

## ***Corydalis alata*: A new species of *Corydalis* sect. *Corydalis* (Fumariaceae) from Korea**

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### **날개현호색: 한국에서 발견된 현호색속의 1신종**

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**ABSTRACT:** A new species of *Corydalis* L. (Fumariaceae), *C. alata* was discovered in Pohang-si, Gyeongsangbuk-do in Korea and is described and illustrated here. The newly described species *C. alata* is distinct from the closely-related species *C. maculata* by having tubers with whitish inner surface, sagittate base of the lower outer petals, and smaller seeds.

**Keywords:** Fumariaceae, *Corydalis*, new species, *Corydalis alata*

**적 요:** 현호색과 현호색속의 1신종인 날개현호색이 한국의 경상북도 포항시에서 발견되어 기재하고 도해하였다. 날개현호색은 괴경의 내부 표면은 백색이고, 하측 외화판의 기부는 전저이며, 더 작은 종자를 가짐으로써, 이와 근연종인 점현호색과 뚜렷이 구별되었다.

**주요어:** 현호색과, 현호색속, 신종, 날개현호색

The genus *Corydalis* L. (Fumariaceae) is distinguishable from others by having simple or branched racemose inflorescences, zygomorphic flowers with spurred upper petals, flattened stigmata with marginal papillae, and dehiscent capsules with many carunculate seeds (Smith, 1971; Cronquist, 1981; Lidén, 1986, 1993). Over 460 species of this genus are distributed in the temperate northern hemisphere (Zhang et al., 2008). About 25 sections have been recognized within the genus *Corydalis* and the perennial species having a solid tuber with roots at the base are placed in sect. *Corydalis* (Lidén, 1986, 1993). At least 53 species in sect. *Corydalis* are known to be distributed in Western Europe and temperate Asia (Tebbit et al., 2008).

The South Korean taxa of the genus *Corydalis* were recently revised, and 18 species representing 4 sections were recognized (Oh, 1999). Since then 4 new species and 1 unrecorded species of the sect. *Corydalis* have been reported in Korea (Oh and Jang, 2002; Oh et al., 2004; Oh and Choi, 2006; Kim et al., 2007;

Kim et al., 2008).

In this study, the plants, which are characterized by the sagittate base of the lower outer petals are described as a new species *C. alata* B.U.Oh & W.R.Lee under the *Corydalis* sect. *Corydalis*.

### **Taxonomic Treatment**

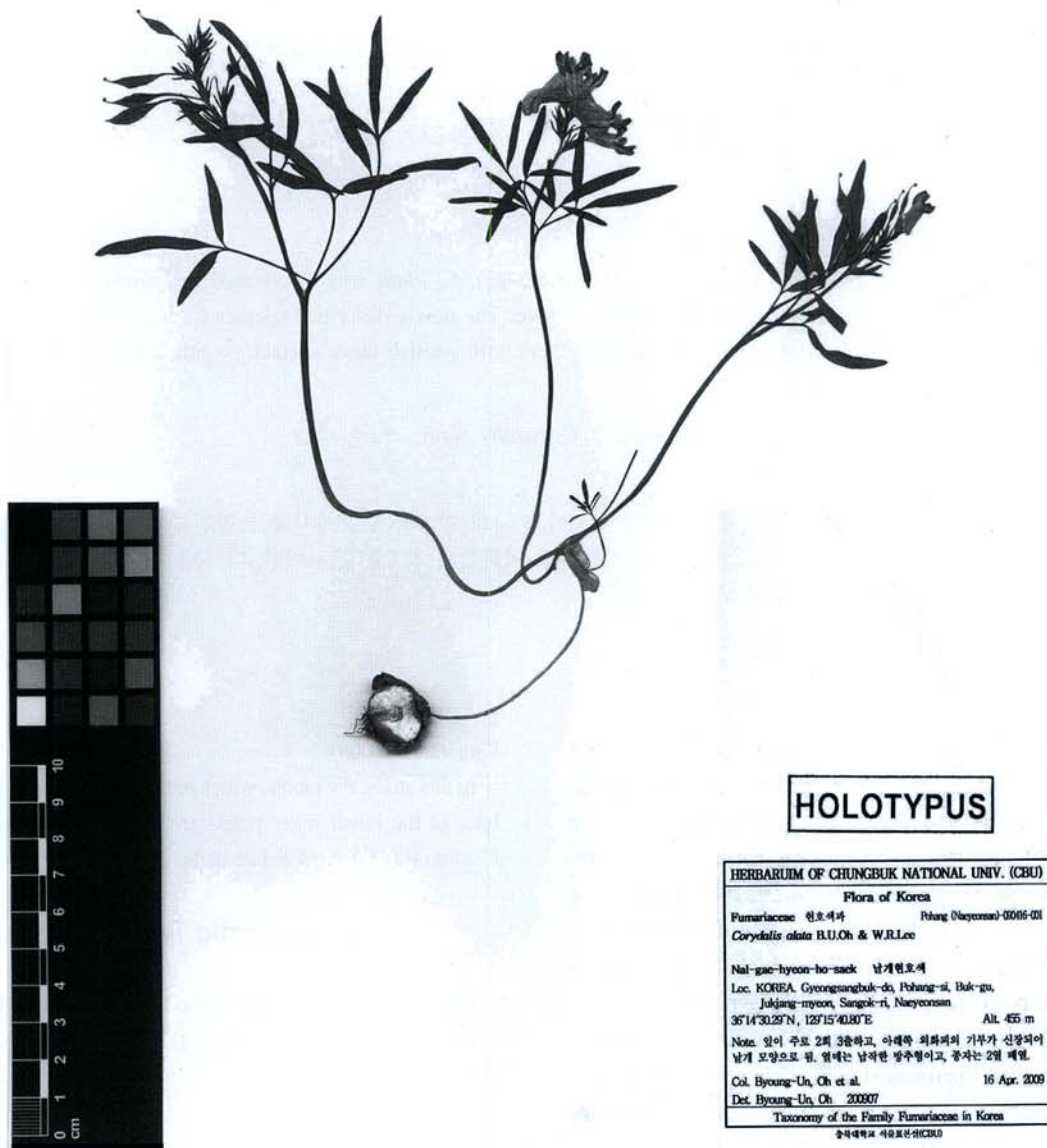
***Corydalis alata*** B.U. Oh & Woo Rak Lee, sp. nov. (Figs. 1, 2, 3)  
Differ a affinis *C. maculata* B.U. Oh & Y.S. Kim, petala exteriora infera basi sagittata

**Holotype:** KOREA. Province Gyeongsangbuk-do, Pohang-si, Jukjang-myeon, Naeyeonsan, alt. 455 m, 36°14'30.29N, 129°15'40.80E, 16 Apr. 2009, B.U. Oh et al, 090416-001 (CBU)

**Isotypes:** CBU

**Herbs** perennial, glabrous. **Rhizome** 1.0–10.0 cm long, with tuber; tuber spherical, 1.0–1.5 cm in diam., inside color of tuber

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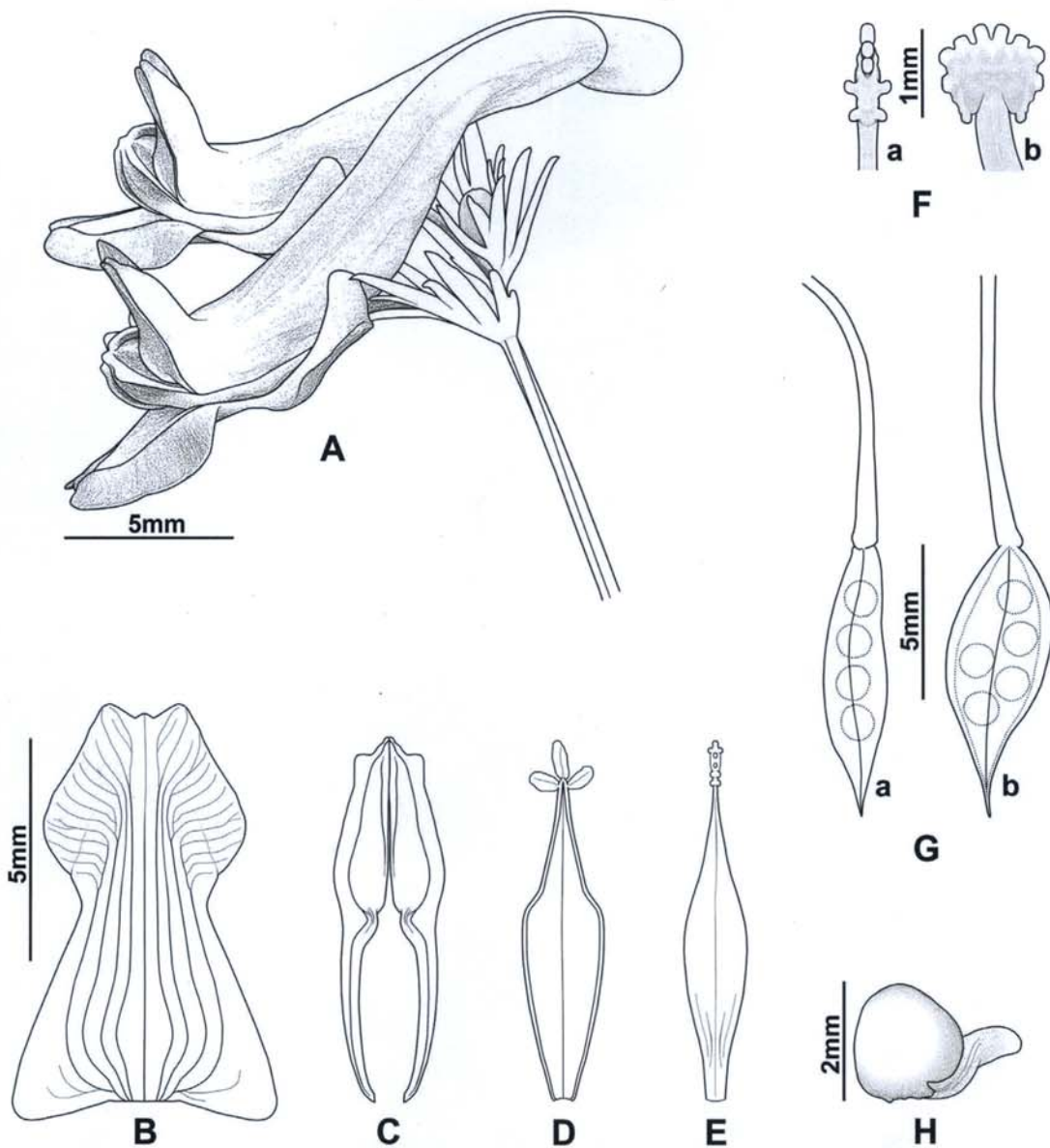
HOLOTYPE

HERBARIUM OF CHUNGBUK NATIONAL UNIV. (CBU)	
Flora of Korea	
Fumariaceae 인호색화	Pihng (Naeyeon)-0006-001
<i>Corydalis alata</i> B.U.Oh & W.R.Lee	
Nal-gae-hyeon-ho-saek 남계현호색	
Loc. KOREA, Gyeongsangbuk-do, Pohang-si, Buk-gu, Jukjang-myeon, Sangok-ri, Naeyeonsan	
36°14'30.25"N, 129°15'40.80"E	Alt. 455 m
Note. 잎이 주로 2회 3출하고, 아래쪽 외화피의 기부가 신장되어 남계 모양으로 됨. 열매는 납작한 방추형이고, 종자는 2개 편열.	
Col. Byoung-Un, Oh et al.	16 Apr. 2009
Det. Byoung-Un, Oh	200907
Taxonomy of the Family Fumariaceae in Korea 충북대학교 생물보존연구소(CBU)	

Fig. 1. Holotype of *Corydalis alata* B.U. Oh & W.R. Lee.

white. **Squamiform leaf** 1, 0.7–2.0 cm long. **Stems** 1–5, originated from the base of squamiform leaf, brownish green, 6.0–25.0 cm long, 1.2–1.8 mm in diam. **Cauline leaves** 2, pale green to green, adaxial surface of leaves rarely with white spots; petioles,

1.5–6.0 cm long; blade ternate or biternate; leaflets entire, oblong to lanceolate, 0.9–6.5 cm long, 0.1–1.0 cm wide. **Inflorescences** terminal, racemes, flowering from March to April; bracts usually flabellate, 4.7–11.8 mm long, 2.8–10.3 mm wide, lobate or cleft

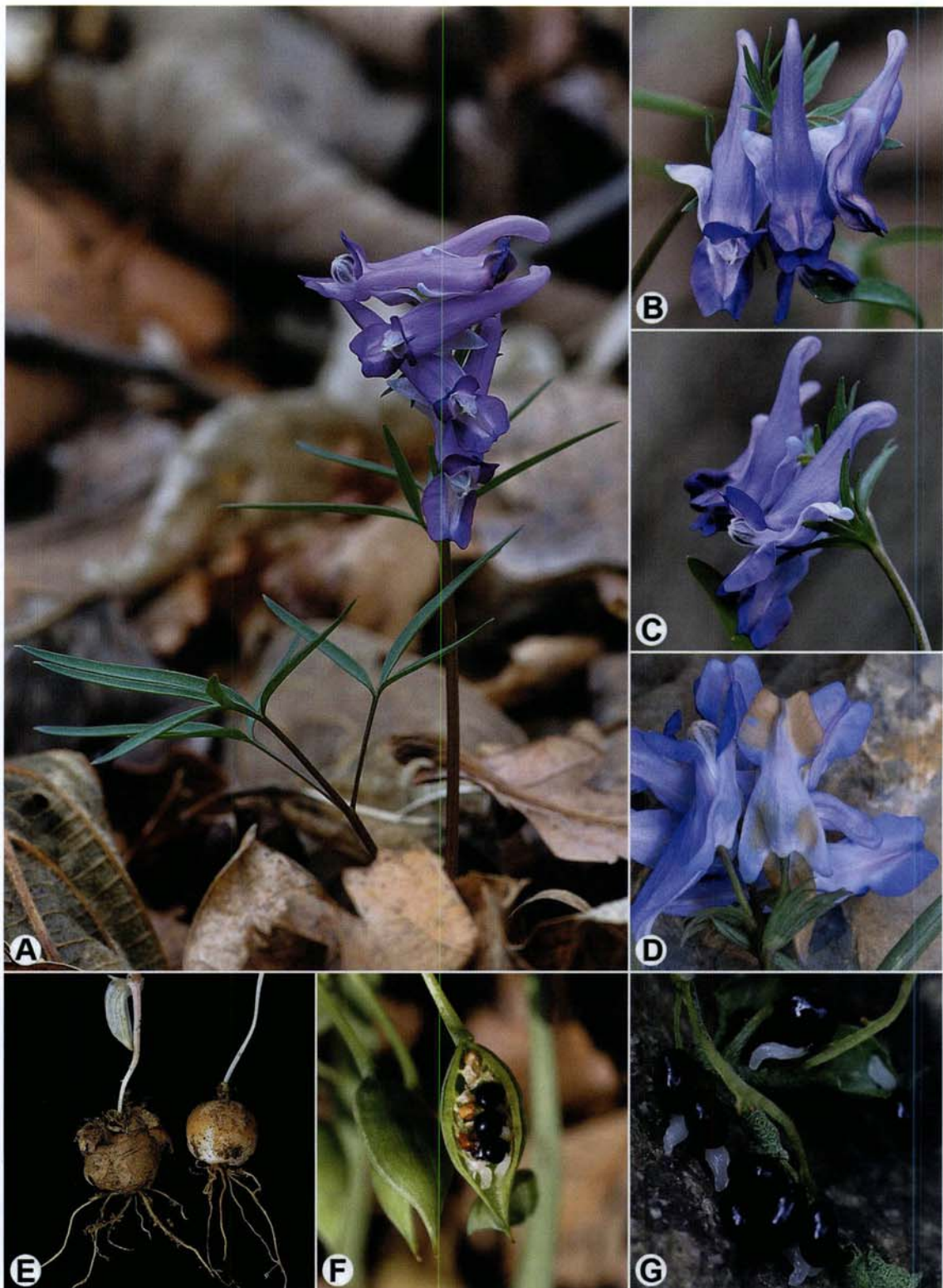


**Fig. 2.** Illustration of *Corydalis alata* B.U. Oh & W.R. Lee. A. Flowers and bracts; B. Lower part of outer petal; C. Inner petals with obtuse apex; D. Membranous stamen; E. Ovary; F. Stigma with 14 papillae (a. Lateral view, b. Front view); G. Fusiform capsule and seed arrangement H. Carunculate seed.

to parted at apex; pedicels 2.7–8.3 mm long when flowering, 6.8–20.0 mm long when fruiting. **Flowers** 2–11, whitish blue to purple; outer petal 2, upper one 1.5–2.7 cm long, apex emarginate with mucro; spur cylindrical, slightly downcurved, 1.0–1.7 cm long; lower one 0.8–1.5 cm long, base sagittate; inner petal 2, 7.0–9.0 mm long, obtuse at apex. **Stamens** 2; filaments membranous, 6.6–8.0 mm long; anthers ca. 0.8 mm long. **Pistil** 1; ovary fusiform, 6.5–8.8 mm long; stigma with 14 papillae, 1.1–1.4 mm wide. **Fruits** capsule, flat, fusiform, 8.5–20.0 mm long, 3.4–5.0 mm wide. **Seeds** black, glossy, flat, circular, 1.8–2.0 mm long, 1.4–1.9 mm wide, with caruncle, arranged in two rows in a capsule.

**Korean name:** 날개현호색(Nal-gae-hyeon-ho-saek)

*Corydalis alata* can be included in *Corydalis* sect. *Corydalis* since it is a perennial species with tubers. *C. alata* is characterized by the sagittate base of the lower outer petals. This type of characteristic sagittate base has previously not been reported in the plants within sect. *Corydalis* occurring in Western Europe and temperate Asia. *C. alata* is also distinguishable from the closely-related species *C. maculata* (Kim and Oh, 1987) based on characteristics such as the whitish inner surface of tubers, a few or no white spots on the adaxial surface of leaves, the



**Fig. 3.** Photographs of *Corydalis alata* B.U. Oh & W.R. Lee. A. Habit; B–D. Flowers (B. Dorsal view, C. Lateral view, D. Basal view); E: Rhizomes; F. Fruits; G. Seeds.

sagittate base of the lower outer petals, and smaller seeds. This species mainly grows underneath trees of the genus *Quercus*

in valleys of Mt. Naeyeon-san, Pohang-si in Gyeongsangbuk-do, and the soil components of their habitats contain moist leaf molds.

**Table 1.** Comparison of major characters between *C. alata* and *C. maculata*.

Characters		<i>C. alata</i>	<i>C. maculata</i>
Rhizome	length	1.0–10.0 cm	1.0–9.0 cm
Tuber	color of inner surface	white	yellow
	diameter	1.0–1.5 cm	1.0–2.0 cm
Stem	color	brownish green	brownish green
	length	6.0–25.0 cm	8.0–25.0 cm
Leaf	spots	absent or rarely a few	usually many white spots
Bract	shape	flabellate	obovate
	length	4.7–11.8 mm	7.0–15.0 mm
	apex	parted	cleft
Pediceal	length	6.8–20.0 mm when fruiting	6.0–15.0 mm when fruiting
Flower	number	2–11	3–18
	lower outer petal base	sagittate	rounded
Stigma	number of papillae	14	14
Capsule	shape	flattened fusiform	flattened fusiform
	length	8.5–20.0 mm	9.0–28.0 mm
Seed	arrangement	in two row	in two row
	length	1.8–2.0 mm	2.1–2.3 mm
	width	1.4–1.9 mm	2.1–2.2 mm

*C. alata* is also accompanied by other species such as *Allium monanthum*, *Asarum sieboldii*, and *Corydalis remota*. The five species of *Corydalis* sect. *Corydalis* can be classified using the following key.

#### Key to the five species of *Corydalis* sect. *Corydalis*

1. Capsules broadly linear; seeds in 1 row ..... *C. ambigua*
1. Capsules flattened fusiform; seeds in nearly 2 row.
  2. Sepals oval, 3.0–5.0 mm long, apex rake-like ..... *C. grandicalyx*
  2. Sepals aborted.
    3. Stems pubescent; peduncles pubescent .... *C. hirtipes*
    3. Stems glabrous; peduncles glabrous.
      4. Inner surface of tubers yellow; adaxial surface of leaves usually with many white spots; lower outer petals rounded at base ..... *C. maculata*
      4. Inner surface of tubers white; adaxial surface of leaves with a few or no white spots; lower outer petals sagittate at base ..... *C. alata*

#### Acknowledgement

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