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PERSICARIA LANKESHANENSIS (POLYGONACEAE: PERSICARIEAE), A NEW SPECIES FROM GUANGDONG, CHINA

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Abstract

Persicaria lankeshanensis, a new species of Polygonaceae from the Lankeshan Nature Reserve, Guangdong province of China, is described and illustrated. *Persicaria lankeshanensis* is similar to *P. taquetii* but differs from the latter by having stems, leaves, and ocreae densely pubescent, pedicels shorter than bracts, smaller flowers and achenes, and achenes opaque and minutely granular-striate. A comparison of achenes, pollen and abaxial leaf epidermis between the two species is provided.

Introduction

Persicaria [Tourn.] *ex* Mill. contains c. 150 species of prostrate or twining annual or perennial herbs, and are distributed mainly in northern temperate and tropical regions (Brandbyge, 1993). It is characterized by many-flowered, spike-like or capitate inflorescence; usually entire, ciliate, or pectinate ocreae; 4–5-parted perianths; tepals with trifid venation; the presence of nectaries; 4–8 stamens (Haraldson, 1978; Ronse Decraene and Akeroyd, 1988); and mostly rectangular to elongated tepal epidermis cells with straight or slightly undulating anticlinal walls (Hong *et al.,* 1998). Within *Persicaria*, Haraldson (1978) recognized four sections, viz. *Cephalophilon* (c. 16 species), *Echinocaulon* (c. 21 species), *Persicaria* (c. 60 species), and *Tovara* (c. 3 species). Qaiser (2001) accepted this treatment, while Freeman (2005) included *Rubrineva* (c. 2 species) and Hou (2006) excluded *Tovara*.

During a field trip in September 2009 in the Lankeshan Provincial Nature Reserve in Guangdong Province of China, a slender *Persicaria* with completely interrupted spike-like inflorescence, densely pubescent stems, leaves, and ocreae, and tiny flowers and fruits was collected. The plants superficially resemble *P. taquetii* (H. Lév.) Koidz., but can be distinguished by a suite of morphological and micromorphological characters. After critical study we recognized it as a new species, *Persicaria lankeshanensis* **sp. nov.**

Materials and Methods

Morphological comparisons of the new species and its related taxa were carried out based on both herbarium specimens and live plants. Characters were measured using a micrometer and a stereomicroscope. Field studies were carried out from 2009 to 2011.

For scanning electron microscopy (SEM) observations, samples of achenes and pollen were removed from mature fruits and unopened flowers, respectively, from the herbarium specimens. After cleaned in 95% ethanol, mounted onto cupreous stubs, and coated by JFC-1100E sputter coater (JEOL Led., Janpan), samples were examined under JSM-6360LV SEM (JEOL Led., Japan) at a voltage of 15 KV. Terminology for achenes and pollen follows Hou (2006) and Zhang and Zhou (1998), respectively.

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For light microscopy (LM) investigation of leaf epidermis, samples were taken from mature leaves of live plants, fixed in FAA solution (18 formalin:1 acetic acid:1 ethanol), dissected under a Zeiss stereoscope, and stained in a solution of 1% safranin before being mounted in glycerine jelly. Measurements and counts were conducted randomly from 5 areas in the prepared slide per species under LM. Stomatal density was calculated using the formula S/M × 100%, where S is the number of stomata in a given area (M). Terminology follows Zhu *et al.* (2007).

Persicaria lankeshanensis T. J. Liang & B. Li, **sp. nov.** (**Figs 1 & 2**).

Diagnosis: *Species P. taquetii (H. Lév.) Kodiz. affinis, sed caules, folia, ochreae dense pubescens, perianthia 0.7-1.0 mm, achenia striato–granulatis, 0.7–1.0 × 0.5–0.7 mm differt.*

Type: CHINA. Guangdong: Zhaoqinq city, Lankeshan Provincial Nature Reserve, growing in wet grassy slopes along river side, altitude 200 m, 23°08′38″N, 112°35′20″E, 24 Sep 2009, *Bo Li* 0075 (*Holotype*: IBSC; *Isotype*: JXAU).

Annual herbs. Stems erect, prostrate, or ascending at base, 15-35 cm tall, slender, densely pubescent, much-branched from base, rooting at proximal nodes. Leaves: ocreae tubular, 4-6 mm long, membranous, densely pubescent, apex truncate, cilia 3-5 mm long; petioles nearly absent; leaf

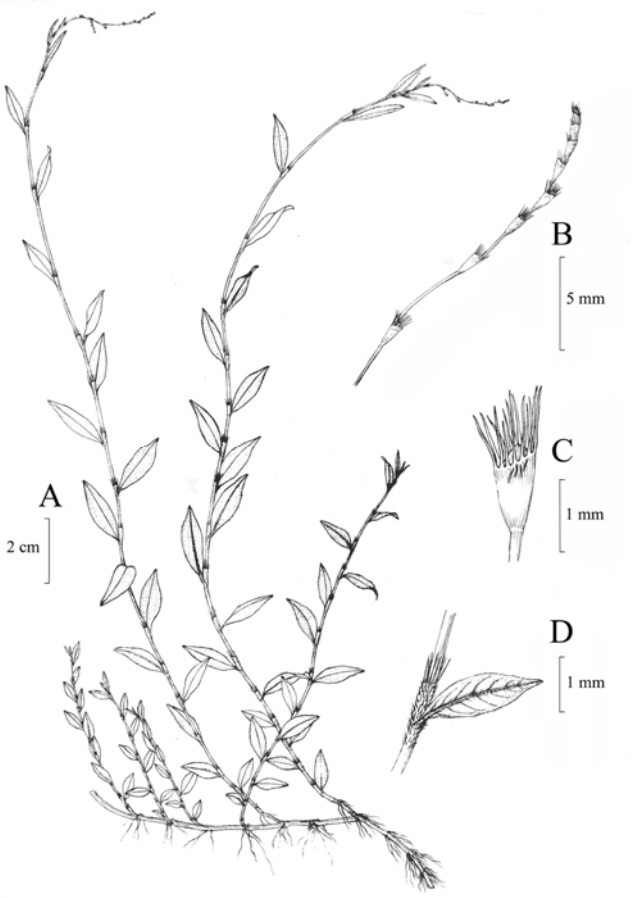

Fig. 1. *Persicaria lankeshanensis* T. J. Liang & B. Li, **sp. nov.** A. Habit; B. Inflorescence; C. Bract; D. Ocrea and leaf (all from the type, *Bo Li* 0075, IBSC).

blades narrowly lanceolate, 15-30 × 4-8 mm, both surfaces densely pubescent, base narrowly cuneate, or slightly rounded, margin entire, ciliate, apex acute. Inflorescence terminal or rarely axillary, spike-like, erect, 1.5-2.5 cm long, slender, interrupted. Bracts green, funnelform, 1.5-2.0 mm long, densely pubescent, margin submembranous, ciliate, each 2-3-flowered. Pedicels 0.8-1.3 mm long, much shorter than subtending bracts. Perianth white, 5-parted, lobes (or tepals) elliptic, 0.7-1.0 mm long. Stamens 7, included. Styles 3, included, connate to below middle; stigmas capitate. Achenes included or slightly exserted from persistent perianth, brown-black, minutely granular-striate, opaque, ovoid, trigonous, 0.7-1.0 x 0.5-0.7 mm.

Phenology: Flowering: August - October; fruiting; September - November.

Etymology: The specific epithet is derived from the type locality.

Distribution and habitat: *Persicaria lankeshanensis* is known only from two nearby localities in Lankeshan Provincial Nature Reserve, Guangdong province of China, from where it was first collected in 2009. It grows in wet, grassy slopes along river sides at an altitude of 100-200 m.

Notes: *Persicaria lankeshanensis* bears a superficial resemblance to *P. taquetii* in having very slender and completely interrupted inflorescence, tiny flowers and fruits, 7 stamens, small and narrowly lanceolate leaves, and slender stems. However, *P. lankeshanensis* differs from *P. taquetii* in plant indumentum, pedicel length, tepal length, and achene size and surface texture (Table 1; Fig. 3A vs. E).

Fig. 2 *Persicaria lankeshanensis* T.J. Liang & B. Li, **sp. nov.** A. Habit; B. A part of stem with ocrea showing pubescence; C. Pubescence of adaxial surface of leaf blade; D. Inflorescence.

In *Persicaria*, achenes (Yang *et al.*, 1991; Ronse Decraene *et al.*, 2000; Qu *et al.*, 2006), abaxial leaf epidermis (Meng *et al.*, 1997; Zhu *et al.*, 2007; Yasmin *et al.*, 2010a), and pollen (Hedberg, 1946; Wang and Feng, 1994; Zhang and Zhou, 1998; Yasmin *et al.*, 2010b) have been proved to be useful characters for the species delimitation. In this study, we found that *P. lankeshanensis* and *P. taquetii* also can be distinguished from each other by the epicarp sculpturing of the achenes, the shape of the epidermal cells on the abaxial leaf surface, the type of stomata, and pollen size and ornamentation (Table 1, Fig. 3).

Table 1. Comparison of *Persicaria lankeshanensis* sp.nov. with *P. taquetii*.

Characters	*P. lankeshanensis* sp. nov.	*P. taquetii*
Plant indumentum	Stems, leaves, and ocreae densely pubescent	Leaves and ocreae sparsely pubescent or rarely glabrous, stems glabrous
Pedicel	0.8-1.3 mm long, much shorter than bracts	1.8-2.7 mm long, obviously longer than bracts
Tepal	0.7-1.1 mm long	1.4-1.6 mm long
Achene		
Size (L × W)	0.8 (0.7-1.0) × 0.6 (0.5-0.7) mm	1.5 (1.3-1.6) × 0.8 (0.7-1.0) mm
Surface	Opaque, minutely granular striate	Shiny, smooth
Epicarp sculpturing	With irregular ridges formed by oblate tubercles following a longitudinal pattern	With irregular hollows
Leaf abaxial epidermis		
Epidermal cell shape and anticlinal wall	Polygonal, straight or curved	Irregular, sinuolate
Stomatal type	Anisocytic	Paracytic, rarely anisocytic
Stomatal density	88.1 / mm^2	168.5 / mm^2
Pollen		
Size	31.1-36.7 μm	37.5-56.8 μm
Width between two adjacent pores	8.2-12.3 μm	11.2-17.4 μm
Lumen number across the diameter	9-12	6-9
Lumen size	3.8-4.7 μm	6.4-10.1 μm
Granules in a lumen	Obscure, undeveloped	25-40, well developed
Number of coarse granules of murus in cross-section under LM	18-22	14-17
Width between two adjacent granules under LM	3.9-5.3 μm	8.2-11.3 μm

Additional specimens examined: CHINA. Guangdong Province: Zhaoqinq City, at the boundary of the Lankeshan Provincial Nature Reserve, 23°08′15″N, 112°34′58″E, alt. 15 m, 8 Oct 2010, *Bo Li and Zhu-Qiu Song* 201002 (IBSC).

Conservation status: *Persicaria lankeshanensis* is only recorded from the Lankeshan Provincial Nature Reserve, Guangdong, China. Given the species was observed only in two nearby localities in a about 5 km^2 area at the nature reserve, we propose to categorize it as Vulnerable (VU) on the IUCN Red List, according to the criteria D2 (IUCN, 2001).

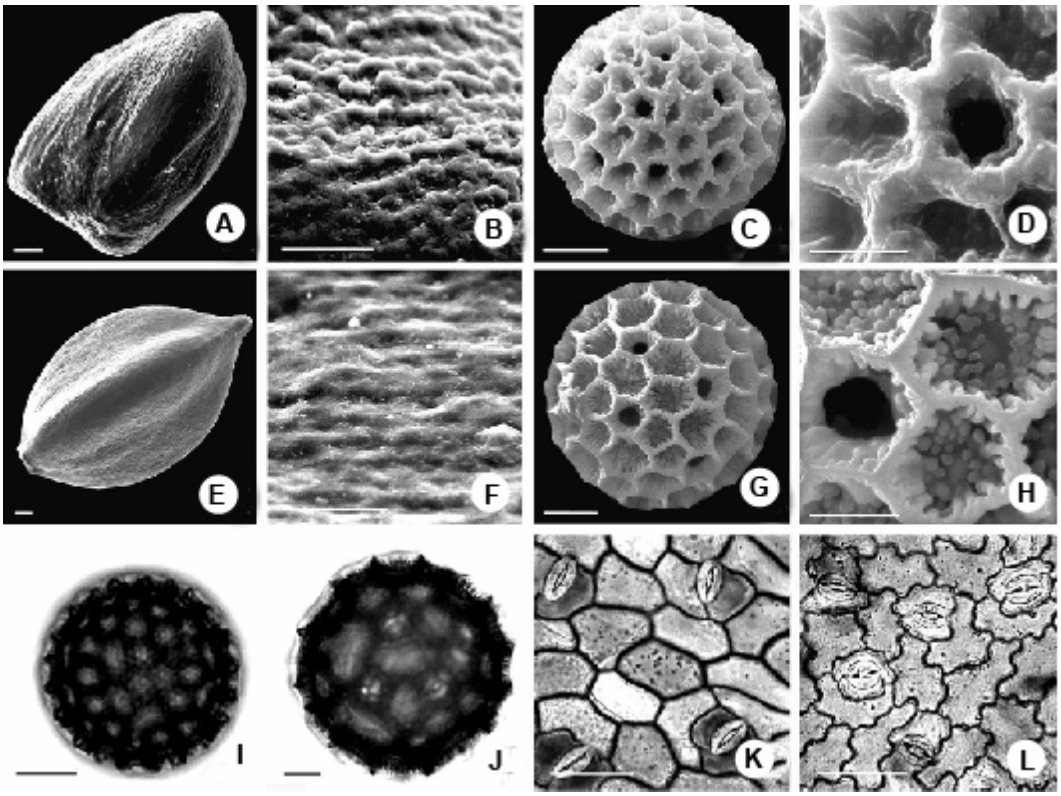

Fig. 3. Micromorphology of *Persicaria lankeshanensis* (A–D, I, K) and *P. taquetii* (E–H, J, L). A,B,E,F. Achene morphology under scanning electron microscopy (SEM); A,E. Lateral view; B,F. Epicarp sculpturing, C,D,G,H. Pollen morphology under SEM; C,G. Whole view; D,H. Lumen and granules inside; I,J. Pollen morphology under light microscopy (LM); K,L. Leaf abaxial epidermis under LM. Scale bars: A,E = 100 μm; B,F,K,L = 50 μm; C,G,I,J = 10 μm; D,H = 5 μm.

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