An Unrecorded Species of Genus Clematis (Ranunculaceae) from Korea

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Abstract: An unrecorded species of Clematis takedana Makino, was found at the border of the reclaimed lake Shihwa Hwasung-si, Gyunggi Prov. This species is distinguished from C. heracleifolia var. davidiana Hemsl, the most similar taxon based on habit and flower shape. The new Korean name ‘Ja-ju-sa-wi-jil-p pang’ was given based on the color of the calyx. The illustration, description and a key to the treated taxa are given.

Keywords: Ranunculaceae, Clematis, Unrecorded species, C. takedana, Korea

The genus Clematis L. is one of the largest genera in the family Ranunculaceae. There are between 300 and 355 total taxa in this genus (Tamura, 1967, 1987; Wang & Li, 2005). This genus is widely distributed, ranging from tropical regions to frigid zones and from sea level to high altitudes (Tamura, 1967; Chang et al., 1980).

Wang and Li (2005) recently published a classification system for Clematis based mainly on floral structure including the features of inflorescence, sepal, calyx, stamen. This system was comprised of 15 sections under 4 subgenera. According to Wang and Li’s system, sect. Tubulosae Decne. had 9 taxa under 2 subsections, and these were distinguished from other sections by ternate or 1-2 pinnate leaves, 4 sepals, valvate composition, linear filaments, pilose near the apex, and unflattened achenes with persistent style. The Chinese C. pinnata Maxim. and Japanese C. takedana were included in subsect. Pinnatae (W.T. Wang) W.T. Wang of sect. Tubulosae.

Although 24 taxa in genus Clematis in Korea are known (Korea National Arboretum and The Plant Taxonomic Society of Korea, 2007), there are only 2 taxa of sect. Tubulosae in Korea, which are C. heracleifolia DC and C. heracleifolia var. davidiana. (Lee, 1996; Lee, 2003; Korea National Arboretum & The Plant Taxonomic Society of Korea, 2007).

C. takedana was found in the border of a reclaimed lake Shihwa Hwasung-si, Gyeonggi Prov., and was firstly reported in the present study. This taxon grew beside a population of C. heracleifolia var. davidiana which is often regarded as synonyms with C. tubulosa Turcz. (Kitagawa, 1937; Wang & Xie, 2007). The population size of C. takedana was very small in this site, but the other population of C. takedana was known in other places on the west coast of the Korean peninsula (per. com.). This taxon was a known hybrid of C. stans Sieb. & Zucc. and C. heracleifolia DC and was distributed only in a restricted area in the middle of Japan. This taxon has similar characteristics to C. mandshurica Rupe. and C. apiifolia DC, a member of sect. Clematis in habit, phyllotaxis, and the state of the calyx etc (Wang, 2003; Wang & Xie, 2007). Many characteristics of the reproductive organs are in common with C. heracleifolia var. davidiana, which is also part of sect. Tubulosae as is C. stans (Wang & Li, 2005; Wang & Xie, 2007; Table 1). C. mandshurica and C. apiifolia from sect. Clematis and C. heracleifolia var. davidiana from sect. Tubulosae were chosen for determination of C. takedana.

More than 10 specimens were collected and measured for comparison of morphological characters to other taxa, and 10 photo specimens from Japan were examined to identify this taxon. The information of gametophyte chromosome number was obtained (Chung, 2013). The new Korean name of “Ja-ju-sa-wi-jil-pang” was given considering the purple color of calyx. All specimens examined in this study are deposited at KNH. A distribution map with description and key to the treated taxa are given in this study (Fig. 1).

Type: Japan. Honshu: Shinano, 1905-08-28, Takeda *s.n.* (holotype, not seen).

Scandent woody vine. Stem and branches sulcate on surface, pubescent. Leaves ternate or sometimes 5-foliolate, leaflets widely ovate to ovate, 6.0-12.5 cm long, 4.5-10.5 cm wide, apex acuminate, base rounded to truncate, doubly denticulate, 2-3 lobed, sparsely pubescent on upper surface, pubescent along veins on under surface; petiole glabrous. Flowers Aug.-Sept., bisexual, 1.4 cm in diam. at beginning, 3.0 cm at anthesis, pale purple, suberect at beginning of anthesis, thereafter spreading. Inflorescence paniculate compound cymes of many flowers, terminal or axillary; pedicel slender, 1.0-3.0 cm long, densely hirsute, bracteolate, bracteoles ovate, 1 mm long. Sepals 4, pale purple, oblong, 8.0-18.0 mm long, 3.0-4.0 mm wide, apex obtuse and more or less recurved, densely pubescent both in- and outside, margin entire. Filaments 8.0-10.0 cm long; anthers linear, 2.0-3.0 mm long, upper part villose. Ovary pubescent; styles ca. 1.7-4.0 mm long, densely villose. Fruit achenes ovate, glabrous, persistent style. 3.0-4.5 mm long, 2.0-3.1 mm wide.

**Specimens examined: **

**Korea**

Gyeonggi Prov., Hwasung-si, Lakeshore of Shihwaho, Jang et al. 20080907-001 (KNH); Jang et al. 20080907-002 (KNH); Jang et al. 20080907-003 (KNH); Jang et al. 20100726-001 (KNH); Jang et al. 20100726-002 (KNH); Jang et al. 20110807-001(KNH); Jang et al. 20110820-001 (KNH); Jang et al. 20110831-001 (KNH); Jang et al. 20110831-002 (KNH); Jang et al. 20110831-003 (KNH); Jang et al. 20110831-004 (KNH); Jang et al. 20110918-001 (KNH)

**Japan (photo)**

Nagano Pref. ?, Jul. 1927, T. Makino *s.n.* (OSA);
An Unrecorded species C. takedana Makino


Korean name: Ja-ju-sa-wi-jil-ppang (자주사위질빵: New Korean name)

Distribution: Japan, Korea

Korea; Seashore of the Yellow sea and lakeshore of Shihwaho, Hwasung-si, Gyeonggi Prov.

Japan; Pref. Akita and Nagano, Central and Northern Honshu

Habitat and Ecology: sunny place or forest margin at a low altitude

Key to related taxa of Clematis takedana in Korea

1. Herbal vine, leaflet margins entire or sparsely crenate, sepals white
2. twig glabrous, leaflets entire, both surfaces glabrous, coriaceous, both surfaces of sepal glabrous
3. Erect perennial herb, leaflets pinnate, obovate, inflorescences densely compound cyme, sepals suberect at whole anthesis, blue purple

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Makino described a new species, C. takedana, based on a specimen collected from Shinano, Japan by H. Takeda. It has been treated as a hybrid between C. apiifolia and C. stans (Makino, 1907). Makino’s viewpoint was accepted by Kitagawa (1937), Ohwi (1965), and Tamura (1982).

Sect. Clematis, which is composed of 74 taxa, is 8 times more larger than sect. Tubulosae (Wang & Li, 2005) that was 9 taxa (Wang & Li, 2005). Intermediate morphological features of C. takedana could be inferred as transitional states from sect. Clematis to sect. Tubulosae (Wang, 2001). On the basis of a recent palynological study of the genus Clematis, Xie (2005) pointed out that sect. Tubulosae might have originated in eastern Asian and subsequently extended eastward to Japan. The reported site in this study can be supposed some

Table 1. Differences in characters state among Clematis takedana and its related taxa (unit: mm)

<table>
<thead>
<tr>
<th>Characters</th>
<th>C. mandshurica</th>
<th>C. apiifolia</th>
<th>C. heracleifolia var. davidiana</th>
<th>C. takedana</th>
</tr>
</thead>
<tbody>
<tr>
<td>habit</td>
<td>herbal vine</td>
<td>herbal vine</td>
<td>perennial herb</td>
<td>woody vine</td>
</tr>
<tr>
<td>phyllotaxis</td>
<td>pinnate/ternate</td>
<td>pinnate/ternate</td>
<td>pinnate</td>
<td>ternate or 5-foliolate</td>
</tr>
<tr>
<td>leaflet shape</td>
<td>ovate</td>
<td>ovate</td>
<td>obovate</td>
<td>widely ovate or ovate</td>
</tr>
<tr>
<td>leaflet margin</td>
<td>entire</td>
<td>dentilcate</td>
<td>double dentilcate</td>
<td>double dentilcate</td>
</tr>
<tr>
<td>leaflet length</td>
<td>49.7±10.70</td>
<td>42.5±7.86</td>
<td>124.5±15.5</td>
<td>102.8±21.64</td>
</tr>
<tr>
<td>leaflet axisial side</td>
<td>grbrous</td>
<td>pubescent</td>
<td>pubescent</td>
<td>pubescent</td>
</tr>
<tr>
<td>leaflet abaxial side</td>
<td>grbrous</td>
<td>pubescent</td>
<td>pubescent</td>
<td>pubescent on vein</td>
</tr>
<tr>
<td>pedicel length</td>
<td>45.3±9.11</td>
<td>10.9±3.02</td>
<td>26.4±7.89</td>
<td>18.0±6.27</td>
</tr>
<tr>
<td>sepal posture</td>
<td>spreading</td>
<td>spreading</td>
<td>erect</td>
<td>spreading</td>
</tr>
<tr>
<td>sepal shape</td>
<td>oboval oblong</td>
<td>lanceolately obovate</td>
<td>oblong</td>
<td>oblong</td>
</tr>
<tr>
<td>sepal margin</td>
<td>entire</td>
<td>entire</td>
<td>lobed</td>
<td>entire</td>
</tr>
<tr>
<td>sepal apex</td>
<td>acute</td>
<td>acute</td>
<td>acuminate</td>
<td>obtuse</td>
</tr>
<tr>
<td>sepal length</td>
<td>13.4±1.28</td>
<td>8.9±1.54</td>
<td>17.5±5.62</td>
<td>11.2±3.24</td>
</tr>
<tr>
<td>sepal width</td>
<td>4.6±0.83</td>
<td>3.0±0.47</td>
<td>4.5±0.56</td>
<td>3.3±0.47</td>
</tr>
<tr>
<td>sepal color</td>
<td>white</td>
<td>white</td>
<td>blue purple</td>
<td>pale purple</td>
</tr>
<tr>
<td>sepal adaxial side</td>
<td>grbrous</td>
<td>pubescent</td>
<td>pubescent</td>
<td>pubescent</td>
</tr>
<tr>
<td>sepal abaxial side</td>
<td>grbrous</td>
<td>pubescent</td>
<td>pubescent</td>
<td>pubescent</td>
</tr>
<tr>
<td>sepal vernation</td>
<td>valvate</td>
<td>valvate</td>
<td>valvate</td>
<td>imbricate</td>
</tr>
<tr>
<td>surface of filament</td>
<td>grbrous</td>
<td>grbrous</td>
<td>pubescent</td>
<td>pubescent upper part</td>
</tr>
</tbody>
</table>
points in the route of speciation in sect. *Tubulosae*.

The chromosome number of gametophyte in *C. takedana* was n=18 (per. com.). This is the first report for this species and the number n=18 is an exceptional case in genus *Clematis* compared to the records reported up to now (IPCN, 2013). The basic chromosome number of *Clematis* is x=8, even though they sometimes have B-chromosomes. Nearly all taxa have somatic chromosome number as 2n=16, 32 or 48 (Sheidai et al, 2009; Savita et al., 2011; IPCN, 2013), except 2 cases *C. brachyura* Maxim, which is a Korean endemic species (2n=18, per. com.) and the American *C. campaniflora* Brot. which has 2n=26 (IPCN, 2013). Therefore, we might infer that aneuploidy and polyploidy happen in speciation.

Although *C. takedana* is reported firstly in this study, the several problems should be resolved are remain. Since the parents taxa of *C. takedana* were not found in the surroundings, the origin of this hybrid species and distribution route should be discovered. Also, the exact systematic relationship among the related taxa should be illuminated by using the more characters in morphological, cytological and molecular study.

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**References**


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