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## Two new miniature species of *Cymbidium* sect. *Jensoa* (Orchidaceae, *Cymbidieae*) from southern Vietnam

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**Keywords:** *Cymbidium ledinhchienii*, *Cymbidium nanulum*, *Cymbidium sungwookii*, Eastern Indochina, endemism, flora, plant conservation, plant diversity, plant taxonomy.

**Summary.** Two new species of *Cymbidium* sect. *Jensoa* (Orchidaceae) are described from southern Vietnam as new for science under the names *C. ledinhchienii* and *C. sungwookii*. Both species morphologically are most similar to *C. nanulum* but clearly differ by the epigeous pseudobulbs and articulate perennial leaves when plant flowers with leaves. Diagnostic characters of *C. ledinhchienii* are median lip lobe elliptic to narrowly ovate, 1–1.2 cm long, 6–7 mm wide, disc lamellae divergent in the middle, column apex straight, not lobed, and anther cap smooth, without beak; diagnostic characters of *C. sungwookii* are triangular ovate median lip lobe, ca. 1 cm long and wide, disc lamellae convergent distally, column apex cleft, with two lobes, and finely papillose beaked anther cap. The paper presents standard illustrated taxonomic descriptions of new species, with data on their ecology, phenology, distribution, conservation status, and comparison with related species.

## Два новых миниатюрных вида секции *Jensoa* рода *Cymbidium* (Orchidaceae, *Cymbidieae*) из южного Вьетнама

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**Ключевые слова:** Восточный Индокитай, охрана растений, разнообразие растений, таксономия растений, эндемизм, флора, *Cymbidium ledinhhienii*, *Cymbidium nanulum*, *Cymbidium sungwookii*.

**Аннотация.** Два вида рода *Cymbidium* из секции *Jensoa* (Orchidaceae) описаны из южного Вьетнама в качестве новых для науки под названиями *C. ledinhhienii* и *C. sungwookii*. Оба вида морфологически наиболее сходны с *C. nanulum*, но хорошо отличаются надземными псевдобульбами, многолетними листьями, имеющими сочленение и цветением в облиственном состоянии. Специфическими диагностическими признаками *C. ledinhhienii* являются эллиптически-узкояйцевидная средняя доля губы 1–1.2 см длины, 6–7 мм ширины, кили диска, сближающиеся в центре своей длины, верхушка колонки прямая и цельная, не образующая долей, и гладкий оперкулум, лишенный клювика; специфическими диагностическими признаками *C. sungwookii* являются треугольно-яйцевидная средняя доля губы около 1 см длины и ширины, кили диска, сближающиеся в дистальной части, верхушка колонки, разделенная на две доли, и оперкулум, покрытый папиллами с выраженным носиком. В статье приводится стандартное иллюстрированное таксономическое описание новых видов и данные по их экологии, фенологии, распространению, охранному статусу, а также приведено сравнение их с родственными видами.

## Introduction

Species and artificial hybrids of the genus *Cymbidium* Sw. are well-known ornamental orchids in cultivation all over the world. Before this study, the genus included at least 87 accepted species spreading from the north-west Himalayas and Japan to the south through Indochina to Malesia, the Philippines, New Guinea, and Australia (POWO, 2024). Two comprehensive taxonomical assessments of this genus summarized presently available information were published recently (Liu et al., 2006; Du Puy, Cribb, 2007). Meanwhile, the acceptable inventory of *Cymbidium* species is still far from being completed. Two new species discovered recently in southern Vietnam belong to *C. sect. Jensoa* (Raf.) Schltr., which represents a monophyletic and somewhat isolated clade according to molecular data (Du Puy, Cribb, 2007). The section includes fifteen species (Liu et al., 2006; Du Puy, Cribb, 2007), including two species described here.

All species of this section are obligatory terrestrial plants characterized by flowers with four pollinia in two unequal pairs, and a lip with two keels converging at a different part along their length and forming more or less short tube. Southern China and Vietnam represent the area of highest species diversity in this section. Eight species belonging to this section were reported from Vietnam before our study (Averyanov, Averyanova, 2003; Averyanov et al., 2015, 2018, 2023; Tuan et al., 2020). These are *Cymbidium cyperifolium* Lindl., *C. ensifolium* (L.) Sw., *C. goeringii* (Rchb. f.) Rchb. f.,

*C. kanran* Makino, *C. nanulum* Y. S. Wu et S. C. Chen, *C. omeiense* Y. S. Wu et S. C. Chen, *C. sinense* (Jackson) Willd., and *C. tamphianum* Aver. Including the new data presented in this paper, the number of species belonging to *Cymbidium* sect. *Jensoa* in the flora of Vietnam reaches ten. Newly discovered species named here as *Cymbidium ledinhhienii* and *C. sungwookii* morphologically are most close to *C. nanulum* but well differ in vegetative and floral features. The standard illustrated taxonomic description of new species, with data on their ecology, phenology, distribution, conservation status, and comparison with related species are presented below.

## Materials and methods

The materials for this study were collected in 2023 and 2024. The measurements and plant descriptions are based on living plants and herbarium specimens. Studied voucher herbarium specimens are stored in herbaria of the Institute of Tropical Biology of Vietnamese Academy of Sciences and Technology (VNM) and the Komarov Botanical Institute of the Russian Academy of Sciences (LE). The detailed analytical photos of plants were made from the living material before preparation of the voucher herbarium specimens. All photos were taken using the Canon 700D body and the Canon EF-S 60 mm f/2.8 Macro USM lens. Scanned images of herbarium specimens and associated analytical photos are available in the open database “Herbarium LE” (<https://en.herbariumle.ru>). Distribution of the

studied taxa in Vietnam is given in accordance with the modern official administrative division of the country (Vietnam Administrative Atlas, 2015). The online version of “The IUCN Red List of Threatened Species” (IUCN. URL: <https://nc.iucnredlist.org/>) was used for the preliminary assessment of the species conservation status. The general terminology for the morphological descriptions follows Beentje (2016) and Simpson (2019).

### Taxonomic treatments

*Cymbidium* Sw.

*Cymbidium* sect. *Jensoa* (Raf.) Schltr.

≡ *Jensoa* Raf.

*Cymbidium ledinhchienii* Aver., Vuong et V. C. Nguyen, **sp. nov.** (Figs. 1, 2).

**Diagnosis.** The new species differs from morphologically similar *Cymbidium nanulum* in epigeous pseudobulbs leafy during flowering, articulate leaves, column at apex frontally deeply cleft, with 2 lateral rounded lobed, broadly triangular stigma, and beaked anther cap.

**Type:** Vietnam, type herbarium specimen and photos prepared from cultivated plants on 18 II 2023. Van Canh Nguyen, L. Averyanov, AL2036 (holo – LE01170456; <https://en.herbariumle.ru/?t=occ&id=167959>; photos LE01123811; <https://en.herbariumle.ru/?t=occ&id=165100>) collected originally in Dak Lak Province, Ea’Hleo District, Ea’Sol Village, Dipterocarp forest, along stream at elevation of 300–400 m a. s. l. V 2022. Van Canh Nguyen s. n.

**Paratype:** “Vietnam, Dak Lak Province, Ea’Hleo District, Ea’Sol Village, Dipterocarp forest, along stream at elevation 300–400 m a. s. l. 01 IV 2024. Ba Vuong Truong, Van Canh Nguyen, BV 1896” (VNM00070006; photos LE01255104; <https://en.herbariumle.ru/?t=occ&id=226120>).

**Etymology.** The species is named after Mr. Le Dinh Hien (Lê Đình Hiền), chairman of Hoang Viet School, who contributes much to the protection of wild orchids.

**Description.** **Terrestrial herb** with densely clustering pseudobulbs. **Pseudobulbs** broadly ovoid to subglobose, 1.5–2 cm tall and wide, covered by leaf sheaths, at base with 2–3 subulate, acute cataphylls, 3–6 cm long. **Roots** thick, fleshy, white to yellowish, 5–8 mm in diameter. **Leaves** 3–4, articulate at base, sub-distichous, narrowly lanceolate to linear, arching, to 40 cm long, 1.3–1.5 cm wide, acute. **Inflorescence** arising from base of pseudobulb,

ascending to erect; peduncle (10)12–16(18) cm long, at base with (2)3(4) imbricate, conduplicate, green, acute bracts; rachis (5)6–7(8) cm long, usually with 4–5 flowers, opening simultaneously. **Floral bracts** pale green, oblong triangular, 8–10 mm long, 2–2.5 mm wide, acute. **Pedice and ovary** 3.8–4 cm long. **Flowers** widely opening, petals and sepals pale yellow to dull yellowish-green, obtuse, with 5 red stripes along nerves, lip white to pale yellowish green, with many purple red blotches on lobes. **Median sepal** oblong narrowly obovate, 2.4–2.5 cm long, 0.7–0.8 cm wide, margin at basal half somewhat recurved. **Lateral sepals** oblong, 2.4–2.5 cm long, 0.7–0.8 cm wide. **Petals** elliptic to narrowly ovate, 1.8–2 cm long, 0.8–1 cm wide, slightly concave. **Lip** 3-lobed; side lobes half-cordate, about 8 mm long, 4–5 mm wide, suberect, apex truncate; median lobe obscurely triangular ovate, about 1 cm wide and long, rounded at apex, strongly recurved to revolute; disc with 2 lamellae divergent at base, raising and touching at middle, and divergent toward the base of median lobe. **Column** slightly forward curved, 0.9–1 cm tall, at apex deeply cleft, with 2 lateral rounded lobed, stigma broadly triangular; anther cap helmet shaped, at front with short, broad beak, surface finely papillose; pollinarium broadly pyramidal, consist of 4 pollinia, with short 2-lobed caudicle. **Fruit** not seen.

**Ecology.** Dry lowland semideciduous Dipterocarp and evergreen gallery forests at elevation of 300–400 m a. s. l.

**Phenology.** Flowers in February – May.

**Distribution.** Endemic to lowland areas of Dak Lak Province (southern Vietnam).

**Conservation status.** The species presently is known only by two collections from a single population with the extent of occurrence (EOO) and area of occupancy (AOO) surely less than 100 km<sup>2</sup> and 10 km<sup>2</sup> respectively. This area has no any official protection and highly affected by various anthropogenic influence seriously decreasing the habitat quality. Being into consideration the wide harvesting of any *Cymbidium* species for the sale and cultivation, the conservation status of this species should be preliminarily assessed according to the formal criteria of the IUCN Red List (IUCN Standards..., 2024) as Critically Endangered (CR) B1ab(iii)+2ab(iii), C1+2a(ii), D.

**Note.** The new species, in its floral morphology and flower color scheme, looks very similar to *Cymbidium nanulum* (Fig. 5). The main diagnostic characteristics of our new species are the presence of distinctly epigeous pseudobulbs densely clustering

on very short, insignificant thin rhizome (vs. stems forming no distinct pseudobulbs, clustering on conspicuous, thick, fleshy hypogeous rhizome), articulate perennial leaves (vs. leaves not articulate, commonly absent during anthesis), a column deeply cleft at the apex with two lateral rounded lobes (vs.

a column not cleft frontally at apex), and an anther cap with a distinct broad beak at front (vs. anther cap cup-shaped, without distinct beak at front). Morphological details of the comparison of the mentioned species are presented in Table 1.



Fig. 1. *Cymbidium ledinhchienii*: flowering plant in natural habitat. Photo by B. V. Truong and V. C. Nguyen.

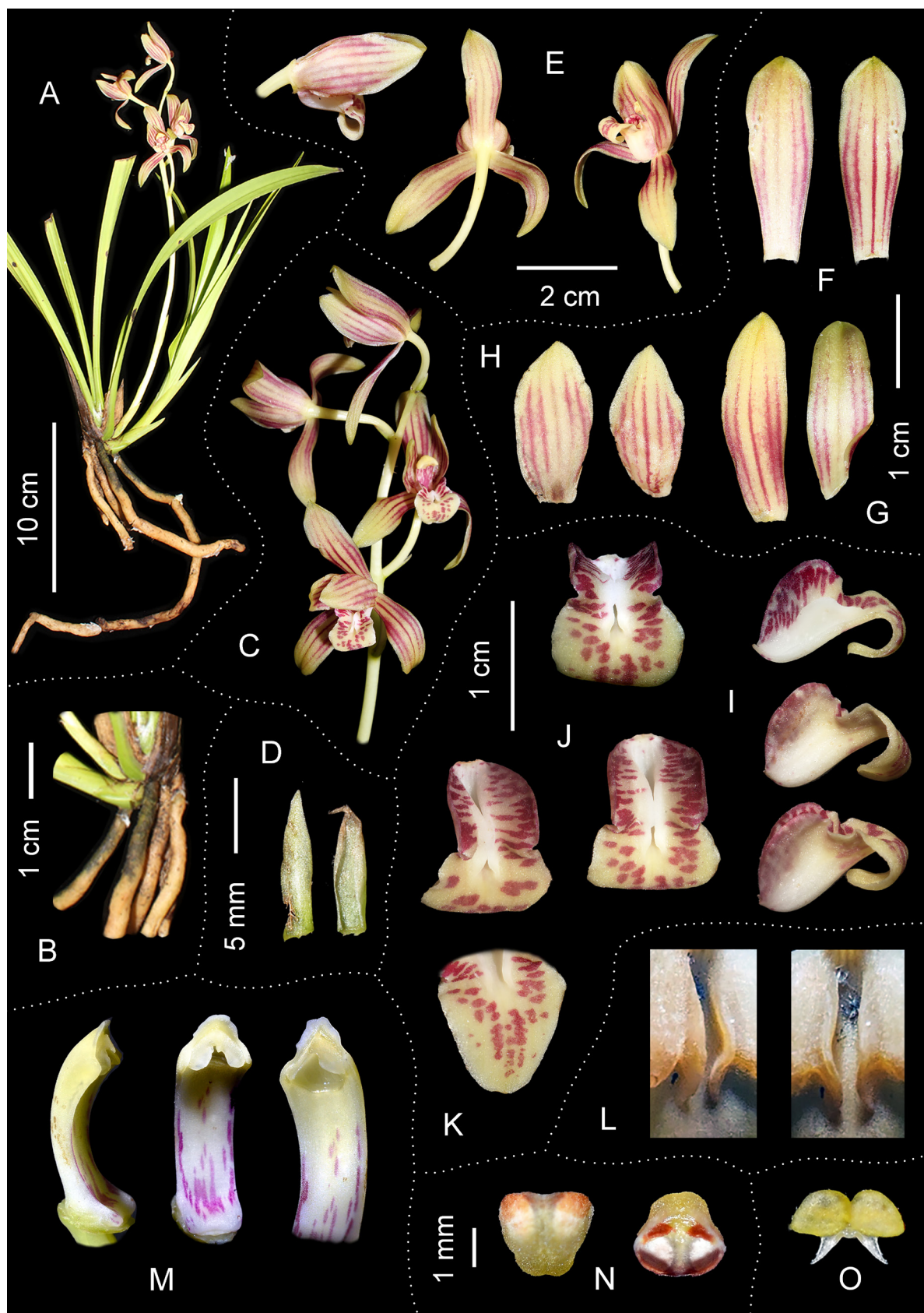


Fig. 2. *Cymbidium ledinhhienii*: A – flowering plant; B – pseudobulbous base of stem; C – inflorescence; D – floral bract, abaxial and adaxial side; E – flower, view from different sides; F – median sepal, abaxial and adaxial side; G – lateral sepal, abaxial and adaxial side; H – petal, abaxial and adaxial side; I – lip, side view; J – lip, view from above; K – epichile, view from above; L – keels on lip disc (fixed in alcohol); M – column, view from different sides; N – anther cap, view from above and from below; O – pollinarium. Photos by B. V. Truong and V. C. Nguyen, from specimen BV 1896, photo-correction and design by L. V. Averyanov.

*Cymbidium sungwookii* Aver., Vuong et V. C. Nguyen, **sp. nov.** (Figs. 3, 4).

**Diagnosis.** The new species differs from morphologically similar *Cymbidium nanulum* in epigeous pseudobulbs densely clustering on very short, insignificant thin rhizome, articulate perennial leaves, median lip lobe elliptic to narrowly ovate, 6–7 mm wide, truncate column apex without lobes, and smooth anther cap.

**Type:** Vietnam, type herbarium specimen prepared from cultivated plants on 18 II 2023. Van Canh Nguyen, L. Averyanov, AL2043 (holo – LE01170508; <https://en.herbariumle.ru/?t=occ&id=170018>) collected originally in Binh Dinh Province, Van Canh District, evergreen forest on granite at elevation 500–600 m a. s. l. 03 I 2023. Van Canh Nguyen, s. n.

**Paratype:** “Vietnam, Binh Dinh Province, Van Canh District, evergreen forest on granite at elevation 500–600 m a. s. l. 06 V 2024. Ba Vuong Truong, Van Canh Nguyen, BV 1895” (VNM00070008, photos LE01255105; <https://en.herbariumle.ru/?t=occ&id=226196>).

**Etymology.** The species is named after Mr. Um Sung Wook, who kindly provided the specimens for this study.

**Description.** **Terrestrial herb** with densely clustering pseudobulbs. **Pseudobulbs** narrowly ovoid, 1.5–2 cm tall, ca. 1 cm wide, covered by leaf sheaths, at base with (1)2–3 pale brown, erect, acute cataphylls, 6–12.5 cm long. **Roots** thick, fleshy, white to yellowish, 5–6 mm in diameter. **Leaves** (1)2, articulate at base, sub-distichous, linear, commonly erect or slightly arching, to 75 cm long, ca. 1 cm wide, acute. **Inflorescence** arising from base of pseudobulb, ascending to erect; peduncle (14)16–20(22) cm long, at base with (2)3(4) imbricate, conduplicate, scales and 2–4 light green, acute bracts spaced above; rachis to 6 cm long, with (1)2–3(5) flowers, opening simultaneously. **Floral bracts** pale green to almost white, narrowly triangular, 6–8 mm long, 0.8–1.2 mm wide, acute. **Pedicel and ovary** light green to almost white, 1.6–2 cm long. **Flowers** widely opening, petals and sepals pale yellow to light yellowish-green, obtuse to round at apex, with 1 short red stripe along median vein at base, lip white to light greenish, with few to many purple red blotches on lobes. **Sepals** oblong to broadly oblanceolate, 2.2–2.6 cm long, 5–7 mm wide, margin somewhat recurved. **Petals** elliptic to narrowly ovate, 2–2.2 cm long, 6–9 mm wide. **Lip** 3-lobed; side lobes half-ovate, 8–9 mm long, 1.5–2 mm wide, suberect; median lobe elliptic narrowly ovate,

1–1.2 cm long, 6–7 mm wide, rounded at apex, strongly recurved to revolute; disc with 2 lamellae divergent proximally and in middle, convergent toward the base of median lobe. **Column** slightly forward curved, 1–1.1 cm tall, at apex truncate; stigma rectangular or obscurely pentagonal, 3 mm long, 2 mm wide; anther cap half globular, ca. 3 mm in diameter, at front rounded, without beak, smooth; pollinarium broadly pyramidal, consist of 4 unequal, rounded pollinia, with short 2-lobed caudicle. **Fruits** (not ripe) erect, narrowly clavate, grassy green, longitudinally ribbed, stalked capsule, 3–4(4.5) cm long, 6–8 mm in diameter.

**Ecology.** Lowland evergreen broad-leaved forest on granite at elevations of 500–600 m a. s. l.

**Phenology.** Flowers in April – May.

**Distribution.** Endemic to lowland areas of Binh Dinh Province (southern Vietnam).

**Conservation status.** The assessment of the conservation status of this species meets identical conditions mentioned above for *C. ledinhhienii*. Similarly, its conservation status should be preliminarily assessed according to the formal criteria of the IUCN Red List (IUCN Standards..., 2024) as Critically Endangered (CR) B1ab(iii)+2ab(iii), C1+2a(ii), D.

**Note.** *Cymbidium sungwookii*, in its floral morphology and flower color scheme, is very similar to *C. nanulum* (Fig. 5). The main diagnostic characteristics of this new species are the presence of distinct epigeous pseudobulbs densely clustering on very short, insignificant thin rhizome (vs. stems forming no distinct pseudobulbs, clustering on conspicuous, thick, fleshy hypogeous rhizome), articulate perennial leaves (vs. leaves not articulate, commonly absent during anthesis), median lip lobe elliptic to narrowly ovate, 6–7 mm wide (vs. median lip lobe obscurely triangular ovate, 8 mm wide), a column apex truncate without lobes (vs. a column apex slightly retuse, with broadly triangular lobes), and anther cap smooth (vs. anther cap finely papillose). *Cymbidium sungwookii* morphologically is also very close to *C. ledinhhienii* described above, but differs in obscurely triangular ovate median lip lobe, ca. 1 cm wide and long (vs. median lip lobe elliptic to narrowly ovate, 1–1.2 cm long, 6–7 mm wide), disc lamellae convergent at the middle (vs. disc lamellae divergent in the middle), column apex cleft, with two lobes (vs. column apex straight, not lobed), and in anther cap beaked, finely papillose (vs. anther cap smooth, without beak). Morphological details of the comparison of the mentioned species are presented in Table 1.



Fig. 3. *Cymbidium sungwookii*: flowering plant in natural habitat. Photo by V. C. Nguyen.

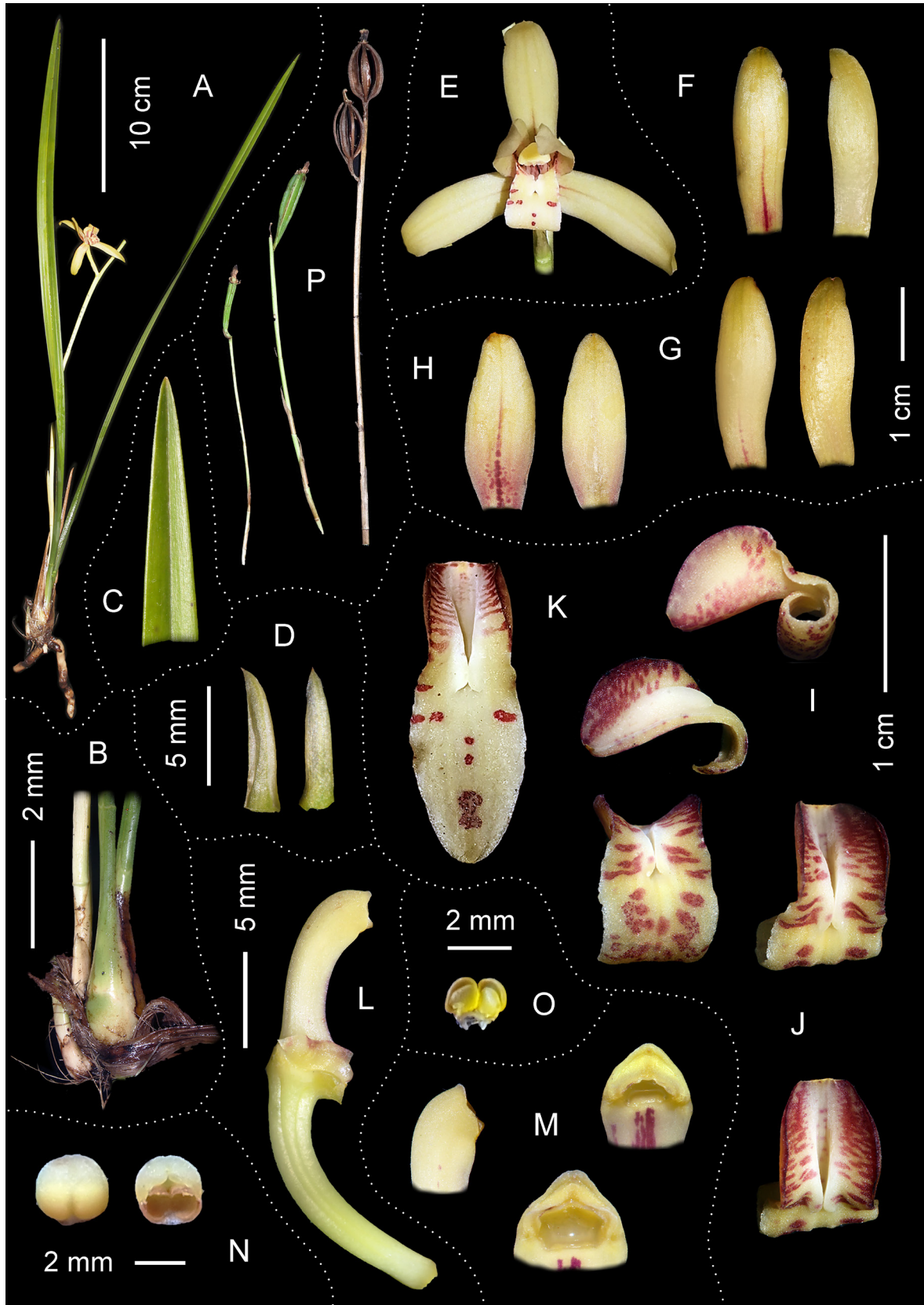


Fig. 4. *Cymbidium sungwookii*: A – flowering plant; B – pseudobulbous base of stem; C – apical part of leaf, adaxial side; D – floral bracts, adaxial and abaxial side; E – flower, front view; F – median sepal, adaxial and abaxial side; G – lateral sepals, adaxial and abaxial side; H – petals, adaxial and abaxial side; I – lip, side view and sagittal section; J – lip, view from above; K – flattened lip, adaxial side; L – pedicel, ovary and column, side view; M – apical part of column, side and front view; N – anther cap, view from above and from below; O – pollinarium in anther cap. Photos by B. V. Truong and V. C. Nguyen, from specimen BV 1895, photo-correction and design by L. V. Averyanov.



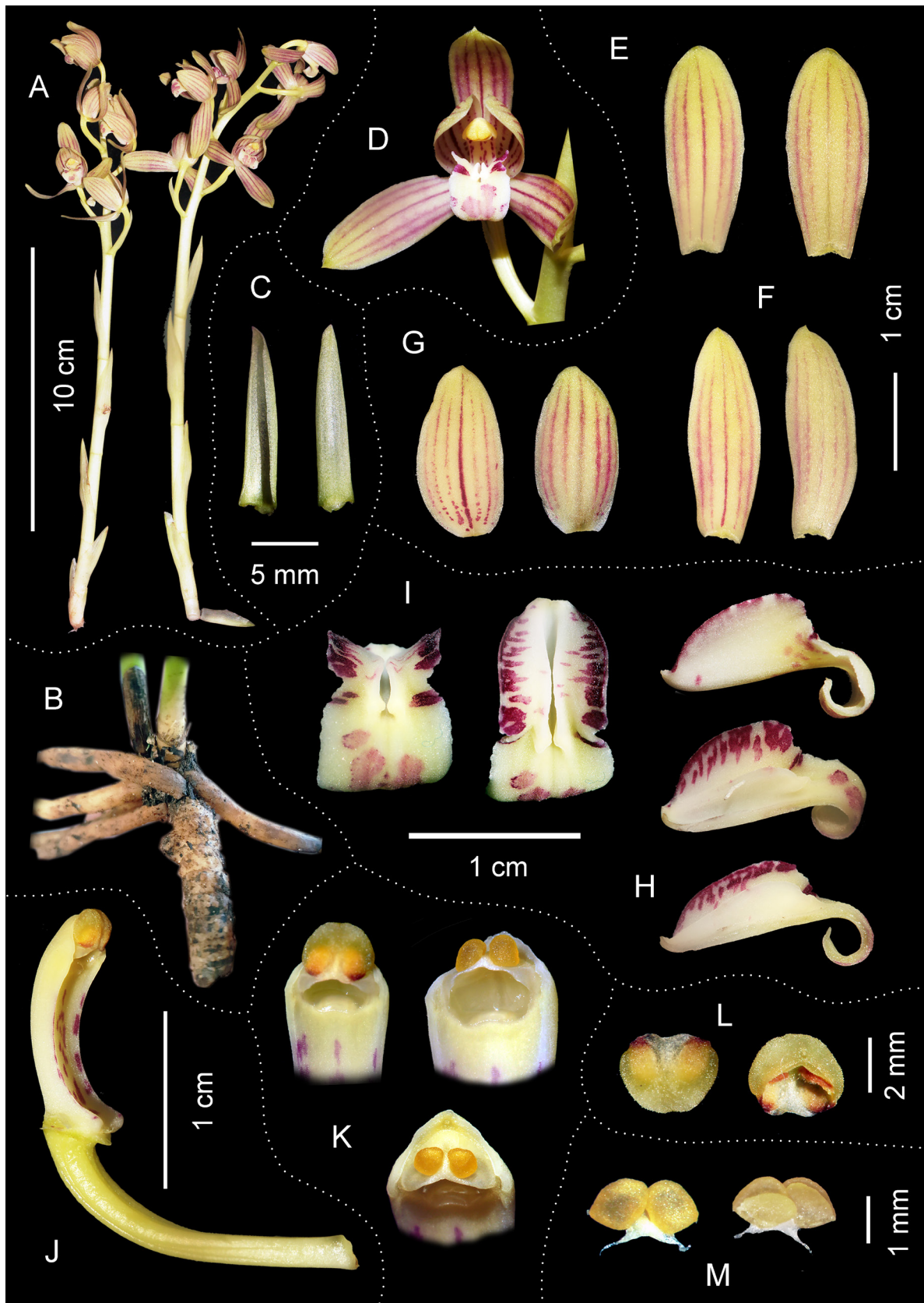


Fig. 5. *Cymbidium nanulum*: A – floriferous stems and inflorescences; B – base of stems, roots and rhizome; C – floral bracts, adaxial and abaxial side; D – flower; E – median sepal, adaxial and abaxial side; F – lateral sepals, adaxial and abaxial side; G – petals, adaxial and abaxial side; H – lip, side view and sagittal sections; I – lip, view from above; J – pedicel, ovary, and column, side view; K – apical part of column, front and half-side views; L – anther cap, view from above and from below; M – pollinaria. Photos by B. V. Truong and V. C. Nguyen, from specimen BV1752 (VNM 00063977), photo-correction and design by L. V. Averyanov.

Table 1

The morphological comparison between *Cymbidium ledinhhienii*, *C. sungwookii*, and *C. nanulum*

Morphological character	<i>Cymbidium ledinhhienii</i>	<i>Cymbidium sungwookii</i>	<i>Cymbidium nanulum</i>
Storage organ	Epigeous pseudobulbs	Epigeous pseudobulbs	Hypogeous thick rhizome
Number of leaves and articulation at the base	3–4, articulate	(1)2, articulate	2–3, not articulate
Time of flowering and leaf formation	Flowers with leaves, leaves always perennial	Flowers with leaves, leaves always perennial	Flowers usually without leaves, leaves usually deciduous during dry winter period
Shape and size of the lip median lobe	Obscurely triangular ovate, ca. 1 cm wide and long	Elliptic narrowly ovate, 1–1.2 cm long, 6–7 mm wide	Obscurely triangular ovate, ca. 1 cm long, 8 mm wide
Character of the lip disc lamellae	Convergent at middle, divergent proximally and distally	Divergent proximally and in middle, convergent toward the apex	Convergent at middle, divergent proximally and distally
Shape of column apical part at front	Deeply cleft, with 2 lateral rounded lobed	Truncate, straight, without lobes	Slightly retuse, with broadly triangular lobes
Stigma shape	Broadly triangular	Rectangular or obscurely pentagonal	Almost rounded
Anther cap characters	At front with short, broad beak, surface finely papillose	At front rounded, without beak, smooth	At front rounded, without beak, finely papillose

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