Tricyrtis xianjuensis (Liliaceae), a new species from eastern China

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Received 16 Apr. 2013, final version received 13 Dec. 2013, accepted 20 Dec. 2013


Tricyrtis xianjuensis G.Y. Li, Z.H. Chen & D.D. Ma sp. nova (Liliaceae) is described from Zhejiang and illustrated. It resembles especially T. ohsumiensis and T. perfoliata (sect. Flavae), but differs from the former in having ascending stems, 70 cm long, and glabrous; widely-spaced, ovate-oblong and 2-ranked leaves with the apex acuminate to long acuminate, and without oil spots; pedicel 0.5–1.2 cm long; tepals ca. 0.8 cm wide, appearing purple-spotted inside, the outer tepals’ mucro less than 1 mm long; and anthers ca. 3 mm long. Tricyrtis xianjuensis differs from T. perfoliata in having ovate-elliptic leaves, clasping at the base, not perfoliate, and without oil spots; axillary flowers, numbering one or two; and 20–25 mm long tepals with slightly larger and scattered spots. The present report extends the known distribution of Tricyrtis sect. Flavae from Japan to China.

Tricyrtis (Liliaceae) includes about 20 species divided into four sections, distributed from the Himalayas to East Asia (Takahashi 1987a, Chen & Takahashi 2000, Hong & Jury 2011). The plants thrive in rainy and species-rich areas in a wide range of terrain, from mountainous regions to low-lying, humid, subtropical forests, on sloping ground along creek beds, road edges and trail clearings.

Tricyrtis sect. Flavae was supposed to be endemic to Japan. Four species were recognized in this section: T. nana, T. perfoliata, T. flava, and T. ohsumiensis. They lack a distinct stolon, have infundibular, erect, axillary flowers, with the pedicels densely beset with hairs, and a yellow perianth with many small red-purple spots on the inner surface. The stamens are exposed, with a glabrous filament, and an extrose anther. Only T. nana has a wide distribution among the four species, the other ones being regarded as endangered, vulnerable, and near-threatened species, respectively (Takahashi 1987a, Maki et al. 1999, Takahashi 2011).

Recently, we discovered a Tricyrtis plant with yellow flowers on humid shaded cliffs located in Xianju County, Zhejiang Province, East China. After consulting relevant floras and other literature (Ohwi 1965, Takahashi 1980, 1984, 1987a,
1987b, 2011, Maki et al. 1999, Hong & Jury 2011), we determined the plant belongs to sect. Flaveae. It however has some clear differences from the already known species and cannot be identified using the published floras of China (Tsi 1980, Lin 1993, Chen & Takahashi 2000).

Tricytis xianjuensis  
G.Y. Li, Z.H. Chen & D.D. Ma, sp. nova (Figs. 1 and 2)


Herbs perennial, rhizomes short, roots with lower nodes fascicled. Stems ascending, simple, purple in light, 50–70 cm long, glabrous. Leaves alternate, 2-ranked on stem, scattered; lower leaves ovate-long-elliptic, upper long-ovate, 4–14 cm long, 2–5 cm wide, base amplexicaul, apex acuminate to long acuminate, glabrous, bright green above, light green below, without oil spots; midrib recessed on adaxial surface, lateral veins obscure. Flowers axillary, solitary or sometimes in pairs; pedicel 5–12 mm long, slightly curved, densely pubescent, base with several yellowish brown to translucent bracts; flowers bright yellow, diameter 2.5–3 cm; tepals 6, free, subequal, not recurved after flowering, with purple-red spots inside; outer tepals 3, obovate-lanceolate, 20–25 mm long, ca. 8 mm wide, abaxial surface densely pubescent, glabrous inside, white near base, apex acute, mucro less than 1 mm long, base with one saccate
foveolate nectary, ca. 3 mm in diam.; inner tepals 3, oblong, ca. 7 mm wide, white near base, glabrous inside, having a midvein ridge and only veins sparsely pubescent outside, apex acute or obtuse. Stamens 6, 17–23 mm long, filaments flat, recurved, glabrous, lower part leaning to a short tube with pubescence and sparse reddish purple spots, white over tube, anthers yellow, ca. 3 mm, two-lobed, born in back, extrorse; pistil 17–20 mm high, ovary superior, triangular-spindle, 7–10 mm long, trilobed, many ovules per locule; style 4–10 mm long; stigma trident, bent outwards, branches recurved-patent, with glandular protuberances. Capsule trigonous-fusiform, 2–3 cm long, glabrous, sepicidally dehiscent. Seeds ellipsoid. Flowering in September to early October, fruiting in October.

Tricyrtis xianjuensis resembles T. perfoliata and T. ohsumiensis, and these three also thrive in similar, damp and shaded habitats on cliffs. However T. xianjuensis can be morphologically distinguished from all other species in Tricyrtis sect. Flavae (see Appendix).

There are about 500 individuals of T. xianjuensis in the community covering about 500 m². The main associated species are Neurandra reynaudiana, Pleione formosana, Aster turbinatus, Rabelosia inflexa, Bredia quadrangularis, Quercus phillyreoides, Fraxinus sieboldiana, Deutzia faberi, Cerasus schneideriana, Neolitsea aurata var. chekiangensis, Toxicodendron succedaneum, Quercus serrata var. brevipetiola, and Callerya dielsiana.

Before this finding Tricyrtis sect. Flavae was thought to be endemic to Japan. The known distribution of sect. Flavae is hereby extended westward by about 10°.

Key to species of Tricyrtis sect. Flavae

1. Stem erect, less than 30 cm tall, pilose or nearly glabrous ................................................................. 2
   1. Stem ascending, up to 70 cm long, glabrous .............. 4
   1. Pedicel distinct, nearly equaling to longer than capsules and flowers ...................................................... 3
   2. Pedicel very short, much shorter than flowers and capsules; stem very short, 0.5–5 cm long ............ T. nana
   3. Tepals narrowly obovate, scarcely spotted, rounded, micro reflexed, 1.5–2 mm, long ................... T. ohsumiensis
   3. Tepals oblong-spathulate, outer ones acute, with an erect or slightly recurved micro 3–4 mm long, inner tepals obtuse to subretuse, micro scarcely 1 mm long ... T. flava
   4. Leaves perfoliate, long-acuminate at apex; flowers solitary in axils of median leaves, with small spots on edge of tepals .................................................... T. perfoliata
   4. Leaves clasping, acuminate to long acuminate apex; flowers axillary, one or two, with large spots scattered on tepals ................................................. T. xianjuensis

References
Hong S.W.P. & Jury S.L. 2011: Phylogeny and divergence
times inferred from rps16 sequence data analyses for *Tricyrtis* (Liliaceae), an endemic genus of northeast Asia. — *AoB Plants*, phr025, doi:10.1093/aobpla/phr025.


Appendix. Differences between *Tricyrtis xianjuensis* and other members of sect. *Flavae*.

<table>
<thead>
<tr>
<th></th>
<th><em>T. xianjuensis</em></th>
<th><em>T. flava</em></th>
<th><em>T. nana</em></th>
<th><em>T. ohsumiensis</em></th>
<th><em>T. perfoliata</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stem</strong></td>
<td>ascending; 30–70 cm long; glabrous</td>
<td>erect; 2–30 cm long; pilose</td>
<td>erect; 0.5–5 cm long; short-pubescent</td>
<td>erect; 10–30 cm long; nearly glabrous</td>
<td>ascending; 50–70 cm long; glabrous</td>
</tr>
<tr>
<td><strong>Leaves</strong></td>
<td>scattered; lower ovate-long-elliptic, upper long-ovate, 4–14 cm long, 2–5 cm wide, base clasping, apex acuminate to long acuminate, without oil spots</td>
<td>fairly densely arranged; oblanceolate to broadly elliptic, 7–15 cm long, base clasping, apex acuminate; usually with oil spots</td>
<td>densely arranged; long-elliptic, 6–12 cm long, 1.5–4 cm wide; base clasping, apex acuminate; with oil spots</td>
<td>fairly densely arranged; lower oblong-lanceolate, upper elliptic to oblong, 5–20 cm long, 2–6 cm wide; base clasping, apex acuminate; sometimes with oil spots</td>
<td>scattered; lower narrowly ovate, upper broadly lanceolate to narrowly ovate-oblong, 6–18 cm long, 2–5 cm wide, base perfoliate, apex long-acuminate, sometimes with oil spots</td>
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<tr>
<td><strong>Flowers</strong></td>
<td>1 or 2; tepals 20–25 mm long, ca. 8 mm wide, with scattered purple-red spots inside; the outers’ mucro less than 1 mm long; stamens 17–23 mm long, anthers ca. 3 mm; pistil 17–20 mm high</td>
<td>1 or 2; tepals 23–31 mm long, with dark purple spots inside; the outers’ mucro 3–4 mm long, the inners’ mucro about 1 mm. long; stamens 18–22 mm long, anthers ca. 2.5–3 mm; pistil 18–21 mm high</td>
<td>1 or 2; tepals 19–23 mm long, with purple-brown spots inside; the outers’ mucro 1.5–2 mm long, the inners’ mucro about 0.5 mm long; stamens 14–17 mm long, anthers ca. 2 mm; pistil 15–17 mm high</td>
<td>1 or 2; tepals 25–33 mm long, ca. 10 mm wide; the outers’ mucro 1.5–2 mm long; stamens 20–24 mm long, anthers ca. 4 mm; pistil 22–25 mm high</td>
<td>solitary; tepals 13–15 mm long, ca. 6–8 mm wide, with small purple-red spots scattered around the edge; the outers’ mucro ca. 1 mm long; stamens 24 mm long</td>
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<tr>
<td><strong>Pedicel</strong></td>
<td>0.5–1.2 cm</td>
<td>2–6 cm</td>
<td>0.5–1.5 cm</td>
<td>2–5 cm</td>
<td>0.5–1 cm</td>
</tr>
<tr>
<td><strong>Habitat</strong></td>
<td>wet, shady cliffs</td>
<td>edges and well-lit forest floors</td>
<td>edges and well-lit forest floors</td>
<td>cliffs</td>
<td>wet, shady cliffs</td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>China (Zhejiang)</td>
<td>Japan (Kyushu)</td>
<td>Japan (Honshu, Shikoku, Kyushu)</td>
<td>Japan (Kyushu)</td>
<td>Japan (Kyushu)</td>
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