

New national records of Asteraceae from Hoang Lien National Park, northern Vietnam

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Summary: We report three species from the family Asteraceae found in Hoang Lien National Park representing new records for Vietnam. *Erigeron lilacinus* is a new combination that we publish to accommodate the taxon earlier known as *Erigeron annuus* subsp. *lilacinus* at species rank. It is a widely distributed weed that, however, has not been reported for Asia until now. Moreover, the entire *E. annuus* s.l. species complex is known to have limited distribution in Asia and especially in its tropical regions; particularly, this complex has not been reported for Vietnam. Additionally, we report *E. lilacinus* as a new record for Taiwan. The second species, *Senecio humbertii*, was earlier considered to be a narrow endemic of Yunnan, China. It is confined to mountain environments and found above 2000 m a.s.l. across its known distribution area. The third species, *Synotis austroyunnanensis*, has been known to inhabit Guizhou and Yunnan provinces of China. We indicate presence of this species in two provinces of Vietnam bordering China. We provide photographs of all three species in the living state and briefly discuss their taxonomy, morphological characteristics and geographical distribution.

Keywords: comb. nov., *Erigeron*, Fansipan, Indochinese Peninsula, Lao Cai Province, *Senecio*, Southeast Asia, *Synotis*, Vietnam-China border area

Hoang Lien National Park is one of the northernmost protected areas in Vietnam. At the same time, it is remarkable for the predominance of areas with high elevations, including the famous Fansipan mountain, the highest of the Indochinese Peninsula. It is therefore not surprising that the flora of Hoang Lien National Park is highly unusual for Indochina, but shows considerable similarity with that of southern China and the Himalayan region (NGUYEN & HARDER 1996). Here, we continue the reports of taxa of vascular plants earlier known in China and found in Hoang Lien National Park as new national records (e.g., NURALIEV 2010; CHRISTENHUSZ 2012; DO et al. 2015; FORD et al. 2015; GADDY & NURALIEV 2017; PASZKO et al. 2017; FU et al. 2019; LE et al. 2019; BUI et al. 2020; LU et al. 2020; TRUONG et al. 2020). We list three species of Asteraceae that have not been known from Vietnam according to the recent accounts (NGUYEN & NGUYEN 1998; HO 2000; BIEN 2003, 2007). We raise one of these taxa from subspecies to species rank and publish a required new combination.

Materials and methods

The records reported here were made by one of the authors (MSN) during expeditions of the Russian-Vietnamese Tropical Center to Hoang Lien National Park in 2009–2010. Records were documented in the form of herbarium specimens and/or photographs and deposited in LE and MW (SEREGIN 2018). Additionally, specimens kept at E (available from <https://data.rbge.org.uk/search/herbarium/>) and TAI (available from <http://tai2.ntu.edu.tw>) were studied as scanned images.

Taxonomic treatment

Erigeron lilacinus (Sennikov & Kurtto) Sennikov, comb. nov. (Fig. 1)

Basionym: *Erigeron annuus* subsp. *lilacinus* Sennikov & Kurtto, Memoranda Soc. Fauna Fl. Fenn. 95: 47 (2019).

Taxonomic notes. *Erigeron annuus* L. s.l. is an annual or biennial (rarely perennial) taxon native to North American prairies. Its stems are tall (up to 100–150 cm), erect, branched in the upper part, single or a few arising from a tap root or a short rhizome. It produces abundant seeds and is capable to colonize extensive territories with barren land either in anthropogenic or natural ecosystems. For these reasons, it became a noxious weed in Europe (WEBER & GUT 2005).

The taxonomy of *E. annuus* s.l. is complicated; usually this taxon was subdivided into three subspecies (WAGENITZ 1965) or segregate species (TZVELEV 1994), which have different ploidy levels and seem to reproduce apomictically in their secondary distribution areas (NOYES 2006). Their morphology, synonymy and nomenclature have been recently reviewed by SENNIKOV & KURTTO (2019). These authors confirmed the established views (WAGENITZ 1965) that the diploid taxon, *Erigeron annuus* subsp. *strigosus* (Muhl. ex Willd.) Wagenitz, can be distinguished from the polyploids by a shorter pubescence, and that the two polyploid taxa are different from each other in flower colour and shape of leaves: white ray flowers and narrow leaves with nearly entire margin are characteristic of *E. annuus* subsp. *annuus*, whereas lilac ray flowers and broader, evidently dentate leaves are found in *E. annuus* subsp. *lilacinus* Sennikov & Kurtto.

Because of their stable morphological characters, the absence of intermediate morphotypes and presumably apomictic mode of reproduction at least in the secondary distribution areas, species rank seems to be more appropriate for the three subspecies of *E. annuus* s.l. accepted by SENNIKOV & KURTTO (2019). A new nomenclatural combination, *E. lilacinus*, is therefore effected here for *E. annuus* subsp. *lilacinus*. Accordingly, correct names for the two remaining taxa of this complex, if treated at species rank, are *E. annuus* s.s. and *E. strigosus* Muhl. ex Willd.

Notes on geographical distribution. In spite of the broad secondary distribution area of the *E. annuus* s.l. species complex and all three of its segregate species (*E. annuus* s.s., *E. lilacinus* and *E. strigosus*) in Europe, this taxon shows a considerably narrower distribution in Asia. With respect to the Asian tropical regions, its known occurrences are limited to Taiwan (PENG et al. 1998), China (CHEN & BROUILLET 2011) and India (HAJRA et al. 1995).

In Taiwan, *E. annuus* s.l. has been naturalized for over 50 years (PENG et al. 1998; WU & WANG 2005). When checking the images of specimens of *E. annuus* s.l. collected in Taiwan, we have noticed a high level of morphological variability, indicating that more than one taxon of this species complex is present in the territory. Because of the broad and coarsely dentate cauline leaves, we assign two specimens cited below to *E. lilacinus*, which is therefore newly reported from Taiwan here.

In Vietnam, no representatives of *E. annuus* s.l. have been known to date (HO 2000; BIEN 2003, 2007). Hereby, we report the presence of this species complex in Vietnam for the first time. The plants observed in Hoang Lien National Park possess sparse long hairs on the involucre, broadly lanceolate and sparsely, but prominently dentate cauline leaves and a pale lilac colour of ray flowers, unambiguously matching *E. lilacinus*. The studied population inhabits a severely

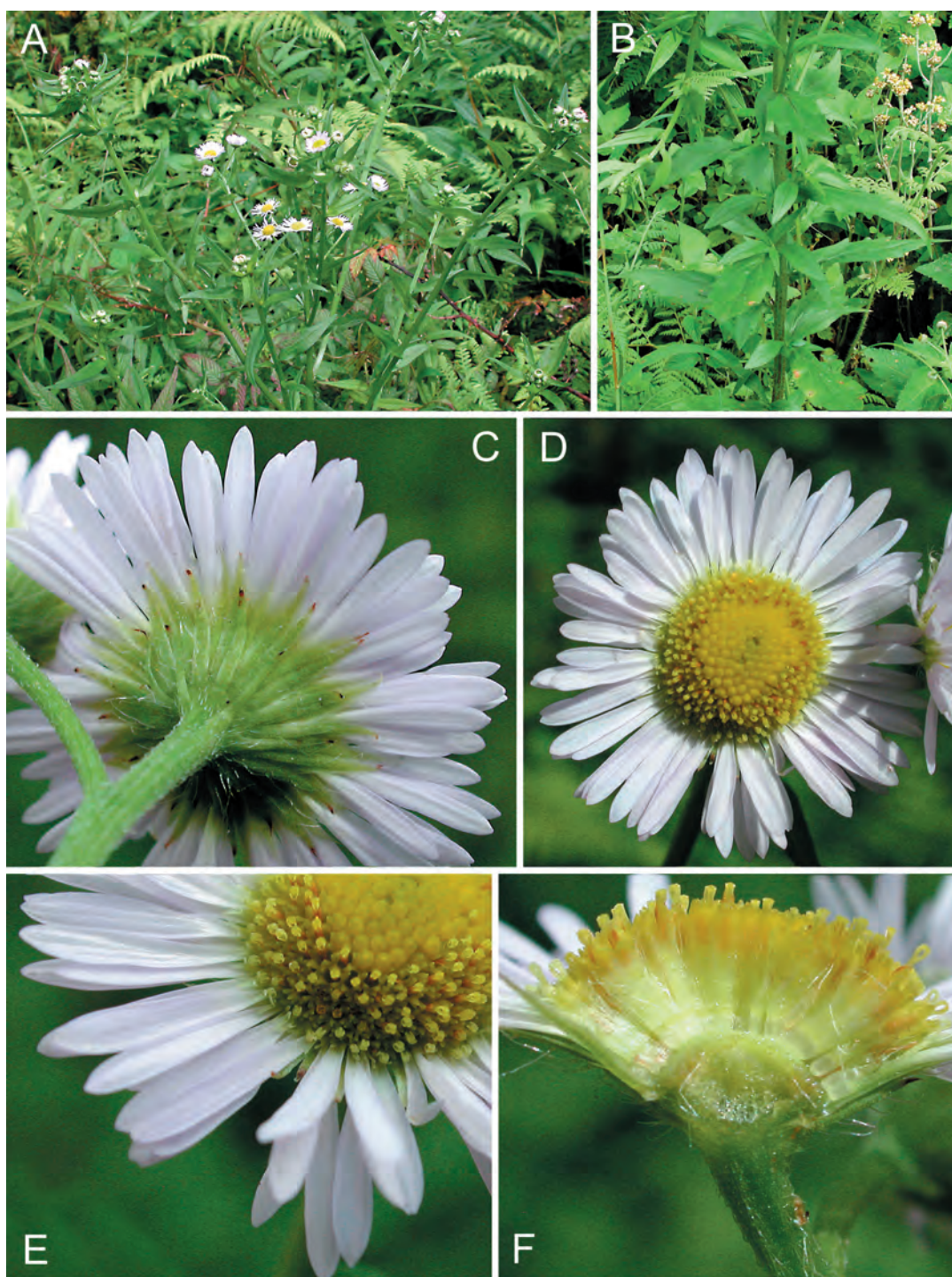


Figure 1. *Erigeron lilacinus*. A – habit; B – leafy shoot; C – head, view from below; D – head, view from above; E – close-up of flowers; F – head, longitudinal section. *Nuraliev NUR 100f*. Photos by M. Nuraliev.

disturbed area at elevation about 1900 m a.s.l. next to Tram Ton (Ton station of forest rangers), close to a road connecting Sa Pa town and Lai Chau city, which is in concordance with the idea of a recent appearance of the population through anthropogenic introduction.

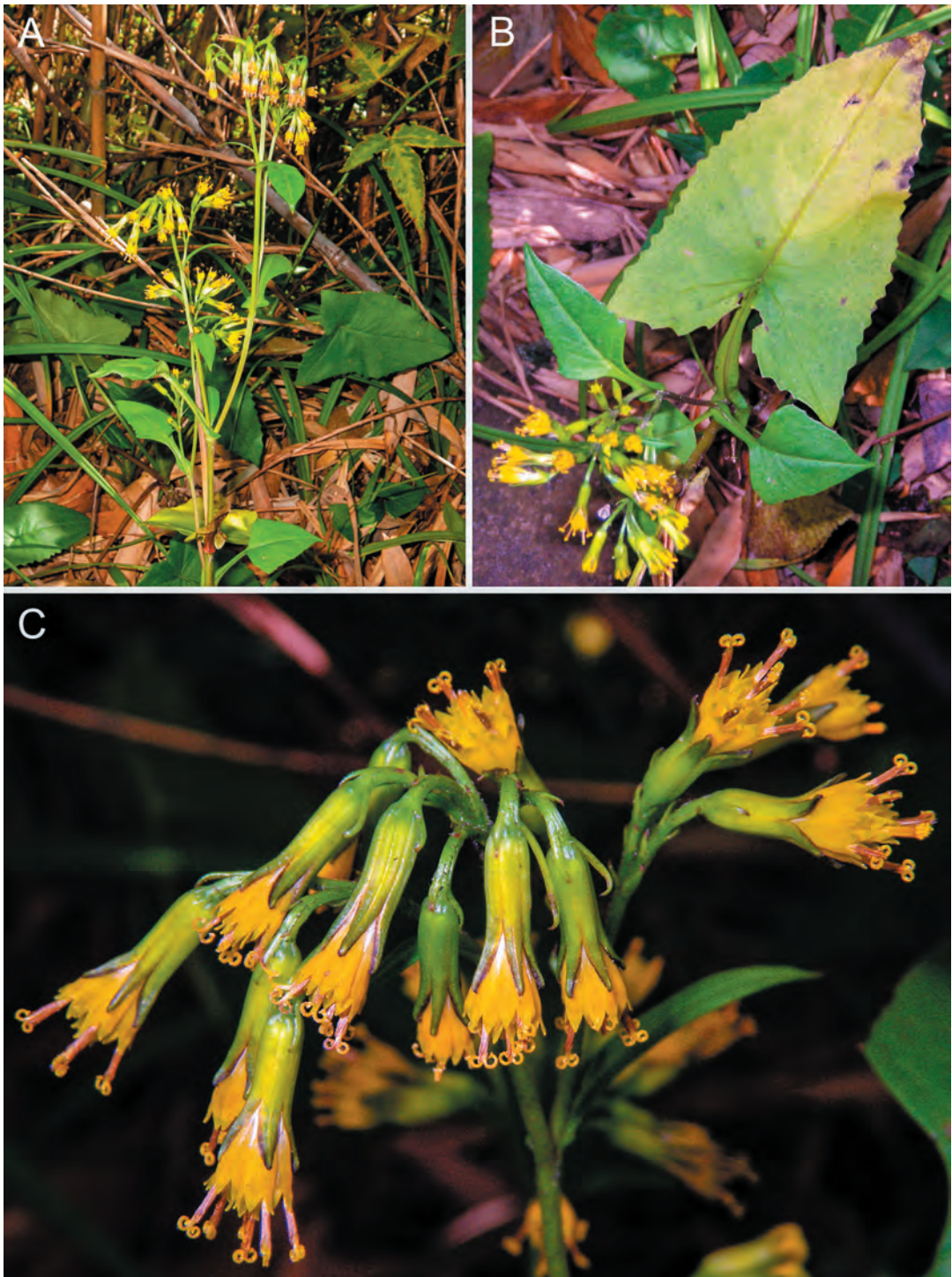


Figure 2. *Senecio humbertii*. A – habit; B – flowering shoot, view from above; C – inflorescence. *Nuraliev NUR 224a*. Photos by M. Nuraliev.

Distribution. Taiwan (Taipei and Taoyuan), Vietnam (Lao Cai: Hoang Lien National Park) and probably some other Asian countries. Also North America (USA: native) and Europe (alien and widely distributed).

Specimens examined. Taiwan: Taipei City, University campus, waste roadside, flowers bluish, 02 June 1967, *C. Hsu 3054* [TAI: 124924]; Taoyuan City, Paling, 18 May 1975, *C.-IPeng 1385* [TAI: 167481]. Vietnam: Lao Cai province, Sa Pa district, San Sa Ho municipality, Hoang Lien National Park, Tram Ton area, 12 June 2009, *M.S. Nuraliev NUR 100f* [photo LE: LE01073563].

***Senecio humbertii* C.C. Chang (Fig. 2)**

Bull. Fan Mem. Inst. Biol., Bot. 7: 153 (1936).

Senecio humbertii is a little-known species previously considered endemic to Yunnan (Mile City) (JEFFREY & CHEN 1984; CHEN et al. 2011b). It occurs in forests at elevations above 2000 m. This species is easily recognizable by 5–6 flowers and 5 phyllaries per head as well as deltoid basal and cauline leaves.

In Hoang Lien National Park, *S. humbertii* was observed only once. The population reported here inhabits an area with open vegetation dominated by bamboo on mountain slopes at 2600 m a.s.l.

Distribution. China (Yunnan: Mile), Vietnam (Lao Cai: Hoang Lien National Park).

Specimens examined. Vietnam: Lao Cai province, Sa Pa district, San Sa Ho municipality, Hoang Lien National Park, trail to Fan Si Pan mt., N 22°19'15" E 103°46'15", 2600 m, 21 November 2010, *M.S. Nuraliev NUR 224a* [photo LE: LE01073566].

***Synotis austroyunnanensis* C. Jeffrey & Y.L. Chen (Fig. 3)**

Kew Bull. 39: 296 (1984).

Synotis austroyunnanensis belongs to a group of herbaceous species of *Synotis* (C.B. Clarke) C. Jeffrey & Y.L. Chen with cuneate leaves aggregated below the synflorescence. It is characterized by radiate heads with rather long ray flowers and phyllaries (both ca 10 mm long).

This species has earlier been known from a few localities in Guizhou and southern Yunnan of China (JEFFREY & CHEN 1984; CHEN et al. 2011a), several of them being rather close to the Vietnamese populations reported here.

In Hoang Lien National Park, *S. austroyunnanensis* is quite a common species; it was observed by one of the authors (MSN) in various habitats ranging from dark dense forests along banks of small mountain rivers at 1900 m a.s.l. to more open vegetation with bamboo on mountain slopes at 2600 m a.s.l.

The Vietnamese populations of *S. austroyunnanensis* show some morphological variabilities extending our knowledge on the characters of this taxon. Leaves are very narrowly lanceolate, apically attenuate, with undulate to minutely serrate margin. Ray flowers 5–9, disc flowers 12–17. Involucre prominently calyculate; bracts of calyculus $\frac{1}{3}$ – $\frac{2}{3}$ as long as the phyllaries. Phyllaries 7–8, glabrous or sparsely puberulous.

Distribution. China (Guizhou and S Yunnan), Vietnam (Ha Giang: Tay Con Linh Nature Reserve, Lao Cai: Hoang Lien National Park).

Specimens examined. Vietnam: Lao Cai province, Sa Pa district, San Sa Ho municipality, Hoang Lien National Park, Tram Ton area, forest, N 22°21'10" E 103°46'30", 1900 m, 20 November 2009, *M.S. Nuraliev NUR 181b* [photo LE: LE01073564]; Lao Cai province, Sa Pa district, San Sa Ho municipality, Hoang Lien National Park, Tram Ton area, stony bank

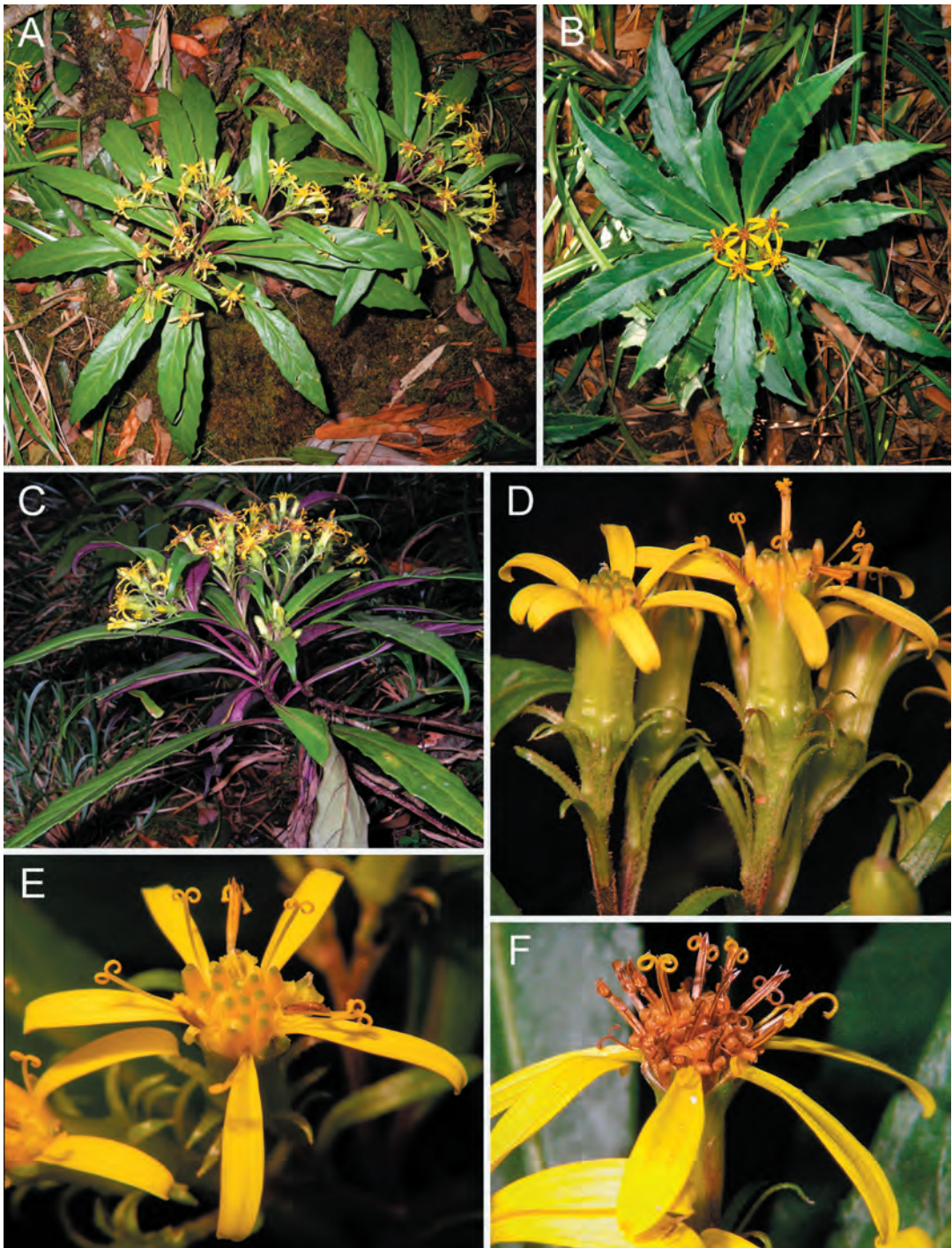


Figure 3. *Synotis austroyunnanensis*: A, B – habit; C – shoot with inflorescence, lateral view; D – heads, lateral view; E – head at early flowering, view from above; F – head at late flowering, lateral view. *Nuraliev 176* (A, C–E) and *Nuraliev NUR 225a* (B, F). Photos by M. Nuraliev.

of Golden stream, N 22°20'40" E 103°46'30", 1950 m, 04 December 2009, *M.S. Nuraliev 176* [MW: MW0748929]; Lao Cai province, Sa Pa district, San Sa Ho municipality, Hoang Lien National Park, Fan Si Pan mt. area, trail to Fan Si Pan summit, moist crooked forest, N 22°19'10"

E 103°46'10", 2600 m, 21 November 2010, *M.S. Nuraliev NUR 225a* [photo LE: LE01073565]; Lao Cai province, Fan Si Pan, understorey of 6 m high forest, 2800 m, 26 September 2004, *A. De Rouw 456* [E: E00544011]; [Ha Giang province,] Vi Xuyen district, Tay Con Linh mountain, Xan Xa Ho Village, Lao Commune, N 22°48'32" E 104°48'17", 10 November 2014, *Hanoi, UBC, Logan, Longwood & Kew Exped. to Vietnam 342* [E: E00791517, specimen not seen].

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