

Pternopetalum monophyllum (Apiaceae), a new species from Sichuan, China

Jin-Bo Tan¹, Zhi-Xin Wang^{1,2}, Hao-Yu Hu¹ & Xing-Jin He^{1,*}

¹ Key Laboratory of Bio-Resources and Eco-Environment of Ministry of Education, College of Life Sciences, Sichuan University, 610065 Chengdu, Sichuan, China (*corresponding author's email: xjhe@scu.edu.cn)

² Department of Life Science, Hengyang Normal University, 421008 Hengyang, Hunan, China

Received 23 June 2014, final version received 5 Oct. 2014, accepted 22 Oct. 2014

Tan, J. B., Wang, Z. X., Hu, H. Y. & He, X. J. 2014: *Pternopetalum monophyllum* (Apiaceae), a new species from Sichuan, China. — *Ann. Bot. Fennici* 51: 414–418.

Pternopetalum monophyllum J.B. Tan & X.J. He *sp. nova* (Apiaceae) from Sichuan Province, China is described and illustrated. The differences between *P. monophyllum* and the two morphologically most similar species *P. molle* and *P. botrychioides* are presented and briefly discussed.

The East Asian genus *Pternopetalum* (Apiaceae) is distributed from Japan and South Korea to China and the adjacent Himalayan regions, with a diversity and endemism center in southwest China, particularly in Sichuan and northwest Yunnan (Shan & Pu 1978, Pu 1985, Pan 1997, Shu & She 2001, Pu & Phillippe 2005). It is characterized by the petals being saccate at base, the umbellules usually with only 2–4(–5) flowers, and by the reflexed styles and rays in fructescence. Considered a monophyletic group, *Pternopetalum* consisted of approximately 20–32 species before 2007 (Shan & Pu 1978, Pu 1985, Valiejo-Roman *et al.* 2002, Pimenov & Leonov 2004, Pu & Phillippe 2005, Wang 2007). After a series of revisions, Wang (2008a, 2008b, 2012) recognized only 15 species in the genus.

During an investigation on the Erlang Mountain in Sichuan Province in May 2012, an intriguing *Pternopetalum* specimen with fruits was collected. In April 2013, we went back to the locality and collected flowering specimens. After thorough consultation of the relevant literature

and herbarium specimens, as well as comparing this species to morphologically similar ones by means of scanning electron microscopy (SEM), we concluded that the Erlang Mountain specimens represented a hitherto undescribed species.

Both living plants and herbarium specimens were studied. The measurements of the morphological features were conducted using a micrometer and a stereomicroscope.

Mature seeds of the undescribed species and two most morphologically similar species, *P. molle* and *P. botrychioides*, were collected from the wild. Considering the morphological similarity, seeds of *P. botrychioides* were specifically collected from the locality where we found the undescribed species. For SEM, after dehydration using graded ethanol, seeds from the fresh material were directly mounted on aluminum stubs using conducting carbon adhesive tabs, sputter-coated with gold, and observed using a JSM-7500F scanning electron microscope (Japan). The micromorphological characters (Fig. 1) were described according to Liu *et al.* (2004).

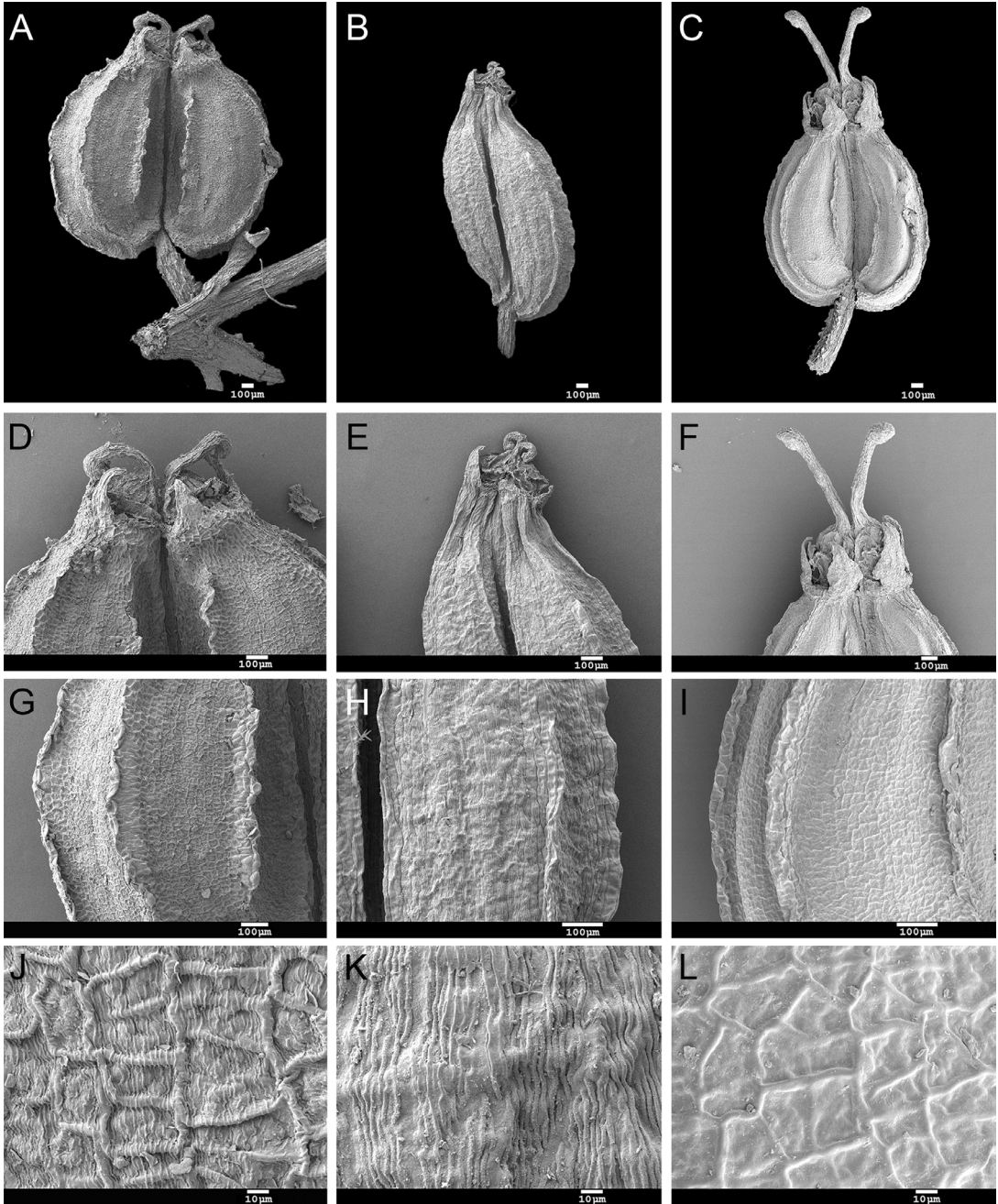


Fig. 1. Micromorphological characters of *Pternopetalum monophyllum* (A, D, G, J; from the paratype), *P. molle* (B, E, H, K; from *J.B. Tan T2013062613*, SZ) and *P. botrychioides* (C, F, I, L; from *J.B. Tan & H.Y. Hu T2012052510*, SZ). — A–C: Fruit. — D–F: Stylopodium and style. — G–I: Ribs. — J–L: Ornamentation of seed coat.

***Pternopetalum monophyllum* J.B. Tan & X.J. He *sp. nova* (Figs. 2–4)**

TYPE: China. Sichuan Province, Tianquan County, Erlang Mountain, Maliuping, on grassy slopes in forests, 2100 m

a.s.l., 14 April 2013 *J.B. Tan & X.G. Ma T2013041401*, flowering (holotype SZ; isotype SZ). — PARATYPE: Same locality, 25 May 2012, *J.B. Tan & H.Y. Hu T2012052503*, fruiting (SZ).

ETYMOLOGY: The specific epithet refers to the unique leaf of the plant which distinguishes it from the other species in *Pternopetalum*.

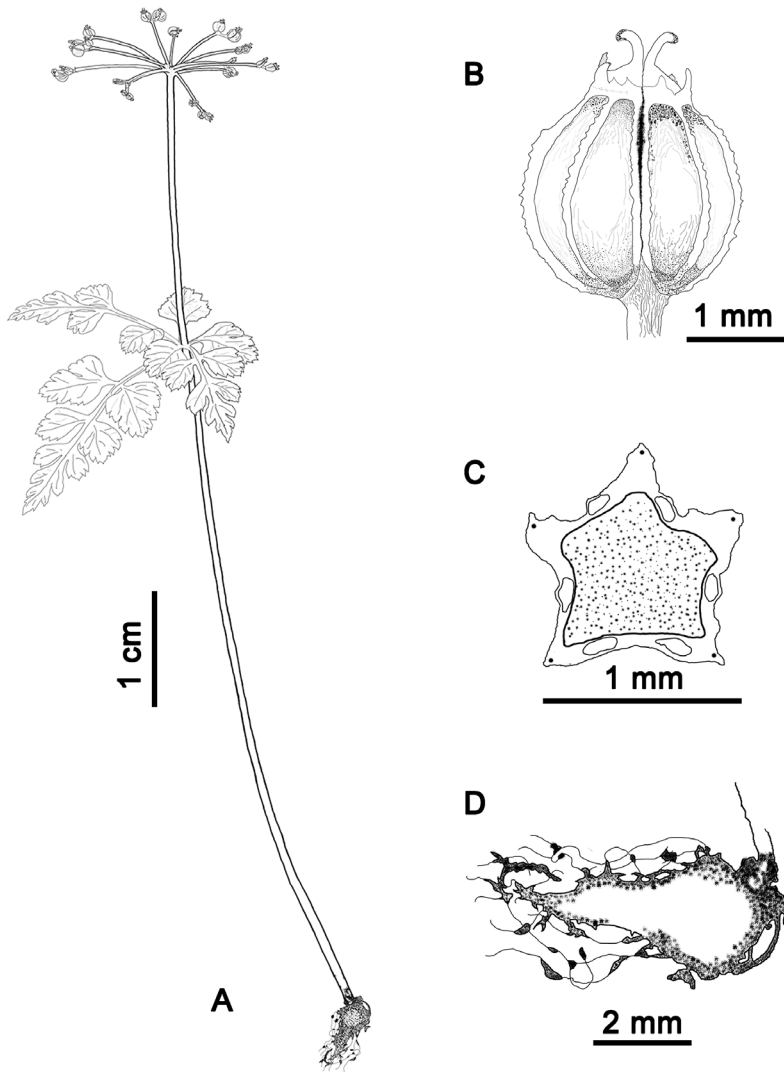


Fig. 2. *Pternopetalum monophyllum* (from the holotype and paratype). — **A:** Habit. — **B:** Cremocarp. — **C:** Transverse section of mericarp. — **D:** Tuberos root.

Delicate perennial herb, 8–20(–25) cm high. Root tuberous, fusiform. Stem erect, slender, solitary, occasionally 2, unbranched, without basal leaf. Cauline leaf 1, 2.8–5.5 × 2.2–5 cm, ternate 2-pinnate, terminal ultimate segments usually caudate at apex, margins serrate, cuneate at base. Umbel terminal, one on each plant. Bract absent. Rays 5–12(–15), unequal, 0.8–2.4 cm. Bracteoles 1–3, linear-lanceolate, ca. 0.5–1.5 mm long. Umbellules usually 2-flowered, rarely 3-flowered. Calyx teeth subulate, 0.3–0.6 mm. Petals white. Stylopodium low-conic. Style elongate, reflexed at upper part, approximately twice as long as stylopodium. Fruit ovoid, 2.5–4 ×

1–2.5 mm. Ribs filiform, scabrid at surface. Vittae 1 in each furrow, 2 on commissure. Flowering in March–April, fruiting in May–June.

DISTRIBUTION AND HABITAT: *Pternopetalum monophyllum* is known only from its type locality, Erlang Mountain, Tianquan County, Sichuan Province, southwest of China. It grows on grassy slopes in forests, at an altitude of 2100 m a.s.l.

Pternopetalum monophyllum can be easily identified from the congeners by its delicate habit, fusiform tuberous root, solitary leaf, terminal umbel and relatively fewer rays. It is somewhat similar to *P. molle*, by sharing a fusiform tuberous root, a single stem, a frequent absence of basal

leaf, and relatively fewer rays, but differs from it by the solitary cauline leaf, terminal umbel and subulate calyx teeth. *Pternopetalum monophyllum* resembles also *P. botrychioides*, especially in the caudate apex of terminal ultimate segment of the cauline leaf. However, the two species are different from each other in many characters (see Appendix). It should be mentioned that *P. monophyllum* and *P. botrychioides* occur at the same locality and elevation on the Erlang Mountain, but their microhabitat preferences differ. *Pternopetalum monophyllum* thrives in the shade of dense grass in forests, while *P. botrychioides* is found in more open habitats (e.g., roadsides, forest edges, wet cliffs).

Acknowledgments

We thank Dr. Xiang-Guang Ma, Dr. Chen-Yang Liao and Dr. Yun-Dong Gao for their help in preparing this paper. We are grateful to Dr. Yun-Xiang Zhang for the line drawing.



Fig. 3. Habit of *Pternopetalum monophyllum* in florescence (holotype).

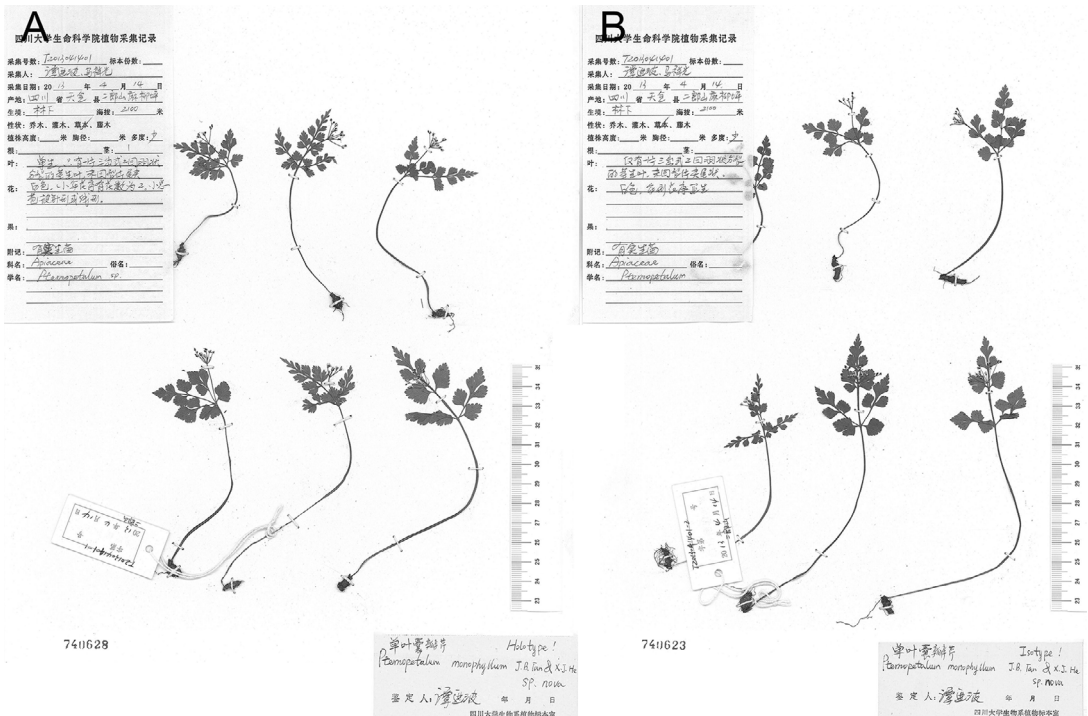


Fig. 4. Type specimens of *Pternopetalum monophyllum* (J.B. Tan & X.G. Ma T2013041401, both in SZ). — A: Holotype. — B: Isotype.

cial thanks go to Ms. Hui Wang (Analysis and Test Center, Sichuan University) for SEM observations. This research was supported by the National Natural Science Foundation of China (grant nos. 31270241, 31100161, 31470009), and the Chinese Ministry of Science and Technology through the “National Science and Technology Infrastructure Platform” Project (grant no. 2005DKA21403-JK).

References

- Liu C.J., Lin Q. & He J.X. 2004: Methods and terminology of study on seed morphology from China. — *Acta Botanica Boreali-Occidentalia Sinica* 24(1): 178–188. [In Chinese with English Abstract].
- Pan Z.H. 1997: *Pternopetalum* Franchet. — In: Wu Z.Y. (ed.), *Flora Yunnanica*, vol. 7: 526–542. Science Press, Beijing. [In Chinese].
- Pimenov M.G. & Leonov M.V. 2004: The Asian Umbelliferae Biodiversity Database (ASIUM) with particular reference to South-West Asian taxa. — *Turkish Journal of Botany* 28: 139–145.
- Pu F.T. 1985: *Pternopetalum* Franchet. — In: Shan R.H. & She M.L. (eds.), *Flora Reipublicae Popularis Sinicae*, vol. 55(2): 38–66. Science Press, Beijing. [In Chinese].
- Pu F.T. & Phillippe L.R. 2005: *Pternopetalum* Franchet. — In: Wu Z.Y. & Raven P.H. (eds.), *Flora of China*, vol. 14: 85–92. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis.
- Shan R.H. & Pu F.T. 1978: [On the Chinese genus *Pternopetalum* Franchet (Umbelliferae)]. — *Acta Phytotaxonomica Sinica* 16(3): 65–78. [In Chinese].
- Shu P. & She M.L. 2001: [*Pollen photographs and flora of Umbelliferae in China*]. — Shanghai Scientific and Technical Publishers, Shanghai. [In Chinese].
- Valiejo-Roman C.M., Terentieva E.I., Samigullin T.H., Pimenov M.G. 2002: nrDNA ITS sequences and affinities of Sino-Himalayan Apioideae (Umbelliferae). — *Taxon* 51: 658–701.
- Wang L.S. 2007: Phenetic analysis of the genus *Pternopetalum* (Apiaceae). — *Acta Botanica Yunnanica* 29(1): 13–25. [In Chinese with English abstract].
- Wang L.S. 2008a: Taxonomic revision of the *Pternopetalum delavayi* complex (Apiaceae). — *Annales Botanici Fennici* 45: 105–112.
- Wang L.S. 2008b: The confusing identity of *Pternopetalum molle* (Apiaceae). — *Botanical Journal of the Linnean Society* 158: 274–295.
- Wang L.S. 2012: A revision of the genus *Pternopetalum* Franchet (Apiaceae). — *Journal of Systematics and Evolution* 50: 550–572.

Appendix. Morphological comparison of *Pternopetalum monophyllum*, *P. molle* and *P. botrychioides*. Data on *P. molle* and *P. botrychioides* from Wang (2012) and own observations.

Character	<i>P. monophyllum</i>	<i>P. molle</i>	<i>P. botrychioides</i>
Underground part	tuberous root, fusiform	tuberous root, fusiform	distinct rhizome
Stem	1 (rarely 2), unbranched	1 (rarely 2), unbranched	1–3, branched
Number of leaves	1	more than 2	several
Basal leaf	absent	absent or occasionally	several, usually
		1–2, ternate	ternate
Cauline leaf	1, ternate 2-pinnate	usually more than 2, 1–2-ternate	1–3, ternate 1–3-pinnate
Terminal ultimate segments	usually caudate at apex	ovate, broad-ovate or rhomboidal	usually caudate at apex
Umbel	terminal	terminal and lateral	terminal and lateral
Rays	5–12(–15)	(4–)6–15(–20)	6–40
Base of fruit	cordate, symmetric	oblique, asymmetric	cordate, symmetric
Calyx teeth	subulate	minute or obsolete	subulate or triangular
Stylopodium	low conic	low conic	conic
Ribs	filiform, scabrid at surface	filiform, smooth at surface	filiform, smooth or finely scabrid at surface
Ornamentation of seed coat	striate, cellular outlines distinct	striate, cellular outlines not distinct	smooth, cellular outlines distinct