

Checklist to the *Elatostema* (Urticaceae) of Vietnam including 19 new records, ten new combinations, one new name and three new synonyms

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Abstract: *Elatostema* (Urticaceae) comprises several hundred herbaceous species distributed in tropical and subtropical Africa, Asia, Australia and Oceania. The greatest species richness occurs on limestone karst in Southeast Asia. Taxonomic revisions of *Elatostema* are largely out of date and contradict each other with respect to the delimitation of *Elatostema* and *Pellionia*. Most herbaria in SE Asia and worldwide contain significant amounts of unidentified material. As part of a broader revision of *Elatostema* in SE Asia, we present an updated checklist for Vietnam based on field visits, a review of specimens in herbaria worldwide, a review of type material and nomenclature. We recognize 77 taxa (75 species and two intraspecific taxa) of *Elatostema* in Vietnam, 23 of which were previously ascribed to *Pellionia*. Nineteen of these are new records for the country, i.e. *E. attenuatoides*, *E. austrosinense*, *E. backeri*, *E. brunneinerve*, *E. crassiusculum*, *E. crenatum*, *E. fengshanense*, *E. glochidioides*, *E. malacotrichum*, *E. nanchuanense*, *E. oblongifolium*, *E. obtusum*, *E. oppositum*, *E. pergameneum*, *E. prunifolium*, *E. pseudolongipes*, *E. pycnodontum*, *E. salviniioides* var. *robustum* and *E. xichouense*. We place *E. colaniae* in synonymy with *E. myrtillus*, *P. macroceras* in synonymy with *E. hookerianum*, and *P. tetramera* in synonymy with *E. dissectum* for the first time. Fourteen taxa (18% of all the recognized taxa) are endemic to Vietnam, which makes *Elatostema* one of the richest genera for endemic species in this country; this level of endemism is comparable to levels observed in Orchidaceae. Our checklist suggests that the highest diversity and endemism of *Elatostema* occurs in northern Vietnam, and that there is the greatest floristic similarity of northern Vietnam to SW China. The relationship among floristic regions is also investigated. We could find no records of *Elatostema* for 33 out of 63 provincial units of Vietnam, including all the southernmost provinces. We propose that further studies on the diversity of *Elatostema* in central and southern Vietnam are severely needed.

Key words:

Flora of Vietnam, *Pellionia*, Elatostemateae, Orchidaceae, *Begonia*, taxonomy, limestone, karst, Indochina.

58 Introduction

59 *Elatostema* J.R.Forster & G.Forster (Urticaceae) comprises several hundred species of
60 succulent herbs and subshrubs that grow in shade in forests, gorges, stream sides and caves
61 (Fu et al., 2017; Monro et al., 2018). There are currently 626 accepted names within the genus
62 *Elatostema* (The Plant List, 2018). *Elatostema* is most diverse in subtropical and tropical
63 climates and is characterized by apparently alternate (opposite but frequently with ephemeral
64 and occasionally absent nanophylls), strongly asymmetrical leaves arranged distichously,
65 small staminate flowers borne in dense cymes with receptacle-like involucre or paniculate
66 cymes and minute pistillate flowers borne in dense capitate cymes, the bracts of which form a
67 receptacle-like involucre (Tseng et al., in press). As in most species in the tribe
68 Elatostemateae (Conn & Hadiah, 2009), the stamens open explosively and the seeds are
69 ejected by reflexive staminodes (Friis, 1989). *Elatostema* is distributed throughout tropical
70 and subtropical Africa, Madagascar, Asia, Australia and Oceania, with highest diversity on
71 limestone karst in China and Southeast Asia (Yahara, 1984; Lahav-Ginott & Cronk, 1993;
72 Wang & Chen, 1995; Lin, Friis & Wilmot-Dear, 2003; Wang, 2014). The previous studies
73 suggest that this diversity has been driven by the challenges of colonising karst substrates,
74 which once overcome leads to species radiations (Chung et al., 2014; Fu et al., 2017), and that
75 past temperature fluctuations and East Asian monsoons have driven the rates of plant
76 diversification in karst ecosystems by accelerating the rate of karstification (Kong et al.,
77 2017).

78 Vietnam comprises 331,000 km² of the eastern Indochinese Peninsula between latitudes
79 8° and 24°N, and longitudes 102° and 110°E. Mountains account for 40% of the surface area,
80 and ca. 42% of the land is forested (De Queiroz et al., 2013). Vietnam's climate divides
81 broadly into humid subtropical in the north, monsoon in the centre and tropical savannah in
82 the south (Peel, Finlayson & McMahon, 2007). However, on the basis of more detailed and
83 accurate climate classification by Nguyen et al. (2000), seven types of climate are defined in
84 Vietnam (Fig. 1) which are largely congruent with the floristic region classification
85 (Takhtajan, 1978; Takhtajan, 1986; Averyanov et al., 2003a). Within Vietnam, six floristic
86 regions have been delimited: the Sikang-Yunnan, South Chinese, North Indochinese, Central
87 Annamese, South Annamese and South Indochinese Floristic Regions (Fig. 2). Vietnam also

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G.Forst.

88 forms part of the Indo-Burma biodiversity hotspot and hosts 110 Key Biodiversity Areas
89 (Mittermeier et al., 2004), and 65 Important Bird Areas (BirdLife International, 2002). Its
90 flora comprises ca. 12,000 vascular plant species (Averyanov et al., 2003a), of which ca. 10%
91 are endemic to the country (Pilgrim & Tu, 2007). Despite Vietnam's rich plant diversity, it is
92 still poorly sampled, with only ca. 14 specimen records per 100 km² (Newman et al., 2007). A
93 comparison of the 20 most species-rich families for neighbouring southern China places
94 Urticaceae in the top ten most species-rich families (Zhu, 2017), yet it is absent from the top
95 20 families for Vietnam (Zhu, Yan & Qin, 2003). This suggests that Urticaceae are
96 undersampled in Vietnam.

97 The delimitation of *Elatostema* has been controversial with respect to *Elatostematoides*
98 (Robinson, 1910), *Pellionia* (Gaudichaud, 1830) and *Procris* (Jussieu, 1789). Using a
99 molecular phylogeny and re-evaluation of morphological characters of leaves, inflorescences
100 and flowers, the latest study (Tseng et al., in press) demonstrates that *Elatostema* is a
101 monophyletic group which includes *Pellionia* but excludes *Procris*, *Elatostematoides* and
102 *Pellionia repens* (Merrill, 1928).

103 Despite the large number of species descriptions and numerous revisions of *Elatostema*
104 in China (Wang, 1980; Wang & Chen, 1995; Lin et al., 2003; Wei et al., 2011; Wang, 2014;
105 Wang, 2016), there has been little work on the Southeast Asian taxa (Robinson, 1910;
106 Gagnepain, 1930; Yahara, 1984; Beaman, 2001; Ho, 2003; Hiep, 2005). In addition, the most
107 recent world-scale revision of this genus was undertaken in the 1930s before much of the
108 region had been extensively covered by collections (Schroeter & Winkler, 1935; Schroeter &
109 Winkler, 1936). Lack of taxonomic effort combined with high species diversity of *Elatostema*,
110 high rate of species discovery and the frequency of point endemism has resulted in many
111 Southeast Asian and world herbaria having significant numbers of undetermined *Elatostema*
112 collections. The lack of a comprehensive species and distribution list for *Elatostema* in
113 Vietnam therefore represents a barrier not only to its study but also to the assessment of
114 extinction threats, conservation and sustainable use.

115 The first checklist of *Elatostema* in Vietnam (Gagnepain, 1930) documented 34 species
116 (together with *Pellionia*). This was followed by two studies (Ho, 2003; Hiep, 2005) which
117 documented 35 species and 32 species (together with *Pellionia*) respectively. Since that time

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118 further 27 species have been recorded from Vietnam in regional floras and checklists and
 119 other works (Wang, 1983; Wang & Chen, 1995; Lin, Friis & Wilmot-Dear, 2003; Lin, 2008;
 120 Lin et al., 2011; Fu et al., 2013; Fu et al., 2014a; Fu et al., 2014b; Lin, Duan & Bi, 2014a; Lin,
 121 Duan & Bi, 2014b; Wang, 2014; Do et al., 2017) and several species have had their
 122 circumscription changed (Shao, Lin & Duan, 2004; Wang, 2016). The generic placement of
 123 some species was also reevaluated (see above). Considering these numerous additions, our
 124 ongoing research in Southeast Asian *Elatostema*, the recently revised genus circumscription
 125 (Tseng et al., in press) and the need to critically assess the extinction threat of the species we
 126 decided to produce an updated checklist to support further taxonomic and broader scientific
 127 studies.

128

129 **Materials & Methods**

130 Fieldtrips were undertaken by two groups, a Sino-Vietnamese Group (SVG) and a
 131 Russian-Vietnamese Group (RVG). Between 2012 and 2017, SVG undertook five fieldtrips to
 132 the provinces or cities of Bac Kan, Cao Bang, Ha Giang, Ha Noi, Hai Phong, Hoa Binh, Nghe
 133 An, Lang Son, Lao Cai, Ninh Binh, Quang Binh, Thanh Hoa, Tuyen Quang and Vinh Phuc in
 134 northern Vietnam. During the course of these trips SVG made ca. 100 *Elatostema* collections.
 135 Over the last 30 years RVG has undertaken dozens of fieldtrips throughout Vietnam, which
 136 have resulted in ca. 200 *Elatostema* collections. In addition to field collecting we reviewed ca.
 137 1000 specimens of *Elatostema* at A, BM, HN, IBK, IBSC, K, LE, MHA, MO, MW, P, PE,
 138 SING, TAI and VNMN. This was accompanied by a literature review which encompassed
 139 species protologues, the most recent monograph (Schroeter & Winkler, 1935; Schroeter &
 140 Winkler, 1936), and regional checklists (Robinson, 1910; Gagnepain, 1930; Backer, 1965;
 141 Yahara, 1984; Ho, 2003; Hiep, 2005; Wang, 2014; Wang, 2016). Using these sources of
 142 information, we have generated a preliminary species list. We then confirmed or refuted each
 143 name on the list against type material, either the original specimens or high resolution images
 144 of them, using the subscription-based [full](#) version of [the JSTOR Global Plants portal](#) (2017)
 145 so that only names for which a herbarium specimen or field image could be confidently
 146 associated with a type image or specimen were included in the final checklist.

147 We used the morphological species concepts (Schroeter & Winkler, 1935; Schroeter &

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Winkler, 1936; Wang, 1980; Wei, Monro & Wang, 2011; Wang, 2014) to delimit species. These concepts place emphasis on peduncle bract shape and length, the number, morphology and arrangement of the bracts comprising the receptacle-like involucre, the number of bracteoles per flower and leaf lamina length/width ratios. Material was examined under a Changfang XTL-240 binocular microscope and Planapo lens at $\times 14$ to $\times 90$ magnifications.

For counting the diversity and endemism of *Elatostema* across floristic regions, we followed the concepts of Takhtajan (1978; Takhtajan, 1986) and Averyanov et al. (2003a) to assign the location of each specimen to particular floristic region. The specimens without detailed localities that could not be assigned with confidence to a floristic region were not used in this analysis.

Results

Diversity & endemism

We document 77 taxa of *Elatostema* in Vietnam, 14 taxa (18%) of which are endemic to the country. These taxa comprise 75 species, two of which are represented each by two varieties. Table 1 provides a summary of the species richness, national endemism, and new national records identified here, per floristic region. Figures 3–5 provide field images of a representative sample of these species.

We document the greatest species richness in northern Vietnam (Cao Bang, Ha Giang, Lao Cai provinces) and the lowest species richness in eight scattered provinces across northern to central Vietnam and 25 southernmost provincial units where no *Elatostema* species have been documented: Bac Ninh, Ha Nam, Hai Duong, Hung Yen, Nam Dinh, Thai Binh, Yen Bai (North), Da Nang City (Central) and An Giang, Ba Ria-Vung Tau, Bac Lieu, Ben Tre, Binh Dinh, Binh Duong, Binh Phuoc, Binh Thuan, Ca Mau, Can Tho City, Dak Nong, Dong Nai, Dong Thap, Hau Giang, Ho Chi Minh City, Kien Giang, Long An, Ninh Thuan, Phu Yen, Quang Ngai, Soc Trang, Tay Ninh, Tien Giang, Tra Vinh, and Vinh Long (South, Fig. 6). We recovered the greatest number of species endemic to the country in northern Vietnam (particularly Bac Kan province and Ha Noi City) (Fig. 6).

Relationship among floristic regions

Figure 7 provides the proportion of diversity and endemism and the relationship of each floristic region. The order of the proportion of diversity of two floristic regions is South Chinese - North Indochinese (49.2%) > Sikang-Yunnan - North Indochinese (46.9%) > Sikang-Yunnan - South Chinese (35.8%) > Central Annamese - South Annamese (35.3%) > North Indochinese - Central Annamese (30.0%) > South Chinese - Central Annamese (20.7%) > North Indochinese - South Annamese (19.4%) > Sikang-Yunnan - South Annamese (13.2%) > South Chinese - South Annamese (13.0%) > Sikang-Yunnan - Central Annamese (10.6%).

New records, new combinations, new name & synonymy

We found 19 new records of *Elatostema* for Vietnam, i.e. *E. attenuatoides* Wang, (2006), *E. austrosinense* Y.H.Tseng & A.K.Monro nom. nov., *E. backeri* (Schroeter & Winkler, 1936), *E. brunneinerve* (Wang, 1983), *E. crassiusculum* (Wang, 1980), *E. crenatum* (Wang, 1980), *E. fengshanense* (Wei & Wang, 2009), *E. glochidioides* (Wang, 1993), *E. malacotrichum* (Wei & Wang, 2009), *E. nanchuanense* (Wang, 1980), *E. oblongifolium* (Wang, 1980), *E. obtusum* (Weddell, 1854), *E. oppositum* (Lin & Shui, 2011), *E. pergameneum* (Wang, 1980), *E. prunifolium* (Wang, 1980), *E. pseudolongipes* (Wang, 2014), *E. pycnodontum* (Wang, 1980), *E. salvinoides* var. *robustum* (Wang, 1989), and *E. xichouense* (Wang, 1980). All new records came from the northern provinces: Cao Bang, Ha Giang, Lao Cai, Dien Bien, Lang Son, Phu Tho, Bac Kan, Hoa Binh and Ninh Binh (Table 1); all of them are also known from the neighbouring regions of China, i.e. Guangxi, Guizhou and Yunnan. Of the Vietnamese provinces, Cao Bang and Ha Giang had the greatest number of new records.

We place *Elatostema colaniae* (Gagnepain, 1929) in synonymy of *E. myrtillus* (Handel-Mazzetti, 1929) basing on the characters of small lamina with auriculate base and furfuraceous stem base. We also place *Pellionia macroceras* (Gagnepain, 1928) in synonymy with *E. hookerianum* (Weddell, 1856) based on the characters of falcate lamina with cordate base, and place *P. tetramera* (Gagnepain, 1928) in synonymy of *E. dissectum* (Weddell, 1856) based on the characters of oblong-lanceolate lamina and staminate inflorescence with long peduncle. In addition and in line with the study by Tseng et al. (in press), we transfer all previously known *Pellionia* species found in Vietnam (except for *P. repens*) to *Elatostema*

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219 including ten new combinations and one new name proposed accordingly.

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221 Discussion

222 Diversity & endemism

223 Our checklist of *Elatostema* in Vietnam doubles the number of species cited in the most
224 recent checklist (Hiep, 2005) bringing the total diversity to 77 taxa (75 species). This is the
225 product of both recent checklists for the region, field collecting and herbarium specimen
226 examination, aided by the availability of protologues, type images and other collections online
227 (e.g. JSTOR Global Plants, 2017, Seregin 2018).

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228 We also document that species richness and endemism increase with latitude, away from
229 the equator. Whilst counter-intuitive, a similar pattern has been documented for the diversity
230 of *Begonia* (Linnaeus, 1753; Averyanov & Nguyen, 2012) and Orchidaceae (Averyanov et al.,
231 2003a). This is likely a reflection of the distribution of karst in Vietnam with which
232 *Elatostema* (Wang 2014), *Primulina* Hance, 1883; Kong et al., 2017) and *Begonia* L. (Chung
233 et al., 2014) species richness in Southeast Asia is strongly associated rather than *Elatostema*'s
234 preference for a more seasonal or cooler climate. Given the total absence of *Elatostema*
235 records from Vietnam's southernmost provinces this pattern may also have been
236 over-emphasised by unequal sampling effort across the country as well as by unequal
237 distribution of intact vegetation. Indeed, the southernmost provinces are largely plain and
238 therefore occupied by agricultural landscapes.

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239 The documented 18% level of endemism of the *Elatostema* taxa in Vietnam is nearly
240 twice the average for the country's flora (10%, Pilgrim & Tu, 2007) and comparable to that in
241 the most species-rich family Orchidaceae (19%, Averyanov et al., 2003a). As in China, an
242 association with karst is likely the driver for much of this diversity. Current researches
243 (Chung et al., 2014; Kong et al., 2017) suggest that rates of karstification over time, and likely
244 in the Miocene, associated with seasonal climate and temperature, may have driven speciation
245 on karst. Species that were able to adapt to what is a relatively inhospitable substrate
246 speciating as karst habitat was formed. It is notable that of the documented genera that have
247 'radiations' associated with karst, i.e. *Begonia*, *Impatiens* (Linnaeus, 1753), *Primulina* and
248 *Elatostema*, all are mostly herbaceous, three of the four are succulent, three of the four are

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insect-pollinated and all have seeds that are abiotically rather than animal dispersed.

Comparison of diversity among floristic regions, and reasons of its differences

Among the six floristic regions delimited in Vietnam (see Fig. 2; Takhtajan, 1978; Takhtajan, 1986; Averyanov et al., 2003a), we found the greatest species richness and endemism in the South Chinese Floristic Region (Figs. 6–7; see Table 1). We attribute this to widespread presence of karst, monsoon tropical climate with cold winter and summer rains and tropical forests (Fig. 2) with which *Elatostema* species richness and endemism is known to be associated (Wang, 2014). For example, the checklist of *Elatostema* in China documented 184 out of the 280 species recorded as restricted to karst, many of which are range-restricted endemics (Wang, 2014). A similar pattern in species richness in Vietnam has been documented for *Begonia* by Averyanov & Nguyen (2012) who also ascribe part of this richness to the presence of karst in this floristic region.

The second highest species diversity and endemism occurred in Sikang-Yunnan Floristic Region. Notably, this region occupies one of the smallest areas in Vietnam, comparable only with the area of South Annamese Region; this indicates extraordinarily high average *Elatostema* species density in the Sikang-Yunnan Floristic Region. This region lies within the SSE extension of the Himalayan Highlands. It can be compared with another representative Himalayan area, i.e. Xizang province, which is the fourth most species-rich province for *Elatostema* in China (Wang, 2014). Within Sikang-Yunnan Floristic Region, 17 species of *Elatostema* (22.7% of the species number that we document for Vietnam) occur in Hoang Lien Son Range of Lao Cai province. It is notable that Sikang-Yunnan Floristic Region is the only one within the territory of Vietnam which represents the Holarctic floristic kingdom, while the other five regions belong to the Paleotropical floristic kingdom (Takhtajan, 1978; Takhtajan, 1986; Averyanov et al., 2003a; Averyanov et al., 2003b). This explains the high diversity of *Elatostema* in this region, as this genus is also known to be mostly associated with the southern part of the Holarctic kingdom (Wang, 2014).

The next most important floristic region for species richness and endemism of *Elatostema* in Vietnam is the North Indochinese Floristic Region (Fig. 7; Table 1). It possesses the same species number as the previous region and a single national endemic

species instead of two. This region covers a chain of continuous limestone plateaux (Averyanov et al., 2003a). Monsoon tropical climate with cold winter and summer rains is typical of the largest part of the northern portion (Fig. 2) which is similar to those found in the South Chinese Region. Therefore, the diversity and endemism of this floristic region share similar pattern to the South Chinese Region which is congruent with our result that nearly half of species (49.2%) co-existed. This region also includes the southern extension of the Himalayan Highlands and our result revealed 46.9% co-existed species (Fig. 7) between it and Sikang-Yunnan Region, which also suggests their similarity. It should also be taken into account that North Indochinese Floristic Region occupies almost largest area within Vietnam, comparable only with the area of South Indochinese Region. Therefore the high species diversity in this region is also an effect of its large territory.

We found low species richness and endemism in the Central Annamese Floristic Region (Fig. 6; see Table 1). The representative provinces of this floristic region are Quang Tri and Thua Thien-Hue which contain karst mountains and a climate very similar to that of the North Indochinese Floristic Region (Averyanov et al., 2003a); besides, 30.0% of species co-occurred in these two floristic regions (Fig. 7). We would therefore expect species richness and endemism to be similar to that of the North Indochinese Floristic Regions rather than lower (Table 1). We would also expect the diversity to be higher (rather than the same) in the Central Annamese Floristic Region than in the South Annamese Floristic Region, as the latter lacks karst and experiences drier climate. We also found 31.3% species shared between Central Annamese and South Annamese Floristic Region. Therefore we propose that both of these phenomena reflect a lack of collecting effort.

South Indochinese Floristic Region, the largest in Vietnam (Fig. 2), comprises lowland area of 23 provincial units and yet we document no species records from all of them (Fig. 6). This is unlikely to be due to the absence of karst, edaphic factors or climate alone. Whilst this floristic region has little karst (Kien Giang province only), it does have multiple climate types (Fig. 1) and significant forest cover (Global Forest Watch, 2014) which elsewhere in SE Asia would support a diversity of *Elatostema* species (Robinson, 1910; Conn, 2008). Again we propose that this absence of records is the result of a lack of collecting effort rather than a consequence of total absence of this genus. This inference is also supported by the absence of

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312 known *Elatostema* collections from several Vietnamese provinces surrounded by areas with
313 rather high diversity of this genus: Yen Bai, Thai Binh, Nam Dinh, Bac Ninh, Hai Duong,
314 Hung Yen, Ha Nam, Da Nang, Quang Ngai and Binh Dinh. We therefore propose that South
315 Indochinese Floristic Region should be of a high priority for subsequent studies of *Elatostema*
316 in Vietnam.

317

318 **Conclusions**

319 This study combines taxonomic and field expertise from China, Russia, the United
320 Kingdom and Vietnam. It has strongly benefited from the availability of type images online
321 which has accelerated the process of identification and the evaluation of taxon names,
322 although sadly high resolution versions of these images are not free to access. Ongoing
323 research to document the floras of Cambodia, Laos, Thailand and Vietnam provides a huge
324 opportunity for the taxonomy of *Elatostema*. Once combined with the completed Flora of
325 China and Flora Malesiana accounts our updated checklist for Vietnam will fill a significant
326 knowledge gap for this species-rich genus and lay the foundations for a global checklist. This
327 fourth checklist for Vietnam not only doubles estimates of the diversity of the genus, it also
328 identifies major knowledge gaps for the country, i.e. central Vietnam and most notably,
329 southern Vietnam. We propose that greater sampling effort of the flora of central Vietnam and
330 southern Vietnam will result in a number of new additions to the flora of the country.

331

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336 IBSC, K, LE, MHA, MO, MW, P, PE, SING, TAI and VNMN for their help in checking
337 specimens.

338

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525 Table 1. The species richness, endemism, and new records identified per Floristic Region

526

527 Figure caption:

528

529 Figure 1. Climate map of Vietnam (original, based on Nguyen et al. 2000).

530

531 Figure 2. Map of floristic regions in Vietnam. (original, first published by Averyanov *et al.*
532 2003c, with modifications).

533

534 Figure 3. Plate I of representative *Elatostema* species in Vietnam: A, *E. crassiusculum*; B, *E.*
535 *glochidioides*; C, *E. hookerianum*; D, *E. prunifolium*; E, *E. arcuatobracteatum*; F, *E.*
536 *retrohirtum*; G, *E. obtusum*; H, *E. ramosum*; I, *E. integrifolium*; J, *E. fengshanense*; K, *E.*
537 *austrosinense*; L, *E. malacotrichum*.

538

539 Figure 4. Plate II of representative *Elatostema* species in Vietnam: A, *E. heterolobum*; B, *E.*
540 *atroviride*; C, *E. tenuicaudatum*; D, *E. nasutum*; E, *E. cyrtandrifolium*; F, *E. backeri*; G, *E.*
541 *veronicoides*; H, *E. dissectum*; I, *E. atropurpureum*; J, *E. paucidentatum*; K, *E. lineolatum*; L,
542 *E. xanthophyllum*.

543

544 Figure 5. Plate III of representative *Elatostema* species in Vietnam: A, *E. caulialatum*; B, *E.*
545 *radicans*; C, *E. tsoongii*; D, *E. sinense*; E, *E. brevifolium*; F, *E. macintyreii*; G, *E. balansae*; H,
546 *E. myrtillus*; I, *E. platyphyllum*; J, *E. petelotii*; K, *E. longistipulum*; L, *E. pseudolongipes*.

547

548 Figure 6. Variation in *Elatostema* species richness and endemism across provinces of Vietnam
549 (Basing on Vietnam location map.svg (by Uwe Dederling)., CC BY-SA 3.0,
550 <https://commons.wikimedia.org/w/index.php?curid=17124413>). The tones of green indicate
551 number of species per province. The red figures in brackets indicate number of national
552 endemic species recorded for a province where it is non-zero.

553

554 Figure 7. Proportion of diversity and endemism and the relationship of the floristic regions
555 (Large circles designate floristic regions. Percentage numbers above the line in the large
556 circles indicate the relative proportion of diversity occurring in a certain region (within
557 Vietnam); percentage numbers below the line indicate the relative proportion of national
558 endemics occurring in a certain region; percentage numbers in the small circles indicate the
559 relative proportion of co-exsisted species occurring in the pairs of region connected by the
560 line and show their relative floristic relationships).

CHECKLIST OF *ELATOSTEMA* IN VIETNAM

Species are listed in alphabetical order. Basionyms and synonyms are cited on a separate line in alphabetical order. This is followed by the species' global distribution, elevation range within Vietnam and the exsiccate seen for this study. New records for Vietnam are denoted by an '*' next to the name.

***Elatostema acuminatum* (Poir.) Brongn.**

Procris acuminata Poir.

Boehmeria acuminata Pers., *Elatostema lowii* Stapf., *Elatostema membranaceum* Hassk., *Elatostema membranifolium* Kurz., *Langeveldia acuminata* Gaudich., *Ramium acuminatum* (Pers.) Kuntze.

Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Sikkim, Thailand, Vietnam; 400–1650 m.

Cao Bang Province: Ha Lang District, Dong Loan Municipality, 22°46'N 103°44'E, *L. Averyanov et al. CBL603* (LE); **Ha Giang Province:** Bac Me District, Phieng Luong Municipality, 22°39'29"N 105°19'35"E, *L. Averyanov et al. HAL6540* (LE); Quan Ba District, Can Ty Municipality, 23°04'N 104°59'E, *N.T. Hiep et al. NTH3622* (LE); Vi Xuyen District, Cao Bo Municipality, Tam Ve Village, 22°46'18"N 104°49'01"E, *D.K. Harder et al. 5615* (K, MO); **Ha Noi City:** Ba Vi District, Ba Vi National Park, 21°04'22"N 105°21'53"E, *L.F. Fu et al. VMN_CN35* (IBK, VNMN); **Quang Binh Province:** Minh Hoa District, Dan Hoa Municipality, 17°45'28"N 105°46'14"E, *L. Averyanov et al. HAL12205* (LE), 17°46'34"N 105°48'56"E, *L. Averyanov et al. HAL12548* (LE); **Vinh Phuc Province:** Tam Dao District, *L. Averyanov et al. LX-VN864* (LE).

Elatostema acutidentatum* (W.T.Wang) Y.H.Tseng & A.K.Monro, *comb. nov.

Pellionia acutidentata W.T.Wang.

China, Vietnam; 1400–1900 m.

Cao Bang Province: Nguyen Binh District, Nguyen Binh Municipality, 22°37'N 105°52'E, *L. Averyanov et al. CBL195* (LE, MO); **Lai Chau Province:** Than Uyen District, Ho Mit Municipality, 22°06'N 103°52'E, *N.T. Hiep et al. NTH2842* (LE); **Lao Cai Province:**

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591 Sa Pa District, *Anon. TV-284* (HN); Van Ban District, 21°59'00"N 104°02'00"E, *L. Averyanov*
592 *et al. HAL2215* (LE).

593

594 **Elatostema albopilosum** W.T.Wang

595 a. **Elatostema albopilosum** var. **vicinum** L.D.Duan & Y.Lin

596 Endemic; 200–400 m.

597 **Bac Kan Province**: Cho Don District, Xuan Lac Commune, 22°21'91"N 105°32'95"E,

598 *L.Q. Li et al. 0432* (PE); **Tuyen Quang Province**: Na Hang District, *H.N. Qin et al. 319* (PE).

599 This variety is very similar to *E. albopilosum* W.T.Wang var. *albopilosum* W.T.Wang

600 and further study may result in it being treated as a synonym.

601

602 **Elatostema arcuatobracteatum** L.F.Fu, V.T.Do & C.X.He

603 Endemic; ca. 500 m.

604 **Ha Giang Province**: Bac Me District, Bac Me Nature Reserve, 22°45'15"N

605 105°13'43"E, *L.F. Fu et al. VMN_CN219* (IBK, VNMN).

606

607 **Elatostema atropurpureum** Gagnep.

608 China, Vietnam; 300–1150 m.

609 **Cao Bang Province**: Nguyen Binh District, Phia Oac - Phia Den National Park, *F. Wen*

610 *et al. VMN_CN532* (IBK, VNMN); **Ha Noi City**: Ba Vi District, Ba Vi Mountain, *B. Balansa*

611 *2534* (P), 21°04.569'N 105°21.765'E, *N.A. Vislobokov & S.P. Kuznetsova s.n.* (MW); **Ha**

612 **Giang province**: Quan Ba District, Tung Vai Municipality, Thang village, 23°03'13"N

613 104°51'49"E, *L. Averyanov VR558* (LE); **Lao Cai Province**: Sa Pa District, *Sino-Vietnam*

614 *Expedition 336* (IBSC, PE); Van Ban District, Hoang Lien - Van Ban Nature Reserve, *L.F.*

615 *Fu et al. VMN_CN920* (IBK, VNMN); *P.A. Petelot 5100* (P); **Ninh Binh Province**: Nho

616 Quan District, Cuc Phuong National Park, *F. Wen et al. VMN_CN600, VMN_CN606* (IBK,

617 VNMN); **Phu Tho Province**: Thanh Son District, Xuan Son Municipality, Xuan Son

618 National Park, 21°08'00"N 104°55'55"E, *M.S. Nuraliev & N.A. Vislobokov 1105* (IBK, MW).

619

620 **Elatostema atroviride** W.T.Wang

621 *Elatostema atroviride* var. *lobulatum* W.T.Wang, *E. leiocephalum* W.T.Wang, *E.*
622 *papilionaceum* W.T.Wang.
623 China, Vietnam; 200–1500 m.
624 **Cao Bang Province:** Ha Quang District, Pac Bo, *L.F. Fu et al. VMN_CN783* (IBK,
625 VNMN); **Ha Giang Province:** Yen Minh District, Lao Va Chai Municipality, 23°07'N
626 105°08'E, *N.T. Hiep et al. NTH3448* (LE); **Hai Phong City:** Cat Hai District, *Y.G. Wei et al.*
627 *VMN_CN14* (IBK, VNMN); Cat Hai District, Cat Ba Island, *N. Arnautov et al. LX-VN3626,*
628 *LX-VN3774, LX-VN3793, LX-VN3834* (LE); between Meo Vac District and Dong Van
629 District, 23°15'16"N 105°23'12"E, *L.F. Fu et al. VMN_CN190* (IBK, VNMN); 22°45'23"N
630 105°13'46"E, *L.F. Fu et al. VMN_CN218* (IBK, VNMN); **Hoa Binh Province:** Mai Chau
631 District, Pa Co Municipality, 20°44'32.3"N 104°56'26.9"E, *V.X. Phuong et al. HNK639* (K);
632 **Nghe An Province:** Quy Chau District, Pu Huong Natural Reserve, *F. Wen et al.*
633 *VMN_CN478* (IBK, VNMN); Con Cuong District, Cay Da Valley, Truong Huong Hamlet,
634 Yen Khe Commune, 19°0'39.3"N 104°51'38"E, *V.D. Nguyen et al. HNK2960* (K); **Ninh Binh**
635 **Province:** Nho Quan District, Cuc Phuong National Park, *J.M. Hu Hu2177* (TAI); **Quang**
636 **Binh Province:** Minh Hoa District, Thong Hoa Municipality, 17°40'N 105°57'E, *L.*
637 *Averyanov et al. VH4797* (LE); Tuyen Hoa District, Lam Hoa Municipality, 17°55'41"N
638 105°49'43"E, *L. Averyanov et al. CPC2620* (LE); **Son La Province:** Moc Chau District, Van
639 Ho Municipality, Hua Tat Village, 20°46'18"N 104°47'45"E, *D.K. Harder et al. 5774* (HN, K,
640 MO), 20°46'18"N 104°47'29"E, *N.T. Hiep et al. HAL9311* (LE); **Thanh Hoa Province:** Quy
641 Chau District, Pu Huong Natural Reserve, *F. Wen et al. VMN_CN427* (IBK, VNMN);
642 Thuong Xuan District, Bat Mot Municipality, 20°01'12"N 104°57'48"E, *L. Averyanov et al.*
643 *CPC6655* (LE).
644
645 ***Elatostema attenuatoides** W.T.Wang
646 China, Vietnam; 500–800 m.
647 **Cao Bang Province:** Ha Lang District, An Lac Municipality, 22°43'N 103°36'E, *L.*
648 *Averyanov et al. CBL786* (LE, MO); Tra Linh District, Quoc Toan Municipality, 22°45'15"N
649 106°17'54"E, *D.K. Harder et al. 4336* (K); 22°45'30"N 106°17'22"E, *L. Averyanov et al.*
650 *VH4854* (HN, LE, MO), *VH4949* (LE, MO); 22°45'N 106°19'E, *L. Averyanov et al. CBL1256*

651 (LE, MO).

652

653 | ***Elatostema austrosinense** Y.H.Tseng & A.K.Monro, *nom. nov.*

654 non *E. macrophyllum* Brongn.

655 *Pellionia macrophylla* W.T.Wang.

656 China, Vietnam; ca. 1650 m.

657 **Lao Cai Province:** Sa Pa District, Hoang Lien National Park, *L.F. Fu et al.*

658 *VMN_CN884* (IBK, VNMN); Van Ban District, 21°58'42"N 104°00'37"E, *L. Averyanov et al.*

659 *HAL2072, HAL2088* (LE).

660 | We selected '*austrosinense*' as epiphet as it coincides with the origin of its distribution

661 area, South China.

662

663 | **Elatostema backanensis** (Gagnep.) Y.H.Tseng & A.K.Monro, *comb. nov.*

664 *Pellionia backanensis* Gagnep.

665 Endemic; elevation unknown.

666 **Bac Kan Province:** Yen Lac District, *P.A. Eberhardt 4669* (P).

667

668 ***Elatostema backeri** H.Schroet.

669 China, Indonesia, Vietnam; elevation unknown.

670 **Cao Bang Province:** Bao Lac District, Dinh Phung Municipality, *L.F. Fu et al.*

671 *VMN_CN814* (IBK, VNMN); Bao Lam District, Tan Viet, Na Dang, *L.F. Fu et al.*

672 *VMN_CN829* (IBK, VNMN); **Thanh Hoa Province:** Quan Hua District, Pu Luong Nature

673 Reserve. *F. Wen et al. VMN_CN551* (IBK, VNMN).

674

675 **Elatostema balansae** Gagnep.

676 *Elatostema balansae* var. *hispidum* W.T.Wang, *E. platyphyllum* Wedd. var. *balansae*

677 (Gagnep.) Yahara.

678 China, Malaysia, Thailand, Vietnam; 1100–1700 m.

679 **Cao Bang Province:** Nguyen Binh District, Phia Oac - Phia Den Nature Reserve,

680 22°37'49"N 105°53'11"E, *L.F. Fu et al. VMN_CN170* (IBK, VNMN); **Ha Giang Province:**

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681 between Meo Vac District and Dong Van District, 23°09'16"N 105°24'52"E, *L.F. Fu et al.*
682 *VMN_CN192* (IBK, VNMN); **Hoa Binh Province**: Mai Chau District, Hang Kia
683 Municipality, 20°43'39"N 104°53'43"E, *N.T. Hiep et al. HAL751* (HN); **Lai Chau Province**:
684 Sin Ho District, Ta Ngau Municipality, 22°18'N 103°15'E, *N.T. Hiep et al. NTH2783* (LE);
685 **Lam Dong Province**: Lac Duong District, Da Chais Municipality, 12°08'N 108°39'E, *L.*
686 *Averyanov et al. VH4511* (LE, MO); Lac Duong District, Da Chais Municipality, Bi Doup
687 mountains, 12°11'07.0"N 108°42'55.9"E, *A.N. Demidova & N.G. Prilepsky 431* (MW); **Son**
688 **La Province**, Yen Chau District, Muong Lum Municipality, On Oc Village, 20°59'44"N
689 104°30'03"E, *D.K. Harder et al. 7229* (HN).

690

691 **Elatostema baviense** Gagnep.

692 *Pellionia baviensis* Gagnep.

693 Endemic; elevation unknown.

694 **Ha Noi City**: Ba Vi District, Ba Vi Mountain, *B. Balansa 2548* (P).

695

696 **Elatostema brachyodontum** (Hand.-Mazz.) W.T.Wang

697 *Elatostema ficoides* Wedd. var. *brachyodontum* Hand.-Mazz.

698 China, Vietnam; elevation unknown.

699 **Province unknown**: Phuong-Lam, *B. Balansa 2535* (P).

700

701 **Elatostema brevifolium** (Benth.) Hallier f.

702 *Pellionia brevifolia* Benth.

703 *Amaranthus polychroa* Raeusch., *Elatostema radicans* var. *minimum* (Makino) H.Schroet,

704 *Pellionia minima* Makino.

705 China, Japan, Vietnam; 60–1900 m.

706 **Cao Bang Province**: Nguyen Binh District, Phia Oac - Phia Den Nature Reserve,

707 22°36'29"N 105°52'61"E, *L.F. Fu et al. VMN_CN161* (IBK, VNMN); **Lao Cai Province**: Sa

708 Pa District, Hoang Lien National Park, Ton Forest Station, *L.F. Fu et al. VMN_CN915* (IBK,

709 VNMN); Sa Pa District, San Sa Ho Municipality, 22°21'10"N 103°46'30"E, *M.S. Nuraliev &*

710 *D.D. Sokoloff 263* (IBK, K, MW).

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Comment [23]: One of these two names must be a combination, (Gagnep.) Gagnep.

711

712 ***Elatostema brunneinerve** W.T.Wang

713 China, Vietnam; 1200–1400 m.

714 **Ha Giang province:** Quan Ba District, Tung Vai Municipality, Thang village,

715 23°03'42"N 104°50'42"E, *L. Averyanov et al. VR591* (LE).

716

717 | **Elatostema caulialatum** (S.Y.Liou) Y.H.Tseng & A.K.Monro, *comb. nov.*

718 *Pellionia caulialata* S.Y.Liou.

719 China, Vietnam; 200–415 m.

720 **Bac Kan Province:** Cho Don District, Xuan Lac Community, 22°21.91'N 105°32.95'E,

721 *L.Q. Li et al. 0386* (HN); Na Ri District, Kim Hy Nature Reserve, 22°17'54"N 106°01'40"E,

722 *L.F. Fu et al. VMN_CN128* (IBK, VNMN); **Ha Giang Province:** Meo Vac District, *L.F. Fu*

723 *et al. VMN_CN859* (IBK, VNMN); **Thai Nguyen Province:** Vo Nhai District, Truong Lung

724 Municipality, 21°48.75'N 105°58.09'E, *L.Q. Li et al. 0142* (HN); **Tuyen Quang Province:** Na

725 Hang District, *Anon. TV-93* (HN).

726

727 | **Elatostema chapaense** (Gagnep.) Y.H.Tseng & A.K.Monro, *comb. nov.*

728 *Pellionia chapaensis* Gagnep.

729 Endemic; elevation unknown.

730 **Lao Cai Province:** Sa Pa District, *Lecomte & Finet 415* (P).

731

732 | **Elatostema cochinchinense** (Gagnep.) Y.H.Tseng & A.K.Monro, *comb. nov.*

733 *Pellionia cochinchinensis* Gagnep.

734 Endemic; elevation unknown.

735 | **Province unknown:** Haut Donnai, Con-heu Mountain, *L. Pierre 4814* (A).

736

737 ***Elatostema crassiusculum** W.T.Wang

738 China, Vietnam; ca. 200 m.

739 **Cao Bang Province:** Bao Lam District, Nam Quang, *L.F. Fu et al. VMN_CN838* (IBK,

740 VNMN).

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Comment [24]: Neuter!

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***Elatostema crenatum** W.T.Wang.
China, Vietnam, elevation unknown.
Phu Tho Province: Ha Ho District, Ao Chau, *V.X. Phuong* 3483 (HN).
Elatostema crispulihirtellum (W.T.Wang) Y.H.Tseng & A.K.Monro, *comb. nov.*
Pellionia crispulihirtella W.T.Wang.
China, Vietnam; 710 m.
Lao Cai Province: On the way from Lao Cai to Sa Pa, *Sino-Vietnam Expedition* 856 (PE).
Elatostema cyrtandrifolium (Zoll. & Mor.) Miq.
Procris cyrtandrifolia Zoll. & Mor.
Elatostema herbaceifolium Hayata, *E. sessile* var. *cyrtandrifolium* (Zoll. & Mor.) Wedd.,
E. sessile var. *pubescens* Hook.f., *E. herbaceifolium* Hayata.
Bhutan, China, India, Indonesia, Malaysia, Myanmar, Vietnam; 200–1050 m.
Cao Bang Province: Tra Linh District, Luu Ngoc Municipality, 22°47'N 106°18'E, *L. Averyanov et al. CBL1203* (LE, MO); **Dien Bien Province:** Tua Chua District, Xa Nhe Municipality, 21°52'35"N 103°24'21"E, *L. Averyanov et al. CPC2221* (LE); **Ha Giang Province:** between Meo Vac District and Dong Van District, 23°13'45"N 105°24'48"E, *L.F. Fu et al. VMN_CN244* (IBK, VNMN); Meo Vac District, Sung Cha Municipality, 23°11'N 105°17'E, *N.T. Hiep et al. NTH3302* (LE); **Hai Phong City:** Cat Hai District, Cat Ba Island, *N. Arnautov et al. LX-VN3796* (LE); **Ninh Binh Province:** Nho Quan District, Cuc Phuong National Park, *J.M. Hu Hu2187* (TAI); **Quang Binh Province:** Minh Hoa District, Thong Hoa Municipality, 17°40'N 105°57'E, *L. Averyanov et al. VH4611* (LE), *VH4793* (HN, LE, MO); **Son La Province:** Moc Chau District, Chieng Hac Municipality, 20°51'N 104°38'E, *N.T. Hiep et al. NTH2937* (LE); **Thanh Hoa Province,** Quy Chau District, Pu Huong Natural Reserve, *F. Wen et al. VMN_CN421* (IBK, VNMN).
Elatostema dissectum Wedd.

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Comment [26]: Not Myanmar, Thailand?

774 *Elatostema paragunshanense* W.T.Wang.
 775 *Pellionia tonkinensis* Gagnep.
 776 *Pellionia tetramera* Gagnep. *syn. nov.*
 777 Bhutan, China, India, Laos, Sikkim, Thailand, Vietnam; 200–1350 m.
 778 **Bac Kan Province:** Phu Thong Hoa, *P.A. Eberhard* 4724 (P); **Ha Noi City:** Ba Vi
 779 District, Ba Vi National Park, *V.D. Nguyen et al. HNK 1268* (K); Ba Vi District, Ba Vi
 780 Mountain, *B. Balansa 2536* (P); **Ha Giang province:** Quan Ba District, Tung Vai
 781 Municipality, Thang village, 23°03'13"N 104°51'49"E, *L. Averyanov et al. VR554, VR559,*
 782 *VR563, VR660, VR713* (LE); **Hoa Binh Province:** Da Bac District, Cao Son Municipality,
 783 Buoi Truong Station, 20°52'31"N 105°11'48"E, *N.T. Hiep et al. HAL540* (HN, MO); Mai
 784 Chau District, *F. Wen et al. VMN_CN262* (IBK, VNMN); Mai Chou District, Hang Kia-Pa
 785 Co Nature Reserve, *F. Wen et al. VMN_CN326, VMN_CN331, VMN_CN337* (IBK, VNMN);
 786 **Kon Tum Province:** Dak Glei District, *L. Averyanov et al. VHI757* (HN, MO); **Lang Son**
 787 **Province:** Bac Son District, Tan Tri Municipality, *L. Averyanov et al. HAL6783* (LE); **Lao**
 788 **Cai Province:** Sa Pa District, Hoang Lien National Park, Ton Forest Station, *L.F. Fu et al.*
 789 *VMN_CN916* (IBK, VNMN); Van Ban District, Khanh Yen Ha Municipality, to the S of Na
 790 Nheo Village, 21°59'04"N 104°15'08"E, *L. Averyanov et al. HAL2814* (HN, LE); Van Ban
 791 District, Nam Xe Municipality, 22°01'27"N 104°00'25"E, *D.K. Harder et al. DKH7051* (LE);
 792 **Nghe An Province:** Con Cuong District, Chau Khe Municipality, Pu Mat National Park,
 793 18°55'56"N 104°35'01"E, *M.S. Nuarliev 2128* (MW); Quy Chau District, Pu Huong Natural
 794 Reserve, *F. Wen et al. VMN_CN486* (IBK, VNMN); Tuong Duong District, Tam Hop
 795 Municipality, 19°05'07"N 104°20'55"E, *L. Averyanov et al. HLF7074* (LE); **Quang Binh**
 796 **Province:** Minh Hoa District, Dan Hoa Municipality, 17°41'50"N 105°45'54"E, *L. Averyanov*
 797 *et al. HAL12410* (LE); **Quang Tri Province:** Huong Hoa District, Huong Viet Municipality,
 798 16°51'14"N 106°34'13"E, *N.T. Hiep et al. HLF5947* (LE); **Son La Province:** Chieng Yen
 799 District, *N.H. Hien et al. VN239* (HN); **Tuyen Quang Province:** Bach Ngoc, *P.A. Eberhardt*
 800 *4818* (P); Na Hang District, Vinh Yen Municipality, 22°21'09"N 105°25'20"E, *L.V. Cham et*
 801 *al. HLF299* (HN).
 802 We place *Pellionia tetramera* in synonymy basing on its shared characters with
 803 *Elatostema dissectum*: oblong-lanceolate lamina and staminate inflorescence with long

804 peduncle.

805

806 | **Elatostema eberhardtii** (Gagnep.) Y.H.Tseng & A.K.Monro, *comb. nov.*

807 *Pellionia eberhardtii* Gagnep.

808 Endemic; elevation unknown.

809 **Quang Tri Province:** Cu Bi, *P.A. Eberharadt 1962 (P).*

810

811 **Elatostema eurhynchum** Miq.

812 Java, Vietnam; 1600 m.

813 **Kon Tum Province:** Dak Glei District, 15°04'00"N 107°59'00"E, *L. Averyanov et al.*

814 *VH797 (HN, LE, MO).*

815

816 ***Elatostema fengshanense** W.T.Wang & Y.G.Wei

817 China, Vietnam; elevation unknown.

818 **Cao Bang Province:** Ha Quang District, Pac Bo, *L.F. Fu et al. VMN_CN786 (IBK,*

819 *VNMN).*

820

821 **Elatostema ficoides** Wedd.

822 *Elatostema mariannae* C.B.Clarke.

823 China, India, Nepal, Sikkim, Vietnam; 400 m.

824 **Bac Kan Province:** Na Ri District, Kim Hy Nature Reserve, 22°11'56"N 106°04'04"E,

825 *L.F. Fu et al. VMN_CN129 (IBK, VNMN). Hoa Binh Province:* Crieng Xen, *P.A. Petelot*

826 *2965 (P).*

827

828 ***Elatostema glochidioides** W.T.Wang

829 China, Vietnam; 300–1190 m.

830 **Ha Giang Province:** Between Meo Vac District and Dong Van District, *L.F. Fu et al.*

831 *VMN_CN233 (IBK, VNMN);* Quan Ba District, Bat Dai Son Nature Reserve, Thanh Van

832 commune, Mo Sai village, 23°07'46"N 104°57'56"E, *L. Averyanov et al. VR417 (LE);* Quan

833 Ba District, Thang village, 23°03'13"N 104°51'49"E *L. Averyanov et al. VR553 (LE).*

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Comment [27]: Country is Indonesia

834

835 | **Elatostema grijsii** (Hance) Y.H.Tseng & A.K.Monro, *comb. nov.*

836 *Pellionia grijsii* Hance.

837 *Pellionia funingensis* W.T.Wang.

838 China, Vietnam; 800–1900 m.

839 **Cao Bang Province:** Nguyen Binh District, Nguyen Binh Municipality, 22°37'N

840 105°52'E, *L. Averyanov et al. CBL069* (LE, MO); Nguyen Binh District, Phia Oac - Phia Den

841 Nature Reserve, 22°36'24"N 105°52'46"E, *L.F. Fu et al. VMN_CN157* (IBK, VNMN); **Lang**

842 **Son Province:** Bac Son District, Tan Tri Municipality, *L. Averyanov et al. HAL6753* (LE);

843 **Lao Cai Province:** Van Ban District, Hoang Lien - Van Ban Nature Reserve, *L.F. Fu et al.*

844 *VMN_CN921* (IBK, VNMN); **Vinh Phuc Province:** Tam Dao Range, *N. Arnautov et al.*

845 *LX-VN4004* (LE).

846

847 **Elatostema heterolobum** (Wedd.) Hallier f.

848 *Pellionia heteroloba* Wedd.

849 *Elatostema bicuspidatum* Hallier f., *E. griffithianum* (Wedd.) Hallier f., *E. henryanum*

850 Hand.-Mazz., *Pellionia heteroloba* var. *minor* W.T.Wang, *P. keitaoensis* Yamam., *P.*

851 *menglianensis* Y.Y.Qian.

852 Bhutan, China, India, Laos, Myanmar, Sikkim, Vietnam; 400–1900 m.

853 **Cao Bang Province:** Bao Lac District, Dinh Phung Municipality, *L.F. Fu et al.*

854 *VMN_CN816* (IBK, VNMN); Nguyen Binh District, Nguyen Binh Municipality, 22°37'N

855 105°52'E, *L. Averyanov et al. CBL035, CBL062* (HN, LE, MO); **Ha Giang Province:** Meo

856 Vac District, Vicinities of Meo Vac Town, 23°10'N 105°24'E, *N.T. Hiep et al. NTH3385* (LE);

857 Quan Ba District, Tung Vai Municipality, *L.F. Fu et al. VMN_CN870* (IBK, VNMN); **Ha**

858 **Noi City:** Ba Vi District, Ba Vi National Park, *V.D. Nguyen et al. HNK1266* (K); **Hoa Binh**

859 **Province:** Mai Chau District, Pa Co Municipality, *V.X. Phuong 2397* (HN); **Lao Cai**

860 **Province:** Sa Pa District, *B. Khao & V. Trung 2545* (HN); Van Ban District, Khanh Yen Ha

861 Municipality, 21°58'28"N 104°15'52"E, *L. Averyanov et al. HAL2312* (LE, MO); **Nghe An**

862 **Province:** Con Cuong District, Chau Khe Municipality, Pu Mat National Park, 18°55'51"N

863 104°36'20"E, *M.S. Nuarliev et al. 2042* (MW); **Quang Binh Province:** Minh Hoa District,

864 Dan Hoa Municipality, 17°41'50"N 105°45'54"E, *L. Averyanov et al. HAL12250, HAL12412*
865 (LE); **Son La Province:** Van Ho District, Tan Xuan Municipality, 20°40'33"N 104°39'00"E,
866 *L. Averyanov et al. CPC7127* (LE).

867
868 **Elatostema heyneanum** (Wedd.) Hallier f.

869 *Procris heyneana* Wall.

870 *Pellionia heyneana* Wedd.

871 Cambodia, China, India, Indonesia, Sri Lanka, Thailand, Vietnam; 100–300 m.

872 **Ha Noi City:** Ba Vi District, Ba Vi Mountain, *B. Balansa 2549* (P); **Quang Binh**

873 **Province:** Tuyen Hoa District, Lam Hoa Municipality, 17°56'51"N 105°49'18"E, *L.*

874 *Averyanov et al. CPC2679, CPC2696* (LE); **Quang Tri Province:** Da Krong District, Ta Rut

875 Municipality, 16°24'29"N 107°01'07"E, *L. Averyanov et al. CPC3049* (LE).

876

877 **Elatostema hookerianum** Wedd.

878 *Elatostema subfalcatum* W.T.Wang.

879 *Pellionia macroceras* Gagnep. *syn. nov.*

880 Bhutan, China, India, Sikkim, Vietnam; 1200–2100 m.

881 **Lai Chau Province:** Than Uyen District, Ho Mit Municipality, 22°06'N 103°52'E, *N.T.*

882 *Hiep et al. NTH2668, NTH2809, NTH2832, NTH2874* (LE); **Lao Cai Province:** Sa Pa

883 District, Hoang Lien Natinal Park, *L.F. Fu et al. VMN_CN882* (IBK, VNMN), *P.A. Petelot*

884 *2294* (P); **Son La Province:** Yen Chau District, Muong Lum Municipality, Lum Village,

885 21°00'17"N 104°29'08"E, *D.K. Harder et al. 7217* (HN); **Province unknown** (Northern

886 Vietnam): *G.V. Mikeschin s.n.* (MHA).

887 We place *Pellionia macroceras* in synonymy basing on the same characters of falcate

888 lamina with cordate base with *Elatostema hookerianum*.

889

890 **Elatostema integrifolium** (D.Don) Wedd.

891 *Procris integrifolia* D.Don.

892 *Elatostema cuspidiferum* Miq., *E. miquelianum* Wedd., *E. pulgarensense* Elmer, *E.*

893 *sesquifolium* (Reinw. ex Blume) Hassk., *E. sesquifolium* var. *integrifolium* (D.Don) Wedd., *E.*

29

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Comment [28]: Not , Wall. ex ' because the Wallich name was in another genus, so it does not count, See IPNI

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Comment [29]: This seems to be a nomen nudum only

895 *viridicaule* W.T.Wang, *E. zollingerianum* Wedd., *Procris sesquifolia* Reinw. ex Blume.
896 Bhutan, China, India, Indonesia, Myanmar, Nepal, Thailand, Vietnam; 600–900 m.
897 **Cao Bang Province:** Bao Lac District, Dinh Phung Municipality, *L.F. Fu et al.*
898 *VMN_CN819* (IBK, VNMN); **Hai Phong City:** Cat Hai District, *Y.G. Wei et al. VMN_CN06*
899 (IBK, VNMN); Cat Hai District, Cat Ba Island, *N. Arnautov et al. LX-VN3778* (LE); **Hoa**
900 **Binh Province:** Lac Son District, Tu Do Municipality, 20°25'29"N 105°19'36"E, *N.Q. Hieu*
901 *et al. CPC1538* (LE); **Kon Tum Province:** Sa Thay District, Ro Koi Municipality, Chu Mom
902 Ray National Park, 14°28'20"N 107°43'00"E, *M.S. Nuraliev & S.P. Kuznetsova 1257* (IBK,
903 MW); **Lam Dong Province:** Bao Loc District, *L. Averyanov et al. III-LX-VN1183* (LE);
904 **Quang Tri Province:** Da Krong District, Ta Rut Municipality, 16°24'29"N 107°01'07"E, *L.*
905 *Averyanov et al. CPC3039* (LE); Huong Hoa District, Huong Viet Municipality, 16°51'06"N
906 106°34'38"E, *L. Averyanov et al. CPC2815* (LE).
907
908 **Elatostema kimhyense** Y.G.Wei & V.T.Do
909 Endemic; 350–1200 m.
910 **Bac Kan Province:** Na Ri District, Kim Hy National Park, 22°11'56"N 106°4'5"E, *Y.G.*
911 *Wei & V.T. Do V-23* (IBK, PE, VNMN), *L.F. Fu et al. VMN_CN194* (IBK, VNMN).
912
913 **Elatostema laevisissimum** W.T.Wang
914 *Elatostema laevisissimum* W.T.Wang var. *puberulum* W.T.Wang.
915 China, Vietnam; 780–2200 m.
916 **Ha Giang Province:** Meo Vac District, Vicinities of Meo Vac Town, 23°10'N 105°24'E,
917 *N.T. Hiep et al. NTH3378, NTH3390* (LE); Quan Ba District, Tung Vai, *L.F. Fu et al.*
918 *VMN_CN871* (IBK, VNMN); between Meo Vac District and Dong Van District, 23°07'31"N
919 105°25'42"E, *L.F. Fu et al. VMN_CN188* (IBK, VNMN); **Kon Tum Province:** Dak Glei
920 District, 15°04'23"N 108°01'34"E, *L. Averyanov et al. VH062* (HN, MO), 15°04'00"N
921 107°59'00"E, *L. Averyanov et al. VH629* (HN, LE, MO), *VH074, VH590* (LE, MO); **Lai**
922 **Chau Province:** Than Uyen District, Ho Mit Municipality, 22°06'N 103°52'E, *N.T. Hiep et al.*
923 *NTH2812* (LE); **Lao Cai Province:** Van Ban District, 21°58'42"N 104°00'37"E, *L.*
924 *Averyanov et al. HAL2013* (LE); **Nghe An Province:** Que Phong District, Hanh Dich

925 Municipality, Pu Hoat Nature Reserve, 19°44'15"N 104°48'59"E, *M.S. Nuraliev 2192* (MW);
926 **Quang Nam Province:** *L. Averyanov et al. VH923* (LE).
927
928 **Elatostema leiocarpum** (W.T.Wang) Y.H.Tseng & A.K.Monro, *comb. nov.*
929 *Pellionia leiocarpa* W.T.Wang.
930 China, Vietnam; ca. 1200 m.
931 **Ha Giang Province:** Quan Ba District, Bat Dai Son Nature Reserve, 23°09'18"N
932 105°00'09"E, *D.K. Harder et al. 5029* (HN); Quan Ba District, Can Ty Municipality, 23°04'N
933 104°59'E, *N.T. Hiep et al. NTH3618* (LE); Quan Ba District, San Chu village, 23°08'55"N
934 104°59'46"E, *L. Averyanov et al. VR079* (LE); Quan Ba District, Tung Vai Municipality,
935 Thang village, 23°03'41"N 104°50'42"E, *L. Averyanov et al. VR575* (LE).
936
937 **Elatostema lineolatum** Wight
938 *Elatostema lineolatum* var. *majus* Wedd., *E. tumidulum* Koidz.
939 Bhutan, China, India, Myanmar, Nepal, Sikkim, Sri Lanka, Thailand; 150–1300 m.
940 **Cao Bang Province:** Bao Lac District, Xuan Truong Municipality, *L.F. Fu et al.*
941 *VMN_CN809* (IBK, VNMN); Nguyen Binh District, Phia Oac - Phia Den Nature Reserve,
942 22°37'40"N 105°53'10"E, *L.F. Fu et al. VMN_CN163* (IBK, VNMN); **Dak Lak Province:**
943 Lak District, Bong Krang Municipality, Chu Yang Sin National Park, 12°25'00"N
944 108°23'00"E, *M.S. Nuraliev et al. 925* (K, MW); **Ha Giang Province:** Bac Me District, Bac
945 Me Nature Reserve, *L.F. Fu et al. VMN_CN232* (IBK, VNMN); **Gia Lai Province:** K'Bang
946 District, Son Lang Municipality, Kon Chu Rang Nature Reserve, 14°30'55"N 108°32'48"E,
947 *M.S. Nuraliev 2010* (MW), 14°30'59"N 108°32'27"E, *M.S. Nuraliev 2020* (MW); **Lang Son**
948 **Province:** Bac Son District, Tan Tri Municipality, *L. Averyanov et al. HAL6787* (LE); **Lao**
949 **Cai Province:** Sa Pa District, San Sa Ho Municipality, Hoang Lien National Park, Cat Cat
950 village area, 22°20'N 103°49'E, *M.S. Nuraliev & D.D. Sokoloff 282* (MW); Van Ban District,
951 Nam Xe Municipality, 22°02'35"N 103°57'23"E, *D.K. Harder et al. 7010* (HN, LE); **Nghe**
952 **An Province:** Con Cuong District, Chau Khe Municipality, Pu Mat National Park,
953 18°57'38"N 104°40'44"E, *M.S. Nuraliev 2065* (MW); Tuong Duong District, Tam Quang
954 Municipality, 19°03'09"N 104°36'53"E, *L. Averyanov et al. HLF6758* (LE); **Quang Binh**

955 **Province:** Bo Trach District, Hung Trach Municipality, 17°27'30"N 106°23'06"E, *S.K. Wu et*
956 *al. WP923* (HN); **Vinh Phuc Province:** *N. Arnautov et al. LX-VN3985* (LE); Tam Dao
957 District, 21°28'02"N 105°38'39"E, *L.F. Fu et al. VMN_CN51* (IBK, VNMN).

958

959 ***Elatostema longibracteatum*** W.T.Wang

960 a. ***Elatostema longibracteatum*** var. ***glabricaule*** W.T.Wang

961 Endemic; 650–800 m.

962 **Cao Bang Province:** Tra Linh District, Quoc Toan Municipality, *L. Averyanov et al.*

963 *VH2468* (HN, LE); 22°45'25"N 106°17'58"E, *D.K. Harder et al. 4288* (K); Tra Linh District,

964 Luu Ngoc Municipality, 22°47'N 106°18'E, *L. Averyanov et al. CBL1199* (LE, MO).

965 This variety is very similar to *Elatostema longibracteatum* W.T.Wang var.

966 *longibracteatum* and further study may result in it being treated as a synonym.

967

968 ***Elatostema longipedunculatum*** (W.T.Wang) Y.H.Tseng & A.K.Monro, *comb. nov.*

969 *Pellionia longipedunculata* W.T.Wang.

970 *Pellionia subundulata* W.T.Wang var. *angustifolia* W.T. Wang.

971 China, Vietnam; 197–1000 m.

972 **Ha Noi City:** Ba Vi District, Ba Vi Mountain, 21°04.096'N 105°21.501'E, *N.A.*

973 *Vislobokov & S.P. Kuznetsova 681* (MW); **Ha Tinh Province:** Huong Son District, Rao

974 An-Ngam Thép village, 18°21'53"N 105°13'12"E, *T.H. Nguyen et al. 184* (MO); **Vinh Phuc**

975 **Province:** Tam Dao District, *Sino-Vietnam Expedition 1996A* (PE).

976

977 ***Elatostema longistipulum*** Hand.-Mazz.

978 China, Vietnam; 140–1450 m.

979 **Cao Bang Province:** Ha Lang District, Thang Loi Municipality, 22°45'N 106°42'E, *P.K.*

980 *Loc et al. CBL1661* (LE, MO); **Ha Giang Province:** Bac Me District, Bac Me Nature

981 Reserve, 22°38'37"N 105°28'36"E, *L.F. Fu et al. VMN_CN220* (IBK, VNMN); **Ha Noi City:**

982 Ba Vi District, Ba Vi National Park, *V.D. Nguyen et al. HNK1282* (K); **Hoa Binh Province:**

983 Lac Son District, Tu Do Municipality, 20°24'57"N 105°13'16"E, *N.Q. Hieu et al. CPC1403*

984 (LE); Mai Chau District, *F. Wen et al. VMN_CN274, VMN_CN274, VMN_CN317,*

985 *VMN_CN323* (IBK, VNMN); **Lang Son Province**: Huu Lung District, Huu Lien
 986 Municipality, 21°40'59"N 106°20'30"E, *D.K. Harder 4116* (MO); **Nghe An Province**: Con
 987 Cuong District, Chau Khe Municipality, Pu Mat National Park, 18°57'42"N 104°41'40"E,
 988 *M.S. Nuraliev 2077* (MW); Quy Hop District, Chau Thai Municipality, Bom Village, *V.D.*
 989 *Nguyen et al. HNK1611* (K); **Ninh Binh Province**: Nho Quan District, Cuc Phuong National
 990 Park, *J.M. Hu Hu2110* (TAI); *L. Averyanov et al. LX-VN1732* (LE), *V.D. Nguyen et al.*
 991 *HNK1334* (K); **Phu Tho Province**: Tan Son District, Xuan Son Municipality, 21°02'55"N
 992 104°56'51"E, *L. Averyanov et al. HAL12722* (LE), 21°06'57"N 104°57'17"E, *L. Averyanov et*
 993 *al. HAL12677* (LE); **Quang Binh Province**: *G.V. Mikeslin, O.V. Daeva s.n.* (MHA); **Son La**
 994 **Province**: Van Ho District, Tan Xuan Municipality, 20°40'33"N 104°39'00"E, *L. Averyanov*
 995 *et al. CPC7143* (LE); Yen Chau District, Muong Lum Municipality, 21°00'35"N 104°29'06"E,
 996 *L. Averyanov et al. CPC1884* (LE); **Thai Nguyen Province**: Vo Nhai District, Than Sa
 997 Municipality, 21°48'N 105°54'E, *N.T. Hiep et al. NTH3780* (LE); **Thanh Hoa Province**: Quy
 998 Chau District, Pu Huong Natural Reserve, *F. Wen et al. VMN_CN428* (IBK, VNMN); Quan
 999 Hoa District, Hien Chung Municipality, Xuan Lien Reserve, *F. Wen et al. VMN_CN398,*
 1000 *VMN_CN410* (IBK, VNMN); Quan Hoa District, Pu Hu Nature Reserve; *F. Wen et al.*
 1001 *VMN_CN350* (IBK, VNMN); Thuong Xuan District, Bat Mot Municipality, 19°59'11"N
 1002 104°58'32"E, *L. Averyanov et al. CPC6440* (LE); **Tuyen Quang Province**: Na Hang District,
 1003 Vinh Yen Municipality, 22°21'14"N 105°25'11"E, *P.K. Loc et al. HLF-009* (HN).
 1004

1005 ***Elatostema macintyre* Dunn**

1006 Bhutan, China, India, Thailand, Vietnam; 1000–1100 m.

1007 **Cao Bang Province**: Bao Lac District, Xuan Truong Municipality, *L.F. Fu et al.*
 1008 *VMN_CN807* (IBK, VNMN); **Gia Lai Province**: Mang Yang District, A Yun Municipality,
 1009 Kon Ka Kinh National Park, 14°13'17"N 108°18'59"E, *M.S. Nuraliev et al. 1492* (IBK, MW),
 1010 *M.S. Nuraliev 1882* (IBK, MW); **Ha Giang Province**: between Meo Vac District and Dong
 1011 Van District, 23°09'06"N 105°24'59"E, *L.F. Fu et al. VMN_CN185* (IBK, VNMN).
 1012

1013 ****Elatostema malacotrichum* W.T.Wang & Y.G.Wei**

1014 China, Vietnam; 400 m.

1015 **Cao Bang Province:** Ha Lang District, An Lac Municipality, 22°46'N 103°44'E, *L.*
1016 *Averyanov et al. CBL607* (LE); Ha Quang District, Pac Bo, *L.F. Fu et al. VMN_CN784* (IBK,
1017 VNMN).
1018
1019 **Elatostema monandrum** (Buch.-Ham. ex D.Don) H.Hara
1020 *Procris monandra* D.Don.
1021 *Elatostema diversifolium* Wedd., *E. laetum* Wedd., *E. monandrum* var. *ciliatum* (Hook.f.)
1022 Murti, *E. monandrum* var. *pinnatifidum* (Hook.f.) Murti, *E. monandrum* var. *serpens* (Hook.f.)
1023 Murti, *E. monandrum* var. *zeylanicum* (Hook.f.) Murti, *E. muscicola* W.T.Wang, *E.*
1024 *surculosum* Wight, *Pellionia mairei* H.Lév.
1025 Bhutan, China, India, Myanmar, Nepal, Sikkim, Sri Lanka, Thailand, Vietnam;
1026 2000–2300 m.
1027 **Lao Cai Province:** Sa Pa District, *P.A. Petelot 5049* (P); **Nghe An Province:** Ky Son
1028 District, Na Ngoi Municipality, 19°11'58"N 104°11'39"E, *L. Averyanov et al. CPC6150* (LE);
1029 19°12'23"N 104°11'34"E, *L. Averyanov et al. CPC6215* (LE).
1030
1031 **Elatostema myrtillus** (H.Lév.) Hand.-Mazz.
1032 *Pellionia myrtillus* H.Lév.
1033 *Elatostema colaniae* Gagnep. *syn. nov.*
1034 China, Vietnam; 500–1600 m.
1035 **Bac Giang Province:** Lang Met, *P.A. Colani 2927* (P); **Cao Bang Province:** Tra Linh
1036 District, Quoc Toan Municipality, vicinity of Thang Heng and Lung Tao Villages,
1037 22°45'30"N 106°17'22"E, *L. Averyanov et al. VH4855* (HN, LE); Tra Linh District, Quoc
1038 Toan Municipality, 22°45'15"N 106°17'54"E, *D.K. Harder et al. 4312* (K); **Ha Giang**
1039 **Province:** between Meo Vac District and Dong Van District, 23°15'02"N 105°23'09"E, *L.F.*
1040 *Fu et al. VMN_CN197* (IBK, VNMN); Meo Vac District, Sung Cha Municipality, 23°11'N
1041 105°17'E, *N.T. Hiep et al. NTH3287* (K, LE); Meo Vac District, Sung Cha Municipality,
1042 23°10'12"N 105°17'39"E, *L. Averyanov et al. HAL8490* (LE); Quan Ba District, Bat Dai Son
1043 Nature Reserve, Thanh Van commune, Mo Sai village, 23°07'46"N 104°57'56"E, *L.*
1044 *Averyanov et al. VR409* (LE); Quan Ba District, Tung Vai Municipality, *L.F. Fu et al.*

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Comment [30]: Buch.-Ham. ex D.Don?

1045 *VMN_CN869* (IBK, VNMN); Quan Ba District, Tung Vai Municipality, Thang village,
 1046 23°03'13"N 104°51'49"E, *L. Averyanov et al. VR742* (LE).
 1047 We place *Elatostema colaniae* in synonymy based on the same combination of
 1048 characters as in *E. myrtillus*: small lamina with auriculate base and furfuraceous stem base.
 1049
 1050 ****Elatostema nanchuanense* W.T.Wang**
 1051 China, Vietnam; 1050–1150 m.
 1052 **Ha Giang province:** Quan Ba District, Tung Vai Municipality, Thang village,
 1053 23°03'13"N 104°51'49"E, *L. Averyanov et al. VR552* (LE).
 1054
 1055 ***Elatostema nasutum* Hook.f.**
 1056 *Elatostema hainanense* W.T.Wang, *E. stipulosum* Hand.-Mazz.
 1057 Bhutan, China, Nepal, Vietnam; 1100–2100 m.
 1058 **Cao Bang Province:** Nguyen Binh District, Nguyen Binh Municipality, 22°37'N
 1059 105°52'E, *L. Averyanov et al. CBL077, CBL171* (LE, MO); Nguyen Binh District, Phia Oac -
 1060 Phia Den Nature Reserve, 22°36'29"N 105°52'18"E, *L.F. Fu et al. VMN_CNI62* (IBK,
 1061 VNMN); **Ha Giang Province:** Vi Xuyen District, Cao Bo Municipality, Tam Ve village,
 1062 22°46'30"N 104°49'01"E, *D.K. Harder 5425* (MO); Yen Minh District, Du Gia Municipality,
 1063 [23°56'N 105°13'E], *P.K. Loc et al. CBL2028, CBL2080* (LE, MO); **Kon Tum Province:** Dak
 1064 Glei District, *N.T. Hiep et al. VH1757* (LE); **Lai Chau Province:** Than Uyen District, Ho Mit
 1065 Municipality, 22°06'N 103°52'E, *N.T. Hiep et al. NTH2669, NTH2812, NTH2874* (LE); **Lao**
 1066 **Cai Province:** Sa Pa District, San Sa Ho, Sin Chai Municipality, 22°20'44.3"N
 1067 103°48'77.0"E, *V.X. Phuong et al. HNK470* (K); **Nghe An Province:** Ky Son District, Na
 1068 Ngoi Municipality, 19°11'59"N 104°11'24"E, *N.T. Hiep et al. CPC6286* (LE); **Son La**
 1069 **Province:** Bac Yen District, Chu Village, 21°15'40.0"N 104°29'27.0"E, *V.D. Nguyen et al.*
 1070 *HNK2726* (K); **Thanh Hoa Province:** Thuong Xuan District, Bat Mot Municipality,
 1071 19°58'18"N 104°59'24"E, *L. Averyanov et al. CPC6555* (LE); **Vinh Phuc Province:** Tam
 1072 Dao District, Tam Dao Range, *N. Arnautov et al. LX-VN3858* (LE).
 1073
 1074 ***Elatostema neriifolium* W.T.Wang & Z.Y.Wu**

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1076 China, Vietnam; 50–750 m.

1077 **Lao Cai Province:** *Sino-Vietnam Expedition 755* (PE); **Quang Binh Province:** Minh

1078 Hoa District, Thuong Hoa Municipality, 17°39'22"N 105°54'59"E, *N.T. Hiep et al. CPC3819*

1079 (LE); **Thanh Hoa Province:** Ba Thuoc District, Co Lung Municipality, Khuyn village,

1080 20°26'39"N 105°15'33"E, *L. Averyanov et al. 3130* (MO); 10 km SW of Ba Thuoc, *B.A.*

1081 *Korotiaev s.n.* (LE); **Tuyen Quang Province:** Na Hang District, Thanh Tuong Municipality,

1082 22°16'26"N 105°25'58"E, *P.K. Loc et al. HAL149* (HN).

1083

1084 ****Elatostema oblongifolium* S.H.Fu**

1085 *Elatostema multicanaliculatum* B.L.Shih & Yuen P.Yang, *Pellionia bodinieri* H.Lév.

1086 China, Vietnam; 1050–1400 m.

1087 **Ha Giang province:** Quan Ba District, Tung Vai Municipality, Thang village,

1088 23°03'13"N 104°51'49"E, *L. Averyanov et al. VR560* (LE), 23°03'42"N 104°50'42"E, *L.*

1089 *Averyanov et al. VR634* (LE).

1090

1091 ****Elatostema obtusum* Wedd.**

1092 *Dorstenia pubescens* Blanco, *Elatostema delicatulum* Wedd.

1093 Bhutan, China, India, Nepal, Sikkim, Thailand, Vietnam; 1400–1900 m.

1094 **Cao Bang Province:** Nguyen Binh District, Nguyen Binh Municipality, 22°37'N

1095 105°52'E, *L. Averyanov et al. CBL206* (LE, MO); **Lao Cai Province:** Sa Pa District, Hoang

1096 Lien National Park, Ton Forest Station, *L.F. Fu et al. VMN_CN971* (IBK, VNMN).

1097

1098 ****Elatostema oppositum* Q.Lin & Y.M.Shui**

1099 China, Vietnam; ca. 1100 m.

1100 **Ha Giang Province:** Quan Ba District, 23°06'57"N 105°01'48"E, *D.K. Harder et al. 4973*

1101 (HN, MO), *4997* (HN).

1102

1103 ***Elatostema paucidentatum* H.Schroet.**

1104 a. ***Elatostema paucidentatum* var. *paucidentatum***

1105 *Pellionia paucidentata* (H.Schroet.) Chien

1106 *Elatostema henryanum* var. *oligodontum* Hand.-Mazz., *Pellionia longgangensis*
1107 W.T.Wang, *P. paucidentata* var. *hainanica* Chien & S.H.Wu, *P. subundulata* W.T.Wang.
1108 China, Vietnam; 180–300 m.
1109 **Cao Bang Province:** Bao Lam District, Bac Mieu Municipality, *L.F. Fu et al.*
1110 *VMN_CN827* (IBK, VNMN); **Ha Giang Province:** between Meo Vac District and Dong Van
1111 District, *L.F. Fu et al. VMN_CN240* (IBK, VNMN); **Lai Chau Province:** Muong Te District,
1112 Muong Te Municipality, 22°32'06"N 102°32'29"E, *N.T. Hiep et al. HAL10102, HAL10123*
1113 (LE); **Lang Son Province:** Lung District, Huu Lien Municipality, 21°39'31"N 106°22'06"E,
1114 *D.E. Atha et al. NY-HN 73* (MO); **Ninh Binh Province:** Nho Quan District, Cuc Phuong
1115 National Park, 20°17'33"N 105°39'54"E, *D.D. Soejarto 10498* (MO), 20°17.55'N
1116 105°39.90'E, *N.T. Hiep et al. 1998* (P); **Quang Ninh province:** Dam Ha District, Long
1117 Ngong village, Sai Vong Mo Leng mt., *W.T. Tsang 30277* (SING); Ha-coi, near Chuk-phai,
1118 Taai Wong Mo Shan, *W.T. Tsang 29166* (SING); **Thai Nguyen Province:** Vo Nhai District,
1119 Thuong Lung Municipality, 21°48.75'N 105°58.09'E, *L.Q. Li et al. 0078* (HN); **Thanh Hoa**
1120 **Province:** Quan Hoa District, Hien Chung Municipality, Xuan Lien Nature Reserve, *F. Wen*
1121 *et al. VMN_CN413* (IBK, VNMN); **Vinh Phuc Province:** *N. Arnautov et al. LX-VN3988*
1122 (LE).
1123
1124 **b. *Elatostema paucidentatum* var. *dolichoceras* W.T.Wang**
1125 Endemic; 100–150 m.
1126 **Lao Cai Province:** *Sino-Vietnam Expedition 590* (PE).
1127
1128 ****Elatostema pergameneum* W.T.Wang**
1129 China, Vietnam; 100–250 m.
1130 **Lang Son Province:** Huu Lung District, Huu Lien Municipality, 21°40'59"N
1131 106°20'30"E, *D.K. Harder et al. 4121* (K); **Quan Binh Province:** Minh Hoa District,
1132 17°40'N 105°57'E, *L. Averyanov et al. VH4611* (HN).
1133
1134 ***Elatostema petelotii* Gagnep.**
1135 China, Vietnam; 260–1300 m.

1136 **Cao Bang Province:** Phia Oac, *P.A. Petelot* 720 (P); **Ha Giang Province:** between
1137 Meo Vac District and Dong Van District, *L.F. Fu et al. VMN_CN239* (IBK, VNMN); Quan
1138 Ba District, Tung Vai Municipality, *L.F. Fu et al. VMN_CN868* (IBK, VNMN); Quan Ba
1139 District, Thang village, around point 23°03'13"N 104°51'49"E, *L. Averyanov et al. VR540*,
1140 *VR731* (LE); Yen Minh District, Du Gia Municipality, 23°56'N 105°13'E, *P.K. Loc et al.*
1141 *CBL2022, CBL2024* (LE); **Nghe An Province:** Que Phong District, Hanh Dich Municipality,
1142 Pu Hoat Nature Reserve, 19°45'19"N 104°47'45"E, *M.S. Nuraliev* 2142 (MW); **Phu Tho**
1143 **Province:** Thanh Son District, Xuan Son Municipality, *V.X. Phuong* 3930 (HN).

1144

1145 **Elatostema platyphyllum** Wedd.

1146 *E. platyphylloides* B.L.Shih & Yuen P.Yang, *E. platyphyllum* Wedd. var. *polycephalum*
1147 Hara.

1148 Bhutan, China, India, Nepal, Philippines, Vietnam; 800–1669 m.

1149 **Gia Lai Province:** K'Bang District, Song Lang Municipality, Kon Chu Rang Nature
1150 Reserve, 14°31'04"N 108°36'23"E, *M.S. Nuraliev et al. 1996* (MW); **Ha Giang Province:**
1151 between Meo Vac District and Dong Van District, 23°13'44"N 105°24'48"E, *L.F. Fu et al.*
1152 *VMN_CN191* (IBK, VNMN); **Ha Noi City:** Ba Vi District, Ba Vi National Park, 21°04'23"N
1153 105°21'36"E, *L.F. Fu et al. VMN_CN33* (IBK, VNMN); **Ninh Binh Province:** Nho Quan
1154 District, Cuc Phuong National Park, *J.M. Hu Hu* 2122 (TAI); **Thanh Hoa Province:** Quan
1155 Hoa District, Hien Chung Municipality, Xuan Lien Nature Reserve, *F. Wen et al.*
1156 *VMN_CN399, VMN_CN408* (IBK, VNMN).

1157

1158 ***Elatostema prunifolium** W.T.Wang

1159 China, Vietnam; elevation unknown.

1160 **Ha Giang Province:** Quan Ba District, Tung Vai Municipality, *L.F. Fu et al.*
1161 *VMN_CN866* (IBK, VNMN).

1162

1163 **Elatostema pseudodissectum** W.T.Wang

1164 China, Vietnam; 1000–1300 m.

1165 **Cao Bang Province:** Bao Lac District, Ca Thanh Municipality, 22°44'N 105°50'E, *L.*

1166 *Averyanov et al. CBL389* (LE, MO); **Vinh Phuc Province**: Tam Dao District, Tam Dao
 1167 National Park, 21°27'47"N 105°38'68"E, *L.Q. Li et al. 559* (PE).
 1168
 1169 ***Elatostema pseudolongipes** W.T.Wang & Y.G.Wei
 1170 China, Vietnam; 150–600 m.
 1171 **Bac Kan Province**: Ba Be District, Nam Mau Municipality, Ba Be National Park,
 1172 22°26'.875'N 106°37.028'E, *D.E. Atha et al. DA4722* (HN); Na Ri District, Liem Thuy
 1173 Municipality, 21°57'.36'N 106°04.622'E, *D.E. Atha et al. DA4773* (HN), Na Ri District, Kim
 1174 Hy Municipality, 22°17'N 106°03'E, *N.T. Hiep et al. NTH3688, NTH3691* (LE); **Cao Bang**
 1175 **Province**: Tra Linh District, Quoc Toan Municipality, Thang Heng vicinity and Lung Tao
 1176 Villages, 22°45'30"N 106°17'22"E, *L. Averyanov et al. VH4850, VH4928, VH4929* (HN, LE,
 1177 MO); **Ha Giang Province**: Bac Me District, Bac Me Nature Reserve, 22°45'23"N
 1178 105°13'46"E, *L.F. Fu et al. VMN_CN221* (IBK, VNMN); **Ninh Binh Province**: Cuc Phuong
 1179 National Park, *L. Wu et al. VN0049* (HN, IBK); **Quang Binh Province**: Bo Trach District,
 1180 Son Trach Municipality, 17°31'02"N 106°16'48"E, *L. Averyanov et al. HAL6382* (LE); Minh
 1181 Hoa District, Thuong Hoa Municipality, 17°39'12"N 105°54'53"E, *N.T. Hiep et al. CPC3753*
 1182 (LE); Tuyen Hoa District, Lam Hoa Municipality, 17°56'10"N 105°49'15"E, *L. Averyanov et*
 1183 *al. CPC2452* (LE); **Thanh Hoa Province**: Ba Thuoc District, Co Lung Municipality, Eo
 1184 Dieu Village, 22°25'35"N 105°14'26"E, *L. Averyanov et al. HAL3354* (HN).
 1185
 1186 ***Elatostema pycnodontum** W.T.Wang
 1187 China, Vietnam; 1400–1500 m.
 1188 **Cao Bang Province**: Bao Lac District, Dinh Phuong Municipality, 22°47'N 105°49'E,
 1189 *P.K. Loc et al. CBL1489* (LE, MO).
 1190
 1191 **Elatostema radicans** (Siebold & Zucc.) Wedd.
 1192 *Procris radicans* Siebold & Zucc.
 1193 *Elatostema cavaleriei* (H.Lév.) Hand.-Mazz., *E. radicans* var. *grande* (Gagnep.)
 1194 H.Schroet., *Pellionia arisanensis* Hayata, *P. cavaleriei* H.Lév., *P. chikushiensis* Yamam., *P.*
 1195 *iseana* (Makino ex Hatus.) Hatus. ex Kimura, *Pellionia pauciflora* W.T.Wang, *P. radicans*

1196 (Siebold & Zucc.) Wedd., *P. radicans* f. *grandis* Gagnep., *P. radicans* var. *chikushiensis*
 1197 (Yamam.) S.S.Ying, *P. radicans* var. *grandis* (Gagnep.) W.T.Wang.
 1198 China, Japan, Korea, Vietnam; 600–2700 m.
 1199 **Cao Bang Province:** Nguyen Binh District, Nguyen Binh Municipality, 22°37'N
 1200 105°52'E, *L. Averyanov et al. CBL064* (HN, LE, MO); Nguyen Binh District, Phia Oac - Phia
 1201 Den Nature Reserve, 22°36'29"N 105°52'18"E, *L.F. Fu et al. VMN_CN160* (IBK, VNMN);
 1202 **Gia Lai Province:** K'Bang District, Son Lang Municipality, Kon Chu Rang Nature Reserve,
 1203 14°31'04"N 108°36'23"E, *M.S. Nuraliev et al. 1994* (MW), 14°30'59"N 108°32'27"E, *M.S.*
 1204 *Nuraliev et al. 2019* (MW), 14°30'02"N 108°34'27"E, *M.S. Nuraliev et al. 2027* (MW); **Ha**
 1205 **Giang Province:** Meo Vac District, vicinities of Meo Vac Town, 23°10'N 105°24'E, *N.T.*
 1206 *Hiep et al. NTH3377* (LE); **Khanh Hoa Province:** Khanh Son District, 12°12'N 108°44'E, *L.*
 1207 *Averyanov et al. VH4353* (LE, MO); **Kon Tum Province:** *L. Averyanov et al. VH543* (LE,
 1208 MO); **Lam Dong Province:** Lac Duong District, Da Chais Municipality, 12°09'N 108°41'E,
 1209 *L. Averyanov et al. VH2890, VH2914* (LE), 12°05'N 108°40'E, *L. Averyanov et al. VH2974*
 1210 (HN, LE), 12°07'N 108°41'E, *L. Averyanov et al. VH3435* (LE, MO), 12°06'N 108°39'E, *L.*
 1211 *Averyanov et al. VH4493* (HN, MO); **Lang Son Province:** *Sino-Vietnam Expedition 1597*
 1212 (PE); **Lao Cai Province:** Sa Pa District, Hoang Lien National Park, *L.F. Fu et al.*
 1213 *VMN_CN886* (IBK, VNMN); Van Ban District, 21°58'42"N 104°00'37"E, *L. Averyanov et al.*
 1214 *HAL2094* (LE), 21°59'04"N 104°15'08"E, *L. Averyanov et al. HAL2094* (LE); **Nghe An**
 1215 **Province:** Ky Son District, Na Ngoi Municipality, 19°11'52"N 104°10'55"E, *L. Averyanov et*
 1216 *al. CPC6098* (LE); **Ninh Binh Province:** Nho Quan District, Phuoc Binh, 12°07'N 108°41'E,
 1217 *L. Averyanov et al. VH3369* (HN, LE); **Quang Binh Province:** Minh Hoa District, Dan Hoa
 1218 Municipality, 17°45'27"N 105°47'46"E, *L. Averyanov et al. HAL12539* (LE); **Quang Nam**
 1219 **Province:** *L. Averyanov et al. VH919* (HN, LE); **Quang Ninh Province:** Ba Mun, 21°05'N
 1220 107°35'E, *L. Averyanov & E. Kudriavtseva 221* (LE); **Vinh Phuc Province:** *N. Arnautov et al.*
 1221 *LX-VN3941* (LE); Tam Dao District, 21°28'02"N 105°38'39"E, *L.F. Fu et al. VMN_CN50*
 1222 (IBK, VNMN); Tam Dao National Park, *N. Arnautov et al. LX-VN3859, LX-VN3859,*
 1223 *LX-VN3920, LX-VN4045* (LE), *L. Averyanov 65-A* (LE).
 1224
 1225 **Elatostema ramosum** W.T.Wang

1226 *Elatostema ramosum* var. *villosum* W.T.Wang.
1227 China, Vietnam; 500–1400 m.
1228 **Cao Bang Province:** Nguyen Binh District, Yen Lac Municipality, 22°45'34"N
1229 105°51'49"E, *L. Averyanov et al. CPC5424* (LE); **Ha Giang Province:** Bac Me District, Bac
1230 Me Nature Reserve, 22°45'14"N 105°13'36"E, *L.F. Fu et al. VMN_CN227* (IBK, VNMN);
1231 Quan Ba District, Bat Dai Son commune, Bat Dai Son Nature Reserve, San Chu village,
1232 23°08'55"N 104°59'46"E, *L. Averyanov et al. VR065* (LE); **Hoa Binh Province:** Lac Son
1233 District, Tu Do Municipality, 20°25'29"N 105°19'36"E, *N.Q. Hieu et al. CPC1559* (LE);
1234 **Ninh Binh Province:** Cuc Phuong National Park, *T.H. Nguyen NTH 3015* (MO); Nho Quan
1235 District, Cuc Phuong National Park, *J.M. Hu Hu2065* (TAI).
1236
1237 **Elatostema retrohirtum** Dunn
1238 China, Vietnam; 87–1100 m.
1239 **Bac Kan Province:** Na Ri District, Kim Hy Nature Reserve, 22°11'49"N 106°03'51"E,
1240 *L.F. Fu et al. VMN_CN120* (IBK, VNMN); **Gia Lai Province:** K'Bang District, Son Lang
1241 Municipality, Kon Chu Rang Nature Reserve, 14°30'55"N 108°32'48"E, *M.S. Nuraliev 2009*
1242 (MW); **Ha Giang Province:** Bac Me District, Bac Me Nature Reserve, 22°45'24"N
1243 105°13'49"E, *L.F. Fu et al. VMN_CN217* (IBK, VNMN); between Meo Vac District and
1244 Dong Van District, *L.F. Fu et al. VMN_CN186, VMN_CN196, VMN_CN245* (IBK, VNMN);
1245 Quan Ba District, Tung Vai Municipality, *L.F. Fu et al. VMN_CN864* (IBK, VNMN); **Ha Noi**
1246 **City:** Ba Vi District, Ba Vi National Park, 21°04'22"N 105°21'36"E, *L.F. Fu et al.*
1247 *VMN_CN34* (IBK, VNMN), 21°03'35"N 105°21'50"E, *M.S. Nuraliev 1917* (IBK, MW); **Hai**
1248 **Phong City:** Cat Hai District, Cat Ba Island, Cat Ba National Park, Frog pond, 20°48.005'N
1249 107°1.600'E, *N.A. Vislobokov 13030* (MW); **Hoa Binh Province:** Lac Son District, Ngoc Son
1250 Municipality, 20°26'31"N 105°19'32"E, *N.Q. Hieu et al. CPC1615* (LE); **Lam Dong**
1251 **Province:** Bao Loc, *L. Averyanov et al. LX-VN1713* (LE); **Nghe An Province:** Que Phong
1252 District, Hanh Dich Municipality, Pu Hoat Nature Reserve, 19°46'19"N 104°47'00"E, *M.S.*
1253 *Nuraliev 2180* (MW); **Ninh Binh Province:** Nho Quan District, Cuc Phuong National Park,
1254 *J.M. Hu Hu2099* (TAI); **Son La Province:** Phu Yen District, Gia Phu Municipality, Nhet
1255 Village, 21°36'27.7"N 104°04'22.8"E, *V.D. Nguyen et al. HNK2469* (K); **Tuyen Quang**

1256 **Province:** Na Hang District, Vinh Yen Municipality, 22°21'07"N 105°25'06"E, *N.T. Hiep et*
1257 *al. HLF-229* (HN).
1258
1259 **Elatostema rhizomatosum** (Gagnep.) Q.Lin
1260 *Pellionia rhizomatosa* Gagnep.
1261 Endemic; ca. 500 m.
1262 **Province unknown:** Annam, col des Nuages près Tourane, *M. Poilane 7909* (P).
1263
1264 **Elatostema rupestre** (Buch.-Ham. ex D.Don) Wedd.
1265 *Procris rupestris* Buch.-Ham. ex D.Don.
1266 *Elatostema zollingerianum* Miq.
1267 India, Nepal, Vietnam; elevation unknown.
1268 **Tuyen Quang Province:** Na Hang District, *A. Gramain et al. 649* (HN).
1269
1270 ***Elatostema salvinioides** W.T.Wang
1271 a. **Elatostema salvinioides** var. **robustum** W.T.Wang
1272 China, Vietnam; 1100–1650 m.
1273 **Dien Bien Province:** Muong Cha District, Mua Ngai Municipality, 21°53'46"N
1274 103°10'07"E, *L. Averyanov et al. CPC1048, CPC1920* (LE); **Lai Chau Province:** Sin Ho
1275 District, Ta Ngau Municipality, 22°18'N 103°15'E, *N.T. Hiep et al. NTH2772* (LE).
1276
1277 **Elatostema scabrum** (Benth.) Hallier f.
1278 *Pellionia scabra* Benth.
1279 *Elatostema pellioniiifolium* W.T.Wang, *Pellionia cephaloidea* W.T.Wang, *P. scabra*
1280 subvar. *pedunculata* Yamam., *Polychroa scabra* (Benth.) Hu.
1281 China, Japan, Vietnam; 700–1800 m.
1282 **Hoa Binh Province:** Da Bac District, Cao Son Municipality, Buoi Truong station,
1283 20°54'09"N 105°12'15"E, *N.T. Hiep et al. HAL592* (HN); **Kon Tum Province:** *L. Averyanov*
1284 *et al. VH255* (HN, LE, MO); **Phu Tho Province:** Tan Son District, Xuan Son Municipality,
1285 21°06'49"N 104°56'03"E, *L. Averyanov et al. HAL12749* (LE); **Son La Province:** Yen Chau

1286 District, Muong Lum Municipality, 20°59'06"N 104°28'46"E, *D.K. Harder et al. 7298* (HN).
1287
1288 **Elatostema simplicissimum** Q.Lin
1289 *Pellionia imbricata* Gagnep.
1290 Endemic; 200–220 m.
1291 **Lai Chau Province:** 22°03'N 103°09'E, *N.T. Hiep et al. NTH2747* (LE); Muong Lay
1292 District, Nam Hang Municipality, 22°08'14"N 102°58'18"E, *D.K. Harder et al. 5884* (K, LE).
1293
1294 **Elatostema sinense** H.Schroet.
1295 *Elatostema sinense* var. *trilobatum* W.T.Wang.
1296 China, Vietnam; ca. 500 m.
1297 **Ha Giang Province:** Bac Me District, Bac Me Nature Reserve, *L.F. Fu et al.*
1298 *VMN_CN216A* (IBK, VNMN); Quan Ba District, Tung Vai Municipality, *L.F. Fu et al.*
1299 *VMN_CN872* (IBK, VNMN); **Hoa Binh Province:** Mai Chau District, Pa Co Municipality, *F.*
1300 *Wen et al. VMN_CN330, VMN_CN333* (IBK, VNMN); **Son La Province:** Bac Yen District,
1301 Ta Sua Municipality, Chu Village, 21°15'40.0"N 104°29'27.0"E, *V.D. Nguyen et al.*
1302 *HNK2724* (K).
1303
1304 **Elatostema sublineare** W.T.Wang
1305 China, Vietnam; elevation unknown.
1306 **Cao Bang Province:** Bao Lac District, Dinh Phung Municipality, *L.F. Fu et al.*
1307 *VMN_CN815* (IBK, VNMN); **Lang Son Province:** Van Lang District, *Anon. 1036* (LE);
1308 **Ninh Binh Province:** Nho Quan District, Cuc Phuong National Park, *J.M. Hu Hu2106* (TAI);
1309 **Tuyen Quang Province:** Na Hang District, *Anon. TV-74* (HN).
1310
1311 **Elatostema tenuicaudatum** W.T.Wang
1312 China, Vietnam; 240–1700 m.
1313 **Cao Bang Province:** Bao Lac District, Xuan Truong Municipality, *L.F. Fu et al.*
1314 *VMN_CN808* (IBK, VNMN); **Dak Lak Province:** Krong Bong District, Cu Pui Municipality,
1315 12°30'N 108°30'E, *L. Averyanov et al. VH6036* (HN); **Dien Bien Province:** Muong Cha

1316 District, Mua Ngai Municipality, 21°53'46"N 103°10'17"E, *L. Averyanov et al. CPC1921*
 1317 (LE); **Gia Lai Province**: Mang Yang District, A Yun Municipality, Kon Ka Kinh National
 1318 Park, 14°13'10"N 108°19'10"E, *M.S. Nuraliev et al. 1827* (IBK, MW); **Ha Giang Province**:
 1319 Vi Xuyen District, Cao Bo Municipality, Tam Ve village, 22°46'03"N 104°49'42"E, *D.K.*
 1320 *Harder et al. 5454* (MO), 22°46'12"N 104°49'33"E, *D.K. Harder et al. 5370* (MO); Yen Minh
 1321 District, Du Gia Municipality, [23°56'N 103°13'E], *P.K. Loc et al. CBL2063* (LE); **Hoa Binh**
 1322 **Province**: Lac Son District, Tu Do Municipality, 20°26'07"N 105°17'19"E, *N.Q. Hieu et al.*
 1323 *CPC1499* (LE); **Khanh Hoa Province**: Khanh Son District, 12°12'N 108°44'E, *L. Averyanov*
 1324 *et al. VH4313* (HN, LE, MO); **Lam Dong Province**: Lac Duong District, Da Chais
 1325 Municipality, 12°09'N 108°41'E, *L. Averyanov et al. VH2891* (HN, LE, MO), 12°07'N
 1326 108°41'E, *L. Averyanov et al. VH3413* (LE), 12°11'N 108°43'E, *L. Averyanov et al. VH4387*
 1327 (LE, MO); **Lao Cai Province**: Van Ban District, Khanh Yen Ha Municipality, 21°57'59"N
 1328 104°14'06"E, *L. Averyanov et al. HAL2462* (HN, LE); Van Ban District, Nam Xe
 1329 Municipality, 22°01'27"N 104°00'25"E, *D.K. Harder et al. DKH7060* (LE); **Phu Tho**
 1330 **Province**: Tan Son District, Xuan Son Municipality, 21°06'57"N 104°57'17"E, *L. Averyanov*
 1331 *et al. HAL12639* (LE); **Quang Nam Province**: *L. Averyanov et al. VH905* (HN, LE); **Tuyen**
 1332 **Quang Province**: Na Hang District, Vinh Yen Municipality, 22°21'09"N 105°25'20"E, *Le*
 1333 *Van Cham et al. HLF-061* (HN); **Vinh Phuc Province**: Tam Dao District, 21°27'35"N
 1334 105°38'58"E, *L.F. Fu et al. VMN_CN45* (IBK, VNMN); Tam Dao Range, *N. Arnautov et al.*
 1335 *LX-VN3921* (LE).
 1336
 1337 **Elatostema trichosantherum** (Gagnep.) H.Schroet.
 1338 *Pellionia trichosantha* Gagnep.
 1339 Endemic; elevation unknown.
 1340 **Ha Noi City**: Ba Vi District, Ba Vi Mountain, *B. Balansa 2529* (P).
 1341
 1342 **Elatostema tsoongii** (Merr.) H.Schroet.
 1343 *Polycharoa tsoongii* Merr.
 1344 *Pellionia cristulata* Gagnep.
 1345 Cambodia, China, Vietnam; 115–1100 m.

1346 a. **Elatostema tsoongii** ssp. **tsoongii**
1347 **Bac Kan Province:** Na Ri District, Kim Hy Nature Reserve, 22°18'01"N 106°01'38"E,
1348 *L.F. Fu et al. VMN_CN139* (IBK, VNMN); **Dak Lak Province:** Krong Bong District, Cu Pui
1349 Municipality, 12°30'N 108°30'E, *L. Averyanov et al. VH5928* (HN); Lak District, Bong Krang
1350 Municipality, Chu Yang Sin National Park, 12°23'50"N 108°21'00"E, *M.S. Nuraliev 997* (K,
1351 MW); **Gia Lai Province:** Mang Yang District, A Yun Municipality, Kon Ka Kinh National
1352 Park, 14°12'53"N 108°18'56"E, *M.S. Nuraliev et al. 1449* (IBK, MW); **Ha Tinh Province:**
1353 Huong Son District, Son Hong Municipality, 18°34'06"N 105°11'40"E, *P.K. Loc et al.*
1354 *HAL5193* (HN, LE); **Lam Dong Province:** Bao Lam District, Lac Bac Municipality,
1355 11°43'28"N 107°41'59"E, *M.S. Nuraliev et al. s.n.* (photo: MW); **Lang Son Province:** Huu
1356 Lung District, Huu Lien Municipality, Huu Lien Protected Area, 21°40'59"N 106°20'30"E,
1357 *D.K. Harder et al. 4120* (K); Pac Mo District, *Anon. 1149* (LE); **Quang Binh Province:**
1358 Minh Hoa District, Thong Hoa Municipality, vicinities of Yen Son Village, 17°40'N
1359 105°57'E, *L. Averyanov et al. VH4729* (HN, LE, MO); **Quang Tri Province:** Da Krong
1360 District, Ta Rut Municipality, 16°24'29"N 107°01'07"E, *L. Averyanov et al. CPC3017* (LE);
1361 Lang Khoai, *Polilane 10741* (P); **Thanh Hoa Province:** Quan Hoa District, Pu Hu Nature
1362 Reserve, *F. Wen et al. VMN_CN352* (IBK, VNMN); **Thua Thien Hue Province:** Phu Loc
1363 District, Bach Ma National Park, 16°14'11"N 107°44'28"E, *N.T. Hiep et al. HLF1649* (HN,
1364 MO); **Tuyen Quang Province:** Na Hang District, Thanh Tuong Municipality, near Ban Bung
1365 Village, 22°16'26"N 105°25'58"E, *P.K. Loc et al. HAL164* (HN); **Vinh Phuc Province:** Tam
1366 Dao National Park, *N. Arnautov et al. LX-VN4005* (LE).
1367
1368 b. **Elatostema tsoongii** ssp. **subpeltatum** (Gagnep.) H.W.Li
1369 *Pellionia subpeltata* Gagnep.
1370 China, Vietnam; elevation unknown.
1371 **Bac Giang Province:** Lang Met, *P.A. Petelot 2929* (P).
1372
1373 **Elatostema veronicoides** (Gagnep.) H.Schroet.
1374 *Pellionia veronicoides* Gagnep.
1375 China, Vietnam; elevation unknown.

1376 **Hoa Binh Province:** Da Bac District, Cho Bo, *B. Balansa* 2251 (P); **Thanh Hoa**
1377 **Province:** Pu Huong Natural Reserve, *F. Wen et al. VMN_CN422* (IBK, VNMN).
1378
1379 **Elatostema vietnamense** Q.Lin & L.D.Duan
1380 Endemic; elevation unknown.
1381 **Thua Thien Hue Province:** Phu Loc District, Bach Ma National Park, *H.N. Qin et al.*
1382 *156* (PE).
1383
1384 **Elatostema xanthophyllum** W.T.Wang
1385 China, Vietnam; 400–1450 m.
1386 **Bac Kan Province:** Na Ri District, Kim Hy Nature Reserve, 22°11'56"N 106°04'05"E,
1387 *L.F. Fu et al. VMN_CN134* (IBK, VNMN); Na Ri District, Kim Hy Nature Reserve, *Y.G. Wei*
1388 *& V.T. Do VMN_CN24* (IBK, VNMN); **Ha Giang Province:** Quan Ba District, 23°06'57"N
1389 105°01'47"E, *D.K. Harder et al. 4830* (HN); Quan Ba District, Can Ti Municipality, 23°04'N
1390 104°59'E, *N.T. Hiep et al. NTH3614* (K); Quan Ba District, San Chu village, 23°08'55"N
1391 104°59'46"E, *L. Averyanov et al. VR063* (LE); Quan Ba District, Thanh Van commune, Mo
1392 Sai village, 23°07'46"N 104°57'56"E, *L. Averyanov et al. VR394* (LE); **Son La Province:** Van
1393 Ho District, Tan Xuan Municipality, 20°40'33"N 104°39'00"E, *L. Averyanov et al. CPC7117*
1394 (LE).
1395
1396 ***Elatostema xichouense** W.T.Wang
1397 China, Vietnam; 300–1100 m.
1398 **Ha Giang Province:** Quan Ba District, Bat Dai Son Nature Reserve, 23°09'N 104°59'E,
1399 *D.K. Harder et al. 5120* (HN), *L. Averyanov et al. VR052* (LE), *N.T. Hiep & L. Averyanov*
1400 *5120* (MO); Quan Ba District, Bat Dai Son Nature Reserve, Thanh Van commune, Mo Sai
1401 village, 23°07'46"N 104°57'56"E, *L. Averyanov et al. VR365* (LE); Meo Vac District, *L.F. Fu*
1402 *et al. VMN_CN852* (IBK, VNMN); **Hoa Binh Province:** Lac Son District, Tu Do
1403 Municipality, 20°26'07"N 105°17'19"E, *N.Q. Hieu et al. CPC1482* (LE); Mai Chau District,
1404 Van Mai Municipality, 20°35'26"N 105°02'00"E, *D.K. Harder et al. 8170* (MO); **Ninh Binh**
1405 **Province:** Nho Quan District, Cuc Phuong National Park, *L. Averyanov et al. LX-VN1728*

1406 (LE).

1407

1408 **Excluded taxa**

1409 | **Elatostema cuneatum** Wight

1410 *Elatostema approximatum* Wedd., *E. densiflorum* Franch. & Sav., *E. nipponicum*

1411 Makino., *E. webbianum* Wedd.

1412 This species was indicated by Ho (2003) and Hiep (2005) as occurring in Vietnam but

1413 no specimen was cited and we were unable to locate any specimen from Vietnam.

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