Tripterospermum hualienense (Gentianaceae), a New Species from Taiwan

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(Manuscript received 5 December 2011; accepted 16 Febuanry 2012)

ABSTRACT: *Tripterospermum hualiense*, a new species of Gentianaceae is described and illustrated from Taiwan. This species is similar to *T. microphyllum* but differs in having elongating and often twining stems, linear-lanceolate leaves in upper nodes, generally larger calyx lobes, long and narrow corolla tubes, higher inserted position of filaments, shorter gynophore at anthesis, larger berries, and distinctly smaller seeds. Populations of *T. hualiense* are so far only found in mountainous regions of eastern Taiwan.

KEY WORDS: Gentiaceae, new species, Taiwan, taxonomy, *Tripterospermum hualienense*.

INTRODUCTION

Tripterospermum Blume (Gentianaceae) is a genus of climbing herbs restricted to E and S Asia (Murata, 1989; Ho and Pringle, 1995). 25 species were recognized in the latest worldwide revision (Murata, 1989), and 5 new taxa were further described (Hul, 2002; Chen et al., 2006; Zhang et al., 2009). In Taiwan, 7 *Tripterospermum* species have been reported, of which 6 are endemic (Wang et al., 2009). Recently, we recognized an additional *Tripterospermum* species from eastern Taiwan which was overlooked in previous studies (Satake, 1951; Liu and Kuo, 1978; Murata, 1989; Ho and Pringle, 1995; Wang and Chen, 1998; Wang et al., 2009). After a detailed comparative study of relative specimens and literature, we are concluded that this entity is a new species and thus describe here as *T. hualienense*. A revised key to the genus *Tripterospermum* in Taiwan is also presented.

Key to the *Tripterospermum* species in Taiwan:

1. Corolla purple with greenish stripes, persistent in fruit; fruit stalk 15-20 mm.....*T. lanceolatum*
1. Corolla not colored as above, caducous or at least withered in fruit; fruit stalk 2-12 mm.....2.
2. Stems trailing; leaves cordate to suborbicular; petioles about as long as blades; calyx lobes linear-oblanceolate.....*T. cordifolium*
2. Stems trailing or twining; leaves ovate to linear-lanceolate; petioles much shorter then blades; calyx lobes linear to ovate-lanceolate....3.
3. Corolla white or yellowish white; calyx tubes 7-9 mm, distinctly winged; calyx lobes 1.5-3 mm wide.....4.
4. Calyx lobes linear to linear-deltoid, 1.5-2 mm wide....*T. taiwanense*
4. Calyx lobes lanceolate to rhombic-lanceolate, 2-3 mm wide.....5.
5. Leaves 6-11 × 2.5-3.5 cm; calyx lobes 9-15 × 1-2.5 mm; corolla 3.5-4 cm.....*T. alutaceifolium*
5. Leaves 2-5 × 1-3 cm; calyx lobes 6-10 × 2-3 mm; corolla 2.5-3.5 cm.....*T. lilungshanensis*
3. Corolla pinkish or red-purplish white; calyx tubes 3-7 mm, wingless; calyx lobes 0.3-1.5 mm wide.....6.
6. Stems twining; petioles 10-17 mm; leaves rounded to subcordate at base, 5-25 mm wide; calyx lobes 1-7 × 0.3-0.5 mm; berries 15-23 mm.....*T. luzonense*
6. Stems trailing at least at base; petioles 2-5 mm; leaves cuneate to decurrent at base, 2-7 mm wide; calyx lobes 3-11 × 0.3-1.5 mm; berries 8-16 mm.....7.
7. Stems mostly trailing, rarely twining at apex; leaves in upper nodes lanceolate to deltoid-lanceolate; corolla 2-2.8 cm; berries 8-12 × 5-7 mm; seeds 1.5-2 mm.....*T. microphyllum*
7. Stems often twining toward apex, sometimes only trailing; leaves in upper nodes linear to linear-lanceolate; corolla 2.4-3.7 cm; berries 10-16 mm × 8-12 mm; seeds 1-1.3 mm.....*T. hualienense*

TAXONOMIC TREATMENT

Tripterospermum hualienense T. C.Hsu & S. W. Chung, ***sp. nov.*** 東臺肺形草 Figs. 1-3

Type: TAIWAN. Hualien County: Sioulin Township, from Chilaipa (奇萊壩) to Mt. Wuchiapeng (五甲崩山), 1500-1600 m alt., 20 Oct. 2011, *T. C. Hsu 4891* (holotype TAIF, isotypes TAIF, TAI, HAST), here designated.

Perennial herbs. Stems trailing and branching at base, often twining toward apex, less often creeping or pendulous, 15-60 cm; internodes 1-10 cm. Petioles 2-5 mm; leave blades ovate to ovate-lanceolate in basal nodes, linear to linear-lanceolate in upper nodes, herbaceous to subcoriaceous, 1-5 × 0.3-0.7 cm, base attenuate and somewhat decurrent, apex acute, margin cartilaginous and minutely scabrous, veins 3. Inflorescences terminal and axillary, 1-3-flowered; bracts 1-2 pairs, scale-like, rarely leaf-like. Calyx campanulate; tube 3-7 mm, wingless; lobes linear-subulate, 3-11 × 0.5-1.5 mm. Corolla pinkish white, longitudinally purple-red striped outside, nearly cylindrical, 2.4-3.7 cm; lobes deltoid, 3-4 × 3-4 mm, apex acute; plicae fan-shaped, margin crenulate. Filaments linear-subulate, 1.3-1.5 cm, inserted to corolla tube slightly above the top of ovary; anthers

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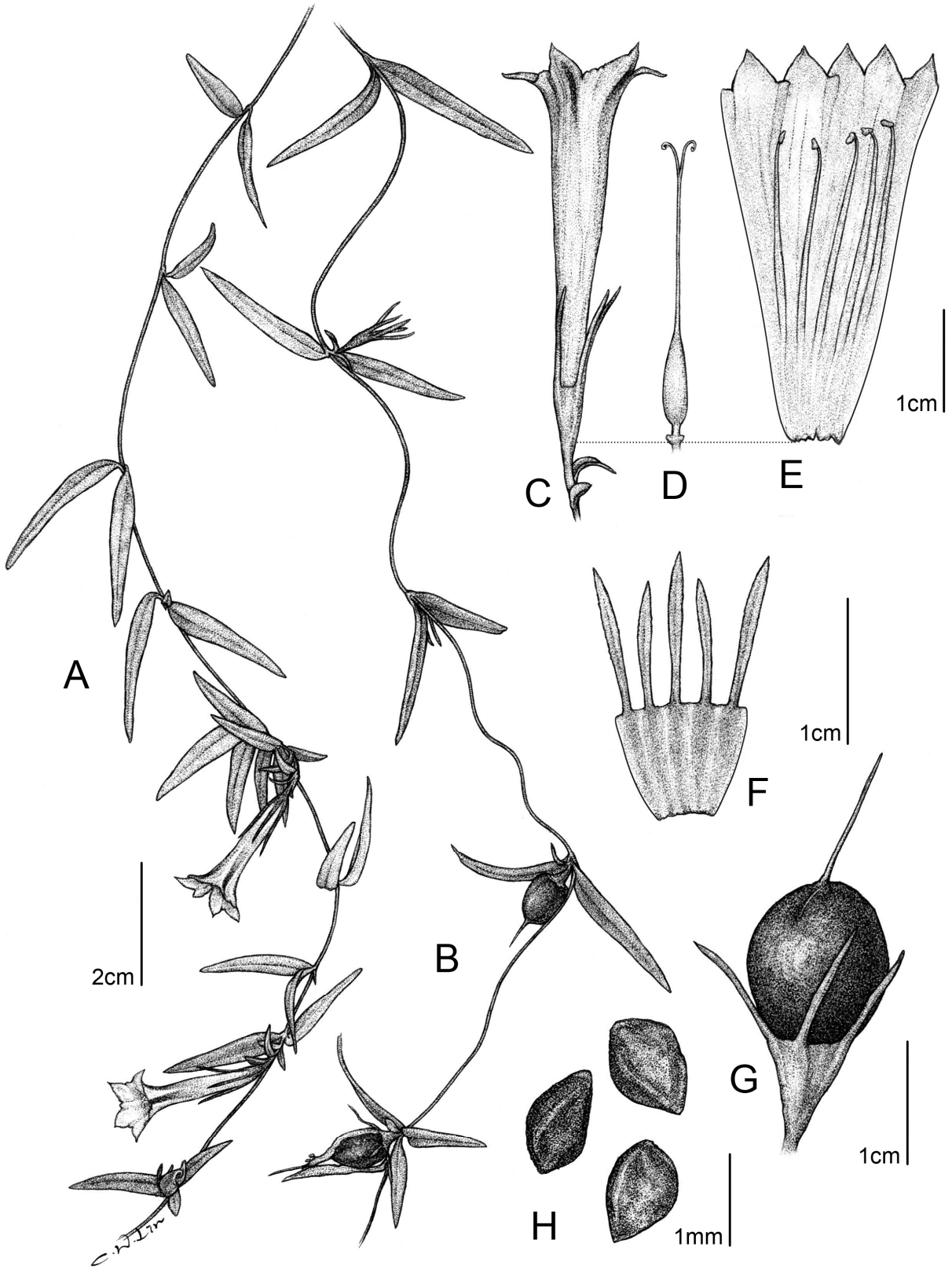


Fig. 1. ***Thipterospermum hualienense*****. A: Flowering habit. B: Fruiting habit. C: Flower, lateral view. D: Pistil. E: Corolla, expanded and flattened. F: Calyx, expanded and flattened. G: Berry and persistent calyx. H: Seeds. Drawn by Che-Wei Lin from** ***T. C. Hsu 4891*** **(A, C-F) and** ***T. C. Hsu 3819*** **(B, G-H).**

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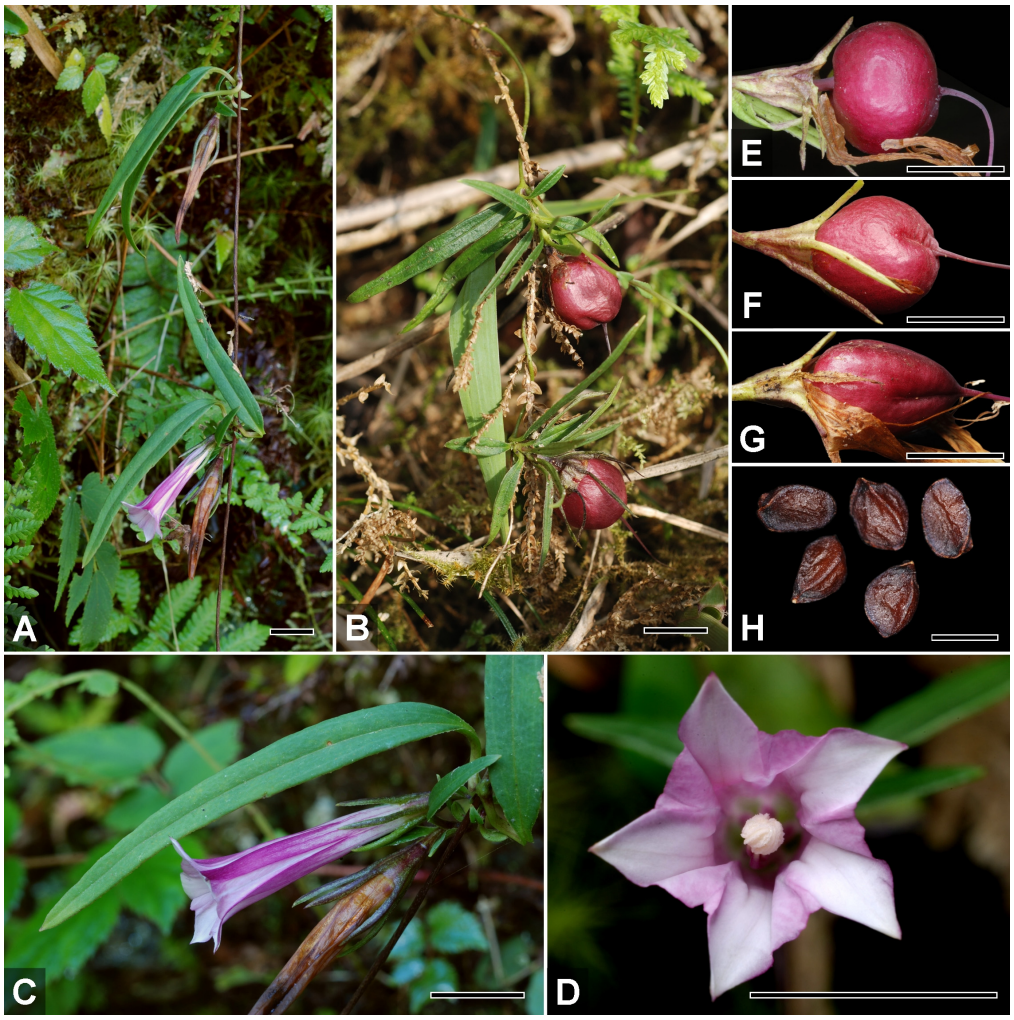


Fig. 2. ***Thipterospermum hualienense.*** **A: Flowering habit. B: Fruiting habit. C: Leaf and flower. D: Flower, top view. E-G: Berries. H: Seeds. Scale bars: A-G = 1 cm; H = 1 mm. Photo from** ***T. C. Hsu 4891*****(A, C, D) and** ***T. C. Hsu 3819*** **(B, E-H).**

ellipsoid, ca. 1 mm. Disc ca. 1 mm. Ovary 7-9 mm long; gynophore 1-2 mm. Style linear, 1.1-1.3 cm. Berries often included in withered corolla, reddish purple, subglobose to ovoid, 10-16 × 8-12 mm; gynophore slightly shorter to slightly longer then calyx tube. Seeds dark-brownish, ellipsoid to ovoid, triquetrous, 1-1.3 mm, wingless.

Distribution: Endemic to Taiwan.

Habitat and ecology: Populations mostly found in limestone-rich mountainous regions of eastern Taiwan, 1300-2300 m in alt. Plants scattered around shrubs, forest gaps, and roadsides. Flowering from August to December. Fruiting from November to April.

Additional specimens examined (paratypes): TAIWAN. Hualien County: Sioulin Township: Hoping Logging Trial (Hoping Forest Track, 和平林道), *S. F. Huang et al. 5174* (TAI); same loc., *T. C. Hsu 5139* (TAIF); Mt. Chingshui (清水山), *C. K. Liou 1457* (TAIF); same loc., *T. T. Ho 74* (TAIF); Mt. Chienliyen (千里眼山), *T. C. Hsu 3773* (TAIF); Mt. Sanchiaochui (三角錐山), 14 Jan 1990, *S. Y. Lu s.n.* (TAIF); Yenhai Forest Road (研海林道), *K. Y.Wang 376* (HAST); Pilu (碧綠), *P. F. Lu 12240* (HAST); Tianchang Cliff (天長斷崖), *T. C. Hsu 3819* (TAIF); Mt. Lan (嵐山), *T. C. Huang 4230* (TAI); same loc., *S. Y. Lu 13066*; *13109* (TAIF). Wanrong Township, Wanrong Forest Road (萬榮林道), *Y. C. Kao 450* (HAST); same loc., *S. W. Chung 8467* (TAIF). Taitung County: Haiduan Township, from Liyuan (栗園) to Hsiangyang (向陽), *T. C. Hsu 951* (TAIF).

Notes: The first specimen corresponding with this taxon (*T. C. Huang 4230*) was collected in 1967 but was identified as *Tripterospermum luzonense* (Vidal) J. Murata (Murata ,1989; Wang and Chen, 1998; Wang et al., 2009). Other earlier specimens were variously determined as *T. lanceolatum* Hayata, *T. luzonense* or *T. microphyllum* Harry Sm. in herbaria and previous studies. The lacking of fruiting specimens, which is important in diagnosing this species, in early collections might be the main cause of such confusion. Morphologically, *Tripterospermum hualienense* is most

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Table 1. Morphological comparison of *Tripterospermum hualienense* and *T. microphyllum*.

species	*T. hualienense*	*T. microphyllum*
stem	trailing at base; often twining toward apex; less often creeping or pendulous	trailing at base; prostrate or creeping toward apex; rarely twining
leaf size	1-5 × 0.3-0.7 cm	1-2.6 × 0.3-0.5 cm
leaf shape in upper nodes	linear to linear-lanceolate	deltoid-lanceolate to lanceolate
leaf base	attenuate and slightly decurrent	attenuate to obtuse
leaf margin	cartilaginous and minutely scabrous; never crenate	indistinctly cartilaginous and scabrous; often crenate
inflorescence	terminal and axillary	mostly terminal
calyx lobe	ca. as long as to longer then calyx tube; 3-11 × 0.5-1.5 mm	shorter to ca. as long as calyx tube; 3-6 × 0.3-0.8 mm
corolla shape	almost cylindrical	campanulate
corolla length	2.4-3.7 cm	2-2.8 cm
insertion of stamens in corolla tube	slightly above the top of ovary	around the middle of ovary
ovary length	7-9 mm	5-6 mm
gynophore length at anthesis	1-2 mm	2-3 mm
berry size	10-16 × 8-12 mm	8-10 × 5-7 mm
seed length	1-1.3 mm	1.5-2 mm

similar to *T. microphyllum*. To clarify their distinction, a detailed comparison of *T. hualienense* and *T. microphyllum* based on a revised specimen examination is given in Table 1. The description of *T. microphyllum* in some studies (Wang and Chen, 1998; Wang et al., 2009) is actually a mixture of true *T. microphyllum* and *T. hualienense*.

ACKNOWLEDGEMENTS

The authors are grateful to Mr. S. K. Yu, Mr. D. M. Huang, Dr. R. C. C. Hsu and Dr. C. T. Lu for field assistance, Mr. C. W. Lin for the great line-drawing, and the curators of TAI and HAST for herbarium access.

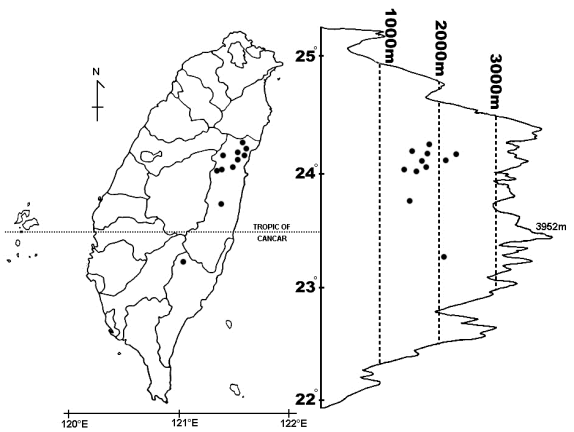


Fig. 3. Distribution map of *Tripterospermum hualienense* (solid circles).

LITERATURE CITED

Chen, C. H., J. C. Wang and Y. C. Chang. 2006. *Tripterospermum lilungshanense* (Gentianaceae), a new species in Taiwan. Bot. Stud. (Taipei) **47**: 199-205.

Ho, T. N. and J. S. Pringle. 1995. *Tripterospermum*. In: Z. Y. Wu and P. H. Raven (eds.), Flora of China **16**: 6-11. Missouri Botanic Garden, St. Louis, USA, and Science Press, Beijing, China.

Hul, S. 2002. Nouvellesespècesde *Crawfurdia*, *Tripterospermum* et *Gentiana* (Gentianaceae) du Viêtnam. Adansonia, ser. 3. **24**: 27-41.

Liu, T. S. and C. C. Kuo. 1978. *Tripterospermum*. In: H. L. Li et al. (eds.), Flora of Taiwan. Vol. **4**. Epoch Publ. Co., Taipei, Taiwan. pp. 191-201.

Murata, J. 1989. A synopsis of *Tripterospermum* (Gentianaceae). J. Fac. Sci. Univ. Tokyo Sec. III. **16**: 273-339.

Wang, J. C. and Y. C. Chen. 1998. *Tripterospermum*. In: T. C. Huang et al. (eds.), Flora of Taiwan, 2nd ed. **4**: 183-190. Editorial Committee, Dept. Bot., NTU, Taipei, Taiwan.

Wang, J. C., C. H. Chen and C. T. Lu. 2009. Flora of Taiwan. Gentiaceae. National Taiwan Normal University, Taipei, Taiwan. pp. 1-109.

Satake, Y. 1951. On the genus *Tripterospermum* and some Formosan species. J. Jap. Bot. **26**: 103-108.

Zhang, Y., H. Wang, J. Zeng and X. Jin. 2009. A New Variety of *Tripterospermum chinense* (Gentianaceae) from Zhejiang Province, Eastern China. Novon **19**: 277-280.

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臺灣龍膽科新種：東臺肺形草

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摘要：本文記述臺灣龍膽科新種植物東臺肺形草 (*Tripterospermum hualienense*)。此新種於形態上接近小葉肺形草 (*T. microphyllum*)，但可藉由下列特徵加以區辨：莖延展且常具纏繞性，莖上部葉片線形至線狀披針形，略大的花萼裂片，窄長之花冠筒，花絲著生於花冠筒較高處，較短的子房柄，較大的果實，及明顯較小的種子。目前東臺肺形草之野外族群僅發現於臺灣東部山區。

關鍵詞：龍膽科，新種，臺灣，分類學，東臺肺形草。

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