

## *Elatostema densistriolatum* sp. nov., *E. latistipulum* sp. nov. and *E. cyrtandrifolium* var. *hirsutum* var. nov. (Urticaceae) from southwest China

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Two new species and one new variety of *Elatostema* J. R. Forst. & G. Forst. (Urticaceae) are described from Yunnan and Xizang, China. Habitat details and morphological comparison with similar species are given and discussed. The new taxa proposed are: *Elatostema densistriolatum* W. T. Wang & Zeng. Y. Wu, *E. latistipulum* W. T. Wang & Zeng Y. Wu and *E. cyrtandrifolium* (Zoll. & Mor.) Miq. var. *hirsutum* W. T. Wang & Zeng Y. Wu.

The genus *Elatostema* is the second largest genus within Urticaceae, and is distributed in tropical and subtropical regions of Africa, Asia and Oceania (Lin et al. 2003). Out of 300 species so far recorded, about 170 species occur in China (Wang 1995, 1997, 2006, 2010, Wang and Wei 2007, 2008, Lin and Duan 2008, Duan and Lin 2010), mainly in the southwest and south, with the majority of the species occurring in the provinces Yunnan, Guangxi, Sichuan and Guizhou (Wang 1995).

During fieldwork between 2008 and 2010 in southwestern China, a few fairly different specimens of *Elatostema* were collected and investigated. Critical studies revealed that two species and one new variety should be added to the genus. These novel taxa are described and illustrated below.

### *Elatostema densistriolatum* W. T. Wang & Zeng Y. Wu sp. nov. (Fig. 1A–J, 2)

Sect. *Weddellia* (H. Schröter) W. T. Wang ser. *Salvinioidea* W. T. Wang

*Species nova haec est arcte affinis E. salvinioidei* W. T. Wang, quod foliis minoribus usque ad 2.6 cm longis 1 cm latis tantum secus costam medianam et marginem cystolithos gerentibus, stipulis cystolithis carentibus, nanophyllis redactis oblongis vel obovato-oblongis superne albo-marginatis haud semihyalinis, capitulis staminatis dimorphis, acheniis minoribus 0.28–0.50 mm longis haud angulatis differt.

**Type:** China. Yunnan, Malipo county, Tianbao village, Jiangjun cave, 22°58'1.02"N, 104°48'42"E, 162 m a.s.l.,

4 Aug 2010, Zeng-Yuan Wu 10129 (holotype: KUN, isotypes: KUN, PE); the same locality, 14 Jan 2010, Germplasm Bank of Wild Species team (GBOWS) 419 (paratypes: KUN, PE).

Perennial herbs, dioecious or monoecious, 11–30 cm tall. Stems erect, longitudinally angulate, simple, puberulent, with dense cystoliths, 0.2–0.3 mm. Leaves alternate, glabrous; petiole absent or 1.0–1.2 mm long; stipules membranous, triangular or broadly ovate, 3.0–3.2 × 1.0–1.5 mm, bearing cystoliths, 0.2–0.5 mm, lacking white margins; leaf blade herbaceous, obliquely obovate-oblong or obliquely narrowly obovate, 12–60 × 6–22 mm, tri-nerved, margin 1–4-crenate, apex obtuse or rounded, with obscure basal nerves and one pair of obscure lateral nerves, cystoliths conspicuous, dense, 0.2–0.8 mm, spindle-shaped or bacilliform, base obliquely cordate. Cataphylls lanceolate-linear or lanceolate, 5–12 × 1.2–3.0 mm, glabrous, on base of mid-rib with a few cystoliths, apex acute, margin entire and semihyaline, colourless. Nanophylls lanceolate-linear or lanceolate, apex acuminate, 8–13 × 1.2–3.0 mm, with cystoliths. Staminate capitulum singularly axillary, sessile, bi-bracteate, dimorphic: 1) Larger staminate capitulum 4–6 mm in diameter; bracts 2, folded lengthways, brownish, membranous, not semihyaline, almost rounded, 4–5 × 3.0–4.6 mm, with dense cystoliths, ciliolate, abaxially sparsely puberulous and below apex corniculate, horn-like projections 0.8–1.5 mm long; bracteoles ca 8, brownish, not semihyaline, oblong, long elliptic or linear, 1.5–4 × 0.15–1.00 mm, ciliate, with cystoliths. 2) Smaller staminate capitulum ca 1 mm in diameter; bracts 2, white, thinly membranous, semihyaline, with a few cystolith, not

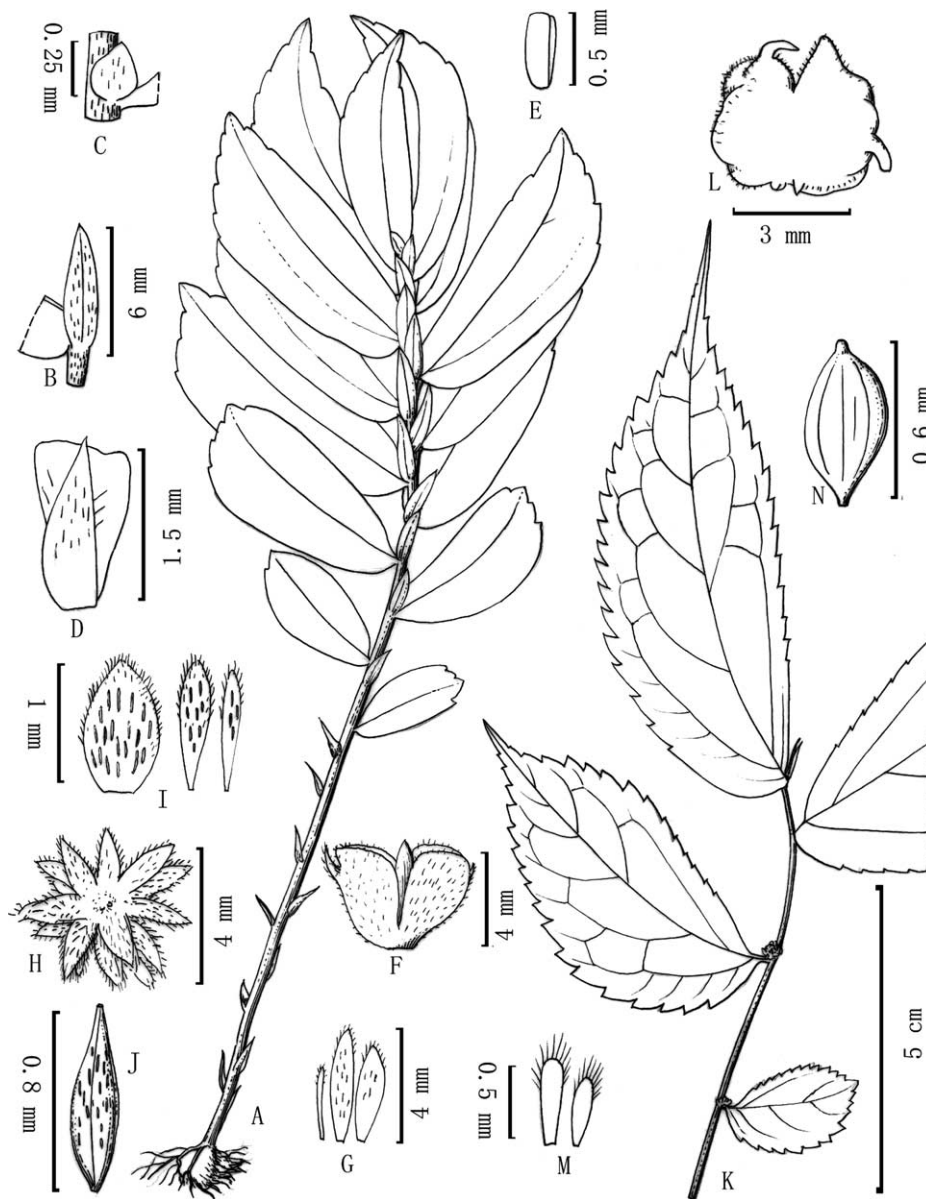


Figure 1. (A)–(J) *Elatostema densistriolatum* W. T. Wang & Zeng Y. Wu sp. nov. (A) habit, (B) nanophyll, (C) stipule, (D) staminate capitulum, showing two bracts, (E) two staminate bracteoles, (F) another staminate capitulum, (G) another staminate bracteoles, (H) pistillate capitulum, seen from beneath, (I) pistillate bracteoles, (J) achene. (K)–(N) *E. cyrtandrifolium* (Zoll. & Mor.) Miq. var. *hirsutum* W. T. Wang & Zeng Y. Wu. Var. nov. (K) upper part, (L) pistillate capitulum, seen from beneath, (M) bracteoles, (N) achene. Drawn by Ying-Bao Sun based on Zeng-Yuan Wu 10219 and Zeng-Yuan Wu 09210.

corniculate, the adaxial bract narrowly triangular, ca 1.5 mm long and 0.7 mm broad, on margin with 2–3 hairs, apex attenuate, the abaxial bract obtuse, 1.5 mm long, 1 mm broad, glabrous, apex truncate; bracteoles 2, white, thinly membranous, semihyaline, oblong, 0.15–1.25 mm long, glabrous. Pistillate capitula solitary, 3–5 mm in diameter, sessile; receptacle obscure; bracts 8–15, ovate, narrowly ovate or obliquely lanceolate, 1.2–2.0 × 0.4–1.0 mm, with cystoliths, puberulent; bracteoles 20, oblong-ovate or lanceolate, 1.0–1.2 × 0.2–0.8 mm, margin with dense cystoliths. Achene brownish, narrowly ellipsoidal or lanceolate, 0.7–0.8 × 0.35 mm, inconspicuously longitudinally 5-angulate, lineolate.

#### **Habitat and ecology**

*Elatostema densistriolatum* is an understory herb. It usually occurs on wet limestone cliffs in monsoon forest, where it is associated with species of *Ficus*, *Begonia*, and other species of *Elatostema*, e.g. *E. aliferum* W. T. Wang.

#### **Distribution and conservation status**

*Elatostema densistriolatum* is probably a locally endemic species in China, so far it is known only from the type locality around the Jiangjun cave in Malipo county in southeastern Yunnan. Here, a population with about 100 individuals was observed in an area of 1 km<sup>2</sup>. However, there are inadequate data to evaluate its conservation status.

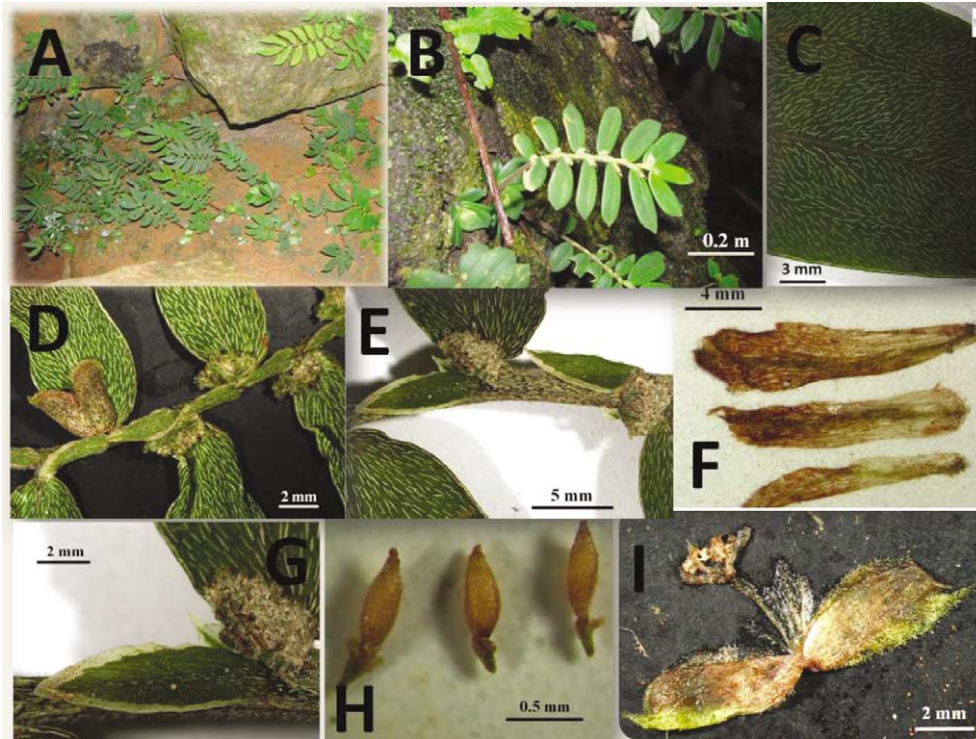


Figure 2. *Elatostema densistriolatum* W. T. Wang & Zeng Y. Wu sp. nov. (A)–(B) habit, (C) dense cystoliths on the leaf blade, (D) monoecism, showing one staminate capitulum and three pistillate capitula, (E) pistillate plant, showing two axillary pistillate capitula, (F) staminate bracteoles, (G) nanophylls, (H) achenes, (I) staminate capitulum.

According to IUCN red list criteria (IUCN 2010), *Elatostema densistriolatum* should be included in the category ‘Data Deficient’ (DD).

### Similar species

*Elatostema densistriolatum* belongs to ser. *Salvinioidea* W. T. Wang, which includes *E. salvinioides* W. T. Wang and *E. simplicissimum* Q. Lin (Wang 1995, Lin 2008). *Elatostema densistriolatum* differs from *E. salvinioides* in its larger leaves with dense cystoliths, stipules bearing cystoliths, lanceolate nanophylls lacking white margins, and by its dimorphic staminate capitulum. In contrast, *E. salvinioides* has smaller leaves up to 6 mm long and 1.9 mm broad, cystoliths present only along the midrib and leaf margin, stipules lacking cystoliths, reduced nanophylls that are oblong or obovate-oblong in outline and white-marginate above, and monomorphic staminate capitula. *Elatostema densistriolatum* is distinguished from *E. simplicissimum* by having glabrous leaves, glabrous stipules bearing cystoliths, lanceolate nanophylls, and its dimorphic staminate capitulum. In contrast, in *E. simplicissimum* the leaves are abaxially villose, the stipules are ciliate and lack cystoliths, the nanophylls are ovate or broadly ovate in outline, and the staminate capitulum is monomorphic as in *E. salvinioides*.

### Key to ser. *Salvinioidea* W. T. Wang

1. Staminate capitula dimorphic; stipules with cystoliths; nanophylls glabrous and lacking white margin; cataphylls lanceolate . . . . . *E. densistriolatum*

- Staminate capitula monomorphic; stipules without cystoliths; nanophylls ciliate with white margin; cataphylls cordate or triangular . . . . . 2
- 2. Plant 12–17 cm tall; leaf blade glabrous, 10–19 × 4–6 cm, cystoliths present only along mid rib and margin; stipule glabrous; nanophylls oblong or obovate-oblong . . . . . *E. salvinioides*
- Plant 12–25 cm tall; leaf blade ciliate, 10–26 × 4–10 cm, with dense cystoliths; stipule ciliate; nanophylls ovate-broadly ovate . . . . . *E. simplicissimum*

### *Elatostema cyrtandrifolium* (Zoll. & Moritz) Miq. var. *hirsutum* W. T. Wang & Zeng Y. Wu var. nov. (Fig. 1K–N, 3)

Sect. *Elatostema* ser. *Cuspidata* W. T. Wang  
*A. E. cyrtandrifolio* var. *cyrtandrifolio* foliis subtus prope basin ad costam medianam hirsutis, acheniis ellipsoideis ad utrumque finem acutis differt.

**Type:** China. Yunnan, Kunming city, Xishan mountain, 24°57′42.85″N, 102°37′46.39″E, 2100 m a.s.l., 11 Jul 2009, Zeng-Yuan Wu 09210 (holotype: PE, isotypes: KUN, PE) (flowering).

Perennial herb, dioecious, 15–70 cm tall. Stems ascending or erect, branched or rarely simple, pilose, with dense cystoliths. Leaves alternate; petiole 5 mm long; stipules narrowly lanceolate or subulate, 6–7 × 0.8–1.0 mm, glabrous, with cystoliths; leaf blade obliquely elliptic, 2.5–17.0 × 1.0–1.5 mm, herbaceous or membranous, major basal lateral veins both arising at base of leaf blade, or one arising above

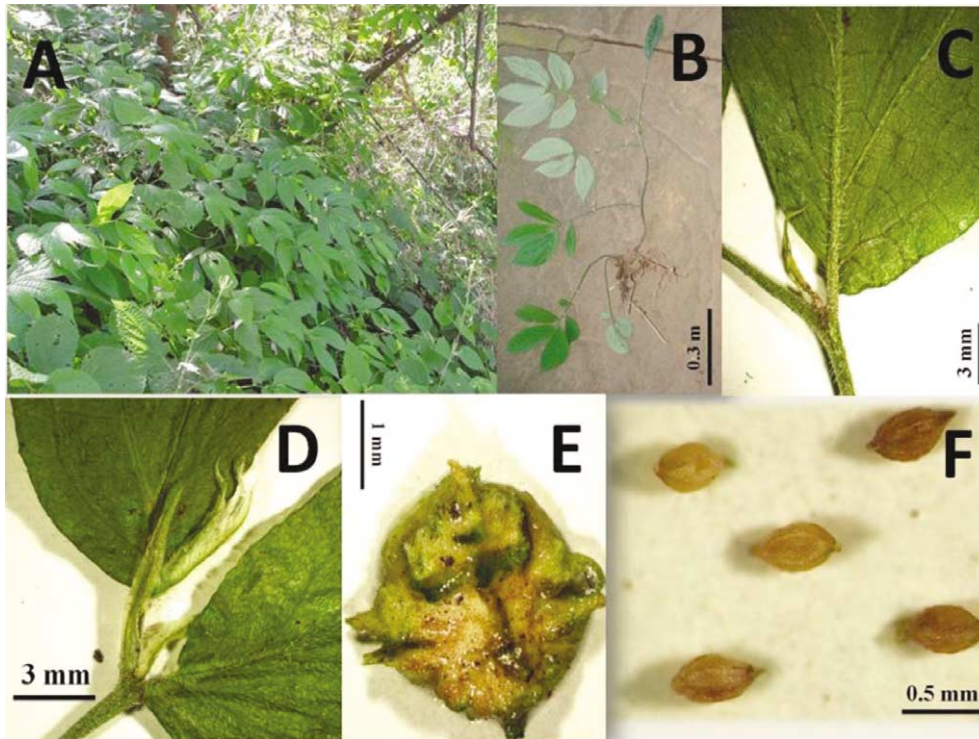


Figure 3. *Elatostema cyrtandrifolium* (Zoll. & Mor.) Miq. var. *hirsutum* W. T. Wang & Zeng Y. Wu var. nov. (A) habit, (B) one specimen in the field, (C) abaxial view of leaf showing the hirsute mid-rib, (D) shape and disposition of stipules, (E) pistillate capitulum, abaxial view, (F) achenes.

base, abaxial surface near base on mid-rib hirsute, adaxial surface sparsely strigulose, cystoliths conspicuous, dense, base at narrow side cuneate, at broad side rounded, margin sharply serrate, apex acuminate or shortly caudate. Nanophylls absent. Pistillate capitulum solitary, 3–5 mm in diameter, sessile; receptacle conspicuous; bracts 6, broadly ovate; bracteoles lanceolate. Achene brown, ellipsoidal, acute at both ends, longitudinally 6–8-ribbed.

#### Habitat and ecology

*Elatostema cyrtandrifolium* var. *hirsutum* is an understory herb, occurring in shady areas or along the roadsides, at an elevation of 1900–2100 m a.s.l.

This variety was found in the subtropical evergreen broadleaf forests in association with *Castanopsis delavayi* Franch. and *Fargesia yunnanensis* Hsueh & T. P. Yi. It also grows together with several other species of Urticaceae, e.g. *Boehmeria clidemioides* Miq., *Pilea sinofasciata* C. J. Chen, *Urtica mairei* H. Lév. and *Parietaria micrantha* Ledeb.

#### Distribution and conservation status

*Elatostema cyrtandrifolium* var. *hirsutum* has been collected only from the type locality, with a population of about 500 individuals in an area of 1 km<sup>2</sup>. According to IUCN red list criteria (IUCN 2010), this new species should belong to the category ‘Near Threatened’ (NT).

#### Similar taxa

*Elatostema cyrtandrifolium* var. *hirsutum* differs from *Elatostema cyrtandrifolium* var. *cyrtandrifolium* in its leaves which are hirsute abaxially near base on mid-rib, and the

ellipsoidal achenes that are acute in both ends. In var. *cyrtandrifolium*, the leaves are abaxially sparsely puberulous or glabrous along the nerves and the achenes are narrowly ovoid and rounded at base (Wang 1995).

#### Key to varieties of *Elatostema cyrtandrifolium*

1. Achenes ellipsoidal with both ends acute; leaves abaxially near base on midrib hirsute.....  
.....*E. cyrtandrifolium* var. *hirsutum*  
– Achenes narrowly ovoid, rounded at base; leaves puberulous or glabrous.....  
.....*E. cyrtandrifolium* var. *cyrtandrifolium*

#### *Elatostema latistipulum* W. T. Wang & Zeng Y. Wu sp. nov. (Fig. 4, 5)

*Species nova haec est affinis E. cyrtandrifolio* (Zoll. & Mor.) Miq., quod stipulis anguste lanceolatis vel subulatis, capituli pistillati bracteis 6, bracteolis anguste lineari-oblancoelatis vel spatulatis apice rotundatis cystolithis carentibus, acheniis minoribus 0.6–0.8 mm longis longitudinaliter 6–8-costatis recedit.

**Type:** China. Xizang, Cuona county, Lebugou, 27°51′02.9″N, 91°46′46.5″E, 2700 m a.s.l., 23 Sep 2008, S. D. Zhang 081308 (holotype: PE, isotype: KUN) (flowering).

Perennial herb, dioecious, 18–37 cm tall. Stems ascending or erect, simple, glabrous or at apex sparsely pilose, often radicans. Leaves alternate; petiole absent; stipules membranous, with



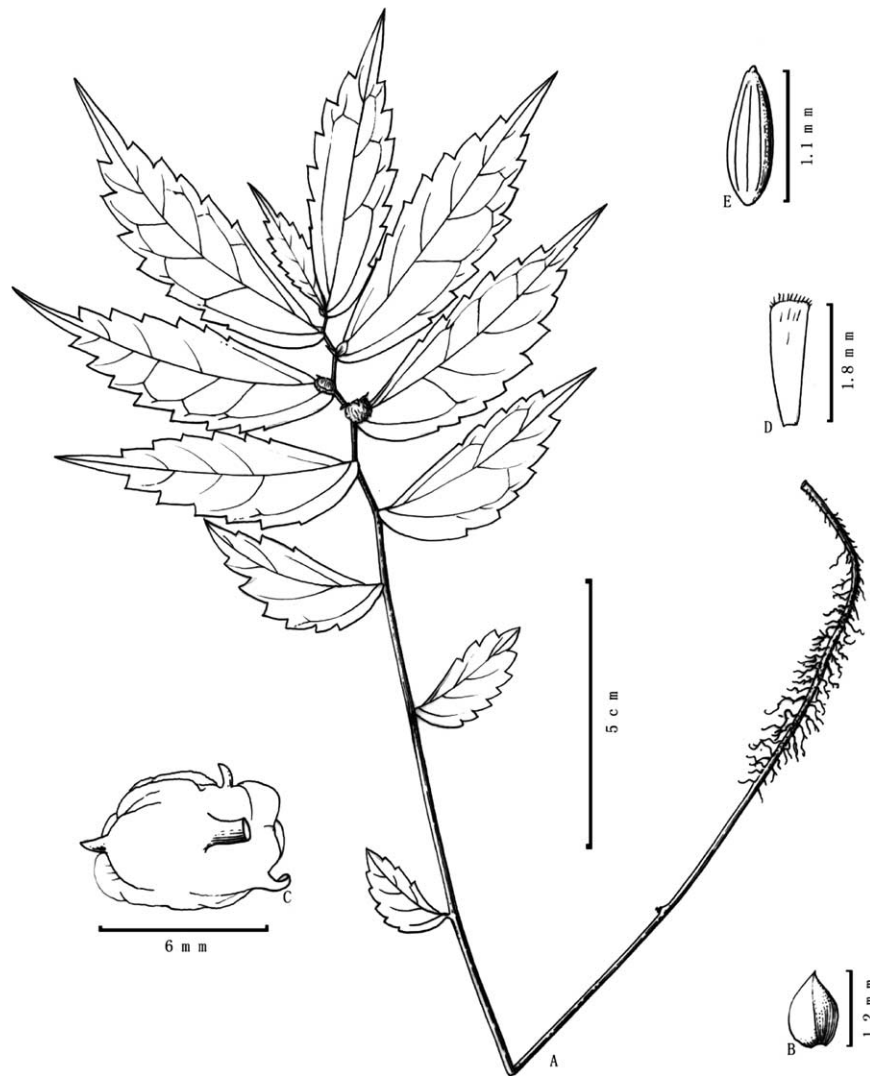


Figure 4. *Elatostema latistipulum* W. T. Wang & Zeng Y. Wu sp. nov. (A) habit, (B) stipule, (C) pistillate capitulum, (D) bracteole, (E) achene. Drawn by Ying-Bao Sun from S. D. Zhang 081308).

cystoliths, ovate, 1–2 × 1–5 mm, glabrous, 1-green nerved; leaf blade obliquely elliptic or oblong, 2–8 × 1.0–2.6 cm, membranous, tri-nerved, with 2–4 pairs of lateral nerves, abaxial surface sparsely puberulent or glabrescent along veins, adaxial surface sparsely strigulose, cystoliths conspicuous, dense, 0.2–0.5 mm, bacilliform, base at narrow side cuneate, at broad side rounded, margin dentate, apex acuminate or shortly caudate. Nanophylls absent. Pistillate capitula solitary, 3–5 mm in diameter, sessile; receptacle obscure; bracts 3, broadly ovate, 1.0–1.8 × 1.0–3.6 mm, glabrous, abaxially below apex carinate, with carinate projections 0.6–1.0 × 0.25–0.70 mm; bracteoles dense, membranous, broadly cuneiform-linear, 1.8 × 0.7 mm, apex obtuse, with some cystoliths. Achene brownish, narrowly ovoid, ca 1.1 mm long, longitudinally, 10-ribbed.

#### **Habitat and ecology**

*Elatostema latistipulum* has been collected only in Cuona county of Xizang. Here, it often grows sparsely in moist and shady habitats under forests, at an altitude of ca 2700 m.

The vegetation in this area is dominated by subtropical evergreen coniferous forest with greater representations of

*Tsuga dumosa*, *Taxus wallichiana* and many other broadleaf trees, e.g. *Acer*, *Quercus*, *Lyonia* and *Rhododendron*.

#### **Distribution and conservation status**

Specimens of *Elatostema latistipulum* deposited in PE and KUN were all collected from a single locality, i.e. Lebugou, Cuona county, Xizang, China. A population comprising of more than 500 individuals in an area of ca 1 km<sup>2</sup> was observed at this locality. The species is probably endemic to the southern belt of the eastern Himalaya, mainly within and around Shannan Prefecture in Xizang.

According to IUCN red list criteria (IUCN 2010), the new species should belong to the category 'Near Threatened' (NT).

#### **Similar species**

*Elatostema latistipulum* resembles *E. cyrtandrifolium*, from which it differs in its brownish stipules with one green nerve, 3-bracteate pistillate capitulum, pistillate bracteoles which are broadly cuneate-linear with truncate apex and have a few cystoliths on the abaxial side, achenes ca 1.1 mm

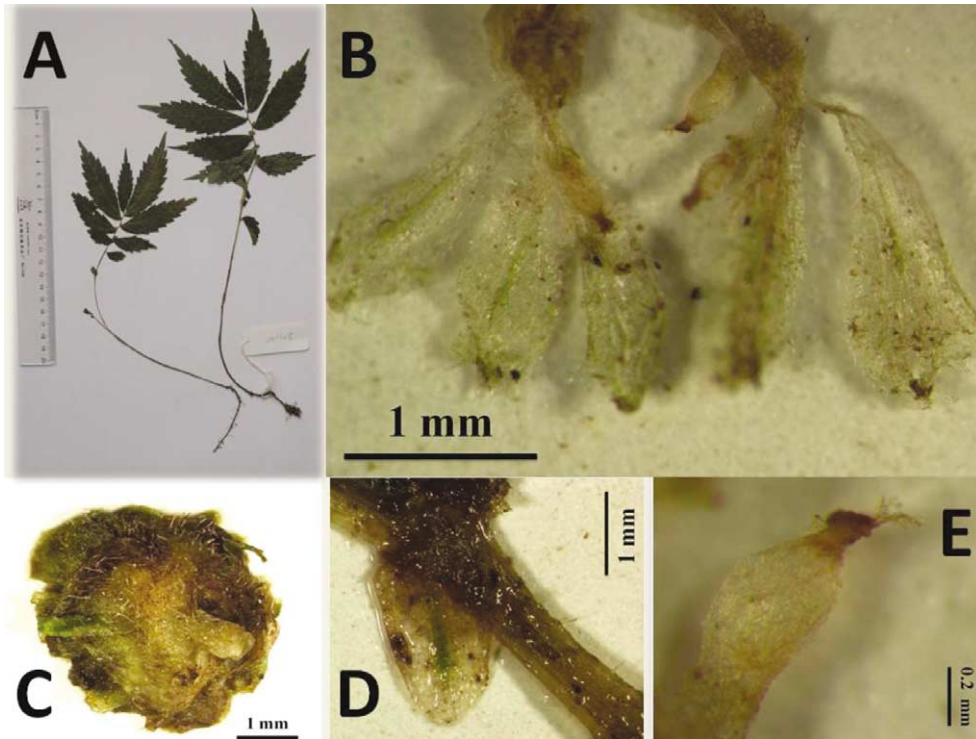


Figure 5. *Elatostema latistipulum* W. T. Wang & Zeng Y. Wu sp. nov. (A) specimen, (B) bracteoles, (C) pistillate capitulum, seen from beneath, (D) stipules, (E) achenes.

and 10-ribbed. In *E. cyrtandrifolium*, stipules are narrowly lanceolate or spatulate in outline, green and nerve-less, the pistillate capitulum has 6 bracts, the pistillate bracteoles are linear-oblongate or narrowly linear with apex rounded or obtuse and lacking cystoliths, and the achenes are 0.6–0.8 mm and 6–8-ribbed.

#### Key to *Elatostema latistipulum* and *E. cyrtandrifolium*

1. Stipules broadly cuneate, brownish with one green nerve; pistillate capitulum with 3 bracts; pistillate bracteoles cuneate-linear, bearing cystoliths, truncate at apex; achenes 10-ribbed ..... *E. latistipulum*
  - Stipules narrowly lanceolate or spatulate, greenish without nerves; pistillate capitulum with 6 bracts; pistillate bracteoles linear-oblongate or narrowly linear with apex round or obtuse, lacking cystoliths; achenes 6–8-ribbed ..... *E. cyrtandrifolium*

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