



## Discovery through citizen science II: *Cryptocoryne vinzelii* (Araceae), a new species of water trumpet from Basilan Island, Philippines

Mark Arcebal K. NAIVE<sup>1,2,3,\*</sup>, Alvin B. DUHAYLUNGSOD<sup>4</sup>, Niels JACOBSEN<sup>5</sup>

1. Jose Rizal Memorial State University, Tampilisan Campus, Znac, Tampilisan 7116, Zamboanga del Norte, Philippines. 2. Center for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Mengla, Yunnan 666303, China. 3. University of Chinese Academy of Sciences, Beijing 100049, China. 4. Malamawi National High School, Santa Barbara, Malamawi, Isabela City 7300, Basilan, Philippines. 5. Section of Organismal Biology, Dept. of Plant and Environmental Sciences, University of Copenhagen, Thorvaldsensvej 40, DK-1871 Frederiksberg C, Denmark. \*Corresponding author's emails: arciinaive19@gmail.com/mark@xtbg.ac.cn

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**ABSTRACT:** A new Sulu Archipelago endemic species, *Cryptocoryne vinzelii*, is herein described and illustrated discovered by a citizen scientist in the island of Basilan. A detailed description, colour plates, phenology, distribution and a provisional conservation status are presented. With the recent discovery of a new species, the biodiversity of the Philippines has expanded, revealing a total of 10 distinct *Cryptocoryne* taxa, of which nine are known to be endemic. This new finding underscores the country's remarkable ecological richness and highlights the importance of citizen science in preserving and studying its unique flora.

**KEY WORDS:** Aroid, critically endangered, *Cryptocoryne palawanensis*, *Cryptocoryne pygmaea*, Sulu Archipelago, BARMM.

### INTRODUCTION

As part of our ongoing work on the systematics and conservation of the genus *Cryptocoryne* (Araceae) in the Philippines, a citizen scientist (second author) discovered an unknown species on the island of Basilan, Bangsamoro Autonomous Region of Muslim Mindanao (BARMM). A living specimen was later sent to the first author for further investigation. After a careful study of its morphology and relevant literature, as well as a comparison of available digitized type specimens from the Philippines and neighboring countries, it became evident that the collected specimen did not match any other known *Cryptocoryne* species. Therefore, we describe it here as *Cryptocoryne vinzelii* sp. nov. - the 10th representative of the genus *Cryptocoryne* in the Philippines. This paper is the second in a series aiming to revise and document the true diversity of *Cryptocoryne* species in the Philippines through the help of citizen science across the archipelago (Naive *et al.*, 2022a).

### MATERIALS AND METHODS

Prior to our botanical excursion in the forest patches of Basilan Island, an approved gratuitous permit was obtained from the Ministry of Environment, Resources and Energy (MENRE). Botanical surveys were conducted in February to April 2023. The measurements and descriptions were based on freshly collected material, unless otherwise indicated. Multiple photographs and colored plates were prepared and edited using Affinity Photo software. Flowers were preserved in 70% ethanol and were subjected to stereomicroscopy. The general

plant descriptive terminology follows Beentje (2016), while herbarium citations follow Index Herbariorum (Thiers, 2023). We examined relevant specimens and literature of *Cryptocoryne* species from the Philippines and neighboring countries in different herbaria through high-resolution images from Global Plants on JSTOR (2023) accessed at <https://plants.jstor.org/> and Global Biodiversity Information Facility (GBIF) accessed at <https://www.gbif.org>. An assessment of conservation status was carried out following IUCN (2022), based on our current knowledge and using their terminology on categories, criteria, and subcriteria.

### TAXONOMIC TREATMENT

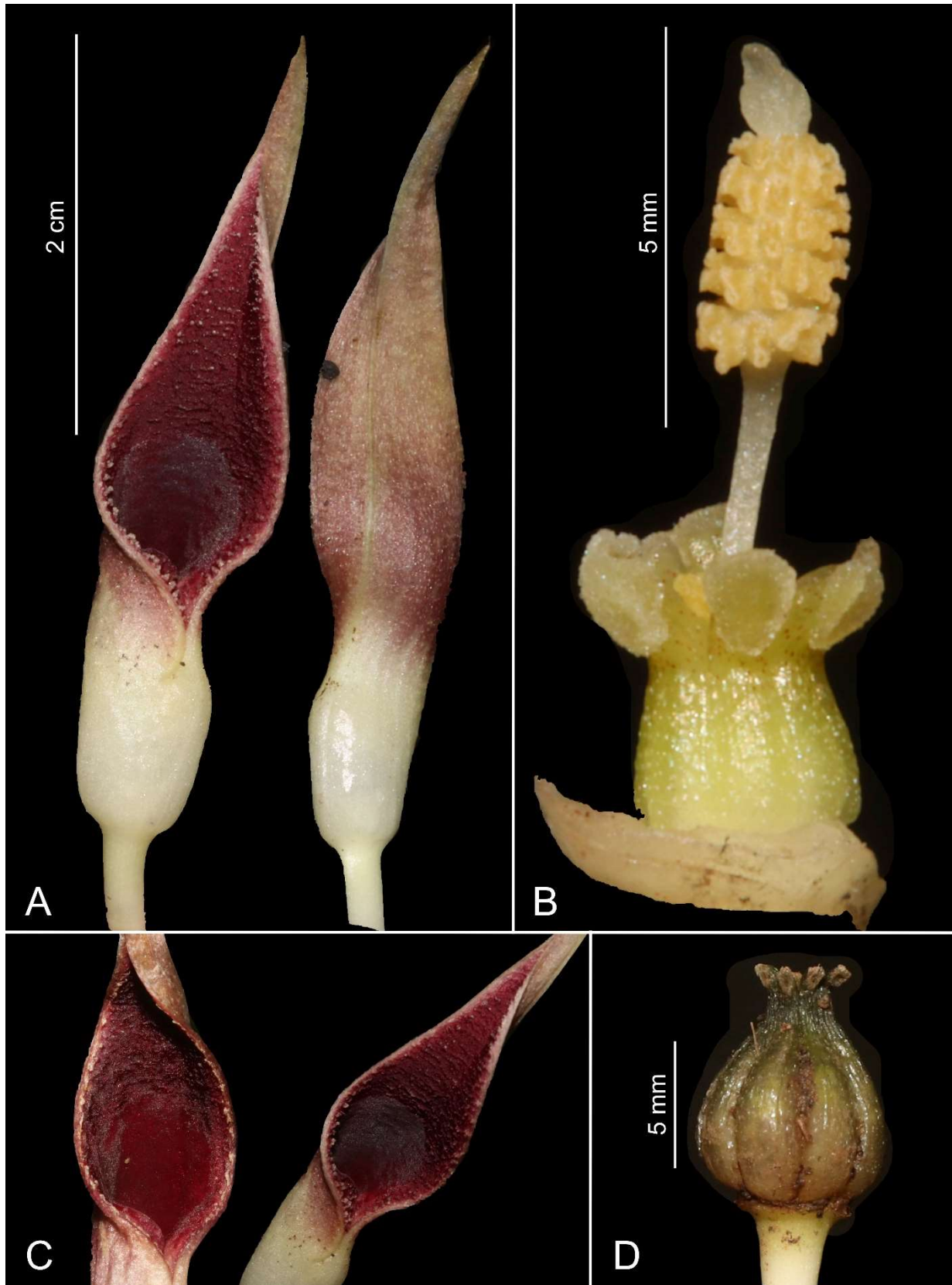
*Cryptocoryne vinzelii* Naive, *sp. nov.*

**Figs. 1–2**

**Type:** PHILIPPINES. Mindanao, Sulu Archipelago, Basilan, elev. ca. 100 m a.s.l., 12<sup>th</sup> February 2023, *A.B. Duhaylungsod & MAK Naive 137* (holotype PNH, isotype HNUL).

**Diagnosis:** This new species resembles *Cryptocoryne palawanensis* Bastmeijer, N.Jacobsen & Naive (Naive *et al.*, 2022b) but differs significantly in having these following characters: smaller, broader, robust leaves; 4–7 mm long peduncle; erect, wide opened, upright limb; and up to 40 male flowers.

**Description:** Amphibious, perennial herb, up to 11 cm tall. *Rhizome* terete, 4.0–5.5 mm in diameter; *roots* numerous, 1.5–2.0 mm in diameter. *Cataphylls* narrowly triangular, 3.5–4.0 cm long by 8–9 mm wide, striate, glabrous, brownish, corrugated, margin entire, cucullate, apex long acuminate, arcuate. *Leaves* up to 10 per



**Fig. 1.** *Cryptocoryne vinzelii* Naive **A.** Spathe **B.** Spadix **C.** Detail of limb **D.** Infructescence. Photos from A.B. *Duhaylungsod* & *MAK Naive 137* prepared by: *MAK Naive*.



**Fig. 2.** In situ photograph of *Cryptocoryne vinzelii* showing its habit. Photo by: AB Duhaylungsod.

individual plant, up to 14 cm long, fully spreading; *petiole* up to 8 cm long, 2.3–3.5 mm in diameter, flattened, fleshy, glabrous, canaliculate, brownish green; *lamina* ovate to narrowly ovate, up to 6 cm long by 2.0–3.2 cm wide, glabrous on both sides, glossy brownish green adaxially, pale brownish green abaxially, margin entire somewhat undulating, base cordate, apex acute. *Peduncle* terete, 4–7 mm long. *Spathe* erect, 4.0–4.5 cm long, sometimes 2–3 developing simultaneously; *kettle* urceolate, 6–8 mm long, 5–6 mm in diameter, fleshy, occasionally corrugated, glabrous, creamy white to greenish creamy white; *tube* very short, 0.5–1.0 mm long, 5–6 mm in diameter, fleshy, glabrous, outside whitish at the base reddish upwards; *limb* triangular, outside greenish-red, ascending to upright, 3.3–3.8 cm long, ca. 7 mm wide, inner surface claret (deep purple red to dark red), rough with irregular protuberances at the margin, apex long acuminate, pointing forward to twisted inwards; *collar zone* broad, claret. *Spadix* 9–10 mm long. *Female flowers* 6–7; *ovary* 2–3 mm long, 2.0–2.5 mm in diameter, creamy white to greenish yellow; *stigmas* ellipsoid, concave, obtuse, cucullate; *olfactory bodies* pale yellow to golden yellow; *naked axis* 2.0–2.5 mm long. *Male flowers* 30–40, golden yellow to pale yellow, lax; *sterile appendix* creamy white to yellowish white. *Infructescence* up to 14 mm long; *peduncle* 4–5 mm long; *syncarp* broadly ovoid, 8–9 mm long, ca. 6 mm in diameter, greenish brown, slightly rugose to verrucose, sulcate, apex apiculate.

**Distribution:** Endemic to the island of Basilan, northernmost island of Sulu Archipelago. The species has so far only been found in the City of Lamitan.

**Ecology:** The species was found growing in sandy soil, in sympatry with *Cryptocoryne joshanii* Naive & Villanueva (Naive and Villanueva, 2018). It was discovered in a stream with clear, slow-running water, ranging from deeply shaded to brightly lit within the rubber plantation, with an abundance of decaying leaves, at an elevation of 100–150 m a.s.l. (Fig. 2). The

populations were either submerged or partly submerged, with the leaves exposed.

**Phenology:** The new species was observed flowering in February to May.

**Etymology:** Named after the son of the citizen scientist (2<sup>nd</sup> author) who discovered the species, Vinzel D. Duhaylungsod.

**Cultivation:** The initial cultivation results reveal that this plant exhibits excellent adaptability to clayish sandy soil, demonstrating its ease of growth in such conditions. Furthermore, it has been successfully established as a beneficial addition to aquariums.

**Proposed conservation status:** At present, the species is only known in the streams of Lamitan City with less than 50 mature individuals found. It was found growing within rubber plantation and human settlement where anthropogenic activities are rampant (e.g., poaching, slash and burn, and agriculture) endangering the existence of this highly endemic species. Hence, we herein propose *Cryptocoryne vinzelii* to be treated as ‘CRITICALLY ENDANGERED’ (CR D), following the IUCN Standards and Petitions Subcommittee (2022).

**Taxonomic notes:** At present, Mindanao holds the greatest number of *Cryptocoryne* species in the Philippines. Among Mindanao *Cryptocoryne* species, we found *Cryptocoryne vinzelii* somewhat resembling *C. pygmaea* Merrill. However, the new species differs significantly in having broader glossy brownish green leaves (vs. narrow green leaves in *C. pygmaea*) and limb triangular, upright coiling inwardly with a claret rough inner limb surface and a broad collar zone (vs. narrowly triangular, horizontally twisted hiding the narrow collar with smooth inner limb surface in *C. pygmaea*). From *C. palawanensis* the new species differs significantly in having shorter, up to 14 cm long, ovate, glossy brownish leaves (vs. up to 25 cm and green to olive green or brownish leaves more or less purplish striped to marmorated on the upper surface in *C. palawanensis*) and limb triangular, upright with a claret rough inner limb surface and a broad collar zone (vs. narrowly triangular, obliquely forward twisted limb hiding the collar and with a claret very rough inner limb surface in *C. palawanensis*).

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## LITERATURE CITED

- Beentje, H.J.** 2016 The Kew plant glossary: an illustrated dictionary of plant terms. 2<sup>nd</sup> ed. Royal Botanic Gardens, Kew, Richmond, Surrey, 184 pp.
- GBIF** (Global Biodiversity Information Facility) 2023 GBIF Home Page. Available from: <https://www.gbif.org> (Accessed 21 April 2023).
- IUCN Standards and Petitions Subcommittee** 2022 Guidelines for Using the IUCN Red List Categories and Criteria. Version **15.1**. Available from: [https://nc.iucnredlist.org/redlist/content/attachment\\_files/RedListGuidelines.pdf](https://nc.iucnredlist.org/redlist/content/attachment_files/RedListGuidelines.pdf) (Accessed 21 April 2023).
- JSTOR** 2023 Global Plants on JSTOR. Available from: <https://plants.jstor.org/> (Accessed 21 April 2023).
- Naive, M.A.K., Villanueva, R.J.T.** 2018 *Cryptocoryne joshanii* (Araceae), a new species serendipitously discovered in Sulu archipelago, Philippines. *Taiwania* **63(3)**: 248–250.
- Naive, M.A.K., Lagud, Y.J., Jacobsen, N.** 2022a Discovery through citizen science: *Cryptocoryne paglaterasiana* (Araceae), a new endangered species from Tampilisan, Zamboanga del Norte, Western Mindanao. *Taiwania* **67(4)**: 539–543.
- Naive, M.A.K., Bastmeijer, J.D., Jacobsen, N.** 2022b On the identity of *Cryptocoryne pygmaea* Merr. (Araceae) from Western Mindanao and the description of a new endemic species from the islands of Palawan and Busuanga. *Phytotaxa* **572(3)**: 295–300.
- Thiers, B.** 2023 [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/science/ih/> (last accessed April 2023).