



A new species of *Paraphlomis* (Lamiaceae) from Korea: an additional genus to the Korean flora

SUNG CHUL KO¹, YOU-MI LEE², KYONG-SOOK CHUNG³, DONG CHAN SON¹, BO MI NAM⁴ & GYU YOUNG CHUNG^{4,5}

¹Department of Biological Sciences and Biotechnology, Hannam University, Daejeon 305-811, Korea.

²Korea National Arboretum, Pocheon-si, Gyeonggi-do 487-829, Korea.

³Department of Medicinal Plant Science, Jungwon University, Goesan, Chungbuk 367-805, Korea.

⁴School of Bioresource Science, Andong National University, Andong, Gyeongbuk 760-749, Korea.

⁵E-mail gychung@andong.ac.kr

Abstract

A new species, *Paraphlomis koreana* S.C.Ko et G.Y.Chung, from Korea is described and illustrated. The species is similar to *P. albida* Hand.-Mazz. in general vegetative characters and white corollas, but the new species is distinguished by its smaller stature, equally toothed 10-veined calyces, and pink-spotted lower corolla lips. *P. koreana* S.C.Ko et G.Y.Chung has been only found in Bogil-do Island, a small island in the Southern Ocean of Korea, and is the first species described from the genus in Korea.

Key words: *Paraphlomis koreana*, Flora of Korea, Lamiaceae

Introduction

Paraphlomis (Prain 1901: 60) Prain (1908: 721) is a genus of about 24 species in the mint family Lamiaceae (Li & Hedge 1994). The genus occurs only in East Asia including China, India, Indonesia, Laos, Myanmar, Thailand, and Vietnam with the greatest diversity in China with 23 species, and most species occupy geographically narrow areas (Li & Hedge 1994). The species are characterized with erected galeate corollas with longer upper lips than lower lips, rounded, bearded upper corolla lips, 5-toothed calyces, and subequally two-cleft style apices (Prain 1901, Azizian & Moore 1982, Li & Hedge 1994). During extensive field surveys for floristic research in Bogil-do Island, located in the Southern Ocean in Korea, we collected an unidentifiable mint species. After examining the various floras and herbarium specimens of Korea and adjacent countries, we concluded the collected specimens have not been recorded before. We describe a new species in *Paraphlomis*, which is also the first description of a *Paraphlomis* species from Korea.

Paraphlomis koreana S.C.Ko et G.Y.Chung, *sp. nov.* (Fig.1 A–I)

TYPE:—KOREA. Province Jeollanam-do: Wando-gun, Bogil-myeon (Bogil-do Island), Buyong-ri, Jeokjabong, 34.140°N, 126.551°E, 320 m, 3 June 2011, *G. Y. Chung and S. C. Ko 11060301* (holotype, HNHM; isotype, 5 sheets, KH, ANH).

Herbs with tuberoids, perennials; stems solitary, erect or somewhat ascending, 8–20 cm tall, branched occasionally, densely white villous. Leaves simple, leaf blades elliptic to ovate, 0.6–2.2 cm wide, 0.6–4.0 cm long, somewhat leathery, both adaxial and abaxial surfaces densely white villous, sparsely glandular, margins irregularly crenate or serrate, apices obtuse or rounded, bases acute, round or subtruncate; petioles 0.15–1.6 cm long, not winged. Inflorescences axillary, verticillasters 4–6-flowered; bracts leaf-like, present or absent, bracteoles lanceolate, ca. 0.5 cm long, fimbriate or ciliolate. Pedicels short to obsolete. Calyces obconical, 1.0–1.2 cm long, densely fine strigose, conspicuously 10-veined, 5-cleft, equally toothed, narrowly triangular, acuminate, 0.5–0.6 mm long, puberulent. Corollas galeate, ca. 1.5 cm long, white, pink-spotted lower lips; tubes erect, cylindric, pilose; upper lips spatulate, slightly concave, entire, densely pilose outside; lower lips horizontally spreading, 3-lobed, middle lobes widely ovate, emarginated, undulate,

lateral lobes oblong, entire. Stamens 4, anterior 2 longer; filaments filiform, pubescent; anther cells 2, parallel. Style apices subequally 2-cleft, lobes subulate. Ovary apices truncate, glabrous. Nutlets oblong, ca. 0.2 cm long, triquetrous, glabrous. Fl. May–June. Fr. June–July.

Distribution and habitat:—Bogil-do Island (Pro. Jeollanam-do, South Korea). 320 m Alt. Forest.

Korean name:—Sokdanajaebi (속단아재비, 속단아재비속).

Additional specimens examined:—No previous collections found.

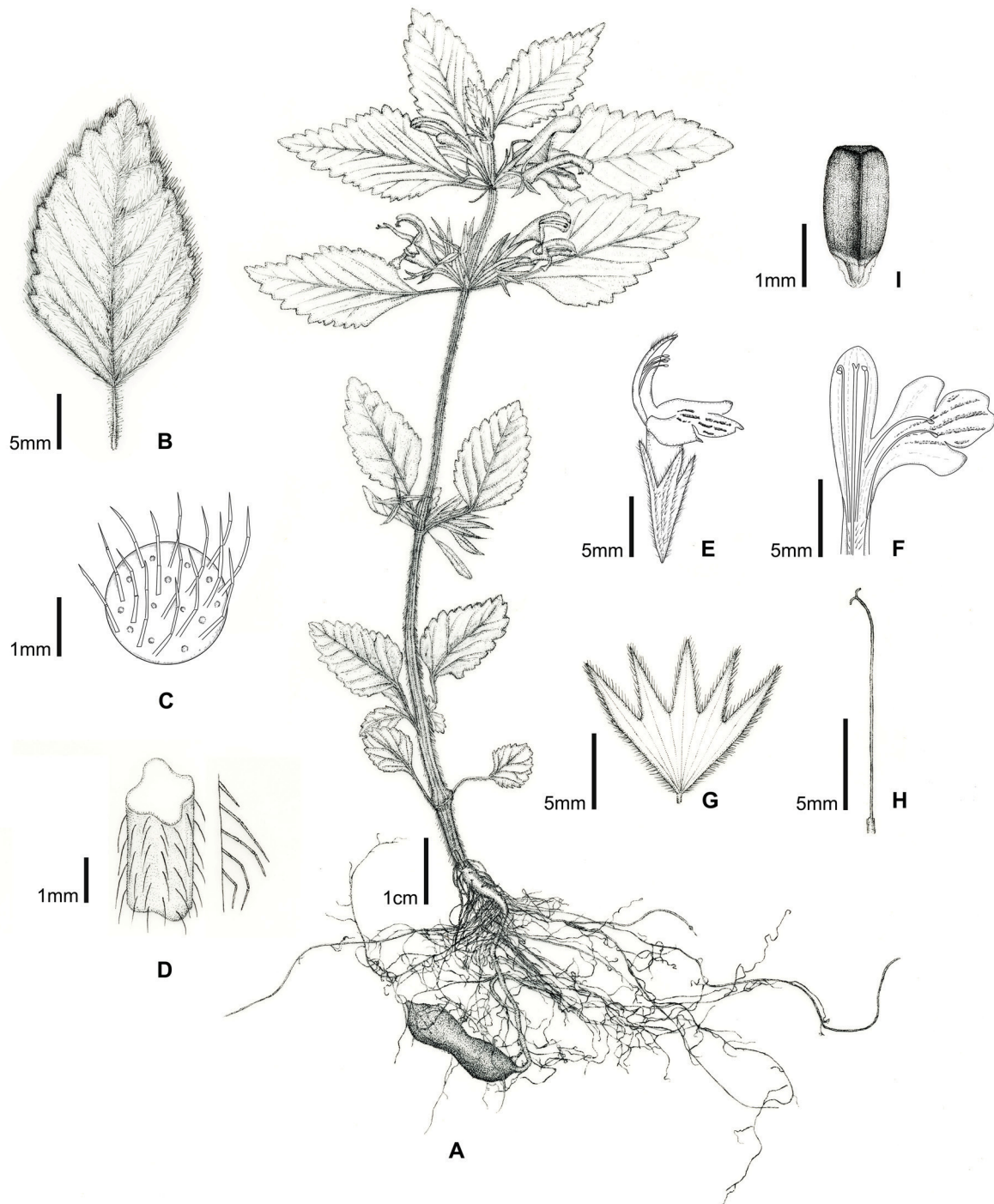


FIGURE 1. *Paraphlomis koreana* S.C.Ko et G.Y.Chung. **A.** Habit. **B.** Leaf (adaxial surface). **C.** Magnified adaxial leaf surface (multicellular and pellucid glandular trichomes). **D.** Stem (squared cross-section surface). **E.** Corolla. **F.** Open calyx (abaxial). **G.** Open corolla. **H.** Pistil. **I.** Nutlet. Drawn from the holotype *G. Y. Chung and S. C. Ko 11060301* (HNHM).

Comparison:—*Paraphlomis koreana* is easily distinguished from other *Paraphlomis* species by small sized individuals and pink-spotted lower lips of corollas. Morphological characters of the species resemble *P. albida* Hand.-Mazz. (1936: 922), including the white corolla and obconical-shaped calyces. However, the new species lacks winged petioles, has lanceolate-shaped bracteoles, 10-veined calyces, and pink-spotted corollas, whereas *P. albida* possesses winged petioles, subulate-shaped bracteoles, 5-veined calyces, and lacks spotted corollas (Table 1). *P. formosana* (Hayata 1906: 318) T.H.Hsieh & T.C.Huang (1995: 15) also has spots on corollas, but the species has lanceolate-shaped leaf blades with winged petioles and white or yellow-colored corollas. In common, the new species and *P. lancidentata* Y.Z.Sun (1935: 30) both have 10-veined, obconical-shaped calyces. However, *P. lancidentata* greatly differs in plant sizes and flower numbers per inflorescence, missing spots on corollas. Morphologically similar individuals to the new species have been collected in China, but spots on corollas are not observed in these plants (Chunlei Xiang, pers. comm.). Additionally, we failed to find any herbarium specimens and descriptions matching the newly named *P. koreana* from Bogil-do Island. Therefore, we report *Paraphlomis koreana* as a new, independent species. The species might be derived from *P. albida* distributed in middle China and Taiwan or a relict species. The species might have downsized as an adaptation to island environments.

Etymology:—The specific epithet of the new species refers to the originally observed locality and the endemism in Korea.

Phenology:—Flowering in May to June; fruiting in June to July.

TABLE 1. A comparison of key features of the new species and three *Paraphlomis* species.

Species	Height (cm)	Leaf shape, size (cm)	Bracteole shape	Verticillaster flower number	Calyx shape, teeth	Corolla color, spot
<i>P. koreana</i>	8–20	Elliptic to ovate, 0.6–4.0 × 0.6–2.2, petioles not winged	Lanceolate	4–6	Obconical, conspicuously 10-veined, teeth equal	White, pink-spotted lower lips
<i>P. albida</i>	30–60	Ovate, 4–9 × 2.5–4.5, petioles winged	Subulate	2–8	Obconical, conspicuously 5-veined, teeth triangular, subulate, acute	White or tinged purple, no spot
<i>P. formosana</i>	100	Lanceolate, 5–10 × 1.7–3.3, petioles narrowly winged	Subulate (minute or obsolete)	(2–)4–8(–12)	Obconical, 10-veined, teeth subulate	White or yellow, purple-spotted lower lips
<i>P. lancidentata</i>	100	Ovate, 10–16 × 4–7, petioles winged or not	Subulate	(4–)6–13	Obconical, conspicuously 10-veined, teeth equal	Yellow or white, no spot

Acknowledgments

We thank Dr. Chunlei Xiang at the Kunming Institute of Botany for early identification and providing Chinese references. So Young Lee and Jong Cheol Yang at the Korea National Arboretum helped for preparation of line drawing and type specimen materials. This study was carried out through by the research projects: The Basal study for secure sovereignty over Korean native plants (Project no.: S111111L040000) from the Korea Forest Service, and the research fund from Hannam University (2014).

References

- Azizian, D. & Moore, D.M. (1982) Morphological and palynological studies in *Phlomis* L., *Eremostachys* Bunge and *Paraphlomis* Prain (Labiatae). *Botanical Journal of the Linnean Society* 85: 225–248.
<http://dx.doi.org/10.1111/j.1095-8339.1982.tb00372.x>
- Handel-Mazzetti, H.R.E. (1936) *Paraphlomis* Prain. *Symbolae Sinicae* 7: 921–922.
- Hayata, B. (1906) Verbenaceae. *The Journal of the College of Science, Imperial University of Tokyo, Japan* 22: 297–320.

- Hsieh, T.-H. & Huang, T.-C. (1995) Notes on the flora of Taiwan (19)—*Paraphlomis formosana* (Hay.) Hsieh&Huang, Comb. Nov. (Lamiaceae). *Taiwania* 40: 13–19.
- Li, X.W. & Hedge, I.C. (1994) *Paraphlomis*. In: Wu, Z.Y. & Raven, P.H. (Eds.) *Flora of China*. Missouri Botanical Garden Press, St. Louis, vol. 17., pp. 170–177.
- Prain, D. (1901) *Paraphlomis* Prain. *Annals of Royal Botanical Gardens* 9: 59–60.
- Prain, D. (1908) *Paraphlomis* Prain. *Journal of the Asiatic Society of Bengal, Part 2, Natural History* 74: 721.
- Sun, Y.Z. (1935) Two new Labiates from Chekiang. *Contributions from the Biological Laboratory of the Science Society of China. Botanical Series* 10: 29–34.