

15. Tribe EUPATORIEAE

泽兰族 ze lan zu

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Herbs (rarely aquatic or semiaquatic), subshrubs, shrubs, climbers, small trees, sometimes epiphytic. Leaves usually opposite, rarely strictly alternate, sometimes rosulate or verticillate, sessile or petiolate, blade usually simple. Synflorescence usually a corymbose panicle, sometimes spicate. Capitula sessile or distinctly pedunculate, homogamous, discoid, rarely with some zygomorphic outer florets; involucre cylindrical, campanulate, or hemispheric, rarely subtended by a subinvolucral bract; phyllaries in 1 to several series, few or numerous, imbricate, subimbricate, or distant, equal, subequal, or markedly graded, persistent or variously deciduous, lanceolate or ovate; receptacle flat to convex, sometimes highly conical, usually naked, glabrous or sometimes pubescent. Florets few, very rarely 1, often 4 or 5 to many, commonly fragrant; corollas funnelform to tubular, never truly yellow; lobes relatively short, commonly 5, very rarely 4; anther cylinders usually included within corolla tube; anther appendages obtuse or acute, rarely emarginate or lobed, as long as broad or shorter, sometimes absent, basal appendages short or almost absent, obtuse or rounded; antheropodia indistinct, cylindrical or variously pronounced; nectary rarely visible; style base glabrous or pubescent, sometimes with a swollen node; styles usually very conspicuous and much exerted, glabrous or rarely pubescent; style branches linear to clavate, obtuse, stigmatic surfaces variously papillate. Achenes obovoid or oblong with phytomelanin in achene walls, usually 3–5 (or 10)-ribbed, body rarely flattened with 2 ribs or 5 winged ribs, sometimes glandular, glabrous or variously setuliferous; carpodium often paler than achene body, rarely indistinct or absent, of several layers of variously enlarged, sometimes ornamented cells, usually symmetrical, rarely eccentric, annular, cylindrical, or stopper-shaped; pappus sometimes absent and reduced to an apical callus, rarely a lacinate crown, or vestigial, occasionally coroniform, usually of setae, commonly uniseriate, rarely biseriate or very rarely multi-seriate, usually persistent, sometimes fragile, usually numerous, sometimes few, usually equal or subequal, rarely very short, or occasionally of flattened scales or awnlike scales, rarely of two distinct elements, very rarely of broad lacinate setae, or of few clavate apical appendages; setae commonly barbellate or lacinate, rarely plumose, apices acute or obtuse, usually gradually tapering, sometimes dilated, very rarely conspicuously narrowing.

About 180 genera and ca. 2,000 species: concentrated in Mexico and Central and South America, with relatively few native species in the Old World; several pantropical weeds widespread in the Old World; ten genera (seven introduced) and 25 species (six endemic, nine introduced) in China.

The tribe appears to be nearly restricted to the W Hemisphere, suggesting a Neotropical origin. The subtribes show a mixed distribution pattern, with explosive speciation in several, especially those occurring in Brazil, the Caribbean, Colombia, and Mexico. There are many pantropical and pansubtropical weeds in the tribe. Uses of members of the tribe have been briefly summarized by King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987). More recent references on the topic include S. Garg and T. C. S. Sastry (in P. D. S. Caligari & D. J. N. Hind, *Compositae Biol. Utiliz.* 2: 361–382. 1996; *Ageratum conyzoides*, *Mikania micrantha*), Y. P. Huang and Y. R. Ling (in P. D. S. Caligari & D. J. N. Hind, loc. cit.: 431–451; *Ageratum houstonianum*, *Adenostemma*), M. Heinrich (in P. D. S. Caligari & D. J. N. Hind, loc. cit.: 475–503; 31 Mexican species), and J. Vallès et al. (in P. D. S. Caligari & D. J. N. Hind, loc. cit.: 453–466; *Eupatorium cannabinum*). *Stevia rebaudiana* (Bertoni) Hemsley, a native of Paraguay, is cultivated in China as the source of a strong sweetener and sugar substitute.

See also Hind and Robinson (in Kadereit & C. Jeffrey, *Fam. Gen. Vasc. Pl.* 8: 510–574. 2007).

- 1a. Phyllaries and florets 4 per capitulum (subtribe Mikaniinae) 237. *Mikania*
- 1b. Phyllaries and florets not of equal number, or if florets 4 then phyllaries more numerous.
 - 2a. Phyllaries distant, with non-articulate bases (subtribe Adenostemmatinae).
 - 3a. Pappus of 3–5 clavate glandular knobs 238. *Adenostemma*
 - 3b. Pappus absent 239. *Gymnocoronis*
 - 2b. Phyllaries imbricate or subimbricate, sometimes distant, bases always articulate.
 - 4a. Phyllaries all deciduous leaving a naked receptacle, remaining appressed until lost and not spreading with age (subtribe Praxelinae).
 - 5a. Receptacle flat to slightly convex 244. *Chromolaena*
 - 5b. Receptacle conical 243. *Praxelis*
 - 4b. At least some basal phyllaries persistent, phyllaries usually spreading with age.
 - 6a. Pappus of scales or awns, rarely absent; receptacle paleaceous 240. *Ageratum*
 - 6b. Pappus of capillary setae; receptacle epaleate.
 - 7a. Style base pubescent (subtribe Eupatoriinae).
 - 8a. Carpodium scarcely differentiated; phyllaries green, sometimes with purplish apex, not evidently ribbed 241. *Eupatorium*
 - 8b. Carpodium prominent; phyllaries straw-colored, weakly ribbed 242. *Austroeupatorium*
 - 7b. Style base glabrous.
 - 9a. Receptacle conical; corollas usually blue; florets 50–70; carpodium obsolete 245. *Conoclinium*
 - 9b. Receptacle slightly convex; corollas white; florets 10–60; carpodium distinct 236. *Ageratina*

236. AGERATINA Spach, Hist. Nat. Vég. 10: 286. 1841.紫茎泽兰属 *zi jing ze lan shu*

Shrubs or perennial herbs, usually erect. Leaves usually opposite; blade narrowly elliptic to deltate, mostly toothed, lobed, serrate, or crenate. Capitula laxly to densely corymbose. Phyllaries ca. 30, 2- or 3-seriate, distant to weakly subimbricate, mostly subequal; receptacle usually slightly convex, glabrous or with minute scattered hairs. Florets 10–60, often sweetly scented; corollas white or lavender, usually with slender basal tube and campanulate limb (in *A. subg. Ageratina* and *A. subg. Klattiella*), others narrowly funnelliform; lobes distinctly longer than wide, outer surface smooth, glabrous or glandular, usually with hairs (in *A. subg. Ageratina*), inner surface densely papillose; antheropodium cylindric, usually elongate; anther appendage large, ovate-oblong, longer than wide; style base usually enlarged [except in *A. subg. Apoda*]; style branches rarely slightly broadened distally, densely papillose with projecting cells on lateral and outer surfaces. Achenes prismatic or fusiform, usually 5-ribbed, setuliferous or glandular or both; carpodium distinct (cylindric in *A. subg. Ageratina*) [in others rounded or broadly stopper-shaped]; pappus setae uniseriate, 5–40, barbellate, often easily deciduous, capillary, often enlarged distally, often with outer series of shorter setulae. $x = 17$.

About 265 species: tropics and subtropics of the New World; one species (introduced) in China.

King and Robinson (Phytologia 19: 208–229. 1970) first provided an infrageneric division recognizing four subgenera, later raising *Ageratina* subg. *Pachythammus* R. M. King & H. Robinson to generic status. Subsequently (King & Robinson, Phytologia 38: 323–355. 1978), they recognized two further subgenera. A complete list of species in the five subgenera was provided by King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987).

See B. L. Turner's The Comps of Mexico, Vol. 1 (Phytologia Mem. 11: i–iv, 1–272. 1997).

1. *Ageratina adenophora* (Sprengel) R. M. King & H. Robinson, Phytologia 19: 211. 1970.

破坏草 *po huai cao*

Eupatorium adenophorum Sprengel, Syst. Veg., ed. 16, 3: 420. 1826, based on *E. glandulosum* Kunth in Humboldt et al., Nov. Gen. Sp. 4, ed. f°: 96. 1818, not Michaux (1803).

Shrubs or perennial herbs, 30–90(–200) cm tall. Stems erect; branches opposite, obliquely ascending, white or ferruginous puberulent, upper part and peduncles more densely so, glabrescent or glabrous in lower part by anthesis. Leaves opposite, long petiolate; blade abaxially pale, adaxially green, ovate, triangular-ovate, or rhombic-ovate, 3.5–7.5 × 1.5–3 cm, thin, both surfaces sparsely puberulent, more densely so abaxially and on veins, basally 3-veined, base truncate or slightly cordate, margin coarsely crenate, apex acute. Synflorescences terminal,

corymbose or compound-corymbose, to 12 cm in diam. Capitula numerous, 2–4 cm, 40–50-flowered; involucre broadly campanulate, ca. 3 × 4 mm; phyllaries 2-seriate, linear or linear-lanceolate, 3.5–5 mm, apex acute or acuminate; receptacle convex to conical; corollas purplish, tubular, ca. 3.5 mm. Achenes black-brown, narrowly elliptic, 1–1.5 mm, 5-angled, without hairs and glands; pappus setae 10, basally connate, white, fine, equal to corolla. Fl. and fr. Apr–Oct. $2n = 51$.

Wet places or roadsides on slopes, forest margins; 900–2200 m. Introduced and naturalized in Guangxi, Guizhou, Nanhai Zhudao, and Yunnan [native to Mexico; pantropical and pansubtropical invasive weed in Cambodia, India, Laos, Myanmar, Nepal, Indonesia, Philippines, Thailand, Vietnam; S Africa, America, Atlantic islands (Canary Islands), Australia, Pacific islands].

Ageratina adenophora was introduced into China in the middle of the 19th century. It is poisonous; oxen and horses have become ill and have sometimes died from consuming it.

237. MIKANIA Willdenow, Sp. Pl. 3: 1481, 1742. 1803, nom. cons.假泽兰属 *jia ze lan shu*

Carelia Jussieu ex Cavanilles (1803), not Fabricius (1759), nor Lessing (1832); *Corynanthelium* Kunze; *Kanimia* Gardner; *Willoughbya* Necker ex Kuntze.

Plants usually woody vines, sometimes erect perennial herbs or shrubs, moderately branched, never rosulate. Leaves opposite or whorled, sessile to long petiolate; blade linear to broadly ovate, membranous to leathery, base narrow to cordate. Synflorescence terminal on stems or lateral branches, cymose to corymbose or thyrsoid; capitula clustered, sessile to pedunculate, with subinvolucral bract; phyllaries distant, 4, subequal, persistent; receptacle flat, epaleate. Florets 4; corollas white or pink, funnelliform or with variously campanulate limb, with or without distinct basal tube, glabrous to pilosulose or glandular on outer surface, with or without papillae on inside of throat or lobes; lobes broadly triangular to narrowly oblong; antheropodium broad; anther cylinder exerted from corolla throat; anther appendages as long as or longer than wide; style base thick, without distinct basal node, glabrous or sometimes papillose; style branches narrowly linear, not broadened at apex, scarcely to strongly papillose. Achenes prismatic, 4–10-ribbed; carpodium broadly cylindric; pappus setae numerous, persistent, capillary-like, apical cells obtuse to acute.

About 430 species: pantropical, mainly in Brazil; two species (one introduced) in China.

See Holmes's Revision of Old World *Mikania* (Compositae) (Bot. Jahrb. Syst. 103: 211–246. 1982).

1a. Leaves, phyllaries, and corollas eglandular; phyllaries 5–7 mm; corollas narrowly campanulate; pappus usually rather reddish 1. *M. cordata*

- 1b. Leaves, phyllaries, and corollas with pale glands; phyllaries ca. 3.5 mm; corollas broadly campanulate; pappus off-white, never reddish 2. *M. micrantha*

1. *Mikania cordata* (N. L. Burman) B. L. Robinson, Contr. Gray Herb. 104: 65. 1934.

假泽兰 *jia ze lan*

Eupatorium cordatum N. L. Burman, Fl. Indica, 176. 1768;
Mikania volubilis Willdenow.

Herbs, perennial, climbing. Stems slender, many branched, sparsely shortly pubescent or subglabrous. Median leaves: petiole 2.5–6 cm; blade triangular-ovate, 4–10 × 2–7 cm, both surfaces sparsely shortly pubescent, glabrescent or glabrous by anthesis, base cordate, margin entire or repand-crenate; upper leaves gradually smaller, shortly petiolate, triangular or lanceolate, base truncate or cuneate. Capitula numerous in terminal corymb or compound corymb; peduncle slender, pubescent or glabrous, with linear-lanceolate bracteole leaves; phyllaries narrowly elliptic, 5–7 mm, sparsely pubescent and glandular, distinctly 3-veined, apex obtuse or slightly acute; corollas white, 3.5–5 mm, with slender tube and campanulate limb, sparsely puberulent. Achenes narrowly elliptic, ca. 3.5 mm, 4-ribbed, glandular; pappus off-white or rather reddish, 3.5–4 mm. Fl. and fr. Aug–Nov. $2n = 34, 36, 38$.

Thickets, forests; 100–1700 m. Hainan, Taiwan, SE Yunnan [Borneo, Cambodia, Indonesia (Java), Laos, New Guinea, Philippines, Thailand, Vietnam; probably widespread throughout SE Asia].

2. *Mikania micrantha* Kunth in Humboldt et al., Nov. Gen. Sp. 4, ed. f^o: 105. 1818.

微甘菊 *wei gan ju*

Vines, slender, branched. Stems yellowish or brownish, usually terete, slightly striate, glabrate to sparsely puberulent. Leaves opposite; petiole 1–6 cm; blade ovate, 3–13 × ca. 10 cm, both surfaces glabrate with numerous glandular spots, base cordate to deeply so, margin entire to coarsely dentate, apex shortly acuminate. Synflorescence a corymbose panicle, capitula clustered on subcymose branches; phyllaries oblong, ca. 3.5 mm, glabrous to puberulent, apex shortly acuminate; corollas white, 2.5–3 mm, tube narrow, limb broadly campanulate, inside papillate. Achenes 1.5–2 mm, 4-ribbed, with many scattered glands; pappus setae dirty white, ca. 3 mm. Fl. and fr. year-round. $2n = 36, 72$.

Naturalized in China [native to the Caribbean, Central and South America, and Mexico; widely introduced in Asia and the Pacific islands].

238. ADENOSTEMMA J. R. Forster & G. Forster, Char. Gen. Pl. 45. 1775.

下田菊属 *xia tian ju shu*

Lavenia Swartz.

Herbs, perennial. Leaf blade narrowly elliptic to broadly ovate or hastate, crenate to strongly serrate, acute to slightly acuminate. Synflorescence very laxly cymose. Phyllaries 10–30, 2-seriate, ± overlapping, somewhat fused at base, equal to subequal; receptacle covered with discrete oval deeply concave scars. Florets 10–60; corollas usually white, narrowly funnellform or with narrow basal tube and broadly campanulate limb, usually with hairs or glands on outer surface, hairs often moniliform; lobes 5, ca. 1.5 × longer than wide, not papillose; antheropodium usually strongly expanded below; anther appendages distinctly shorter than wide; style shaft with or without long hairs; style branches slightly to strongly clavate, often forming most showy part of head, fleshy, rounded apically, scarcely mammillate below. Achenes slightly curved, usually 3-angled without distinct ribs or 5-angled, often tuberculate; carpodium forming a prominent asymmetrical knob; pappus usually of 3 or 5 terete clavate knobs, knobs with tips and upper outside surface covered with an elongated mass of viscid glands. $x = 10$.

About 26 species: pantropical; one species in China.

1. *Adenostemma lavenia* (Linnaeus) Kuntze, Revis. Gen. Pl. 1: 304. 1891.

下田菊 *xia tian ju*

Herbs, annual, 30–100 cm tall. Stems erect, solitary, rigid, usually divaricately branched in upper part, white puberulent, glabrous in lower part. Leaves remote; basal leaves persistent or withered at anthesis; median leaves large; petiole narrowly winged, 0.5–4 cm; blade elliptic-lanceolate to elliptic or rhombic-elliptic, or broadly ovate to cordate, 4–12 × 2–5 cm, both surfaces sparsely puberulent or glabrescent, usually rather densely hairy on veins, base broadly or narrowly cuneate, margin crenate or incised, serrate, or doubly serrate, apex acute or obtuse; upper and lower leaves smaller, shortly petiolate. Capitula few, rarely many, small, in a lax or dense corymb or panicle; peduncle 0.8–3 cm, gray-white or ferruginous puberulent; involucre hemispheric, 4–5 × 6–8 mm, to 10 mm in diam. at

fruiting; phyllaries 2-seriate, green, subequal, narrowly elliptic, thin, submembranous, outer phyllaries mostly connate, sparsely white villous, apex obtuse; corollas ca. 2.5 cm, viscid-glandular, pubescent. Achenes blackish brown when mature, oblanceolate, ca. 4 × 1 mm, glandular, sometimes densely tuberculate, contracted at base, apex obtuse; pappus elements clavate, ca. 4.1 mm, basally connate into a ring, fulvous viscid-glandular. Fl. and fr. Aug–Oct. $2n = 20$.

Watersides, roadsides, forests and thickets on slopes, forest margins; 400–2300 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Nanhai Zhudao, Shaanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea, Myanmar, Nepal, Philippines, Thailand; probably widespread throughout SE Asia, Australia].

This is an extremely variable and problematic taxon. *Adenostemma lavenia* is regarded by some authorities as distinct from *A. tinctorium* and *A. viscosum*, and to be endemic to Sri Lanka (cf. King & Rob-

inson, Monogr. Syst. Bot. 22: 1–581. 1987), while others consider it to be pantropical.

- 1a. Leaves broadly ovate or cordate, margin incised, serrate, or doubly serrate; achenes densely tuberculate 1b. var. *latifolium*
 1b. Leaves elliptic-lanceolate to elliptic or rhombic-elliptic, margin crenate.
 2a. Leaves elliptic-lanceolate, margin crenate; achenes glandular 1a. var. *lavenia*
 2b. Leaves elliptic-lanceolate, rhombic-elliptic, or elliptic, thick; achenes densely tuberculate 1c. var. *parviflorum*

1a. *Adenostemma lavenia* var. *lavenia*

下田菊(原变种) xia tian ju (yuan bian zhong)

Verbesina lavenia Linnaeus, Sp. Pl. 2: 902. 1753; *Adenostemma tinctorium* (Loureiro) Cassini; *A. viscosum* J. R. Forster & G. Forster; *Anisopappus candelabrum* H. Léveillé; *Myriactis candelabrum* (H. Léveillé) H. Léveillé [“*caudelabrum*”]; *Spilanthes tinctoria* Loureiro.

Leaves elliptic-lanceolate, margin crenate. Achenes glandular.

Watersides, roadsides, forests and thickets on slopes; 400–2000 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Nanhai Zhudao, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Nepal, Philippines; Australia].

Adenostemma lavenia var. *lavenia* is a widespread weed.

1b. *Adenostemma lavenia* var. *latifolium* (D. Don) Handel-Mazzetti, Symb. Sin. 7: 1086. 1936.

宽叶下田菊 kuan ye xia tian ju

Adenostemma latifolium D. Don, Prodr. Fl. Nepal. 181. 1825.

Leaves broadly ovate or cordate, margin incised, serrate, or doubly serrate. Achenes densely tuberculate.

Forest margins, shaded wet places by rivers, along coasts, thickets; 500–2300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangsu, Nanhai Zhudao, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea].

Adenostemma lavenia var. *latifolium* is used medicinally for skin diseases of the foot.

1c. *Adenostemma lavenia* var. *parviflorum* (Blume) Hochreutiner, Candollea 5: 298. 1934.

小花下田菊 xiao hua xia tian ju

Lavenia parviflora Blume, Bijdr. 905. 1826; *Adenostemma parviflorum* (Blume) Candolle; *A. viscosum* var. *parviflorum* (Blume) J. D. Hooker.

Leaves elliptic-lanceolate, rhombic-elliptic, or elliptic, thick. Capitula small. Involucre 5–7 mm in diam. Achenes small, densely tuberculate.

• Hainan, Hunan, Jiangxi, Taiwan.

239. GYMNOCORONIS Candolle, Prodr. 5: 106. 1836.

裸冠菊属 luo guan ju shu

Herbs, annual to perennial, erect. Leaf blade lanceolate to ovate or deltate. Synflorescence strongly cymose. Phyllaries 20–50, 2-seriate, equal to subequal; receptacle with discrete oval scars and with soft tissue in between. Florets 50–200; corollas white, narrowly funnellform, with shortly stalked glands on outer surface; lobes as wide as long to wider than long; antheropodium slightly enlarged; anther appendages small, wider than long; style branches very broadly oar-shaped, mammillate abaxially, smooth adaxially. Achenes slightly curved, prismatic, (4 or)5-ribbed, glandular between ribs, ribs sometimes corky; carpodium broadly cylindrical; pappus absent.

Five species: Mexico and South America, one species recently naturalized in Japan and China; one species (introduced) in China.

See King and Robinson's Studies in the Eupatorieae (Phytologia 29: 1–20. 1974).

The occurrence of this genus in China was reported by T. G. Gao and Yan Liu (Acta Phytotax. Sin. 45: 329–332. 2007). Its occurrence in Japan was reported by C. Suyama (J. Phytogeogr. Taxon. 49: 183–184. 2001).

1. *Gymnocoronis spilanthisoides* (D. Don ex Hooker & Arnott) Candolle, Prodr. 7: 266. 1838.

裸冠菊 luo guan ju

Alomia spilanthisoides D. Don ex Hooker & Arnott, Companion Bot. Mag. 1: 238. 1836.

Herbs, perennial, 1–1.5 m tall. Stems erect, few branched, glabrous, angled, fistulose. Leaves opposite, glabrous, broadly lanceolate to ovate; petiole ca. 2.5 cm; blade 8–12(–18) × 1–2.5(–9) cm, 3-veined or veins pinnate, base attenuate, rarely truncate, margin serrate, apex acute. Synflorescence terminal,

cymose. Involucre hemispheric, ca. 4 × 8 mm; phyllaries 2-seriate, lanceolate, outside pubescent; receptacle convex; corollas white, ca. 4 mm, short-stipitate glandular throughout; style base lacking basal node, glabrous; style branches clavate to oar-shaped, white or pink. Achenes ca. 3 mm, 5-ribbed, body gland-dotted. Fl. and fr. Sep–Oct. $2n = 20$.

Recently introduced, and now naturalized, in Guangxi, Taiwan, and Yunnan [native to South America; naturalized in Australia, Japan, and Pacific islands (New Zealand)].

Gymnocoronis spilanthisoides is an emergent plant and prefers marshes or pond sides. It spreads by the stems, which easily produce roots.

240. AGERATUM Linnaeus, Sp. Pl. 2: 839. 1753.藿香蓟属 *huo xiang ji shu**Caelestina* Cassini; *Carelia* Fabricius; *Isocarpa* Lessing (1830), not R. Brown (1817).

Subshrubs or annual to perennial herbs. Leaves opposite or sometimes alternate; blade elliptic or lanceolate to deltate or ovate, margin entire to dentate. Synflorescence cymose to subcymose, sometimes subumbellate. Phyllaries 30–40, distant, 2- or 3-seriate, equal or subequal, lanceolate, markedly hardened, often with scarios margin; receptacle conical, glabrous or paleaceous. Florets 20–125; corollas white, blue, or lavender, funnellform or with distinct basal tube; lobes 5, as long as wide, partially papillose and sometimes hispidulous on outer surface, papillose on inner surface; antheropodium cylindrical; style base not enlarged, glabrous, style branches linear, usually strongly and densely papillose. Achenes prismatic, 4- or 5-ribbed, glabrous or ribs setuliferous; carpodium distinct; pappus of 5 or 6 free, flattened, sometimes awnlike, scales or lacking or coroniform. $x = 10, 20$.

About 40 species: Central and South America, one species (*Ageratum houstonianum*) widely cultivated and another species (*A. conyzoides*), although sometimes cultivated, a widespread weed throughout the tropics in both the Old and New Worlds; two species (both introduced) in China.

See Johnson (Ann. Missouri Bot. Gard. 58: 6–88. 1971) and Robinson (Phytologia 69: 93–104. 1990).

- 1a. Leaves basally cordate or truncate; phyllaries narrowly lanceolate, apex long acuminate, margin entire, stipitate glandular, with long hairs 1. *A. houstonianum*
 1b. Leaves basally obtusely or broadly cuneate; phyllaries broad, oblong or lanceolate-oblong, acute, glabrous or with long, non-viscid hairs, eglandular 2. *A. conyzoides*

1. Ageratum houstonianum Miller, Gard. Dict., ed. 8, *Ageratum* no. 2. 1768.

熊耳草 *xiong er cao**Ageratum mexicanum* Sims.

Herbs, annual, 30–70(–100) cm tall. Stems erect, simple or branched from middle or lower part; stems and branches purple-red, green, or straw-colored, white tomentose or thinly lanate. Leaves broadly ovate or triangular-ovate; petiole 0.7–3 cm; median stem leaves 2–6 × 1.5–3.5 cm, or length equal to width; upper and axillary leaves smaller; all leaves basally 3-veined or inconspicuously 5-veined, both surfaces sparsely or densely white pubescent, base cordate or truncate, margin crenate-serrate, apex rounded or acute; petioles of upper leaves and axillary branches usually spreading white long tomentose. Synflorescence corymbose, 2–4 cm in diam.; peduncle densely pubescent or powdery pubescent. Capitula 5–15 or more; involucre campanulate, 6–7 mm in diam.; phyllaries 2- or 3-seriate, narrowly lanceolate, 4–5 mm, abaxially glandular pubescent, margin entire, apex long acuminate; corollas tubular, 2.5–3.5 mm; limb purplish; lobes pubescent. Achenes black, 5-angled, 1.5–1.7 mm; pappus of 5 short free scales; scales oblong-lanceolate, 2–3 mm, apex aristate-acuminate, sometimes truncate and 0.1–1.5 mm. Fl. and fr. year-round. $2n = 20, 40$.

Grasslands, roadsides, slopes in valleys; 100–1500 m. Cultivated and naturalized in Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Jiangsu, Nanhai Zhudao, Shandong, Sichuan, Taiwan, Yunnan, Zhejiang [native to tropical America; cultivated and naturalized in India, Myanmar, Nepal, Thailand; Africa].

Ageratum houstonianum is used medicinally. People in Central America (Ecuador) use the plant as an antiphlogistic, to relieve swelling and pain in the throat.

2. Ageratum conyzoides Linnaeus, Sp. Pl. 2: 839. 1753.

藿香蓟 *huo xiang ji*

Herbs, annual, 50–100 cm tall, sometimes less than 10 cm, with inconspicuous main root. Stems robust, ca. 4 cm in diam. at base, simple or branched from middle, stems and branches reddish, or green toward apex, white powdery puberulent or densely spreading long tomentose. Leaves often with axillary abortive buds; petiole 1–3 cm, densely white spreading villous; median leaves ovate, elliptic, or oblong, 3–8 × 2–5 cm; upper leaves gradually smaller, oblong, sometimes all leaves small, ca. 1 × 0.6 cm, both surfaces sparsely white puberulent and yellow gland-dotted, basally 3-veined or obscurely 5-veined, base obtuse or broadly cuneate, margin crenate-serrate, apex acute. Capitula small, 4–14, in dense terminal corymbs; peduncle 0.5–1.5 cm, powdery puberulent; involucre campanulate or hemispheric, ca. 5 mm in diam.; phyllaries 2-seriate, oblong or lanceolate-oblong, 3–4 mm, glabrous, margin lacerate; corollas 1.5–2.5 mm, glabrous or apically powdery puberulent; limb purplish, 5-lobed. Achenes black, 5-angled, 1.2–1.7 mm, sparsely white setuliferous; pappus scales 5 or awned, 1.5–3 mm. Fl. and fr. year-round. $2n = 20, 38, 40$.

Valleys, forests, forest margins on slopes, riversides, grasslands, field margins. Cultivated and naturalized in Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Jiangsu, Jiangxi, Nanhai Zhudao, Shaanxi, Sichuan, Taiwan, Yunnan; only cultivated in Hebei and Zhejiang [native to tropical America; widespread weed throughout Africa, India, Nepal, and SE Asia].

Ageratum conyzoides is used medicinally in China to treat a variety of conditions, including common colds, headaches, boils, eczema, bleeding wounds, and burns.

241. EUPATORIUM Linnaeus, Sp. Pl. 2: 836. 1753.泽兰属 *ze lan shu**Eupatoriadelphus* R. M. King & H. Robinson.

Herbs, annual to perennial. Leaves opposite or verticillate, upper leaves subopposite to alternate; blade linear to ovate, deltate, or 3-lobed, serrate to subentire. Synflorescence a corymbose or pyramidal panicle. Phyllaries 10–22, weakly to strongly subimbricate, 2–5-seriate, sometimes inner phyllaries deciduous; receptacle flat or weakly convex. Florets 3–23; corollas white to purple, lavender, or pink, narrowly funnelliform or with constricted basal tube and narrowly to broadly campanulate limb, outer surface with glands often concentrated at base of throat and on outer surfaces of lobes, rarely with a few hairs; lobes 5, usually slightly longer than wide; antherodium cylindric; anther appendages large, ovate-triangular, ca. $1.5 \times$ as long as wide; style base puberulent or rarely glabrous, with or without node; style branches filiform to slightly broadened or flattened distally, papillose. Achenes prismatic, 5-ribbed; carpodium not or slightly differentiated; pappus setae 25–40, barbellate, persistent, apical cells with rounded to shortly acute tips. $x = 10, 20$.

Forty-five species: Asia, Europe, North America; 14 species (six endemic) in China.

The results of the studies by G. J. Schmidt & E. E. Schilling (Amer. J. Bot. 87: 716–726. 2000) and those of M. Ito et al. (J. Plant Res. 113: 79–89. 2000) are in conflict as to the re-recognition of *Eupatoriadelphus*. Schmidt and Schilling favor a distinct *Eupatoriadelphus* (= the “*Eutrochium* group”) whereas Ito et al. imply that *Eupatorium* s.s. can be divided into three “morphological species groups,” one of which is the “*Eutrochium* group.” As there is still much confusion among the Chinese species of *Eupatorium* with both sexual and agamosperous species, the species here are simply arranged alphabetically. The presence of the hybrid *E. ×tripartitum* (Makino) Murata & H. Koyama (*E. chinense* \times *E. lindleyanum*), a plant with tripartite leaves, has been recorded.

See Lamont, Mem. New York Bot. Gard. 72: 1–68. 1995.

- 1a. Leaves glabrous and eglandular on both surfaces, or abaxially sparsely puberulent.
 - 2a. Leaves undivided, ovate, triangular-ovate, or oblong-ovate, basally 3-veined; shrubs 14. *E. tashiroi*
 - 2b. Leaves usually 3-lobed; lobes narrowly elliptic-lanceolate or oblanceolate, pinnately veined; perennial herbs; few branched 5. *E. fortunei*
- 1b. Leaves sparsely or densely puberulent or villous, or tomentose on both surfaces, glandular on both surfaces or at least abaxially; achenes setuliferous or glabrous but usually glandular.
 - 3a. Leaves basally 3- or 5-veined.
 - 4a. Phyllaries acute at apex.
 - 5a. Leaves petiolate 2. *E. cannabinum*
 - 5b. Leaves sessile 9. *E. lindleyanum*
 - 4b. Phyllaries obtuse or rounded at apex.
 - 6a. Leaves usually tripartite, with large terminal lobe; achenes sparsely setuliferous above or at apex only 11. *E. nanchuanense*
 - 6b. Leaves simple; achenes sparsely long setuliferous.
 - 7a. Capitula 9–15-flowered; shrubs 1. *E. amabile*
 - 7b. Capitula 5-flowered; herbs.
 - 8a. Leaves sessile, ovate or ovate-lanceolate, apex acute 13. *E. shimadae*
 - 8b. Leaves shortly petiolate, ovate-oblong, apex long acuminate 10. *E. luchuense*
 - 3b. Leaves pinnately veined.
 - 9a. Phyllaries acute at apex 9. *E. lindleyanum*
 - 9b. Phyllaries obtuse or rounded at apex.
 - 10a. Leaves simple.
 - 11a. Achenes glabrous and eglandular 12. *E. omeiense*
 - 11b. Achenes glandular.
 - 12a. Leaf base cuneate, apex long acuminate, both surfaces sparsely crisped-pubescent, abaxial surface gland-dotted; synflorescence of lax corymbs 3. *E. chinense*
 - 12b. Leaf base shallowly cordate or rounded, apex obtuse or shortly acuminate, both surfaces \pm glabrous, abaxial surface gland-dotted; synflorescence of dense corymbs 7. *E. hualienense*
 - 10b. Leaves divided.
 - 13a. Achenes glabrous and eglandular 4. *E. formosanum*
 - 13b. Achenes glandular.
 - 14a. Leaves simple, ovate, broadly ovate, or narrowly ovate, base rounded, sessile or very shortly petiolate 3. *E. chinense*
 - 14b. Leaves divided; lobes narrowly elliptic or lanceolate, or leaves simple, base truncate, petiolate, petiole 1–2 cm.
 - 15a. Leaves white tomentose on both surfaces, abaxially and on veins densely tomentose, margin serrate-incised 6. *E. heterophyllum*
 - 15b. Leaves scabrid, sparsely puberulent, margin finely serrate 8. *E. japonicum*

1. *Eupatorium amabile* Kitamura, Acta Phytotax. Geobot. 1: 283. 1932.

多花泽兰 duo hua ze lan

Shrubs. Stems ca. 1 m tall, not scandent; branches slender, divaricate, striate, densely glandular villous in upper part. Leaves abaxially pale green, adaxially green, ovate or ovate-oblong, 9–12 × 3.5–4 cm, abaxially sparsely villous and glandular, adaxially subglabrous, basally 3-veined, sparsely villous on veins, base rounded, margin mucronate-serrate, apex long acuminate. Synflorescence of divaricate terminal corymbs. Capitula 9–15-flowered; involucre campanulate, ca. 5 mm; phyllaries 12–15, unequal, linear, apically much obtuse, 2- or 3-seriate, outer phyllaries very short, sparsely glandular villous; corollas tubular, ca. 4.5 mm, glandular. Achenes black, striate, ca. 2.5 mm, sparsely villous; pappus off-white, 4.5–5 mm, barbellate. Fl. and fr. Jul–Mar. $2n = 20^*$.

• Grasslands, slopes, rocks. Taiwan.

2. *Eupatorium cannabinum* Linnaeus, Sp. Pl. 2: 838. 1753.

大麻叶泽兰 da ma ye ze lan

Eupatorium nodiflorum Wallich ex Candolle.

Herbs, perennial, 50–150 cm tall. Rhizomes robust, with many fibrous roots. Stems erect, purplish red, simple or only apically corymbose branched, puberulent; synflorescence branches and peduncles more densely hairy, glabrescent in median lower part by anthesis. Leaves opposite, shortly petiolate; petiole ca. 5 mm; median and lower leaves irregularly lobed; central lobe elliptic or narrowly lanceolate, large, 6–11 × 2–3 cm, base cuneate or broadly cuneate, apex acuminate or long acuminate; lateral lobes same shape as central lobe, smaller; upper stem leaves gradually smaller, irregularly lobed or simple; lower stem leaves shed by anthesis; all stem leaves scabrid, rather thick, sparsely puberulent and glandular, more densely hairy abaxially and on veins, pinnately veined, lateral veins 5- or 6-paired, margin serrate, undulate. Synflorescences terminal, of densely compound corymbs. Capitula numerous, 3–7-flowered; involucre campanulate, ca. 6 mm; phyllaries 2- or 3-seriate, imbricate; outer phyllaries short, ovate-lanceolate, ca. 2 mm, puberulent; median and inner phyllaries gradually longer, with membranous margin and purplish tip; corollas purple-red, pink, or whitish, ca. 5 mm, outside sparsely yellow glandular. Achenes black-brown, cylindric, ca. 3 mm, 5-ribbed, with yellow glands; pappus setae white, ca. 5 mm. $2n = 20$.

Summits of small hills, grasslands, among bamboos. Jiangsu, ?Taiwan, Zhejiang, may be introduced and naturalized [Europe].

3. *Eupatorium chinense* Linnaeus, Sp. Pl. 2: 837. 1753.

多须公 duo xu gong

Eupatorium chinense var. *oppositifolium* (Koidzumi) Murata & H. Koyama; *E. chinense* var. *yuliense* C. H. Ou; *E. crenatifolium* Handel-Mazzetti; *E. makinoi* T. Kawahara & Yahara; *E. makinoi* var. *oppositifolium* (Koidzumi) T. Kawahara & Yahara; ?*E. melanadenium* Hance; *E. sachalinense* Makino var. *oppositifolium* Koidzumi.

Herbs, perennial, or small shrubs or subshrubs, (50–)70–100(–250) cm tall. Lower part woody, well branched, stems often purplish red; branches ascending, upper branches and corymb sordid-white puberulent, synflorescence branches and peduncles more densely hairy, glabrescent in lower part by anthesis. Leaves opposite, sessile or subsessile with petiole to 2–4 mm; median stem leaves simple or 3-lobed, ovate or broadly ovate, 4.5–10(–20) × (2–)3–5(–6.5) cm, both surfaces scabrid, white puberulent and glandular, more densely so abaxially and on veins, pinnately veined, veins 3–7-paired, base rounded, margin regularly crenate-serrate, apex acuminate or obtuse; upper stem leaves homomorphic with median leaves, but smaller; radical leaves withered by anthesis, margin irregularly crenate. Synflorescences terminal, of large laxly compound corymbs, 20–30 cm in diam. Capitula numerous, 5-flowered; involucre campanulate, ca. 5 mm; phyllaries 3-seriate, imbricate; outer phyllaries short, ovate or lanceolate-ovate, outside puberulent and sparsely glandular, 1–2 mm; median and inner longer, elliptic or elliptic-lanceolate, 5–6 mm, apically and marginally white, membranous, glabrous, but with yellow glands; corollas white, pink, red, or reddish purple, ca. 5 mm, with yellow glands. Achenes pale black-brown, elliptic, ca. 3 mm, 5-ribbed, yellow glandular; pappus setae white, ca. 5 mm. Fl. and fr. Jun–Nov. $2n = 20, 30, 31, 39, 40, 50$.

Forest margins on slopes, forests, thickets or grasslands on slopes; 200–1900 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang [India, Japan, Korea, Nepal].

One of us (Chen) does not accept the broad view of *Eupatorium chinense* by King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987), who included *E. japonicum*, together with many other synonyms, but excluded *E. reevesii* Wallich ex Candolle, which was synonymized with *E. squamosum* D. Don.

T. Kawahara et al. (Pl. Sp. Biol. 4: 37–46. 1989) found sexual diploids with restricted distribution and agamosperous polyploids with broad distributions in this complex. They mentioned sexual populations belong to different varieties, which are morphologically distinct from each other and have allopatric distributions, but agamosperous populations may be of hybrid origin and have significant morphological variation.

Eupatorium chinense is poisonous, especially the leaves, but it is used medicinally to treat large carbuncles, scabies, snakebites, and to alleviate pain.

4. *Eupatorium formosanum* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 122. 1908.

台湾泽兰 tai wan ze lan

Eupatorium cannabinum Linnaeus subsp. *asiaticum* Kitamura; *E. formosanum* var. *quasitripartitum* (Hayata) Kitamura; *E. quasitripartitum* Hayata.

Herbs, perennial, ca. 2 m tall. Stems erect, fascicled; branches obliquely ascending, divaricate synflorescence branches corymbose, slender; stems and branches green initially, densely ferruginous puberulent, later glabrescent, gray-brown. Leaves opposite; median stem leaves 3-partite; central lobe lanceolate, large, 10–15 × 2.5–3 cm, base cuneate, apex acuminate; lateral lobes lanceolate, small; upper leaves gradu-

ally smaller; lower leaves simple, ovate or broadly ovate; upper leaves abaxially pale green, adaxially green, narrowly ovate or ovate-lanceolate, abaxially with many yellow glands and densely adpressed puberulent, adaxially sparsely scabrid-hairy, pinnately veined, lateral veins 5–7-paired, adaxially slightly prominent. Synflorescence of lax terminal corymbs 8–11 cm in diam. Capitula numerous, 5-flowered; involucre campanulate, ca. 5 mm; phyllaries 3-seriate, imbricate, outer phyllaries elliptic, 1–1.5 mm, median and inner phyllaries longer, narrowly elliptic, ca. 5 mm, all phyllaries obtuse, glabrous and eglandular; corollas white, ca. 3.5 mm. Achenes black-brown, ca. 2.5 mm, angled, without hairs and glands; pappus off-white, ca. 3 mm. Fl. and fr. Dec–Aug. $2n = 20^*$.

Forest margins, grasslands. Taiwan [Japan (Ryukyu Islands)].

5. *Eupatorium fortunei* Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 24(1): 170. 1851.

佩兰 pei lan

Eupatorium caespitosum Migo; *E. chinense* Linnaeus var. *tripartitum* Miquel; *E. fortunei* var. *angustilobum* Y. Ling; *E. stoechadosmum* Hance.

Herbs, perennial, 40–100 cm tall. Rhizomes procumbent, reddish brown. Stems erect, green or reddish purple, few branched or apically synflorescence branched, sparsely puberulent, more densely on synflorescences and peduncles. Median stem leaves large, 3-sect or 3-partite; petiole 0.7–1 cm; terminal lobe large, narrowly elliptic, elliptic-lanceolate, or oblanceolate, 5–10 × 1.5–2.5 cm, apex acuminate; lateral lobes identical to terminal lobe but smaller, pinnately veined; margin coarsely toothed or irregularly finely toothed; lower stem leaves gradually smaller; radical leaves withered by anthesis. Capitula numerous in apical compound corymbs; synflorescence 3–6(–10) cm in diam. Involucre campanulate, 6–7 cm; phyllaries 2- or 3-seriate, imbricate, outer phyllaries short, ovate-lanceolate; median and inner phyllaries gradually longer, narrowly elliptic, ca. 7 mm; all phyllaries purple-red, without hairs and glands, apex obtuse; corollas white or reddish, ca. 5 mm, eglandular. Achenes black-brown, elliptic, 3–4 mm, 5-angled, glabrous and eglandular; pappus white, ca. 5 mm. Fl. and fr. Jul–Nov. $2n = 40$.

Rare as a wild plant, but commonly cultivated, usually in thickets or roadside ditches; ca. 2000 m. ?Anhui, ?Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang [?introduced in Japan, Korea, N Thailand, Vietnam].

The whole plant of *Eupatorium fortunei* is fragrant like *Lavandula angustifolia* Miller when crushed.

The plant is used medicinally. The fragrant stems and leaves are used for making fragrant oils.

6. *Eupatorium heterophyllum* Candolle, Prodr. 5: 180. 1836.

异叶泽兰 yi ye ze lan

Eupatorium cannabinum Linnaeus var. *heterophyllum* (Candolle) Kitamura; *E. mairei* H. Léveillé; *E. wallichii* Candolle var. *heterophyllum* (Candolle) Diels.

Herbs perennial, 1–2 m tall, or subshrublike, woody in median-lower part. Stems erect, brownish or purple-red, 1–2 cm in diam. at base, branched, and with corymbose synflorescence branches, white or sordid-white puberulent, more densely hairy on synflorescence branches and peduncles, glabrescent or sparsely hairy in middle-lower part by anthesis. Leaves opposite; median stem leaves large, 3-sect, -partite, or -lobate; petiole 0.5–1 cm; central lobe large, elliptic or lanceolate, 7–10 × 2–3.5 cm, base cuneate, apex acuminate; lateral lobes homomorphic with central lobe, smaller, or all stem leaves simple, oblong, elliptic-lanceolate, or ovate, abaxially densely gray-white tomentose, adaxially scabrid, white puberulent, both surfaces with dense yellow glands, pinnately veined, lateral veins 3–7-paired, abaxially prominent, margin rather regularly and deeply incised-crenate, not undulate; basal leaves withered by anthesis. Capitula numerous in terminal compound corymb; synflorescence to 25 cm in diam. Involucre campanulate, 7–9 cm; phyllaries 3-seriate, imbricate; outer phyllaries short, ovate or broadly ovate, ca. 2 mm, outside sparsely white puberulent; median and inner phyllaries elliptic, 8–9 mm; all phyllaries purple-red or purplish rose, apex obtuse. Florets white or reddish tinged; corolla ca. 5 mm, with sparse yellow glands. Achenes black-brown, elliptic, ca. 3.5 mm, 5-angled, with yellow glands, glabrous. Pappus white, ca. 5 mm. Fl. and fr. Apr–Oct.

Forests, forest margins, grasslands on slopes and in valleys; 1700–3000 m. Anhui, Gansu, Guizhou, Hubei, Shaanxi, Sichuan, ?Taiwan, Xizang, Yunnan [Nepal].

One of us (Hind) follows King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987) in treating *Eupatorium heterophyllum* as a synonym of *E. cannabinum*. However, the others of us (Chen and Kawahara) prefer to treat *E. heterophyllum* as a distinct species. Whereas the leaves of *E. cannabinum* are irregularly lobed, with the margin serrate and undulate, those of *E. heterophyllum* are 3-sect, with the margin rather regularly and deeply incised-crenate and not undulate.

The stems or whole plant of *Eupatorium heterophyllum* are used medicinally for treating injuries and trauma.

7. *Eupatorium hualienense* C. H. Ou, S. W. Chung & C. I. Peng, Fl. Taiwan, ed. 2, 4: 956. 1998.

花莲泽兰 hua lian ze lan

Herbs, perennial. Stems erect, 50–150 cm, simple or branching apically, branches divaricate and ascending. Leaves: petiole short, 2–10 mm; median leaves broadly ovate, thick, 6.5–9 × 4.5–6.5 cm, lateral veins 5–7 pairs, both surfaces glabrous, abaxially gland-dotted, base shallowly cordate or rounded, margin serrate with obtuse teeth, apex obtuse or shortly acuminate. Synflorescence of compact corymbs. Capitula numerous, 5–8-flowered; involucre cylindrical; phyllaries 3-seriate, sparsely gland-dotted, apices obtuse or rounded. Corolla tubular, ca. 3.5 mm, glandular. Achenes 5-ribbed, black, 3–4 mm, gland-dotted, sparsely setuliferous; pappus whitish, 3–4 mm, barbellate.

• Cliffs. Taiwan.

8. *Eupatorium japonicum* Thunberg in Murray, Syst. Veg., ed. 14, 737. 1784.

白头婆 bai tou po

Eupatorium chinense Linnaeus var. *simplicifolium* (Makino) Kitamura; *E. chinense* var. *tozanense* (Hayata) Kitamura; *E. fortunei* Turczaninow f. *aureoreticulatum* (Makino) Nakai; *E. fortunei* var. *simplicifolium* (Makino) Nakai; *E. fortunei* var. *tripartitum* (Makino) Nakai; *E. japonicum* f. *aureoreticulatum* Makino; *E. japonicum* var. *dissectum* Makino; *E. japonicum* var. *simplicifolium* Makino; *E. japonicum* var. *tozanense* (Hayata) Kitamura; *E. japonicum* var. *tripartitum* Makino; *E. japonicum* var. *wallichii* (Candolle) Yamamoto; *E. tozanense* Hayata; *E. wallichii* Candolle.

Herbs perennial, 50–200 cm tall. Rhizomes short, with numerous fibrous roots. Stems erect, purplish red, usually simple or corymbose synflorescence branched in upper part, white crisped-puberulent, more dense on synflorescence branches, glabrescent or sparsely hairy in lower part. Leaves opposite; petiole 0.5–2 cm, rather thick; median stem leaves elliptic, narrowly elliptic, ovate-elliptic, or lanceolate, 6–20 × 2–6.5 cm, pinnately veined, lateral veins 7-paired, abaxially prominent, base broadly or narrowly cuneate, margin sometimes 3-partite, apex acuminate; basal stem leaves withered by anthesis; upper leaves smaller, homomorphic with median leaves; both surfaces scabrid, crisped-villous or puberulent and yellow glandular, more densely hairy abaxially on veins and on petiole; margin coarsely or doubly serrate. Capitula apically densely corymbose, synflorescence usually 3–6 cm in diam., rarely forming a large compound corymbose synflorescence to 20 cm in diam. Involucre campanulate, 5–6 mm, 5-flowered; phyllaries imbricate, 3-seriate; outer phyllaries very short, lanceolate, 1–2 mm, median and inner phyllaries gradually longer, lanceolate, narrowly elliptic, or elliptic-lanceolate, 5–6 mm, green or purpletinged, apex obtuse or rounded. Florets white, red-purple, or pink; corolla ca. 5 mm, with dense yellow glands. Achenes black-brown, elliptic, ca. 3.5 mm, 5-angled, with many yellow glands, glabrous. Pappus white, ca. 5 mm. Fl. and fr. Jun–Nov.

Grasslands on slopes, open forests, thickets, wet places, riverbanks; 100–3000 m. Anhui, Fujian, Guangdong, Guizhou, Hainan, Heilongjiang, Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang [Japan, Korea].

9. *Eupatorium lindleyanum* Candolle, Prodr. 5: 180. 1836.

林泽兰 lin ze lan

Herbs, perennial, 30–150 cm tall. Rhizome short, with numerous fibrous roots. Stems erect, red or purplish red in lower and median parts, often branched from base or simple, or with corymbose synflorescence branches, only densely white villous or shortly pubescent. Lower stem leaves shed by anthesis; median stem leaves elliptic-lanceolate or linear-lanceolate, 3–12 × 0.5–3 cm, simple or 3-sect, thick, both surfaces scabrid, long or shortly white scabrous, densely so adaxially and on veins, abaxially with yellow glands or eglandular, basally 3-veined, base cuneate, apex acute; upper leaves gradually smaller upward, homomorphic with median stem leaves; all stem leaves basally 3-veined, margin deeply or shallowly dentate, sessile or subsessile. Capitula numerous in apical dense corymb; synflorescence 2.5–6 cm in diam., or large compound corymbs ca. 20 cm in diam.; synflorescence and peduncles

purple-red or green, densely shortly white pubescent. Involucre campanulate, 5-flowered; phyllaries 3-seriate, imbricate; outer phyllaries short, lanceolate or broadly lanceolate, 1–2 mm; median and inner phyllaries longer, elliptic or elliptic-lanceolate, 5–6 mm; all phyllaries green or purple-reddish, acute; corollas white, pink, or purplish red, ca. 4.5 mm, with sparse yellow glands. Achenes black-brown, elliptic, ca. 3 mm, 5-ribbed; pappus white, equal to or rather longer than corollas. Fl. and fr. May–Dec. $2n = 20, 30, 40$.

Shaded wet places in valleys, wet places in forests or grasslands; 200–2600 m. Throughout China except Xinjiang [Japan, Korea, Myanmar, Philippines, Russia (Siberia)].

- 1a. Leaves with yellow glands abaxially 9a. var. *lindleyanum*
 1b. Leaves eglandular abaxially 9b. var. *eglandulosum*

9a. *Eupatorium lindleyanum* var. *lindleyanum*

林泽兰(原变种) lin ze lan (yuan bian zhong)

Eupatorium kirilowii Turczaninow; *E. lindleyanum* f. *aureoreticulatum* Makino; *E. lindleyanum* var. *trifoliolatum* Makino; *E. subtetragonum* Miquel.

Leaves with yellow glands abaxially.

Shaded wet places in valleys, forests, or grasslands; 200–2600 m. Throughout China except Xinjiang [Japan, Korea, Russia (Siberia)].

The stems and leaves of *Eupatorium lindleyanum* var. *lindleyanum* are used medicinally as a carminative and vasopressin (i.e., to promote water retention).

9b. *Eupatorium lindleyanum* var. *eglandulosum* Kitamura, J. Jap. Bot. 11: 169. 1935.

无腺林泽兰 wu xian lin ze lan

Eupatorium lindleyanum f. *eglandulosum* (Kitamura) Murata & H. Koyama.

Leaves eglandular abaxially.

- Jiangsu, Zhejiang.

10. *Eupatorium luchuense* Nakai, Bot. Mag. (Tokyo) 30: 147. 1916.

基隆泽兰 ji long ze lan

Eupatorium kiirunense (Kitamura) C. H. Ou & S. W. Chung; *E. luchuense* var. *kiirunense* Kitamura.

Herbs, perennial. Rhizome short. Stems 50–120 cm tall, often woody at lower part, decumbent, sometimes forming tussocks, glabrescent. Leaves opposite, shortly petiolate; petiole 3–8 cm; blade adaxially shiny, obovate to elliptic-lanceolate, 8–10 × 5–7 cm, subglabrous, abaxially glandular, 3-veined, base truncate or cordate, margin simple, serrate with obtuse teeth, apex long acuminate. Capitula numerous in terminal corymbs; synflorescence 10–17 cm in diam., ± loose; phyllaries 4–5 mm; corollas white to pale pink, 3–4 mm. Achenes 2.5–3 mm; pappus white, ca. 5 mm. Fl. and fr. Jan–Aug. $2n = 20$.

Open places, often on rock walls and coral-based islands. Taiwan [Japan (Ryukyu Islands)].

11. *Eupatorium nanchuanense* Y. Ling & C. Shih, Fl. Reipubl. Popularis Sin. 74: 354. 1985.

南川泽兰 nan chuan ze lan

Herbs, perennial, 30–120 cm tall. Rhizomes procumbent; stems erect, brownish, purple-red, or dark purple-red; branches ascending; upper synflorescence branches corymbose; stems and branches white crisped-puberulent, more densely hairy on peduncles, sparsely hairy, or glabrescent in middle-lower part. Leaves irregularly opposite, often with axillary leaf buds, abaxially pale green, adaxially dark green; median stem leaves 3-sect; petiole ca. 1 cm; central lobe large, elliptic or lanceolate-elliptic, 6–8 cm, base cuneate, pinnately lobed, partite, apex caudate-acuminate; basal segment large; lateral lobes smaller, 3–5 mm, elliptic or lanceolate-elliptic, pinnately lobate, semi-lobed, incised-dentate; upper leaves 3-sect or irregularly 3-partite; lateral lobes unequal in size; central lobe sparsely incised-serrate or sometimes undivided, often lanceolate or ovate-lanceolate; basal leaves withered by anthesis; all leaves with both surfaces sparsely white adpressed puberulent and yellow glandular. Synflorescence terminal or compound corymbs, 8–12 cm in diam. Capitula numerous; involucre campanulate; phyllaries 3-seriate, imbricate, outer phyllaries short, elliptic, ca. 2.5 mm, median and inner phyllaries elliptic or lanceolate-elliptic, ca. 5 mm, all phyllaries purple tinged, apically rounded; corollas white or reddish, ca. 5 mm, with sparse yellow glands. Achenes black-brown, elliptic, ca. 3 mm, 6-angled, sparsely white setuliferous apically. Fl. and fr. Jun–Jul.

• Hill slopes; 1200–1700 m. Chongqing (Nanchuan), Yunnan (Daguan).

12. *Eupatorium omeiense* Y. Ling & C. Shih, Fl. Reipubl. Popularis Sin. 74: 354. 1985.

峨眉泽兰 e mei ze lan

Herbs, perennial. Rhizomes robust, with numerous adventive roots. Stems erect, 1–2 m tall, multibranching; branches ascending, slender; synflorescence branched, corymbose in upper part. Stems and branches pulverous dirty-white puberulent; synflorescence branches and peduncles rather densely hairy, sparsely hairy or glabrous in lower part by anthesis. Leaves opposite, thickly papery; median stem leaves abaxially pale green, adaxially dark green, elliptic or ovate-oblong, 6–9 × 2–3.5 cm, both surfaces sparsely white puberulent and with yellow glands, pinnately veined, lateral veins 4- or 5-paired, base cuneate, margin subentire or repand-crenate, apex acuminate; upper leaves homomorphic with middle leaves, but smaller, basal leaves withered by anthesis. Synflorescence of terminal compound corymbs. Capitula numerous, 5-flowered; involucre campanulate, ca. 4 mm; phyllaries 2- or 3-seriate, imbricate; outer phyllaries short, elliptic, ca. 1 mm; median and inner phyllaries gradually longer, elliptic, ca. 4 mm, puberulent, without glands, apex rounded; corollas white, ca. 4 mm, sparsely yellow glandular. Achenes blackish brown, subelliptic, 5-ribbed,

glabrous and eglandular; pappus white, ca. 4 mm. Fl. and fr. Sep–Nov.

• Roadsides on hill slopes; 700–900 m. Sichuan (Emei Shan, Tianquan).

13. *Eupatorium shimadae* Kitamura, Acta Phytotax. Geobot. 1: 284. 1932 [*“Shimadai”*].

毛果泽兰 mao guo ze lan

Herbs, perennial, 40–80 cm tall. Rhizomes short, procumbent. Stems erect, fulvous or purple-tinged, ca. 4 mm in diam. at base, usually simple, or with terminal corymbose synflorescence branches, rarely few branched, white puberulent in upper part, densely hairy on synflorescences and peduncles, glabrescent in lower part. Leaves opposite, thick, simple, abaxially pale green, adaxially green, sessile or nearly so; median leaves large, ovate-lanceolate, ovate-oblong, or ovate, 8–10 × 5–7 cm, base rounded or truncate, apex caudate-acuminate; from middle part upward or downward gradually smaller, but homomorphic with median stem leaves; all leaves abaxially with yellow glands, both surfaces white puberulent, densely hairy on veins, basally 3-veined, margin coarsely or shallowly serrate. Synflorescences terminal, of compound corymbs, 8–18 cm in diam. Capitula numerous, 5-flowered; involucre campanulate, ca. 6 mm; phyllaries 2- or 3-seriate, imbricate, outer phyllaries short, oblong or lanceolate-oblong, 2–2.5 mm, median and inner phyllaries oblong, ca. 6 mm, all phyllaries sparsely shortly pubescent, without glands, apex obtuse or rounded; corollas white or purplish, ca. 4 mm, with few yellow glands. Achenes black-brown, elliptic, 3–3.5 mm, 5-ribbed, sparsely villous, eglandular; pappus off-white, ca. 4 mm. Fl. and fr. May–Jun. $2n = 20^*$.

• Grasslands on slopes, rocky places. Fujian, Taiwan.

14. *Eupatorium tashiroi* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 18(8): 9. 1904.

木泽兰 mu ze lan

Eupatorium clematideum (Wallich ex Candolle) Schultz Bipontinus var. *gracillimum* (Hayata) C. I. Peng & S. W. Chung; *E. gracillimum* Hayata; *E. tashiroi* f. *gracillimum* (Hayata) Sasaki; *E. tashiroi* var. *gracillimum* (Hayata) Yamamoto.

Shrubs, subshrubs, or herbs, scandent. Stems terete, slender, glabrous; branches divaricate, flexuous. Leaves opposite; petiole 4–6 mm; blade 4–8 × 2–3 cm, thin, 3-veined, base obtuse or rounded, margin dentate, apex acuminate. Synflorescence a lax corymb. Capitula 5-flowered, ca. 1 cm; peduncle 1–1.5 cm, pubescent; involucre narrowly campanulate; phyllaries narrowly lanceolate, 1- or 2-seriate, outer phyllaries ca. 1.5 mm, inner phyllaries ca. 5 mm, margin scarious; corollas white, ca. 4 mm. Achenes black, cylindric, ca. 2.5 mm, 5-ribbed, glabrous; pappus 1-seriate, 3–4 mm, barbellate. $2n = 20^*$.

• Mountains. C and S Taiwan.

Eupatorium clematideum (Wallich ex Candolle) Schultz Bipontinus (= *E. squamosum* D. Don) was recognized in Fl. Taiwan, ed. 2 (4: 953. 1998); however, *E. clematideum* is a native of Nepal, and the plants in Taiwan are actually *E. tashiroi*.

242. AUSTROEUPATORIUM R. M. King & H. Robinson, *Phytologia* 19: 433. 1970.南泽兰属 *nan ze lan shu*

Subshrubs or herbs, erect. Leaves opposite below, often subopposite or alternate above; blade ovate to narrowly oblong, usually crenulate to serrulate. Synflorescences of terminal flattened corymbose panicles. Involucre campanulate, 5–6 × 4–5 mm; phyllaries 12–18, 2- or 3-seriate, mostly unequal; receptacle flat or slightly convex. Florets 9–23, fragrant; corolla white, rarely lilac, narrowly funnelliform with rather narrow tube, glands on outer surface; lobes ca. 1.5 × as long as wide, without stomata; lower part of filaments slender and flexuous; antheropodium narrowly cylindrical; anther appendages ovate-oblong, longer than wide, style base not enlarged, densely puberulent; style filiform. Achenes prismatic, 5-ribbed; carpodium distinct; pappus setae 30–40, slender, barbellate, persistent, apical cells often enlarged, with rounded tips. $x = 10$.

Thirteen species: S South America, one species adventive in the palaeotropics; one species (introduced) in China.

1. Austro eupatorium inulifolium (Kunth) R. M. King & H. Robinson, *Phytologia* 19: 434. 1970.南泽兰 *nan ze lan*

Eupatorium inulifolium Kunth in Humboldt et al., *Nov. Gen. Sp.* 4, ed. f°: 85. 1818.

Subshrubs or perennial herbs, to 3 m tall. Stems erect, few branched, brownish, terete, densely puberulent. Leaves mostly opposite; petiole ca. 15 mm, winged toward blade; blade narrowly ovate to lanceolate, ca. 15 × 6 cm, abaxially densely puberulent and gland-dotted, adaxially sparsely to densely puberulent, gland-dotted, 3-veined, base rounded to cuneate, abruptly narrowed, margin serrulate to crenate-serrate, apex

narrowly acuminate. Synflorescence a broad dense corymb; peduncles 2–5 mm, densely puberulent. Capitula 6–7 mm, 8–15 florets; phyllaries 3-seriate, subimbricate, broadly oblong, 1.5–6 mm, margin and tip scarious, weakly 2–4-ribbed, puberulent outside, apex shortly acute to rounded; corollas white, 4–4.5 mm, tube and lobes sparsely gland-dotted, lobes with few hairs. Achenes 1.8–2 mm, glabrous or very sparsely gland-dotted; carpodium short; pappus 1-seriate, persistent, 3.5–5 mm, barbellate, off-white. [Fl. and fr. Oct–May in South America.]

Introduced and naturalized in Taiwan [widespread in Central and South America; naturalized in Indonesia and Sri Lanka].

T. W. Hsu et al. (*Taiwania* 51: 41–45. 2006) reported *Austro-eupatorium inulifolium* as a newly naturalized plant in Taiwan.

243. PRAXELIS Cassini in F. Cuvier, *Dict. Sci. Nat.* 43: 261. 1826.假臭草属 *jia chou cao shu*

Subshrubs or annual or perennial herbs, erect to decumbent. Leaves opposite or whorled; blade ovate to elliptic or filiform, subentire to sharply serrate. Synflorescences of solitary capitula on long erect peduncles or laxly thyrsoid or rather densely corymbose. Involucre usually campanulate; phyllaries 15–25, 3- or 4-seriate, unequal, gradate, outer phyllaries falling first; receptacle highly conical, glabrous. Florets 25–30; corollas white, blue, or lavender, narrowly funnelliform or with cylindrical throat and slightly narrower basal tube, outer surface mostly smooth, with a few glands; lobes 1.5–3 × as long as wide, outer surface usually with some projecting cells at tip, inner surface densely long papillose; antheropodia with enlarged bases, narrowed apically; anther appendages slightly longer than wide to distinctly longer than wide, often toothed at tip; style base not enlarged; style branches long, narrowly linear, more broadened in distal half, densely long papillose. Achenes slightly to strongly obcompressed, 3- or 4-ribbed, sparsely setuliferous; carpodium distinct, broad, highly asymmetrical; pappus setae ca. 40, persistent, not or scarcely broadened distally. $x = 10$.

Sixteen species: South America, one species adventive in E Asia and Australia; one species (introduced) in China.

1. Praxelis clematidea R. M. King & H. Robinson, *Phytologia* 20: 194. 1970.假臭草 *jia chou cao*

Eupatorium clematideum Grisebach, *Abh. Königl. Ges. Wiss. Göttingen* 24: 172. 1879, not (Wallich ex Candolle) Schultz Bipontinus (1866); *E. urticifolium* Linnaeus f. var. *clematideum* Hieronymus ex Kuntze; *E. catarium* Veldkamp.

Subshrubs or annual herbs, to 0.6 m tall. Stems erect or ascending, bright green, simple or poorly branched at base, leafy throughout except at base, pubescent throughout, hairs simple, eglandular. Leaves opposite, rank-smelling; petiole 3–7 mm; blade ovate, 20–35 × 12–25 mm, pubescent below, hairs long, simple, eglandular along venation, stipitate glandular and gland-dotted between veins, base attenuate, margin coarsely serrate, apex acute. Synflorescence terminal, corymbose, capit-

ula pedunculate; peduncles 4–7 mm, pubescent; involucre narrowly campanulate, 4–5 mm in diam.; phyllaries 2- or 3-seriate, with scattered short simple eglandular hairs at base, glabrous apically, margin ciliate, apex long attenuate; receptacle conical, epaleate. Florets 35–40; corollas bright lilac-blue, ca. 4.5 mm; corolla lobes long papillose on inner surface, usually glabrous outside or with few simple eglandular hairs; anther appendages longer than wide, apex acute; style base not swollen, glabrous, bright lilac-blue; style branches coarsely papillose. Achenes 2–2.5 mm, 3–5-ribbed, ribs pale, setuliferous or glabrous, body black, with scattered setulae; pappus setae 3.5–4.5 mm, coarsely barbellate, off-white. Fl. and fr. often year-round.

Introduced and becoming naturalized in Guangdong and Taiwan [widespread in South America, becoming weedy in many cultivated areas; introduced and becoming naturalized in E Asia and N Australia].

244. CHROMOLAENA Candolle, Prodr. 5: 133. 1836.

飞机草属 fei ji cao shu

Osmia Schultz Bipontinus.

Subshrubs, shrubs, or perennial herbs, erect to somewhat scandent. Leaves usually opposite; blade mostly ovate or triangular to elliptic, sometimes linear, subtire to lobed. Synflorescences usually thyrsoid to candelabriform or with lax to densely corymbose branches, rarely of solitary capitula on long erect peduncles. Phyllaries 18–65, 4–6-seriate, markedly unequal, gradate, often with expanded herbaceous or colored tips; receptacle flat to slightly convex, glabrous, sometimes paleaceous. Florets 6–75; corollas white, blue, lavender, or purple, rather cylindric with scarcely narrower base, outer surface smooth below lobes, with few to many shortly stalked glands, often with rather stiff hairs; lobes slightly to distinctly longer than wide; usually densely papillose on inner surface, or smooth (*Chromolaena* subg. *Osmiella* R. M. King & H. Robinson); antheropodia usually broader below, narrowed apically, or not broadened below (*C.* subg. *Osmiella*); anther appendages large, oblong, ca. $1.5 \times$ as long as wide, entire or crenulate at tip; style base not enlarged; style branches narrowly linear to slightly broadened distally, slightly mammillate to densely long papillose. Achenes prismatic, (3–)5-ribbed, with setulae mostly on ribs; carpodium distinct, broadly cylindric or narrowed below; pappus setae ca. 40, slender, persistent, not or scarcely broadened distally. $x = 10, 16$.

About 165 species: New World tropics and subtropics, one species a pantropical weed; one species (introduced) in China.

King and Robinson (Monogr. Syst. Bot. 22: 1–581. 1987) noted two subgenera and provided characters in their generic description to separate species of *Chromolaena* subg. *Osmiella*. Concern is growing in many tropical countries over the alarming spread of the weed *Chromolaena odorata* (e.g., C. Zachariades et al., Proc. 5th Int. Workshop Biol. Control Managem. *Chromolaena odorata*. 2002). The taxonomy and distribution of this species has been well documented by L. Gautier (Candollea 47: 645–662. 1992).

1. *Chromolaena odorata* (Linnaeus) R. M. King & H. Robinson, Phytologia 20: 204. 1970.

飞机草 fei ji cao

Eupatorium odoratum Linnaeus, Syst. Nat., ed. 10, 2: 1205. 1759.

Herbs, perennial. Rhizomes robust, procumbent. Stems erect, 1–3 m tall, striate; branches robust, often opposite, spreading and horizontal, rarely alternate forming an acute angle with stem; stems and branches densely fulvous tomentose or shortly pubescent. Leaves opposite; petiole 1–2 cm; blade abaxially pale, adaxially green, ovate, triangular, or ovate-triangular, 4–10 × 1.5–5 cm, rather thick, both surfaces scabrid, villous with red-brown glands, abaxially and on veins more densely so, basally 3-veined, lateral veins fine, abaxially slightly raised, base truncate or shallowly cordate, margin

sparsely coarsely and irregularly crenate or entire, or serrate on one side, or with one coarse tooth or 3-fid on each side, apex acute; leaves below synflorescence small, often entire. Synflorescence of numerous or few capitula in corymbs or compound corymbs; peduncle thick, densely shortly pubescent. Capitula ca. 20-flowered; involucre cylindric, ca. 10 × 4–5 mm; phyllaries 3- or 4-seriate, imbricate, outer phyllaries ovate, ca. 2 mm, puberulent, apex obtuse, median and inner phyllaries straw-colored, oblong, 7–8 mm, broadly 3-veined, eglandular, apex acuminate; corollas white or pink, ca. 5 mm. Achenes black-brown, ca. 4 mm, 5-ribbed, eglandular, sparsely white adpressed setuliferous along ribs. Fl. and fr. Apr–Dec. $2n = 58, 60$.

Forest margins, roadsides, open disturbed land. Introduced in Hainan during World War II; naturalized in Fujian, Hainan, and Yunnan [native to Mexico; widely naturalized in tropical Asia].

Chromolaena odorata is a competitive and pernicious weed.

245. CONOCLINIUM Candolle, Prodr. 5: 135. 1836.

锥托泽兰属 zhui tuo ze lan shu

Herbs, perennial, erect, rhizomatous. Leaves opposite; blade ovate to deltate-ovate, crenate to bipinnatifid. Synflorescence laxly cymose below, with densely cymose branches. Phyllaries 2- or 3-seriate, ca. 25, distant, mostly subequal, lanceolate; receptacle highly conical, glabrous or rarely pubescent. Florets 50–70; corollas blue or white, narrowly funnelform, with glands on outer surface; basal tube not constricted above nectary; lobes slightly longer than wide, outer surface papillose in distal half, inner surface with short bulging cells, mammillate to shortly papillose; antheropodia cylindric, often narrow; anther appendages ovate to ± quadrate, as long as wide; style base not enlarged, glabrous; style branches narrowly linear to filiform, slightly broadened distally, densely papillose. Achenes prismatic, 5-ribbed, glabrous or with a few scattered glands, rarely setuliferous above; carpodium usually obsolete, rarely distinct and asymmetrical; pappus setae uniseriate, ca. 30, barbellate, persistent, often with slightly to distinctly enlarged tips, apical cells obtuse to rounded. $x = 10$.

Four species: United States and Mexico, one species often cultivated and sometimes escaped; one species (introduced) in China.

1. *Conoclinium coelestinum* (Linnaeus) Candolle, Prodr. 5: 135. 1836.

锥托泽兰 zhui tuo ze lan

Eupatorium coelestinum Linnaeus, Sp. Pl. 2: 838. 1753.

Herbs, perennial, 0.3–2 m. Stems usually erect, sometimes decumbent or procumbent and rooting at nodes. Leaves oppo-

site, petiolate; leaf blade triangular to deltate or ovate, 2–7(–13) × 1.5–3 cm, base usually cuneate to truncate, rarely subcordate, margin serrate to serrate-dentate or crenate, apex acute. Phyllaries 3.5–4 mm; corollas blue to blue-violet or rosy violet,

(1.6–)2–2.5 mm. Achenes 1–1.5 mm, glabrous; pappus setae not dilated at apices. Fl. and fr. Aug–Oct.

Cultivated and escaped, now growing in wet areas on slopes and roadsides. Guizhou, Yunnan [native to United States].