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Source: Rhodora, 109(940):448-455.
Published By: The New England Botanical Club, Inc.
DOI: http://dx.doi.org/10.3119/0035-4902(2007)109[448:TNSOWT]2.0.CO;2
URL: http://www.bioone.org/doi/full/10.3119/0035-4902%282007%29109%5B448%3ATNSOWT%5D2.0.CO%3B2

RHODORA, Vol. 109, No. 940, pp. 448–455, 2007

TWO NEW SPECIES OF *WIKSTROEMIA* (THYMELAEACEAE) FROM WESTERN SICHUAN, CHINA

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ABSRACT. Two new species of *Wikstroemia* from Sichuan, China, are described and illustrated. *Wikstroemia guanxianensis* from Dujiangyan Xian is similar to *W. dolichantha* in the one-sided development of the disc and in the elongate inflorescence. It differs from *W. dolichantha* in the oval, wider leaves (to 3.5 cm wide) rounded at the base, longer pedicel (1.5 mm), and disc quadrate, apex truncate, undulate. *Wikstroemia jiulongensis* is similar to *W. fargesii*, but differs from it in young branches with scattered pubescence, the peduncles absent or very short, and a quadrate disc with undulate apex. A key to similar species of *Wikstroemia* in Sichuan is provided.

Key Words: new species, *Wikstroemia guanxianensis*, *W. jiulongensis*, Sichuan, flora of China

Wikstroemia Endl., a genus comprising about 70 species and several varieties, is distributed from northern Asia through the Himalaya and the Malesian region to Hawaii (Huang 1999). Forty-four species occur in China, and 22 of them are in Sichuan (Zhou and Chang 1989). While identifying some specimens of *Wikstroemia* (Thymelaeaceae) in the Harvard University Herbaria (A/GH), two collections, *D.E. Boufford et al. 24699* and *D.E. Boufford et al. 32996*, were found that differ from known species of the genus.

To obtain further information, Zhang revisited the Guanxian (Dujiangyan) locality where one of the specimens, *D.E. Boufford et al. 24699*, was collected, to gather additional specimens and to study the plants in nature. Specimens in the herbaria at KUN and CDBI were also examined. After detailed morphological and anatomical analysis, and comparison with other specimens and with recent descriptions in the literature (Anonymous 1972, 1983; Huang 1999; Liu 2004; Zhou and Chang 1989), we determined that

both specimens represent new species of *Wikstroemia*, which we describe and illustrate in this paper.

Wikstroemia guanxianensis Y.H. Zhang, H. Sun & D.E. Boufford, *sp. nov.* TYPE: CHINA. Sichuan Province: Dujiangyan Municipality (formerly Guan Xian), Qinglongzui near the site of Longwangmiao, along the Longxi River, open areas near the river and on adjacent slopes, 1780 m, 8 Sep 1988, *D.E. Boufford & B. Bartholomew with G. Li & G.H. Zhu 24699* (HOLOTYPE: A!; ISOTYPES: CAS!, PE!). Figure 1.

Wikstroemia dolichantha Diels similis, sed in foliis latioribus, ellipticis, basi subrotundis; inflorescentia longiora, pedicellis longioribus; disco secundo, lobis disci oblongis, apice minute undulatis differt.

Shrubs, deciduous, 1–2.5 m tall. Branches usually opposite, terete, glabrous or very sparsely hairy, yellowish, with sparse black spots, older branches reddish brown. Petiole ca. 2 mm long, abaxially sparsely hairy. Leaves loosely spaced, alternate or subopposite, membranaceous or papyraceous, oval, 1.5–6 × 0.9–3.5 cm, entire, base subrounded, apex rounded; lateral nerves 5–7 pairs, obvious and elevated on abaxial surface; abaxial surface sparsely hairy, adaxial surface glabrous. Buds axillary, subglobose, yellowish white pubescent. Inflorescences racemose, terminal, 4–8 cm long, usually 2 or 3 times branched, 20- to 35-flowered; peduncle absent or to 2 mm long, glabrous; branches 2.5–6 cm long; pedicels 1.5 mm long. Flowers ebracteate; calyx tube narrowly tubular, yellow, ca. 1 cm long, abaxially sparsely pubescent, adaxially glabrous; calyx lobes 5, broadly ovate, ca. 2 × 2 mm, apex obtuse; inside of calyx 10-ribbed; stamens 10, in 2 series, inserted on calyx tube, upper stamens attached below throat, lower ones attached at middle of tube; filaments ca. 0.5 mm long; anthers oblong, ca. 2 mm long; disc quadrate, developed on one side, ca. 1.5–2 mm long; apex undulate; ovary obconical, ca. 4 mm long, apically appressed pubescent; style slender, ca. 0.2 mm long; stigma globose, papillose. Fruit ovoid, bright yellow, 3 mm in diameter, 6 mm long, base covered by remnant calyx.

PHENOLOGY. *Wikstroemia guanxianensis* flowers and fruits from August to September.

DISTRIBUTION AND HABITAT. *Wikstroemia guanxianensis* is found only in western Sichuan, China, where it grows in sandy soil along rivers at 1800–2300 m elevation.

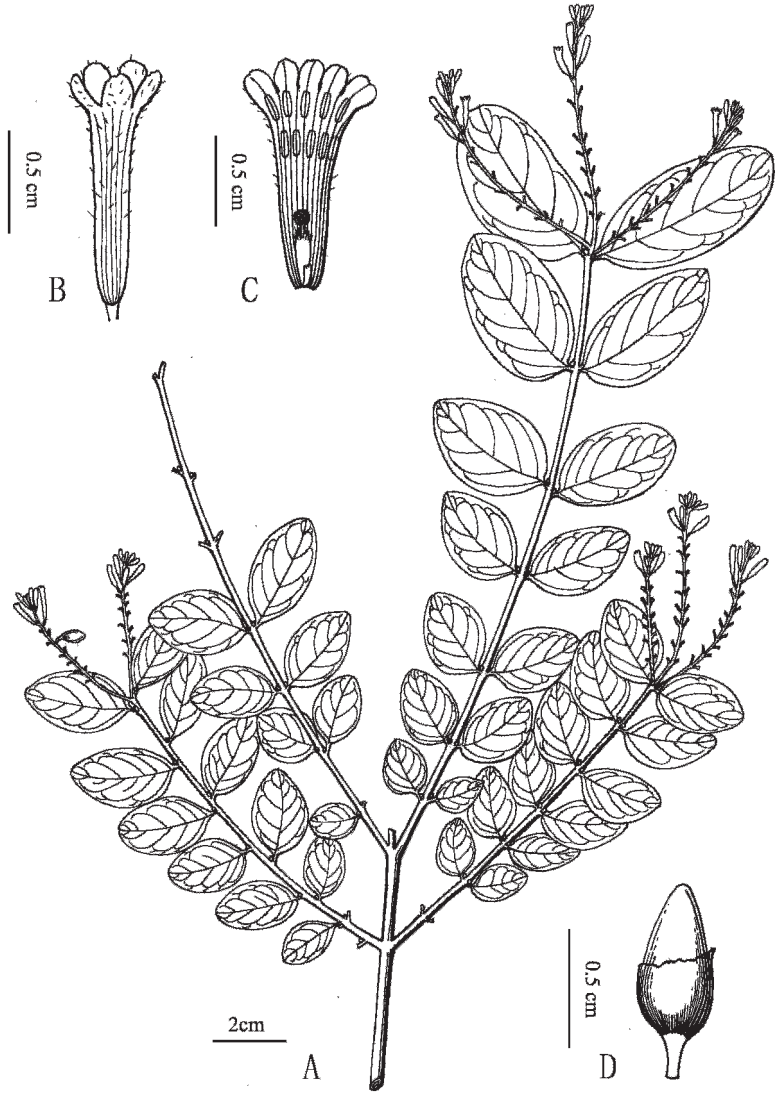

Figure 1. *Wikstroemia guanxianensis* (from holotype). A. Flowering plant. B. Flower. C. Details of flower. D. Fruit (base covered by remnant calyx).

ETYMOLOGY. The name *guanxianensis* is from the Guanxian region of Sichuan, where the type specimen was collected.

ADDITIONAL SPECIMENS EXAMINED: CHINA. Sichuan Province: Hongya Xian, Hongya forestry centre, 2300 m, 21 Jul 1995 (fl), *W.K. Bao et al. 3323* (CDBI); Dujiangyan Municipality (formerly Guanxian County), Longxi National Forest Garden (Rhododendron Garden of China), Qinglongzui near the site of Longwanmiao, along the Longxi River, open area near the river and on adjacent sandy slope, 31°08′47″N, 103°34′39″E, 1800 m, 1 Aug 2006 (fr.), *Y.H. Zhang 060801* (KUN).

Wikstroemia guanxianensis is similar to *W. dolichantha* in having the calyx covered by scattered pubescence, the elongate inflorescence and the one-sided development of the disc, but differs from *W. dolichantha* in having oval, wider leaves (to 3.5 cm wide) rounded at the base; pedicel obvious, 1.5 mm long; and disc quadrate and undulate; the disc of *W. dolichantha* is scale-like, linear or lanceolate and the margin is deeply incised or divided. The pedicel of *W. dolichantha* is absent, or falls together with the spent flower; in *W. guanxianensis* the pedicel remains on the inflorescence after the flowers have withered. *Wikstroemia guanxianensis* also has obvious, globose, yellowish white pubescent axillary buds; the buds of *W. dolichantha* are not obvious during the flowering season.

Wikstroemia jiulongensis Y.H. Zhang, H. Sun & D.E. Boufford, *sp. nov.* TYPE: CHINA. Sichuan Province: Jiulong Xian, between the city of Jiulong and the Yalong Jiang (River), right side of highway going toward Yalong Jiang, steep rocky slopes and cliffs in narrow gorge feeding into Jiulong River, 28°44′36″N, 101°40′51″E, 2250–2300 m, 16 Jul 2005 (fl, fr), *D.E. Boufford, J.H. Chen, K. Fujikawa, S.L. Kelley, R.H. Ree, H. Sun, J.P. Yue, D.C. Zhang & Y.H. Zhang 32996* (HOLOTYPE: KUN!; ISOTYPE: A!). Figure 2.

Wikstroemia fargesii (Lecomte) Domke in characteribus habituum similibus, sed in lobis perianthii, inflorecentis plerumque terminalibus vel minus axillaribus differt.

Shrubs, deciduous, ca. 1 m tall. Branches alternate or subopposite, terete, sparse, glabrous, yellowish, with sparse reddish brown spots, sericeous; older branches yellowish brown, glabrous. Leaves loosely spaced on middle of branch, alternate or subopposite,

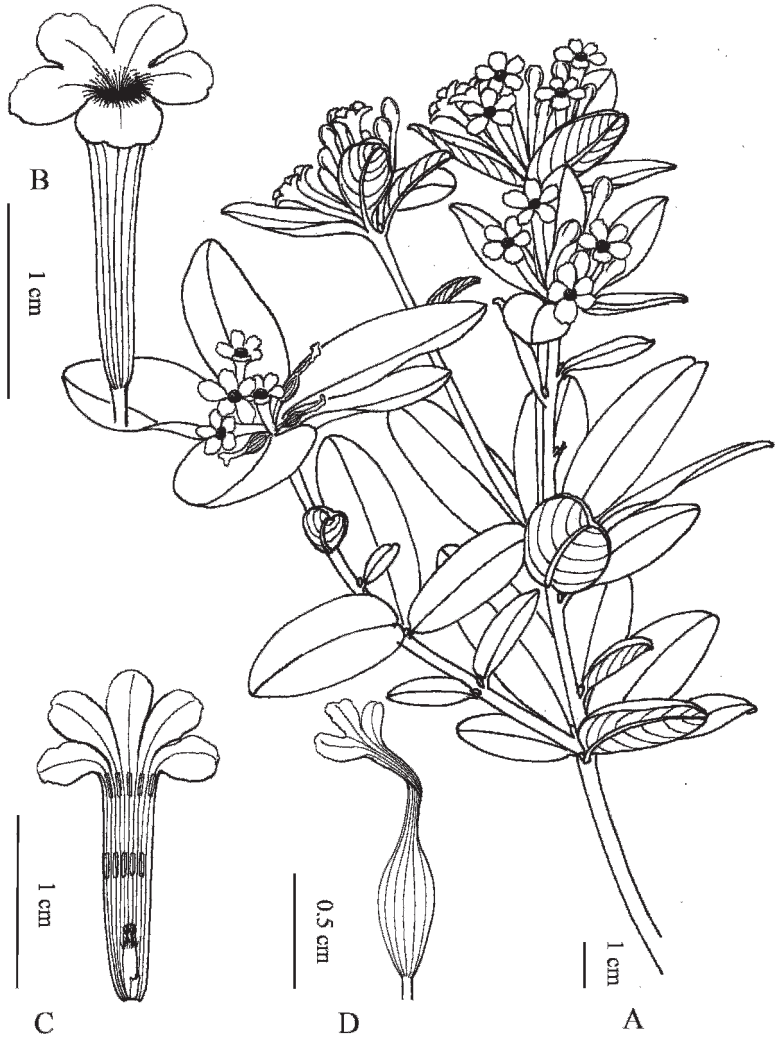

Figure 2. *Wikstroemia jiulongensis* (from holotype). A. Flowering plant. B. Flower. C. Details of flower. D. Fruit (covered by remnant calyx).

oblong or narrowly oval; younger leaves membranaceous or papyraceous, yellowish, older leaves coriaceous, with sparse reddish brown spots, 1.5–5 × 0.6–2 cm, entire, base broadly cuneate, apex obtuse or acute; adaxial surface of younger leaves hairy, glabrous in age; lateral nerves 7–9 pairs, obvious on younger leaves and abaxial

surface of older leaves; petiole ca. 2 mm long, abaxially sparsely hairy. Buds axillary, subglobose, yellowish white pubescent. Inflorescences fascicles at apex of branchlets, rarely axillary, 8–15 flowered; peduncle absent or very short; pedicels ca. 1 mm long. Flowers ebracteate, golden yellow. Calyx tube narrowly tubular, cylindrical, ca. 1.5 cm long, glabrous; calyx lobes 5, broadly ovate, ca. 2.5 × 2 mm, apex obtuse; inside of calyx 10-ribbed; stamens 10, in 2 series, inserted on calyx tube, upper stamens inserted below throat, lower ones on middle of tube; filaments ca. 0.5 mm long; anthers oblong, ca. 1.5 mm long; disc quadrate, developed on one side, ca. 1 mm long, 0.5 mm broad, apex truncate, undulate; ovary obconical, ca. 3 mm long, apically appressed pubescent; style ca. 1 mm long; stigma globose, papillose. Fruit conical, bright yellow, ca. 6 mm long, 2.5 mm in diameter, enclosed by persistent calyx tube; testa membranaceous, brown; pedicel to ca. 3 mm long at maturity of fruit.

PHENOLOGY. *Wikstroemia jiulongensis* flowers from June to July and fruits from July to August.

DISTRIBUTION AND HABITAT. *Wikstroemia jiulongensis* has been found only in Jiulong Xian, Sichuan, China, where it grows on the floodplains of streams in vegetation dominated by spinescent shrubs (*Pyracantha*, *Rhamnus*, *Rosa*, *Elaeagnus*, *Prinsepia*).

ETYMOLOGY. Named for Jiulong Xian, where the species was first discovered and where its distribution is centered.

ADDITIONAL SPECIMENS EXAMINED: CHINA. Sichuan Province: Jiulong Xian, 2400 m, 9 Jun 1930 (fl), *K. Huang, Z.Y. Luo, S.P. Zhu, Z.P. Huang & W.X. Liu 00332* (KUN); Jiulong Xian, Naiqu Xiang, 2300 m, 7 Jun 1979 (fl), *X.L. Hu & Q.Q. Wang 20139* (CDBI); Jiulong Xian, Chengguan district, 2600 m, 14 Jun 1974 (fl), *X.G. Liu 4516* (CDBI).

Wikstroemia jiulongensis is similar to *W. fargesii*; both species have alternate or subopposite leaves, small flowers in fascicles at the apex of branchlets, calyx tube glabrous, and calyx lobes 5. *Wikstroemia jiulongensis* is characterized by young branchlets with scattered pubescence, leaves with 7–9 pairs of lateral nerves, peduncle absent or very short, disc developed on one side, quadrate and with the apex truncate and undulate. In addition, *W. jiulongensis* occurs at higher elevations than *W. fargesii*, between 2300 and 2600 m.

DISCUSSION

Many species of the genera *Daphne* and *Wikstroemia* (tribe Daphneae, subfamily Thymelaeoideae, Thymelaeaceae) are remarkably similar in appearance. The lack of clear distinguishing features brings into question the distinctness of the two genera. Although the shape of the hypogynous disc has been considered to be an important diagnostic feature to divide them—species of *Daphne* have mostly an annular or cup-shaped disc and those of *Wikstroemia* have mostly scale-like, subulate or quadrate discs—some species are inconsistent in this feature. For example, *D. aurantiaca* has discs that range gradually from annular to scale-like (Hamaya 1955). Halda (1999, 2001) treated *Wikstroemia* as a subgenus of *Daphne*. Except for the work of Domke (1934) and Hamaya (1959, 1963), who carried out studies on the tribe Daphneae, little anatomic analysis has been done. Despite the weakness in many characters, the two genera are usually kept separate on the basis of exomorphic and anatomic characters. Until more detailed systematic work is carried out to settle the issue, we accept the view that *Wikstroemia* is distinct. A key to eight similar species of *Wikstroemia* from Sichuan with a 5-lobed calyx is provided below:

KEY TO SELECTED SPECIES OF *WIKSTROEMIA* FROM SICHUAN

1. Calyx abaxially pubescent . . . . . (2)
   2. Leaves linear . . . *W. linearifolia* H.F. Zhou *ex* C.Y. Zhang
   2. Leaves oval or oblong-oblanceolate, not linear . . . . . (3)
      3. Flowers sessile; disc scale-like, linear-lanceolate, margin deeply incised or divided . . . . . *W. dolichantha* Diels
      3. Flowers pedicellate, pedicel 1.5 mm long; disc quadrate, margin undulate . . . . . *W. guanxianensis* Y.H. Zhang, H. Sun & D.E. Boufford
1. Calyx abaxially glabrous . . . . . (4)
   4. Inflorescences spicate, racemose or paniculate . . . . . (5)
      5. Leaves not linear; flowers yellow; inflorescences spicate or racemose . . . . . (6)
         6. Leaves alternate or subopposite; ovaries sericeous . . . . . *W. scytophylla* Diels
         6. Leaves opposite; ovaries glabrous, rarely pubescent at apex . . . . . *W. huidongensis* C.Y. Chang
      5. Leaves linear; flowers yellowish green; inflorescences of 3 or 4 racemes . . . . . *W. leptophylla* W.W. Smith

4. Inflorescence a capitulum, at apex of branches . . . . . (7)
   7. Young branches sericeous; capitulum with 3–7 flowers . . . . . *W. fargesii* (Lecomte) Domke
   7. Young branches glabrous; capitulum with 8–15 flowers . . . *W. jiulongensis* Y.H. Zhang, H. Sun & D.E. Boufford

ACKNOWLEDGMENTS. We are most grateful to Professor Jie Chen for carefully writing the Latin diagnoses. We thank Ling Wang of the Kunming Institute of Botany for skillfully preparing the beautiful line drawings. We also thank Susan Kelley, Lihong Duan, and Anthony R. Branch of the Harvard University Herbaria, Jinghua Wang of the Kunming Institute of Botany, and Yulan Peng of the Chengdu Institute of Biology for their warmhearted help. This research was supported by grants from the National Science Foundation (grant DEB-0321846 to D. E. Boufford) and the National Natural Science Foundation of China (grants 40332021, 30420120049 and 30625004 to Hang Sun).

LITERATURE CITED

ANONYMOUS. 1972. Thymelaeaceae. Iconogr. Cormophytorum Sinicorum 2: 948–963.

———. 1983. Thymelaeaceae. Iconogr. Cormophytorum Sinicorum. Suppl. 2: 546–564.

DOMKE, W. 1934. Untersuchungen über die systematische und geographische Gliederung der Thymelaeaceen. Biblioth. Bot. III: 1–151.

HALDA, J. J. 1999. Some taxonomic problems in the genus *Daphne* L. II. Acta Mus. Richnov. Sect. Nat. 6(3): 195–233.

———. 2001. The Genus *Daphne*. Sen, Dobré, Czech Republic.

HAMAYA, T. 1955. A dendrological monograph of the Thymelaeaceae plants of Japan. Bull. Tokyo Univ. Forest 50: 45–96.

———. 1959. Dendrological studies of the Japanese and some foreign genera of the Thymelaeaceae. Bull. Tokyo Univ. Forest 55: 1–80.

———. 1963. Taxonomical notes on Daphneae (Thymelaeaceae). Acta Horti Gothob. 26: 63–99.

HUANG, S. C. 1999. *Wikstroemia*. Fl. Reipubl. Popularis Sin. 52(1): 292–331. [Institute of Botany, Beijing]

LIU, S. Y. 2004. *Wikstroemia trichotoma* var. *flavianthera* S.Y. Liu (Thymelaeaceae), a new variety from Guangxi, China. Acta Phytotax. Sin. 42: 265–267.

ZHOU, H. F. AND C. Y. CHANG. 1989. Thymelaeaceae. Fl. Sichuan 9: 229–282.