

1. POPULUS Linnaeus, Sp. Pl. 2: 1034. 1753.

杨属 yang shu

Trees; trunk usually straight; bark furrowed or smooth, often gray or tan; pith mostly 5-angled in cross section. Terminal bud terete or angled; bud scales several, unequal. Stipules small, deciduous; petiole terete or laterally compressed; leaf blade usually ovate to deltoid-ovate. Flowering precocious; catkins pendulous. Flowers anemophilous; bracts apically lobed or lacinate, membranous, caducous; flowers with disc obliquely cupular. Male flower: stamens 4–many; filaments short, free; anthers dull red. Female flower: ovary 1-loculed; style 1, short or not; stigmas 2–4. Capsule 2–4(or 5)-valved. Seeds few to numerous, small. Cotyledons elliptic.

About 100 species: N Africa, Asia, Europe, North America; 71 species (47 endemic) in China, including at least nine hybrids.

The taxonomy of *Populus* in China, at species level, is at a preliminary stage. To reach an adequate understanding, it is necessary to make direct observations in natural populations of all morphological variations between individuals, for all species and at all seasonal developmental stages. Moreover, other methods beyond morphological studies need to be applied, especially anatomic and chemotaxonomic analyses.

- 1a. Leaves grayish blue on both surfaces; disc membranous, caducous (5. Sect. *Turanga*).
 2a. Branchlets rarely pilose; leaves glabrous; capsule glabrous; leaf margin dentate distally 70. *P. euphratica*
 2b. Branchlets, leaves, and capsule shortly tomentose; leaf margin entire or with 2 or 3 teeth apically 71. *P. pruinosa*
- 1b. Leaves not grayish blue on both surfaces; disc persistent.
 3a. Leaf margin lobed, incised, or with sinuous teeth or, if serrate, then petiole with 2 large glands at apex; bracts with long, straight marginal hairs (1. Sect. *Populus*).
 4a. Leaves of long shoots 3–5-palmately lobed, leaves of short branchlets and petioles abaxially densely white tomentose 1. *P. alba*
 4b. Leaves of long shoots not palmately lobed, leaves of short branchlets and petiole abaxially glabrous or gray tomentose.
 5a. Leaf margin incised or with sinuous teeth; buds pubescent.
 6a. Leaf apex acuminate; leaves of short branchlets usually deltoid-ovate, 7–11(–18) × 6.5–10.5(–15) cm 10. *P. tomentosa*
 6b. Leaf apex acute or obtuse; leaves of short branchlets ovate, ovate-elliptic, ovate-orbicular, or suborbicular, 3–8 × 2–7 cm.
 7a. Branchlets grayish; leaf margin obtusely notched, teeth blunt, not incurved; female catkin 5–10 cm 2. *P. canescens*
 7b. Branchlets grayish brown; leaf margin coarsely serrate, teeth acute, incurved, sometimes sinuous; female catkin 3–5 cm 6. *P. ×hopeiensis*
- 5b. Leaf margin with sinuous teeth or, if serrate, then leaf blade with 2 glands at base; bud scales usually glabrous or pilose basally and ciliate.
 8a. Leaves usually ovate to broadly ovate; petioles on short branchlets with 2 large glands at apex.
 9a. Leaf blade long acuminate or caudate at apex; petiole with 2 raised, nearly stipitate glands at apex.
 10a. Bracts palmatifid 9. *P. adenopoda*
 10b. Bracts subulate 8. *P. qionghdaoensis*
 9b. Leaf blade acute or shortly acuminate at apex; petiole with obscure, flattened glands at apex.
 11a. Leaves of short branchlets broadly ovate, margin with sinuous teeth; bud scales ciliate 12. *P. ningshanica*
 11b. Leaves of short branchlets ovate-orbicular, margin coarsely serrate; bud scales glabrous 11. *P. ×pseudotomentosa*
- 8b. Leaves usually suborbicular; petioles on short branchlets eglandular at apex (*P. davidiana* sometimes small glandular).
 12a. Branchlets brown or dull brown; leaf apex shortly acuminate or obtuse 7. *P. rotundifolia*
 12b. Branchlets purplish or reddish brown, shiny; leaf apex obtusely rounded, acute, shortly acuminate, or acuminate.
 13a. Leaf margin densely serrulate 5. *P. wulianensis*
 13b. Leaf margin with sparse or dense, sinuous teeth or serrate.
 14a. Leaf margin with sparse, sinuous teeth, apex obtusely rounded 4. *P. tremula*

- 14b. Leaf margin with dense, sinuous teeth or serrate, apex acute, shortly acuminate, or acuminate.
 - 15a. Leaf margin serrate, apex acuminate 39. *P. alashanica*
 - 15b. Leaf margin with dense, sinuous teeth, apex acute or shortly acuminate 3. *P. davidiana*
- 3b. Leaf margin serrate or nearly entire; bracts without long, marginal hairs.
 - 16a. Leaves with a well-defined, translucent margin (4. Sect. *Aigeiros*).
 - 17a. Petiole compressed, at least distally, capsule with a longer, slender stipe.
 - 18a. Leaves of short branchlets deltoid or deltoid-ovate, margin ciliate 69. *P. ×canadensis*
 - 18b. Leaves of short branchlets ovate, rhomboid, or rhombic-ovate, rarely deltoid, margin glabrous (only *P. ×beijingensis* loosely ciliate).
 - 19a. Branchlets grayish green or red; leaves of long shoots broadly ovate or deltoid-broadly ovate, those of short branchlets ovate 66. *P. ×beijingensis*
 - 19b. Branchlets yellowish; leaves of long shoots and short branchlets uniformly shaped or not, those of short branchlets rhombic-ovate-orbicular, rhombic-deltoid, or rhombic 62. *P. nigra*
 - 17b. Petiole terete or subterete; capsule with stipe short.
 - 20a. Leaves of short branchlets deltoid-orbicular or compressed orbicular, as wide as or wider than long, 2–7 cm 68. *P. afghanica*
 - 20b. Leaves of short branchlets ovate, rhombic-ovate, or rhombic-elliptic, apparently narrower than long, 5–10 cm.
 - 21a. Petiole glabrous, leaf margin with loose hairs 63. *P. ×xiaohei*
 - 21b. Petiole pilose or with loose hairs; leaf margin glabrous.
 - 22a. Branchlets pilose; leaf apex acuminate to long acuminate; petiole ca. as long as leaf blade; capsule 2- or 3-valved 65. *P. ×jrtyschensis*
 - 22b. Branchlets glabrous; leaf apex long acuminate to caudate; petiole ca. 1/3 as long as leaf blade; capsule 2-valved 67. *P. ×berolinensis*
 - 16b. Leaf margin not translucent.
 - 23a. Petiole usually glandular at apex or, if eglandular, then ca. 4/5 as long as leaf blade; leaves greenish or grayish green abaxially or, if glaucous, then densely tomentose or downy and capsule densely tomentose; flower disc parted or sinuous (2. Sect. *Leucooides*).
 - 24a. Buds, petioles, and capsules glabrous or subglabrous; petiole nearly equaling leaf blade; leaf blade broadly ovate, suborbicular, or broadly long ovate-elliptic, abaxially glabrescent ... 14. *P. wilsonii*
 - 24b. Buds, petioles, and capsules pilose (if petiole glabrous, then also violet); petiole less than 1/2 to 2/3 as long as leaf blade; leaf blade usually ovate, abaxially often tomentose.
 - 25a. Petiole violet, glabrous 15. *P. violascens*
 - 25b. Petiole red or green, not violet, pilose.
 - 26a. Leaf blade to 30 cm, base deeply cordate, often auriculate, apex acuminate; capsule ovoid, 1–1.7 cm 13. *P. lasiocarpa*
 - 26b. Leaf blade to 20 cm, base cordate to rounded, rarely truncate, apex acute or shortly acuminate; capsule broadly ovoid to globose, less than 1 cm.
 - 27a. Leaf blade to 20 cm, base subcordate to truncate; petiole downy; capsule 2-valved 16. *P. glauca*
 - 27b. Leaf blade to 14 cm, base cordate or subrounded; petiole tomentose; capsule 3- or 4-valved 17. *P. pseudoglauca*
 - 23b. Petiole usually eglandular (except *P. shanxiensis* and *P. yatungensis*); leaves often glaucous, abaxially rarely yellowish green or greenish white (*P. iliensis* greenish); flower disc entire; capsule usually glabrous or rarely pilose (3. Sect. *Tacamahaca*).
 - 28a. Petiole compressed throughout or only apically; leaves greenish or slightly greenish white abaxially.
 - 29a. Young branchlets pilose; capsule 2- or 3-valved.

- 30a. Leaves ovate-orbicular or ovate, apex shortly acuminate, base rounded or broadly cuneate 46. *P. iliensis*
 30b. Leaves rhombic-deltoid, rhombic-elliptic, or rhombic-ovate-orbicular, apex acuminate, base cuneate to broadly cuneate 61. *P. ×xiaozhuanica*
- 29b. Young branchlets glabrous; capsule 2-valved.
 31a. Capsule pilose 38. *P. minhoensis*
 31b. Capsule glabrous.
 32a. Capsule 2-valved 36. *P. ×gansuensis*
 32b. Capsule (2 or)3-valved 37. *P. wenzianica*
- 28b. Petiole terete; leaves yellowish green or glaucous abaxially.
 33a. Leaf margin revolute 20. *P. kangdingensis*
 33b. Leaf margin not revolute.
 34a. Leaf blade usually broadest at or above middle (especially on leaves of long shoots).
 35a. Leaf blade rhombic-elliptic or rhombic-obovate, base cuneate (except *P. simonii* var. *rotundifolia*); capsule 2-valved.
 36a. Petioles, veins on both leaf surfaces, catkin rachis, and capsule pilose 19. *P. przewalskii*
 36b. Petioles, veins on both leaf surfaces, catkin rachis, and capsule glabrous (catkin rachis pilose in *P. simonii* var. *liaotungensis*).
 37a. Branchlets grayish yellow; leaf margin crenate-serrate, ciliate or glabrous 64. *P. manshurica*
 37b. Branchlets yellowish brown; leaf margin serrulate, glabrous 18. *P. simonii*
- 35b. Leaf blade suborbicular or elliptic to obovate-elliptic, base rounded or shallowly cordate; capsule 3- or 4-valved.
 38a. Branchlets glabrous.
 39a. Leaf blade of short shoots suborbicular, rarely ovate-orbicular or ovate, not wrinkled adaxially, greenish abaxially, often ± as long as broad; capsule usually 2-valved 22. *P. charbinensis*
 39b. Leaf blade of short shoots elliptic to obovate-elliptic, conspicuously wrinkled adaxially, whitish or pinkish abaxially, longer than broad; capsule usually 4-valved 31. *P. koreana*
- 38b. Branchlets pilose, at least when young.
 40a. Leaves with veins glabrous, or only proximal veins with sparse hairs adaxially 29. *P. suaveolens*
 40b. Leaves with veins pilose.
 41a. Leaf blade of short shoots suborbicular, 5–8 cm; petiole more than 3/4 as long as leaf blade; capsule pilose 45. *P. pamirica*
 41b. Leaf blade of short shoots elliptic or, if suborbicular, then petiole less than 1/2 as long as leaf blade; capsule glabrous.
 42a. Branchlets angled; catkin rachis pilose 33. *P. ussuriensis*
 42b. Branchlets terete; catkin rachis glabrous 32. *P. maximowiczii*
- 34b. Leaves broadest below middle.
 43a. Branchlets and catkin rachis glabrous or, if catkin rachis pilose, then buds or leaf margins glabrous.
 44a. Leaves rhombic-elliptic, rhombic-ovate, or rarely ovate-lanceolate, margin alternating high and low serrate, teeth not arranged on same horizontal plane 21. *P. pseudosimonii*
 44b. Leaves neither rhombic-elliptic nor rhombic-ovate, margin with teeth arranged on same horizontal plane; if leaves ovate-lanceolate, then margin loosely serrate only distally.
 45a. Petiole pilose or, if glabrous (*P. koreana*), then leaves clearly wrinkled.
 46a. Catkin rachis glabrous; leaves 5–14 cm, apex obtuse, acute, or rarely shortly acuminate.
 47a. Leaves broadly ovate or ovate, both surfaces long pubescent along veins, smooth; capsule (2 or)3-valved, pilose, rarely glabrous 49. *P. pseudomaximowiczii*
 47b. Leaves elliptic, elliptic-oblong, or obovate-elliptic, both surfaces glabrous; capsule (2 or)4-valved, glabrous 31. *P. koreana*
 46b. Catkin rachis pilose; leaves 4–7 cm, apex acuminate or shortly acuminate.
 48a. Capsule glabrous, 3-valved 28. *P. nakaii*
 48b. Capsule pilose, 2- or 4-valved.

- 49a. Capsule 4-valved 34. *P. amurensis*
- 49b. Capsule 2-valved 27. *P. keerqinensis*
- 45b. Petiole glabrous, leaf surface never wrinkled.
- 50a. Bud scales ciliate; leaves suborbicular-cordate, rarely ovate-orbicular, apex shortly acuminate, usually twisted 30. *P. hsinganica*
- 50b. Bud scales glabrous; leaf neither suborbicular nor orbicular-cordate, apex acuminate, long acuminate, or caudate, rarely mucronate or, if shortly acuminate, then apex not twisted.
- 51a. Catkin rachis pilose; capsule 2- or 3(or 4)-valved.
- 52a. Stipe pilose 47. *P. talassica*
- 52b. Stipe glabrous 48. *P. platyphylla*
- 51b. Catkin rachis glabrous; capsule 3- or 4-valved.
- 53a. Branchlets terete; leaves often with prominent lateral veins adaxially, to 7 cm.
- 54a. Branchlets reddish brown or yellowish brown; leaf apex caudate or long acuminate 25. *P. trinervis*
- 54b. Branchlets yellowish green or grayish yellow; leaf apex mucronate or acuminate 23. *P. cathayana*
- 53b. Branchlets and shoots angled; leaves with obscure lateral veins adaxially, more than 7 cm.
- 55a. Leaves pilose along veins of both surfaces, at least basally, apex acuminate, ciliate; bark exfoliating (except *P. purdomii* var. *rockii*) 24. *P. purdomii*
- 55b. Leaves glabrous, or pilose only along veins abaxially, apex long acuminate, not ciliate; bark not exfoliating.
- 56a. Fruiting catkin to 35 cm; capsule (4 or)5-valved; leaves of short branchlets ovate or elliptic-ovate, 16–23 cm 59. *P. yuana*
- 56b. Fruiting catkin less than 20 cm; capsule 3- or 4-valved; leaves of short branchlets broadly ovate, ovate-orbicular, long ovate, or ovate-lanceolate, to 18 cm.
- 57a. Branchlets purplish or greenish brown; leaf apex shortly acuminate, midvein yellowish green abaxially 51. *P. szechuanica*
- 57b. Branchlets yellowish brown, with reddish tinge; leaf apex long acuminate, rarely obtuse, midvein usually reddish abaxially 52. *P. yunnanensis*
- 43b. Branchlets or shoots and catkin rachis pilose or, if catkin rachis glabrous, then buds, petioles, and leaf margins pilose.
- 58a. Leaf margin glabrous; petiole with loose hairs 26. *P. girinensis*
- 58b. Leaf margin pilose, at least at young leaf apices; petiole densely pubescent (*P. suaveolens* with loose hairs).
- 59a. Leaves glabrous or pilose along veins of one surface.
- 60a. Petiole with 2 glands at apex; branchlets reddish brown 50. *P. shanxiensis*
- 60b. Petiole eglandular; branchlets yellowish brown to brown.
- 61a. Leaves ovate, 10–15 × 8–12 cm, base cordate or rounded, apex acute, downy along veins abaxially; capsule glabrous, 4-valved; stipe 5–10 mm 57. *P. ciliata*
- 61b. Leaves ovate, 6–10 × 2.5–7 cm, base rounded, apex acuminate, pilose adaxially along veins; capsule densely downy, 2(or 3)-valved; stipe ca. 5 mm 53. *P. qamdoensis*
- 59b. Leaves pilose, at least along veins on both surfaces.
- 62a. Leaf base rounded or cuneate.
- 63a. Branchlets waxy golden, angled 40. *P. laurifolia*
- 63b. Branchlets not waxy golden, terete.
- 64a. Leaves ovate or narrowly ovate, base rounded; capsule pilose 42. *P. schneideri*
- 64b. Leaves ovate-lanceolate to narrowly lanceolate, base cuneate; capsule glabrous 41. *P. lancifolia*
- 62b. Leaf base shallowly cordate, cordate, or rarely rounded.
- 65a. Leaves of short branchlets mostly less than 10 cm.

- 66a. Buds with hairs, or bud scales ciliate.
 67a. Capsule pubescent, 2-valved, sessile; leaves ovate or broadly ovate 43. *P. pilosa*
 67b. Capsule glabrous, with short stipe, (2 or)3(or 4)-valved, leaves long elliptic, ovate-elliptic, or rhombic-elliptic 44. *P. intramongolica*
 66b. Buds glabrous.
 68a. Catkin rachis pilose; leaves usually elliptic; branchlets angled 33. *P. ussuriensis*
 68b. Catkin rachis glabrous; leaves usually broadly elliptic; branchlets terete 32. *P. maximowiczii*
 65b. Leaves of short branchlets mostly more than 10 cm.
 69a. Leaf apex acute, shortly acuminate, or acuminate; branchlets terete.
 70a. Branchlets pubescent; leaves of short branchlets ovate-orbicular or ovate 55. *P. haoana*
 70b. Branchlets tomentose; leaves of short branchlets broadly deltoid or broadly ovate-cordate.
 71a. Leaf broadly deltoid, 12–16 × ca. 10 cm, apex acuminate; capsule 2-valved, long stipitate 35. *P. candicans*
 71b. Leaf broadly ovate-cordate, to 10 × 8 cm, apex acute; capsule 4-valved, subsessile 54. *P. mainlingensis*
 69b. Leaf apex long acuminate or rarely acuminate; branchlets angled, at least when young.
 72a. Petiole glandular at apex 60. *P. yatungensis*
 72b. Petiole eglandular.
 73a. Leaves of short branchlets leathery, ovate-lanceolate or broadly lanceolate, 8–18 × 3–10 cm; fruiting catkin to 30 cm; capsule glabrous 58. *P. wuana*
 73b. Leaves of short branchlets not leathery, ovate or broadly ovate, 7–14 × 4–10 cm; fruiting catkin 8–16 cm; capsule pilose 56. *P. xiangchengensis*

1. Sect. *Populus*

白杨组 bai yang zu

Sect. *Leuce* Duby.

Bark usually grayish white, smooth, only becoming rough on old trunks. Buds tomentose or glabrous. Leaves with petioles flattened or subterete; leaf blade lobed, incised, or with sinuous teeth, abaxially tomentose or glabrous. Bracts lacinate, long ciliate. Disc sinuate. Stamens 5–12(–20). Stigma 2–4-lobed. Capsule long ellipsoid or long ovoid, usually 2-valved.

1. *Populus alba* Linnaeus, Sp. Pl. 2: 1034. 1753.

银白杨 yin bai yang

Trees to 30 m tall, suckering freely; crown broad. Branchlets at first white tomentose; shoots grayish green or brownish, terete, densely white tomentose. Buds russet, ovoid, 4–5 mm, densely white tomentose, glabrescent, shiny. Leaves of short branchlets with petiole slightly flattened, ca. as long as leaf blade; leaf blade ovate-orbicular or elliptic-ovate, 4–8 × 2–5 cm, both surfaces tomentose. Leaves of sprouts and long shoots ovate-orbicular, middle lobe much larger than lateral ones, 4–10 × 3–8 cm, adaxially white tomentose at first, somewhat glabrescent, base broadly cuneate, rounded, truncate, or subcordate, palmately 3–5-lobed; margin irregularly notched; lateral lobes spreading nearly obtusely, entire or notched-lobed. Male catkin 3–6 cm. Male flower: stamens 8–10. Female catkin 5–10 cm. Female flower: stipe short; stigma 2-lobed. Capsule narrowly conical, ca. 5 mm, glabrous, 2-valved. Fl. Apr–May, fr. May.

Native in Xinjiang; planted in Gansu, Hebei, Henan, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xinjiang [N Africa, SW and WC Asia, Europe].

1a. Crown narrowly columnar or tower-shaped 1c. var. *pyramidalis*

1b. Crown broad.

- 2a. Bark green-white; leaves of short branchlets abaxially white tomentose 1a. var. *alba*
 2b. Bark gray or bluish gray; leaves of short branchlets abaxially subglabrous 1b. var. *bachofenii*

1a. *Populus alba* var. *alba*

银白杨(原变种) yin bai yang (yuan bian zhong)

Bark usually gray-white, smooth. Crown broad. Leaves of short branchlets with leaf blade ovate-orbicular or elliptic-ovate, abaxially white tomentose, base broadly cuneate, rounded, rarely minutely cordate or truncate, margin irregularly dentate, teeth asymmetric.

Native in Xinjiang (Ertix He valley); often planted in Gansu, Hebei, Henan, S Liaoning, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [N Africa, NW Asia, Europe].

1b. *Populus alba* var. *bachofenii* (Wierzbicki ex Rochel) Wesmael in A. de Candolle, Prodr. 16(2): 324. 1868.

光皮银白杨 guang pi yin bai yang

Populus bachofenii Wierzbicki ex Rochel, Banat. Reise 77. 1838.

Bark gray or bluish gray. Crown broad. Leaves of short branchlets with leaf blade abaxially subglabrous, base truncate, margin with nearly asymmetric, notched teeth.

Planted in Xinjiang [native to WC Asia, SW Europe].

Only male specimens have been seen by the authors.

1c. *Populus alba* var. *pyramidalis* Bunge, Mém. Acad. Imp. Sci. St.-Petersbourg Divers Savans 7: 498. 1854.

新疆杨 xin jiang yang

Populus alba f. *pyramidalis* (Bunge) Dippel; *P. alba* var. *bolleana* (Lauche) Otto; *P. bolleana* Lauche.

Bark grayish white or bluish gray, smooth, slightly furrowed. Crown narrowly columnar or tower-shaped.

Leaf blade orbicular, palmately parted on sprouts and long shoots, abaxially green and subglabrous, base truncate, margin with nearly asymmetric, coarsely notched teeth. $2n = 38^*$, 40^* , 48^* .

Planted in Gansu, Hebei, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, more often in Xinjiang [native to WC Asia, Europe].

Only male specimens have been seen by the authors.

2. *Populus canescens* (Aiton) Smith, Fl. Brit. 3: 1080. 1804.

银灰杨 yin hui yang

Populus alba Linnaeus var. *canescens* Aiton, Hort. Kew. 3: 405. 1789.

Trees to 20 m tall, suckering freely; bark grayish or bluish gray, smooth, rough at base of trunk; crown spreading. Branchlets terete, often glabrous; short branchlets brownish, tomentose. Buds ovoid, brown tomentose. Leaves of short branchlets with petiole slightly compressed, nearly as long as blade, glabrous; leaf blade ovate-orbicular, ovate-elliptic, or rhombic- to ovate-orbicular, $4-8 \times 3.5-6$ cm, both surfaces glabrous or sometimes thinly tomentose abaxially, base broadly cuneate or rounded, margin with obtusely notched teeth, apex obtuse. Leaves of sprouts and long shoots with petiole gray tomentose; leaf blade broadly elliptic, abaxially gray tomentose, adaxially green, glabrous or sparsely tomentose, irregularly dentate. Male catkin 5–8 cm. Male flower: stamens 8–10. Female catkin 5–10 cm. Female flower: ovary glabrous; stipe short. Capsule long ovoid, 3–4 mm, 2-valved. Fl. Apr, fr. May.

Xinjiang [W Asia, Europe].

Regarded by many authors as a hybrid between *Populus alba* and *P. tremula*.

3. *Populus davidiana* Dode, Bull. Soc. Hist. Nat. Autun 18: 189. 1905.

山杨 shan yang

Trees to 25 m tall, suckering freely; trunk to 60 cm d.b.h.; bark grayish green or grayish white, smooth, but rough on basal part of old trunk; crown globose.

Branchlets reddish brown, terete; sprouts pubescent. Buds ovoid or ovoid-globose, glabrous, slightly viscid. Petiole laterally flattened; leaf blade deltoid-ovate-orbicular or suborbicular, 3–6 cm, larger and deltoid-ovate-orbicular on sprouts, reddish when very young, abaxially pilose, base rounded, truncate, or shallowly cordate, margin with dense, sinuate teeth, apex acute or shortly acuminate. Male catkin 5–9 cm. Male flower: stamens 5–12. Female catkin 4–7 cm, ca. 12 cm in fruit. Female flower: ovary conical; stigma red, 2-parted.

Capsule ovoid-conical, ca. 5 mm, 2-valved, shortly stipitate. Fl. Mar–Apr, fr. Apr–May. $2n = 38^*$, 44.

Mountains; 100–3800 m. Anhui, Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Korea, Mongolia, E Russia].

1a. Branchlets, petioles, and leaf blades glabrous

or pilose when very young 3a. var. *davidiana*

1b. Branchlets, petioles, and leaf blades

abaxially pilose 3b. var. *tomentella*

3a. *Populus davidiana* var. *davidiana*

山杨(原变种) shan yang (yuan bian zhong)

Populus davidiana f. *ovata* C. Wang & S. L. Tung; *P. davidiana* f. *pendula* (Skvortzov) C. Wang & Tung; *P. davidiana* var. *pendula* Skvortzov; *P. tremula* Linnaeus var. *davidiana* (Dode) C. K. Schneider; *P. wutanica* Mayr.

Branchlets, petioles, and leaf blades smooth.

Mountains; 100–3800 m. Anhui, Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Korea, Mongolia, E Russia].

3b. *Populus davidiana* var. *tomentella* (C. K. Schneider)

Nakai, Fl. Sylv. Kor. 18: 191. 1930.

茸毛山杨 rong mao shan yang

Populus tremula var. *davidiana* f. *tomentella* C. K. Schneider in Sargent, Pl. Wilson. 3: 25. 1916.

Branchlets, petioles, and leaf blades abaxially pilose. Mountain slopes; 2300–3000 m. Gansu (Laojun Shan), Sichuan, Yunnan [Korea].

4. *Populus tremula* Linnaeus, Sp. Pl. 2: 1043. 1753.

欧洲山杨 ou zhou shan yang

Trees to 20 m tall; bark grayish green, smooth, irregularly fissured or scabrous at base of trunk; crown globose, open. Branchlets grayish brown, terete; 1-year-old branchlets reddish brown, shiny, glabrous or pubescent. Buds ovoid-globose. Petiole compressed, ca. as long as leaf blade; leaf blade suborbicular, 3–7 cm, both surfaces glabrous, or pilose at first, base truncate, rounded, or shallowly cordate, margin with remotely sinuous teeth or crenate, apex obtuse-rounded, rarely apiculate. Sprouts with leaf blade larger, deltoid-ovate-orbicular, base cordate or truncate, margin crenate-serrate. Male catkin 5–8 cm; rachis pubescent. Male flower: stamens 5–10 or more. Female catkin 4–6 cm, to 10 cm in fruit. Capsule narrowly conical, glabrous, 2-valved, subsessile. Fl. Apr, fr. May. $2n = 38$.

River valleys, open or scattered coniferous forests; 700–2300 m. Xinjiang [Kazakhstan, Mongolia, Russia; Europe].

5. *Populus wulianensis* S. B. Liang & X. W. Li, Bull. Bot. Res., Harbin 6(2): 135. 1986.

五莲杨 wu lian yang

Trees to 12 m tall; trunk erect; bark grayish green or grayish white, rough on basal part of old trunk; crown long ovoid or ovoid. Juvenile branchlets russet, terete, pubescent at first, glabrescent. Buds russet, conical or ovoid-conical, slightly viscid. Petiole laterally flattened, apex with 2 cupular glands; leaf blade ovate-orbicular or deltoid-ovate, 4–7 × 4–7 cm, base cordate to subcordate, margin serrulate, apex shortly acute. Leaf blade of sprouts and vigorous shoots oblong-ovate, 9–13 × 7–11 cm, base subcordate or subtruncate abaxially. Female catkin 4–8 cm, 5–8 cm in fruit; rachis pilose. Female flower: ovary glabrous; stigma 4-lobed. Capsule long ovoid, 2-valved. Fl. Apr, fr. May.

• Mountains; 300–500 m. Shandong (Muping Xian, Wulian Xian).

6. *Populus ×hopeiensis* Hu & Chow in Hu, Bull. Fan Mem. Inst. Biol. 5: 305. 1931.

河北杨 he bei yang

Trees to 30 m tall; bark yellowish green to grayish white, smooth; crown large and rounded. Branchlets grayish brown, terete, glabrous, yellowish brown and pubescent when young. Buds long ovoid or ovoid-globose, pubigerous. Petiole laterally flattened, ca. as long as or shorter than blade; leaf blade ovate or suborbicular, 3–8 × 2–7 cm, abaxially greenish, tomentose when leaves unfold, adaxially dull green, pilose at first, base truncate, rounded or broadly cuneate, margin coarsely dentate, teeth sinuous or not, acute and incurved. Male catkin ca. 5 cm; rachis with dense hairs. Female catkin 3–5 cm; rachis pubescent. Female flower: ovary ovoid, glabrous; stigma 2-lobed. Capsule 2-valved, shortly stipitate. Fl. Apr, fr. May–Jun. $2n = 38^*$, 40^* , 46^* , 57^* .

• Along rivers, valleys, alluvial deposits; 700–1600 m. Gansu, Hebei, Nei Mongol, Shaanxi; often planted elsewhere.

A natural hybrid between *Populus davidiana* and *P. tomentosa*.

7. *Populus rotundifolia* Griffith, Not. Pl. Asiat. 4: 382. 1854.

圆叶杨 yuan ye yang

Trees to 20 m tall; bark grayish white, smooth. Old branches gray; branchlets dull brown, at first pilose, glabrescent. Buds reddish brown, ovoid or conical; scales white downy, viscid. Leaves of short branchlets with petiole compressed, 3.5–6.5 cm; leaf blade ovate-orbicular or deltoid-orbicular, 5.5–8.5 × 5–8 cm, larger on sprouts, abaxially grayish green, adaxially green, both surfaces white downy when leaves unfold, base shallowly to deeply cordate or truncate, margin sinuously obtusely serrate, apex shortly acuminate or obtuse. Leaves of sprouts with petiole shorter; leaf blade ovate-orbicular, larger, base cuneate or subcordate. Female catkin 4–7 cm, ca. 10 cm in fruit; rachis pilose. Female flower: ovary long ovoid, glabrous; style short or subsessile; stigma 2-parted. Capsule long ovoid, 2-valved.

Mountain slopes; ca. 2800 m. Gansu, Guizhou, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan].

1a. Style short or subsessile; stigma 2-parted, each part diverging 7a. var. *duclouxiana*

1b. Style evident; stigma 2-lobed, each lobe broad, 3-parted or -lobed 7b. var. *bonatii*

7a. *Populus rotundifolia* var. ***duclouxiana*** (Dode) Gombocz, Math. Termesz. Kozl. 30: 130. 1908.

清溪杨 qing xi yang

Populus duclouxiana Dode, Bull. Soc. Nat. Hist. Autun. 18: 190. 1905.

Female flower: style short or subsessile; stigma 2-parted, each part diverging.

• Mountain slopes; ca. 2800 m. Gansu, Guizhou, Shaanxi, Sichuan, Xizang, Yunnan.

This variety differs from var. *rotundifolia* (which occurs in Bhutan) as follows: leaves deltoid-orbicular, larger, apex shortly acuminate or obtuse; female catkin usually more than 10 cm.

7b. *Populus rotundifolia* var. ***bonatii*** (H. Léveillé) C. Wang & S. L. Tung, Fl. Reipubl. Popularis Sin. 20(2): 15. 1984.

滇南山杨 dian nan shan yang

Populus bonatii H. Léveillé, Monde Pl. 12: 9. 1910.

Female flower: style evident; stigma 2-lobed, each lobe broad, 3-parted or -lobed.

• Sichuan, Yunnan (Kunming to Dali).

8. *Populus qionghaensis* T. Hong & P. Luo, Bull. Bot. Res., Harbin 7(3): 67. 1987.

琼岛杨 qiong dao yang

Trees to 40 m tall; trunk to 1.7 m d.b.h.; bark grayish black, shallowly furrowed. Juvenile branchlets dark green; older branchlets brown to gray. Buds ovoid or narrowly ovoid, yellow-green, canescent or glabrous, brown at margin. Petiole 3–6 cm, laterally flattened, apex with 2 glands or eglandular; leaf blade ovate, narrowly ovate, or broadly ovate 7–13.5 × 5.5–10.5 cm, abaxially glaucous, pilose or glabrous along veins, adaxially grayish green, base rounded, truncate, or broadly cuneate, margin with loose, glandular saw teeth, apex acuminate to acute. Long shoots densely pubescent; petiole 2–3 cm, laterally flattened, apex with 2 glands; leaf blade broadly ovate, 9–13 × 6.5–10.5 cm, abaxially densely pubescent along veins, base truncate or subcordate, margin coarsely glandular dentate, apex shortly acuminate. Female catkin ca. 8 cm; rachis pilose; bracts subulate. Female flower: disc cupular, irregularly serrate; ovary ovoid, with 4 ovules; stigma reddish, cristate. Capsule 2-valved. Fl. Jan.

• Mountains; ca. 1200 m. Hainan (Bawangling).

9. Populus adenopoda Maximowicz, Bull. Soc. Imp. Naturalistes Moscou 54(1): 50. 1879.

响叶杨 *xiang ye yang*

Trees to 30 m tall; bark grayish white, smooth, becoming dark gray, furrowed; crown ovoid. Old branches grayish brown, glabrous; branchlets slender or robust, dull reddish brown pubescent. Buds conical, viscid, glabrous. Petiole very laterally flattened, 2–8(–12) cm, tomentose or downy; leaf blade ovate-orbicular or ovate, 5–15 × 4–7(–13) cm, abaxially grayish green, densely pubescent when young, adaxially dark green, glabrous or downy along veins, shiny, base truncate or cordate, rarely subrounded or cuneate, with 2 raised glands, margin incurved, glandular crenate-serrate or loosely or coarsely dentate, apex long acuminate or caudate. Male catkin 6–10 cm. Male flower: disc dentate-lobed. Fruiting catkin 12–20(–30) cm; rachis pilose; bracts palmatifid, brown, obovate-elliptic, ca. 2.5 mm, ciliate. Capsule long ovoid-ellipsoid, (2–)4–6 mm, glabrous, 2-valved, shortly stipitate, apex acute. Seeds dark. Fl. Mar–Apr, fr. Apr–May.

• Mountain slopes; 300–2500 m. Anhui, Fujian, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang.

Used for timber, construction, making furniture, farm tools, and wood pulp.

- 1a. Branchlets slender; leaves 5–15 × 4–7 cm, margin incurved, crenate-serrate 9a. var. *adenopoda*
- 1b. Branchlets robust; leaves ca. 15 × 13 cm, margin sparsely dentate to coarsely saw dentate 9b. var. *platyphylla*

9a. Populus adenopoda var. *adenopoda*

响叶杨(原变种) *xiang ye yang* (yuan bian zhong)

Populus adenopoda f. *cuneata* C. Wang & S. L. Tung; *P. adenopoda* f. *microcarpa* C. Wang & S. L. Tung; *P. silvestrii* Pampanini; *P. tremula* Linnaeus var. *adenopoda* (Maximowicz) Burkill.

Branchlets slender. Leaf blade 5–15 × 4–7 cm, margin incurved, crenate-serrate.

• Mountain slopes; 300–2500 m. Anhui, Fujian, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang.

9b. Populus adenopoda var. *platyphylla* C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 114. 1982.

大叶响叶杨 *da ye xiang ye yang*

Branchlets robust. Leaf blade ovate-orbicular, large, ca. 15 × 13 cm, margin sparsely dentate to coarsely saw dentate.

• Yunnan.

10. Populus tomentosa Carrière, Rev. Hort. 1867: 340. 1867.

毛白杨 *mao bai yang*

Trees to 30 m tall; trunk usually erect; bark at first dull gray, becoming grayish green to grayish white, later dark gray on basal part of trunk, furrowed, rough; crown conical to ovoid-globose, globose, or fastigiate. Lateral branches spreading, pendulous when old;

branchlets at first gray tomentose, glabrescent. Buds ovoid, ovoid-globose, or subglobose, tomentulose. Leaves of short branchlets often smaller; petiole laterally flattened, slightly shorter than blade; leaf blade ovate or deltoid-ovate, 7–11 × 6.5–10.5 cm, abaxially tomentose when leaves unfold, glabrescent, adaxially dark green, shiny, base shallowly cordate to cordate or truncate, margin sinuate-dentate, apex acuminate. Long shoots with petiole 3–7 cm, compressed distally; leaf blade broadly ovate or deltoid-ovate, 10–15 × 8–13 cm, abaxially densely tomentose, glabrescent, adaxially dull green, smooth, base cordate or truncate, usually 2(–4)-glandular, margin with deeply coarse or sinuate teeth, apex shortly acuminate. Male catkin 10–14(–20) cm. Male flower: stamens 6–12. Female catkin 4–7 cm, to 14 cm in fruit. Female flower: ovary long ellipsoid; style pink, 2-lobed. Capsule conical or long ovoid, 2-valved. Fl. Mar, fr. Apr–May. $2n = 38^*$, 40^* , 57^* .

• Plains; near sea level to 1500 m. Anhui, Gansu, Hebei, Henan, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang.

Used for wood pulp, timber for construction, making farm tools, furniture, and matchwood; also commonly planted along streets and as an ornamental.

- 1a. Leaves of short branchlets with cordate bases 10a. var. *tomentosa*
- 1b. Leaves of short branchlets with truncate bases 10b. var. *truncata*

10a. Populus tomentosa var. *tomentosa*

毛白杨(原变种) *mao bai yang* (yuan bian zhong)

Populus glabrata Dode; *P. pekinensis* L. Henry.

Crown conical to ovoid-globose or globose. Leaf blade of short branchlets cordate at base.

• Plains; near sea level to 1500 m. Anhui, Gansu, Hebei, Henan, Jiangsu, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang.

10b. Populus tomentosa var. *truncata* Y. C. Fu & C. H. Wang, Acta Phytotax. Sin. 13(3): 95. 1975.

截叶毛白杨 *jie ye mao bai yang*

Bark grayish green, smooth. Crown dense. Leaves appearing early; leaf blade of short branchlets usually truncate at base.

• Shaanxi.

Fast-growing trees.

11. Populus ×pseudotomentosa C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 22. 1979.

响毛杨 *xiang mao yang*

Trees. Juvenile branchlets purplish brown, smooth. Buds yellowish brown, ovoid, apex acute. Petiole and leaves of long shoots abaxially densely white tomentose; leaf blade of short branchlets ovate-orbicular, smaller, to 9 cm, base cordate and usually with 2 conspicuous glands, margin irregularly coarsely undulate dentate and shallowly small serrate, apex acute.

• Cultivated. Henan, Shandong, Shanxi.

Probably a natural hybrid between *Populus adenopoda* and *P. tomentosa*.

12. *Populus ningshanica* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 19. 1979.

汉白杨 han bai yang

Trees to 18 m tall; trunk to 30 cm d.b.h.; bark of young trees bluish gray, becoming bluish white; crown narrowly oblong. Branches spreading; branchlets dull purplish brown, at first pubescent, glabrescent. Buds ovoid, slightly viscid, shiny; scales ciliate at margin. Petiole laterally flattened, terete near base, 1.5–5(–6) cm, pilose, with 2 large, flattened glands at apex; leaf

blade broadly ovate, red when young, 3–10 × 3–8 cm, both surfaces pilose along veins, later glabrous, abaxially greenish, adaxially dark green, base shallowly cordate or rounded to rounded-cuneate, margin remotely glandular sinuate-serrate, apex shortly acuminate. Fruiting catkin ca. 10 cm. Capsule 2-valved.

• Forests; 700–800 m. Hubei, Shaanxi.

Similar to *Populus adenopoda* but 1-year-old branchlets dark purple, smooth, pilose; bud scales ciliate at margin; leaf blade remotely sinuate-serrate at margin, shortly acuminate at apex. Similar also to *P. davidiana* but bud scales ciliate at margin; petiole with 2 large glands at apex; leaf blade nearly deltoid-ovate, apex shortly acuminate.

2. Sect. *Leucoides* Spach, Ann. Sci. Nat., Bot., sér. 2, 15: 30. 1841.

大叶杨组 da ye yang zu

Bark exfoliating, rough. Buds conical, slightly viscid, smooth. Leaves of short branchlets and long shoots with petiole terete or slightly compressed distally; leaf blade suborbicular, base cordate or deeply cordate. Disc parted or sinuate, persistent. Male flower: stamens 12–40; anthers long elliptic, apex apiculate. Female flower: ovary downy (or glabrous); style elongate; stigma 2- or 3-lobed. Capsule pilose, 2- or 3(or 4)-valved.

13. *Populus lasiocarpa* Olivier in Hooker's Icon. Pl. 20: t. 1943, 1890.

大叶杨 da ye yang

Trees to 20 m tall; trunk to 50 cm d.b.h.; bark dark gray, furrowed; crown tower-shaped or rounded. Branchlets yellowish brown or slightly purplish brown, coarsely robust, loose, angled, tomentose when young, or pilose to glabrescent. Buds ovoid-conical, large, slightly viscid; basal scale tomentose. Petiole red, terete, 5–8 cm, pilose; leaf blade ovate, 15–30 × 10–15 cm, abaxially greenish, tomentose along veins, adaxially bright green, glabrous, densely downy at base, base deeply cordate, often auriculate, often 2-glandular, margin glandular crenate-serrate, revolute, apex acuminate, rarely shortly acuminate. Male catkin 9–12 cm; rachis pilose; bracts russet, oblanceolate, smooth, apex lacinate. Male flower: stamens 30–40. Fruiting catkin 15–24 cm; rachis pilose. Capsule ovoid, 1–1.7 cm, tomentose, 3-valved, shortly stipitate or sessile. Seeds oblong, 3–3.5 mm. Fl. Apr–May, fr. May–Jun.

• Mountain slopes, riverside woods; 1300–3500 m. Guizhou, Hubei, Shaanxi, Sichuan, Yunnan.

1a. Capsule stipitate, 1–1.7 cm; fruiting catkin 15–24 cm 13a. var. *lasiocarpa*

1b. Capsule sessile, 1.6–1.9 cm; fruiting catkin to 40 cm 13b. var. *longiamenta*

13a. *Populus lasiocarpa* var. *lasiocarpa*

大叶杨(原变种) da ye yang (yuan bian zhong)

Fruiting catkin 15–24 cm. Capsule 1–1.7 cm, stipitate.

• Mountain slopes, riverside woods; 1300–3500 m. Guizhou, Hubei, Shaanxi, Sichuan, Yunnan.

13b. *Populus lasiocarpa* var. *longiamenta* P. Y. Mao & P. X. He, Bull. Bot. Res., Harbin 6(2): 79. 1986.

长序大叶杨 chang xu da ye yang

Fruiting catkin to 40 cm. Capsule 1.6–1.9 cm, sessile.

• Mountain slopes; 1700–1900 m. Yunnan (Yiliang Xian, Zhenxiang Xian).

14. *Populus wilsonii* C. K. Schneider in Sargent, Pl. Wilson. 3: 16. 1916.

椅杨 yi yang

Populus wilsonii f. *brevipetiolata* C. Wang & S. L. Tung; *P. wilsonii* f. *pedicellata* C. Wang & S. L. Tung.

Trees to 25 m tall; trunk to 1.5 m d.b.h.; bark dark grayish brown, slightly furrowed, exfoliating; crown broadly tower-shaped. Branchlets purple or dull brown when young, becoming grayish brown, terete, coarsely robust, smooth, pilose. Buds russet or purplish brown, ovoid-globose, large, glabrous, slightly viscid. Petiole purple, terete, (4–)6–16 cm, glabrous, apex slightly angled, sometimes glandular; leaf blade broadly ovate, suborbicular, or broadly ovate-elliptic, 8–20 × 7–15 cm, abaxially tomentose at first, glabrescent, grayish green, adaxially bluish green, pilose along veins or glabrous at base, base cordate to rounded-truncate, margin glandular crenate, apex obtuse; veins raised abaxially. Male catkin ca. 7 cm. Fruiting catkin to 15 cm; rachis pubescent. Capsule ovoid, subglabrous, stipitate. Fl. Apr–May, fr. May–Jun.

• Forests; 1300–3400 m. Gansu, Hubei, Shaanxi, Sichuan, Xizang, Yunnan.

15. *Populus violascens* Dode, Bull. Soc. Dendrol. France 31. t. 3. 1921.

堇柄杨 jin bing yang

Trees to 20 m tall; bark dark gray, furrowed. Branchlets yellowish brown, coarsely robust. Leaves of short branchlets with petiole violet, 2–3 cm, glabrous; leaf blade ovate to lanceolate, margin glandular serrate; veins white villous abaxially, subglabrous adaxially. Long shoots with leaf blade elliptic-ovate to long elliptic-ovate, 10–15 cm, base subcordate, apex acute.

Similar to *Populus lasiocarpa*. Described by L.-A. Dode using a plant cultivated in Paris, introduced from C China; to date, no specimens have been collected that agree with the original description.

16. *Populus glauca* H. H. Haines, J. Linn. Soc., Bot. 37: 408. 1906.

灰背杨 hui bei yang

Trees to 10 m tall; bark gray. Branchlets brown or purplish brown, villous when young. Buds pilose. Petiole terete, short, downy; leaf blade ovate, ca. 20 × 18 cm, abaxially pale, pilose along veins, adaxially green, pubescent along veins, base shallowly cordate or truncate, apex acute. Flowers usually bisexual; disc 5–7-lobed; stamens 6–12. Fruiting catkin very long; rachis pilose. Capsule subglobose, pilose, 2-valved.

Forests; 2500–3300 m. Sichuan, Xizang, Yunnan [India, Sikkim].

3. Sect. *Tacamahaca* Spach, Ann. Sci. Nat., Bot., sér. 2, 15: 32. 1841.

青杨组 qing yang zu

Bark furrowed. Buds usually large, very viscid, with a strongly balsamic odor. Leaves of long shoots and short branchlets variously shaped; petiole terete or subquadrate, of varying length, sulcate; leaf blade abaxially usually white, adaxially green, base cuneate or rounded to shallowly cordate, without translucent margin. Bracts not fringed. Male flower: stamens 8–60; anthers long elliptic to globose. Female flower: disc usually entire, persistent; style short or absent; stigma 2–4-lobed. Capsule 2–4(or 5)-valved.

18. *Populus simonii* Carrière, Rev. Hort. 1867: 360. 1867.

小叶杨 xiao ye yang

Trees to 20 m tall; trunk to 50 cm d.b.h.; bark grayish green when young, dark gray on old trees, furrowed; crown subrounded. Branchlets of young trees and sprouts usually russet, becoming yellowish brown, conspicuously angled; branchlets of old trees terete, slender, glabrous. Buds brown, elongate, viscid, apex acuminate. Petiole yellowish green or reddish, terete, 0.5–4 cm; leaf blade rhombic-ovate, rhombic-elliptic, or rhombic-obovate, 3–12 × 2–8 cm, broadest above middle, abaxially grayish green or slightly white, adaxially brightly greenish, glabrous, base cuneate, broadly cuneate, or narrowly rounded, margin serrulate, apex abruptly acute or acuminate. Male catkin 2–7 cm; rachis glabrous; bracts greenish, lacinate, lobes brown, glabrous. Male flower: stamens 8–9(–25). Female catkin 2.5–6 cm, to 15 cm in fruit. Female flower: stigma 2-lobed. Capsule small, glabrous or pubescent, 2(or 3)-valved. Fl. Mar–May, fr. Apr–Jun. $2n = 38^*$ Mountains, plains, alluvial deposits, valleys; near sea level to 3000 m. Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang [Mongolia]. Used for timber.

- 1a. Leaves with short, soft hairs along veins adaxially and on petioles.
 - 2a. Leaves rhombic-broadly ovate, wider than long, pubescent with short, soft hairs only along veins adaxially; catkin rachis glabrous 18b. var. *latifolia*
 - 2b. Leaves rhombic, longer than wide, axils pubescent with short, soft hairs

17. *Populus pseudoglauc*a C. Wang & P. Y. Fu, Acta Phytotax. Sin. 12: 191. 1974.

长序杨 chang xu yang

Trees to 7 m tall. One-year-old branchlets purplish brown, elongate, tomentose or subglabrous; juvenile branchlets grayish white, densely tomentose. Buds purple, villous, viscid. Petiole terete, 3–6 cm, densely tomentose; leaf blade ovate to broadly ovate, 11–14 cm, abaxially glaucous, densely tomentose, adaxially green, pubescent along veins, base cordate or subrounded, margin glandular crenate-serrate, apex acute or shortly acuminate. Fruiting catkin to 40 cm; rachis pilose.

Capsule tomentose, 3- or 4-valved, subsessile. Fl. May, fr. Jun–Jul.

• Mountain slopes; 2100–2700 m. Sichuan, Xizang (Bomi Xian).

- along veins; catkin rachis pubescent with short, soft hairs 18c. var. *liaotungensis*
- 1b. Leaves and petioles glabrous.
 - 3a. Leaves rhombic 18a. var. *simonii*
 - 3b. Leaves ovate-lanceolate, suborbicular, or obovate.
 - 4a. Leaves suborbicular or obovate 18d. var. *rotundifolia*
 - 4b. Leaves ovate-lanceolate 18e. var. *tsinlingensis*

18a. *Populus simonii* var. *simonii*

小叶杨(原变种) xiao ye yang (yuan bian zhong)

Populus balsamifera Linnaeus var. *simonii* Wesmael; *P. laurifolia* Ledebour var. *simonii* Regel; *P. simonii* f. *fastigiata* C. K. Schneider; *P. simonii* f. *pendula* C. K. Schneider; *P. simonii* f. *robusta* C. Wang & S. L. Tung.

Leaves rhombic-ovate, rhombic-elliptic, or rhombic-obovate, glabrous.

Mountains, plains; near sea level to 2500 m. Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Yunnan [Mongolia].

18b. *Populus simonii* var. *latifolia* C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 116. 1982.

宽叶小叶杨 kuan ye xiao ye yang

Trunk straight. Juvenile branchlets pilose. Leaves of short branchlets with petiole proximally and distally pilose; leaf blade usually rhombic-broadly ovate, adaxially pubescent along veins, base broadly cuneate, apex acute.

• C Liaoning (Anshan Shi).

Used for timber.

18c. *Populus simonii* var. *liaotungensis* (C. Wang & Skvortzov) C. Wang & S. L. Tung, Fl. Reipubl. Popularis Sin. 20(2): 27. 1984.

辽东小叶杨 *liao dong xiao ye yang*

Populus liaotungensis C. Wang & Skvortzov in Liou & al., Ill. Man. Woody Pl. N.-E. China 119. 1955; *P. simonii* var. *breviamentata* T. Y. Sun; *P. simonii* f. *liaotungensis* (C. Wang & Skvortzov) Kitagawa.

Petiole pilose; leaf blade pubescent along veins. Catkin rachis pubescent. Capsule pubescent, shortly stipitate.

• Plains, alluvial deposits. Hebei, Liaoning, Nei Mongol.

18d. *Populus simonii* var. *rotundifolia* S. C. Lu ex C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 116. 1982.

圆叶小叶杨 *yuan ye xiao ye yang*

Trees usually small. Leaf blade suborbicular or obovate-orbicular, abaxially pale, adaxially dark green, leathery, apex subrounded.

• Plains. Nei Mongol.

18e. *Populus simonii* var. *tsinlingensis* C. Wang & C. Y. Yu, Fl. Tsinling. 1(2): 597. 1974.

秦岭小叶杨 *qin ling xiao ye yang*

Leaf blade ovate-lanceolate, leathery, base broadly cuneate or subrounded, margin remotely serrulate and glandular distally; veins raised, midvein and 2 lateral veins more so at base.

• Valleys; 1000–3000 m. S Shaanxi (Qinling Mountains).

19. *Populus przewalskii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 540. 1882.

青甘杨 *qing gan yang*

Populus simonii Carrière var. *griseoalba* T. Y. Sun; *P. simonii* var. *ovata* T. Y. Sun; *P. simonii* f. *przewalskii* (Maximowicz) Rehder; *P. suaveolens* Fischer var. *przewalskii* (Maximowicz) C. K. Schneider.

Trees to 20 m tall; trunk straight; bark grayish white, smooth, furrowed near base. Petiole 2–2.5 cm, pilose; leaf blade rhombic-ovate, 4.5–7 × 2–3.5 cm, abaxially glaucescent, adaxially green, base cuneate, margin serrulate, entire near base, apex shortly acuminate; veins pilose on both surfaces. Male catkin slender, ca. 4.5 cm; rachis pilose. Disc slightly sinuate-nicked. Female flower: ovary ovoid, tomentose; stigma 2-lobed, each lobe forked. Capsule ovoid, pubescent, 2-valved.

• Gansu, Nei Mongol, Qinghai, Sichuan.

20. *Populus kangdingensis* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 19. 1979.

康定杨 *kang ding yang*

Trees to 10 m tall; bark grayish white to gray, furrowed. Branchlets russet to brown, angled, pubescent. Buds dark russet, conical, ca. 1 cm, viscid. Petiole 1–3.5 cm, pilose; leaf blade rhombic-elliptic or long elliptic-lanceolate, rarely ovate, broadest at or below middle, 3–9 × 1–5 cm, abaxially yellowish, adaxially green, base cuneate or broadly cuneate, margin densely glandular serrulate, revolute, apex acute or acuminate.

• Meadows by rivers; ca. 3500 m. W Sichuan.

Similar to *Populus simonii*, but branchlets and petioles pilose; leaf blade rhombic-elliptic, veins pilose, margin revolute, glandular serrulate.

21. *Populus pseudosimonii* Kitagawa, Bull. Inst. Sci. Res. Manch. 3: 601. 1939.

小青杨 *xiao qing yang*

Trees to 20 m tall; bark grayish white, shallowly furrowed when mature; crown broadly ovate.

Branchlets grayish or yellowish brown, green or brownish green and angled when young, terete; sprouts conspicuously angled. Buds yellowish red, conical, slender, viscid. Petiole terete, 1.5–5 cm, sometimes pubescent at apex; leaf blade rhombic-elliptic, rhombic-ovate-orbicular, ovate-orbicular, or ovate-lanceolate, 4–9 × 2–5 cm, broadest below middle, abaxially greenish white, adaxially dull green, glabrous, base cuneate, broadly cuneate, or rarely subrounded, margin alternating high and low serrate, ciliate, apex acuminate or shortly acuminate. Sprouts with petiole shorter; leaf blade larger, long elliptic, base suborbicular, margin crisped. Male catkin 5–8 cm. Female catkin 5.5–11 cm. Female flower: ovary globose or conical, glabrous; stigma 2-lobed. Capsule oblong, ca. 8 mm, 2- or 3-valved, subsessile, apex acuminate. Fl. Mar–Apr, fr. Apr–May(–Jun). $2n = 36^*, 38^*, 40^*, 41^*$.

• Mountain slopes, valleys, along rivers; below 2300 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan.

- 1a. Catkin rachis glabrous; capsule subsessile; branchlets slightly ascending 21a. var. *pseudosimonii*
1b. Catkin rachis sparingly pilose; capsule clearly stipitate; branchlets spreading or pendulous 21b. var. *patula*

21a. *Populus pseudosimonii* var. *pseudosimonii*

小青杨(原变种) *xiao qing yang* (*yuan bian zhong*)

Branchlets slightly ascending. Catkin rachis glabrous. Capsule subsessile.

• Mountain slopes, valleys, along rivers; ca. 2300 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan.

21b. *Populus pseudosimonii* var. *patula* T. Y. Sun, J. Nanjing Forest. Univ. 4: 113. 1986

展枝小青杨 *zhan zhi xiao qing yang*

Branchlets spreading or pendulous. Catkin rachis sparingly pilose. Capsule clearly stipitate.

• Nei Mongol (Hohhot, Wuchuan Xian).

22. *Populus charbinensis* C. Wang & Skvortzov in Liou & al., Ill. Man. Woody Pl. N.-E. China 550, 120. 1955.

哈青杨 *ha qing yang*

Trees to 20 m tall; bark grayish green at first, becoming dark gray on old trees; crown broadly ovoid. Branchlets reddish brown, subterete or slightly angled, glabrous. Buds brown, long ovoid, viscid, apex acuminate.

Leaves on fruiting branchlets with petiole 4–4.5 cm; leaf blade usually suborbicular, rarely ovate-orbicular or ovate, broadest at or sometimes above middle, ca. as

long as broad, pilose, abaxially greenish, glabrous, adaxially green, pubescent along veins, both surfaces pubescent along veins when young, base rounded or broadly cuneate, margin serrulate, entire proximally, ciliate. Sprouts with petiole terete, 1.5–2.3 cm; leaf blade obovate-orbicular, 5–6.5 × 3–4.2 cm, broadest above middle, base broadly cuneate, margin serrulate, densely ciliate, apex acute or shortly acuminate. Male catkin ca. 6 cm; rachis pilose; bracts yellowish brown with brown lobes. Male flower: stamens 15. Female catkin ca. 9 cm, 10–12 cm in fruit; rachis glabrous or pilose at base; flowers shortly stipitate. Capsule glabrous, 2(or 3)-valved. Fl. Apr–May, fr. Jun.

• Heilongjiang, N Liaoning.

Probably a hybrid between *Populus ×berolinensis* and *P. simonii*. Resembling the former in its grayish green, smooth bark, furrowed only at base of old trunks, and caducous leaves; resembling the latter in its branchlet color, viscid buds, angled sprouts, and shape of leaves of sprouts. Similar also to *P. cathayana* but leaf blade broadly cuneate basally, and to *P. pseudosimonii* but bark greenish; 1-year-old branchlets reddish; buds more viscid; leaf blade of sprouts obovate, caducous.

Both varieties are important for reforestation.

1a. Leaf margin and petiole glabrous 22a. var. *charbinensis*

1b. Leaf margin and petiole pubescent 22b. var. *pachydermis*

22a. Populus charbinensis var. **charbinensis**

哈青杨(原变种) ha qing yang (yuan bian zhong)

Petiole and leaf margin glabrous.

• Heilongjiang.

22b. Populus charbinensis var. **pachydermis** C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 117. 1982.

厚皮哈青杨 hou pi ha qing yang

Trunk straight, terete; bark thick and deeply furrowed at base. Branches short. Petiole and leaf margin pubescent.

• Heilongjiang (Lindian Xian), N Liaoning.

23. Populus cathayana Rehder, J. Arnold Arbor. 12: 59. 1931.

青杨 qing yang

Trees to 30 m tall; crown broadly ovoid. Branchlets olive green when young, becoming orange to grayish yellow, terete, sometimes angled, glabrous. Buds purplish brown or yellowish brown, long conical, glabrous, viscid. Leaves of short branchlets with petiole terete, 2–7 cm, glabrous; leaf blade ovate, elliptic-ovate, elliptic, or narrowly ovate, sometimes broadly or orbicular-ovate, (4.5–)5–10 × 3.5–7(–8.5) cm, broadest below middle, abaxially greenish white, adaxially bright green, glabrous, base rounded, rarely subcordate or broadly cuneate, apex acuminate or mucronate; lateral veins 5–7 on each side, raised. Leaves on long shoots larger, ovate-oblong, 10–20 cm, base usually slightly cordate. Male catkin 5–6 cm. Male flower: stamens 30–35. Female catkin 4–5 cm, 10–15(–20) cm

in fruit. Female flower: stigma 2–4-lobed. Capsule ovoid, 6–9 mm, (2 or)3- or 4-valved. Fl. Mar–May, fr. May–Jul. 2n = 38*, 40*.

• Valleys, along rivers; 800–3000 m. S Gansu, Hebei, Liaoning, Nei Mongol, E Qinghai, Shaanxi, Shanxi, Sichuan, Yunnan, Zhejiang.

1a. Capsule with long stipe to 5 mm 23c. var. *pedicellata*

1b. Capsule with shorter stipe.

2a. Leaf blade broadly ovate 23b. var. *latifolia*

2b. Leaf blade narrowly ovate 23a. var. *cathayana*

23a. Populus cathayana var. **cathayana**

青杨(原变种) qing yang (yuan bian zhong)

Bark at first grayish green and smooth, becoming dull gray and furrowed when old. Leaf blade ovate, elliptic-ovate, elliptic, or narrowly ovate, margin glandular crenate-serrate.

• Valleys, along rivers; 800–3000 m. Hebei, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan.

Cultivated in plantations and shade belt forests.

23b. Populus cathayana var. **latifolia** (C. Wang & C. Y. Yu) C. Wang & S. L. Tung, Fl. Reipubl. Popularis Sin. 20(2): 32. 1984.

宽叶青杨 kuan ye qing yang

Populus cathayana f. *latifolia* C. Wang & C. Y. Yu, Fl. Tsingling. 1(2): 597. 1974.

Leaf blade broadly ovate or orbicular-ovate, 4.5–9.5 × 3.5–8.5 cm, apex mucronate, twisted.

• Valleys; 1600–1800 m. S Gansu, E Qinghai.

23c. Populus cathayana var. **pedicellata** C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 117. 1982.

长果柄青杨 chang guo bing qing yang

Leaf blade adaxially pubescent along veins. Capsule with long stipe to 5 mm.

• Valleys; ca. 1800 m. Hebei (Huailai Xian).

24. Populus purdomii Rehder, J. Arnold Arbor. 3: 325. 1922.

冬瓜杨 dong gua yang

Trees to 30 m tall; bark grayish green when young, becoming dark gray; crown globose. Branchlets yellowish brown or gray, terete, glabrous. Buds glabrous, viscid, apex acute. Petiole terete, 2–5 cm; leaf blade ovate or broadly ovate, 7–14 × 4–9 cm, long ovate and ca. 25 × 15 cm on sprouts, pilose along veins, glabrescent or not, abaxially shiny, adaxially bright green, base rounded or cordate, margin glandular serrulate or crenate-serrate, ciliate, apex acuminate. Fruiting catkin 11(–13) cm, glabrous. Capsule globose-ovoid, ca. 7 mm, (2 or)3- or 4-valved, sessile or subsessile. Fl. Apr–May, fr. May–Jun.

• Mountains, streamsides; 700–2600 m. Gansu, Hebei, Henan, Hubei, Shaanxi, Sichuan.

1a. Bark furrowed, exfoliating when old; leaf veins glabrescent 24a. var. *purdomii*

1b. Bark smooth, not exfoliating; leaf veins pubescent 24b. var. *rockii*

24a. Populus purdomii var. **purdomii**

冬瓜杨(原变种) dong gua yang (yuan bian zhong)

Bark furrowed, exfoliating when old. Leaf blade glabrescent along veins.

• Mountains, streamsides; 700–2600 m. Gansu, Hebei, Henan, Hubei, Shaanxi, Sichuan.

According to A. Rehder's original description, *Populus purdomii* var. *purdomii* should have a 2-valved capsule; however, the authors have seen only 3- or 4-valved capsules on specimens collected at the type locality. This variety is similar to *P. cathayana* and *P. szechuanica*, but differs from the former in its larger leaves, from the latter in its non-purple branchlets, and from both species in its exfoliating bark and pilose leaf veins.

Used for timber and wood pulp.

24b. *Populus purdomii* var. *rockii* (Rehder) C. F. Fang & H. L. Yang, Fl. Reipubl. Popularis Sin. 20(2): 34. 1984.

光皮冬瓜杨 *guang pi dong gua yang*

Populus szechuanica C. K. Schneider var. *rockii*

Rehder in Rehder & Kobuski, J. Arnold Arbor. 13: 368. 1932.

Bark smooth, not exfoliating. Petiole and leaf blade abaxially ± pubescent along veins.

• Mountains; 1000–1800 m. SE Gansu.

25. *Populus trinervis* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 23. 1979.

三脉青杨 *san mai qing yang*

Trees to 12 m tall; bark gray, furrowed. Branchlets reddish brown or yellowish brown, terete, slender, glabrous. Leaves of short branchlets with petiole terete, 2–4 cm, pilose at first, glabrescent; leaf blade broadly ovate or ovate, 4–7 × 2.5–5 cm, abaxially grayish white and smooth, adaxially green, pilose along veins, base rounded, margin shallowly crenate, entire near base, apex long caudate or acuminate; veins 3, adaxially raised, lateral veins curved at base. Fruiting catkin to 15 cm; rachis glabrous. Capsule long ovoid, ca. 5 mm, 2-valved. Fl. Mar, fr. Apr.

• Along streams; 1800–3000 m. Sichuan.

Similar to *Populus cathayana* but leaf veins pilose, lateral veins curved at leaf base; capsule 2-valved. Similar also to *P. simonii* but leaf blade broadest below middle, base rounded; fruiting catkin longer.

1a. Capsule sessile 25a. var. *trinervis*

1b. Capsule with stipe 2–4 mm ... 25b. var. *shimianica*

25a. *Populus trinervis* var. *trinervis*

三脉青杨(原变种) *san mai qing yang* (*yuan bian zhong*)

Capsule sessile.

• Along streams; 2100–3000 m. Sichuan.

25b. *Populus trinervis* var. *shimianica* C. Wang & N. Chao, Fl. Sichuan. 3: 285. 1985.

石棉杨 *shi mian yang*

Capsule with longer stipe 2–4 mm.

• Along streams; 1800–1900 m. SC Sichuan (Shimian Xian).

26. *Populus girinensis* Skvortzov, China J. 10: 337. 1929.

东北杨 *dong bei yang*

Trees to 12 m tall; trunk to 45 cm d.b.h.; bark furrowed; crown long ovoid. Branchlets terete, pubescent. Buds viscid, pilose or glabrous. Petiole 3–4 cm, pubescent; leaf blade broadly ovate or long ovate, 6.5–9 × 2.8–6 cm, abaxially shiny, ± pilose along veins, adaxially dull green, pubescent along veins, base subcordate or cuneate, margin slightly crenate-serrate, apex shortly acuminate. Female catkin 10–14 cm; rachis glabrous. Capsule oblong, ca. 11 × 7 mm, glabrous, 3-valved, sessile. Fl. Apr, fr. May.

• Heilongjiang, Jilin.

According to B. V. Skvortzov (Not. Trees & Shrubs 10: 337. 1929), this is a hybrid that originated in Harbin, Heilongjiang around 1910.

1a. Buds pilose; leaf blade subcordate at

base 26a. var. *girinensis*

1b. Buds glabrous; leaf blade cuneate at

base 26b. var. *ivaschevitchii*

26a. *Populus girinensis* var. *girinensis*

东北杨(原变种) *dong bei yang* (*yuan bian zhong*)

Buds pilose. Leaf blade subcordate at base.

• Cultivated. Heilongjiang, Jilin.

Similar to *Populus ussuriensis* but leaf blade broadly ovate; female catkin rachis glabrous.

26b. *Populus girinensis* var. *ivaschevitchii* Skvortzov in Liou & al., Ill. Man. Woody Pl. N.-E. China 127, 551. 1955.

楔叶东北杨 *xie ye dong bei yang*

Buds glabrous. Leaf blade cuneate at base.

• Heilongjiang, Jilin.

27. *Populus keerqinensis* T. Y. Sun, Fl. Intramongol. 1: 277. 1985.

科尔沁杨 *ke er qin yang*

Trees to 30 m tall; trunk to 50 cm d.b.h., irregularly canaliculate. Juvenile branchlets thin, shiny, angled. Winter buds apiculate, glabrous, viscid. Leaves with petiole 1–4 cm, canaliculate, pilose; leaf blade ovate, long ovate, broadly ovate, or orbicular, subleathery, 3–7 × 2–4 cm; leaf blade on long shoots narrowly ovate, broadly ovate, or rhomboid, abaxially becoming pale, glabrous, and pubescent along veins, adaxially dull green, base cuneate, broadly cuneate, or rounded, margin loosely crenate only in distal 1/2; leaf blade on suckers obovate, adaxially pilose along midvein, base narrowly cuneate, margin with glandular teeth only distally. Male flower: Stamens (3 or)4–6(–10). Female catkin ca. 4 cm; rachis pilose. Capsule ca. 1 mm, pilose, 2- or 3(or 4)-valved, shortly stipitate. Fl. Apr, fr. May–Jun.

• Plains or damp places. Nei Mongol (Zhelimu Meng).

28. *Populus nakaii* Skvortzov, China J. 10: 336. 1929.

玉泉杨 *yu quan yang*

Trees to 13 m tall; bark gray, furrowed near base of trunk. Branchlets green, becoming yellowish gray,

terete. Buds viscid, glabrous. Petiole 1.2–2.5 cm, villous; leaf blade ovate to ovate-lanceolate, 4–6.5 × 1.5–2.3 cm, abaxially pale, adaxially dark green, base subcordate, margin glandular serrulate or subentire distally when young, slightly serrate when mature, ± ciliate, apex acuminate. Fruiting catkin 8–10 cm; rachis pubescent. Capsule ovoid, 3-valved. Fl. Apr, fr. May.

• Cultivated. Hebei, Heilongjiang, Jilin, Liaoning.

Similar to *Populus ussuriensis* but leaf blade narrower, ovate to ovate-lanceolate. Similar also to *P. girinensis* but leaf blade narrower; catkin rachis pubescent.

29. *Populus suaveolens* Fischer, Allg. Gartenzeitung. 9: 404. 1841.

甜杨 tian yang

Populus balsamifera Linnaeus var. *suaveolens* Loudon, Arb. Brit. 3: 1674. 1838.

Trees to 30 m tall; bark grayish green and smooth when young, dull gray and furrowed when old; crown oblong. Branchlets gray or grayish brown, terete, slightly pubescent. Buds brown, elongate, viscid. Petiole terete, 0.5–3(–4) cm, glabrous or pilose; leaf blade elliptic, ovate-orbicular, elliptic-oblong, or obovate-elliptic, 5–12 × 2–5.5 cm, usually broadest at middle, base rounded or subcordate, margin crenate-serrate, ciliate, apex abruptly acuminate or shortly acuminate, often twisted. Sprouts with leaf blade to 18 cm, abaxially grayish white, glabrous or pilose, adaxially dull green, base subcordate; lateral veins 3–5 on each side. Male catkin 4–5 cm. Female catkin 6–8 cm, ca. 10 cm in fruit. Female flower: ovary conical; style 3-parted; stigma broadly ovate or reniform, with sinuous margin. Capsule glabrous, often 3-valved, subsessile. Fl. May, fr. Jun. $2n = 38$.

Riversides. E Nei Mongol (Da Hinggan Ling Diqu), Shaanxi [Mongolia, Russia (E Siberia)].

Used for timber, industrial wood, and wood pulp.

30. *Populus hsinganica* C. Wang & Skvortzov in Liou & al., Ill. Man. Woody Pl. N.-E. China 124. 1955.

兴安杨 xing an yang

Trees to 20 m tall; bark greenish gray, deeply furrowed near base of trunk. Branchlets gray-tawny or russet, terete, glabrous. Buds oblong, viscid; scales ciliate along margin. Petiole 1.5–3.5 cm, glabrous; leaf blade suborbicular or orbicular-cordate, rarely ovate-orbicular, 3–10 × 2–9 cm, abaxially greenish and glabrous, adaxially dark green, pilose along veins, base cordate or rounded, margin serrulate and ciliate, apex shortly acuminate, often twisted. Male catkin 4–8 cm; rachis glabrous or pilose. Male flower: stamens 30–40. Fruiting catkin 13–16 cm; rachis glabrous or pilose. Capsule 3-valved. Fl. May, fr. May–Jun.

• Along rivers. Hebei, Nei Mongol.

Used for wood pulp, timber for construction, matchwood, and ship building.

1a. Petiole and catkin rachis glabrous 30a. var. *hsinganica*

1b. Petiole and catkin rachis pilose 30b. var. *trichorachis*

30a. *Populus hsinganica* var. *hsinganica*

兴安杨(原变种) xing an yang (yuan bian zhong)

Petiole and catkin rachis glabrous.

• Along rivers. Hebei, Nei Mongol.

30b. *Populus hsinganica* var. *trichorachis* Z. F. Chen, Bull. Bot. Res., Harbin 8(1): 115. 1988.

毛轴兴安杨 mao zhou xing an yang

Populus cana T. Y. Sun.

Petiole and catkin rachis pilose.

• Hebei (Yanshan), Nei Mongol (Daqing Shan).

31. *Populus koreana* Rehder, J. Arnold Arbor. 3: 226. 1922.

香杨 xiang yang

Trees to 30 m tall; trunk to 1.5 m d.b.h.; bark grayish green and smooth when young, dull gray and deeply furrowed when old; crown broadly ellipsoid. Branchlets slightly yellowish russet at first, balsamic, terete, stout, glabrous. Buds chestnut colored or light russet, long ovoid or long conical, large, very viscid, odoriferous, apex acuminate. Leaves of short branchlets with petiole 1.5–3 cm, distally pubescent; leaf blade elliptic, elliptic-oblong, elliptic-lanceolate, or obovate-elliptic, 9–12 cm, abaxially pale or slightly pinkish, adaxially dull green, prominently wrinkled, base narrowly rounded or broadly cuneate, margin glandular crenulate-serrate, apex obtuse. Leaves of long shoots with petioles 4–10 mm; leaf blade narrowly ovate-elliptic, elliptic, or obovate-lanceolate, 5–15 × 8(–9) cm, base usually cuneate. Male catkin 3.5–5 cm; bracts suborbicular or reniform. Male flower: stamens 10–30; anthers dull purple. Female catkin ca. 3.5 cm; rachis glabrous. Capsule green, ovoid-globose, glabrous, (2 or)4-valved, sessile. Fl. Apr–May, fr. Jun.

Forests. Hebei, Heilongjiang (Da Hinggan Ling Diqu), Jilin (Changbai Shan), E Liaoning, Nei Mongol [Korea, Russia].

Similar to *Populus ussuriensis* but branchlets reddish, smooth, odorous; leaf blade wrinkled.

Used for wood pulp, timber for construction, plywood, and matchwood.

32. *Populus maximowiczii* A. Henry, Gard. Chron., ser. 3, 53: 198. 1913.

辽杨 liao yang

Trees to 30 m tall; bark grayish green or yellowish gray and smooth when young, gray and deeply furrowed when old; crown spreading. Branchlets reddish at first, becoming gray, terete, stout, densely pubescent. Buds brightly colored, conical, viscid. Leaves of fruiting branchlets with petiole terete, 1–4 cm, pilose; leaf blade broadly elliptic, obovate-elliptic, elliptic, or broadly ovate, 5–10(–14) × 3–6 cm, abaxially glaucous, adaxially dark green, wrinkled or ± smooth, both surfaces pubescent along veins, base subcordate or suborbicular, margin glandular crenate-serrate, ciliate, apex shortly acuminate or acute, usually twisted. Leaves of sprouts with leaf blade broadly ovate-orbicular or long ovate,

larger than others, shorter than petiole. Male catkin 5–10 cm; rachis glabrous; bracts lacinate. Male flower: stamens 30–40. Fruiting catkin 10–18 cm. Capsule ovoid-globose, glabrous, 3- or 4-valved, sessile or subsessile. Fl. Apr–May, fr. May–Jun.

Woods; 500–2000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi [Japan, Korea, Russia].

Used for wood pulp, timber for construction, ship building, and matchwood.

33. *Populus ussuriensis* Komarov, Bot. Zhurn. SSSR 19: 510. 1934.

大青杨 da qing yang

Populus maximowiczii A. Henry var. *barbinervis* Nakai.

Trees to 30 m tall; trunk to 2 m d.b.h.; bark grayish green and ± smooth when young, dull gray and furrowed when old; crown globose. Branchlets grayish green, rarely russet, pubescent when young, angled in cross section. Buds conical, viscid, apex acuminate. Petiole 1–4 cm, densely downy; leaf blade elliptic or broadly elliptic to suborbicular, 5–12 × 3–7(–10) cm, abaxially shiny, adaxially dull green, both surfaces ± downy along veins, base subcordate or rounded, margin crenate, densely ciliate, apex apiculate, twisted. Flowering catkin 12–18 cm; peduncle pubescent; rachis densely pubescent. Capsule ca. 7 mm, glabrous, 3- or 4-valved, subsessile. Fl. Apr–May, fr. May–Jun. $2n = 38^*$.

Forests; 300–1400 m. E Heilongjiang, E Jilin, E Liaoning [Korea, Russia].

Similar to *Populus maximowiczii* but branchlets, leaves, and catkin rachis densely pubescent; fallen leaves blackened adaxially. Fallen leaves of both *P. maximowiczii* and *P. koreana* become rust colored adaxially.

Used for wood pulp, timber for construction, ship building, and matchwood.

34. *Populus amurensis* Komarov, Bot. Zhurn. SSSR 5: 510. 1934.

黑龙江杨 hei long jiang yang

Trees; bark grayish white. Branchlets reddish yellow, angled, glabrous. Petiole 2–3 cm, densely pubescent; leaf blade ovate to broadly ovate, 4.5–7 × 2–4 cm, abaxially pale, adaxially deep green, both surfaces densely pubescent along veins, base rounded or cordate, margin serrulate, apex shortly acuminate. Female catkin 6–7 cm, 9–10 cm in fruit; rachis densely white downy. Female flower: stigma 4-lobed. Capsule globose, ca. 5 mm, white pilose, 4-valved, subsessile.

Planted along rivers. N Heilongjiang, NE Nei Mongol (Butha Qi) [Russia].

Used for timber, tool making, and matchwood.

35. *Populus candicans* Aiton, Hort. Kew. 3: 406. 1789.

欧洲大叶杨 ou zhou da ye yang

Populus balsamifera Linnaeus var. *candicans* (Aiton) A. Gray; *P. balsamifera* var. *subcordata* Hylander.

Trees; crown wide. Branches stout and spreading; branchlets chestnut colored, terete, tomentose. Buds

large, very viscid. Leaves of sprouts and mature trees nearly uniformly shaped; petiole terete, 3–5 cm, tomentose; leaf blade broadly ovate-deltoid, 12–16 × ca. 10 cm, abaxially whitish, adaxially dull green, both surfaces pilose, more densely so along veins, base cordate, rarely truncate, margin crenate-serrate, ciliate, apex acuminate. Fruiting catkin to 16 cm; rachis pubescent. Capsule ovoid, glabrous, 2-valved, often sterile, stipitate. Fl. May.

Planted. Xinjiang [Asia, Europe, North America, but native range uncertain, probably of hybrid origin].

No male specimens have been seen by the authors.

36. *Populus ×gansuensis* C. Wang & H. L. Yang in C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 106. 1982.

二白杨 er bai yang

Trees to more than 20 m tall; trunk straight; bark grayish green, smooth, ± russet and shallowly furrowed at base of old trunk; crown long ovoid or narrowly ellipsoid. Branches stout, subwhorled, spreading from trunk at ca. 45°, on male trees at ca. 60°; sprouts and branchlets angled. Leaves of short branchlets with petiole terete, compressed distally, 3–5 cm; leaf blade broadly ovate or rhombic-ovate, broadest below middle, 5–6 × 4–5 cm, abaxially pale, adaxially green, base rounded or broadly cuneate, margin glandular serrulate, entire near base, apex acuminate. Sprouts and long shoots with leaf blade deltoid or deltoid-ovate, ca. as long as wide, 7–8 cm, base truncate or subrounded, margin obtusely serrate near base. Male catkin slender, 6–8 cm. Male flower: stamens 8–13; filaments ca. 3 × as long as anthers. Female catkin 5–6 cm, to 12 cm in fruit; rachis glabrous; bracts flabelliform, lacinate. Female flower: ovary glabrous. Capsule long ovoid, 4–5 mm, 2-valved; stipe ca. 0.5 mm. Fl. Apr, fr. May.

• Along irrigation canals and ditches, roadsides. Gansu (Jiuquan Xian, Wuwei Xian, Zhangye Xian); planted in Nei Mongol.

Probably a natural hybrid between *Populus nigra* var. *thevestina* and *P. simonii*. Similar to the latter but bark grayish green; crown long ovoid or narrowly ellipsoid, stratified; branches subwhorled; leaf blade of long shoots deltoid, those of shorter branchlets broadest below middle; petioles compressed distally; flowering catkin longer.

37. *Populus wenxianica* Z. C. Feng & J. L. Guo ex G. Zhu, Novon 8: 464. 1998.

文县杨 wen xian yang

Trees to 30 m tall; trunk straight, to 80 cm d.b.h.; bark gray-green or green-white, smooth, that of old trunk shallowly furrowed at base. Sprouts and long branchlets angled. Leaves on short branchlets with petiole terete, 3–5 cm, laterally flattened distally; leaf blade ovate-orbicular or rhombic-ovate, 6–10 × 2.5–8 cm, abaxially greenish white, adaxially dull green, base rounded or broadly cuneate, margin with glandular teeth, apex acuminate. Leaf blade of sprouts and long branchlets deltoid-ovate or broadly ovate, 11–18 × 7–12 cm, base subcordate, rounded or broadly cuneate, margin with obtusely glandular teeth. Male catkin 4–5 cm; rachis glabrous. Fruiting catkin 8–12 cm; bracts fan-shaped,

2–2.5 mm, intricately laciniate. Female flower: ovary glabrous; stigma large, 3-lobed. Capsule long ovoid, 4–7 mm, (2 or)3-valved; stipe ca. 1 mm. Fl. Apr, fr. May.

• Mountains, along rivers; 1200–1800 m. Gansu (Wen Xian).

38. *Populus minhoensis* S. F. Yang & H. F. Wu, Fl. Xylophyta Qinghai 77. 1987.

民和杨 min he yang

Trees to more than 20 m tall; trunk erect; bark gray-brown, shallowly furrowed at base; crown narrowly conical. Lateral branches thin, stratified; spreading at acute angles; 1-year-old branchlets green, angled, later grayish white. Winter buds conical, viscid. Leaves on short branchlets with petiole green or somewhat pink, thin, apically compressed, ca. as long as blade, sparingly puberulent; leaf blade rhombic-ovate, 5–7 × 2.5–3.5 cm, both surfaces pilose along veins, base cuneate, margin serrulate, ciliate, apex acuminate. Leaves on sprouts with petiole 2–3 cm; leaf blade larger, deltoid-ovate to rhombic-ovate. Female catkin 1.5–2 cm, 7–9 cm in fruit; rachis pilose; bracts brown, broadly elliptic, fringed-laciniate. Female flower: ovary broadly ovoid; stigma 2-lobed. Capsule ovoid, pilose, 2-valved, shortly stipitate. Fl. Apr, fr. May–Jun.

• Mountains, river valley banks; 1800–2500 m. E Qinghai (Minhe Xian).

39. *Populus alaschanica* Komarov, Repert. Spec. Nov. Regni Veg. 13: 233. 1914.

阿拉善杨 a la shan yang

Trees to 18 m tall; bark gray, slightly pruinose. Branchlets slender. Petiole slender; leaf blade ovate, 2–7 × 1–9 cm, abaxially pale, glabrous, base cuneate, serrate, apex acuminate; veins raised abaxially. Male catkin ca. 3 cm. Female catkin 10–17 cm, loose; rachis and stipes pubescent; bracts lobed, long pilose, caducous; flowers green, shortly stipitate.

• Nei Mongol (Alxa Youqi, Alxa Zuoqi).

V. L. Komarov (Repert. Spec. Nov. Regni Veg. 13: 233. 1914) supposed this species to be a hybrid between *Populus przewalskii* and *P. tremula*.

40. *Populus laurifolia* Ledebour, Fl. Altaic. 4: 297. 1833.

苦杨 ku yang

Trees to 15 m tall; bark grayish, darkened and furrowed toward base of trunk; crown wide. Sprouts and branchlets yellowish, angled, tomentose or rarely glabrous. Buds conical, very viscid; basal scales tomentose. Leaves of short branchlets with leaf blade elliptic, ovate, or oblong-ovate, 6–12 × 4–7 cm, base rounded or cuneate, margin crenulate, ciliate, apex acute or shortly acuminate. Leaves of sprouts with petioles terete, 2–5 cm, adaxially canaliculate, tomentose; leaf blade lanceolate or ovate-lanceolate, 10–15 cm. Male catkin 3–4 cm; bracts suborbicular, 3–5 mm, usually caducous, base cuneate, margin lacinate, with brown lobes. Male flower: stamens 30–40; anthers purplish red. Female catkin 5–6 cm, elongated in fruit;

rachis tomentose. Capsule ovoid, 5–6 mm, glabrous or pilose, 2- or 3-valved. Fl. Apr–May, fr. Jun.

Riverbanks; 500–1900 m. Nei Mongol, Xinjiang (Altay Shan, Tacheng Diqu) [NW Mongolia, Russia].

Used for fuel, wood pulp, and making farm tools.

41. *Populus lancifolia* N. Chao, Fl. Sichuan. 3: 285. 1985.

瘦叶杨 shou ye yang

Trees to 8 m tall. Two-year-old branchlets gray-brown; 1-year-old branchlets ± puberulent; juvenile branchlets terete, densely rigidly puberulent. Leaves of short branchlets with petiole thin, terete, 1–4.5 cm, puberulent; leaf blade lanceolate or ovate-lanceolate, 5–8.5 × 1.4–3.4 cm, abaxially pale, adaxially dark green, pubescent, hairy along veins, base cuneate or obtuse, margin with glandular crenate saw teeth, ciliate, apex long acuminate; lateral veins raised on both surfaces, 5–7 on each side. Fruiting catkin to 16 cm; peduncle and rachis rigidly puberulent. Disc entire or irregularly crenate. Capsule ovoid, ca. 4 mm, glabrous, 3- or 4-valved; stipe ca. 1 mm. Fr. Jun.

• Mountains; 3100–3200 m. W Sichuan (Kangding Xian).

42. *Populus schneideri* (Rehder) N. Chao, Fl. Sichuan. 3: 50. 1985.

西南杨 xi nan yang

Populus cathayana Rehder var. *schneideri* Rehder, J. Arnold Arbor. 12: 63. 1931; *P. yatungensis* (C. Wang & P. Y. Fu) C. Wang & Tung var. *trichorachis* C. Wang & Tung.

Trees. Older branches gray brown, densely pilose; juvenile branchlets gray purple, angled. Petiole terete, 1.5–4 cm, densely puberulent; leaf blade ovate or narrowly ovate, 5.5–9.5 × 3–5.5 cm, abaxially glaucous, adaxially dark green, both surfaces densely puberulent along veins, base rounded, margin glandular crenate-serrate, ciliate; lateral veins ca. 7 each side of prominent midvein, conspicuous. Fruiting catkin 10–13 cm; rachis densely pubescent. Capsule ovoid, ca. 5 mm, villous, 3- or 4-valved; stipe ca. 1.5 mm or capsule subsessile. Fl. Apr, fr. May–Jun.

• Mountains; 2500–3000 m. Sichuan, Xizang, Yunnan.

43. *Populus pilosa* Rehder, Am. Mus. Novit. 1: 292. 1927.

柔毛杨 rou mao yang

Trees to 10 m tall; bark whitish gray, deeply furrowed. Branchlets stout, yellowish white, with short internodes and dense leaf scars, pubescent, glabrescent. Buds viscid, downy. Petiole subterete, 1–2.5(–4) cm, with dense, yellow hairs; leaf blade suborbicular or ovate to broadly ovate, 4.5–8 × 4–6 cm, abaxially yellowish white or white, trichiferous along veins, adaxially pilose, base shallowly cordate, truncate, or rounded, margin sinuate-serrate, apex shortly acuminate. Fruiting catkin 5–8 cm; rachis pilose; bracts wider than long. Disc with sinuous teeth. Capsule globose-ovoid, 4–5 mm, pubescent or glabrous, 2- or 3-valved, sessile or shortly stipitate. Fl. May, fr. Jun.

River valleys, mixed woods; 1600–2400 m. Xinjiang [Mongolia].

1a. Capsule pubescent, 2-valved, sessile 43a. var. *pilosa*

1b. Capsule glabrous, 3-valved, shortly stipitate 43b. var. *leiocarpa*

43a. *Populus pilosa* var. *pilosa*

柔毛杨(原变种) rou mao yang (yuan bian zhong)

Capsule pubescent, 2-valved, sessile.

River valleys; 1600–2300 m. N Xinjiang [Mongolia].

Similar to *Populus laurifolia* but leaf blade broadly ovate or ovate, shorter, broader; capsule globose-ovoid, downy.

43b. *Populus pilosa* var. *leiocarpa* C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 116. 1982.

光果柔毛杨 guang guo rou mao yang

Capsule glabrous, 3-valved, shortly stipitate.

• Mixed woods; ca. 2400 m. Xinjiang (Aksu Xian, Tomort Shan).

44. *Populus intramongolica* T. Y. Sun & E. W. Ma, J. Nanjing Forest. Univ. 4: 109. 1986.

内蒙杨 nei meng yang

Trees to 22 m tall; bark gray-green, smooth. Juvenile branchlets green-brown, later grayish green. Winter buds very viscid; scales angled, ciliate, caudate. Leaves of short and long branchlets similar; petiole 2–10 cm, ± pubescent; leaf blade long elliptic, ovate-elliptic, or rhombic-elliptic, 5–10 × 2.5–6 cm, abaxially gray-white, glabrous or sparingly pubescent, adaxially green, pubescent along veins, base cuneate or broadly cuneate, margin crenate, densely ciliate, apex acuminate or long acuminate. Sprouts with leaf blade elliptic-lanceolate, narrowly oblong-elliptic, narrowly elliptic, or oblanceolate, abaxially whitish, base narrowly cuneate, margin glandular crenate. Male catkin with rachis hairy. Male flower: stamens 15–30(–47). Fruiting catkin 12–16 cm, sparsely hairy. Capsule glabrous, (2 or)3 (or 4)-valved, shortly stipitate.

• Mountains; 1400–2000 m. Hebei (Huailai Xian), Nei Mongol (Hohhot), Shanxi (Xing Xian).

45. *Populus pamarica* Komarov, Bot. Zhurn. SSSR 19: 510. 1934.

帕米杨 pa mi yang

Trees. Branches yellowish gray or brownish; branchlets angled, downy. Leaves of short branchlets with petiole terete, 3–7 cm, downy; leaf blade orbicular, 5–8 cm, abaxially greenish, slightly pubescent along veins, adaxially green, base rounded or broadly cuneate, margin coarsely sinuate dentate, ciliate, apex apiculate. Sprouts with leaf blade long elliptic, base cuneate, margin nearly doubly serrate, apex shortly acuminate, glabrous. Fruiting catkin ca. 6 cm; rachis pilose. Capsule ovoid, ca. 4 mm, 3-valved, sessile. Fl. May, fr. Jun.

Along rivers; 1800–3000 m. Xinjiang (W Kunlun Shan) [Tajikistan]. Similar to *Populus pilosa* but branchlets angled; petiole longer, to 7 cm; leaf blade suborbicular, base rounded or broadly cuneate, margin coarsely dentate.

46. *Populus iliensis* Drobow, Bot. Mater. Gerb. Bot. Inst. Uzbekistansk. Fil. Akad. Nauk S.S.S.R. 6: 12. 1941.

伊犁杨 yi li yang

Trees to 15 m tall; bark gray, furrowed. Juvenile branchlets brown, tomentulose or sometimes

glabrescent; 2- and 3-year-old branchlets brownish. Leaves of sprouts and long shoots with petiole compressed, 2–4 cm; leaf blade ovate-orbicular or broadly ovate-orbicular, 3–7 × 3–6 cm, glabrous, abaxially greenish, pilose along veins, adaxially green, base broadly cuneate, rounded, or truncate, margin with densely incurved gland-tipped teeth, at first ciliate, apex shortly acuminate or apiculate, usually twisted. Fruiting catkin 5–10 cm; rachis glabrous or pubescent. Disc yellowish white, orbicular, with a stalk 3–4 mm. Capsule ovoid, ca. 6 × 4 mm, glabrous, 2(or 3)-valved.

• Along rivers. Xinjiang (Ili He valley).

A. K. Skvortsov believes that this species is synonymous with *Populus afghanica*.

47. *Populus talassica* Komarov, Bot. Zhurn. SSSR 19: 509. 1934.

密叶杨 mi ye yang

Populus densa Komarov.

Trees; bark grayish green; crown spreading. Suckers russet or gray, slightly angled, at first pilose, becoming nearly glabrescent; branchlets gray, subterete, glabrous; short branchlets russet, tomentulose. Leaves of short branchlets with petiole terete, 2–4 cm, subglabrous or glabrous; leaf blade ovate-orbicular or ovate-elliptic, 5–8 × 3–5 cm, lanceolate to broadly lanceolate and 5–10 × 1.5–3 cm on sprouts, abaxially pale along veins, often pilose, adaxially greenish, glabrous, base cuneate, broadly cuneate, or rounded, margin shallowly crenate, apex acuminate. Male catkin 3–4 cm; rachis glabrous. Male flower: anthers purple. Fruiting catkin 5–6 cm, elongated to 10 cm when mature; rachis pilose. Capsule ovoid, 5–8 mm, tomentose, 3-valved; shortly stipitate. Fl. May, fr. Jun.

Rivers; 500–1800 m. C Xinjiang (Tian Shan) [S Kazakstan, Kyrgyzstan, Tajikistan, Uzbekistan].

Similar to *Populus laurifolia*, but long shoots less elongate, not angled; leaves on short shoots smaller; geographical distribution different.

48. *Populus platyphylla* T. Y. Sun, Fl. Intramongol. 1: 277. 1985.

阔叶杨 kuo ye yang

Populus platyphylla var. *flaviflora* T. Y. Sun; *P. platyphylla* var. *glauca* T. Y. Sun.

Trees to 25 m tall; trunk to more than 50 cm d.b.h.; bark lacteous. Older branches yellow-brown; juvenile branchlets russet or green-brown, usually angled. Winter buds erect, dark brown, long conical, viscid. Leaves on short branchlets with petiole 2–6 cm, at least sparsely pubescent apically; leaf blade broadly ovate, rhombic-ovate, or ovate, 4–9 × 3.5–7 cm, abaxially pale, usually with sparse hairs, adaxially dull deep green, pilose along veins, margin with incurved, glandular teeth, apex apiculate-acuminate. Sprouts with leaf blade obovate or obovate-elliptic, on long shoots broadly ovate or ovate-orbicular, apex slightly acute or shortly

acuminate. Male catkin ca. 5 cm; bracts white villous adaxially. Male flower: stamens 12–24. Fruiting catkin 10–12 cm; rachis pilose. Capsule ovoid, 6–7 mm, 2- or 3(or 4)-valved, shortly stipitate. Fl. Apr, fr. Jun.

• Valleys; ca. 1600 m. Hebei, Nei Mongol (Hohhot, Wuchuan Xian), N Shanxi.

49. *Populus pseudomaximowiczii* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 20. 1979.

梧桐杨 wu tong yang

Trees to 15 m tall; bark gray, pruinose. Branchlets russet or yellowish russet, stout, glabrous. Buds brown, conical, large, ca. 2 cm, viscid. Leaves of short branchlets with petiole terete, 3–7 cm, pilose; leaf blade broadly ovate or ovate, 7–14 × 4–11 cm, abaxially pale, adaxially dark green, both surfaces whitish long pubescent along veins, base shallowly cordate or sub-rounded, margin crenate, ciliate, apex apiculate or shortly acuminate, often twisted. Leaves of sprouts with petiole terete, ca. 7 cm, subglabrous; leaf blade broadly ovate or ovate-elliptic, ca. 27 × 22 cm, abaxially pale, adaxially dark green, base cordate, margin irregularly and coarsely glandular dentate, apex apiculate. Male catkin 3–6 cm; bracts brown, laciniate, glabrous. Fruiting catkin to 15 cm; rachis glabrous. Capsule ovoid, downy, rarely glabrous, (2 or)3-valved, subsessile. Fl. Apr, fr. Jun.

• Forests; 1000–1600 m. Hebei (Wuling Shan), Shaanxi (Guanshan).

50. *Populus shanxiensis* C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 105. 1982.

青毛杨 qing mao yang

Trees to 15 m tall; trunk to 40 cm d.b.h.; bark grayish brown, furrowed. Branches yellowish gray, glabrous; branchlets reddish brown, angled, downy. Buds dull russet, conical, viscid; margin of scales downy. Petiole terete, 3–6 cm, pubescent, with 2 glands near apex; leaf blade ovate to broadly ovate, 5–10 cm, leathery, abaxially pale, adaxially dark green, base cordate, margin crenate, ciliate, apex shortly acuminate. Flowers and capsule unknown.

• Valleys; ca. 1600 m. W Shanxi.

This species is probably a hybrid between *Populus cathayana* and *P. tomentosa*. Similar to the former but petiole with 2 glands near base of leaf; leaf blade leathery. Similar to the latter but branchlets, buds, and petioles tomentose; leaf blade thicker.

51. *Populus szechuanica* C. K. Schneider in Sargent, Pl. Wilson. 3: 20. 1916.

川杨 chuan yang

Trees to 40 m tall; bark grayish white, rugged and fissured toward base of trunk, smooth above; crown ovoid-globose. Branchlets greenish brown or purplish, angled or only slightly angled, stout, glabrous; old branchlets at first yellowish brown, becoming gray, terete. Buds purplish, glabrous or pubescent, viscid, apex acute. Leaves appearing reddish, short branchlets with petiole 2.5–8 cm; leaf blade broadly ovate, ovate-orbicular, or ovate-lanceolate, 8–18 × 5–15 cm, glabrous or pubescent, base rounded, cuneate, or

shallowly cordate, margin glandular dentate, at first ciliate. Sprouts with petiole 2–4 cm; leaf blade usually long ovate-elliptic, 11–20(–28) × 5–11(–16) cm, abaxially with yellowish green midvein, base subcordate or rounded, margin glandular crenate, apex acute or shortly acuminate. Fruiting catkin 10–20 cm or more; rachis glabrous. Capsule ovoid, 7–9 mm, glabrous, 3- or 4-valved, subsessile. Fl. Apr–May, fr. May–Jun.

• Forests, mountains; 1100–4600 m. Gansu, Shaanxi, Sichuan, Xizang, Yunnan.

1a. Buds and leaves glabrous; branchlets angled 51a. var. *szechuanica*

1b. Buds pubescent; leaves pubescent or glabrescent; branchlets only slightly angled 51b. var. *tibetica*

51a. *Populus szechuanica* var. *szechuanica*

川杨(原变种) chuan yang (yuan bian zhong)

Branchlets angled. Buds and leaves glabrous.

• Forests; 1100–4600 m. Gansu, Shaanxi, Sichuan, Yunnan.

Used for timber for construction and making furniture; also planted along roadsides as an ornamental.

51b. *Populus szechuanica* var. *tibetica* C. K. Schneider in Sargent, Pl. Wilson. 3: 33. 1916.

藏川杨 zang chuan yang

Populus schneideri (Rehder) N. Chao var. *tibetica* (C. K. Schneider) N. Chao.

Branchlets slightly angled. Buds and petioles pubescent. Leaf blade with both surfaces at first pubescent, later ± pilose or glabrescent only along veins.

• Mountains; 2000–4500 m. Sichuan, Xizang.

52. *Populus yunnanensis* Dode, Bull. Soc. Hist. Nat. Autun 18: 221. 1905.

滇杨 dian yang

Trees to 20 m tall; trunk to 60 cm d.b.h.; bark gray, furrowed. Old branches purplish brown, not angled; branchlets yellowish brown or reddish and glabrous when young, angled. Buds ellipsoid, glabrous, viscid. Petiole reddish, 1–4 cm, stout; leaf blade ovate, elliptic-ovate, broadly ovate, or deltoid-ovate, 5–16 × 2–7.5 cm, papery, abaxially grayish white and glabrous or pubescent along veins, usually reddish along midvein, adaxially green, shiny, pilose along midvein, base broadly cuneate or rounded, margin glandular crenulate, at first ciliate, glabrescent, apex long acuminate. Short branchlets with petiole 2–9 cm; leaf blade ovate, 7.5–17 × 4–12 cm, base rounded or shallowly cordate, rarely cuneate, apex long acuminate or obtuse. Male catkin 12–20 cm; rachis glabrous; bracts russet, palmately laciniate, glabrous. Male flower: stamens 20–40. Female catkin 10–15 cm. Capsule 3- or 4-valved, subsessile or shortly stipitate. Fl. Apr, fr. Apr–May.

• Mountains, forests; 1300–3700 m. Guizhou, Sichuan, Yunnan.

1a. Leaf blade ca. 6 × 5 cm 52c. var. *microphylla*

1b. Leaf blade more than 6 × 5 cm.

- 2a. Leaves glabrous abaxially; capsule subsessile 52a. var. *yunnanensis*
 2b. Leaves pubescent along veins abaxially; capsule with stipe ca. 4 mm 52b. var. *pedicellata*

52a. *Populus yunnanensis* var. *yunnanensis*

滇杨(原变种) dian yang (yuan bian zhong)

Leaf blade abaxially glabrous. Capsule subsessile.

- Mountains; 1300–2700 m. Guizhou, Sichuan, Yunnan.

52b. *Populus yunnanensis* var. *pedicellata* C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 115. 1982.

长果柄滇杨 chang guo bing dian yang

Leaf blade abaxially pubescent along veins. Capsule with stipe ca. 4 mm.

- 3500–3700 m. Sichuan, Yunnan.

52c. *Populus yunnanensis* var. *microphylla* C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 115. 1982.

小叶滇杨 xiao ye dian yang

Branchlets slender, conspicuously angled. Petiole on sprouts short, downy when young; leaf blade small, obovate on sprouts, ca. 6 × 5 cm, downy along veins when young.

- Forests; 2200–2300 m. Yunnan.

53. *Populus qamdoensis* C. Wang & S. L. Tung in C. Wang & C. F. Fang, Acta Phytotax. Sin. 17(4): 101. 1979.

昌都杨 chang du yang

Trees to 25 m tall. Branches yellowish gray; branchlets yellowish brown, slender, subglabrous, pilose when young. Buds viscid. Petiole terete, 1.5–3 cm; leaf blade ovate, 6–10 × 2.5–7 cm, abaxially greenish, glabrous, adaxially dull green, pilose along veins, base rounded, margin crenate-serrulate, ciliate, apex acuminate. Fruiting catkin to 15 cm; rachis glabrous. Capsule ovoid, densely downy, 2(or 3)-valved; stipe to 5 mm.

- Along rivers; 1700–3800 m. Xizang.

Very similar to *Populus szechuanica* var. *tibetica* but branchlets yellowish brown, subglabrous, downy only when young; petiole shorter; leaf blade smaller, base rounded, margin ciliate; catkin rachis glabrous; capsule 2-valved, densely downy; stipe to 5 mm.**54. *Populus mainlingensis*** C. Wang & S. L. Tung, Acta Phytotax. Sin. 17(4): 102. 1979.

米林杨 mi lin yang

Trees to 30 m tall. Branches grayish brown; branchlets tomentose. Buds ovoid, smooth, viscid. Petiole terete, ca. 4 cm, densely pubescent; leaf blade broadly ovate-cordate, ca. 10 × 8 cm, abaxially glaucous, with dense hairs, adaxially dull green, pilose along veins, base cordate, margin glandular serrulate, ciliate when young, apex acute. Fruiting catkin to 15 cm; rachis pubescent; bracts russet, suborbicular, lacinate. Disc sinuate. Capsule ovoid, densely tomentose when young, glabrescent, 4-valved, subsessile. Fl. May, fr. Jul.

- Mountain slopes, along rivers; 3000–3800 m. Xizang (Mainling Xian, Nyingchi Xian).

Similar to *Populus ciliata* but branchlets densely tomentose; petiole ca. 1/2 as long as leaf blade, eglandular distally; capsule subsessile, densely hairy when young. Similar also to *P. lasiocarpa* but petiole not red, smaller; leaf blade broadly ovate-cordate, smaller, ca. 10 cm,

base cordate, apex acute; bracts suborbicular; disc sinuate; capsule glabrescent, 4-valved.

55. *Populus haoana* W. C. Cheng & C. Wang in C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 17. 1979.

德钦杨 de qin yang

Trees to 20 m tall; bark gray, smooth. Branchlets dull brown or russet, stout, downy or glabrous. Buds downy, slightly viscid. Leaves of short branchlets with petiole terete, 4–7 cm, densely downy; leaf blade ovate-orbicular or ovate to long ovate-elliptic, 10–18(–22) × 5–11 cm, abaxially pale, pilose, densely downy along veins, adaxially dull green, downy along veins, base cordate or deeply so, margin glandular serrate or crenate-serrate, apex shortly acuminate, often twisted. Fruiting catkin 8–40 cm; rachis pubescent or glabrous. Capsule ovoid, 3- or 4-valved, subsessile or stipitate. Seeds brown, more than 1 mm.

- Forests, mixed woods, valleys, mountains; 2200–3600 m. SE Sichuan, NW and S Yunnan.

Similar to *Populus szechuanica* var. *tibetica* but branchlets, petiole, leaf veins, and catkin rachis densely pubescent; leaves larger.

1a. Fruiting catkin ca. 8 cm.

2a. Capsule ca. 5 mm 55d. var. *microcarpa*2b. Capsule ca. 12 mm 55b. var. *macrocarpa*

1b. Fruiting catkin 10–40 cm.

3a. Leaf blade 10–18 cm, margin glandular serrate; fruiting catkin to 18 cm; rachis pubescent 55a. var. *haoana*3b. Leaf blade 22–35 cm, margin glandular crenate-serrate; fruiting catkin to 40 cm; rachis glabrous 55c. var. *megaphylla***55a. *Populus haoana* var. *haoana***

德钦杨(原变种) de qin yang (yuan bian zhong)

Branchlets dull brown, downy, densely so when young. Leaf blade 10–18 × 5–11 cm, downy along veins, base cordate, margin glandular serrate. Fruiting catkin to 18 cm; rachis pubescent. Capsule densely tomentose when young, glabrescent, subsessile.

- Forests; 2200–3600 m. NW Yunnan.

55b. *Populus haoana* var. *macrocarpa* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 17. 1979.

大果德钦杨 da guo de qin yang

Branchlets russet, slender, smooth. Leaf blade small, both surfaces pilose along veins. Catkin rachis stout. Capsule large, ca. 1.2 × 1 cm; stipe stout, densely pilose.

- Valleys; 3000–3300 m. SE Sichuan, NW Yunnan.

55c. *Populus haoana* var. *megaphylla* C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 118. 1982.

大叶德钦杨 da ye de qin yang

Branches sulcate; branchlets and petioles smooth. Leaf blade large, ca. 22 cm on short branchlets, to ca. 35 cm on sprouts, margin glandular crenate-serrate. Fruiting catkin to 40 cm; rachis densely downy. Capsule ovoid, shortly stipitate.

- Mixed woods; 2300–2700 m. S Yunnan.

55d. *Populus haoana* var. *microcarpa* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 18. 1979.

小果德钦杨 *xiao guo de qin yang*

Leaf blade orbicular-ovate, ca. 15 cm, base deeply cordate. Fruiting catkin short, thin, ca. 8 cm, glabrous. Capsule ca. 5 mm, glabrous.

• Mountains; ca. 3200 m. NW Yunnan.

56. *Populus xiangchengensis* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 22. 1979.

乡城杨 *xiang cheng yang*

Trees to 20 m tall; trunk to 1.5 m d.b.h. Branches stout, dull purplish brown, slightly angled; juvenile branchlets densely downy. Leaves of short branchlets with petiole terete, ca. 6 cm, pubescent; leaf blade ovate to broadly ovate, 7–14 × 4–10 cm, both surfaces with raised veins and hairs, abaxially pale, adaxially dull green, base cordate or rounded, margin crenate-serrulate, ciliate, apex acuminate or long acuminate. Fruiting catkin 8–16 cm; rachis downy. Capsule globose-ovate, densely tomentose, rarely pilose, 4-valved, sessile or shortly stipitate.

• Along rivers; 2000–3900 m. Sichuan.

Similar to *Populus szechuanica* but branchlets, petiole, leaf veins, catkin rachis, and capsule pubescent. Similar also to *P. szechuanica* var. *tibetica* but capsule densely tomentose.

57. *Populus ciliata* Wallich ex Royle, Ill. Bot. Himal. Mts. 1: 346. 1839.

缘毛杨 *yuan mao yang*

Trees to 20 m tall; bark gray; crown large and spreading. Branchlets brown, terete, pilose and glabrescent or tomentose. Buds ovoid, large, ca. 2 cm, usually glabrous, rarely downy, ± viscid. Petiole terete, 5–12 cm, downy; leaf blade ovate-cordate, 10–15 × 8–12 cm, abaxially grayish green, downy at least along veins, adaxially dull green, glabrous, base cordate or rounded, margin glandular crenate, densely ciliate, apex acute to acuminate. Male catkin ca. 6 cm; rachis glabrous. Female catkin to 22 cm; rachis glabrous or pubescent. Capsule glabrous or pilose, 4-valved; stipe 5–10 mm or capsule sessile. Fl. May, fr. Jun. $2n = 38$.

Mountains, mixed woods, forests; 2200–3400 m. Xizang, Yunnan [Bhutan, India, Kashmir, N Myanmar, Nepal, Pakistan, Sikkim].

1a. Branchlets and catkin rachis tomentose

..... 57c. var. *gyirongensis*

1b. Branchlets glabrescent; catkin rachis pilose or glabrous.

2a. Catkin rachis and capsule pilose 57d. var. *weixi*

2b. Catkin rachis and capsule glabrous.

3a. Leaves with dense golden yellow hairs when young 57b. var. *aurea*

3b. Leaves abaxially downy, adaxially glabrous 57a. var. *ciliata*

57a. *Populus ciliata* var. *ciliata*

缘毛杨(原变种) *yuan mao yang* (*yuan bian zhong*)

Branchlets pilose at first, glabrescent. Leaf blade abaxially downy, adaxially glabrous. Catkin rachis glabrous.

Mountains; 3300–3400 m. Xizang (Zayü Xian), Yunnan [Bhutan, India, Kashmir, N Myanmar, Nepal, Pakistan, Sikkim]. Used for timber for construction and making furniture; leaves used as forage for goats.

57b. *Populus ciliata* var. *aurea* C. Marquand & Airy Shaw in C. Marquand, J. Linn. Soc., Bot. 48: 223. 1929.

金色缘毛杨 *jin se yuan mao yang*

Leaf blade abaxially with dense golden yellow hairs when young.

• Mountains; ca. 2900 m. Xizang.

57c. *Populus ciliata* var. *gyirongensis* C. Wang & S. L. Tung, Acta Phytotax. Sin. 17(4): 102. 1979.

吉隆缘毛杨 *ji long yuan mao yang*

Branchlets, veins on both surfaces of leaves, petioles, and catkin rachis tomentose.

• Mixed woods; ca. 2400 m. Xizang.

57d. *Populus ciliata* var. *weixi* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 25. 1979.

维西缘毛杨 *wei xi yuan mao yang*

Leaf blade broadly ovate, apex shortly acuminate to long acuminate. Fruiting catkin to more than 20 cm. Catkin rachis and capsule pilose.

• Forests; 2200–2300 m. NW Yunnan.

58. *Populus wuana* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 23. 1979.

长叶杨 *chang ye yang*

Trees to 30 m tall; trunk to 1 m d.b.h.; bark grayish, fissured. Branches dull brown, angled; branchlets yellowish brown, downy, glabrescent. Buds dull purple, conical, with downy basal scales, viscid. Petiole terete, 2–4.5 cm, densely downy; leaf blade ovate-lanceolate to broadly lanceolate, 8–18 × 3–10 cm, leathery, abaxially white, pubescent on both surfaces, adaxially green, base shallowly cordate to rounded, margin glandular serrate, ciliate, slightly revolute, apex long acuminate. Fruiting catkin to 30 cm; rachis glabrous. Capsule ovoid, ca. 10 × 8 mm, at first pilose, 4- or 5-valved. Fr. Sep.

• Margins of woods, along streams. E Xizang.

59. *Populus yuana* C. Wang & S. L. Tung, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 4: 24. 1979.

五瓣杨 *wu ban yang*

Trees to 30 m tall; trunk to 2 m d.b.h.; bark black, furrowed. Branches grayish brown to brown, stout; branchlets russet, angled, smooth. Petiole russet, terete, 5–10 cm, glabrous. Leaf blade ovate to elliptic-ovate, 16–23 × 10–15 cm, abaxially grayish white, pubescent along veins, adaxially dull green, smooth, base narrowly cordate, margin densely shallowly glandular serrate, apex acuminate to long acuminate; veins raised abaxially. Fruiting catkin to 35 cm; rachis glabrous. Capsule ovoid, ca. 5 mm, 4- or 5-valved, sessile. Fr. May.

• Along rivers; ca. 2000 m. Xizang (Zayü Xian), NW Yunnan.

Similar to *Populus haoana* but branchlets, petioles, and leaf blade glabrous; capsule 5-valved, glabrous. Similar also to *P. yunnanensis* but leaf blade narrowly cordate at base, veins pilose; fruiting catkin longer; capsule usually smaller, 5-valved.

60. *Populus yatungensis* (C. Wang & P. Y. Fu) C. Wang & S. L. Tung, Fl. Reipubl. Popularis Sin. 20(2): 60. 1984.

亚东杨 *ya dong yang*

Populus yunnanensis Dode var. *yatungensis* C. Wang & P. Y. Fu, Acta Phytotax. Sin. 12: 192. 1974; *P. pseudoglauca* C. Wang & P. Y. Fu var. *yatungensis* (C. Wang & P. Y. Fu) N. Chao.

Trees to 10 m tall; bark grayish green to grayish, furrowed. Branchlets yellowish brown or grayish brown, purplish brown when young, angled, yellowish villous. Buds purple, downy, viscid. Petiole terete, 4–7 cm, villous, glandular distally; leaf blade long ovate to broadly ovate, 14–16 × 6–11 cm, abaxially glaucous, sometimes with coarse, long hairs, adaxially dull green, both surfaces pilose along veins, base cordate, margin glandular serrulate or crenate-serrate, ciliate or glabrous, apex acuminate to long acuminate. Fruiting catkin to 22 cm; peduncle pilose; rachis purplish red, stout. Capsule globose-ovoid, glabrous or pilose, 4-valved, shortly stipitate or sessile.

• Mountain slopes; 2400–3600 m. SW Sichuan, Xizang, Yunnan.

1a. Leaf margin crenate-serrate, base deeply cordate 60b. var. *crenata*

1b. Leaf margin serrulate or slightly serrulate, base cordate but not deeply so 60a. var. *yatungensis*

60a. *Populus yatungensis* var. *yatungensis*

亚东杨(原变种) *ya dong yang* (*yuan bian zhong*)

Base of leaf blade shallowly cordate or cordate, margin serrulate. Capsule shortly stipitate.

• Mountain slopes; 2400–3600 m. SW Sichuan, Xizang, Yunnan.

Similar to *Populus yunnanensis* but young branchlets purplish brown; petiole and leaf veins pubescent; capsule shortly stipitate.

60b. *Populus yatungensis* var. *crenata* C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 115. 1982.

圆齿亚东杨 *yuan chi ya dong yang*

Petiole and leaf blade abaxially coarsely long hairy, glabrescent; base of leaf blade deeply cordate, margin crenate-serrate.

• Xizang.

61. *Populus ×xiaozhuanica* W. Y. Hsu & Liang in C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 107. 1982.

小钻杨 *xiao zuan yang*

Trees to 30 m tall; trunk erect, shallowly furrowed at base; bark brownish gray and smooth, grayish green, grayish white, or greenish gray when young; lenticels rhombic, crowded; crown conical or tower-shaped. Lateral branches diverging from trunk at less than 45°; young branchlets grayish yellow, slightly angled, pilose. Buds russet, long ellipsoid-conical, 0.8–1.4 cm, viscid, apex obtuse. Leaves of short branchlets with petiole 1.5–3.5 cm, terete, slightly flattened distally, pilose or glabrous; leaf blade rhombic-deltoid, rhombic-elliptic, or broadly rhombic-ovate, 3–8 × 2–5 cm, abaxially greenish, glabrous, adaxially green, pilose along veins, base cuneate to broadly cuneate, margin glandular serrate, entire near base, sometimes translucent, apex acuminate. Sprouts and long shoots with leaf blade rhombic-deltoid, rarely obovate, larger, base broadly cuneate to rounded, apex mucronate. Male catkin 5–6 cm. Male flower: stamens 8–15. Female catkin 4–6 cm, 10–16 cm in fruit. Female flower: stigma 2-lobed. Capsule ovoid, large, 2(or 3)-valved. Seeds russet, obovate. Fl. Apr, fr. May.

• Cultivated. E Henan, Jiangsu, Jilin (Baicheng Xian), Liaoning, E Nei Mongol (Jirem Meng, Ju Ud Meng), Shandong.

A hybrid between *Populus nigra* var. *italica* and *P. simonii*.

A fast-growing tree important for timber, reforestation, and soil retention.

4. Sect. *Aigeiros* Duby, Bot. Gall. 1: 427. 1828.

黑杨组 *hei yang zu*

Bark furrowed. Buds viscid. Leaf blade usually deltoid-ovate or rhombic-ovate, both surfaces green, with stomata, base truncate or broadly cuneate, margin crenate-serrate, distinctly translucent at edge, apex long acuminate. Male flower: stamens 15–30(–60); anthers subglobose or elliptic. Female flower: disc entire, persistent; style absent; stigmas 2. Capsule 2(or 3)-valved.

62. *Populus nigra* Linnaeus, Sp. Pl. 2: 1034. 1753.

黑杨 *hei yang*

Trees to 30 m tall; bark dull gray, furrowed when older; crown broadly ovoid. Branchlets yellowish, terete, glabrous. Buds russet, ovoid, very viscid. Petiole ca. as long as or longer than leaf blade, laterally flattened, glabrous; leaf blade rhombic, rhombic-ovoid, or deltoid, 5–10 × 4–8 cm, thinly leathery, abaxially greenish, adaxially green, base cuneate or broadly cuneate, rarely truncate, margin crenate-serrate, ciliate, apex long acuminate. Flower buds outwardly curved at apex.

Male catkin 5–6 cm; rachis glabrous; bracts brownish, 3–4 mm, membranous, lacinate. Male flower: stamens 15–30; anthers purplish red. Fruiting catkin 5–10 cm. Female flower: ovary ovoid, glabrous, stipitate; stigmas 2. Capsule ovoid, 5–7 × 3–4 mm, 2-valved, stipitate. Fl. Apr–May, fr. Jun. $2n = ?19^*, 38^*, 57$.

Along rivers. Native in Xinjiang; cultivated in Fujian, Hebei, Jiangsu, Liaoning, Nei Mongol, Shaanxi, Sichuan, Yunnan [N Africa, WC Asia, Europe].

- 1a. Leaf blade of long shoots and short branchlets uniformly shaped, rhombic, rhombic-ovate, or deltoid; crown broad
- 1b. Leaf blade of long shoots and short branchlets not uniformly shaped, those of short branchlets rhombic-deltoid or rhombic-ovate; crown columnar.
- 2a. Leaf blade of short branchlets broadly cuneate to subrounded at base; those of long shoots wider than long; bark dull gray, rough
- 2b. Leaf blade of short branchlets cuneate at base; those of long shoots ca. as long as wide; bark grayish white, smooth

62a. Populus nigra var. nigra

黑杨(原变种) hei yang (yuan bian zhong)

Crown broad. Leaf blade of long shoots and short branchlets uniformly shaped, rhombic, rhombic-ovate, or deltoid, 5–10 × 4–8 cm.

Along rivers. Xinjiang (Ertix He and Ulungur He valleys) [WC Asia, Europe].

Used for timber for construction and making furniture.

62b. Populus nigra var. italica (Moench) Koehne, Deut. Dendrol. 81. 1893.

钻天杨 zuan tian yang

Populus italica Moench, Verz. Ausl. Bäume 79. 1785; *P. fastigiata* Poiret; *P. nigra* var. *pyramidalis* (Bork.) Spach; *P. pyramidalis* Rozier.

Bark dull gray, rough. Crown columnar. Leaf blade of short branchlets and long shoots not uniformly shaped, pilose along veins on both surfaces; blade of short branchlets rhombic-deltoid or rhombic-ovate, 5–10 × 4–9 cm, broadly cuneate to subrounded at base; blade of long shoots deltoid, usually wider than long, ca. 7.5 cm. Fl. Apr, fr. May.

Widely planted and cultivated in the Chang Jiang and Huang He basins. Fujian, Hebei, Jiangsu, Liaoning, Nei Mongol, Shaanxi, Sichuan [native to WC Asia, Europe].

62c. Populus nigra var. thevestina (Dode) Bean, Not. Trees & Shrubs 2: 217. 1914.

箭杆杨 jian gan yang

Populus thevestina Dode, Bull. Soc. Hist. Nat. Autun 18: 210 [Extr. Monogr. Ined. Populus 52]. 1905.

Bark grayish white, smooth. Crown columnar. Leaf blade of short branchlets and long shoots not uniformly shaped; blade of short branchlets rhombic-deltoid or rhombic-ovate, base cuneate; blade of long shoots ca. as long as wide, small.

Cultivated. Hebei, Liaoning, Nei Mongol, Shaanxi, Yunnan [native to N Africa, WC Asia, Europe].

63. Populus ×xiaohei T. S. Hwang & Liang in C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 109. 1982.

小黑杨 xiao hei yang

Trees to 20 m tall; trunk columnar, slightly furrowed at base when old; bark grayish green, when old dull grayish brown, smooth; lenticels loose; crown long ovoid. Lateral branches spreading from trunk at 45–60°; sprouts grayish green, 3-angled below scars; short branchlets grayish brown or grayish white, terete. Buds slightly reddish brown, conical, apex acuminate, Leaves of short branchlets with petiole yellowish green, 2–4 cm, flattened at apex, glabrous; leaf blade rhombic-

elliptic or rhombic-ovate, 5–8 × 4–4.5 cm, abaxially greenish, glabrous, adaxially bright green, base cuneate or broadly cuneate, margin crenate-serrate, entire near base, narrow and translucent at edge, apex long caudate or long acuminate. Leaves of long shoots with petiole reddish, flattened, short; leaf blade broadly ovate or rhombic-deltoid, base subcordate or broadly cuneate, apex shortly acuminate or mucronate. Male catkin 4.5–5.5 cm; bracts yellow, brown at apex, elliptic, lacinate. Male flower buds ox-horn-shaped, bent outward, often 3 or 4 together, viscid; disc yellow, flabelliform; stamens 20–30. Female catkin 5–7 cm, to 17 cm in fruit. Capsule ovoid-ellipsoid, large, 2-valved, stipitate. Seeds 5–10, russet, obovate. Fl. Apr, fr. May.

• Widely planted. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi.

A hybrid between *Populus nigra* and *P. simonii*.

Used for wood pulp, fibers, timber for construction, and matchwood; also planted for reforestation.

64. Populus manshurica Nakai, Rep. Exped. Manchoukuo Sect. IV: 73. 1936.

热河杨 re he yang

Populus simonii Carrière var. *manshurica* (Nakai) Kitagawa.

Trees. One-year-old branchlets grayish yellow, terete, glabrous; juvenile branchlets brown, densely glandular, glabrous. Buds brown, oblong-lanceolate, 0.8–1.4 cm, viscid, apex acute. Petiole terete, 1.7–5.2 cm; leaf blade rhombic-deltoid, rhombic-elliptic, or broadly rhombic-ovate, ca. 7.5 × 5.5 cm, subleathery, abaxially greenish, glabrous, adaxially green, not wrinkled, base rounded or widely cuneate, margin crenate-serrate, ciliate or glabrous, apex acuminate.

• W Liaoning, E Nei Mongol.

No specimens have been seen by the authors; the description follows the protologue.

65. Populus ×jrtyschensis C. Y. Yang in C. Wang & S. L. Tung, Bull. Bot. Res., Harbin 2(2): 112. 1982.

额河杨 e he yang

Trees; trunk irregularly furrowed at base; bark grayish; crown spreading. Branchlets yellowish brown, pilose, rarely glabrous, slightly angled. Petiole slightly compressed distally, ca. as long as blade, pilose or sometimes glabrous; leaf blade ovate, rhombic-ovate, or deltoid-ovate, 5–8 × 4–6 cm, adaxially greenish, both surfaces tomentulose along veins, base cuneate or broadly cuneate, rarely rounded or truncate, margin crenate-serrate, narrowly translucent at edge, apex acuminate or long acuminate. Male catkin 3–4 cm. Male flower: stamens 30–40; anthers purplish red. Female catkin 5–6 cm, 15–20-flowered; rachis pilose or rarely glabrous. Capsule ovoid, 2(or 3)-valved. Fl. May, fr. Jun.

• Along rivers. Xinjiang (Ertix He valley).

66. *Populus ×beijingensis* W. Y. Hsu in C. Wang & S. L. Tung, *Bull. Bot. Res.*, Harbin 2(2): 111. 1982.

北京杨 *bei jing yang*

Trees to 25 m tall; trunk erect; bark grayish green, smooth, with orbicular or long elliptic, crowded lenticels; crown ovoid or widely ovoid. Lateral branches spreading; branchlets grayish green or slightly red; juvenile branchlets light green or reddish, not angled. Stem apex of seedlings with white mucilage in leaf axil. Buds curved outward, long conical, viscid, apex brownish or dull red. Leaves of short branchlets with petiole laterally flattened, 2–4.5 cm; leaf blade ovate, 3–9 cm, abaxially bluish white, adaxially light green, base rounded or broadly cuneate to cuneate, margin glandular serrate, apex acuminate or long acuminate. Leaves of long shoots and sprouts broadly ovate or deltoid-ovate, base cordate or rounded, margin crisped, coarsely crenate-serrate, translucent at edge, sparsely ciliate, glabrescent, apex shortly acuminate. Male catkin 2.5–3 cm; bracts brownish, ca. 4 mm, irregularly lacinate. Male flower: stamens 18–21. Fl. Mar. $2n = 38, 40$.

• Widely planted. N China.

An artificial hybrid between *Populus cathayana* and *P. nigra* var. *italica*, with many cultivars.

67. *Populus ×berolinensis* Dippel, *Handb. Laubholz*. 2: 210. 1892.

中东杨 *zhong dong yang*

Trees to 25 m tall; bark grayish green, furrowed and dull when older; crown broadly conical. Branches spreading; branchlets yellowish gray, robust, angled, glabrous. Buds light green, ovoid, glabrous, viscid, apex acuminate. Petiole terete, pilose; leaf blade ovate or rhombic-ovate, 7–10 × ca. 5 cm, abaxially green or slightly white, adaxially deep green, base broadly cuneate or rounded, margin crenate-serrate, narrowly translucent at edge, apex long acuminate to caudate. Fruiting catkin to 18 cm. Capsule glabrous, 2-valved, stipitate.

Planted. Hebei, Heilongjiang, Jilin, Liaoning [Kazakstan, Kyrgyzstan, Uzbekistan; Europe].

Used for wood pulp and timber for construction; also planted for landscaping and reforestation.

68. *Populus afghanica* (Aiton & Hemsley) C. K. Schneider in Sargent, *Pl. Wilson*. 3: 36. 1916.

阿富汗杨 *a fu han yang*

Trees medium sized; bark grayish, darker at base of trunk; crown wide. Branchlets yellowish brown or light yellow, slightly angled, glabrous. Leaves on proximal part of short branchlets with petioles terete; leaf blade varying from obovate or ovate at base of branchlet through orbicular-ovate to deltoid-orbicular or compressed orbicular near apex, from 2–3 cm near base of branchlet to 6–7 cm at apex, both surfaces glabrous, base cuneate to broadly cuneate, rounded, or truncate, margin obtusely crenate-serrate, slightly translucent, apex acuminate or shortly acuminate. Sprouts with leaf blade rhombic-ovate or obovate, base cuneate. Male catkin ca. 4 cm. Female catkin 5–6 cm, elongated in fruit; rachis glabrous or tomentose. Female flower: style short; stigmas 2. Capsule 5–6 mm, 2-valved; stipe 4–5 mm. Fl. Apr–May, fr. Jun.

Along river valleys; 1400–2800 m. S Xinjiang [Afghanistan, Kazakstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

1a. Petiole and catkin rachis glabrous 68a. var. *afghanica*

1b. Petiole and catkin rachis tomentose

..... 68b. var. *tajikistanica*

68a. *Populus afghanica* var. *afghanica*

阿富汗杨(原变种) *a fu han yang* (*yuan bian zhong*)

Populus nigra Linnaeus var. *afghanica* Aiton & Hemsley, *J. Linn. Soc.*, Bot. 18: 96. 1880; *P. usbekistanica* Komarov.

Petiole and catkin rachis glabrous.

Along river valleys; 1400–2800 m. S Xinjiang [Afghanistan, Kazakstan, Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan].

Similar to *Populus nigra* var. *thevestina* but crown wider; petiole terete.

68b. *Populus afghanica* var. *tajikistanica* (Komarov) C. Wang & Chang Y. Yang, *Fl. Reipubl. Popularis Sin.* 20(2): 71. 1984.

喀什阿富汗杨 *ka shi a fu han yang*

Populus tajikistanica Komarov, *Bot. Zhurn. SSSR* 19: 509. 1934; *P. usbekistanica* subsp. *tajikistanica* (Komarov) Bugala.

Petiole and catkin rachis tomentose.

• Along rivers, native and planted. S Xinjiang (Kax He valley).

69. *Populus ×canadensis* Moench, *Verz. Ausland. Baume* 81. 1785.

加杨 *jia yang*

Populus euramericana (Dode) Guinier.

Trees to more than 30 m tall; trunk erect; bark rough, thick, deeply furrowed; crown ovoid. Branches spreading; sprouts and seedling stem conspicuously

angled or not; branchlets terete, slightly angled, glabrous, rarely pubescent. Buds large, at first green, becoming brownish green, very viscid, apex decurved. Petiole long, laterally flattened; leaf blade deltoid-ovate, 7–10(–20) cm, usually longer than wide, abaxially greenish, adaxially dull green, base truncate or broadly cuneate, with 1 or 2 glands or not, margin crenate, translucent, shortly ciliate, apex acuminate. Male catkin 7–15 cm; rachis glabrous; bracts greenish brown,

lacerate. Male flower: disc yellowish green, margin entire; stamens 15–25(–40). Female catkin to 27 cm when mature, 45–50-flowered. Female flower: stigma 4-lobed. Capsule ovoid, ca. 8 mm, 2- or 3-valved. Fl. Apr, fr. May–Jun. $2n = 36^*$, 38^* .

• Widely planted. Anhui, Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang.
Used for timber and planted for reforestation.

5. Sect. Turanga Bunge, Mém. Acad. Imp. Sci. Saint-Pétersbourg (Sav. Etr.) 7: 498. 1851.

胡杨组 hu yang zu

Growth sympodial, without terminal buds. Buds pilose, not resinous. Petiole subterete; leaf blade variably shaped, grayish blue on both surfaces, abaxially with stomata. Bracts white with purplish apex, spatulate, membranous. Male flower: disc membranous, lobed or parted, with sharp teeth, caducous; stamens 15–35; anthers long, apex apiculate. Female flower: ovary long ovoid; stigma large, 3- or 4-lobed. Capsule elongate, (2 or)3-valved, stipitate.

70. Populus euphratica Olivier, Voy. Emp. Othoman 3: 449. 1807.

胡杨 hu yang

Balsamiflua euphratica (Olivier) Kimura; *Populus ariana* Dode; *P. diversifolia* Schrenk; *P. litwinowiana* Dode; *Turanga euphratica* (Olivier) Kimura.

Trees to 15 m tall, rarely shrubby; bark grayish brown, furrowed on basal part of trunk. Branchlets brownish, tomentulose or glabrous, pilose when young. Sprouts terete, slender, smooth or slightly tomentose. Buds brown, ellipsoid, ca. 7 mm, glabrescent. Petiole at maturity slightly complanate, ca. as long as leaf blade; leaf blade ovate-orbicular, reniform, or deltoid-ovate, base cuneate, broadly cuneate, rounded, or truncate, with 2 glands, apex with coarse teeth. Leaves of seedling stage and on sprouts shortly petiolate; leaf blade linear, lanceolate, linear-lanceolate, or oblanceolate, margin entire or with irregular, loose, undulate teeth. Male catkin slender, terete, 2–3 cm; rachis tomentulose. Male flower: anthers purplish red. Female catkin 2.5 cm, to 9 cm in fruit; rachis tomentulose or glabrous; ovary long ovoid, tomentulose or glabrous, long stipitate. Female flower: stigmas 3, yellowish green, each 2-lobed. Capsule 1–1.2 cm, glabrous, 2- or 3-valved. Fl. May, fr. Jul–Aug.

Plains, valleys, basins; 200–2400 m. Gansu, W Nei Mongol, Qinghai, Xinjiang [Afghanistan, ?India, Kazakstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan; SW Asia].

Used for timber; vulnerable.

71. Populus pruinosa Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg, sér. 2, 3: 210. 1845.

灰胡杨 hui hu yang

Balsamiflua pruinosa (Schrenk) Kimura; *Turanga pruinosa* (Schrenk) Kimura.

Trees to 10(–20) m tall; bark grayish yellow; crown spreading. Sprouts densely gray tomentulose; branchlets gray tomentulose. Leaves of short branchlets

with petiole 2–3 cm, slightly compressed; leaf blade reniform, 2–4 × 3–6 cm, both surfaces grayish blue, densely tomentulose, margin entire or apex with 2 or 3 loose teeth. Sprouts with leaf blade elliptic, both surfaces tomentose. Fruiting catkin 5–6 cm; rachis tomentulose. Capsule long ovoid, 5–10 mm, tomentulose, 2- or 3-valved, stipitate. Fl. May, fr. Jul–Aug.

Basins; 200–1500 m. Xinjiang [Kazakstan, Tajikistan, Turkmenistan; SW Asia].

