

Clematis calcicola J. S. Kim: A new species of *Clematis* sect. *Atragene* (Ranunculaceae) from Korea

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바위종덩굴: 한국에서 발견된 으아리속 자주종덩굴절의 1신종

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ABSTRACT: We named and described *Clematis calcicola* J. S. Kim, a new species of *Clematis* sect. *Atragene* (Ranunculaceae) found in a limestone area of Mt. Deokhang, Korea. *Clematis calcicola* is distinguished from the other species of sect. *Atragene* by 1) sparsely dentate, glabrescent, and subcoriaceous leaflets and 2) smooth and thick sepals.

Keywords: Ranunculaceae, *Clematis*, sect. *Atragene*, new species, endemic species

적 요: 한국의 강원도에 위치한 석회암 산지인 덕향산에서 발견된 으아리속 자주종덩굴절의 1신종, 바위종덩굴 (*Clematis calcicola* J. S. Kim)을 기재 및 도해하였다. 바위종덩굴은 엽연에 거치가 드물게 있고 털이 없는 가죽질의 잎과 두텁고 주름이 없는 꽃받침의 특징으로 자주종덩굴절의 다른 종들과 쉽게 구별된다.

주요어: 미나리아재비과, 으아리속, 자주종덩굴절, 신종, 특산식물

The genus *Clematis* L., one of the largest genus belonging to the family Ranunculaceae (Yang and Huang, 1995; Yang and Moore, 1999), contains about 300 species worldwide (Tamura, 1987; Essig, 1991). These species are widely distributed from tropical regions to boreal zones (Essig, 1991; Yang and Huang, 1995). *Clematis* species can easily be distinguished from other genera in the family Ranunculaceae, by liane habit, opposite phyllotaxy, flowers with four sepals and achenes with a long tail (Yang and Moore, 1999). More than 14 sections have been recognized in the genus *Clematis* (Tamura, 1987) but 9 sections containing 12 species have been reported in Korea.

Sect. *Atragene* is distinguished from other sections by toothed leaves, hairy stamens, and staminodes (Tamura 1987; Essig, 1991; Wang, 2005). This section, which contains about 15

species worldwide (Wang, 2005), is mainly distributed in the temperate to sub-arctic regions of the northern hemisphere (Tamura 1987). Two species, *C. ochotensis* (Pall.) Poir. and *C. koreana* Kom. have been reported in Korea. We are reporting a new species of *Clematis*, which is classified as the sect. *Atragene*.

Clematis calcicola J. S. Kim, sp. nov. TYPE: limestone cliffs, Mt. Doekhang, Samcheok-si, Gangwon-do, Korea. alt. 600 m. 37°18'59"N, 129°00'58"E, 15 May 2004, J. S. Kim 2204 (holotype, KB; isotypes, KB, KNU) Fig. 1, 2.

Liana lignosa. Rhizoma crescet crasse et longe. Caulis teres, glaber; squama germinis angusta ovata vel triangula, 0.4-1 cm longa, habet pubes. Folium 1-ternatum; petiolus 3-8.5 cm longus; segmentum folium oblongum vel ovatum, 3-7×2-5 cm,

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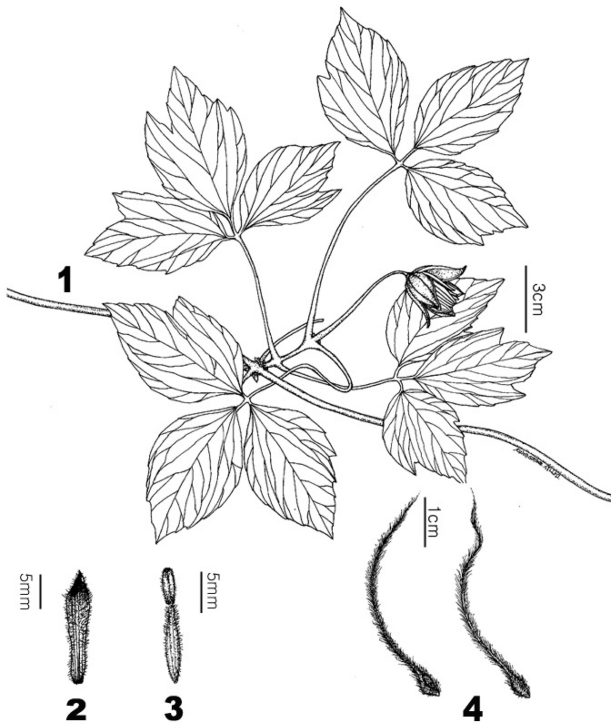


Fig. 1. *Clematis calcicola* J. S. Kim. 1, habit; 2, staminode; 3, stamen; 4, achenes.

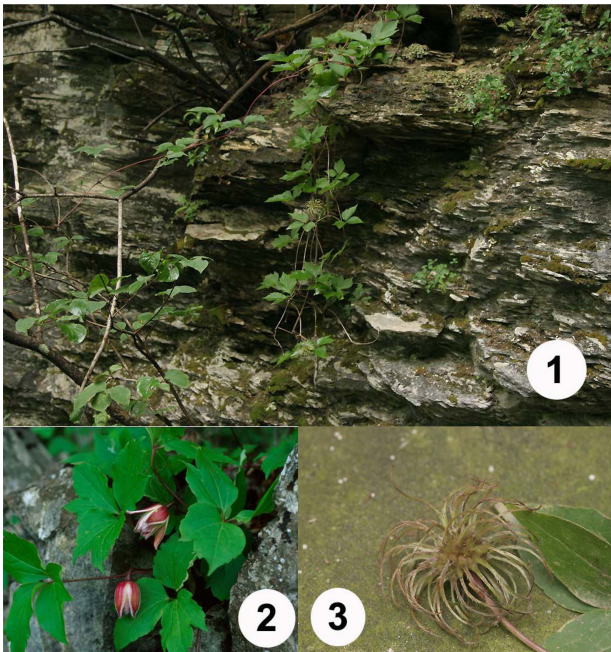


Fig. 2. *Clematis calcicola* J. S. Kim. 1, habit; 2, flowers; 3, fruit.

opulentum papyrifera, habet 1-2 lobatum vel holophyllum, supra raro dentatum, superficies glabrescens, petiolulus et margo et basis habent raro pubes. Flos solitarius, inclinatus, habet 2.5-3 cm diametros, rubella purpura; pediculus 4-6.5 cm

longus, habet raro pubes; calyculus ovatus-oblongus, 2-3 cm longa, 0.8-1.2 cm lata, paucis superficies habet pubes, margo pilosus; staminodium spatula-gracile, 1.5-1.8 cm longa, habet pubes; stamena 1-1.5 cm longa, filamentum et connectivum habet pubes; ovarium habet pubes; stilus ad 8 mm longa, pilosus. Achaenium artus obovatum, 4-5 mm longum, 2-3 mm latum, habet pubes; persistentis stilus ad 4.5 cm longus, habet plumosus. Pubertas est Majus-Junius.

Korean name: ba-wi-jong-deong-gul

Woody vine. Rhizome thick and long. Branches terete, glabrescent; bud scales narrowly ovate to deltoid, 0.4-1 cm long, pubescent. Leaves 1-ternate; petiole 3-8.5 cm long; leaflet blades oblong to oval, 3-7 × 2-5 cm long, subcoriaceous, 1-2 lobed or undivided, above sparsely dentate, surface glabrescent, veins, margin and base sparsely pubescent. Flowers solitary, nodding, 2.5-3 cm in diam., reddish purple; pedicel 4-6.5 cm long, sparsely pubescent; sepals oblong to oval, 2-3 × 0.8-1.2 cm, abaxial surface sparsely pubescent, margin densely pubescent; staminodes linear-spatulate, 1.5-1.8 cm long, pubescent. Stamens 1-1.5 cm long, filaments and connective pubescent. Ovaries pubescent. Style ca. 8 mm, densely pubescent. Achenes narrowly obovate, 4-5 × 2-3 mm, pubescent; persistent styles ca. 4.5 cm, plumose. Fl. May-June.

Distribution: Restricted to the east face of Mt. Deokhang (Gangwon-do) in Korea; limestone cliffs, alt. 600 to 900 m.

Based on the presence of petaloid staminodes and hairy stamens, *Clematis calcicola* belongs to the sect. *Atragene*. Although *C. calcicola* is morphologically similar to *C. koreana* Kom. that commonly grows in the sub-alpine montane regions of the Korean Peninsula, these two species show distinctive differences in the shape of sepals and leaflets (Table 1).

Clematis calcicola can be found only on the limestone cliffs of Mt. Deokhang (Gangwon-do) at an altitude above 600 m, growing along with other calciphilous plants such as *Abelia coreana* Nakai, *Asplenium rutamurarium* L., *Galium kinuta* Nakai & Hara, *Peucedanum insolens* Kitag., *Sausurea chabyoungsanica* H. T. Im and *Thymus quinquecostatus* Celak. So far, only 20 or so *C. calcicola* have been found in the rocky area on the east face of Mt. Deokhang, but nowhere else in Korea. The growth of individual plants in

Table 1. Distinguished characters among Korean species of sect. *Atragene*.

Characters	<i>C. ochotensis</i>	<i>C. calcicola</i>	<i>C. koreana</i>
Habitat	subalpine forest	limestone region	subalpine forest
Leaves	2-ternate	ternate	ternate
Leaflet texture	cartaceous	subcoriaceous	cartaceous
Leaflet surface	sparsely pubescent	glabrescent (vein, margin, and base sparsely pubescent)	pubescent
Leaflet margin	serrate to denticulate	sparsely dentate	dentate
Sepal color	purple to blue	reddish purple	yellow to red
Sepal length	2.2-4 cm	2-3 cm	2.2-3.8 cm
Sepal apex shape	acuminate or acute	acute	acuminate or acute
Sepal surface	smooth	smooth	wrinkled
Sepal thickness	0.3-0.4 mm	0.7-0.9 mm	0.4-0.5 mm
Sepal base protuberance	absent	nearly absent	present
Pedicel length	7-14 cm	4-6.5 cm	5-12 cm

their natural habitat is greatly depauperated showing very poor seed production, and the natural population seems to be in gradual decline. From these facts it is assumed that this endemic species of the Korean Peninsular is under threat of extinction due to intense vegetational competition and climatic changes going on ever since the last glacial period.

Key to the East Asian species of *Clematis* sect. *Atragene*

- 1. Leaves 2-3-ternate
 - 2. Staminoles (at least outer ones) narrowly lanceolate, nearly as long as sepals, sometimes inner ones linear-spatulate *C. macropetala*
 - 2. Staminoles linear-spatulate, ca. 1/2 as long as sepals
 - 3. Sepals yellow, yellowish, or white, narrowly oblong, oblong, or narrowly ovate, 3-4.5 × 1-1.6 cm *C. sibirica*
 - 3. Sepals purple to blue, narrowly oblong to oblong-obovate, 2.2-4 × 1-2 cm *C. ochotensis*
- 1. Leaves ternate (rarely pinnate)
 - 4. Leaves ternate or pinnate; sepals linear-lanceolate, abaxially velutinous, apex long acuminate *C. moisseenkoi*
 - 4. Leaves ternate; sepals oblong, narrowly elliptic, or ovate, abaxially puberulous, apex obtuse or subacute
 - 5. Flowers 1-3-fasciculate, 4-7 cm in diam.; sepals 3.6-4.5 (-5) cm *C. iliensis*
 - 5. Flowers solitary, ca. 3 cm in diam.; sepals 1.7-2 cm
 - 6. Leaflet blade cartaceous, puberulous, margin dentate; sepals thin, surface wrinkled

- *C. koreana*
- 6. Leaflet blade subcoriaceous, glabrous, margin sparsely dentate; sepals thick, surface smooth
- *C. calcicola*

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