

## *Sium ternifolium* (Apiaceae), a new species from Korea

Byoung-Yoon Lee and Sung-Chul Ko<sup>1\*</sup>

Division of Vascular Plants, National Institute of Biological Resources, Incheon 404-170, Korea

<sup>1</sup>Department of Biological Sciences, Hannam University, Daejeon 305-811, Korea

### 개발나물속 1신종(미나리과), 세잎개발나물

이병윤 · 고성철<sup>1\*</sup>

국립생물자원관 고등식물연구과, <sup>1</sup>한남대학교 생명과학과

**ABSTRACT:** A new species of Apiaceae, *Sium ternifolium* from Mt. Chiak-san National Park, Gangwon-do province, Korea, is described and illustrated. This new species is closely related to *S. serra* (Fr. & Sav.) Kitag., having such characters as long acuminate apex of leaflets, 3-6 slender rays, but distinguished from the latter by its lower height, the absence of involucre bracts, and tri-foliate leaves.

**Keywords:** Apiaceae, Umbelliferae, *Sium*, *Sium ternifolium*, new species

**적 요:** 한국의 강원도 치악산의 산림에서 발견된 개발나물속 1 신종인 세잎개발나물 (*Sium ternifolium* B.Y. Lee & S.C. Ko)을 기재하고 도해하였다. 세잎개발나물은 긴 점첨두의 엽선, 연약한 3-6개의 소산경과 같은 공유 형질을 가지고 있어 일본에 자생하는 *S. serra* (Fr. & Sav.) Kitag.와 유사하나 키가 작고, 총포가 없으며 모든 잎이 3개로 갈라지는 특징에 의해 쉽게 구별된다.

**주요어:** 미나리과, 산형과, 개발나물속, 세잎개발나물, 신종

In the genus *Sium* L. belonging to the tribe Oenanthe Dumort. of the family Apiaceae (Hardway et al., 2004), about 14 recognized species often live in moist to wet areas (Pimenov and Leonov, 1993). Among them, a couple of species have been reported in Korea, *S. suave* Walter and *S. ninsi* L. (Lee, 1980; Lee, 2007). The latter is considered an ancestor of *S. sisarum* L. that was widely cultivated once for its tuberous roots rich in carbohydrates (Spalik and Downie, 2006). *S. suave* is distinguished from *S. ninsi* by the presence of stout rays, seven to eleven leaflets, and broader leaflets (Ohwi, 1965). In addition to these two species, an unknown species of *Sium* was found from Mt. Chiak-san National Park, Gangwon-do Province, Korea. This new one can easily be distinguished from other related Korean taxa by the presence of only tri-foliate leaflets and the absence of involucre bracts. In general appearance, this one is rather similar to a Japanese species, *S. serra* (Fr. & Sav.) Kitag., but quite different in numbers of leaflets. The new species, from Korea, is here described and illustrated. (Fig. 1, Fig. 2)

\*Author for correspondence: kscaa@hannam.ac.kr

### Taxonomic Treatment

*Sium ternifolium* B.Y. Lee & S.C. Ko, sp. nov. Type: KOREA. Gangwon-do Province, Wonju-si city, understory in the forests of *Carpinus laxiflora* and *Betula chinensis*, near stream, alt. 480–495 m, 20 Aug. 2009, S.C. Ko 064185 (holotype: HNHM; isotypes: HNHM, 2 sheets; KB, 2 sheets; NH, 1 sheet). Fig. 1.

Herbae perennes, erectae, glabrae, raro ramosus, 20-50 cm altus; folia totus ternatus, petiolis glabris 10 cm. longis, vaginantes; foliolis sessilibus, longiacuminatus, serrulatus; umbellae paucae, pedunculus elongatus, radii 3-6, subaequalis, involucri bracteae nullum, involucrellum bracteolis 2-3 brevissimis ornatum, pedicellis plerumque brevioribus, tenuibus, 0.5-2 cm. longis.

Herbs perennial, glabrous; roots fibrous at first node, and branched and thickened at second node; stems erect, rarely branched, 20-50 cm high; all leaves ternately tri-foliate, rarely simple at the low stem, radical leaves sheathing the stem, leaflets ovate, acuminate, lower cauline leaves petiolate, petiole



Fig. 1. Holotype of *Sium ternifolium* B. Y. Lee & S. C. Ko.

5-11 cm long, sheathing the stem, margin membranaceous, the leaflets sessile, long acuminate, minutely serrulate, terminal leaflet ovate to broad-lanceolate, lateral leaflets smaller than the terminal one, subequal at its base, the upper leaves small,

short-petiolate, leaflets lanceolate; umbels few, delicate, irregular, lateral and terminal, the involucrel bract none (rarely present, filiform when present), rays 3-6 (rarely 2), very slender, 0.5-2 cm long, subequal, involucrel bractlets 2-3, filiform, 1 mm

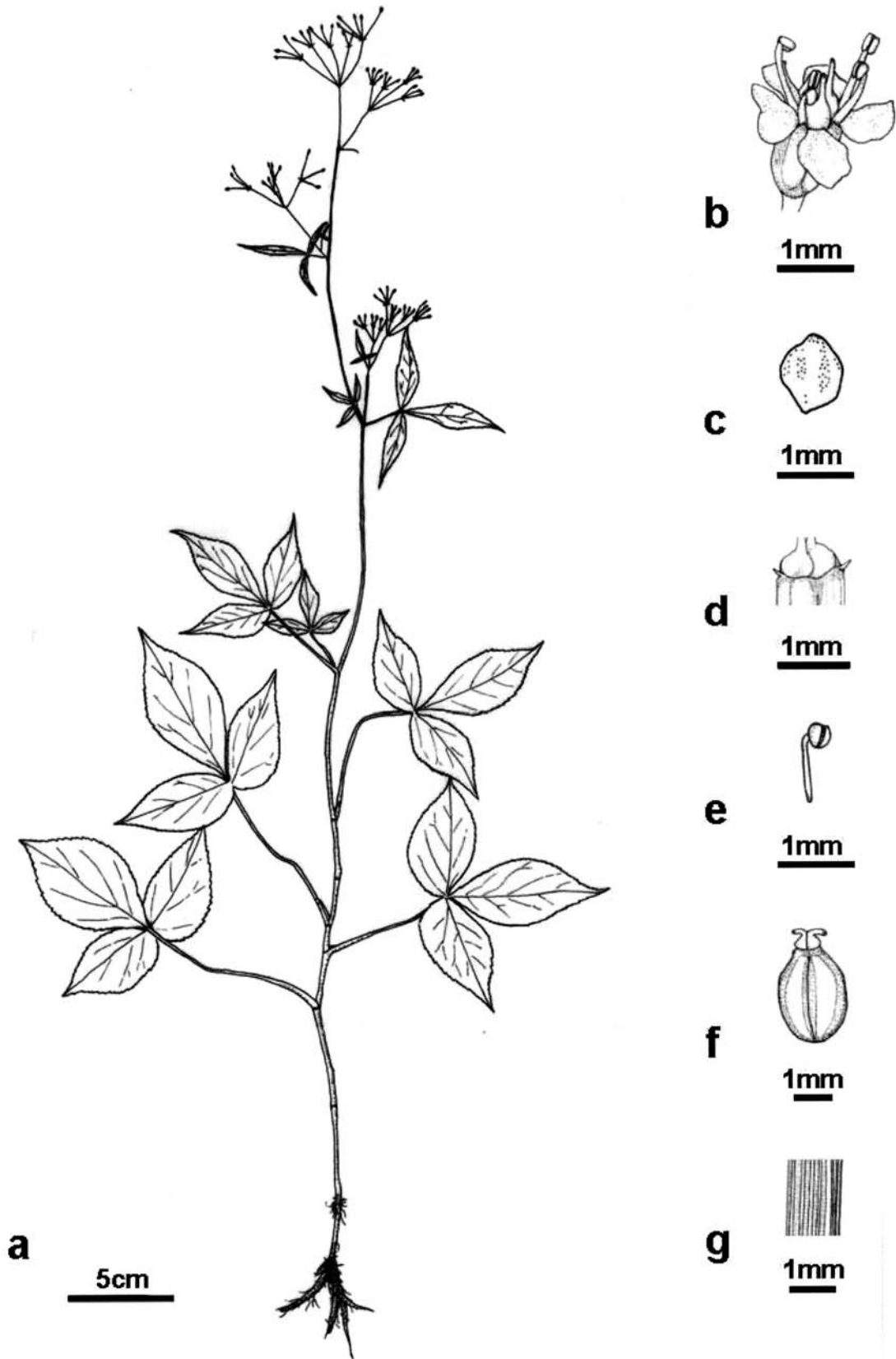


Fig. 2. Drawings of *Sium ternifolium* B.Y.Lee & S.C.Ko : a, habit; b, flower; c, petal; d, sepals; e, stamen; f, fruits; g, stem.

**Table 1.** Diagnostic characters among Korean species of *Sium* and close relatives.

Characters	<i>S. suave</i>	<i>S. ninsi</i>	<i>S. serra</i>	<i>S. ternifolium</i>
Stem height	60-120 cm	30-80 cm	60-80 cm	20-50 cm
Stem branch	branched	branched	branched	rarely branched
Leaf dissection (lower cauline)	pinnate	pinnate	pinnate	ternate
Leaf dissection (upper cauline)	pinnate	ternate	ternate	ternate
Apex of leaflet	acuminate	acuminate	long acuminate	long acuminate
Involucral bracts	several	several	single	none
Rays	stout	slender	slender	slender
Number of rays	7-12	about 10	2-6	2-6
Involucral bractlets	several, deflexed	several, deflexed	several, deflexed	several, non-deflexed

long, much shorter than pedicels, not deflexed in flowering, the pedicels 2-5 (rarely single), very slender; calyx teeth elongated, persistent in fruiting, petals white, outer ones emarginate and incurved at apex; stamens 5, versatile, 2-locular; ovary half-inferior, 2-locular; styles elongated, 1.5 times longer than conical stylopodium; fruits ovoid, 2-3 mm long, glabrous, mericarps laterally compressed, ribs 5, obtuse, thick, 3 on the dorsal, 2 at the lateral, vittae numerous; seeds nearly orbicular in cross section, with a nearly flat face. Fl. Aug.

Korean name: **세잎개발나무 (Se-ip-gae-bal-na-mul)**

Distribution: Korea (Mt. Chiak-san, Gangwon-do Province), endemic

*Sium ternifolium* is considered endemic to Korea, compared with Japanese and Chinese species within the genus *Sium*. So far, about 70 individuals of *Sium ternifolium* have been found in the shady and wet areas on Mt. Chiak-san, Gangwon-do Province, growing along with *Oplismenus undulatifolius* (Ard.) Roem. & Schult., *Galium dahuricum* Turcz., *Viola diamantiaca* Nakai, *Clematis apiifolia* DC., *Staphylea bumalda* DC., *Morus bombycis* Koidz., *Fraxinus mandshurica* Rupr., *Carpinus laxiflora* (Siebold & Zucc.) Blume, and *Betula chinensis* Maxim.. *S. ternifolium* is similar to *S. serra* in characters such as long acuminate apex of leaflets, numbers of very slender rays (3-6), but distinguished by characters such as trifoliate leaflets, stem height less than 50 cm long, non-branched stems, and even sequences of nuclear ribosomal DNA regions (B. Lee et al., unpubl. data).

*S. serra* occurs in Japan and China, but treatment of the species is quite different by authors in the two countries. In Japanese flora, the species has been treated as a member of *Sium* L. since Kitagawa transferred the species from *Pimpinella* to *Sium* (Kitagawa, 1941; Ohwi, 1965; Ohba, 1999). However, Chinese authors who do not follow Kitagawa's transfer still

retain the species as a member of the genus *Pimpinella*, treating it as *P. serra* Fr. & Sav. (Pu, 1985; Pu and Watson, 2005). From the herbarium specimens of Chinese *P. serra* (PE00744575, PE00744576) loaned from the Beijing Botanical Garden (PE), we found that this one is strikingly similar to Korean *S. ternifolium* by the presence of all trifoliate leaves, long acuminate leaflet apex, but different from Japanese *S. serra*. Although just a couple of specimen sheets are not enough to observe all the morphological characters of Chinese *P. serra* in detailed, the species is distinguished clearly from Korean *S. ternifolium* by the presence of clearly petiolated terminal leaflets. Except for the character above, *S. ternifolium* and *P. serra* are almost identical. Therefore, the taxonomic position and rank of the Chinese *P. serra* (treated as *S. serra*) is urgently needed.

**Key to the species of Korean *Sium* L. and their related species**

1. Number of rays 7-12, apex of leaflets acuminate.
  2. Upper cauline leaves dissected pinnately, rays stout ..... *S. suave*
  2. Upper cauline leaves dissected ternately, rays slender ..... *S. ninsi*
1. Number of rays 2-6, apex of leaflets long acuminate.
  3. Stems branched above, lower cauline leaves dissected pinnately, involucral bracts present, bractlets deflexed ..... *S. serra*
  3. Stems rarely branched, all leaves dissected ternately, involucral bracts absent, bractlets non-deflexed ..... *S. ternifolium*

**Acknowledgement**

This research was supported by grants in part from Hannam university (Project No: HNU2009), in part from the project

(2009) on survey and excavation of Korean indigenous species of the National Institute of Biological Resources (NIBR) under the Ministry of Environment, Korea. The authors extend deep appreciate to PE and TI for their loan of valuable specimens.

### Literature Cited

- Hardway, T. M., K. Spalik, M. W. Watson, D. S. Katz-Downie, and S. R. Downie. 2004. Circumscription of Apiaceae tribe Oenantheae. *South African J. Botany* 70: 393-406.
- Kitagawa, M. 1941. Miscellaneous notes on Apiaceae (Umbelliferae) of Japan and Manchuria (IV). *J. Jap. Bot.* 17: 557-562.
- Lee, B. Y. 2007. *Sium* L. In *The genera of vascular plants of Korea*. Park, C.-W. (ed.), Academy Publishing Co., Seoul. Pp. 753-754.
- Lee, T. B. 1980. *Illustrated flora of Korea*. Hyangmoonsa, Seoul. P. 584 (in Korean).
- Ohba, H. 1999. Umbelliferae. In *Flora of Japan*, vol. 2c. Iwatsuki, K. et al. (eds.), Kodansha, Tokyo. Pp. 268-303.
- Ohwi, J. 1965. *Flora of Japan*. Smithsonian Institution. Washington D. C. Pp. 676-677.
- Pimenov, M. J. and M. V. Leonov. 1993. The genera of the Umbelliferae. Royal Botanic Gardens, Kew. P. 105.
- Pu, F. 1985. *Pimpinella* L. In *Flora Republicae Popularis Sinicae*, vol. 55. no. 2. Academica Sinica, Beijing. Pp. 67-114.
- Pu, F. and M. F. Watson. 2005. *Pimpinella* Linnaeus. In *Flora of China*, Vol. 14. She et al. (eds.), Missouri Botanical Garden, St. Louis. Pp. 93-104.
- Spalik, K. and S. R. Downie. 2006. The evolutionary history of *Sium* sensu lato (Apiaceae): dispersal, vicariance, and domestication as inferred from ITS rDNA phylogeny. *Amer. J. Bot.* 93: 747-761.