoliae* (Ehrendorfer et al., Fl. Iranica 176: 131–142. 2005). As we have not seen material from China, the data presented here are mostly taken from FRPS (71(2): 214. 1999) and do not allow an exact determination. Outside of China, populations of *A. oppositifolia* are found at elevations down to 1350 m. Their leaves are narrow and short relative to the internodes and sometimes deciduous. Thus, the plants appear to consist only of photosynthetic stems with small terminal groups of flowers.

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2. *Asperula orientalis* Boissier & Hohenacker in Boissier, *Diagn. Pl. Orient.*, ser. 1, 3: 30. 1843.
蓝花车叶草 lan hua che ye cao

Asperula arvensis Linnaeus subsp. *orientalis* (Boissier & Hohenacker) Thiébaud; *A. azurea* Jaubert & Spach.

Herbs, annual, from fibrous roots. Stems few or solitary, to 30(–40) cm tall, 4-angled, erect, often regularly divaricately branched, glabrous to scaberulous or hispidulous. Leaves and leaflike stipules at middle stem regions in whorls of 4–8, subsessile; blade drying papery, lanceolate, linear-lanceolate, or spatulate, (7–)12–25(–30) × (1.5–)2–5(–10) mm, glabrous to sparsely hispidulous on lamina and densely scaberulous to antrorsely aculeolate on veins and margins, base acute, apex obtuse to rounded; secondary veins not evident. Inflorescences terminal, capitate to subcapitate; peduncles 1.5–4 cm; involucre bracts leaflike, 1–12 mm, white ciliate at margins. Flowers sessile. Corolla pale to clear purplish blue, salverform, outside densely papillose; tube 8–10 mm, dilated in throat around anthers; lobes 4, elliptic to ovate, 2–3 mm, obtuse. Ovary ovoid, ca. 1 mm, glabrescent. Mericarps 1–1.8 mm, glabrous. Fl. Jun–Jul, fr. Aug–Sep.

Cultivated ornamental in Anhui, Jiangsu (Nanjing), and Shaanxi (Xi'an) [native to SW Asia (Georgia, Iraq, Lebanon, Syria, Turkey)].

Asperula orientalis is a butterfly-pollinated SW Asiatic member of *A. sect. Asperula*. Pobedimova et al. (*Fl. URSS* 23: 283. 1958) erroneously gave the name *A. azurea* priority over *A. orientalis*. The other closely related taxa of *A. sect. Asperula* are the smaller-flowered and widespread *A. arvensis* Linnaeus (the conserved type of the genus) and *A. setosa* Jaubert & Spach. The latter has very small flowers, is obviously autogamous, and grows at higher elevations (1200–3200 m) from SW Asia to the Tian Shan and Pamir-Alai. It could be found in the mountains of W China.

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