

CONTRIBUTIONS FROM THE INSTITUTE OF BOTANY
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一九三五年七月

SYNOPSIS OF CHINESE POPULUS

BY K. S. HAO

Populus Linnaeus.

Small or large trees, with furrowed or smooth bark and terete or angled branches; winter-buds resinous with several or many scales; leaves alternate, mostly ovate to ovate-lanceolate, entire or dentate or lobed, involute in bud; petioles terete or much flattened sidewise; flowers in pendulous or erect catkins before the leaves; stamens in caducous catkins, mostly 8-30 or more, under laciniate or lobed scales; pistils in separate catkins and also subtended by the laciniate scales, stigmas 2-4; all flowers provided with a caplike disk, this disk caducous or persistent; capsules 2-4-valved, ripening before the leaves are fully grown; seeds small, ovoid or obovoid, brown, provided with copious down; cotyledons elliptic (*Populus*, the classical name in Latin).

About 40 species in North America, Europe, North Africa and Asia south to Himalaya, 24 recorded in China.

Ornamental shade and street trees, cultivated on account of their rapid growth and the easy propagation of most species by cutting as *P. nigra sinensis* and *P. simonii*.

1. Disk persistent; different colour on one side of leaves from the other side.
2. Anthers long, apiculate; style elongated. Sect. I. *Leucoides*.
3. Petioles and branches not violet.

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Ornamental shade and street trees, cultivated on account of their rapid growth and the easy propagation of most species by cutting as *P. nigra sinensis* and *P. simonii*.

1. Disk persistent; different colour on one side of leaves from the other side.
2. Anthers long, apiculate; style elongated. Sect. I. *Leucoides*.
3. Petioles and branches not violet.

- 4. Branchlets green, subangular; leaves broadly ovate-oblong, quite cordate at base, dark green above, palish beneath; petioles longer than the blade. 1. *P. lasiocarpa*
- 4. Branchlets brown or purplish; leaves orbicular-ovate, upper surface bluish green, lower surface glaucous villose at base; petioles more or less shorter than the blade.
- 5. Branchlets villose; leaves glaucous beneath, mostly attenuate at base; capsule subglobose 2. *P. glauca*
- 5. Branchlets glabrous; leaves reddish and flocculent-tomentose beneath when unfolding, often cordate to rounded at base; capsule elliptic-ovate 3. *P. wilsonii*
- 3. Petioles and branches quite violet 4. *P. violascens*
- 2. Anthers oblong or suborbicular, not apiculate; style short or nearly wanting.
- 3. Leaves beneath concolored or greenish or white tomentose.
- 4. Leaves beneath concolored or discolored, without stomata above, variable in form; buds viscid, glabrous rarely pubescent. Sect. 2. *Leuce*.
- 5. Leaves white tomentose beneath; margin lobed or irregularly denticulate, those of fruiting branches often glabrous, thick in texture, papyraceous, buds pubescent.
- 6. Leaves irregularly dentate, those of the fruiting branches quite glabrous, dark green above, light green beneath, usually larger, to 14 cm long. 5. *P. tomentosa*
- 6. Leaves palmately lobed, those of the fruiting branches more or less pubescent, usually smaller, only to 6 cm long, rarely larger 6. *P. alba*

5. Leaves glabrous or pubescent, or thinly tomentose only when unfolding; margin short denticulate; buds glabrous.
6. Leaves of fruiting branches distinctly long acuminate 7. *P. adenopoda*
6. Leaves of fruiting branches acute or short acuminate.
7. Leaves usually truncate not cordate rarely rounded at base, obtuse or acute at apex 8. *P. tremula* var. *daurica*
7. Leaves cordate at base, rounded at apex, pistillate catkins usually longer than 12 cm ... 9. *P. rotundifolia*
4. Leaves beneath concolored, greenish, both surfaces with numerous stomata, truncate at base, acuminate at apex; buds viscid. Sect. 3. *Aigeiros*.
5. Leaves large broadly subcordate-triangular, abruptly acuminate at apex, margin glandular-crenate, glabrous to 9 cm long and 10 cm broad; petioles 4-5 cm long 10. *P. nigra* var. *sinensis*
5. Leaves small obovate or ovate-deltoid, narrow cuneate at base, short acuminate at apex, crenate-denticulate or subserrate, 1.4-4 cm long and 1.2-2 cm broad, margin ciliate, puberulous beneath; petioles slender, puberulous, 0.3-2 cm long 11. *P. afghanica*
3. Leaves beneath discolored, whitish; petioles terete; buds very resinous. Sect. 4. *Tacamahaca*
4. Branchlets more or less angled.
5. Leaves broadest below the middle, usually rounded at the base.
6. Branchlets brown, young branches and leaves glabrous.

- 7. Pedicels only 1-2 mm long; buds small. ...
..... 12. *P. szechuanica*
- 7. Pedicels 5-10 mm long; buds larger to 2 cm
long. 13. *P. ciliata*
- 6. Branchlets light yellowish gray, branches and
leaves pubescent when young ... 14. *P. laurifolia*
- 5. Leaves broadest above the middle, cuneate at base,
at least so on the sterile branches.
- 6. Petioles stout, less than 1 cm long
..... 15. *P. yunnanensis*
- 6. Petioles usually more than 1 cm long
..... 16. *P. simonii*
- 4. Branchlets terete, or only vigorous shoots of young trees
sometimes angled.
- 5. Branchlets yellowish gray; capsule subsessile 3-4-
valved.
- 6. Young branches glabrous or slightly puberulous;
buds not viscid; petioles 1-4 cm long.
- 7. Leaves glabrous, rounded at base, ovate to
ovate-lanceolate 17. *P. suaveolens*
- 7. Leaves pubescent on the veins beneath, sub-
cordate at base, obliquely short acuminate,
elliptic 18. *P. maximowiczii*
- 6. Young branchlets pilose; petioles pilose or hirsute,
leaves being pilose on the midrib and veins of
both surfaces; capsule subglobose ... 19. *P. pilosa*
- 5. Branchlets brown or dully colored; capsule 2-valved
..... 20. *P. purdonii*
- 1. Disk deciduous; leaves variable in form, ovate to linear-lanceolate,
both surfaces having the same colour. Sect. 5. *Turanga*.
- 2. Leaves polymorphous, dentate or lanceolate with entire margin;
petioles slightly longer than the blade 21. *P. euphratica*

2. Leaves ovate-elliptic or reniform, quite entire; petioles shorter than the blade 22. *P. pruinosa*.

Sect. 1. *Leucoides* Spach—Bark of trunk rough, scaly; leaves of long and short shoots scarcely different, without stomata above, cordate at base; petioles cylindrical, slightly compressed at apex; buds glabrous viscid; flowers with deeply lobed persistent disk; ovary pubescent; stigma 2-3, style elongated; stamens 30-40; anthers oblong, apiculate at apex; capsule pedicelled, 2-3-valved, villose.

1. ***P. lasiocarpa*** Oliver in Hookers Icon. XX. t. 1943 (1890); *Populus fargesii* Franchet.

Round-headed tree to 20 m tall; branchlets tomentose when young, becoming glabrous during maturity; buds large to 2 cm long, glabrous, brown in colour, slightly viscid, the basal scale pilose at base; leaves ovate, acuminate, deeply cordate, crenately glandular-serrate and revolute at margin, 15-30 cm long, bright green and glabrous above, light green and pubescent beneath; petioles about 1/2 as long as the blade, usually tomentose; stipules narrowly linear, caducous; staminate catkins to 12 cm long, rachis white tomentose, scales glabrous, slightly laciniate, narrowed into their stipes; stamens 30-40; fruiting catkins 15-20 cm long, rachis villose; capsule white tomentose, 3-valved, short stalked or subsessile; disk angular-ovate glabrous.

Hupei: Chienshih, *A. Henry* no. 5423 A (type, in Herb. Kew; Herb. Berlin); Patung, on the slope of the mountains, *Henry* no. 4013; Ichang, *Wilson* no. 706; Hsiang shan hsien, *Wilson* no. 706; Fang hsien, *Wilson* no. 706; The same locality, *Henry* no. 5423, *Wilson* no. 384. Szechuan: Tchenkeoutin, *Farges* (type of *P. fargesii* Franchet).

A good timber tree, common in Hupei, rare in Szechuan, between 1200 and 2300 meters in the altitude, easily distinguished by the large glabrous winterbuds.

2. ***P. glauca*** Haines in Journ. Linn. Soc. XXXVII. 408 with fig. (1906).

The most interesting characters of *P. glauca* are the frequency of 2-sexual characters and the large development of the perianth; leaves ovate, acute at apex, slightly cordate at the base, or truncate or attenuate

into a short petiole; fruits subglobose often 2-carpelled, pilose; rachis pilose; flowers all 2-sexual and 6 mm in diameter; disk 5-7-fid membrane with segments 3-5 mm long; stamens 6-12, inserted at the base of this perianth on its very short tube; capsule subglobose.

Tibet: Tonglo, alt. 7500-10000 ft., *Haines* no. 826 (Type, in Herb. Kew; Herb. Berlin).

Distributed in Sikkim, India and Bhutan.

3. ***P. wilsonii*** Schneider in Sargent, Pl. Wils. III. 16 (1916).

Tree to 25 m tall with pyramidal head; branchlets terete, glabrous, purple when young, the older grayish brown, robust; buds viscid, scale very compressed, ovate, glabrous; leaves broad-ovate to broadly ovate-oblong, obtuse, cordate to rounded at base, crenate-dentate, 8-18 cm long, 7-15 cm broad, glabrous and dull bluish green above, reddish and floccose-tomentose beneath when unfolding, soon nearly glabrous; petiole 6-11 cm long; pistillate catkins about 7 cm long, pubescent, in fruits to 15 cm long; capsule nearly glabrous.

Hupei: Hsiang-shan Hsien, *Wilson* no. 706 a (Type, in Arn. Arb.); Chang-yang Hsien, *Wilson* no. 706 b; Fang Hsien, *Wilson* no. 4450. Szechuan: Sung-pan Ting, *Wilson* no. 4450 a.

A very common tree in Szechuan and Western Hupei, between 1300 and 2000 m. in altitude especially along the river or near the moist place. By the pyramidal form with the pendulous branches it is easily recognized.

4. ***P. violascens*** Dode in Bull. Soc. Dendr. France no. 38, p. 31 (1921).

Buds 15 mm long, acute, glabrous, reddish brown or violet; leaves 11-15 cm long, 7-8 cm broad, elliptic, slightly cordate at base, granulate-serrate, not acuminate at apex, glabrescent above, slightly villose at the base, margin ciliate, white pilose beneath; petioles 2-3 cm long, violet, glabrous or glabrescent; those of flowering branches ovate-lanceolate, more or less acuminate, truncate or attenuate at base; all the leaves red or whitish-red beneath; flowers not known.

This new species is described by Dode on a cultivated plant which has been introduced in Paris Botanical Garden from central China.

Sect. 2. *Leuce* Duby—Bark smooth, rough only at the base of old trunks; buds tomentose or glutinous and glabrous; leaves tomentose or glabrous, with stomata above; petioles compressed or cylindrical; disk persistent, sinuate; stigma 2-4, sessile; stamens 5-20, subglobose or elongated, not apiculate; capsule small, elongated, usually 2-valved.

5. ***P. tomentosa*** Carrière in Rev. Hort. XXXIX. 340 (1867); Dode Monogr. *Populus* 25, pl. XI. fig. 21 (1905); *Populus alba* var. *denudata* Maximowicz; *P. alba* Burkill not Linnaeus; *P. pekinensis* Henry; *P. alba* var. *seminuda* Komarov; *P. glabrata* Dode; *P. alba* var. *tomentosa* Vesmael.

Tree similar to *P. alba*; stem quite straight; branches gray-tomentose; buds slightly tomentose; leaves of long shoots triangular-ovate, acuminate, subcordate or truncate at base, doubly dentate, to 15 cm long on the young trees, dark green above, grayish-tomentose beneath, those on old branches much smaller, sinuately toothed and glabrescent beneath, on short branches also much smaller, ovate or triangular-ovate, sinuately toothed, glabrous beneath; petiole about as long as the blade; catkins to 14 cm long, pendulous, scale brown pilose along the margin.

Hopeh: Slwantze *G. E. Simon* (type, Mus. Paris); Peking and its neighborhood, *Skatschkow*, *Bretschneider*, *Williams*, *C. S. Sargent*, *J. G. Jack* etc. Yunnan: Yunnan fu, alt. 1900 m. *Maire* no. 2474 (ex *Handel-Mazzetti*).

A very common tree in North China as Hopeh, Shantung, Shansi, Honan, Shensi and Kansu. Nakai has told us that he has never seen this species in Manchuria.

6. ***P. alba*** Linnaeus Sp. 1034 (1753); Dode Monogr. *Populus* 25. pl. XI. fig. 19 (1905); *Populus triloba* Dode; *P. morisetiana* Dode.

Tree to 30 m or occasionally taller with tomentose young branches; winter-buds white tomentose; leaves ovate, to 6 cm long, 5 cm broad, rarely larger, nearly rounded at base, margin with ovate large teeth,

glabrous and green above, white densely tomentose beneath; petiole also tomentose when young, with 2 glands at apex, staminate catkins to 12 cm long, with pilose rachis, fruiting catkins somewhat shorter; ovary glabrous, globose, acute at apex; bracts brown, attenuate into a stalk; capsule short-pedicelled.

Tibet: without locality, *Falconer*; Altai, in the mountains, *Ehrenburg*.

Central and south Europe to central Asia as Kashmir and North Himalaya. Wild tree and also cultivated.

This species is very closely related to *P. tomentosa* from which it differs in the smaller leaves with thinner texture and large dentate margin.

7. ***P. adenopoda*** Maximowicz in Bull. Soc. Nat. Mosc. Liv. 50 (1879);
Dode in Bull. Soc. Hist. Nat. Autun, XVIII. pl. XI (1905);
P. silvestrii Pampanini; *P. tremula* var. *adenopoda* Burkill;
P. macranthela Léveillé.

Tree to 30 m tall; branches slender, pubescent when young, becoming grayish or brown, terete; buds conical, acute, glabrous, viscid, about 1.5 cm long, scale-margin ciliate; leaves of long shoots ovate, acuminate, truncate or cordate with 2 prominent glands at base, crenate-serrate with incurved gland-tipped teeth, 7-10 or occasionally to 15 cm long, glabrous above or pubescent along the veins, pale green and grayish pubescent beneath at least when young, those of short branches smaller, ovate to orbicular-ovate, 5-8 cm long; petioles at least as long as the blade or slightly longer; staminate catkins 6-12 cm long, bracts deeply lobed and long ciliated; fruiting catkins 14-18 cm long; capsule glabrous, elliptic-acute, 2-valved; seed about 2 mm long, flat, attenuate-ovate and blackish.

Shensi: Han River, *Piasezki* (type, in Herb. Petrop.; Herb. Berlin). Hupeh: Patung, *Henry* no. 5281; See kio ho, 600 m. C. *Silvestri* no. 378 (type of *P. silvestrii* Pampanini), *Wilson* nos. 7, 255; Kao kien scian, C. *Silvestri* nos. 296, 296a; Ichang, *Henry* nos. 3798, 3816, *Wilson* no. 724; Changyang Hsien, *Wilson* nos. 1400, 1437; Hsiang shan

Hsien, alt. 1600-2500 m. *Wilson* no. 1460. Szechuan: Tachien-lu, alt. 2300 m. *Wilson* no. 1430; Wushan, *Henry* no. 5211 a; Mupin, alt. 1300-2000 m. *Wilson* no. 1400. Hunan: *Handel-Mazzetti* nos. 11800, 11860. Yunnan: *Handel-Mazzetti* no. 10254, *Duclox* no. 666, *Delavay*. Kweichow, *Cavalerie* no. 974, *Handel-Mazzetti* no. 10466. Kiangsi: Kiukiang, alt. 300 m. *Wilson* no. 1738.

8. **P. tremula** Linnaeus Sp. 1034 (1753); *Populus tremula* var. *typica* Schneider.

Tree to 30 m tall, usually much smaller with rounded open head, suckering; branches terete, glabrous; buds ovoid, lustrously glabrous; leaves suborbicular or ovate, rounded or acute at apex, truncate or rounded at base, margin crenate-dentate to 10 cm long, tomentose when unfolding, becoming glabrous, green above, slightly glaucescent beneath; petioles glabrous, as long as the blade; leaves of the suckers ovate to 15 cm long, pubescent beneath; staminate catkins cylindrical to 8 cm long; scales deeply lobed and long hairy along the margin; pistillate catkins 12 cm long, scale deeply lobed and fringed, stigmas 2, 2-parted, pink colored; capsule 2-carpelled, short-pedicelled.

The typical species is first recorded in Europe. Distributed in North Africa, West Asia and Siberia. One variety and a form recorded in China.

(1) **P. tremula** var. **daurica** (Dode) Schneider in Sargent, Pl. Wils. III. 24 (1916); *Populus daurica* Dode in Mém. Soc. Nat. Hist. Autun, XVIII (Entr. Monog. Inéd. *Populus*, 31, t. XI. fig. 31) (1905); *P. tremula* Maximowicz non Linnaeus; *P. wutaica* Mayr; *P. petiostachya* Dode.

Tree rarely exceeding 20 m in height with branches forming a loose and rounded to oval crown; bark smooth greenish to pale gray except on the very old trees of which it is dark gray and fissured on the lower part of the trunk; leaves triangular-acuminate, margin regularly dentate, glabrous beneath during maturity, those on old branches orbicular, rounded at base; petioles about as long as the blade or slightly shorter; staminate catkins about 6 cm long, producing from the glabrous lustrous

bud-scales; rachis pilose; disk entire, ovate, acuminate into a petiole, glabrous; bracts deeply acutely lobed, long pilose; stamens 10-14; filaments unequal; fruiting catkins longer than the staminate; capsule 2-carpelled with glabrous rachis and entire bracts.

Jehol, *A. David* no. 1687 (type of this variety, in Herb. Paris). Hopeh: Hsiao wu tai shan, alt. 2000 m. *F. N. Meyer* no. 43, 1113. Hupeh: Fang Hsien, alt. 1600-2000 m. *Wilson* no. 722; Hsiang shan Hsien, alt. 1600-2500 m. *Wilson* no. 722. Szechuan: Kuan Hsien, alt. 3000 m. *Wilson* no. 4347; Tachien-lu, alt. 2500 m. *Wilson* no. 4358; Tchenkcoutin, 4600 ft. *Farges*; without locality, *H. Smith* no. 4647. Yunnan: between Chien chuan plain and the Mekong drainage basin, *J. F. Rock* no. 8640; Likiang snow range, *J. F. Rock* no. 8247; Eastern flank of Bei ma shan, tree to 40 ft. tall, *G. Forrest* no. 13835; Yunnan fu *H. Smith* no. 1634; the same locality, *Delavay* no. 896. Manchuria, *F. N. Meyer*. Amur, *R. Maack* nos. 10, 11, *Maximowicz*; Ussuri, *C. S. Sargent*. also recorded in Korea.

This is a common tree on the higher mountains in Hupeh, Szechuan and Yunnan, where it covers extensive areas and often forms pure stands. The young branches are reddish purple. It produces suckers very freely, like *P. sieboldii* Miquel which is a native of Japan.

(2) *P. tremula* var. *dauidiana* f. *tomentella* Schneider in Sargent. Pl. Wils III. 25 (1916).

This forma differs from its type in the pubescent branches and leaves.

Szechuan: Mupin, Forests, alt. 2300-3000 m. *Wilson* no. 4359 (type of the forma, in Herb. Arn. Arb.)

9. *P. rotundifolia* Griffith, Notul. Pl. As. IV. 382 (1854), Icon. Pl. Asia. IV. t. 546 (1854); *Populus microcarpa* Hooker.

Tree to 20 m tall, usually much smaller; leaves orbicular, rounded at base, not acute or acuminate at apex, pubescent when young becoming glabrous; petioles slightly longer than the blade; fruiting catkins being 15-16 cm long; capsule glabrous, 2-valved; seed with densely white hairs; known only from Himalaya.

East Himalaya, *Griffith* no. 4495 (type, in Herb Kew); Bhutan, *Griffith* no. 4495. (type, in Herb. Kew and Berlin)

(1) *P. rotundifolia* var. *duclouxiana* (Dode) Gombo. in Math. Termesz. Közl. XXX. 130 (Monog. Gen. Populi) (1908); *P. duclouxiana* Dode; *P. macranthela* Léveillé et Vaniot; *P. rotundifolia* var. *macranthela* Gombocz.

Leaves angular, deeply cordate at base, finely acuminate at apex, serrate along the margin, glabrous beneath at maturity; those on old branches suborbicular, rounded at base; capsule pedicelled; the fruiting catkins being 15-16 cm long.

Yunnan, *F. Ducloux* (type, in Herb Paris and Berlin). Szechuan: Ching chi sien, 2000-2300 m. *Wilson* no. 1432. Kweichow: Pinfa, *J. Cavalerie* no. 974 (type of *P. macranthela*).

Sect. 3. *Aigeiours* Duby—Bark furrowed; buds viscid; leaves green and stomatiferous on both surfaces, with a well defined translucent border, triangular-ovate, or orbicular-ovate, broad at base, long-acuminate, crenate-serrate; disk persistent and sinuate; stigma 2, sessile; stamens 5-20, anthers subglobose or elongated, not apiculate; capsule small, elongated; the species of this section used as cottonwoods.

10. *P. nigra* var. *sinensis* Carrière in Revue Hortic. 340 (1867); *P. nigra* var. *italica* Du Roi; *P. nigra* var. *pyramidalis* Spach; *P. sinensis* Dode.

A very common tree in North China up to 40 m tall with a pyramidal crown and wide-spreading branches; branches glabrous, terete; buds small about 8 mm long, acute, viscid; scale lustrous terminal on the short branches; leaves angular, rounded or broadly truncate at base, abruptly acuminate at apex, breadth and length about equal, dark green and glabrous above, light green and glabrous beneath, margin serrate-dentate; petioles about as long as the breadth of blade; fruiting catkins glabrous about 3 cm long, rachis green; capsule elliptic, 3-4 mm long, glabrous, upright in habit; staminate catkins slightly curving, to 3 cm long, with glabrous and green rachis.

North China, *G. E. Simon* (type, in Herb. Berlin). Shantung: Chefoo, *Fauvel*. Kansu: southern part, *Piasezki*. Shensi: *Piasezki*. Hopeh: Peking, Temple of Heaven, catkins not drooping, *J. C. Liou* no. 2507.

The wood of this plant is quite white, therefore it is very commonly cultivated in North China southward to Tibet and Himalaya.

11. ***P. afghanica*** (Aitchison et Hemsley) Schneider in Sargent, Pl. Wils. III, 36 (1916); *P. nigra* var. *afghanica* Aitchison et Hemsley in Journ. Linn. Soc. XVIII. 96 (1880).

Tree to 30 m tall, 2.5 m in girth, with ascending branches; branchlets very slender; leaves puberulous when young, membranaceous at maturity, ovate-rhomboid, 3-4 cm long, about 2.5 cm broad, long cuneate at base, short acuminate at apex, margin crenate-denticulate; petioles about 10 mm long; fruiting catkins short peduncled, slender, very loosely flowered, about 3 cm long; bracts capulate more or less lobed; capsule ovate, about as long as the pedicel; fruits in May.

Altai, rare. Afghanistan: Kuram valley, *J.E.T. Aitchison* no. 161 (type, in Herb. Kew, Herb. Berlin).

By the exceedingly slender branches, small leaves and the slender female catkins, this plant proves to be a very distinct species.

Sect. 4. *Tacamahaca* Spach—Bark furrowed; buds large, very viscid, exhaling a strong balsamic odor; leaves whitish below, glandular at base, without translucent margin, cuneate to subcordate at base; petioles variable in length, terete or quadrangular, usually grooved above; disk persistent, margin lobed or crenate; stigma 2-4, style short or wanting; stamens 18-60; anthers subglobose to oblong; capsul 2-4-valved.

12. ***P. szechuanica*** Schneider in Sargent, Pl. Wils. III. 20 (1916).

Tree to 4 m tall; young branches angled, glabrous often purple or yellowish brown; buds purple, glabrous, viscid; leaves reddish when young, glabrous bright green above, whitish beneath, those of long

shoots ovate-oblong to ovate-lanceolate, acute or short acuminate at apex, rounded or subcordate or broad-cuneate at base, margin crenately glandular-dentate, 11-20 cm long, 5-11 cm broad; petioles 2-4 cm long; those of fruiting branches broad-ovate on petiole 3-7 cm long; fruiting catkins to 16 cm long, glabrous; capsule subsessile, 3-4-valved; seed-hairs to 7 mm long; staminate catkins about 10 cm long, scale deeply lobed with angular segments which are hairy along the margin, rachis glabrous.

Szechuan: Kuan Hsien, *Wilson* no. 2163 (type, in Arn. Arb.); the same locality, *Wilson* nos. 4346, 4348; Ta chien lu, *Wilson* nos. 413, 1434, 4355. Kansu: Minchow, Hata pu, *K. S. Hao* no. 562; Yang dia dien, *F. N. Meyer* no. 1945. Yunnan: Mekong-Salween, *Forrest* nos. 16203, 16424; Likiang Snow Range, *J. F. Rock* no. 3930; Shiku, near Tungtien, *J. F. Rock* no. 9501; Likiang, *Handel-Mazzetti* no. 6829 (ex *Handel-Mazzetti*).

Cultivated in Berlin Botanical Garden, lower side of the leaf much glandular when young.

(1). *Populus szechuanica* var. *tibetica* (Thomson) Schneider in Sargent, Pl. Wilson. III. 33 (1916); *Populus balsamifera* Thomson.

Differing from the type in the distinctly angular branches, in the pubescent short petioles, both surfaces of leaves puberulous and hairy at nerv-axis beneath.

Szechuan: without locality, 3000-3600 m. *Wilson* no. 4527. North-West Tibet, cult. at 2000-4500 m. *Thomson* (type, in Herb. Kew, Herb. Berlin). Tibet, *Schlagintweit* nos. 1162, 1563, 4976, 5327.

13. *P. ciliata* Wallich apud Royle, Ill. Bot. Himal. I. 346 et II. t. 84, fig. I (1839).

Tree up to 20 m tall, with glabrous branches; branchlets terete, pubescent when young, becoming glabrous; buds ovate, quite large to 2 cm long, scales glabrous, more or less viscid, sometimes slightly pubescent; leaves ovate-cordate, 10-15 cm long, 8-12 cm broad, acute, rounded or subcordate, margin ovately dentate, upper surface glabrous dark

green, lower surface grayish green, pubescent especially along the veins; petioles pubescent, without glands at apex; staminate catkins small about 6 cm long with glabrous rachis; pistillate catkins up to 20 cm long also with glabrous rachis; pedicel 5-10 mm long; capsule 4-valved, open into a spreading plane when ripe.

Yunnan: Salwin-Scheidekette, *Handel-Mazzetti* no. 8911. Shensi: without locality, *Giraldi* no. 1638 only with leaves. Tibet: *Hooker*, *Falconer* no. 956.

Distributed in India, Sikkim, Himalaya, Bhotan and Kumaon near Mattiana, *Wallich* no. 2796 (type, in Herb. Kew, Herb. Berlin.).

This species may be represent a distinct group of Sect. *Tacamahaca* according to its rather long stalked fruits, its densely ciliate leaves and its long anthers .

14. **P. laurifolia** Ledebour, Fl. Alt. IV. 297 (1833) et Ic. Ross. V. t. 479 (1834). *Populus balsamifera* Pallas; *P. lindleyana* Carrière; *P. balsamifera* var. *laurifolia* Wesmael.

Tree to 15 m tall; branchlets slender, sharply angled, pubescent at least near apex, becoming grayish yellow; buds elongated, upright but not appressed; leaves of long shoots ovate-lanceolate to lanceolate, acuminate, rounded or attenuate at base, finely glandular-serrate, 7-12 cm long, bright green above, whitish and sparingly pubescent below at least so on the midrib; petioles short, pubescent; leaves of flowering branchlets elliptic to elliptic-ovate, short acuminate, rounded at base; petioles rather long; catkins about 5 cm long; scale large pubescent; stamens 20-30; capsule 2-3-valved, slightly pubescent; stipule linear-lanceolate.

Altai Mts. near Ulba, *Ledebour* (type, in Herb Petrop.) Hopeh: Hsiao wu tai shan, *F. N. Meyer* no. 1311; Peking, *Bushell*, Fengtien: *Ross* nos. 17,69 (ex *Bushell*).

Distributed in Siberia, cult. in Berlin Botanical Garden.

15. **P. Yunnanensis** Dode Monogr. Populus 63. t. XII, fig. 103 a (1905); *Handel-Mazzetti*, Symbolae Sinicae VII. i. 57 (1929).

Branches purplish when young, flowering branches yellowish brown, terete or subangular; buds elongated ovoid, acute, scale long ovate, resinous, glabrous, more or less purplish; leaves papyraceous, 6.5-16 cm long, ovate-lanceolate or broad-ovate or subtriangular, 2-7.5 cm broad, long acuminate, rounded or subcuneate at base, dark green above, whitish glabrous below, margin glandular narrowly crenate-dentate, puberulously ciliate, then glabrous; those on flowering branches 7.5-17 cm long, 4-12 cm broad, ovate, rounded or cordate rarely narrowly cuneate, long acuminate or obtuse at apex, subcoriaceous, green above, whitish beneath; petioles 2-9 cm long, nearly as long as the blade; staminate catkins pendulous, subsessile, 6-10 cm long, rachis glabrous; bracts broadly ovate, attenuate into a short stalk which is about 0.5 cm long, margin deeply lobed; segments about 2.5 mm long; disk glabrous; anthers mostly 2 mm long, filaments subequal.

Yunnan: without locality, *F. Ducloux* (type, Dode received a living plant; the same province, *Handel-Mazzetti* nos. 813, 1146, 8541, 10046.

16. **P. simonii** Carrière in Rev. Hort. XXXIX. 360 (1867); Dippel, Hand. Laubholz. II. 211, fig. 105 (1892); *P. brevifolia* Carrière; *P. balsamifera* var. *simonii* Wesmael.

Tree to 12 m tall or more, of rather narrow habit; branches slender, angled, glabrous, reddish brown or grayish white; buds pointed, upright; leaves rhombic-ovate or rhombic-elliptic, abruptly acuminate, broad-cuneate or narrowly rounded at base, crenate-serrulate, 6-12 cm long and 3-8 cm broad, glabrous, bright green above, whitish or pale green beneath; petioles 1-2 cm long, reddish; staminate catkins 2-3 cm long; stamens 8.

Hopeh: Siwantze, *G. E. Simon* no. 151 (type, in Herb. Paris); Nankow, *J. G. Jack*; near San tau ying, *Meyer* no. 974. Hupeh: Hsiang shan, *Wilson* no. 1454. Szechuan: Wen chuan Hsien, 1300-2300 m *Wilson* no. 1420. Kansu: Sining fu, *Szechenyi* (ex Kanitz). Manchuria: upper Amur, *S. Korshinsky*; common in the country of Harbin, *C. S. Sargent*; Fengtien, *Ross* no. 211.

Distributed in Korea, cult. in Berlin Botanical Garden.

There are two forms of this species cultivated in Arnold Arboretum.

- (1). f. **pendula** Schneider in Sargent, Pl. Wils. III. 22 (1916).

Differing from the type in the pendulous and strongly angled branches; the bright green leaves are comparatively small.

- (2). f. **fastigiata** Schneider in Sargent, Pl. Wils. III. 22 (1916).

Narrow pyramidal tree with upright branches. Introduced by F. N. Meyer from China into America.

17. **P. suaveolens** Fischer in Allg. Gartenzeit. IX. 404 (1841); Henry in Gard. Chron. ser. 3, Liii. 198. fig. 88 (1913); *P. pseudobalsamifera* Turczaninow; *P. balsamifera* var. *suaveolens* Loud.

Tree to 30 m tall, with upright branches; branches terete, gray, glabrous, olive-green while young, becoming pale grayish yellow; buds elongated, viscid, lustrously glabrous; stipule obtuse; leaves firm, oval or ovate-elliptic or suborbicular-rhomboid, short acuminate or acute at apex, rounded or cordate at base, crenate-serrulate, ciliate, 10-18 cm long, 6-10 cm broad, glabrous, lustrous above, grayish beneath, palmately 3-5-7-nerved at base; petioles terete about half as long as the blade, glabrous; staminate catkins 4-5 cm long, rachis glabrous; pistillate catkins 6-8 cm, in fruits to 18 cm long; capsule nearly sessile, 3-valved, glabrous, subglobose; disk entire along the margin.

Hopsh: Hsiao wu tai shan, alt. 1800 m. F. N. Meyer no. 1311; the same locality, W. Purdom no. 2; Peking, Tatarinow, Bretschneider. Kansu: Liang tshou, Piasezki; Min chow, 1500 m. in alt. K. S. Hao no. 526. Szechuan: very common along the River Min Kiang, 2000-3000 m. Wilson no. 4577; Mongkong Ting, Wilson no. 2162, the same locality, Wilson no. 2164; Ching chi Hsien, Wilson nos. 1431, 1432. Shantung: Chefoo, Fauvel. Manchuria, C. S. Sargent. Shensi: without locality, Piasezki. Yunnan: Maikha Salween divide, Forrest no. 18035; Likiang Snow Range, J. F. Rock no. 3617. Turkestan, ad flumen Sairam, Fetissow. Tibet (ex Schneider).

Songaria: an den Qellen des Aksu, A. Schrenk (type, in Herb Berlin, Herb. Kew).