

Taxonomic Study of the Genus *Acer*,
with Special Reference to the Seed Proteins

III. System of Aceraceae

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The writer proposes herewith a revised system of Aceraceae, reexamining the morphological characters and referring to the protein affinities.

Finally, the writer considers that the protein affinity should be taken as an important character in constructing a taxonomic system with specific rank.

Clavis ad Series

- A Discus plerumque intrastaminalis vel rarius nullus.
- B Discus intrastaminalis. Gemmae perulae 2- raro 3-jugae, interiores elongatae. Inflorescentia fructifera in ramulis foliatis terminalis.
- C Inflorescentia racemosa, andro-dioecia, bracteolata vel ebracteolata. Planta monoecia raro andro-dioecia. Discus crassus.
- D Loculi ovati vel elliptici planati.
- E Antherae apiculatae, leviter scabrae. Ovaria glabra. Stylus lobatus.
Folia 5-partita, lobis inciso-lobulatis. *Micrantha*.
- EE Antherae laeves. Ovaria parce puberula. Stylus partitus vel lobatus.
Folia indivisa vel 3~5-lobata, lobis inaequaliter serratis vel minute serratis. *Macrantha*.
- DD Loculi orbiculati convexi. Inflorescentia rubro-fusco tomentosa. Stylus lobatus. *Rufinervia*.
- CC Inflorescentia composite racemosa, demum in fructu racemosa, andro-polygama, ebracteolata, rubro-fusco tomentosa. Flores multi parvi. Discus paulo crassus. Loculi orbiculati convexi. *Parviflora*.
- CCC Inflorescentia corymbosa. Bracteola linearis vel lanceolata apice acuminata.
- D Loculi carinato-convexi. Folia 3-lobata vel 3-secta, lobis obtusis. Discus floris masculi indivisus. *Glabra*.

- DD Loculi reticulato-convexi. Folia 5-lobata vel indivisa, lobis acutis, argute serratis. Lobi disci floris masculi ad stamina alternati. *Arguta.*
- BB Discus intrastaminalis vel nullus. Gemmae perulae 4~6-jugae, interiores non elongatae. Inflorescentia umbellata, lateralis. Flores longe ante folia nascentes. Stylus ad basin partitus. *Rubra.*
- BBB Discus intrastaminalis. Gemmae perulae ultra 6-jugae, interiores elongatae. Inflorescentia in ramulis foliatis terminalis, racemosa, bracteolata. Planta andro-dioecia. Loculi elliptici plani, nervis minutis parallelis. Folia indivisa, argute biserrata, parallele multicostata. *Carpinifolia.*
- AA Discus plerumque extrastaminalis vel rarius nullus.
- B Discus extrastaminalis, lobatus vel dentatus. Gemmae perulae 2-jugae rarissime 3-jugae, interiores elongatae. Inflorescentia in ramulis foliatis terminalis, composite racemosa, andro-polygama, rubro-fusco pilosa. Stylus ad basin partitus. Folia 5~7-lobata vel fida, lobis acuminatis dentatis. *Spicata.*
- BB Discus extrastaminalis vel nullus. Gemmae perulae 3~6-jugae, interiores non elongatae. Planta dioecia vel androdioecia. Flores longe ante folia nascentes. Inflorescentia lateralis (raro foliata sed foliis 1-jugis caducis) feminea plerumque racemosa, bracteolata vel ebracteolata. Stylus ad basin partita. Folia ternata vel impari-pinnata.
- C Discus nullus. Pedicelli longi. *Negundo.*
- CC Discus extrastaminalis. Pedicelli breves. *Cissifolia.*
- BBB Discus extrastaminalis. Gemmae perulae 4-jugae vel ultra 4-jugae, interiores plerumque elongatae.
- C Inflorescentia in ramulis foliatis terminalis, paniculata, bracteata vel ebracteata.
- D Folia integra vel grosse sinuato-dentata vel remote minute serrata.
- E Inflorescentia corymboso-paniculata vel paniculata, fructifera corymbosa, andro-polygama.
- F Sepala connata. Petala nulla. Discus floris masculi paullo crassus. Stylus lobatus. Pedicelli longi. Loculi convexi. Folia palmatim 5-lobata, lobis grosse sinuato-dentatis vel sub-integris. *Saccharina.*
- FF Sepala libera. Discus crassus.
- G Folia indivisa vel 3-lobata, 3-nervata vel reticulata, integra vel remote minute serrata. Loculi carinato-convexi vel globato-convexi.
- H Inflorescentia paniculata. Folia 3-nervata, 3-lobata raro indivisa, decidua. *Trifida.*
- HH Inflorescentia corymboso-paniculata. Folia indivisa, 3-nervata vel reticulata raro 5-nervata, saepissime sempervirentia. *Integrifolia.*

- HHH Inflorescentia corymboso-paniculata, pedunculo brevi. Folia 3-loba vel sub-quinqueloba, raro semperfurentia. *Monspessulana*.
- GG Folia palmatim 3~7-lobata raro ad 13-lobata, integra vel grosse sinuato-dentata. Loculi plani vel plus minus convexi.
- H Loculi plani. Lobi foliorum apice acuminati. *Platanoidea*.
- HH Loculi plani. Lobi foliorum apice obtusi. *Pubescencia*.
- HHH Loculi paulo convexi plani. Lobi foliorum apice obtusiusculi. *Campestraria*.
- EE Inflorescentia elongato-racemosa, basi composita, in fructu racemosa andro-polygama. Stylus lobatus. Filamenta pilosa. Folia magna palmatim lobata, grosse sinuato-dentata. Loculi convexi. *Macrophylla*.
- DD Folia serrata.
- E Inflorescentia paniculata vel paniculato-corymbosa, andro-polygama. Discus crassus.
- F Folia indivisa vel 3-lobata, irregulariter serrata. Loculi plani. *Triloba*.
- FF Folia 3~5-lobata, crenulato-serrata, subtus alba. Loculi convexi. *Velutina*.
- FFF Folia 5~11-palmatim lobata, raro 3-lobata vel 13-lobata, lobis argute serratis. Fructus pauci. Loculi convexi. Stylus lobatus. *Palmata*.
- EE Inflorescentia composite racemosa vel elongato-paniculata, andro-polygama. Loculi convexi. Folia 3~5-lobata.
- F Folia irregulariter grosse serrata. Inflorescentia in fructu racemosa. Filamenta pilosa. *Acer*.
- FF Folia argute serrata vel serrulata vel duplicato serrata. *Sinensis*.
- DDD Folia ternata. Inflorescentia corymbosa pauciflora. Stylus bifidus~lobatus. Loculi convexi. Gemmae perulae mulate. *Trifoliata*.
- CC Inflorescentia lateralis, feminea racemosa.
- D Loculi convexi. Folia palmatim lobata raro indivisa, grosse sinuato-dentata. Planta andro-dioecia vel dioecia.
- E Sepala et petala floris masculi libera. *Lithocarpa*.
- EE Sepala et petala floris masculi adonata. *Diabolica*.
- DD Loculi plani. Folia indivisa. *Decandria*.

Gen. Acer [TOURNEF.] L., Sp. Pl., 1054 (1753), Gen. Pl., 474, No. 1023 (1754).

The type species is *Acer pseudoplatanus* from northern Europe, which was most familiar to LINNAEUS, and the plant was also mentioned in TOURNEFORT (Inst. Rei Herb., 1:615, Tab. 386, 1719).

Subg. I. Acer. — *Acer* L., Sp. Pl., 1054 (1753) pro parte, *A. negundo* exclud.; *Acer* sect. *Acer.* MAXIM., in Bull. Acad. Sci. St. Pétersb., 26: 437 (1880).—REHDER, (1949) pro parte, *A. carpinifolium* exclud.

Sect. 1. Glabra PAX, in ENGLER's Bot. Jahrb., 6:327 (1885), 7:217 (1886).

Ser. 1. Glabra. — REHDER, Bibl. Cul. Tr. & Shr., 423 (1949). Syn. *Acer* subg. *Sacharodendron* RAFINESQUE, New Fl. N. Am., 1:47 (1836) pro parte, quoad *A. glabrum*.

A. glabrum TORREY, in Ann. Lyc. Nat. Hist. New York, 2:172 (1828).—N. America.

Ser. 2. Arguta (REHDER) REHDER, Bibl. Cul. Tr. & Shr., 425 (1949). Syn. *Acer* sect. *Arguta* REHDER, in SARGENT, Tr. & Shr., 1:181 (1905); *Acer* sect. *Lithocarpa* PAX, in ENGLER's Bot. Jahrb., 6:328 (1885), 7:249 (1886) pro parte.

A. argutum MAXIM., in Bull. Acad. Sci. St. Pétersb., 12:227 (1867, Nov.).—MIQUEL, in Arch. Néerl. Sci. Nat., 2:475 (1867, Dec.).—Japan. **A. barbinerve** MAXIM., in Bull. Acad. Sci. St. Pétersb., 12:227 (1867).—Corea and Manchuria. **A. tetrapterum** PAX, in HOOKER's Icon. Pl., 19, t. 1897, p. 5 (1889).—Central China. **A. stachyophyllum** HIERN, in HOOKER f., Fl. Brit. Ind., 1:694 (1875).—Himalaya and Central China. **A. acuminatum** WALL. ex D. DON, Prodr. Fl. Nepal, 249 (1825).—Himalaya.

Sect. 2. Macrantha PAX, in ENGLER's Bot. Jahrb., 6:328 (1885), 7:244 (1886).

Ser. 1. Rufinervia, ser. nov. (the type species is *A. rufinerve* SIEB. et ZUCC. from Japan). Syn. *Acer* sect. *Macrantha* PAX, in ENGLER's Bot. Jahrb., 6:328 (1885), 7:244 (1886) pro parte;—KOIDZUMI, in Journ. Coll. Sci. Tokyo, 32(1): 18 (1911) pro parte; *Acer* ser. *Tegmentosa* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 345 (1933) pro parte.

A. rufinerve SIEB. et ZUCC., in Abh. Akad. Wiss. München, 4(4):155 (1845).—Japan. **A. morifolium** KOIDZUMI, in Bot. Mag. Tokyo, 28:151 (1914).—Japan (Yakushima endemic). **A. rubescens** HAYATA, in Journ. Coll. Sci. Tokyo, 30(1):66 (1911).—Formosa.

Note; *A. erosum* PAX, in HOOKER, Icon. Pl., 19, t. 1897, p. 3 (1889).—China (Hupeh). *Acer erosum* may be included in this series according to Pax's description, though REHDER treated this name as a synonym of *A. caudatum* var. *multiserratum*.

Ser. 2. Macrantha. — REHDER, Bibl. Cul. Tr. & Shr., 424 (1949) (some species should be excluded). Syn. *Acer* ser. *Tegmentosa* POJARK. pro parte; ser. *Crataegifolia* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 345 (1933).

A. pectinatum WALL., Pl. As. Rar., 2:4 (1831).—Himalaya (Nepal, Sikkim). **A. hookeri** MIQUEL, in Arch. Néerl. Sci. Nat., 2:471 (1852).—Himalaya (Sikkim),

Bhotan). *A. sikkimense* MIQUEL, in Arch. Néerl. Sci. Nat., 2:471 (1852).—Himalaya. *A. laxiflorum* PAX, in ENGLER, Pflanzenreich, IV (163), 36, fig. 7 c, d (1902); syn. *A. taronense* HAND.-MAZT.; *A. forrestii* DIELS.—Central China. *A. davidi* FRANCHET, in Nouv. Arch. Mus. Hist. Nat. Paris, Sér. 2 (8), 212 (1886); syn. *A. cavaleriei* LÉVEILLÉ.—China (Szechuan, Hupei, Schensi). *A. grosseri* PAX, in ENGLER, Pflanzenreich, IV (163), 80 (1902); syn. *A. pavolinii* PAMPANINI, in Nuov. Giorn. Bot. Ital., n. ser., 17:422 (1910); *A. davidi* var. *horizontalis* PAX; *A. davidi* var. *hersii* (REHDER) REHDER.—China (Schensi) W. China. *A. chienii* HU et CHENG, in Bull. Fan Mem. Inst. Biol. Peiping, n. ser. 1, 207 (1948).—China (Yunnan). *A. metcalfii* REHDER, in Journ. Arnold Arb., 14:221 (1933).—China (Hunan, Kwangtung). *A. wardii* W. W. SMITH, in Notes Bot. Gard. Edin., 10:8 (1917); syn. *A. mirabile* HAND.-MAZT.—China (Yunnan) and Himalaya. *A. tegmentosum*, MAXIM., in Bull. Acad. Sci. St. Pétersb., 15:125 (1856).—Manchuria and Corea. *A. kawakamii* KOIDZUMI, in Bot. Mag. Tokyo, 25:102 (1911); syn. *A. morrisonense* HAYATA (1911); *A. taitonmontanum* HAYATA; *A. caudatum* MATSUM. et HAYATA non WALL.; *A. caudatifolium* HAYATA.—Formosa. *A. ovatifolium* KOIDZUMI, in Journ. Coll. Sci. Tokyo, 32 (1):16, t. VI. (1911).—Formosa. *A. insulare* MAKINO, in Bot. Mag. Tokyo, 24:293 (1910); syn. *A. caudatum* MATSUM.;—MATSUM. et ITO non WALL.—Japan (Amami-Ohshima). *A. capillipes* MAXIM., in Mél. Biol., 6:367 (1867).—Japan. *A. crataegifolium* SIEB. et ZUCC., in Abh. Akad. Wiss. München., 4 (3):155 (1846).—Japan. *A. pennsylvanicum* L., Sp. Pl., 1055 (1753).—N. America.

Note; according to FANG (1934) *A. veitchii* SCHWERIN, in Mitt. Deut. Dendr. Ges., 1894 (3), 51 (1894), is native in Northern China.

Ser. 3. *Micrantha* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 345 (1933). Syn. *Acer* sect. *Palmatoidea* KOIDZUMI, in Journ. Coll. Sci. Tokyo, 32 (1):22 (1911).

A. micranthum SIEB. et ZUCC., in Abh. Akad. Wiss. München., 4 (2):155 (1845).—Japan. *A. tschonoskii* MAXIM., in Bull. Acad. Sci. St. Pétersb., 31:24 (1886); syn. *A. pellucidobracteatum* LÉVEILLÉ et VANIOT.—Japan (var. *rubripes* KOMAROV, in Acta Hort. Petrop., 22:736 (1904).—Corea and Manchuria). *A. maximowiczii* PAX, in HOOKER, Icon. Pl., 19: t. 1897, p. 4 (1889, Oct.); syn. *A. urophyllum* MAXIM., in Acta Hort. Petrop., 11:105 (1889, Nov.).—Central China.

Sect. 3. *Spicata* PAX, in ENGLER's Bot. Jahrb., 6:326 (1885), 7:182 (1886) (many species should be excluded). Syn. *Acer* sect. *Microcarpa* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 339 (1933) pro parte.

Ser. 1. *Parviflora* (KOIDZUMI) POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 345 (1933). Syn. *Acer* sect. *Parviflora* KOIDZUMI, in Jour. Coll. Sci. Tokyo, 32 (1):11 (1911); *Acer* sect. *Indivisa* PAX, in ENGLER's Bot. Jahrb., 6:327 (1885), 7:213 (1886) pro parte; *Acer* sect. *Macrantha* PAX, in ENGLER's Bot. Jahrb., 6:328 (1885), 7:244 (1886) pro parte; *Acer* ser. *Spicata* (PAX) REHDER and ser. *Integrifolia* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 418, 424 (1949) pro parte.

A. nipponicum HARA, in Journ. Jap. Bot., 14:50 (1937); syn. *A. parviflorum*

Fr. et SAV., Enum. Fl. Jap., 2:321, 323 (1878), non EHRHART (1789); *A. crassipes* PAX (1902), non HEER (1859); *A. pictum* var. *parviflorum* SCHNEIDER (1922); *A. brevilibolum* HESSE (1903).—Japan. *A. distylum* SIEB. et ZUCC., in Abh. Acad. Wiss. Münch., 4 (2) : 154 (1845).—Japan.

Ser. 2. Spicata.—POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 339 (1933). Syn. *Acer* ser. *Spicata* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 418 (1949) pro parte; *Acer* subg. *Evotrium* RAFINESQUE, New Fl. N. Am., 1:47 (1836) pro parte.

A. spicatum LAMARCK, in Encycl. Méth. Bot., 2:381 (1786); syn. *A. parviflorum* EHRHART (1789); *A. montanum* AITON (1789), non LAMARCK (1778).—N. America. **A. ukurunduense** TRAUTV. et MEYER, in MIDDEENDORF, Reise. Sibir., 1 (2) : 24 (1856).—Kuril, Japan, Corea and Manchuria. **A. caudatum** WALL., Pl. Asiat. Rar., 2:4,:28, t. 132 (1831); syn. *A. papilio* KING (1896).—Himalaya.

Note; *A. caudatum* var. *multiserratum* (MAXIM.) REHDER is, according to POJARK. (1933) and REHDER (1926), native in Central China.

Sect. 4. Rubra PAX, in ENGLER's Bot. Jahrb., 6:326 (1885), 7:179 (1886). Syn. *Acer* ser. *Rubra* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 426 (1949); *Acer* subg. *Clinotrox* RAFINESQUE and subg. *Eriocarpum* RAFINESQUE, New Fl. N. Am., 1:47 (1836); *Argentacer* SMALL and *Rufacer* SMALL, Man. Southeast Fl., 825, 1505 (1933); *Acer* ser. *Saccharinum* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 236 (1933).

A. rubrum L., Sp. Pl., 1055 (1753).—N. America. **A. saccharinum** L., Sp. Pl., 1055 (1753).—N. America. **A. pycnanthum** K. KOCH, in Ann. Mus. Bot. Lugd.-Bat., 1:250 (1863); syn. *A. rubrum* L. sensu MAKINO, in Bot. Mag. Tokyo, 16:93 (1902), non L.—KOIZUMI, in Journ. Coll. Sci. Tokyo, 32 (1), 27, t. XVI (1911), non L.; *A. rubrum* var. *pycnanthum* MAKINO, in Bot. Mag. Tokyo, 26:148 (1912).—Japan (Honshu).

Sect. 5. Trilobata POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 324 (1933). Syn. *Acer* sect. *Trilobata* ser. *Tatarica* POJARK. (ser. *Trifida* should be excluded); *Acer* sect. *Spicata* PAX, in ENGLER's Bot. Jahrb., 6:326 (1885), 7:182 (1886) pro parte.

A. tataricum L., Sp. Pl., 1054 (1753); syn. *A. cordifolium* MÜNCH., Meth. Pl., 55 (1794).—Eastern Europe (from Jugoslavia to Uralsk). **A. semenovii** REGEL et HERDER, in Bull. Soc. Nat. Moscou, 39 (1) : 550 (1866); syn. *A. tataricum* var. *semenovii* NICHOLSON (1881); *A. ginnala* subsp. *semenovii* PAX (1886).—Central Asia. **A. ginnala** MAXIM., in Bull. Acad. Sci. St. Pétersb., 15:126 (1856).—Manchuria and Corea. **A. aidzuense** (FRANCHET) NAKAI, in Bot. Mag. Tokyo, 40:146 (1926), 49:418 (1935); *A. tataricum* var. *aidzuense* FRANCHET, in Bull. Soc. Bot. France, 26:84 (1879); *A. subintegrum* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 152 (1933).—Japan.

Sect. 6. Palmata PAX, in ENGLER's Bot. Jahrb., 6:326 (1885), 7:24 (1886).

Ser. 1. Palmata.—POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 236 (1933). Syn. *Acer* ser. *Palmata* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 421

(1949); *Acer* subg. *Sacharodendron* RAFINESQUE and subg. *Antadenium* RAFINESQUE, New Fl. N. Am., 1:47, :49 (1836) pro parte quoad *A. circinatum*; *Acer* sect. *Microcarpa* ser. *Sinensis* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 339 (1933) pro parte.

A. sieboldianum MIQUEL, in Ann. Mus. Bot. Lugd.-Bat., 2:87 (1865).—Japan.
A. shirasawanum KOIDZUMI, in Journ. Coll. Sci. Tokyo, 32(1):38, t. XXII (1911).—Japan. ***A. palmatum*** THUNB., in Nov. Acta Soc. Sci. Upsal., 4:40 (1783).—Japan, Formosa, Corea and Central China. ***A. japonicum*** THUNB., Fl. Jap., 161 (1784).—Japan. ***A. tenuifolium*** KOIDZUMI, in Bot. Mag. Tokyo, 30:327 (1916).—Japan. ***A. ishidoyanum*** NAKAI, in Bot. Mag. Tokyo, 27:130 (1913), 29:28 (1915).—Corea. ***A. takeshimense*** NAKAI, in Bot. Mag. Tokyo, 32:107 (1918).—Corea (Utsuryo Isl.). ***A. nudicarpum*** NAKAI, in Bot. Mag. Tokyo, 29:28 (1915).—Corea. ***A. pseudosieboldianum*** KOMAROV, in Acta Hort. Petrop., 22:725 (1903).—Corea and Manchuria. ***A. schneiderianum*** PAX et K. HOFFM., in FEDDE, Repert. Beih., 12:435 (1922).—China (Szechuan). ***A. robustum*** PAX, in ENGLER, Pflanzenreich, IV (163), 79 (1902).—China. ***A. pubipalmatum*** FANG, in Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 8, 164 (1932).—China (Chekiang). ***A. pauciflorum*** FANG, in Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 7, 166 (1932).—China (Chekiang). ***A. heptalobum*** DIELS, in Notizb. Bot. Gart. Berlin, 11:211 (1931).—China (Yunnan). ***A. flabellatum*** REHDER, in SARGENT, Tr. & Shr., 1:163, t. 81 (1905).—China (Kiangsi, Kwangss). ***A. oliverianum*** PAX, in HOOKER, Icon. Pl., 19, t. 1897, p. 2 (1889).—Central China (var. *nakaharai* HAYATA ex KOIDZUMI, in Journ. Coll. Sci. Tokyo, 32(1):33 (1911).—Formosa). ***A. confertifolium*** MERRILL et METCALF, in Lingnan Sci. Journ., 16:167 (1937).—China (Kwangtung). ***A. johnedwardianum*** METCALF, in Lingnan Sci. Journ., 20:221 (1942).—China (Fokien). ***A. ceriferum*** REHDER, in SARGENT, Pl. Wilson., 1:89 (1911).—China (Hupeh). ***A. circinatum*** PURSH, Fl. Am. Sept., 1:266 (1814).—N. America.

Ser. 2. *Sinensis* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 339 (1933) (some species should be excluded). Syn. *Acer* sect. *Spicata* PAX, in ENGLER's Bot. Jahrb., 6:326 (1885), 7:182 (1886) pro parte; *Acer* ser. *Spicata* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 418 (1949) pro parte.

A. sinense PAX, in HOOKER, Icon. Pl., 19, t. 1897, p. 1 (1889).—Central China. ***A. tutcheri*** DUTHRIE, in Kew Bull. Miss. Inform., 21:16 (1908).—China (Kwangtung). ***A. erianthum*** SCHWERIN, in Mitt. Deutsch. Dendr. Gez., 1901 (10), 159 (1901).—China (Szechuan, Hupei). ***A. wilsoni*** REHDER, in SARGENT, Tr. & Shr., 1:157, t. 79 (1905); syn. *A. angustilobum* HU.—Central China. ***A. campbellii*** HOOK. f. et THOM. ex BLANDIS, For. Fl. Brit. Ind., 109 (1874).—Central China and Himalaya.

Note; *A. chingii* HU, *A. calcaratum* GAGNEP. and *A. liquidambarifolium* HU et CHENG published under the sect. *Spicata* may be placed in this series.

Sect. 7. *Acer*. Syn. *Acer* sect. *Gemmata* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 312 (1933).

Ser. 1. *Velutina* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 312 (1933). Syn. *Acer* ser. *Trautvetterana* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 312 (1933); *Acer* sect. *Spicata* PAX, in ENGLER's Bot. Jahrb., 6: 326 (1885), 7: 182 (1886) pro parte.

A. velutinum BOISS., Diagnos. Pl. Or., Ser. 1 (6), 28 (1845); syn. *A. insigne* BOISS. et BUHSE, in Nouv. Mem. Soc. Nat. Mosc., 12: 46 (1860).—from Central Europe to Caucasus. **A. trautvetteri** MEDW., in Bull. Mus. Cauc. Tiflis, 12: 7 (1919).—Armenia. **A. herdreichii** ORPH. ex BOISS., Diagnos. Pl. Or. Nov., Ser. 2 (5), 71 (1856).—Central Europe to Caucasus. **A. caesium** WALL. ex BRANDIS, For. Fl. Brit. Ind., 111, t. 21 (1874).—Himalaya (Kashmir to Nepal).

Ser. 2. *Acer*. Syn. *Acer* ser. *Pseudoplatani* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 312 (1933); *Acer* sect. *Spicata* PAX, in ENGLER's Bot. Jahrb., 6: 326 (1885), 7: 182 (1886) pro parte.

A. pseudoplatanus L., Sp. Pl., 1054 (1753) (REHDER cited many specific synonyms in Bibl. Cul. Tr. & Shr., 418; 1949).—Europe.

Sect. 8. *Macrophylla* (POJARK.).—POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 236 (1933) pro ser.

A. macrophyllum PURSH, Fl. Am. Sept., 1: 267 (1814).—N. America.

Sect. 9. *Platanoidea* PAX, in ENGLER's Bot. Jahrb., 6: 327 (1885).

Ser. 1. *Platanoidea*.—POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 278 (1933). Syn. *Acer* ser. *Platanoidea* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 412 (1949); *Acer* sect. *Platanoidea* ser. *Picta* POJARK.; ser. *Quinqueloba* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 278 (1933).

A. platanoides L., Sp. Pl., 1055 (1753) (REHDER cited many specific synonyms of this species in Bibl. Cul. Tr. & Shr., 412-413; 1949).—Central Europe. **A. lobelii** TENORE, Cat. Pl. Hort. Neapol. App., 2: 69 (1819).—Mediterranean reg. **A. divergens** PAX, in ENGLER's Bot. Jahrb., 7: 234 (1886); syn. *A. quinquelobum* K. KOCH, Dendr., 1: 540 (1869), non GILBERT (1781).—Mediterranean reg. **A. turkestanicum** PAX, in ENGLER's Bot. Jahrb., 7: 49 (1886).—Central Asia. **A. cappadocicum** GLEDITSCH, in Schrift Ges. Naturf. Fr. Berlin, 6: 116, t. 2 (1785); syn. *A. laetum* C. A. MEYER, Verz. Kauk. Pflanz., 206 (1831).—Asia minor to Caucasus (var. *sinicum* REHDER in China, var. *indicum* REHDER from Iran to Himalayas). **A. fulvescens** REHDER, in SARGENT, Pl. Wilson., 1: 84 (1911).—China (Szechuan, Yunnan). **A. catalpifolium** REHDER, in SARGENT, Pl. Wilson., 1: 87 (1911).—China (Szechuan). **A. longipes** FRANCHET ex REHDER, in SARGENT, Tr. & Shr., 1: 174 (1905).—China (Szechuan). **A. amplum** REHDER, in SARGENT, Pl. Wilson., 1: 86 (1911).—Central China. **A. acutum** FANG, in Contr. Biol. Lab. Sci. Soc. China, Bot. Ser. 8, 164 (1932).—China (Chekiang). **A. truncatum** BUNGE, in Mém. Div. Sav. Étrang. Acad. Sci. St. Pétersb., 2: 84 (1835).—Manchuria and Corea. **A. okamotoanum** NAKAI, in Bot. Meg. Tokyo, 31: 28 (1917).—Corea and Utsuryo Isl. **A. mono** MAXIM., in Mél. Biol., 2: 416 (1857), Prim. Fl. Amur., 68 (1859); syn. *A. pictum* THUNB., Fl. Jap., 162 (1784), non THUNB. (1783).—Amur, Manchuria, Corea and Japan. **A. mayrii** SCHWERIN, in Mitt.

Deutsch. Dendr. Ges., 1901 (10), 58 (1901); syn. *A. pictum* subvar. *mayri* (SCHWERIN) KOIDZUMI, in Journ. Coll. Sci. Tokyo, 32 (1): 63 (1911) pro parte. — Japan.

Ser. 2. Campestria (PAX) POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 297 (1933). Syn. *Acer* sect. *Campestria* PAX, in ENGLER's Bot. Jahrb., 6: 327 (1885) sensu stricto; *Acer* ser. *Campestria* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 415 (1949), non POJARK. (1933).

A. campestre L., Sp. Pl., 1055 (1753); syn. *A. molle* OPIZ and *A. eriocarpum* OPIZ, in Fl., 7: 1 (1824), non MICHAUX (1803). — Europe. **A. miyabei** MAXIM., in Bull. Acad. Sci. St. Pétersb., 32: 485 (1888); syn. *A. shibatai* NAKAI, in Bot. Mag. Tokyo, 57: 365 (1937). — Japan.

Note: *A. miaotense* TSOONG, in Kew Bull., 1954, 83 (1954), from China (Shensi), may be included in this series.

Ser. 3. Pubescentia POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 307 (1933). Syn. *Acer* sect. *Campestria* PAX, in ENGLER's Bot. Jahrb., 6: 327 (1885) pro parte; *Acer* sect. *Platanoidea* sensu SCHNEIDER, Ill. Handb. Laubh., II: 223 (1912) pro parte. Distr. Only 2 species in Central Asia.

A. pubescens FRANCHET, in Ann. Sci. Nat., 6, Sér. 15, 245 (1833); syn. *A. fedeshenkoanum* KRYSHT. (1914). **A. regelii** PAX, in ENGLER, Pflanzenreich, IV, 163, 60 (1902).

Ser. 4. Monspessulanum POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 347 (1933). Syn. *Acer* ser. *Opulifolia* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 347 (1933); *Acer* sect. *Campestria* PAX, in ENGLER's Bot. Jahrb., 6: 327 (1885) pro parte; *Acer* ser. *Campestria* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 415 (1949) pro parte.

A. monspessulanum L., Sp. Pl., 1056 (1753). — Mediterranean reg. **A. syriacum** BOISS. et GUILLARDOT, in BOISS. Diagnos. Pl. Or., Ser. 2 (5), 72 (1856). — Mediterranean reg. **A. orientale** L., Syst. Nat., ed. 10 (2), 1300 (1759). — Mediterranean reg. **A. persicum** POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 147, fig. 3 (1933). — Iran. **A. ibericum** M. BIEBERSTEIN, Fl. Taur.-Cauc., 2: 447 (1880). — Trans Caucasus. **A. turcomanicum** POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 143, fig. 1 (1933). — Trans Caucasus. **A. cinerascens** BOISS., Diagnos. Pl. Or. Nov., Ser. 1 (6), 29 (1845). — Iran. **A. assyriacum** POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 145, fig. 2 (1933). **A. opalus** MILLER, Gard. Dict., A. no. 8 (1768); syn. *A. italicum* LAUTH (1781). — Eastern Europe. **A. hyrcanum** FISHER et MEYER, in Ind. Sem. Hort. Petrop., 4: 31 (1837). — Mediterranean reg. **A. stevenii** POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 150 (1933). — Mediterranean reg. (Crimea).

Sect. 10. Integrifolia PAX, in ENGLER's Bot. Jahrb., 6: 327 (1885), 7: 207 (1886).

Ser. 1. Integrifolia. — REHDER, Bibl. Cul. Tr. & Shr., 424 (1949) (excluding some species). Syn. *Acer* subsect. *Oblongae* HU et CHENG, in Bull. Fan Mem. Inst. Biol., n. s. 1 (2), 200 (1948); *Acer* ser. *Trinervium* METCALF and ser. *Pen-*

ninervium METCALF, in Lingnan Sci. Journ., 11: 194, : 202 (1932). Many species were reported from Central- and SE China. Probably 1 species in the Philippines, ca. 2 species in Upper Burma and Indo-China, ca. 2 species in Himalaya.

A. oblongum WALL. ex De CANDOLLE, Prodr., 1: 593 (1824); syn. *A. coriaceifolium* LÉVEILLÉ; *A. laurifolium* D. DON; *A. buzimbalia* HAMILTON.—from the Himalayas, Southern China, Indo-China to Formosa and Loochoo (var. *Itoanum* HAYATA; syn. *A. hypoleucum* HAYATA; *A. itoanum* HAYATA; *A. litseaefolium* HAYATA; *A. albopurpurascens* HAYATA). *A. fabri* HANCE, in Journ. Bot. Brit. & For., 22: 76 (1884) (*A. fargesii* FRANCHET and *A. salweenense* W. W. SMITH may be the synonyms of this species).—China (Kwangtung, Szechuan, Hupei, Kiangsi and Kweichou). *A. cordatum* PAX, in HOOKER, Icon. Pl., 19, t. 1897 (1889).—China (Hupei). *A. laevigatum* WALL., Pl. As. Rar., 2: 3, t. 104 (1831).—Central China. *A. reticulatum* CHAMPION, in HOOKER, Lond. Journ. Bot., 3: 312 (1851).—China (Kwangtung and Hongkong). *A. cinnamomifolium* HAYATA, Icon. Pl. Formos., 3: 65 (1913).—China (Fokien, Kwangtung, Chekiang, Kwangsi and Kweichow). *A. lanceolatum* MOLLIARD, in Bull. Soc. Bot. France, 50: 134, pl. 5 (1903).—China (Kwangsi). *A. dimorphifolium* METCALF, in Lingnan Sci. Journ., 11: 201 (1932).—China (Fokien). *A. erythranthum* GAGNEP., in Not. Syst. ed. HUMBERT, 13: 192 (1948).—Indo-China. *A. garretii* CREIB, in Kew Bull., 1920: 301 (1920).—Siam. *A. niveum* BLUME, in Rumphia, 3: 193, t. 167, B (1837).—Assam, Burma, Sumatra, Java, Celebes and Philippines (Luzon, Negros, Mindanao).

Note: *Acer lucidum* METCALF, *A. sino-oblongum* METCALF, *A. amoenum* HU et CHENG non CARRIÈRE, *A. crassum* HU et CHENG, *A. pubipetiolatum* HU et CHENG, *A. hilaënsis* HU et CHENG, *A. kuikiangense* HU et CHENG, *A. kwangnanense* HU et CHENG and *A. sycopseoides* CHUN were published under the sect. *Integritifolia* or subsect. *Oblongae*. *Acer discolor* MAXIM. was often cited under the sect. *Integritifolia*.

Ser. 2. **Trifida** POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 325 (1933). Syn. *Acer* sect. *Spicata* PAX, in ENGLER'S Bot. Jahrb., 6: 326 (1885), 7: 182 (1886) pro parte.

A. buergerianum MIQUEL, in Ann. Mus. Bot. Lugd.-Bat., 2: 88 (1866); syn. *A. trifidum* HOOKER et ARNOTT, Bot. Beechery Voy., 174 (1841), non THUNB. (1784); *A. subtrilobum* KOIZUMI, in Bot. Mag. Tokyo, 44: 99 (1930).—Eastern part of China, often cultivated in Japan. *A. paxii* FRANCHET, in Bull. Soc. Bot. France, 33: 464 (1887).—China (Yunnan).

Note: *Acer yui* FANG, in Contr. Biol. Lab. Sci. Soc. China, Bot. Ser., 9: 235 (1934), may be a species of this series, according to FANG's description and HU et CHENG's citation (1948).—China (Szechuan).

Additional note: *Acer* sect. *Integritifolia* subsect. *Decandrae* HU et CHENG (in Bull. Fan Mem. Inst. Biol., n. s. 1 (2), 206; 1948, distr. Central China), was proposed in view of its distinct taxonomic characters. *Acer decandrum* MERRILL, in Lingnan Sci. Journ., 11: 47 (1932), *A. machilifolium* HU et CHENG and *A. longicarpum* HU et CHENG were listed under this group.

Sect. 11. *Trifoliata* PAX, in ENGLER's Bot. Jahrb., 6:326 (1885), 7:203 (1886).—KOIDZUMI, in Journ. Coll. Sci. Tokyo, 32 (1): 56 (1911). Syn. *Acer* sect. *Coelocarpa* PAX, in ENGLER's Bot. Jahrb., 6:328 (1885), 11:80 (1889) (some species should be excluded); *Acer* ser. *Trifoliata* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 427 (1949).

A. nikoënsis MAXIM., in Bull. Acad. Sci. St. Pétersb., 12:227 (1867, Nov.); syn. *A. maximowiczianum* MIQUEL, in Arch. Néerl. Sci. Nat., 2:472, :478 (1867, Dec.); *Negundo nikoense* NICHOLSON, in Gard. Chron., n. s. 16, 815 (1881).—Japan. **A. triflorum** KOMAROV, in Acta Horti. Petrop., 18:430 (1901), 22:728, fig. 15 (1904).—Corea and Manchuria. **A. mandshuricum** MAXIM., in Bull. Acad. Sci. St. Pétersb., 12:228 (1867).—Manchuria. **A. griseum** (FRANCHET) PAX, in ENGLER, Pflanzenreich, IV (163), 30 (1902); syn. *A. nikoense* var. *griseum* FRANCHET, in Morot. Journ. Bot., 8:294 (1894).—Central China (Hupei and Szechuan). **A. sutchuense** FRANCHET, in Morot. Journ. Bot., 8:294 (1894).—Central China.

Note: According to POJARK. (1933), *A. megalocarpum* REHDER is a native of Himalaya.

Additional note: Sect. *Pentaphylla* HU et CHENG, in Bull. Fan Mem. Inst. Biol., n. s. 1 (2), 208 (1948) (the type species is *A. pentaphyllum* DIELS from Central China). According to FANG (1934), *A. pentaphyllum* belongs to the sect. *Negundo*. But this species should not be placed in *Negundo*, in view of its convex nutlet, terminal compound raceme and arrangement of bud-scales.

Sect. 12. *Lithocarpa* PAX, in ENGLER's Bot. Jahrb., 6:328 (1885), 7:249 (1886).

Ser. 1. *Lithocarpa*.—REHDER, Bibl. Cul. Tr. & Shr., 426 (1949). Syn. *Acer* ser. *Villosa* POJARK., in Acta Inst. Bot. Acad. Sci. U.S.S.R., (1-1), 236 (1933).

A. villosum WALL., Pl. As. Rar., 2:4 (1831); syn. *A. sterculiaceum* WALL., Pl. As. Rar., 2:3 (1831).—Himalaya (from Kashmir to Nepal). **A. thomsonii** MIQUEL, in Arch. Néerl., 2:470 (1867).—Himalaya (Sikkim). **A. franchetti** PAX, in HOOKER, Icon. Pl. 19, t. 1897, p. 4 (1889).—Central China. **A. schoenher-markiae** PAX, in ENGLER, Pflanzenreich, IV (163), 71 (1902).—China (Yunnan). **A. sino-purpurascens** CHENG, in Contrib. Biol. Lab. Sci. Soc. China, Bot. Ser. 6, 62 (1931).—China (Chekiang). **A. pilosum** MAXIM., in Bull. Acad. Sci. St. Pétersb., 26:436 (1880).—Central China.

Ser. 2. *Diabolica* (KOIDZUMI).—KOIDZUMI, in Journ. Coll. Sci. Tokyo, 32 (1):65, t. XXXIII (1911) pro sect.

A. diabolicum BLUME ex K. KOCH, in Ann. Mus. Bot. Lugd.-Bat., 1:251 (1864); syn. *A. purpurascens* FRANCHET et SAVATIER, En. Pl. Jap., 2:320 (1879).—Japan.

Sect. 13. *Saccharina* PAX, in ENGLER's Bot. Jahrb., 6:328 (1885), 7:241 (1886). Syn. *Acer* ser. *Saccharina* (PAX) REHDER, Bibl. Cul. Tr. & Shr., 417 (1949); *Acer* subgen. *Sachardonendron* NIEUWLAND, in Am. Midland. Nat., 3:181 (1914). Distr.—N. America.

A. saccharum MARSHALL, Arbust. Am., 4 (1785) (REHDER cited many specific

synonyms and varieties of this species in his *Bibl. Cul. Tr. & Shr.*, 417; 1949). *A. grandidentatum* NUTTAL ex TORREY et GRAY, *Fl. N. Am.*, 1:847 (1838). *A. barbatum* MICHAUX, *Fl. Bor. Am.*, 2:252 (1803). *A. nigrum* MICHAUX, *Hist. Arb. Am.*, 2:238, t. 16 (1812). *A. leucoderme* SMALL, in *Bull. Torrey Bot. Club*, 22:367 (1895).

Subgen. II. Negundo (BOEHMER).—BOEHMER, in LUDWING, *Defin. Gen. Pl.*, 308 (1760). Syn. *Acer* sect. *Negundo* (BOEHMER) PAX, in ENGLER'S *Bot. Jahrb.*, 6:327 (1885); *Rulac* ADANSON, *Fam. Pl.*, 383 (1763): *Negundium* RAFINESQUE, in *Med. Repos. New York*, 2(5):352 (1808) and *New Fl. N. Am.*, 1:48 (1836); *Acer* sect. *Trifoliata* PAX, in ENGLER'S *Bot. Jahrb.*, 6:326 (1885), 7:203 (1886) pro parte; *Acer* sect. *Cissifolia* KOIDZUMI, in *Journ. Coll. Sci. Tokyo*, 32(1):26 (1911); *Crula* NIEUWLAND, in *Am. Midland Nat.*, 2:140 (1911).

Ser. 1. Negundo.

A. negundo L., *Sp. Pl.*, 1056 (1753) (REHDER cited many specific synonyms and varieties of this species in *Bibl. Cul. Tr. & Shr.*, 428, 1949).—N. America.

Ser. 2. Cissifolia (KOIDZUMI).—KOIDZUMI, in *Journ. Coll. Sci. Tokyo*, 31(1):26 (1911) pro sect.

A. cissifolium (SIEB. et ZUCC.) K. KOCH, in *Ann. Mus. Bot. Lugd.-Bat.*, 1:252 (1864); syn. *Negundo cissifolium* SIEB. et ZUCC., in *Abh. Akad. Wiss. Münch.*, 4(2):159 (1845).—Japan. *A. henryi* PAX, in HOOKER, *Icon. Pl.*, 19, t. 1896 (1889) (according to FANG (1933), *A. mairei* LÉVEILLÉ from Yunnan is closely related to this species).—Central China.

Subgen. III. Carpinifolia (KOIDZUMI), stat. nov.—KOIDZUMI, in *Journ. Coll. Sci. Tokyo*, 32(1):17 (1911) pro sect. Syn. *Acer* sect. *Indivisa* PAX, in ENGLER'S *Bot. Jahrb.*, 6:327 (1885), 7:213 (1886) pro parte; *Acer* ser. *Indivisa* (PAX) REHDER, *Bibl. Cul. Tr. & Shr.*, 424 (1949).

A. carpinifolium SIEB. et ZUCC., in *Abh. Akad. Wiss. Münch.*, 4(2):154 (1845).—Japan.

Gen. Dipteronia OLIVER, in HOOKER, *Icon. Pl.*, 29, t. 1898 (1889).

D. sinensis OLIVER, in HOOKER, *Icon. Pl.*, 29, t. 1898 (1889); syn. *A. dielsii* LÉVEILLÉ, in *Repert. Sp. Nov. Reg. Veg.*, 10:432 (1915).—China (Hupei and Szechuan). *D. dyerianna* HENRY, in *Gardners Chronicle*, 1903(1), 122 (1903).—China (Yunnan).

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