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Camchaya bolavenensis (Asteraceae: Vernonieae), a new species from Bolaven Plateau, southern Laos

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Abstract

A new species *Camchaya bolavenensis* (Asteraceae: Vernonieae: Centrapalinae) from Dong Hua Sao National Protected Area located in Bolaven Plateau, southern Laos, is described and illustrated. It resembles *C. gracilis* and *C. thailandica* in morphology but distinguished by its basally decumbent stem, margin of lamina with distinct (1–)2–3 teeth, 2–4 mm long on each side, invisible secondary veins, and a capitulum with 10–30 of florets.

Keywords: Asterales, Compositae, Dong Hua Sao NPA, flora of Laos, Indochina, taxonomy

Introduction

The genus *Camchaya* Gagnepain (1920: 14) (Asteraceae: Vernonieae), with about 10 species, is a well-supported genus within the subtribe Centrapalinae Robinson (1999: 223). The genus is characterized by its leafy stems, pappus arranged in one series and deciduous (or rarely lacking in some species), non-reflexed phyllaries, absence of carpopodium, and echinolophate hexaporate pollen (Bunwong *et al*. 2014). It is closely related to *Koyamasia* Robinson (1999: 234) within the Centrapalinae, but distinguished by its obovate achenes, not reflexed phyllaries, and hexaporate pollen (vs. achenes oblong, reflexed phyllaries, 3-porate pollen in *Koyamasia*) (Bunwong *et al*. 2014). All species are distributed mainly in Southeast Asia and extending to China (Chen & Gilbert 2011, Bunwong *et al*. 2014), and mainly found in forest floor or rocky area of dipterocarp forest in Indochina (Bunwong *et al*. 2014). In Laos, two species with two varieties, *C. glacilis* Bunwong *et al*. (2009: 357) and *C. loloana* Kerr (1935: 327) var. *lobana* and var. *mukdahanensis* Koyama (1984: 35) have been recorded (Bunwong *et al*. 2014, Newman *et al.* 2017 onwards).

During the floristic surveys led by the third and fourth authors in Bolaven Plateau in 2018–2019, we collected an unknown species of Asteraceae. It was identified as a member of *Camchaya* in the point that its leafy stems, non-reflexed phyllaries, absence of carpopodium, pappus lacking and echinolophate hexaporate pollen. More detailed research based on reference of herbarium specimens and taxonomic reports of closely related species showed that this species is morphologically distinct from the other *Camchaya* species reported in past. Here we describe and illustrate it as a new species, *Camchaya bolavenensis* Noyori, Komada, Soulad. & Tagane, with its vernacular name, ecological information and preliminary conservation assessment.

Materials and methods

Morphological observations

Digital images of specimens stored at herbaria BKF, K, L, P and US were download and examined from JSTOR Global Plants (https://plants.jstor.org/) and their original website. In addition to examination of specimens, taxonomic

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reports (Gagnepain 1920, Kerr 1935, Koyama 1984, Robinson 1999, Bunwong *et al.* 2009, 2012, 2014) were read and compared. The measurements are based on the herbarium specimens which we collected in our field surveys. Pollen grains from dried herbarium specimens were examined and photomicrographed by direct observation with SEM (Hitachi, Miniscope TM3000; Kagoshima University).

Taxonomic treatment

Camchaya bolavenensis Noyori, Komada, Soulad. & Tagane, ***sp. nov.*** Figs 1–3.

Diagnosis:—*Camchaya bolavenensis* is morphologically similar to *C. thailandica* Bunwong *et al*. (2012: 53) of Thailand and *C. gracilis* of Thailand and Laos in the point that all of them have terminal and axillary capitulescences and phyllaries without marginal spines. However, *C. bolavenensis* is distinguished from these two by its basally decumbent stem (vs. entirely erect), margin of lamina with distinct (1–)2–3 teeth which is 2–4 mm long (vs. entire or serrate with 5–10 teeth less than 1 mm long), invisible secondary veins (vs. prominent and clearly visible abaxially), and 10–30 florets per capitulescence (vs. 50–70 florets).

Type:—LAOS. Champasak Province, Paksong District, near Nong Luang Village, Dong Hua Sao National Protected Area (Bolaven Plateau), 15°03′43.35″N, 106°12′37.47″E, 1252 m elev., 17 Dec. 2019, *Souladeth P., Tagane S., Kongxaysavath D., Rueangruea S., Suddee S., Suyama Y., Suzuki E. L3349* (holotype FOF [FOF0005197!], isotypes BKF, KAG [KAG155714!]).

Herbs, probably perennial, up to 50 cm tall. **Stem** decumbent at lower part, erect in middle and upper part, terete, inconspicuously ribbed, sparsely covered with short filiform hairs and glands, 1–2 mm in diam. **Leaves** alternate, sessile; blades narrowly obovate to linear, 3.5–6.2 × 0.4–1 cm, apex acuminate, base cuneate to attenuate, margin serrate with (1–)2–3 teeth, 2–4 mm long on each side, chartaceous, gray-green adaxially, pale greenish gray abaxially, glabrous on both surfaces except a few filiform hairs on margin near lamina base, very sparsely covered with capitate glands on both surfaces, midrib slightly prominent abaxially, secondary and tertiary veins invisible. **Capitulescences** terminal and axillary, solitary or corymbose. **Capitula** pedunculate, 1.3–1.5 cm long in anthesis, involucres campanulate, 3–5 mm in diam. **Receptacle** convex, ca. 4 mm in diam, glabrous, with sessile glands. **Phyllaries** 3–4 seriate, imbricate, dull gray-green with reddish purple apices, glabrous adaxially, very sparsely hairy, glandular abaxially, margins entire, sparsely ciliolate, apex acuminate, the outer phyllaries ovate-lanceolate, 6 × 2.2 mm, the middle ones ovate-elliptic, 7.5–7.8 × 3–3.2 mm, the inner ones lanceolate, 8–9 × 1.5–2 mm long. **Florets** 10–30; corollas infundibular, purple, sparsely hairy, tubes 4–6 mm long, whitish, lobes 5, 3–4 mm long, apex obtuse to slightly capitate with dense glands. **Stamens** 5, ca. 6 mm long, anthers linear, 1.7–2 mm long, apex acute, base sagittate, apical appendage ovate, ca. 0.4 mm long, filaments ca. 4.6 mm long, glabrous, connate to corolla near the corolla mouth, free part 1–1.1 mm long. **Styles** linear, 8–9 mm long, purple, pubescent, stigmas 2-branched, branches 2–2.5 mm long, ovary elliptic, 1.1–1.2 × 0.3–0.4 mm, without carpopodium. **Achenes** obovate-turbinate, ca. 2.2 mm long, 10-ribbed. **Pappus** absent. **Pollen** echinolophate, 6-porate, without micropuncta.

Etymology:—The specific epithet *bolavenensis* refers to the type locality, Bolaven Plateau.

Distribution:—Laos (Champassak Province, Bolaven Plateau).

Additional specimens examined:—LAOS. Champasak Province, Paksong District, near Nong Luang Village, Dong Hua Sao National Protected Area (Bolaven Plateau), 15°04′19.26″N, 106°12′38.67″E, 1248 m elev., 10 Dec. 2018, *Tagane S., Nagahama A., Souladeth P., Pisuttimarn P. L2011* (FOF, KAG [KAG128113], KYO); ibid., 15°04′14.58″N, 106°12′33.72″E, 1246 m elev., 17 Dec. 2019, *Souladeth P., Tagane S., Kongxaysavath D., Rueangruea S., Suddee S., Suyama Y., Suzuki E. L3321* (BKF, FOF, KAG [KAG155686]).

Habitat and ecology:—*Camchaya bolavenensis* grows on wet thin soil over large and exposed sandstone boulders, where it grows with sphagnum moss (*Sphagnum* sp.), *Canscora andrographioides* Griff. ex Clarke (1875: 431), *Eriocaulon cormosum* Souladeth *et al.* (2020: 2), *Eriocaulon* sp. and some species of Poaceae. Flowering specimens were collected in December.

Vernacular name:—Mouk Nong Luang (ມຸ໋ກຫນອງຫລວງ), suggested here.

Preliminary conservation status:—Critically Endangered (CR). *Camchaya bolavenensis* is known only from the two populations on the plateau of Bolaven, which located within the protected area of the Dong Hua Sao National Protected Area. We observed each population less than 100 flowering stalks and they are possibly consisted of a few genets. The extent of occurrence (EOO) regarded as open rocky grassland on the plateau is less than 500 km² and the area of occupancy (AOO) for this species is 4 km² (using 2 km cell width). Considering these information as well as

FIGURE 1. Holotype of *Camchaya bolavenensis* Noyori, Komada, Soulad. & Tagane (*Souladeth et al. L3349*, FOF0005197).

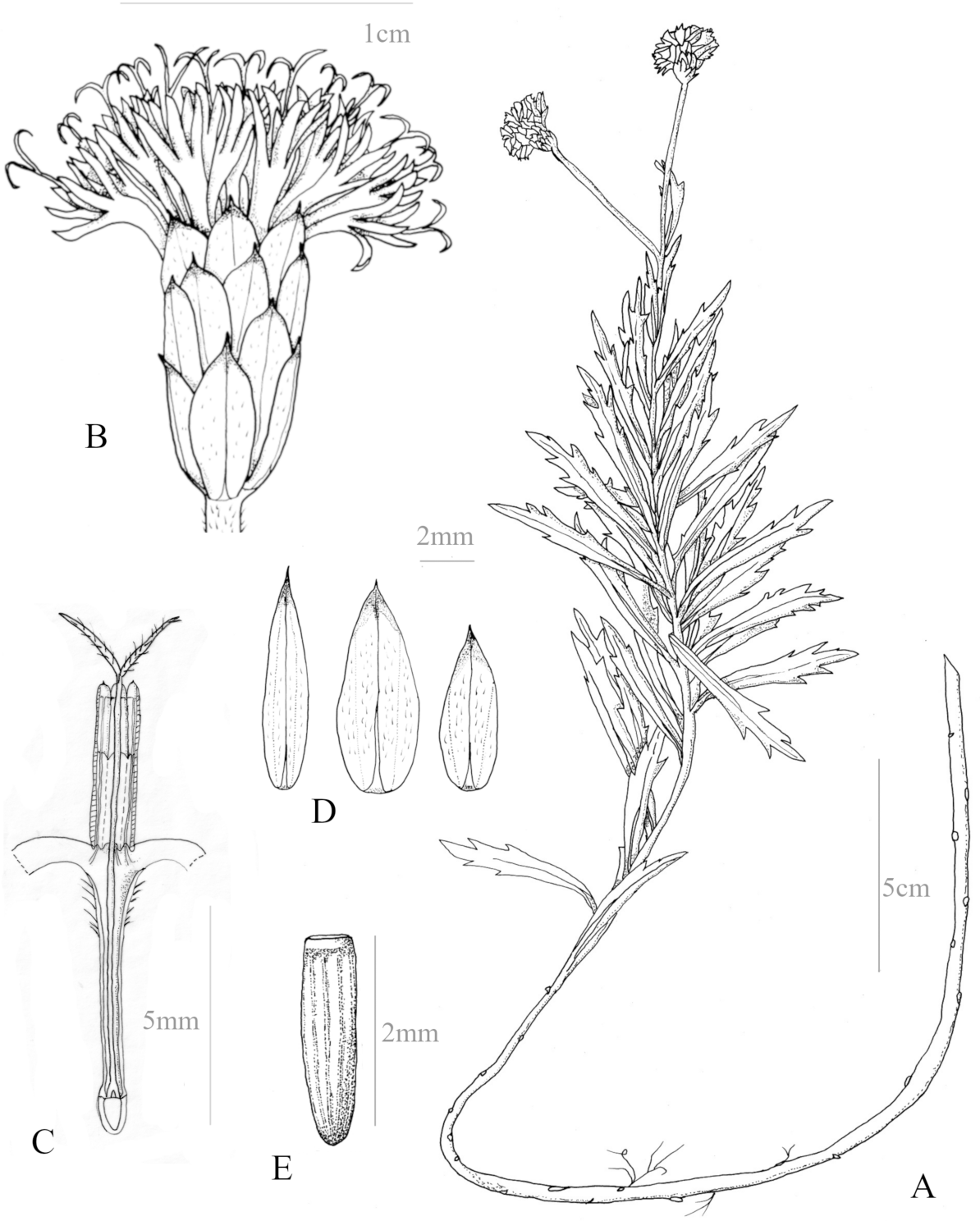

FIGURE 2. *Camchaya bolavenensis* Noyori, Komada, Soulad. & Tagane. A. Flowering plant; B. Capitula; C. Long section of floret, lateral view; D. Phyllaries, inner (left), middle (middle) and outer (right); E. Achene. Materials all from *Tagane et al. L2011* (KYO).

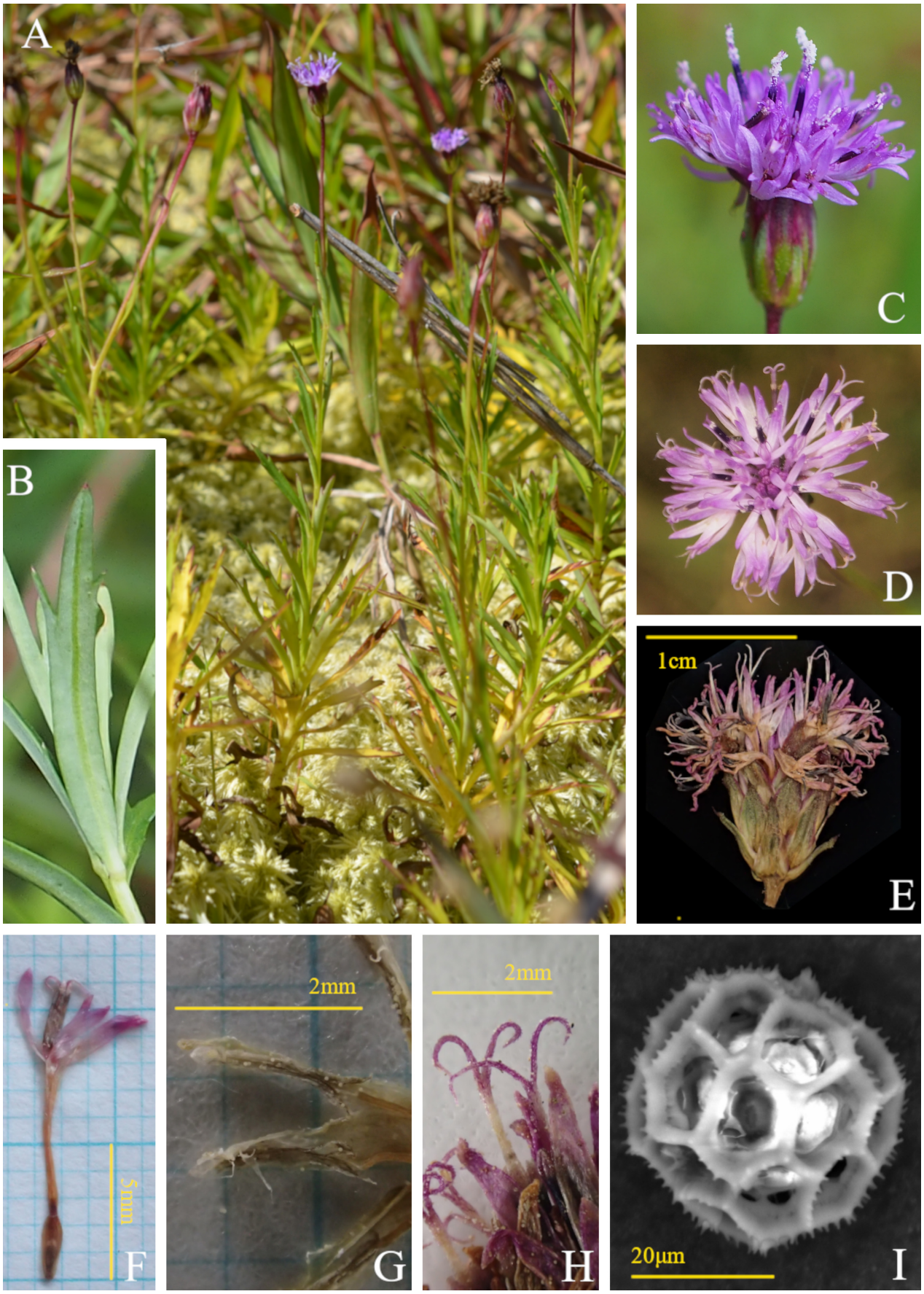

FIGURE 3. *Camchaya bolavenensis* Noyori, Komada, Soulad. & Tagane. A. Habit; B. Lower leaf surface; C. Capitula, lateral view; D. Capitula, apical view; E. Capitula; F. Floret; G. Anthers; H. Styles and stigmas; I. Hexaporate pollen. Materials A–E & G–H from *Souladeth et al. L3349* (KAG), F from *Tagane et al. L2011* (KYO) and I from *Tagane et al. L2011* (KAG).

the area is popular with tourists, which might increase disturbance in the area and which could affect the survival of this species, and the vicinities are heavily affected by habitat loss due to land conversion to agriculture, mining and dams (Delang *et al*. 2013), a preliminary conservation status can be assessed as Critically Endangered according to the IUCN criteria 2ab(iii) (IUCN Standards and Petitions Committee 2019).

Notes:—In addition to *Camchaya gracilis*, *C. bolavenensis* is different from *C. loloana*, another species of the genus distributed in Laos, in having basally decumbent stem (vs. erect in *C. loloana*), glabrous leaves (vs. covered with whip-shaped hairs), and entire phyllaries (vs. with spines).

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