



## *Isodon delavayi* (Ocimeae, Nepetoideae, Lamiaceae): a new species from Yunnan Province, Southwest China

YA-PING CHEN<sup>1,2</sup>, GUO-XIONG HU<sup>1,2</sup> & CHUN-LEI XIANG<sup>1\*</sup>

<sup>1</sup> Key Laboratory for Plant Diversity and Biogeography of East Asia, Kunming Institute of Botany, Chinese Academy of Sciences, 650201, Kunming, China

<sup>2</sup> University of Chinese Academy of Sciences, 100049, Beijing, China

\*Author for Correspondence. E-mail: [xiangchunlei@mail.kib.ac.cn](mailto:xiangchunlei@mail.kib.ac.cn)

### Abstract

*Isodon delavayi* (Lamiaceae), a new and distinct species found in Mt. Yangyu of Yunnan Province, is described and illustrated. It is similar to *I. scoparius* and *I. pharicus*, but differs from the former by its much branched and shorter stems, entire leaves, and ovate-triangular calyx lobes, and from the latter by its entire and glabrous leaves, obsolete petiole, and less flowered cymes. Microfeatures of leaf epidermis, pollen grains, and mericarps of the new species are also presented.

### Introduction

The subtribe Isodoninae J.S. Zhong, J. Li & H.W. Li (Ocimeae, Nepetoideae, Lamiaceae; 2010: 216) was proposed by Zhong *et al.* (2010: 216) to accommodate a single genus, *Isodon* (Schrader ex Bentham 1832–1836: 40) Spach (1840: 162). As currently circumscribed, *Isodon* contains about 100 species distributed in tropical and subtropical Asia, as well as tropical Africa (Wu & Li 1977: 418, Codd 1984: 8, Li 1988: 291, Li & Hedge 1994: 271, Mabberley 2008: 437). Most taxa (79 species and 11 varieties) of the genus can be found in China (Li & Hedge 1994: 271, Paton & Ryding 1998: 730), with 65 species and seven varieties being distributed in the southwest part which is considered as the diversity center of *Isodon* (Zhong *et al.* 2010: 207, Xiang & Liu 2012: 811). The genus can be distinguished by pedunculate and bracteolate cymes, actinomorphic or 2-lipped (3/2) calyx, strongly 2-lipped (4/1) corolla, as well as free filaments inserted at base of corolla tube (Li 1988: 291, Harley *et al.* 2004: 256).

*Isodon* species are economically and medicinally important that they have been widely used in ornamental, culinary, and medicinal aspects (Wu & Li 1977, Sun *et al.* 2001). Except for its economic value within the mint family, *Isodon* is also remarkably various in habit, leaf shape, and habitat (Wu & Li 1977, Li 1988, Li & Hedge 1994). In terms of habit diversity, species of *Isodon* range from perennial herbs to subshrubs, with the majority being shrubs. As for the morphology of leaves, they varied from herbaceous to subleathery, lanceolate to suborbicular, entire to dentate, glabrous to piliferous (such as villous, glandular puberulent and stellate tomentose). Although most species of *Isodon* grow in xeric habitats, such as dry thickets, margins of forest, rocky slope, and roadside, some of them survive in montane forest, riverside, and even wetland.

During a taxonomic revision for *Isodon* in China, two collections which were exchanged with the herbarium P attracted our attention. They were collected by M. l'Abbé Delavay from Yunnan Province, but hadn't been identified. After comparing with other taxa, we concluded that these specimens represent a new species of *Isodon*. Fortunately, we found it in wild again at the same place according to Delavay's record, after more than one hundred years since his collection in 1887. Here, we describe and illustrate the new species below.

*G.X. Hu & Y.P. Chen. 540, 542 (KUN!); at the same place, 19 October 1887, M. l'Abbé Delavay 2707 (KUN!); Yunnan: M. l'Abbé Delavay 2922 (KUN!).*

## Discussion

After examining herbarium specimens of other taxa of *Isodon* as well as study of relevant literature (Wu & Li 1977, Wu *et al.* 1977, Li 1988, Li & Hedge 1994), we found out that the new species was morphologically much similar to *I. scoparius* and *I. pharicus*. *Isodon delavayi* shares small and glabrous leaves, obsolete petiole, axillary and glandular puberulent cymes with *I. scoparius*, but they differ from each other in length of stem, leaf shape and margin, flower number per cyme, and morphology of calyx lobes. Both *I. delavayi* and *I. pharicus* are characterized with much branched and short stems, thick papery leaves, as well as axillary and glandular puberulent cymes, but they can be distinguished by length of petiole, leaf shape and margin, indumentum on leaf surface, and flower number per cyme. Detailed morphological differences between the three species are listed in Table 1.

**TABLE 1.** Morphological comparisons among *Isodon delavayi*, *I. scoparius*, and *I. pharicus*.

Character	<i>I. delavayi</i>	<i>I. scoparius</i>	<i>I. pharicus</i>
Stem	15–40 cm long	40–100 cm long	30–50 cm long
Lamina	0.5–2 × 0.2–0.6 cm thick papery ovate-elliptic, narrowly elliptic or lanceolate margin entire glabrous	1.2–1.8 × 0.6–1.8 cm ± leathery ovate, broadly ovate to suborbicular margin serrate glabrous	0.7–2.5 × 0.6–2.2 cm thick papery ovate, broadly ovate to suborbicular margin crenate glandular puberulent and puberulent
Petiole	obsolete	obsolete	1–4 mm long
Cyme	1–3-flowered densely glandular puberulent and puberulent	3–5-flowered densely glandular puberulent	3–7-flowered densely glandular puberulent and puberulent
Calyx	2.5 mm long	3.5 mm long	3 mm long
Calyx lobes	ovate-triangular 1.2 mm long	linear-lanceolate 2.5–3 mm long	ovate 1 mm long
Flowering time	September to October	July to August	July to September

As to habitat and distribution area, *Isodon delavayi* was only found in Mt. Yangyu, Eryuan County of Yunnan to date, and grew on open and rocky slopes at an elevation of 2400–2600 m; *I. scoparius* is restricted to Zhongdian County, Yunnan, and usually can be found under pine forests or on limestone mountains between 2300 m and 2900 m; while *I. pharicus* is known from Sichuan and Xizang, and thrives in thickets, on rocky dry open slopes and forest margins of 2300–4300 (–5400) m elevation (Wu & Li 1977, Li & Hedge 1994).

## Acknowledgements

Thanks are given to Ms. Ling Wang (KUN) for her line drawing of the new species, Dr. Ende Liu and Dr. Pascale Chesselet for their help with exchanging the paratype specimens of *I. delavayi* from P, and to Dr. Libing Zhang for his comments which improved the manuscript. The authors are also grateful to the staff of following herbaria for their warmly help in research facilities: CDBI, E, K, KUN, L, LE, P, PE, TI, and W. This study was supported by Main Direction Program of Knowledge Innovation of Chinese Academy of Sciences (Grant Nos. KSCX2-EW-J-24 and KSCX2-EW-Z-1), National Natural Science Foundation of China (Grant Nos. 31270245 and 31110103911), Basic Research Program from Ministry of Science and Technology of China (Grant No. 2013FY112100), and Institute of Botany, Chinese Academy of Sciences (LSEB2012-08).

## References

- Bentham, G. (1832–1836) *Labiatarum Genera and Species*. Ridgeway & Sons, London.
- Budantsev, A.V. & Lobova, T.A. (1997) Fruit morphology, anatomy and taxonomy of tribe Nepeteae (Labiatae). *Edinburgh Journal of Botany* 54: 183–216.  
<http://dx.doi.org/10.1017/s0960428600004029>
- Codd, L.E. (1984) The genus *Isodon* (Schard. ex Benth.) Spach in Africa and a new genus *Rabdosiella* Codd (Lamiaceae). *Bothalia* 15: 7–10.
- Cantino, P.D. & Sanders, R.W. (1986) Subfamilial classification of Labiatae. *Systematic Botany* 11: 163–185.  
<http://dx.doi.org/10.2307/2418955>
- Erdtman, G. (1945) Pollen morphology and plant taxonomy. IV. Labiatae, Verbenaceae and Avicenniaceae. *Svensk Botanisk Tidskrift* 39: 279–285.
- Hara, H. (1985) Comments on the East Asiatic plants (17). *Journal of Japanese Botany* 60: 230–238.
- Harley, M.M., Paton, A.J., Harley, R.M. & Cade, P.G. (1992) Pollen morphological studies in tribe Ocimeae (Nepetoideae: Labiatae): 1. *Ocimum* L. *Grana* 31: 161–176.  
<http://dx.doi.org/10.1080/00173139209432027>
- Harley, R.M., Atkins, S., Budantsev, A.L., Cantino, P.D., Conn, B.J., Grayer, R., Harley, M.M., de Kok, R., Krestovskaja, T., Morales, R., Paton, A.J., Ryding, O. & Upson, T. (2004) Labiatae. In: Kubitzki, K. & Kadereit, J.W. (eds.), *The families and genera of vascular plants* vol. 7. Springer, Berlin & Heidelberg. pp.167–275.  
[http://dx.doi.org/10.1007/978-3-642-18617-2\\_11](http://dx.doi.org/10.1007/978-3-642-18617-2_11)
- Hesse, M., Halbritter, H., Zetter, R., Weber, M., Buchner, R., Frosch-Radivo, A. & Ulrich, S. (2009) *Pollen terminology: an illustrated handbook*. SpringerWien, New York.
- Holmgren, P.K., Holmgren, N.H. & Barnett, L.C. (1990) *Index Herbariorum. Part 1: The Herbaria of the World* 8th edition. New York Botanical Garden, Bronx.
- Li, H.W. (1988) Taxonomic review of *Isodon* (Labiatae). *Journal of the Arnold Arboretum* 69: 289–400.
- Li, H.W. & Hedge, I.C. (1994) Lamiaceae. In: Wu, C.Y. & Raven, P.H. (eds.), *Flora of China* vol. 17. Science Press, Beijing; Missouri Botanical Garden Press, St. Louis. pp. 269–291.
- Mabberley, D.J. (2008) *Mabberley's plant-book: a portable dictionary of the plants* 3rd edition. Cambridge University Press, Cambridge.
- Marin, P.D., Duletić, S. & Petković, B. (1996) Nutlet ornamentation in selected *Salvia* L. species (Lamiaceae). *Flora Mediterranea* 6: 203–211.
- Moon, H.K., Hong, S.P., Smets, E. & Huysmans, S. (2009) Micromorphology and character evolution of nutlets in tribe Mentheae (Nepetoideae, Lamiaceae). *Systematic Botany* 34: 760–776.  
<http://dx.doi.org/10.1600/036364409790139592>
- Murata, G. (1955) Tibetan plants collected by E. Kawaguchi. *Acta Phytotaxonomica et Geobotanica* 16: 13–16.
- Paton, A.J. & Ryding, O. (1998) *Hanceola*, *Siphocranion* and *Isodon* and their position in the Ocimeae (Labiatae). *Kew Bulletin* 53: 723–731.  
<http://dx.doi.org/10.2307/4110492>
- Prairie, D. (1891) Novieae Indieae. III. Some additional species of Labiatae. *Journal of the Asiatic Society of Bengal* 59: 294–318.
- Spach, E. (1840) Labiatae. In *Histoire Naturelle des Végétaux* vol. 9. Librairie Encyclopédique de Roret, Paris. pp. 160–224.
- Sun, H.D., Xu, Y.L. & Jiang, B. (2001) *Diterpenoids from Isodon species*. Science Press, Beijing.
- Wu, C.Y. & Li, H.W. (1977) *Rabdosia* (Bl.) Hassk. In *Flora Reipublicae Popularis Sinicae* vol. 66. Science Press, Beijing. pp. 416–534.
- Wu, C.Y., Li, H.W., Chen, J., Huang, S.Q., Li, H., Fang, R.Z., Huang, S.H., Zhuang, X., Li, Y.R. & Bai, P.Y. (1977) Lamiaceae. In Wu, C.Y. (ed.), *Flora Yunnanica* vol. 1. Science Press, Beijing. pp. 497–817.
- Xiang, C.L. & Liu, E.D. (2012) A new species of *Isodon* (Lamiaceae, Nepetoideae) from Yunnan Province, Southwest China. *Systematic Botany* 37: 811–817.  
<http://dx.doi.org/10.1600/036364412x648751>
- Zhong, J.S., Li, J., Li, L., Conran, J.H. & Li, H.W. (2010) Phylogeny of *Isodon* (Schard. ex Benth.) Spach (Lamiaceae) and related genera inferred from nuclear ribosomal ITS, *trnL-trnF* region, and *rps16* intron sequences and morphology. *Systematic Botany* 35: 207–219.  
<http://dx.doi.org/10.1600/036364410790862614>