

Celastrus yuloensis (Celastraceae), a new species from China

Yan Ao¹, Yun-Hong Tan², Xian-Yun Mu^{1,*} & Zhi-Xiang Zhang¹

¹) Laboratory of Systematic Evolution and Biogeography of Woody Plants, College of Biological Sciences and Biotechnology, Beijing Forestry University, CN-100083 Beijing, China (*corresponding author's e-mail: xy-mu85@163.com)

²) Key Laboratory of Tropical Forest Ecology, Xishuangbanna Tropical Botanical Garden, the Chinese Academy of Sciences, Menglun, Mengla, CN-666303 Yunnan, China

Received 11 Jan. 2012, final version received 1 Mar. 2012, accepted 2 Mar. 2012

Ao, Y., Tan, Y. H., Mu, X. Y. & Zhang, Z. X. 2012: *Celastrus yuloensis* (Celastraceae), a new species from China. — *Ann. Bot. Fennici* 49: 267–270.

Celastrus yuloensis X.Y. Mu, a new species of Celastraceae from the seasonal rainforest of southern Yunnan Province, China, is described and illustrated. The new species is morphologically similar to *C. hirsutus*, but differs in the prominent spine-like bud scales, elliptic-oblong leaves pubescent only on the veins, axillary long panicle inflorescences, and upper half articulation on stalks.

Celastrus is the type genus of Celastraceae and contains about 35 species distributed in eastern Asia, both Americas, Oceania and Madagascar. The diversity centers are in Yunnan (China), Burma, eastern India and Central America (Hou 1955, Zhang & Funston 2008, Mu *et al.* 2012a). Because of the extreme variability in morphology, definitions of many species given in the literature are conflicting (Wang 1936, Wang & Tang 1951, Hou 1955, Di 1978, Cheng & Gao 1999, Zhang & Funston 2008). Various subgeneric systems (subgenera, sections and series) were proposed based on different morphological characters (Maximowicz 1881, Rehder & Wilson 1916, Hou 1955, Di 1978, Cheng & Gao 1999). Because the single existing infrageneric phylogenetic analysis sampled just few species in the genus (Simmons *et al.* 2008), the infraspecific as well as interspecific relationships remain poorly understood.

When performing a field investigation in the dense woods of the southern Yunnan Province

in China for the revision of *Celastrus*, an additional, previously unrecorded species was discovered. It is described and illustrated and compared morphologically with its congeners here.

Celastrus yuloensis X.Y. Mu, *sp. nova* (Figs. 1 and 2A, C, E, G)

HOLOTYPE: China. Yunnan Province: Xishuangbanna, Town Menglun, in the dense woods of Yulo Mountain, near Yanuo village, 21°59'N, 101°05'E, alt. 1255 m a.s.l., 31 Jan. 2010 *Yun-Hong Tan B779* (holotype BJFC; isotypes HITBC). — PARATYPE: China. Yunnan Province: Xishuangbanna, Town Menglun, in the dense woods of Yulo Mountain, 19 Aug. 2011 *Xian-Yun Mu 186* (BJFC).

ETYMOLOGY: The species is named after the type locality, Yulo Mountain in Yunnan Province.

Scandent shrubs up to 15 m long; branches terete, sulcate on old branches, scarcely brownish-pubescent or glabrescent, densely lenticellate, lenticels distinct, elliptic to orbicular; axil-

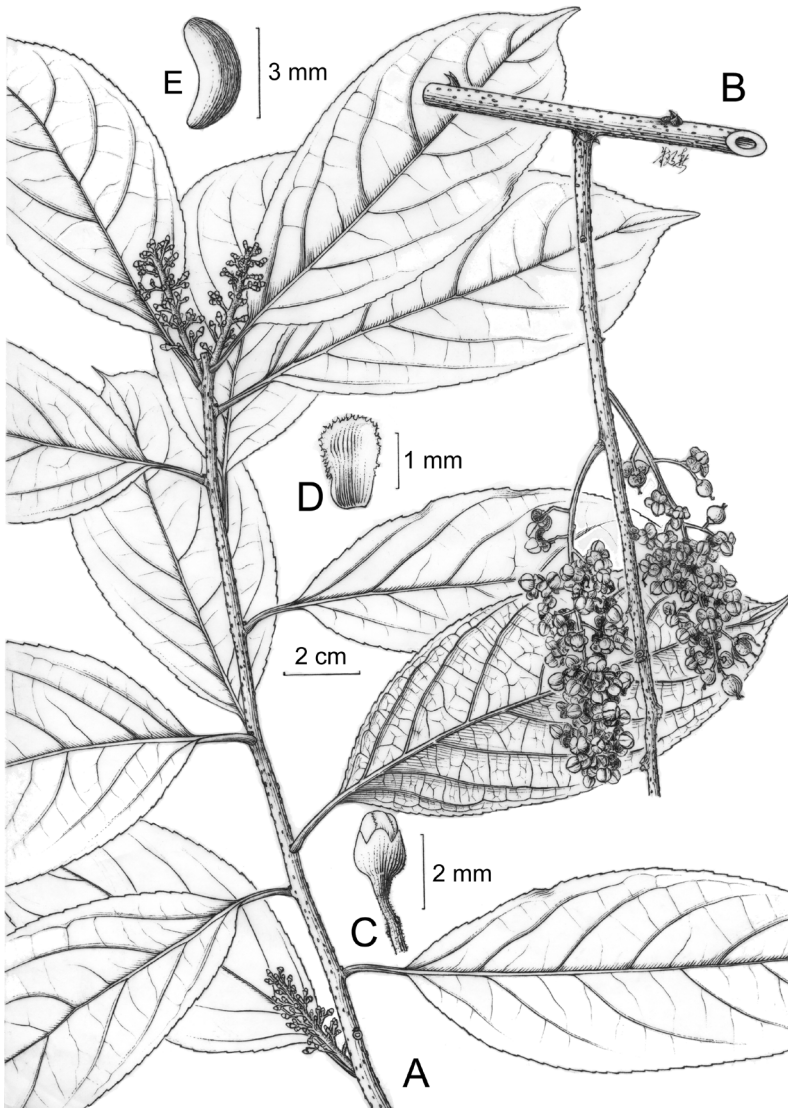


Fig. 1. *Celastrus yuloensis* (drawn by Yun-Xi Zhu from the holotype.). — **A**: Flowering branch. — **B**: Fruiting branch. — **C**: Flower. — **D**: Petal. — **E**: Seed.

lary bud ovoid, 2 mm long, protected by two prominent, broadly accrescent bud scales with erect or slightly falcate acuminate apex, about 5 mm long. Leaves elliptic-oblong, both apex and base acute, margins serrate, 8.9–15.5 cm long, 4.5–6.7 cm wide, membranous, obviously pubescent on veins; primary lateral veins 5–7 pairs, elevated below, veinlets distinct below, immersed to obscure above; stipules lacinate, about 2 mm long; petioles glabrous, 1.5–1.9 cm long. Inflorescence axillary, long panicle, peduncles hirsute; flowers unisexual, pale green or white, pedicles 3–6 mm long, articulation at

upper half of stalk. Male flowers unseen. Female flowers: calyx lobes valvate, semicircle, margins slightly erose, ca. 1 mm long; petals oblong, ca. 2 mm long, margins strongly erose; discs membranous, lobes arcuate or semicircle, entire; sterile stamens arising between disc lobes, ca. 0.8 mm long, anthers deltoid, 0.3 mm long, filaments oblong, ca. 0.5 mm long; pistil ca. 3 mm long, style columnar, stigma 3-lobed, each slightly 2-lobed again. Fruits subglobose, valves broadly elliptic, about 5–7 mm long and 4–6 mm wide, 3- to 6-seeded; seeds lunate, attenuate at both ends, ca. 3.5 mm long and 2.1 mm wide,

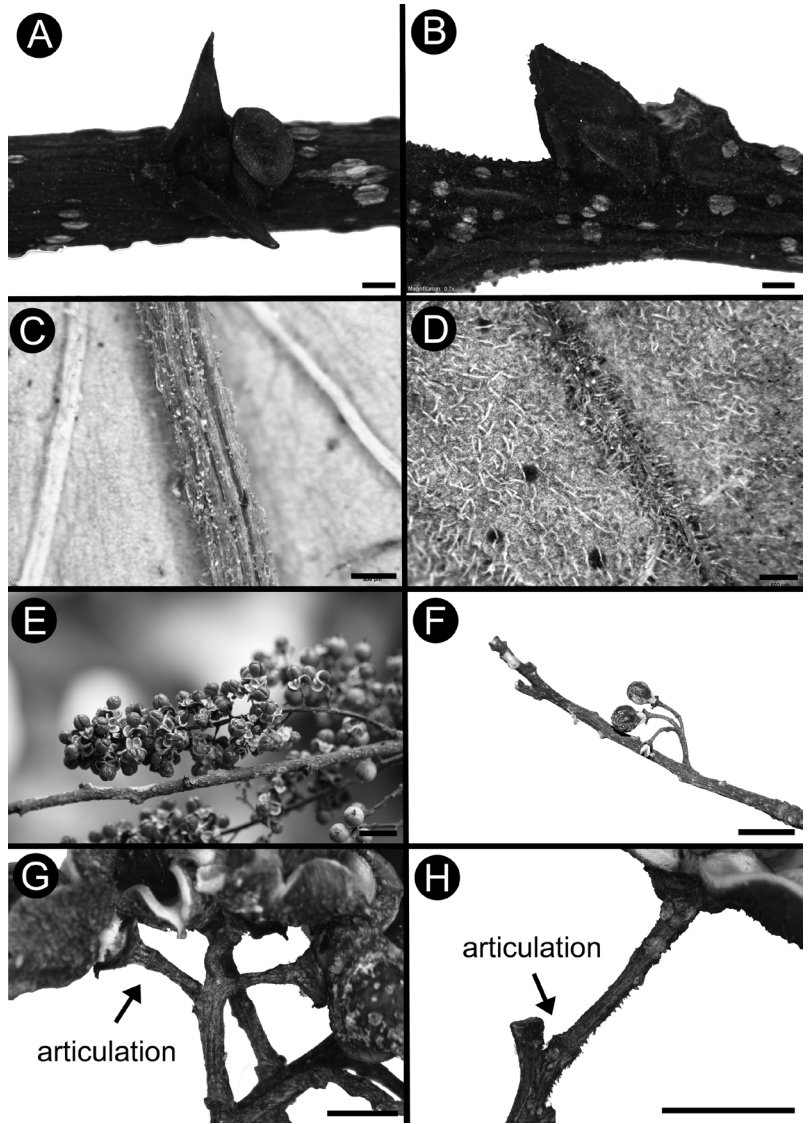


Fig. 2. Morphological differences between *Celastrus yuloensis* (A, C, E and G) and *C. hirsutus* (B, D, F and H). — A and B: Bud scales. — C and D: Leaf pubescence. — E and F: Inflorescences. — G and H: Stalk articulation. Scale bars: A and B = 1 mm, C and D = 0.5 mm, E–H = 1 cm.

blackish-brown, red arils fleshy, distinct. Flowers from January to March and fruits in October.

So far, *Celastrus yuloensis* is only known from the seasonal rainforest in the far south of Yunnan Province in China. The type population was found climbing on *Choerospondias axillaria*, growing with *Ficus*, *Oreocnide*, *Tetrastigma*, etc.

Four previously described species of *Celastrus* have lunate or semi-annular (vs. elliptic) seeds: *C. aculeatus*, *C. hirsutus*, *C. kusanoi* and *C. stylosus* (Hou 1955). These four species are grouped in a maximally supported clade in a

comprehensive phylogenetic analysis of *Celastrus* inferred from two nuclear and three plastid markers, implying that the lunate seed shape is an important synapomorphy in the clade (Mu *et al.* 2012b).

Celastrus yuloensis becomes the fifth species with lunate seeds, implying a close relationship with the four species named above. It is more similar to *C. hirsutus* than *C. stylosus* based on the dense lenticels on the branches and the distinct pubescence on the leaf veins. However, several morphological differences do exist between *C. yuloensis* and *C. hirsutus* (Table 1 and Fig. 2).

Table 1. Comparison of *Celastrus yuloensis* and four morphologically close species.

Characters	<i>C. aculeatus</i>	<i>C. hirsutus</i>	<i>C. yuloensis</i>	<i>C. kusanoi</i>	<i>C. stylosus</i>
Lenticels on branch	dense	dense	dense	sparse	sparse
Bud scale	normally deciduous, depressed	normally deciduous, depressed	two outmost bud scales persistent, broadly opened, spine-like, accrescent	normally deciduous, depressed	normally deciduous, depressed
Leaf shape	elliptic to oblanceolate	suborbicular to orbicular	elliptic-oblong	suborbicular to orbicular	elliptic-oblong, ovate to obovate
Pubescence on leaf	scarce	dense	on veins	scarce	scarce
Inflorescence	short axillary dichasia, cauline	short axillary dichasia, cauline	long axillary panicle or raceme	short axillary dichasia, cauline	short axillary dichasia, cauline
Articulation on stalk	upper half	lower or basal part	upper half	lower or basal part	lower or basal part

Acknowledgements

We thank Jian-Xia Li for the treatment of pictures with Photoshop CS5, Lei Xie for the kind suggestions and Yun-Xi Zhu for the illustration. This work was supported by grants from the Natural Science Foundation of China (30870149 to Zhi-Xiang Zhang).

References

- Cheng, J. R. & Gao, Z. J. 1999: *Celastrus* L. — In: Wu, C. Y. (ed.), *Flora Reipublicae Popularis Sinicae*, vol. 45: 99–128. Science Press, Beijing. [In Chinese].
- Di, W. Z. 1978: [A preliminary study on *Celastrus* L. in Sichuan and Shaanxi provinces]. — *Journal of Northwest University of China* 1: 81–93. [In Chinese].
- Hou, D. 1955: A revision of the genus *Celastrus*. — *Annals of the Missouri Botanical Garden* 42: 215–302.
- Maximowicz, C. J. 1881: Diagnoses plantarum novarum Asiaticarum. — *Bulletin de l'Académie Impériale des Sciences de Saint-Petersbourg* 27: 455.
- Mu, X. Y., Zhao, L. C. & Zhang, Z. X. 2012b: Phylogeny of *Celastrus* L. (Celastraceae) inferred from two nuclear and three plastid markers. — *Journal of Plant Research*. [In press, doi:10.1007/s10265-012-0484-8].
- Mu, X. Y., Xia, X. F., Zhao, L. C. & Zhang, Z. X. 2012a: *Celastrus obovatifolius* sp. nov. (Celastraceae) from China. — *Nordic Journal of Botany* 30: 53–57.
- Rehder, A. & Wilson, E. H. 1916: *Celastrus*. — In: Sargent, C. S. (ed.), *Plantae Wilsonianae*, vol. 2: 346–358. Cambridge University Press, London.
- Simmons M. P., Cappa, J. J., Archer, R. H., Ford, A. J., Eichstedt, D. & Clevinger, C. C. 2008: Phylogeny of the Celastrae (Celastraceae) and the relationships of *Catha edulis* (qat) inferred from morphological characters and nuclear and plastid genes. — *Molecular Phylogenetics and Evolution* 48: 745–757.
- Wang, F. Z. & Tang, J. 1951: *Monocelastrus*, an unrecorded genus of Celastraceae. — *Acta Phytotaxonomica* 1: 135–137. [In Chinese].
- Wang, Z. H. 1936: The studies of Chinese Celastraceae. — *Chinese Journal of Botany* 1: 35–68.
- Zhang, Z. X. & Funston, A. M. 2008: *Celastrus*. — In: Wu, C. Y. & Raven, P. H. (eds.), *Flora of China*, vol. 11: 446–474. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis.