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Disanthus ovatifolius (Hamamelidaceae), a new species from northwestern Vietnam

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Abstract

Disanthus ovatifolius discovered in northwestern Vietnam is described as a new species of Hamamelidaceae, subfamily Disanthoideae. The new species belongs to the genus *Disanthus*, which was represented only by the type species of the genus, *D. cercidifolius*, until now. The new species differs from its congener in a series of morphological characters, such as the evergreen narrowly ovate leaves and cornute fruits. Detailed analytical color plate and ink drawing are provided for the new species along with data on its ecology, phenology and distribution. Similar plants were introduced into European horticulture under the invalid name *Ucodendron whartonii* hort. since 2006.

Key words: *Disanthus ovatifolius*, Vietnam, new species, plant diversity, Tertiary flora, Hamamelidaceae, Disanthoideae, Disanthaceae, *Ucodendron whartonii*

The monotypic genus *Disanthus* Maximowicz (1866: 485) has an isolated position in Hamamelidaceae R. Br. (Brown, 1818: 374) compared with other genera of the family. It was positioned in a monotypic subfamily Disanthoideae Harms (1930: 316) or in a family of its own, Disanthaceae Nakai (1943: 246). The possibilities of other poorly known genera of Hamamelidaceae that may also belong to Disanthoideae is at the moment unclear as relevant genera mentioned below were not included in previous molecular studies. The studies by Li (1999) and Magallón (2007) failed to resolve the position of *Disanthus* more than that it is sister to the clade of Hamamelidoideae, and *Exbucklandia*, *Rhodoleia*, and *Mytilaria* were positioned outside of those two clades. Besides that, the additionally critical genus *Chunia* was also not included in their studies. The flowers of *Chunia* are only known from the original description of the genus by Chang (1948). They have several (6) ovules per locule as *Disanthus*, but otherwise they are very different (sepals and petals lacking, stamens 8, ovary inferior, inflorescence with 10–16 flowers).

An unusual tree of uncertain taxonomic position from the family Hamamelidaceae was found during field botanical surveys of the Institute of Ecology and Biological Resources of the Vietnam Academy of Sciences and Technology in March and November 2016. The tree was found in a rather small isolated mountainous area in the northwestern part of the Hoang Lien Son Range in the limits of the Lao Cai province (Bat Xat district, Y Ty commune) of northwestern Vietnam very close to the country boundary with China. The species was observed as an integral element of primary evergreen mountain broad-leaved and mixed forests with *Tsuga dumosa* (D. Don 1825: 55) Eichler (1887: 80). It is fairly common at elevations 1850–2000 m, but almost absent above 2000 m a.s.l.

Morphological characters of the specimen upon careful examination relate it to *Disanthus* Maxim. (1866: 485): 5-merous bisexual flowers; several seeds per fruit; often only two flowers and fruits per inflorescence, which are very close to each other back to back (hence the name “*Disanthus*”, “double flower”); petals dark red, long attenuated, pointed (vs. not attenuate but of equal breadth along their length and not pointed but blunt in Hamamelidoideae), in bud irregularly incurved and crinkled toward the tip (vs. regularly rolled up in Hamamelidoideae); staminodes lacking; undehisced anthers bean-shaped, with a simple longitudinal slit (with no valves); plants almost glabrous in mature parts, indumentum only in young shoots (Endress 1989).

However, the specimen differs from the type species, *Disanthus cercidifolius*, in a suite of other morphological characters and is here described as a new species (Table 1). The new species represents another extant member of the ancient Tertiary flora almost completely obliterated in northern areas of the Holarctic, but still well preserved in mountains of northern Indochina. This paleoendemic was also discovered in the same area where other such living-fossils were recently discovered, such as *Diplopanax vietnamensis* Aver. & T.H. Nguyen (2002: 435), *Xanthocyparis vietnamensis* Farjon & T.H. Nguyen (2002: 180) and *Calocedrus rupestris* Aver., T.H. Nguyen & P.K. Loc (2004: 41).

A formal description of the new species is provided below along with analytical supplemental illustrations and data on its distribution, phenology and ecology.

Disanthus Maximowicz (1866: 485).

Type—*D. cercidifolius* Maximowicz (1866: 486).

Previously monotypic genus distributed in eastern China and Japan.

D. ovatifolius Averyanov, P.K. Endress, B.H. Quang & K.S. Nguyen, sp. nov. (Fig. 1 & 2).

Diagnosis—Small evergreen hermaphrodite tree; young shoots densely hairy, later glabrous; buds perulate, purple; stipules present, paired, caducous; leaves alternate, petiolate; simple, leathery, with 3 palmate veins and pinnate venation; inflorescence bracteate, capitate, axillary, (1)2–3-flowered; floral bracts sub-verticillate; flowers red, sessile, actinomorphic, bisexual, 5-merous, with 2-whorled perianth; floral cup inside densely hairy, outside glabrous; sepals ovate, recurved glabrous, ciliate; petals ribbon-like, spreading; stamens 5, filamentous, with no connective protrusion; anthers dorsifixed, extrorse, tetra-sporangiate; gynoeceium, of 2 hemi-syncarpous carpels; ovary semi-inferior, 2-locular, styles 2, cylindrical, with truncate stigma; fruit semi-woody, sessile, hemi-syncarpous 2-carpellate capsule, enveloped by woody floral cup fused to each other forming compact infructescence of 2–3 capsules, dehiscent septically by 2 valves, fruiting carpels connate at apex; seeds (6)8(10) per carpel, ejected, glossy black.

Type—VIETNAM, Lao Cai province, Bat Xat district, Y Ty commune, Nhiu Co San Mountain, primary evergreen broad-leaved humid forest on sandstone at elevation about 1858 m a.s.l. around point 22°37'27.5N 103°37'23.6E, small tree, to 5 m tall, locally common, 21 March 2016, *N.V. Du, B.H. Quang, T.D. Binh, D. Justice, B. White, A. Hill, S. McMahan, D. Hinkley, HN-UBC-68* (holotype, HN; isotypes, HN).

Paratypes—VIETNAM, Lao Cai province, Bat Xat district, Y Ty commune, Nhiu Co San Mountains, primary evergreen broad-leaved humid forest on sandstone at elevation about 1861 m a.s.l. around point 22°37'30.2N 103°37'28.2E, small tree about 5 m tall, locally common, 25 October 2016, *R. Baines, A. Luke, A. Summers, W. Ritchie, Q.B. Hong, D.V. Nguyen, K.S. Nguyen, HN-E-304* (HN, LE). VIETNAM, Lao Cai province, Bat Xat district, Y Ty commune, Nhiu Co San Mountains, primary evergreen broad-leaved and mixed forest with *Tsuga dumosa* on sandstone at elevation about 2367 m a.s.l. around point 22°35'46.9N 103°37'31.8E, small tree about 4 m tall, not common, 26 October 2016, *R. Baines, A. Luke, A. Summers, W. Ritchie, Q.B. Hong, D.V. Nguyen, K.S. Nguyen, HN-E-381* (HN, LE). VIETNAM, Lao Cai province, Bat Xat district, Y Ty commune, Nhiu Co San Mountains, primary evergreen broad-leaved humid forest on sandstone at elevation 1860 m a.s.l. around point 22°37'34.2N 103°37'32.9E, small tree, up to 5 m tall, locally common, 2 November 2016, *B.H. Quang, N.S. Khang, QK-1* (HN, LE).

Description—Small evergreen hermaphrodite tree with trunk to 5 m tall and Ø 15 cm; crown loose of diffuse irregular shape. Trunk with dark dirty brownish-gray to light gray, finely rough bark. Young stems, stipules and leaves at the beginning of their development light yellowish-green to pale pink, densely hairy throughout with long soft straight woolly caducous hairs; later completely glabrous. Young branches light green, straight to slightly zigzag, older light dull brownish, often irregularly curved. Buds perulate, purple, ovoid, (2)2.5–4(5) mm long, acute to obtuse, consist of (2)3(4) rigid, coriaceous, glabrous bud scales, 2–4 mm long, 2.5–3.5 mm wide. Stipules paired, large, herbaceous, broadly lanceolate to narrowly ovate, (6.5)8–12(13.5) mm long, (1.5)2–3(4) mm wide, slightly concave, early deciduous, leaving small scars. Leaves alternate, distichous, petiolate; petiole rigid, subterete, dull green to purple, (1.5)2–2.5(3.5) cm long, Ø (1)1.2–1.4(1.6) mm, inflated and slightly curved at base and apex; leaf blade simple, leathery, narrowly ovate, (5)7–10(13) cm long, (2.5)3–4.5(5.5) cm wide, entire along the margin, cordate to sub-orbicular at the base, shortly attenuate at the apex, dark glossy green above, pale light glaucous-green to almost whitish below; venation pinnate, with 2 more or less prominent basal sub-opposite lateral veins, tertiary veins well distinct on both surfaces, almost perpendicular to main veins. Inflorescence scape naked or bracteate, capitate, axillary, (1)2–3-flowered. Scape (2)4–6(8) mm long, densely hairy, with (0)3–6(7) sterile bracts; sterile bracts distichous, sub-opposite or sub-verticillate (by 3), ovate to narrowly ovate, acute, to 5 mm long, lower sub-glabrous, upper densely hairy and ciliate along the margin; rachis less than 0.5 mm long. Floral bracts (2)3(4), sub-verticillate, ovate, broadly ovate to

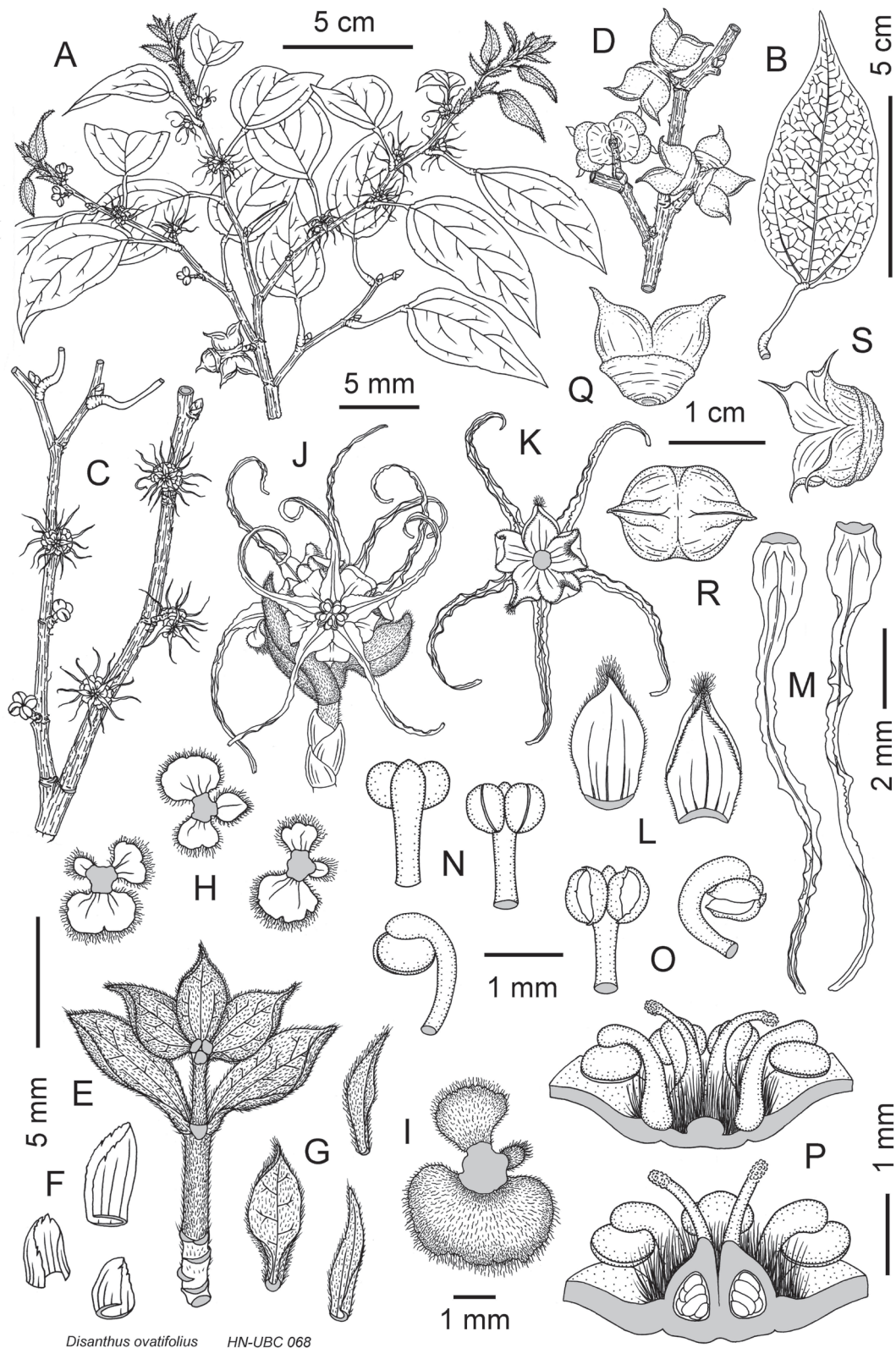


FIGURE 1. *Disanthus ovatifolius* sp. nov. A—Leafy flowering and fruiting branch. B—Leaf, abaxial surface. C—Leafless flowering branch. D—Leafless fruiting branch. E—Floriferous shoot (bud scales and 3 lower sterile scape bracts removed, 5 apical sterile scape bracts flattened, 3 flowers, each with 3 floral bracts removed). F—Removed bud scales. G—Removed sterile scape bracts. H—Floral bracts, adaxial surface. I—Floral bracts, abaxial surface. J—Intact inflorescence, side view. K—Flower, view from below. L—Sepals, adaxial and abaxial views. M—Petals, adaxial and abaxial views. N—Stamens, frontal view, view from behind and side view. O—Stamens at the end of anthesis. P—Flower disc, tangential and sagittal section. Q—Ripening fruit, side view. R—Ripening fruit, view from above. S—Dehiscent fruit with naturally recurved valves, seeds removed. Drawn from the type *HN-UBC-68* and paratype *QK-1* by L. Averyanov and T. Maisak.



FIGURE 2. *Disanthus ovatifolius* sp. nov. Digital epitype, 0274/HN-UBC-68 & QK1. Photos of B.H. Quang & K.S. Nguyen, correction and design by L. Averyanov.

transversely reniform, (0.5)1–2(2.2) mm long, (0.5)1–3(3.5) mm wide, acute, obtuse or truncate, often crenulate at apex, slightly concave, adaxially glabrous, abaxially densely hairy, ciliate along the margin. Flowers sessile, densely adpressed to each other, actinomorphic, bisexual, 5-merous, with 2-whorled perianth. Floral cup almost flat or hardly concave, outside glabrous, inside between stamens and carpels densely hairy with long straight stiff white hairs; in fruits broadly cup-shaped, glabrous. Sepals 5, red to pink, imbricate, narrowly ovate to ovate, (2.8)3–3.2(3.4) mm long, (1.6)1.8–2(2.2) mm wide, recurved and often revolute along margin; both surfaces glabrous, the margin ciliate, at apex with dense tuft of soft fuzzy hairs. Petals 5, red to pink, sometime whitish along margin in basal part, glabrous, imbricate, (8)9–11(12) mm long, (circinate in bud), basal part (0.8)1–1.2(1.4) mm broad, distally tapering into long ribbon-like prolongation 0.4–0.5 mm wide, spreading, straight or undulate; margins finely irregularly crenulate or incised, often wavy and revolute. Androecium of 5 stamens, with no staminodia; stamens free, arranged in one whorl; filaments cylindrical recurved, (0.8)1–1.2(1.4) mm long, Ø 0.3–0.4 mm; anthers dorsifixed, extrorse, 0.6–0.7 mm long, 0.4–0.5 mm wide, thecae di-sporangiate, bean-shaped before dehiscence, each theca dehiscing by 1 longitudinal slit, with no connective protrusion. Gynoecium, of 2 carpels; ovary semi-inferior, 2-locular, carpels free at apex, fused in basal part; ovules 8(10) per carpel, pendent on axile placenta formed by fused carpellary margins; styles 2, cylindrical, 0.8–1 mm long, purple, slightly recurved, each with indistinct truncate stigma. Fruit semi-woody, pale yellowish to dull brownish, sessile, hemi-syncarpous 2-carpellate capsule, (1.2)1.4–1.6(1.8) cm long and wide, lower part enveloped by woody floral cup, free apex of each carpel erect, apiculate; individual capsules fused to each other forming compact infructescence of 2–3 capsules, dehiscing septicidally above middle by two valves with acute erect apex; woody endocarp loose from semi-woody exocarp. Seeds (6)8(10) per carpel, ejected, obscurely ovoid to indistinctly angled, (3.5)4–5(5.5) mm long, (2)2.2–2.6(3) mm wide, wingless, seed coat black, thick, hard, bony, shiny.

Etymology:—Species name refers to the narrowly ovate shape of leaf blade.

Vernacular name:—Vietnamese: Sừng gõ nhiều hạt [fruit like woody horn with many seeds].

Habitat, phenology and conservation status:—Small tree to 5 m tall. Primary evergreen broad-leaved and mixed forests with *Tsuga dumosa* on sandstone at elevations 1850–2000 m a.s.l., usually in wet places in assemblage with *Acer* sp., *Actinidia* sp., *Altingia* sp., *Ardisia* sp., *Arisaema* sp., *Asplenium* spp., *Burmannia indica*, *Daphniphyllum* sp., *Euonymus* sp., *Impatiens* spp., *Lyonia* sp., *Magnolia* sp., *Oreocharis aurea*, *Photinia* sp., *Polyspora* sp., *Polystichum* sp., *Rhododendron* spp., *Rhodoleia championii*, *Sargentodoxa cuneata*, *Schefflera* sp., *Schima* sp., *Strobilanthes* sp., *Utricularia* sp., *Vaccinium* sp. and *Vittaria* sp. Locally common. Flowering in March–April, fruiting October–November. Estimated IUCN Red List status DD.

Distribution:—Northwestern Vietnam (Lao Cai province, Bat Xat district). Endemic of northwestern Vietnam.

TABLE 1. Life form, habitat and morphological differences between *Disanthus ovatifolius* and *D. cercidifolius*.

CHARACTER	<i>D. OVATIFOLIUS</i>	<i>D. CERCIDIFOLIUS</i>
Life form	Small tree to 5 m tall	Shrub to 3 m tall
Canopy habit	Evergreen	Deciduous
Leaf blade texture	Leathery	Membranous
Leaf blade shape	Narrowly ovate	Suborbicular-cordate
Leaf blade base	Cuneate	Cordate
Leaf blade venation	Pinnate with 1 median and 2 stronger basal lateral veins	Palmate with 5–7 veins
Number of flowers per inflorescence	1–3	2
Hairiness on involucre and floral bracts abaxially	Densely hairy	Almost glabrous
Hairiness on floral cup abaxially	Almost glabrous	Pubescent
Hairiness on floral cup adaxially	Hairy, with long stiff hairs	Almost glabrous
Ovary position	Semi-inferior	Almost superior
Style length	0.9–1.2 mm long, exceeding anthers in length	0.4–0.8 mm long, equal or shorter than anthers
Capsule shape	Narrowly ovate	Ovate to broadly ovate
Capsule apex	Cornute with acute attenuate apex	Truncate
Seeds per carpel	6–10	Almost always 5–6
Seed size (mm)	3.5–5.5 × 2–3	4–7 × 3–4

Notes:—The new species in its general appearance has some superficial similarity with representatives of *Loropetalum* and *Hamamelis* widely cultivated as ornamental shrubs and trees. Like species of these genera, as well as *Disanthus cercidifolius*, our plant has certain significance for ornamental horticulture. It has quite attractive red

flowers, long-lasting fruits of unusual shape, pale green or pink young leaves becoming later dark glossy green. It is noteworthy that the same or similar plants were introduced into cultivation in Europe already ten years ago, since 2006. These plants were imported from Vietnam by collectors of the commercial nursery “Crûg Farm Plants” located in northern Wales, UK (Crûg Farm Plants 2017, The Guardian 2017) and later were successively propagated for sale as ornamental plants (Crûg Farm Plants. PLANT LIST 2016 2017). It was reported that this rare ornamental tree was collected in the same locality of Lao Cai province (Bat Xat district, Y Ty commune) of northern Vietnam in 2006 and 2007 (Crûg Farm Plants 2017, The Guardian 2017). The plant was discovered by leading assistance of Mr. Uoc, local guide, who organized a successful collecting tour. It was provisionally named after him, as *Uocodendron whartonii* hort. Although this name was never validly published it was widely used in horticulture internet blogs including recent picturesque description of botanical excursions in the species *locus classicus* by UK botanists (Summers 2016).

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