



## Weeding the nettles VI: Taxonomic and phylogenetic studies of the Southeast Asian *Urtica fissa*-clade (Urticaceae)

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### Abstract

*Urtica* L. (Urticaceae) is a subcosmopolitan genus common throughout temperate Asia. Species delimitation is very difficult and the present study investigates a group of taxa associated with *Urtica fissa* from East-Southeast Asia and based mainly on herbarium collections, including most of the type specimens and cultivated plants. Species limits especially of *U. mairei*, *U. fissa* and *U. himalayensis* have been consistently confused in both herbaria and floristic treatments. As part of a taxonomic revision we produced a molecular phylogeny of the group based on ITS1-5.8S-ITS2, *psbA-trnH*, *trnL-trnF* and *trnS-trnG* markers. Our revision recovers a total of five species and two subspecies: *U. fissa* E.Pritz. ex Diels, *U. grandidentata* Miq. subsp. *grandidentata*, *U. grandidentata* Miq. subsp. *lombok* K.Becker & Weigend, *U. himalayensis* Kunth & C.D.Boché, *U. mairei* Lév. and *U. parviflora* Roxb. We provide type information, diagnostic characters, a key to species identification, species conservation assessments and a list of exsiccatae for each taxon.

**Key words:** Asia, chloroplast markers, Himalayas, infraspecific taxa, nuclear marker, phylogeny, stinging nettle

### Introduction

*Urtica* L. (Urticaceae) is a common genus over most of its range, often found in anthropogenically altered habitats and naturally disturbed sites. In spite of its abundance and the visibility of the genus, phylogenetic relationships and alpha-taxonomy remain incompletely understood (Friis 1993). The past years have brought considerable progress in the taxonomy of *Urtica*, especially of the European, American and Australian/New Zealand taxa (e.g. Weigend 2005, 2006, Weigend *et al.* 2005, Weigend & Luebert 2009, Farag *et al.* 2013, Henning *et al.* 2014, Grosse-Veldmann & Weigend 2015, Weigend & Monro 2015, Grosse-Veldmann *et al.* 2016a, 2016b). Most notably, the first near-comprehensive phylogeny (Grosse-Veldmann *et al.* 2016b) which provides a clear picture of the taxonomy of the genus. One of the clades retrieved by Grosse-Veldmann *et al.* (2016b) comprises tall, late-flowering species with largely fused and often very large stipules, namely the species complex *U. fissa* E.Pritz. ex Diels and *U. parviflora* Roxb. This group ranges across the Himalayas to western China and into Indonesia. In the present study we address this problematic complex using a combined morphological and molecular approach with the aim of identifying and clarifying the delimitation and relationships of these taxa.

### Material and methods

#### *Plant material*

For the present study ca. 170 herbarium specimens, including all type specimens that could be located, were revised. Material was examined from B, BONN, CDBI, E, HENU, HUH, IFP, K, KUN, L, LE, M, MO, NY, P, PE, TAIF, TAIM, US and WU. For two species (*Urtica fissa* and *U. parviflora*) seeds were available, which were raised at Bonn University Botanical Gardens in 2014 and 2015 in order to compare the character states expressed in cultivation to those observed in the wild collected source material. All protologues and type specimens were studied and compared to current floristic treatments [e.g., Flora of Bhutan (Grierson & Long 1983), Flora of China (Chen *et al.* 2003), Flora

of Pakistan (Ghafoor 1981), Flora of Xizangica (Wu 1983)]. In order to corroborate our morphological findings, phylogenetic analyses were conducted, especially in order to test out re-definition of *Urtica fissa* across its range. Plant material used for the phylogenetic analyses was silica-dried or taken from herbarium material. In total, 12 ingroup and 7 outgroup accessions were sampled. Representatives of other *Urtica* species within the genus covering a broad geographical and phylogenetic range (compare Grosse-Veldmann *et al.* 2016b) were chosen as outgroup. A complete voucher list of the plant material used in this study including voucher information and GenBank accession numbers is given in Table 1.

Conservation assessments were undertaken using IUCN Red List Categories and Criteria (2016).

**TABLE 1.** List of taxa included in the phylogenetic study of the *Urtica fissa*-clade.

Taxon	Country of origin	Herbarium voucher	DNA No.	ITS	<i>trnS-trnG</i>	<i>psbA-trnH</i>	<i>trnL-trnF</i>
<i>U. cannabina</i> L.	China	Q. R. Wu 322 (MO)	W 2038	KX271370	KX271525	KX271601	KX271451
<i>U. dioica</i> L. subsp. <i>dioica</i>	Spain	E. Zippel 2002/2b (B)	W 2232	KF558920	KF559101	KF558980	KF559040
<i>U. echinata</i> Benth.	Ecuador	Loejtnant & Molau 11657 (GB)	W 1863	KX271427	KX271577	KX271657	KX271501
<i>U. flabellata</i> Kunth	Peru	M. Weigend <i>et al.</i> 8819 (B)	W 2040	KF558908	KF559089	KF558968	KF559028
<i>U. fissa</i> E.Pritz ex Diels	China	C.Y. Wang 7438 (HUH)	W 4540	KY284025	KY284036	KY284029	KY284033
<i>U. fissa</i> E.Pritz ex Diels	China	W. Li s.n. (MO)	W 4553	KY284026	KY284037	KY284030	KY284034
<i>U. fissa</i> E.Pritz ex Diels	Taiwan	M. Weigend 8129 (B)	W 1880	KX271397	KX271548	KX271628	KX271473
<i>U. fissa</i> E.Pritz ex Diels	China	Hsiu-Lan Ho 951 (MO)	W 2011	KF558905	KF559086	KF558965	KF559025
<i>U. fissa</i> E.Pritz ex Diels	China	Sino-American Guizhou Botanical Expedition 1135 (HUH)	W 4211	KX271395	KX271546	KX271626	KX271471
<i>U. fissa</i> E.Pritz ex Diels	China	A. Henry 2900 (K)	K 22888	KX271396	KX271547	KX271627	KX271472
<i>U. grandidentata</i> Miq. subsp. <i>grandidentata</i>	Indonesia	S. H. Koorders 37901B (K)	K 22882	KX271401	KX271552	KX271632	-
<i>U. grandidentata</i> Miq. subsp. <i>grandidentata</i>	Indonesia	H. N. Ridley s.n. (K)	K 22883	KX271402	KX271553	KX271633	KX271477
<i>U. himalayensis</i> Kunth & Boché	India	H. Collett 590 (K)	K 22889	KY284027	KY284038	KY284031	-
<i>U. incisa</i> Poir.	New Zealand	Ward CHR 234516A (NZ Landcare Research)	W 2264	KF971218	KF971185	KF971284	KF971251
<i>U. mairei</i> Lévl.	Tibet	K. Rushforth & H. McAllister 5247 (BSB)	W 2910	KX271398	KX271549	KX271629	KX271474
<i>U. massaica</i> Mildbr.	Uganda	M. Ackermann 1050 (B)	ED 841	KX271388	KX271539	KX271619	KX271464
<i>U. parviflora</i> Roxb.	China	B. Dickoré s.n. (B)	W 2238	KX271400	KX271551	KX271631	KX271476
<i>U. parviflora</i> Roxb.	India	H. Binski s.n. (BONN)	W 4538	KY284024	KY284035	KY284028	KY284032

#### DNA extraction, amplification, and sequencing

DNA extraction, amplification, purification, and sequencing followed standard protocols as described in Gottschling & Hilger (2001) and Weigend *et al.* (2010). Samples were sequenced for four genomic regions: the nuclear ribosomal ITS1–5.8S–ITS2 (thereafter ITS), and three plastid regions: the *psbA-trnH* intergenic spacer (IGS), *trnL-trnF* (including the *trnL* group I intron and the *trnL-trnF* IGS), and *trnS-trnG* (including the *trnS-trnG* IGS and the *trnG* group II intron). The same primers were used for amplification and for sequencing. The primers used were ITS5 and ITS4 for ITS (White *et al.*, 1990), *psbAF* and *trnHR* for *psbA-trnH* (Sang *et al.*, 1997), C and F for *trnL-trnF* (Taberlet *et al.*, 1991) and *trnS<sub>(GCU)</sub>* and *trnG<sub>(UCC)</sub>* for *trnS-trnG* (Hamilton 1999). Amplicons were sequenced by

either MacroGen Inc., South Korea (<http://www.macrogen.com>) or GATC Biotech AG, Konstanz, Germany (<http://www.gatc-biotech.com>). All sequences generated in this study have been submitted to the GenBank genetic sequence database (see Tab. 1 for accession numbers).

#### *Alignment and phylogenetic analyses*

The alignment was conducted using the MAFFT algorithm in the Geneious software package ver. R8 with default settings, followed by manual adjustments using PhyDE® ver. 1 (Müller *et al.*, 2005) in order to build a motif alignment, based on the criteria laid out in Kelchner (2000). The combined data set (ITS, *trnS-trnG*, *trnH-psbA* and *trnL-trnF*) contains 2473 aligned positions (ITS: 624, *trnS-trnG*: 740, *psbA-trnH*: 282, *trnL-trnF*: 837).

The data partitions were first analysed separately, and in the absence of statistically supported topological conflict (defined as >80% bootstrap support) they were combined following Wiens (1998). The Incongruence Length Difference (ILD) test (Farris *et al.* 1994) implemented in PAUP\* v. 4.0a150 (Swofford 2003) with 1,000 replicates (addseq=random, nreps=10, swap=tbr, MaxTrees=1000), was used to test first the congruence between each individual plastid marker and then between the plastid and the ITS data set. Moreover, incongruence was tested visually by comparing plastid and ITS topologies and by evaluating the respective support values.

The data set contains two hairpin associated inversions, one situated in P8 of the *trnL* intron (compare Borsch *et al.* 2003) and the second approximately 90 nt upstream of the *trnF* gene. Both inversions were positionally isolated in the alignment and included as reverse complement in the nexus files used for phylogenetic analyses (see Quandt *et al.* 2003, Borsch & Quandt 2009).

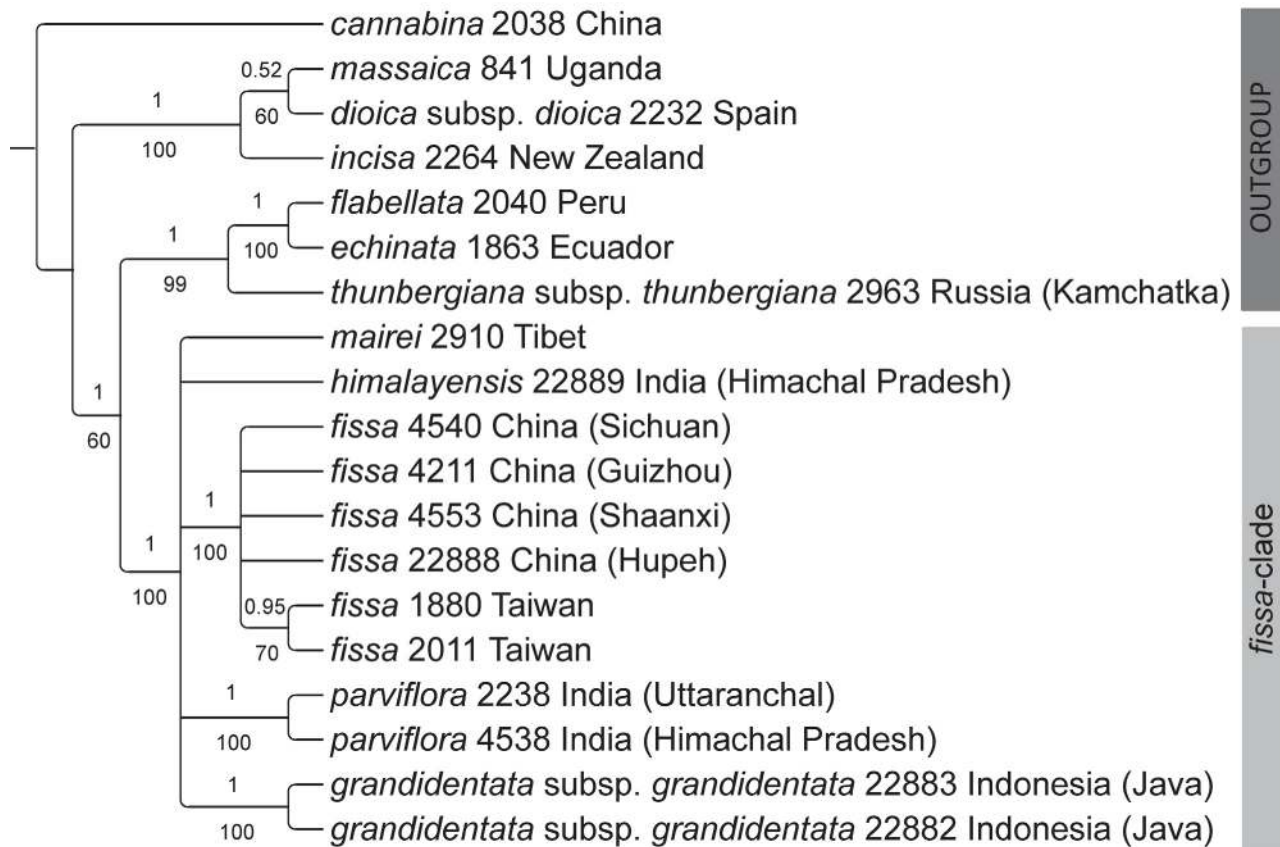
Phylogenetic analyses were conducted on a concatenated dataset employing maximum likelihood (ML) and Bayesian inference (BI). ML analyses were conducted with the standard settings in RAxML Version 8 (Stamatakis 2006, Stamatakis *et al.* 2008). The node support under ML is based on 1000 bootstrap replicates. BI analyses were conducted in MrBayes vers. 3.2.2 (Ronquist & Huelsenbeck 2003) with six independent runs of 2,000,000 generations each under the GTR +  $\Gamma$  + I model with partitions unlinked. Chains were sampled every 1000<sup>th</sup> generation. Log likelihoods were examined using Tracer v1.5 (Rambaut & Drummond 2009) in order to determine the burn-in and to ensure that an adequate effective sample size (ESS) was attained. The consensus tree and the posterior probability (PP) of clades were calculated based upon the trees sampled after the burn-in set at 500,000 generations.

TreeGraph2 (Stöver & Müller 2010) was used for tree drawing. We used *Urtica cannabina* to root the final tree.

## Results

### *Molecular data*

The sampling of Grosse-Veldmann *et al.* (2016b) was significantly expanded and resulted in a well resolved phylogeny (Fig. 1). The ILD test indicates that both the plastid and the ITS data partitions are congruent (P=1), and the plastid markers are congruent when individually compared with ITS. The visual inspection also revealed major congruence among the topologies resulting from the analyses of the plastid and the nuclear markers (data not shown). The partitioned analysis showed no incongruence among the chloroplast regions analysed, i.e., no conflicting well-supported clades were obtained in the single-gene trees. Considering this, we decided to combine the four molecular datasets. The resulting tree from the ML and BS analyses were compatible and both retrieved a well-resolved topology, with all nodes of the backbone receiving 100% ML bootstrap and posterior probability of 1.0. The internal nodes are largely unresolved in both topologies except the *U. fissa* accessions which form a well supported clade with 97% ML bootstrap and > 0.95 posterior probability. *U. grandidentata* subsp. *lombok* was only available as a specimen scan and was therefore not included into the phylogenetic study. *Urtica fissa* and closely allied taxa are recovered as a strongly supported monophylum, as are the collections here assigned to *U. fissa* from both China and Taiwan and the two accessions each of *U. parviflora* and *U. grandidentata* (Fig. 1). However, the relationships between the five species here recognized remain unresolved based on our analysis.



**FIGURE 1.** Maximum likelihood tree based on concatenated data set (ITS, *trnS-trnG*, *psbA-trnH* and *trnL-F*) of the *U. fissa*-clade. Bayesian posterior probabilities are indicated above branches; bootstrap support under likelihood is indicated below.

### Morphology

A critical revision of numerous collections including type collections and living plants leads to the recognition of six morphological entities within the *Urtica fissa*-clade. The characters identified as relevant for species delimitation are summarized in Table 2. Morphological differences between cultivated plants and plants from wild collected source material could not be observed. The taxa of the *Urtica fissa*-clade are all robust, perennial herbs, with large, often suborbicular leaves and two pairs of fused stipules at each node. The interpetiolar stipules are suborbicular to widely ovate in *U. grandidentata*, *U. mairei*, *U. himalayensis* and *U. fissa*. *Urtica parviflora* has ovate to oblong-acuminate stipules. The main characters to distinguish the species are found in the details of the leaf margin. *U. fissa* is the only species with palmately lobed leaves (Fig. 2 A–C), there are 2–6 lobes on each side, the leaves lobes are themselves coarsely dentate to lobulate and incisions are 1/3<sup>rd</sup> to 2/3<sup>rd</sup>s of the leaf diameter. Leaves of *U. grandidentata* subsp. *grandidentata* are widely ovate to suborbicular with lobulate margin, with 12–20 major teeth on each side (Fig. 3 A, E). The leaf margin of *U. grandidentata* subsp. *lombok* is similar, but the leaves are triangular-ovate and have ca. 15–25 major teeth on each side (Fig. 4). Both subspecies have a shallowly cordate leaf base. *U. mairei* has widely ovate to suborbicular leaves (Fig. 6 C, Fig. 7), superficially similar to those of *U. grandidentata* subsp. *grandidentata*. Leaf margin is also lobulate, with 8–15 more narrowly triangular major teeth. Especially the apex of each lobe is protracted into a narrowly triangular apex. *Urtica himalayensis* has finely and serrate leaf margins on widely triangular-ovate leaves, distally they have two orders of serration (Fig. 5 D). *Urtica parviflora* is the only species of this group with a leaf margin with one order of dentation (older leaves occasionally have two orders of dentation, Fig. 8 C). *Urtica himalayensis* is here redefined to include both *U. mairei* var. *oblongifolia* and *U. zayuensis*, because consistent morphological differences between these two taxa could not be found. *U. parviflora*, *U. ardens* and *U. virulenta* are also considered as synonymous and the name *U. parviflora* takes priority. This deviates from the Flora of China (Chen *et al.* 2003), where *U. ardens* is erroneously considered as the valid name for *U. himalayensis*. And it also differs from the Flora of Pakistan (Ghafoor 1981), where *U. parviflora* and *U. himalayensis* are listed incorrectly as synonyms for *U. ardens*. Similarly, in the Flora of Bhutan (Grierson & Long 1983) *U. parviflora* and *U. ardens* are listed as two separate species which we believe to be incorrect.



In total, five distinct species can be morphologically differentiated for this SE Asian clade of *Urtica*: *U. fissa*, *U. grandidentata*, *U. himalayensis*, *U. mairei* and *U. parviflora*. Within *U. grandidentata* two subspecies are proposed, the typical subspecies *U. grandidentata* subsp. *grandidentata* and *U. grandidentata* subsp. *lombok*.

**TABLE 2.** Diagnostic comparison of *U. parviflora*, *U. himalayensis*, *U. grandidentata* subsp. *grandidentata*, *U. grandidentata* subsp. *lombok*, *U. mairei* and *U. fissa*.

	<i>U. parviflora</i>	<i>U. himalayensis</i>	<i>U. grandidentata</i> subsp. <i>grandidentata</i>	<i>U. grandidentata</i> subsp. <i>lombok</i>	<i>U. mairei</i>	<i>U. fissa</i>
<b>Leaf lamina</b>	ovate-lanceolate	suborbicular to ovate-lanceolate	widely ovate to suborbicular	triangular-ovate	widely ovate to suborbicular	suborbicular
<b>Leaf margin</b>	with one order of dentation, 15–30 teeth per side	with two orders of serration, 30–55 major teeth per side	lobulate, with two orders of dentation, 12–20 major teeth per side	lobulate, with one order of dentation 15–25 major teeth per side	lobulate, with two orders of dentation, 8–15 major teeth per side	palmately lobed, with 2–6 large lobes per side (incisions 1/3 <sup>rd</sup> to 2/3 <sup>rd</sup> s of leaf diameter), lobe margins with two orders of dentation
<b>Leaf base</b>	rounded	subcordate to rounded	shallowly cordate	shallowly cordate to ovate	subcordate to rounded	subcordate to rounded
<b>Interpetiolar stipules</b>	ovate to oblong-acuminate	suborbicular to widely ovate	suborbicular to widely ovate	suborbicular to widely ovate	suborbicular to widely ovate	suborbicular to widely ovate

## Discussion

The overall diversity of morphological characters across the taxa studied is very limited and it is not always easy to distinguish the species. Several recent taxonomic studies, some using phylogenetic analyses of DNA sequence data, resolved a range of taxonomic problems, but some are still unclear (Weigend 2005, 2006, Weigend *et al.* 2005, Weigend & Luebert 2009, Henning *et al.* 2014, Grosse-Veldmann & Weigend 2015, Weigend & Monro 2015, Grosse-Veldmann *et al.* 2016a, 2016b). Grosse-Veldmann *et al.* (2016b) provided the first insights into relationships among the East-Southeast Asian *Urtica* species retrieved as a monophyletic group (“*fissa*-clade”). The relationships found within this clade are basically identical with the results presented here, but were based on unrevised plant material. All species within this clade have two pairs of fused stipules. Chen (1983) suggested close relationships between members of this group based on morphological studies. A lack of designated types and morphological similarity has resulted in the inconsistent application of the names *U. ardens*, *U. himalayensis*, *U. mairei* var. *oblongifolia*, *U. parviflora*, *U. virulenta* and *U. zayuensis* [see Flora of Pakistan (Ghafoor 1981), Flora of China (Chen *et al.* 2003), Chen (1983), Grierson & Long (1983), Wu (1983), The Plant List (2013)].

Morphological and molecular differences between *U. grandidentata* subsp. *grandidentata*, *U. bullata* and *U. bullata* var. *contracta* could not be identified and so we combine these three taxa under the oldest name *U. grandidentata* (subsp. *grandidentata*). We segregate and describe a new subspecies from eastern Java and Lombok, *U. grandidentata* subsp. *lombok*. So far we have only seen a few specimens from Java and Lombok which were only available as specimen scan and were therefore not included into the phylogenetic studies. *U. fissa* is clearly distinct from the other members of the clade by its palmately lobed leaves.

As demonstrated by Grosse-Veldmann *et al.* (2016b), both morphology and geographical range are poor predictors of relatedness in the genus. We could confirm this for the *Urtica fissa*-clade since we found only poor congruence between geography and phylogenetic relationships and conclude that geographical location is a poor predictor of relationships within this clade. *Urtica himalayensis*, *U. mairei* and *U. parviflora* share the same distribution in and around Tibet. *Urtica fissa* does not occur in Tibet, but is restricted to central China, Taiwan and the Philippines, where the distribution area overlaps partially with *U. mairei* and *U. himalayensis*. In contrast, *U. grandidentata* is restricted

to Indonesia: *U. grandidentata* subsp. *grandidentata* occurs on Java and *U. grandidentata* subsp. *lombok* on eastern Java and Lombok.

### Key to the species of the *Urtica fissa*-clade present in Asia

1. Leaf margin with one order of dentation, older leaves occasionally with two orders of dentation; vegetative basal part of the plant with conspicuously more stinging hairs than the reproductive part ..... *Urtica parviflora*
- Leaf margin serrate, lobulate or palmately lobed; vegetative basal part of the plant not with conspicuously more stinging hairs than the generative part ..... 2
2. Leaf margin with two orders of serration, major teeth 1–2 mm long, minor teeth 0.5–1 mm long ..... *Urtica himalayensis*
- Leaf margin lobulate or palmately lobed with one or two orders of dentation, major teeth or lobes more than 2 mm long ..... 3
3. Leaf base ovate to cordate, leaf margin lobulate with one or two orders of dentation, 12–20 major teeth on each side, major teeth with 1–3 minor teeth ca. 1–2 mm long ..... *Urtica grandidentata*
  - a. Major teeth 5–15 mm long, with 1–3 minor teeth on each side, leaf base cordate ..... subsp. *grandidentata*
  - b. Major teeth ca. 5 mm long, with 1–2 minor teeth on each side, leaf base ovate ..... subsp. *lombok*
- Leaf base subcordate to rounded, leaf margin lobulate with 8–15 major teeth on each side or palmately lobed with 2–6 lobes on each side, lobe margins with two orders of dentation ..... 4
4. Leaf margin lobulate with two orders of dentation, 8–15 major teeth on each side, 2–10 mm long, major teeth with 2–4 minor teeth on each side, minor teeth 0.5–2 mm ..... *Urtica mairei*
- Leaf margin palmately lobed with 2–6 large lobes on each side, lobes 5–50 mm long, lobe margins with two orders of dentation, 2–15 teeth on each lobe side, teeth 1–15 mm ..... *Urtica fissa*

### Formal Taxonomy of the *Urtica fissa*-clade.

#### 1. *Urtica fissa* E.Pritz. ex Diels (1900: 301). Fig. 2

Type:—[CHINA, Chongqing] Nan ch'uan, Lung mo ai, *B. v. Rosthorn* 866 (holotype WU†destroyed). Neotype (here designated):—CHINA. Zhejiang: Hangzhou, Longjing Village, SE of Beili Lake, valley from Longjing to Jiuxicun, stream-sides in a valley with tea plantations and bamboo forest, 40 m, N 30,20183 E 120,10825; source collection by N. M. Nürk 2012, cultivated in the Botanical Gardens of the University of Bonn, *B. Große-Veldmann, K. Becker & A. Mustafa* 134-C (neotype BONN!, isoneotypes B!, HUH!, K!, MO!).

= *Urtica pinfaensis* H. Lév. & Blin. in H. Lév. (1912: 371). Type: [China, Kouy-Tchéou = Guizhou] 9 Oct. 1902, *J. Cavalerie* 771 (holotype E! (E\_00275397)).

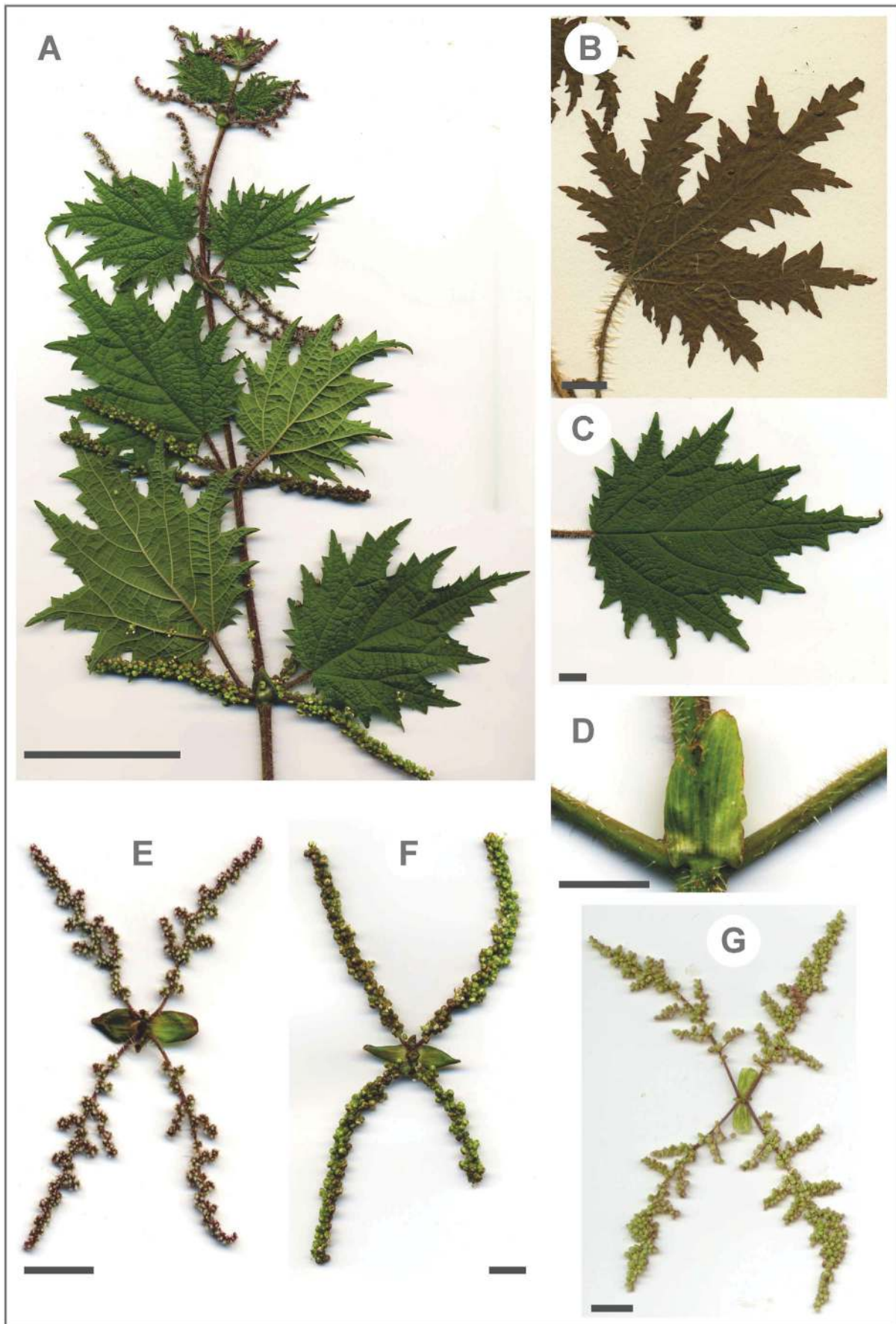
Erect, perennial herb 0.7–2.5 m, form perennial root and with pleiokorm of perennating underground stems; stem indumentum of stinging hairs with pluricellular base 2.0–4.0 mm long overall, setae 1.8–3.3 mm and simple trichomes ca. 0.1 mm long; leaf lamina suborbicular, 70–130 × 50–110 mm, palmately lobed margin with 2–6 large lobes on each side, lobes 5–50 mm long; lobe margins with two orders of dentation, 2–15 teeth on each lobe side, teeth 1–15 mm, leaf base subcordate to rounded, leaf apex apiculate; leaf indumentum of stinging hairs with pluricellular base 2.0–3.5 mm long overall, setae 1.6–3.2 mm, simple trichomes 0.1–0.5 mm long; leaf surface with punctiform cystoliths; petioles 25–70 mm long; 4 stipules forming 2 fused pairs per node, 10–15 mm long, elongated; plant monoecious, usually staminate flowers basal, carpellate flowers apical.; staminate flowers with all tepals ca. 1.0 mm long, pubescent; pistillate flowers with tepals ca. 0.5 mm long, pubescent; infructescence 40–70 mm; mature fruits with longer tepals 1.0–1.2 mm long, achenes suborbicular in outline, laterally flattened, ca. 1.0 × 1.0 mm.

**Distribution and Habitat:**—*U. fissa* is widespread in central to eastern China, and is here reported from the provinces of Chongqing, Guangxi, Guizhou, Hubei, Hunan, Shaanxi, Sichuan, and Zhejiang. It is also found in northeast Vietnam, on Taiwan and the Philippines, thus replacing *U. himalayensis* essentially on the eastern side down to the Philippines, whereas the latter describes a more south-easterly pattern ranging from Kashmir south to Sumatra. *U. fissa* is commonly found on roadsides, waste grounds and disturbed sites, in the understory of forests growing in rich and moist soil, near streams, on fields and meadows, and is usually found at low and intermediate elevations.

**Phenology:**—*U. fissa* flowers throughout the year.

**Conservation status:**—Using IUCN criteria (IUCN 2016), *Urtica fissa* E.Pritz. ex Diels is considered “Least Concern” (LC).

**Representative specimens:**—CHINA. **Guangxi:** Jinxiu, in a valley, sparse woods, wet soil, 1000 m, 24 Sep. 1981, *Collector unknown* (IBK\_00193189!); Lingle, Gangle, in hilly woods as understory, in the shade, 22 Jun. 1959, *Z. Li* 603489 (IBK\_00130574!); Lingle, riverside, hillside, in the shade, 04 May 1960, *C. Liang* 32952 (IBK\_00130573!); Longjin, Gebu, Riverside in a forest with hills and valleys, 800 m, 20. Oct. 1953, *Z. Zhang* 10229 (IBK\_00130571!);



**FIGURE 2.** *Urtica fissa* (A, C–G: B. Große-Veldmann, K. Becker & A. Mustafa 134-C): A. Habit, B. Typical deeply incised palmately lobed leaf (Smith, 4595), C. Typical weakly incised palmately lobed leaf, D. Node with fused stipules, E. Female inflorescence, F. Male inflorescence, G. Infructescence. Scale bar: A = 5 cm; B–G = 1 cm.



Roadside, in the shade, 28 Apr. 1956, *Collector unknown* (IBK\_00130575!); Yao Shan, 8 Dec. 1936, *C. Wang* 40582 (HUH!); **Guizhou**: [Kouy-Tchéou = Guizhou] 9 Oct. 1902, *J. Cavalerie* 771 (E\_00275397!); Bieyang, Luho, 333 m, *Y. Tsiang* 7202 (K\_000229280!); Daozhen, Huilong Town, back river, in the grass by a stream, 720 m, 16 Oct. 1995, *L. Zhengyu* 16123 (MO\_04485995!); Jiangkou Xian, Daiyepeng along the Kaitu River on the SW side of the Fanjing Shan mountain range, Elevation ca. 750–1000 m, on moist slope in farmyard, 11 Sep. 1986, *Sino-American Guizhou Botanical Expedition* 1135 (HUH!); Songtao Xian, vicinity of Lengjiaba in the vicinity of the confluence of the Xiaohe and Dahe rivers, NE side of Fanging Shan mountain range, Elevation 820–1120 m, 5–9 Oct. 1986, *Sino-American Guizhou Botanical Expedition* 2239 (HUH!); Zheng'an, Dalou Mountains, Qingding, in the grass by a stream, 560 m, 20 Aug. 1996, *L. Zhengyu* 20237 (MO\_04485996!); **Hunan**: Baojing, Kapeng, a valley in mountainous regions, 500 m, *L. Linhan* 9735 (MO\_04732502!); Dongkon, Fulong Zhou, by the roadside of flatland in the hill, 300 m, 11 Nov. 1963, *L. Linhan & H. Guanzhou* 016628 (MO\_04732142!); Ma-Ling-Tung, Sinning Hsien, 600 m, shade, 24 Jun. 1935, *C.S. Fan & Y.Y. Li* 704 (L\_1640100!); **Hupei**: Feb. 1887, *A. Henry* 2900 (K\_000229279! & P\_06854464!); **Shaanxi**: Baocheng (now Nanzheng), Bao's Shop, by the roadside, 11 Oct. 1952, *F. Kunjun s.n.* (MO\_04486901!); Shaanxi: Foping, Lianghe Township, a shady wet place in the field, 500 m, 15 Aug. 1998, *L. Weiqing s.n.* (MO\_04563053!); **Sichuan**: Chengtu, 12 Nov. 1938, *W.P. Fang* 13173 (HUH\_00240969!); Chengtu, 21 Sep. 1943, *C.Y. Wang* 7438 (HUH\_00240974!); Kiating, 1 Oct. 1943, *H.H. Chung* 3 (HUH\_00240970!); Kiating, by the roadside, 12 Oct. 1939, *H.H. Tai* 269 (HUH\_00240971!); Kiating, outside of the city, by roadside, 23 Nov. 1938, *H.C. Chow* 8868 (HUH\_00240973!); Lifan: Mung-twin-ko, 7,500 ft. alt.; abundant in waste place, 14 Aug. 1941, *S.Y. Hu* 2108 (HUH\_00278063!); Mt. Omei, by the slope of hill, 14 Oct. 1939, *S.C. Sun & K. Chang* 1551 (HUH\_00240972!); Omei-hsien: Mt. Omei, alt. 1700 m, 29 Sep. 1941, *W.P. Fang* 17820 (HUH\_00240967!); reg. bor.-occid.: Hsu-Tsing, in rupibus supra Ta-chin-ho, ca. 2100 m, 9 Oct. 1922, *H. Smith* 4595 (MO\_4383339!); W. Sichuan, By the roadside, 30 Sep. 1942, *L.Y. Tai* 1420 (HUH\_00240968!); Hangzhou, Pearl Temple, in the grass by the roadside, 09 Oct. 1981, *P.L. Chiu* 2224 (MO\_04491527!); Mu-gan Shan, 25 Sep. 1998, *S.Y. Hu* ZJ 43 (MO\_5307228! & HUH!);—**PHILIPPINES**. **Benguet**: Between Mts. Abbocot & Libbung, Kabayan, Luzon, 14 Dec. 1960, *D.R. Mendoza* (L\_1629152!); **Cordillera**: Mt. Polis, Bontoc Sub-Provinve, Luzon, Feb. 1920, *M. Ramos & G.E. Edaña* 37725 (P\_06456161!); Mt. Pulog, 2200 m, clearing, mossy forest, 14 Mar. 1961, *M.L. Steiner* 2096 (L\_1629153!); **Davao**: Mindanao, 4 Sep. 1946, *G.E. Edaña* 1084 (L\_1629154!); Mindanao, Aug. 1909, *A.D.E. Elmer* 11583 (K\_000229284!, L\_1629155!, MO\_3535020!);—**TAIWAN**. **Musya**, 30 Sep. 1929, *T. Tanaka* 355 (P\_06855929!); Ilan County, Nanhu Shan Mt., 2500 m, on the way from central highway to Nanhu Peak, near Nanhu River Cabin in a dense *Abies* forest. Seeds from original collection from T. Henning (Apr. 2005), cultivated in Berlin, 02 Oct. 2006, *M. Weigend* 8129 (B!); Kaohsiung Hsien: Taoyuan Hsiang. Paoshan Village, Chyunshan Forest Trail: en route from Shelter to the Yunshan Bridge. 23°02' N, 120° 46' E, Elev. Ca. 740 m, On shady and wet forest trail with abundant herbs, 30 Dec. 1992, *H.L. Ho* 951 (MO\_4327087! & HUH!); Natou, 2295 m, Nov. 1997, *J. Chen* 91453 (PE\_00509587!);—**VIETNAM**. **Northeast**: Tonkin, 20 Dec. 1887, *B. Balansa* 2527 (K\_000229278!, P\_06855808!, P\_06855802!);—**Unidentified localities**. 24 Oct. 1985, *Q.S. Wang* 2924 (MO\_04512800!).

## 2. *Urtica grandidentata* Miq. (1853: 27)

Erect, perennial herb ca. 1.5 m, form perennial root and with pleiokorm of perennating underground stems; stem indumentum of stinging hairs with pluricellular base 2.0–3.0 mm long overall, setae 2.0–1.0 mm, and with simple trichomes ca. 0.1 mm long; leaf lamina ovate, 90–180 (–300) × 70–130 (–300) mm, leaf margin lobulate with 12–25 major teeth on each side, 5–15 mm long, major teeth with 1–3 minor teeth, 1–2 mm long; leaf base subcordate to rounded, leaf apex apiculate; leaf indumentum of stinging hairs with pluricellular base 1.5–3.0 mm long overall, setae 1.0–2.5 mm, and with simple trichomes 0.1–0.5 mm long; petioles 30–100 (–250) mm long; 4 stipules, forming 2 fused pairs per node, 10–15 mm long, elongated to rounded; plant monoecious, mature fruits with tepals ca. 1.2 mm long, achenes suborbicular in outline, laterally flattened, ca. 1.2 × 1.0 mm.

### 2.1 *Urtica grandidentata* Miq. subsp. *grandidentata*. Fig. 3

Type:—[INDONESIA, Java] Wonosari, *F.W. Junghuhn, s.n.* (holotype L! (L\_0356531)).

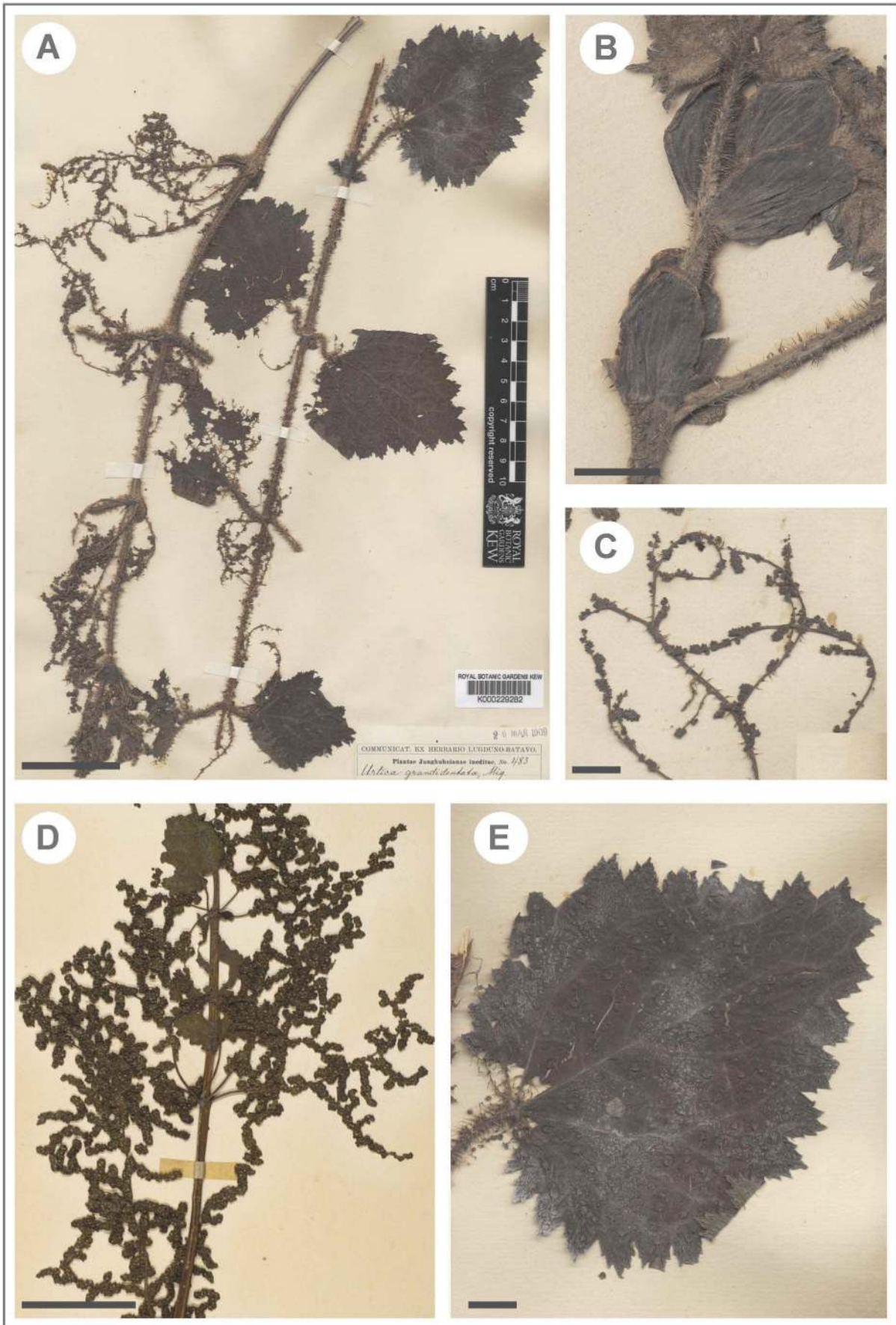
= *Urtica bullata* Blume (1856: 145). Type:—[INDONESIA, Java] *F.W. Junghuhn, s.n.* (holotype L! (L\_0356531)).

= *Urtica bullata* Blume var. *contracta* Hochr. (1936: 20). Type: [INDONESIA, Java, 19 Jan. 1905] *Hochreutiner* 2680 (holotype L! (L\_1629158)).

- non *Urtica grandidentata* Moris (1828)

- non *Urtica grandidentata* Liebm. (1851: 296)





**FIGURE 3.** *Urtica grandidentata* subsp. *grandidentata*: A. Habit (Junghuhn, 483), B. Node with fused stipules (Koorders 37901B), C. Female inflorescence (Koorders 37901B), D. Male inflorescence (Junghuhn s.n.), E. Typical leaf (Junghuhn, 483). Scale bar: A, D = 5 cm; B, D, E = 1 cm.

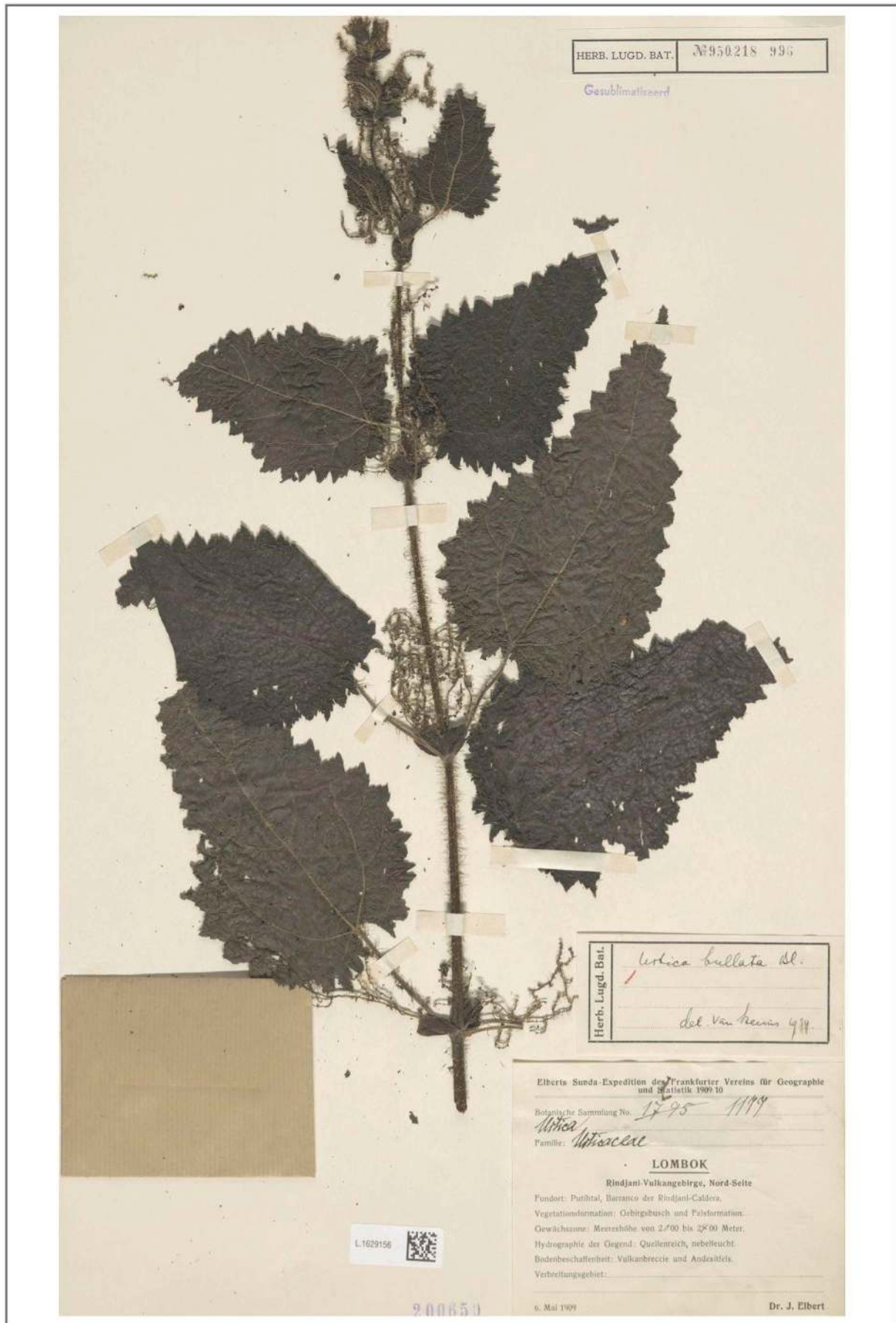


FIGURE 4. Habit of *Urtica grandidentata* subsp. *lombok* (Elbert 1177).



Leaf lamina suborbicular, 90–130 (–300) × 90–130 (–300) mm; leaf margin with two orders of dentation; petioles 40–100 (–250) mm long.

**Note:**—The most recent collection seen of this species is from montane forests on Java from 1938. Its current distribution can not be evaluated based on the collections seen.

**Distribution and Habitat:**—*U. grandidentata* subsp. *grandidentata* is restricted to Java and is usually found at intermediate elevations.

**Phenology:**—*U. grandidentata* subsp. *grandidentata* flowers throughout the year.

**Conservation status:**—Using IUCN criteria (IUCN 2016), *Urtica grandidentata* subsp. *grandidentata* is considered “Not Evaluated” (NE).

**Representative specimens:**—**INDONESIA. Java:** [Klakah] *Zollinger 2539* (P\_06456163!); 1835–1863, *Junghuhn 493* (L\_1629143!); anno 1903–1905, *Hochreutiner 2680* (L\_1629158!); *Collector unknown* (L\_0356530!); Besoeki [nowadays: Besuki], 22 Jun. 1918, *Backer 25241* (L\_1629141!); Besoeki [nowadays: Besuki], Westzijde Jang Plateu, Djentor-Sekassor 2100–2600 m, 14 Jul. 1938, v. *Steenis 10875* (L\_1629140!); *Junghuhn 483* (K\_000229282!); *Junghuhn s.n.* (L\_1629150!); Klakah, *Zollinger 2539* (P\_06456162!); *Leschenault 605* (P\_06456164!); Near Ngadisari, 2200 m, 18 Oct. 1899, *S.H. Koorders 37901B* (K\_000229283!); Near Ngadisari, 2200 m, 18 Oct. 1899, *S.H. Koorders 37901B* (L\_1629145!); Near Ngadisari, 2200 m, 18 Oct. 1899, *S.H. Koorders s.n.* (L\_1629144!); Without legible locality information, 20 Jan. 1915, *H.N. Ridley s.n.* (K\_000229281!); Without legible locality information, 4 to 5 Jul. 1913, *Backe 8361* (L\_1629142!); Without legible locality information, 6 Jun. 1927, *Backe 37519* (L\_1629138!); Wonosari, *Junghuhn s.n.* (L\_0356531!).

## 2.2 *Urtica grandidentata* Miq. subsp. *lombok* K.Becker & Weigend, *subspec. nov.*, Fig. 4

Type:—[INDONESIA] Oost Java: *J.H. Coert 1174* (holotype L! (L\_1629139)).

Leaf lamina triangular-ovate, 100–180 × 70–130 mm; leaf margin with one order of dentation; petioles 30–50 mm long.

**Note:**—This very poorly understood subspecies is currently differentiated by leaf type only—but the differences are very distinctive, by the standards of *Urtica* systematics. Clearly more material is desirable of this taxon, which was last collected in 1909 and which is apparently restricted to montane forests.

**Distribution and Habitat:**—*U. grandidentata* subsp. *lombok* is restricted to Indonesia and is here reported from the islands of Java and Lombok. The subspecies is known from volcanic mountains at intermediate elevations and grows on moist soil.

**Phenology:**—*U. grandidentata* subsp. *lombok* flowers throughout the year.

**Conservation status:**—Using IUCN criteria (IUCN 2016), *Urtica Urtica grandidentata* Miq. subsp. *lombok* K.Becker & Weigend is considered “Not Evaluated” (NE).

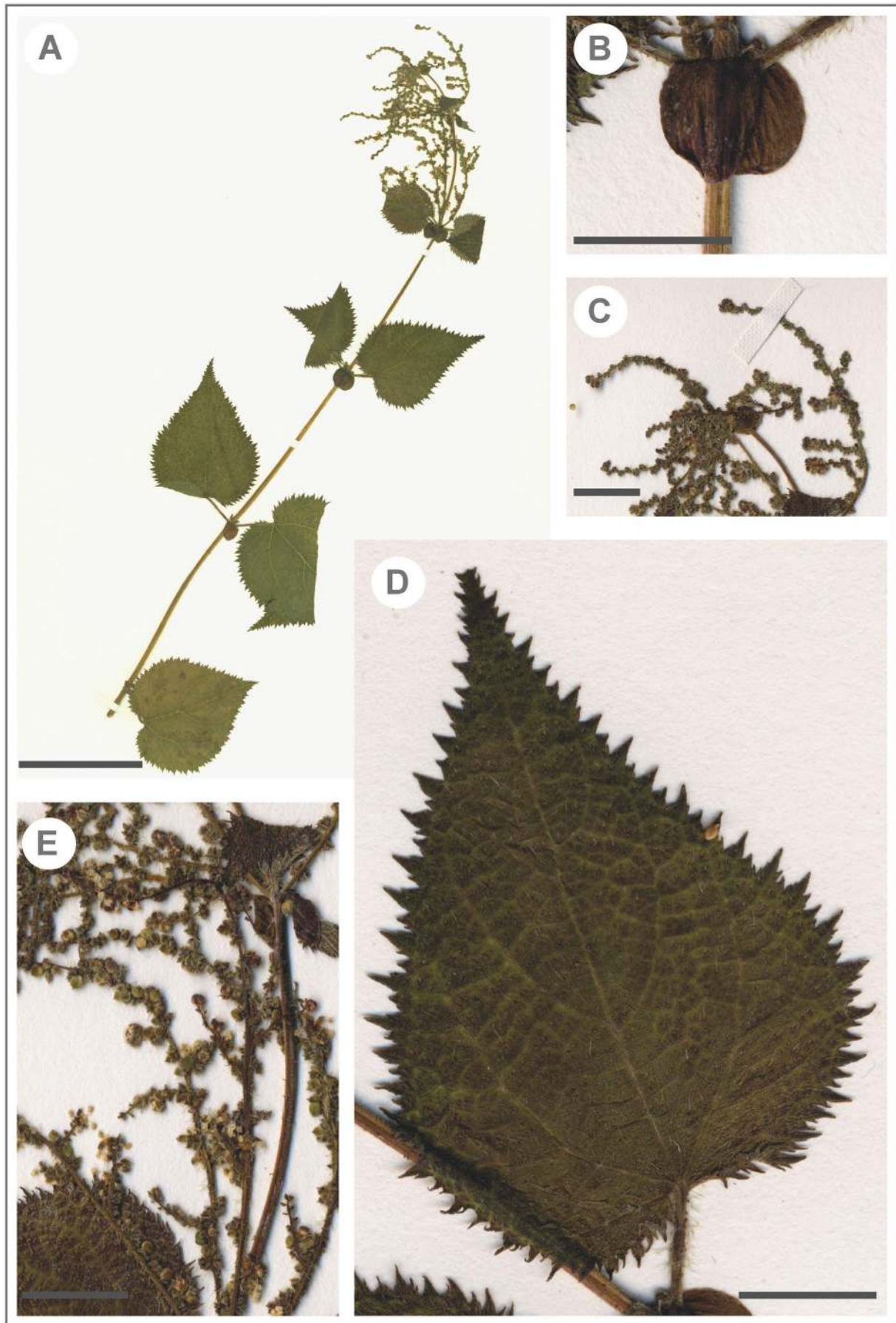
**Representative specimens:**—**INDONESIA. Java:** Oost-Java (Jawa Timur), *J.H. Coert 1174* (L\_1629139!); **Lombok:** Rindjani volcanic mountains, north side, Putihtal, Barranco Rindjani-Caldera, 2100–2600 m, many springs, moist from the fog, 06 May 1909, *J. Elbert 1121* (L\_1629157!); Rindjani volcanic mountains, north side, Putihtal, Barranco Rindjani-Caldera, 2000–2400 m, many springs, moist from the fog, 06 May 1909, *J. Elbert 1177* (L\_1629156!).

## 3. *Urtica himalayensis* Kunth & C.D.Boché (1846: 11). Fig. 5

Type:—Himalaya, Oct. 1844, *A. Braun 13* (holotype B! (B100088731)).

= *Urtica mairei* Lévl. var. *oblongifolia* C.J. Chen (1983: 122). Type:—[CHINA] Yunnan: Gintung: Ban-ma, 2200 m, on ditch side, 17 Jan. 1940, *M.K. Li 2985* (holotype Y, isotype PE! (PE\_00565202)). Paratypes:—CHINA. Guangxi: 13 Jan. / 3 Jun. 1940, *M.K. Li 2782* (KUN! (KUN\_0523743), KUN! (KUN\_0523742)).

= *Urtica zayuensis* C.J. Chen (1983: 123). Type:—TIBET. Chayu, evergreen forest, 1500 m, 7.7.1980, *Z. Ni, Y. Wang, Ciduo, Cidan 0494* (holotype PE! (PE-00509715)).



**FIGURE 5.** *Urtica himalayensis* (all Gaoligong Shan Biodiversity Survey 34461): A. Habit, B. Node with fused stipules, C. Female inflorescences, D. Typical leaf, E. Infructescence and male flowers. Scale bar: A = 5 cm; B–E = 1 cm.



Erect, perennial herb ca. 1.5 m, form perennial root and with pleiokorm of perennating underground stems; stem indumentum of stinging hairs with pluricellular base 1.0–2.0 mm long overall, setae 0.8–1.5 mm, and with simple trichomes 0.1–0.2 mm long; leaf lamina suborbicular to ovate-lanceolate, 5–150 (–230) × 35–100 (–160) mm, leaf margin with two orders of serration, 30–55 (–70) majorpointed teeth on each side, 1–2 mm long, each major tooth with 0–3 minor teeth 0.5–1 mm long, leaf base subcordate to rounded, leaf apex apiculate; leaf indumentum of stinging hairs with pluricellular base 1.4–1.8 mm long overall, setae 1.0–1.6 mm, and with simple trichomes 0.1–0.5 mm long; leaf surface with punctiform cystoliths; petioles 10–60 (–150) mm long; 4 stipules, forming 2 fused pairs per node, 5–15 mm long, elongated to rounded in the upper part of the plant; plant monoecious, usually staminate flowers proximal, carpellate flowers distal; staminate flowers with all tepals ca. 1.0 mm long, pubescent; pistillate flowers with tepals ca. 0.2 mm long, pubescent; infructescence 40–80 mm; mature fruits with longer tepals ca. 1.5 mm long, achenes suborbicular in outline, laterally flattened, ca. 1.5 × 1.0 mm.

**Note:**—The type specimen for this species is from cultivation in Berlin Botanical Garden, it is unknown where the seed was obtained from. *Urtica mairei* var. *oblongifolia* is here synonymized with *U. himalayensis* since the isotype seen (M.K. Li 2985) clearly corresponds to this species. However, the paratype (M.K. Li 2782) has to be referred to *U. mairei*, indicating a certain degree of confusion in the description of this taxon. The presence of *U. himalayensis* on Sumatra is somewhat surprising, since its distribution is otherwise exclusively Himalayan. Clearly, more and better material from Indonesia would be highly desirable. As now defined, the species ranges down to Sumatra and is replaced by *U. grandidentata* on Java. The latter differs by clearly lobed and much larger, suborbicular leaves.

**Distribution and Habitat:**—*U. himalayensis* is widespread in the Himalayas and is reported from Yunnan (China), India (Sikkim, Punjab and Himachal Pradesh), Nepal and Tibet and with one additional specimen collected in Indonesia, from the highest peak of Sumatra. *U. himalayensis* is commonly found on roadsides, near streams, in the understory of forests growing in rich and moist soil, and is usually found at intermediate elevations.

**Phenology:**—*U. himalayensis* flowers throughout the year.

**Conservation status:**—Using IUCN criteria (IUCN 2016), *Urtica himalayensis* Kunth & C.D.Boché is considered “Least Concern” (LC).

**Representative specimens:**—**CHINA. Yunnan:** Feng chen, 2133 m, *A. Henry 11197* (K\_000229275!); Gintung: Ban-ma, 2200 m, on ditch side, 17 Jan. 1940, *M.K. Li 2985* (PE\_00565202!); Gongshan, Dulong River, Ba Slope, shrubland in a valley, 1300 m, 18 Nov. 1990, *Dulong River Expedition Team 512* (KUN\_523797! & KUN\_523798!); Gongshan, Dulong River, Meiqiewang, shrubland in a valley, 1620 m, 10 Jan. 1991, *Dulong River Expedition Team 1804* (KUN\_523794! & KUN\_523795!); Gongshan, Dulong River, secondary shrubland, 1500 m, 20 Dec. 1990, *Dulong River Expedition Team 1260* (KUN\_523796! & PE\_00509719!); Gongshan, Dulong River, secondary shrubland, 2000 m, 26 Mar. 1991, *Dulong River Expedition Team 5208* (KUN\_523793! & PE\_00509718!); Dulongjiang, Moquiwan Cun, ca 3.6 direkt km NW of Moquiwan in the vicinity of the bridge across the Moquiwan river on the road from Gonshang to Kongdang, W side of Gaoligong Shan, 2240 m, S facing 10–30° slope, 27° 54'38" N, 98° 24' 39.8" E, subtropical evergreen broadleaf forest dominated by *Lithocarpus* and *Pinus bhutanensis*, disturbed by clearing, 09 Jan. 2006, *Gaoligong Shan Biodiversity Survey 34461* (HUH\_00285255!); Guangxi, Naop, shrubland in a valley, 1100 m, 09 Dec. 1958, *Z. Zhang 13088* (IBK\_00130578!); Lushui, Yaojiaping, forest farm, roadside of theropencedrymion [forest type], 2300 m, 02 Aug. 1981, *Hengduan Mountain Team, Institute of Botany, The Academy of Science 379* (PE\_00509713!); *A. Henry 11197* (MO\_3535025!);—**INDIA. Himachal Pradesh:** Lahol [Lahaul], Kardong to Dartse in the Bhaga valley, 15 to 18 Jun. 1856, *Schlagintweit 2767* (PR!); Simla, 2133 m, 01 Sep. 1880, *Collett 590* (K\_000229276!); Simla, Himalaya occ. 10 Oct. 1888, *Harmand s.n.* (P\_06750057! & P\_06750058!); **Punjab:** Bhogarmanly, 1524 m, *Barrett 21997* (K\_000229287!); **Sikkim:** no locality data, 1524 m, *J.D. Hooker & Thompson 1855* (P\_06855893!); 1828–2438 m, *J.D. Hooker & Thompson s.n.* (P\_06855895!); 1828–2438 m, *J.D. Hooker & Thompson s.n.* (P\_06855896! & P\_06855895!); 2133 m, *J.D. Hooker & Thompson s.n.* (L\_1629647!); India, no province, *Jacquemont 1247* (P\_06855898!); no collector, *s.n.* (P\_06855900!);—**INDONESIA. Sumatra:** Kerinchi, Sep. 1915, *Jacobson 2503* (L\_1629137!);—**NEPAL. Janakpur:** Ramechhap, Choarma (2750 m)–Kyama (2600 m), 03 Aug. 1985, *H. Ohba, T. Kikuchi, M. Wakabayashi, M. Suzuki, N. Kurosaki, K.R. Rajbhandari & S.K. Wu 8571187* (E\_00148746!);—**TIBET. Chayu:** evergreen forest, 1500 m, 07 Jul. 1980, *Z. Ni, Y. Wang, Ciduo, Cidan 0494* (PE\_00509715!); hillside, grassland, 2400 m, 25 Jun. 1980, *Z. Ni, Y. Wang, Ciduo, Cidan 0185* (PE\_00509714!); Shangzay, humid valley, evergreen forest, 2200 m, 11 Jul. 1996, *Collector unknown* (PE\_00509716! & PE\_00509717!);—**Unidentified localities:** Himalayas, Oct. 1844, *Kunth s.n.* (B\_100088731!); Kashmir [India, Pakistan or China]. 2133 m, *J.D. Hooker & Thompson s.n.* (P\_06855897!).

4. *Urtica mairei* Lév. (1913: 183). Figs. 6 and 7

Type:—[China. Yunnan] pied des murs-plaine de Tong-Tchouan, 2500 m, Sep. 1913, *E.E. Maire s.n.* (holotype E! (E\_00275395)).

Erect, perennial herb ca. 1.5 m, form perennial root and with pleiokorm of perennating underground stems; stem indumentum of stinging hairs with pluricellular base 1.0–1.5 mm long overall, setae 0.8–1.0 mm, and with simple trichomes 0.1 mm long; leaf lamina suborbicular, 70–120 × 50–90 mm, margin lobulate with two orders of dentation, 8–15 major teeth on each side, 2–10 mm long, major teeth with 2–4 minor teeth on each side, minor teeth 0.5–2 mm, leaf base subcordate to rounded, leaf apex apiculate; leaf indumentum of stinging hairs with pluricellular base 1.3–2.0 mm long overall, setae 1.1–1.5 mm, and with simple trichomes 0.1–0.2 mm long; leaf surface with punctiform cystoliths; petioles 40–90 mm long; 4 stipules, forming 2 fused pairs per node, 100–150 mm long, elongated; plant monoecious, usually staminate flowers basal, carpellate flowers apical; staminate flowers with all tepals 1.0 mm long, pubescent; pistillate flowers with tepals 0.2–0.5 mm long, pubescent; infructescence 30–90 mm; mature fruits with longer tepals 1.0–1.3 mm long, achenes suborbicular in outline, laterally flattened, ca. 1.0–1.3 × 1.0 mm.

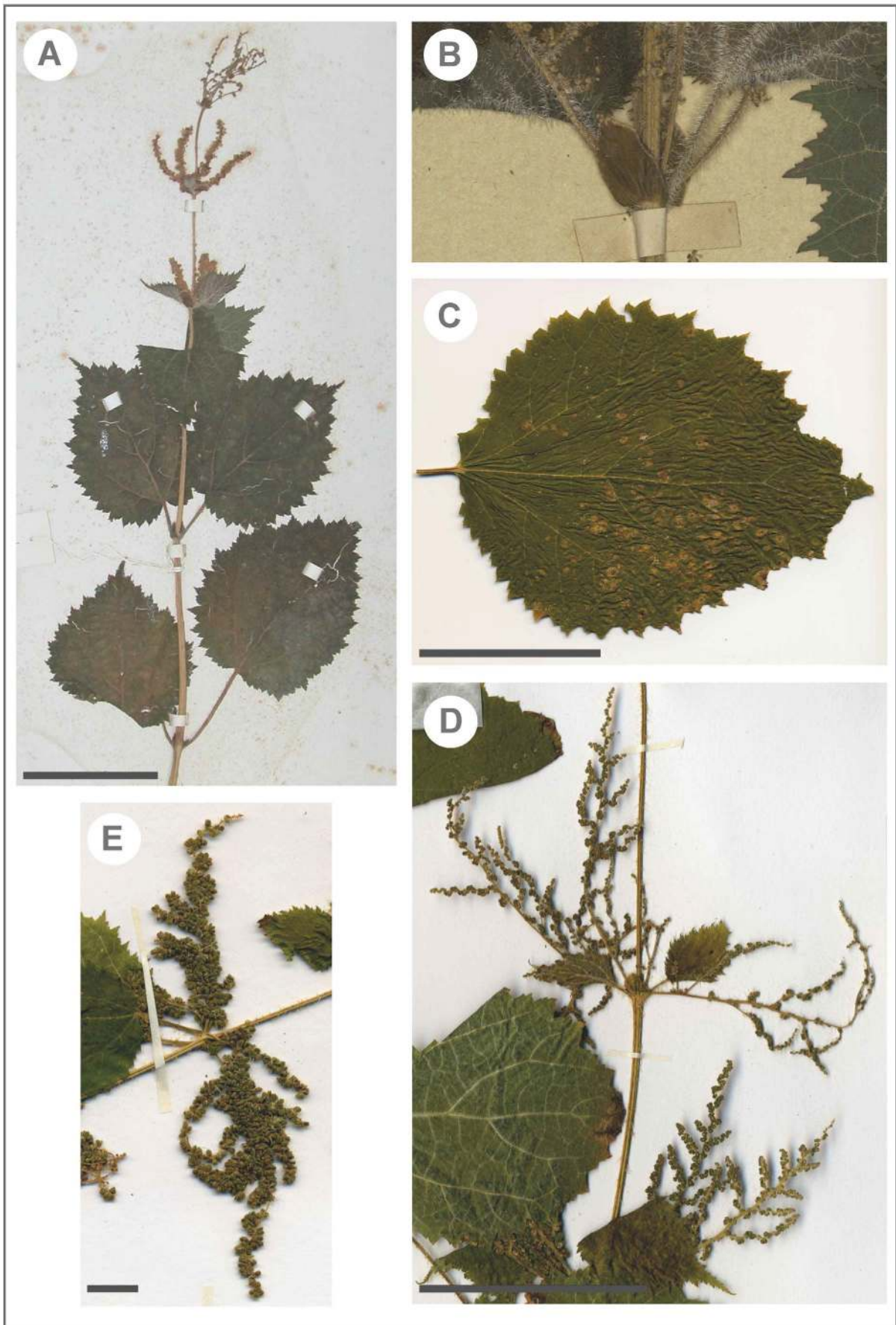
**Note:**—Amongst the numerous collections of *U. mairei* none was exactly identical to the type specimen, all of them differ in marginally smaller stipules (compare Figs. 6 and 7) and slightly less sharp teeth. However, we consider this part of the natural variation within one species.

**Distribution and Habitat:**—*U. mairei* is restricted to southern Asia and is here reported from Northeast-Vietnam, Taiwan, Tibet and the Chinese provinces Guangxi, Sichuan, and Yunnan. *U. mairei* is commonly found on roadsides, pastures, in the understory of forests growing in rich and moist soil, near streams, and is usually found at intermediate to high elevations.

**Phenology:**—*U. mairei* flowers throughout the year.

**Conservation status:**—Using IUCN criteria (IUCN 2016), *Urtica mairei* Lév. is considered “Least Concern” (LC).

**Representative specimens:**—**CHINA. Guangxi:** Longjin, in a valley, 560 m, 18 Nov. 1957, *Collector unknown* (IBK\_00130570!); Longjin, in a valley, roadside, 1000 m, 09 Nov. 1957, *Collector unknown* (IBK\_00130572!); Longlin, in a valley, slow slope, 1570 m, 12 Mar. 1956, *Collector unknown* (IBK\_00130576!); **Sichuan:** Linggu, back mountain, hillside, in a groove under a tree, 50–80 m, 18 Jul. 1976, *Collector unknown* (CDBI\_0017400! & CDBI\_0017401!); Riverside, understory, 2600 m, 19 Aug. 1978, *Zhao, Yang, Kehua Nian 2600* (CDBI\_0017432!, CDBI\_0017433!, CDBI\_0017434!); **Yunnan:** 21. Jul. 1898, *F. Ducloux 659* (P\_06749810!); Dry shady situations in pine and mixed forests on the eastern flank of the Lichiang Range, Lat. 27°20'N, 2743–3048 m, Aug. 1910, *G. Forrest 63931* (P\_06855806!); 1934, *H.T. Tsai 57550* (HUH\_00240989!); Central-Yunnan Wuding Sheshan, Pinus-Castanopsis mixed forest, 2000–2400 m, 25 Dec. 1984, *T. Deding 840035* (HUH\_00278031! & HUH\_00278030!); Chungtien, Haba, Altitude: 2600 m, Habitat: Margin of garden, 25 Nov. 1937, *T.T. Yü 14978* (HUH\_00278006!); Gingtung A-Lo-De, 2200 m, on road side, 13 Jan. 1940, *M.K. Li 2782* (KUN\_0523742! & KUN\_0523743!); Jingdong, evergreen broad-leaf forest, 2300 m, 21 Oct. 1993, *Dai Peng 1408* (KUN\_0523718!); Kunming, West Mountain, Sanqing Pavilion, 01 Jun. 1957, *W. Yin 881* (KUN\_0523724!); Likiang city, open pasture, 23 Sep. 1939, *R.C. Ching 21696a* (HUH\_00240990!); Luna, Stone Forest, 1800 m, 07 Sep. 1977, *S. Qiu s.n.* (CDBI\_0017436!); Muli, Tongtian River, Riverside, sunny slope, 04 Oct. 1959, *Wu 3493* (CDBI\_0017435!); Plain de Tong-Tchouan, 2500 m, Aug. 1913, *E.E. Maire s.n.* (P\_06750044!); Plain de Tong-Tchouan, 2500 m, Oct. 1913, *E.E. Maire s.n.* (P\_06822139!); Plain de Tong-Tchouan, beneath walls, 2500 m, Sep. 1913, *E.E. Maire 1184* (E\_00275395!, E\_00275394!, E\_00275396!); Wei-si Hsien, Yeh-Chih, Altitude: 3200 m, Habitat: Mountain slope, Aug. 1935, *C.W. Wang 68073* (HUH\_00278027!);—**TAIWAN.** 1500m, Dec. 1914, *M. Faurie 1511* (HUH! & P\_06855803!); Mt. Taiha, Izawayamasitn, 04 Aug. 1934, *Suzuki s.n.* (PE\_00509586!); Nokosan (Mt. Noko), between Noko Police Station (alt. 9437 ft.) and the Prefectural Boundary, 10,200 ft., west of the divide, 05 Oct. 1926, *H.H. Bartlett 6235* (HUH!);—**TIBET. Kongbo:** near Tripe (SE Tibet), roadside climbing out of Tripe towards Gyala, Shady cleft in roadside cliff by track, Near 29 36 54.4 N 94 56 26.8 E, 3000 m, 08 Oct. 1997, cultivated specimens collected in University of Liverpool Botanic Gardens, Ness, *K. Rushforth & H. McAllister 5247* (BONN!); **Nacuo,** in the forest, 2750 m, 26 Aug. 1975, *Tibet Team 751685* (KUN\_0523739!, KUN\_0523740!);—**VIETNAM.** 17 Sep. 1888, *Anon. 3251* (P\_06855805!); **Northeast:** Tonkin, 06 Jul. 1909, *C. Alleizette s.n.* (L\_1629818!).



**FIGURE 6.** *Urtica mairei*: A. Habit (*Qiu s.n.*), B. Node with fused stipules (*Ducloux 659*), C. Typical leaf (*Rushforth & McAllister 5247*), D. Male inflorescence (*Rushforth & McAllister 5247*), E. Infructescence (*Rushforth & McAllister 5247*). Scale bar: A, C, D = 5 cm; B, E = 1 cm.



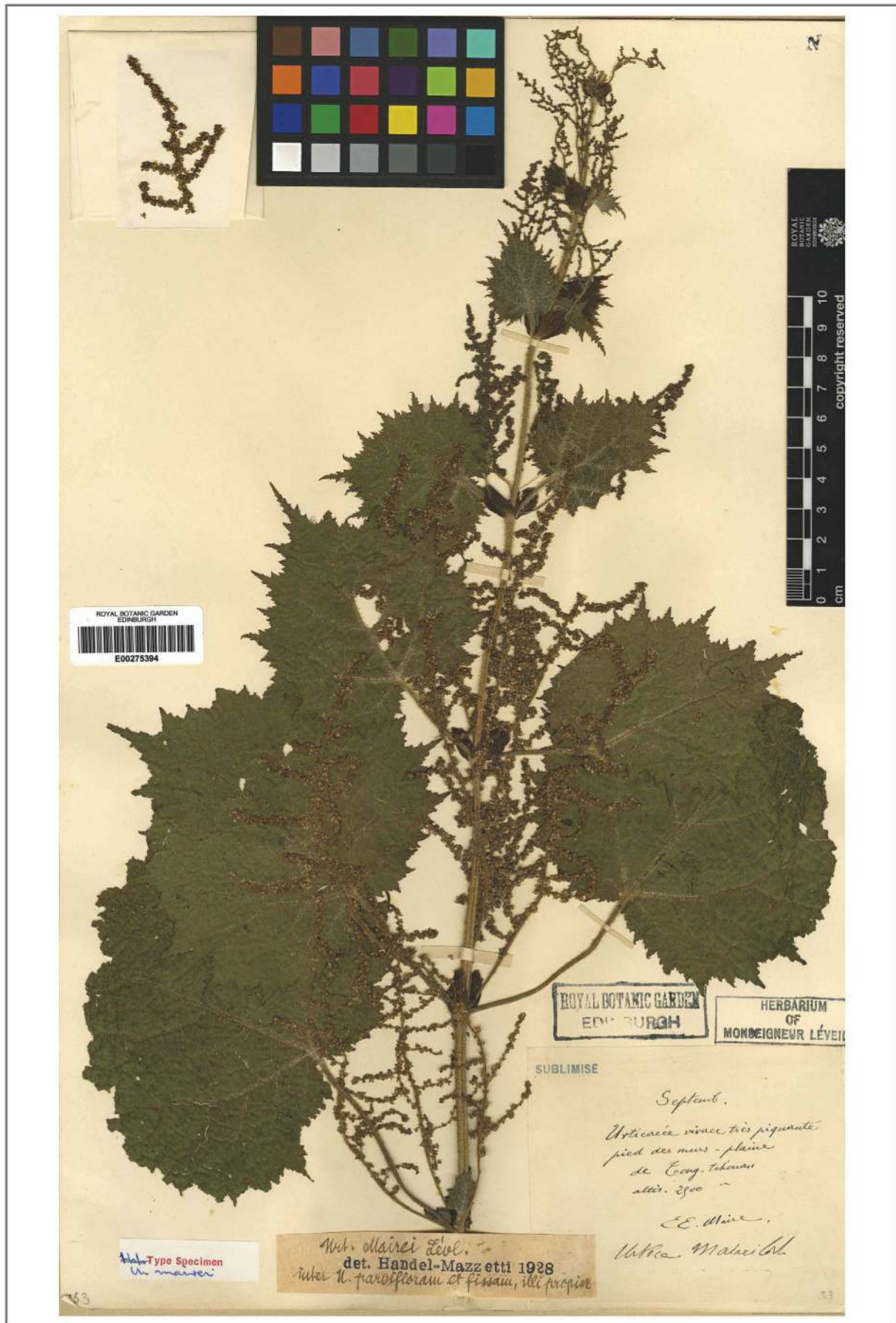
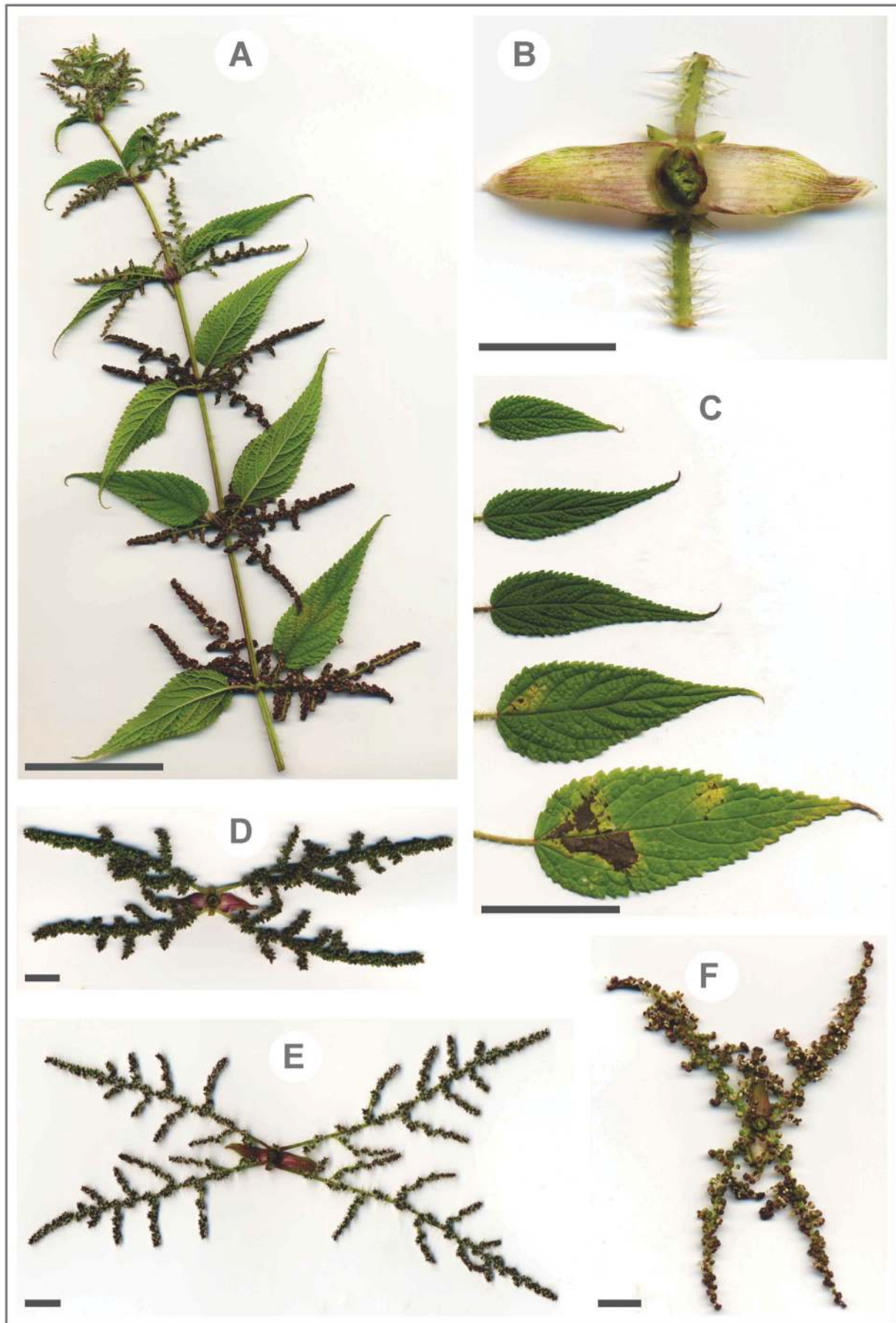


FIGURE 7. Habit of a type specimen of *Urtica mairei* (Maire s.n., E\_00275394).





**FIGURE 8.** *Urtica parviflora* (all B. Große-Veldmann, K. Becker & A. Mustafa 136-C): A. Habit, B. Node with fused stipules, C. Typical leaves, D. Inflorescence, E. Female inflorescence, F. Male inflorescence. Scale bar: A, C = 5 cm; B, D–F = 1 cm.

## 5. *Urtica parviflora* Roxb. (1814: 67). Fig. 8

Type:—INDIA. Uttar Pradesh: Rohilkund [=Rohilkhand], 1803, *A. Gott s.n.* (holotype not localized). Iconotype:—R. [Roxburgh] No. 1909 (photograph of the plate at Calcutta). Epitype (here designated):—INDIA. Himachal Pradesh: Upper Dharamsala, ca. 2000 m, 25 Mar. 2013, source collection by *H. Binski* 25 March 2013, cultivated in the Botanical Gardens of the University of Bonn, *B. Große-Veldmann, K. Becker & A. Mustafa 136-C* (epitype BONN!, isoeotypes B!, HUH!, K!, MO!).

= *Urtica ardens* Link (1822: 385). Type:—NEPAL. Bagmati: Along side of road below Royal Drug Research Laboratory, Godavari, Kathmandu Valley, 28 June 1987, *W. Codon & A. Codon* (neotype (here designated) MO! (MO\_4320803)).

= *Urtica virulenta* Wall. (1831: 4586). *nom. nud.*, specimen:—Nepal. 1821, *Wallich 4586* (K! (K\_001039385)).

Erect, perennial herb 0.7–1.5 m, form perennial root and with pleiokorm of perennating underground stems; stem indumentum of stinging hairs with pluricellular base 3.0–4.5 mm long overall, setae 1.8–3.5 mm, and with simple trichomes ca. 0.1 mm long; indumentum is ontogenetically variable: vegetative basal part of the plant with conspicuously more and shorter stinging hairs than the generative part; leaf lamina ovate-lanceolate, 50–80 × 35–15 mm, leaf margin dentate with 15–30 major teeth on each side, teeth 1–3 mm long, occasionally some teeth irregularly dentate with minor teeth ca. 0.5–1 mm long, leaf base rounded, leaf apex aristate; leaf indumentum of stinging hairs with pluricellular base 2.0–3.5 mm long overall, setae 1.6–3.0 mm, and with simple trichomes 0.1–0.2 mm long; leaf surface with punctiform cystoliths; petioles 20–60 mm long; 4 stipules, forming 2 fused pairs per node, occasionally incised distally, 5–10 mm long, elongated; plant monoecious, usually staminate flowers basal, carpellate flowers apical; staminate flowers with tepals ca. 1.0 mm long, pubescent; pistillate flowers with tepals ca. 0.2 mm long, pubescent; infructescence 50–100 mm; mature fruits with longer tepals 1.2–1.5 mm long, achenes suborbicular in outline, laterally flattened, ca. 1.2 × 1.5 mm.

**Note:**—*Urtica ardens* and *U. virulenta* are here treated as synonyms of *U. parviflora*, this is clear from the type material (in *U. virulenta*) respectively the description (in *U. ardens*). The taxon considered as *U. ardens* in Chen *et al.* (2003) therefore has to be correctly called *U. himalayensis*.

**Distribution and Habitat:**—*U. parviflora* is restricted to the Himalayas and is here reported from Nepal, the Indian provinces Sikkim, Uttar Pradesh and Himachal Pradesh, Tibet and Kashmir (nowadays parts of northern India, eastern Pakistan and western China). *U. parviflora* is found on roadsides and in the understory of forests at intermediate elevations.

**Phenology:**—*U. parviflora* flowers throughout the year.

**Conservation status:**—Using IUCN criteria (IUCN 2016), *Urtica parviflora* Roxb. is considered “Least Concern” (LC).

**Representative specimens:**—INDIA. Sikkim: 1855, *J.D. Hooker s.n.* (P\_06855887!);—KASHMIR [nowadays parts from India, Pakistan & China]. Jammu and Kashmir [India]: Drained lake basin of Kashmir, environs of Srinager, within a circle of 8 miles radius, 10 Aug. to 30 Sep. 1856, *Schlagintweit 4367* (P\_06855889!);—NEPAL. *Wallich 4586* (K\_001039385!); **Bagmati:** Along side of road below Royal Drug Research Laboratory, Godavari, Kathmandu Valley, 28 June 1987, *W. Codon & A. Codon* (MO\_4320803!);—TIBET. Nyalam: Nepal friendship bridge, 18 Aug. 1992, *J. Chen s.n.* (PE\_00565204! & PE\_00565205!);—Unidentified localities: *Collector unknown* (P\_06855892!)

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