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The identity of *Cremanthodium citriflorum* (Asteraceae, Senecioneae)

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Abstract

Our critical observations of herbarium specimens (including type material) and living plants demonstrate that *Cremanthodium citriflorum* is identical to *C. delavayi* and that the holotype sheet of *C. farreri* is a mixture of *C. delavayi* and *C. farreri*. We therefore place *C. citriflorum* in synonymy with *C. delavayi*. We recognize *C. farreri* as an independent species and designate a lectotype for it. In addition, a lectotype is designated for *C. delavayi*, a species described on the basis of several syntypes.

Key words: Compositae, lectotypification, northeastern Myanmar, northwestern Yunnan, taxonomy

Introduction

Cremanthodium citriflorum Good (1929: 277) (Asteraceae, Senecioneae) was described on the basis of a single gathering, *R. Farrer 1179* (E; Fig. 1), from the Chimili Pass (not the Chawchi Pass as stated in the protologue) in the bordering area between northwestern Yunnan, China and northeastern Myanmar. In the protologue, the author suspected the specimen to be a mixture, with the basal leaves being exactly those of *C. farreri* Smith (1920: 202), while the flowers closely resembling those of *C. delavayi* (Franchet 1892: 286) Diels ex Léveillé (1916: 43). He thus did not describe the basal leaves associated with the specimen as belonging to the flowers. He described the cauline leaves as being reniform, glabrous, dentate or reduced to vaginae only. Since its description, *C. citriflorum* has been only known from the type specimen (a few collections referred to it turn out to be misidentifications; see below), although it has been recognized as an independent species by all later authors, including Hu (1966), Koyama (1968), Wu (1984), Liu (1989), Kress *et al.* (2003), Min (2004), and Liu & Illarionova (2011). In his account of the genus *Cremanthodium* Bentham (1873: 37) in the *Flora Reipublicae Popularis Sinicae*, Liu (1989) argued that although *C. citriflorum* was described on the basis of an incomplete specimen, the shape of phyllaries and of ray florets seemed to be quite particular, and thus it deserved recognition as an independent species. He pointed out further that *C. citriflorum* was close to *C. farreri*, but differed by the glabrous leaves, yellow ray florets with oblong-lanceolate, apically caudate-acuminate laminae, and brown pappus. It is evident that Liu (1989) did not see the type material of *C. citriflorum*, basing his concept of *C. citriflorum* on the protologue and a misidentified specimen of *C. delavayi* kept in IBSC (see below). Min (2004) and Liu & Illarionova (2011) also should not have examined the type material of *C. citriflorum*, just following Liu (1989) in their understanding of *C. citriflorum*.

Our critical observations of herbarium specimens (including type material) and living plants demonstrate that *Cremanthodium citriflorum* is identical to *C. delavayi* and that the holotype sheet of *C. farreri* is a mixture of *C. delavayi* and *C. farreri*. We therefore place *C. citriflorum* in synonymy with *C. delavayi*. We recognize *C. farreri* as an independent species and designate a lectotype for it. In addition, a lectotype is designated for *C. delavayi*, a species described on the basis of several syntypes.

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FIGURE 1. Holotype sheet of *Cremanthodium citriflorum* (only the plants with capitula).

FIGURE 2. Specimens of *Cremanthodium farreri*. **A**. Bordering area between northwestern Yunnan, China and northeastern Myanmar, Chimili Pass, *R. Farrer 1178* (E, lectotype, only the lower plant with a capitulum). **B**. Same locality, *R. Farrer 1178* (E, isolectotype). **C**. Myanmar, Kachin, N'Maikha-Salwin divide, western flank of the Chimili Pass, *G. Forrest 24883* (E). **D**. Same locality, *G. Forrest 26837* (E).

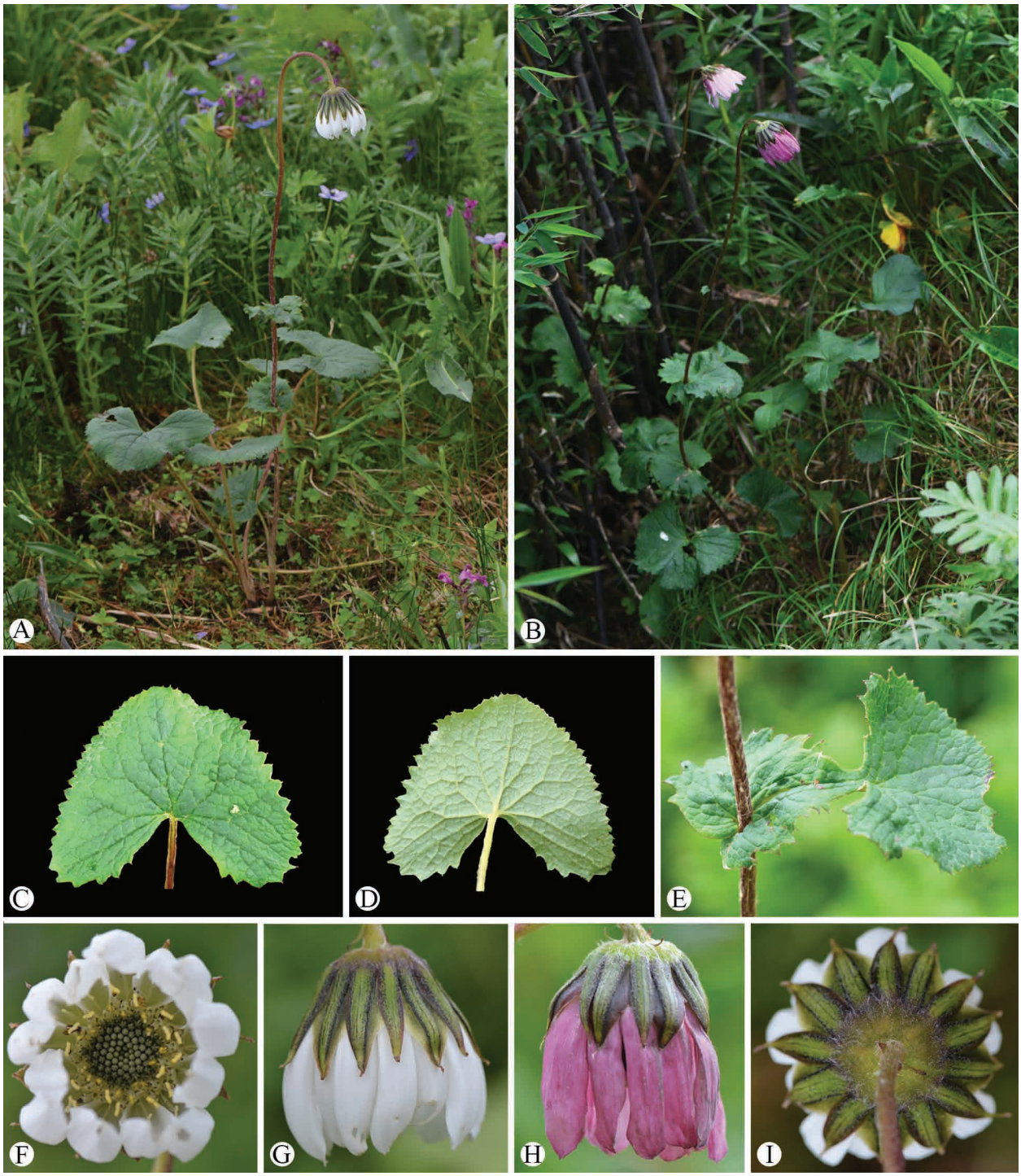

FIGURE 3. *Cremanthodium farreri* in the wild (China, Yunnan, Fugong). **A**, **B**. Habit and habitat. **C**. Basal leaf (adaxial surface). **D**. Basal leaf (abaxial surface). **E**. Portion of stem, showing the cauline pubescence (arachnoid hairs) and a cauline leaf. **F**. Capitulum (top view). **G**. Capitulum (side view). **H**. Capitulum (side view). **I**. Capitilum (back view).

Material and methods

For morphological comparisons, we critically examined herbarium specimens or high-resolution images of specimens in A, CAS, E, HIB, HITBC, IBSC, K, KUN, NAS, P, PE, SYSU, and SZ. We also conducted field observations in northwestern Yunnan, China.

FIGURE 4. Specimens of *Cremanthodium delavayi*. **A**. China, Yunnan, Dali, *J.M. Delavay 52* (P, lectotype). **B**. Same locality, *J.M. Delavay 52* (P, isolectotype). **C**. Myanmar, Kachin, N'Maikha-Salwin divide, western flank of the Chimili Pass, *G. Forrest 24884* (E). **D**. Same locality, *G. Forrest 24884* (P).

Results and discussion

The three basal leaves of the right-hand plant mounted on the holotype sheet of *Cremanthodium citriflorum* (Fig. 1) are undoubtedly those of *C. farreri* (Figs. 2, 3), as pointed out by Good (1929) in the protologue. The leaves are long petiolate, the blades are reniform, and the petioles and the abaxial surface of the blades are all more or less white arachnoid. The remaining four plants (Fig. 1) all belong to *C. delavayi* (Figs. 4, 5, 7). The basal leaves are petiolate, the blades are broadly triangular or ovate-triangular, pinnately veined, and the petioles and the two surfaces of the blades are all glabrous. The cauline leaves are smaller, ovate-triangular or ovate-lanceolate. The capitula are hemispheric, with the ray laminae being yellow, linear-lanceolate, up to 4.5 cm long, apex caudate-acuminate, 3-lobed.

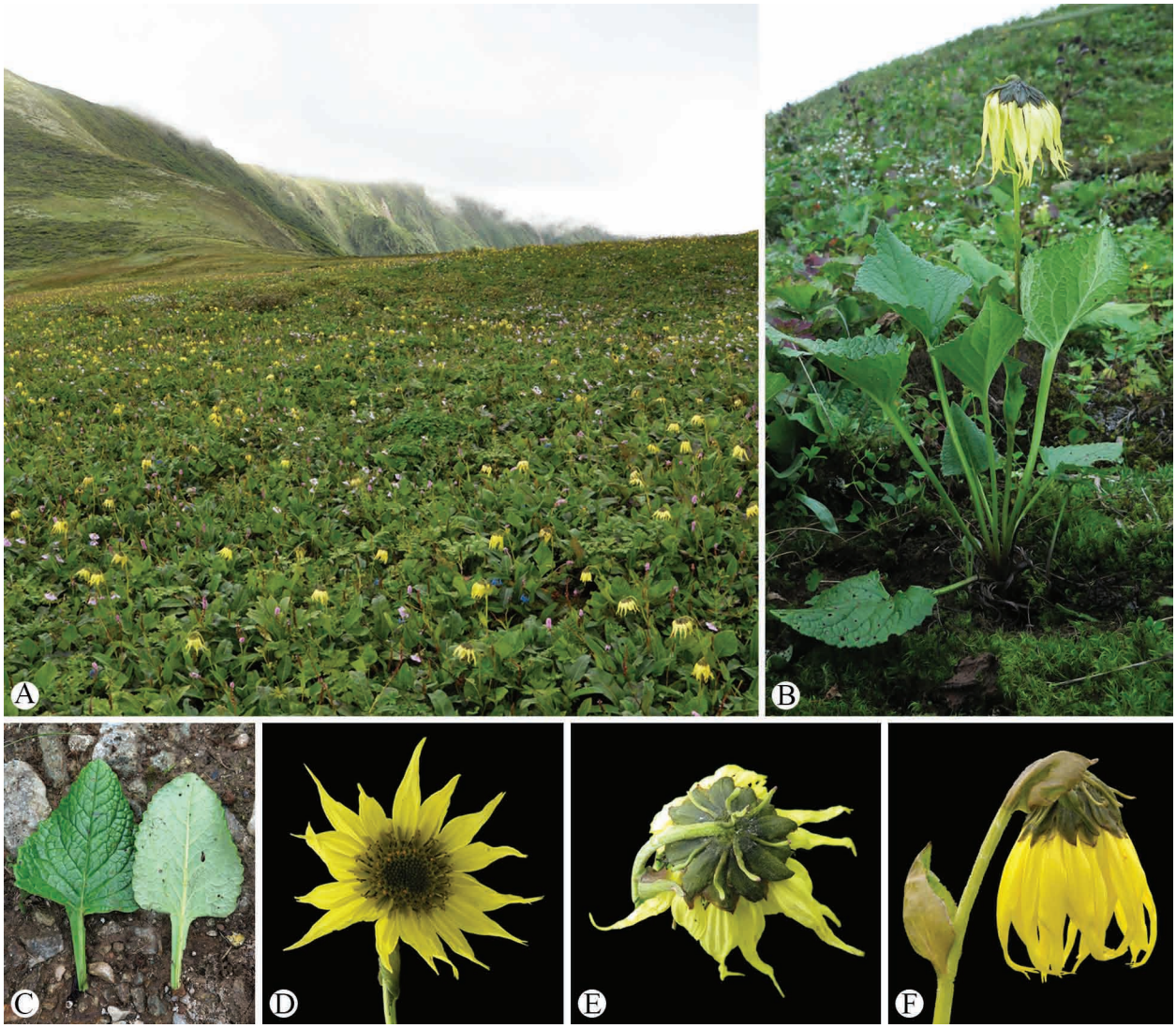

FIGURE 5. *Cremanthodium delavayi* in the wild (China, Yunnan, Lanping). **A**. Habitat. **B**. Habit. **C**. Basal leaves (left, adaxial surface; right, abaxial surface). **D**. Capitulum (top view). **E**. Capitulum (back view). **F**. Capitulum (side view).

Our examination of herbarium specimens and our field work in northwestern Yunnan indicate that both *C. delavayi* and *C. farreri* occur in the bordering area between northwestern Yunnan, China and northeastern Myanmar, including the Chimili Pass, the type locality of both *C. citriflorum* and *C. farreri*. Some of the specimens of *C. farreri* and *C. delavayi* collected from the Chimili Pass are shown in Fig. 2 (including two type sheets and two other specimens) and Fig. 4C, D, respectively. Moreover, the type material of *C. citriflorum* and of *C. farreri* was collected from the same locality almost at the same elevation on the same day. It is understandable that plants of *C. delavayi* and *C. farreri* were mutually confused and collected together as the same gathering. In fact, the holotype sheet of *C. farreri* (Fig. 2A) is obviously also a mixture, with the four basal leaves of the upper plant on the holotype sheet being those of *C. delavayi*, while the lower plant with a capitulum belonging to *C. farreri*. A perusal of the protologue of *C. farreri* indicates that the description of the basal leaves was made mainly on the basis of the four basal leaves of *C. delavayi*.

FIGURE 6. Specimens of *Cremanthodium decaisnei* (previously misidentified as *C. citriflorum*). **A**. China, Yunnan, Zhongdian, *K.M. Feng 1633* (KUN). **B**. Same locality, *K.M. Feng 1633* (PE). **C**. Same locality, *T.T. Yu 12249* (KUN). **D**. Same locality, *T.T. Yu 12249* (PE).

In addition to the type specimen, i.e. *R. Farrer 1179*, Hu (1966) cited under *C. citriflorum* another two collections, *K.M. Feng 1633* (A, KUN, PE; Fig. 6A, B) and *T.T. Yu 12249* (A, KUN, PE; Fig. 6C, D), both from Zhongdian, northwestern Yunnan, China. This was followed by Wu (1984). We agree with Chen & Li (1994) that these two collections should be referred to *C. decaisnei* Clarke (1876: 168). A depauperate specimen, *H.T. Tsai 58068* (Fig. 7A) kept in IBSC and identified as *C. citriflorum* by S.W. Liu, the author and the first co-author of the accounts of *Cremanthodium* in both the *Flora Reipublicae Popularis Sinicae* and the *Flora of China* respectively, actually belongs to *C. delavayi*. This is clearly indicated by the three relatively better preserved duplicates of this gathering in KUN, NAS and PE (Fig. 7B; only the PE sheet is shown). The line illustration of *C. citriflorum* in the *Flora Reipublicae Popularis Sinicae*, mainly showing a capitulum and a basal leaf, was undoubtedly executed from the sheet of *H.T. Tsai 58068* kept in IBSC just mentioned above.

FIGURE 7. Specimens of *Cremanthodium delavayi*. **A**. China, Yunnan, Fugong, *H.T. Tsai 58068* (IBSC, previously misidentified as *C. citriflorum*). **B**. Same locality, *H.T. Tsai 58068* (PE).

It is worth noting that *Cremanthodium farreri* is variable in the color of ray florets within and between populations. In the protologue, Smith (1920) described this species as having white florets, while Good (1929) described the florets to be white becoming purple, and yet Liu (1989), Min (2004), and Liu & Illarionova (2011) described them to be purplish red. As pointed out by Good (1929), the record of the ray florets of the collection *G. Forrest 26911* (E, PE) as yellow on the field label must be an error. Our observations in the field demonstrate that the ray florets are white, pinkish, or purplish (Fig. 3).

Taxonomic treatment

Cremanthodium delavayi (Franchet 1892: 286) Diels ex Léveillé (1916: 43). *Senecio delavayi* Franchet (1892: 286). Figs. 4, 5, 7

Type:—CHINA. Yunnan: Tali (= Dali), Cang Shan (= Tsang-chan), 4 August 1884, *J.M. Delavay 52* (P! [P00836366], lectotype designated here; isolectotypes K!, KUN!, P!). Fig. 4A, B.

= *Cremanthodium citriflorum* Good (1929: 277), **syn**. **nov**.

Type:—Bordering area between northwestern Yunnan, China and northeastern Myanmar. Chimili Pass, 12500 feet (= 3810 m), 1 August 1919, *R. Farrer 1179* (holotype E!, only the plants with capitula). Fig. 1.

For a full description of this species see Franchet (1892), Good (1929), Liu (1989), Min (2004), and Liu & Illarionova (2011).

Distribution and Habitat:—*Cremanthodium delavayi* is distributed in northwestern Yunnan (Dali, Fugong, Lanping), China, and also in northeastern Myanmar (Fig. 8). It grows in alpine meadows or on grassy slopes at elevations of 3350−4200 m above sea level.

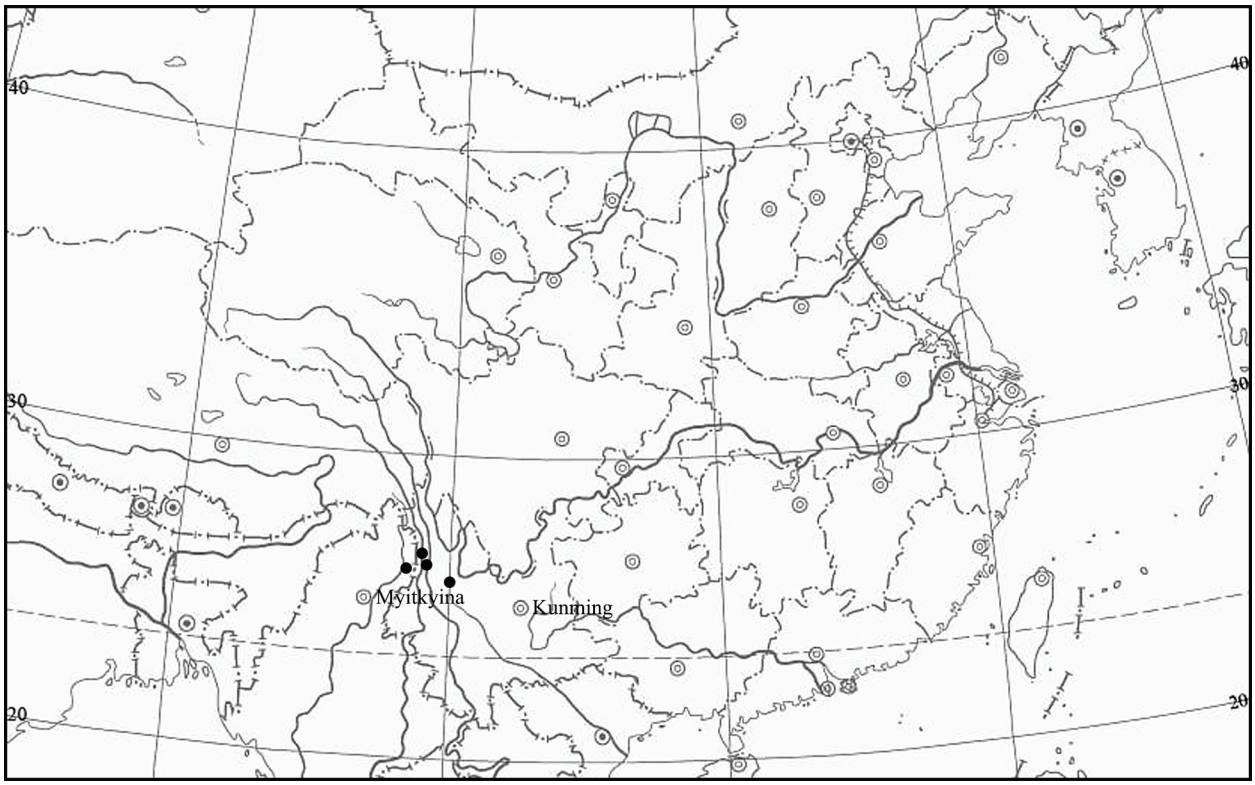

FIGURE 8. Distribution of *Cremanthodum delavayi* (●).

Phenology:—Flowering July to August; fruiting September.

Additional specimens examined:—CHINA. Yunnan: Dali, *J.M. Delavay s.n.* (K, P), *G. Forrest 4049* (E), *McLaren's Collector 224* (E), *H.C. Wang 987* (IBSC, KUN, PE), *K.J. Zheng 614278* (KUN); Fugong, *H.T. Tsai 58068* (IBSC, KUN, NAS, PE), *L. Wang & Y.P. Zeng 926* (IBSC), *S.K. Wu 8760* (HIB, KUN); Lanping, *M. Tang et al. 1297* (IBSC), *H.T. Tsai 58001* (IBSC, KUN, NAS, PE, SZ); Precise locality unknown, *Anonymous 6320* (KUN), *Anonymous 20584* (PE), *G. Forrest 29885* (E, PE).

MYANMAR. Kachin: N'Maikha-Salwin divide, *G. Forrest 24884* (E, P), *G. Forrest 26983* (E, IBSC, P), *G. Forrest 27309* (E).

Cremanthodium farreri Smith (1920: 202). Figs. 2, 3

Type:—Bordering area between northwestern Yunnan, China and northeastern Myanmar. Chimili Pass, 12500−13000 feet (= 3810−3962 m), 1 August 1919, *R. Farrer 1178* (E!, only the lower plant with a capitulum, lectotype designated here; isolectotype E!). Fig. 2A, B.

For a full description of this species see Smith (1920) (excluding the description of the shape of basal leaves), Good (1929), Liu (1989), Min (2004), and Liu & Illarionova (2011).

Distribution and Habitat:—*Cremanthodium farreri* is distributed in northwestern Yunnan (Fugong, Gongshan, Lushui), China, and also in northeastern Myanmar (Fig. 9). It grows in alpine meadows or on grassy slopes at elevations of 3350−4400 m above sea level.

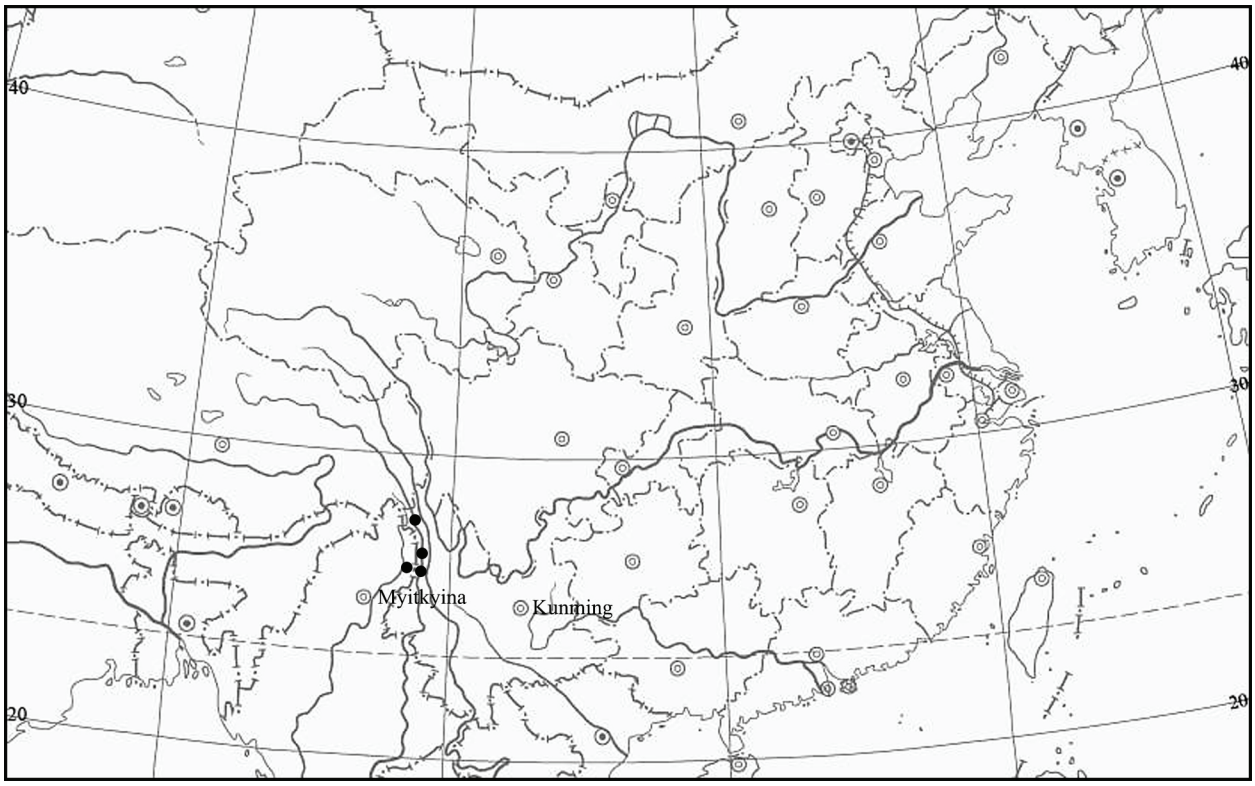

FIGURE 9. Distribution of *Cremanthodium farreri* (●).

Phenology:—Flowering July to August; fruiting September.

Additional specimens examined:—CHINA. Yunnan: Fugong, *Anonymous 80147* (HITBC), *Bijiang Exped. 1117* (KUN), *Gaoligong Shan Biodiversity Survey 26420* (CAS, PE), *Nujiang Exped. 0832* (KUN), *H.T. Tsai 58024* (IBSC, KUN, NAS, PE, SZ), *H.T. Tsai 58025* (IBSC, KUN, PE, SZ), *H.T. Tsai* 58285 (IBSC, KUN, PE, PE), *H.T. Tsai* 58597 (IBSC, KUN, PE, SZ), *S.K. Wu* 8803 (IBSC, KUN); Gongshan, *R. Farrer 1875* (E), *G. Forrest 23068* (E, IBSC, SYSU); Lushui, *Anonymous s.n.* (HITBC), *Bijiang Exped. 1781* (KUN); Irrawady-Salwin divide, *J.F. Rock 21967* (E, KUN); Salwin-Mekong divide, *G. Forrest 22829* (E, P).

MYANMAR. Kachin: N'Maikha-Salwin divide, *G. Forrest 24569* (E, P), *G. Forrest 24837* (E), *G. Forrest 24883* (E, IBSC, P), *G. Forrest 24924* (E), *G. Forrest 26911* (E, PE), *G. Forrest 26941* (E), *G. Forrest 26970* (E, IBSC, P, PE), *G. Forrest 27008* (E, PE), *G. Forrest 27257* (E), *G. Forrest 27259* (E), *G. Forrest 27260* (E), *G. Forrest 27302* (E), *F. Kingdon-Ward 3409* (E).

Note:—Good (1929) mentioned that three *Forrest* collections, *20228* (E, P, PE), *22820* (E), *22828* (E), were possibly all old specimens of *Cremanthodium farreri*, but could not be determined accurately. The three gatherings were all made from Gongshan, northwestern Yunnan, China, and actually belong to *C. phyllodineum* Liu (1984: 60). The specimen *Forrest 20228* (PE) was cited by Liu (1984) as one of the paratypes of this species.

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