



## Newly discovered native orchids of Taiwan (IX)

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ABSTRACT: This report presents three new orchids of Taiwan, i.e., *Aphyllorchis montana* Reichb. f. forma *pingtungensis* T.P. Lin, *Cheirostylis pusilla* Lindl. var. *simplex* T.P. Lin, and *Cheirostylis nantouensis* T.P. Lin.

KEY WORDS: Native orchids, *Aphyllorchis montana*, *Cheirostylis nantouensis*, *Cheirostylis pusilla*, Taiwan.

### INTRODUCTION

A recent field trip resulted in the discovery of three new orchids in Taiwan.

### TAXONOMIC TREATMENT

*Aphyllorchis montana* Reichb. f. forma *pingtungensis* T.P. Lin, *forma nov.*

屏東紫紋無葉蘭 Figs. 1A, B, 2

Typus: TAIWAN: Pingtung County: Shouka, 400 m, Sept. 9, 2016. T.P. Lin s.n. (holotype: TAI, TAI286815, iso: TAI286816 and TAI286817).

Saprophyte. Roots thick, spreading from a short rhizome about 0.4 cm in diameter. Stem and flowering stem 35–55 cm long aboveground, whitish-yellow marked with purplish-brown stripes. Inflorescence covered with loose scale-like sheaths, sheaths tubular and obtuse. Raceme lax, bearing 12–25 flowers. Flowers sub-open, slightly ascending; bracts lanceolate, 7–15 mm long, reflexed; pedicel and ovary 0.8–2.5 cm long, purplish-brown; perianth whitish-yellow speckled with violet spots; sepals oblong, 1.1 cm × 4 mm, obtuse; petals nearly as long as sepal but slightly narrower, 1-nerved, somewhat outwardly curved. Lip yellow, 10 × 5.5–6 mm, hypochilum auriculate, 2 × 4.5 mm; epichilum ovate, 8 × 6 mm, obscurely 3-lobed; lateral lobes small, erect; midlobe ovate, and margins not involute; disc rugose, with small keels at constricted region. Column slightly shorter than sepal, yellow, curved; rostellum small; anther-cap 2 mm long; pollinia 4, powdery. Capsules cylindrical, about 2 cm × 4.5 mm, descendent.

Flowering time: August–September.

Occurrence: Endemic. *Aphyllorchis montana* forma *pingtungensis* has only been found in one location in Pingtung Co. at an elevation of about 400 m.

Note: The forma *pingtungensis* can be distinguished from forma *montana* by a smaller plant size and the labellum with a wrinkled disc without margin decoration, while forma *montana* is characterized by a

labellum decorated with raised and involute margins. This plant was discovered by Shyh-Shiarn Lin in 2013 with fruits, and only was able to see the flower in 2016.

*Cheirostylis nantouensis* T.P. Lin, *sp. nov.*

南投指柱蘭 Figs. 1C, D, 3

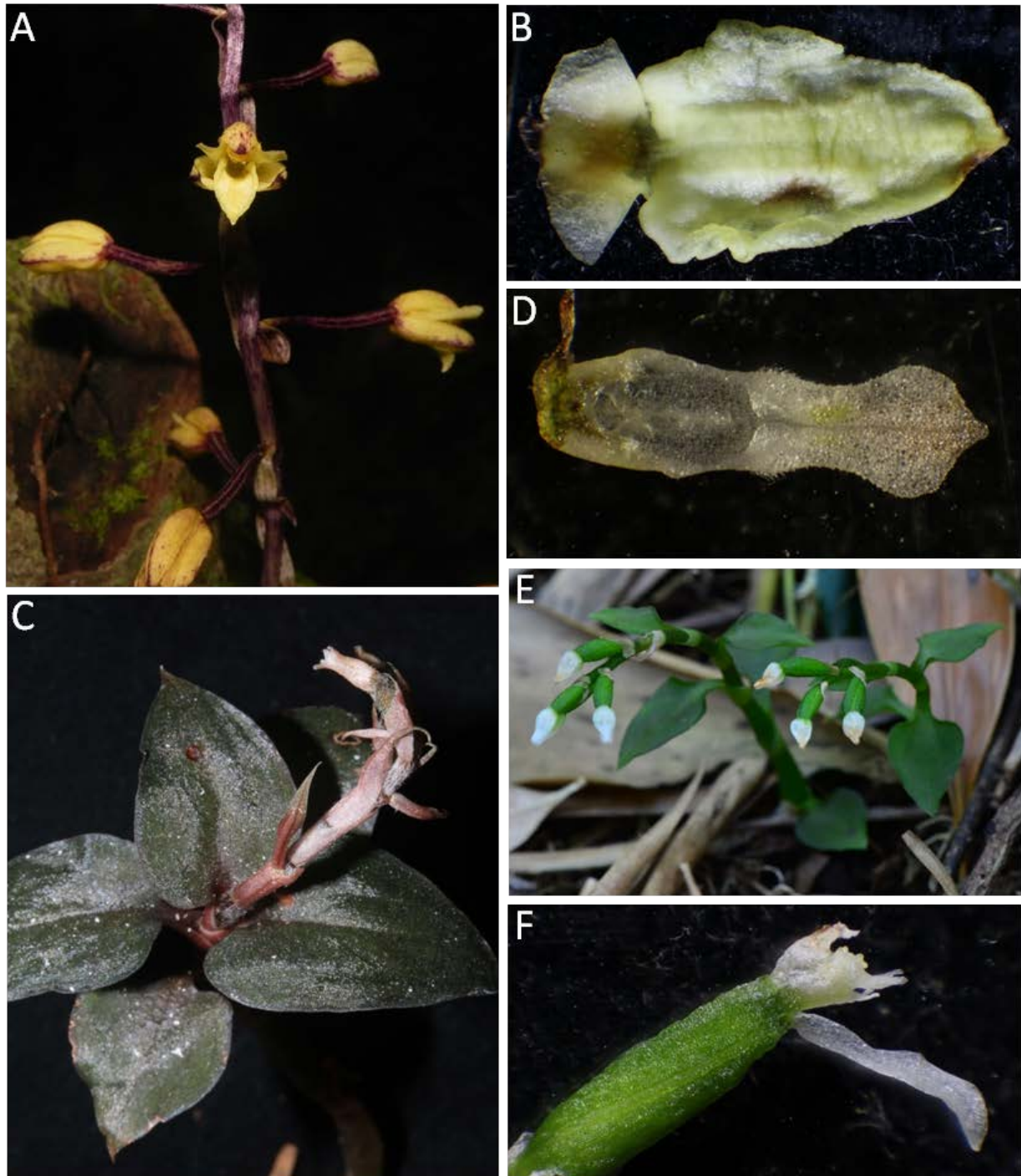
Typus: TAIWAN: Nantou County, February 3, 2017, 1300 m, *Po-Neng Shen* s.n. (holotype TAI286823).

This plant is almost identical to *Cheirostylis liukuensis* Masam. var. *derchiensis* (S.S. Ying) T.P. Lin. Terrestrial herb. Rhizome decumbent, fleshy, moniliform, greenish-brown. Plant and inflorescence 5–8 cm tall. Leaves 3–6, can reach 2.6 mm long and 1.6 mm wide, ovate, velvet, acute, subcordate at base, dark-green on surface, light-green tinged with reddish-brown below especially on major veins. Inflorescence terminal, 2–7 cm long, hirsute, densely many-flowered. Bracts ovate, acuminate, 9 mm long, somewhat same length as pedicellate ovary, glabrous. Ovary hirsute. Flowers secund; sepals whitish flushed with reddish-brown, acute, 4.5–5 mm long, joined for 2/3 of their length, partially pilose outside only on lower part; petals adnate to upper sepal, oblong-oblongate, 4.5 × 1.5 mm, white, obtuse. Lip whitish, about 5 mm long, with shallowly saccate base; sac shallowly bilobed, provided inside on each side with a bifurcate or trifurcate cylindrical appendage; claw of lip decorated with a pair of infolding appendages and covered with glandular hairs; apex of claw abruptly widened into a round blade, blade about 1.5 mm in diameter, at base of blade with two faint-green spots. Column short, with a long and deeply bifid rostellum, appendages of stigma slightly longer than rostellum and approximate to it. Stigma 2, located on both sides of column. Pollinia 2, yellow, attached to a narrow transparent disc.

Flowering time: January–February.

Occurrence: Endemic. This plant grows in broadleaf forests and bamboo plantations at elevations of 1300–1400 m in Nantou Co.

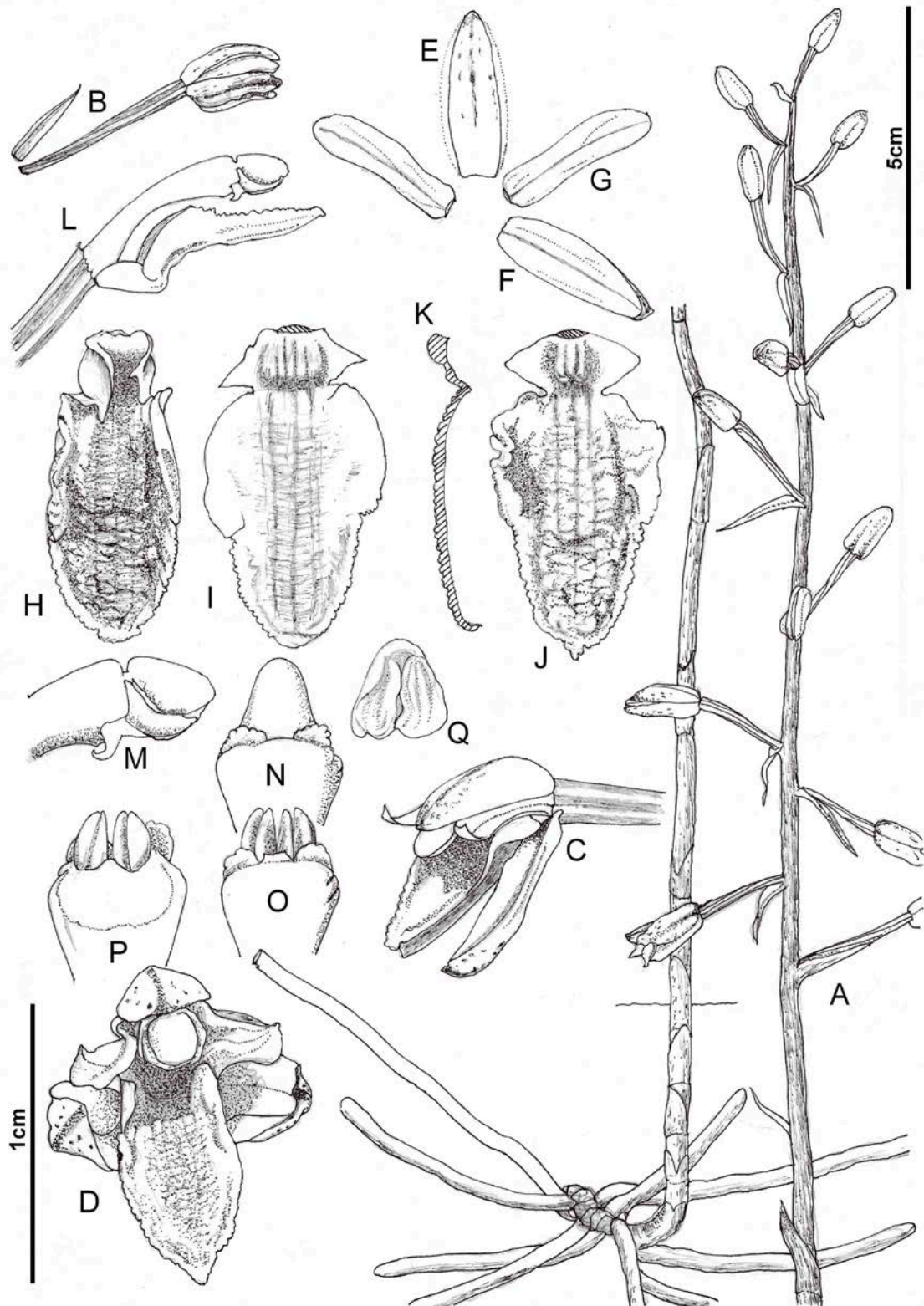
Note: *Cheirostylis nantouensis* is morphologically



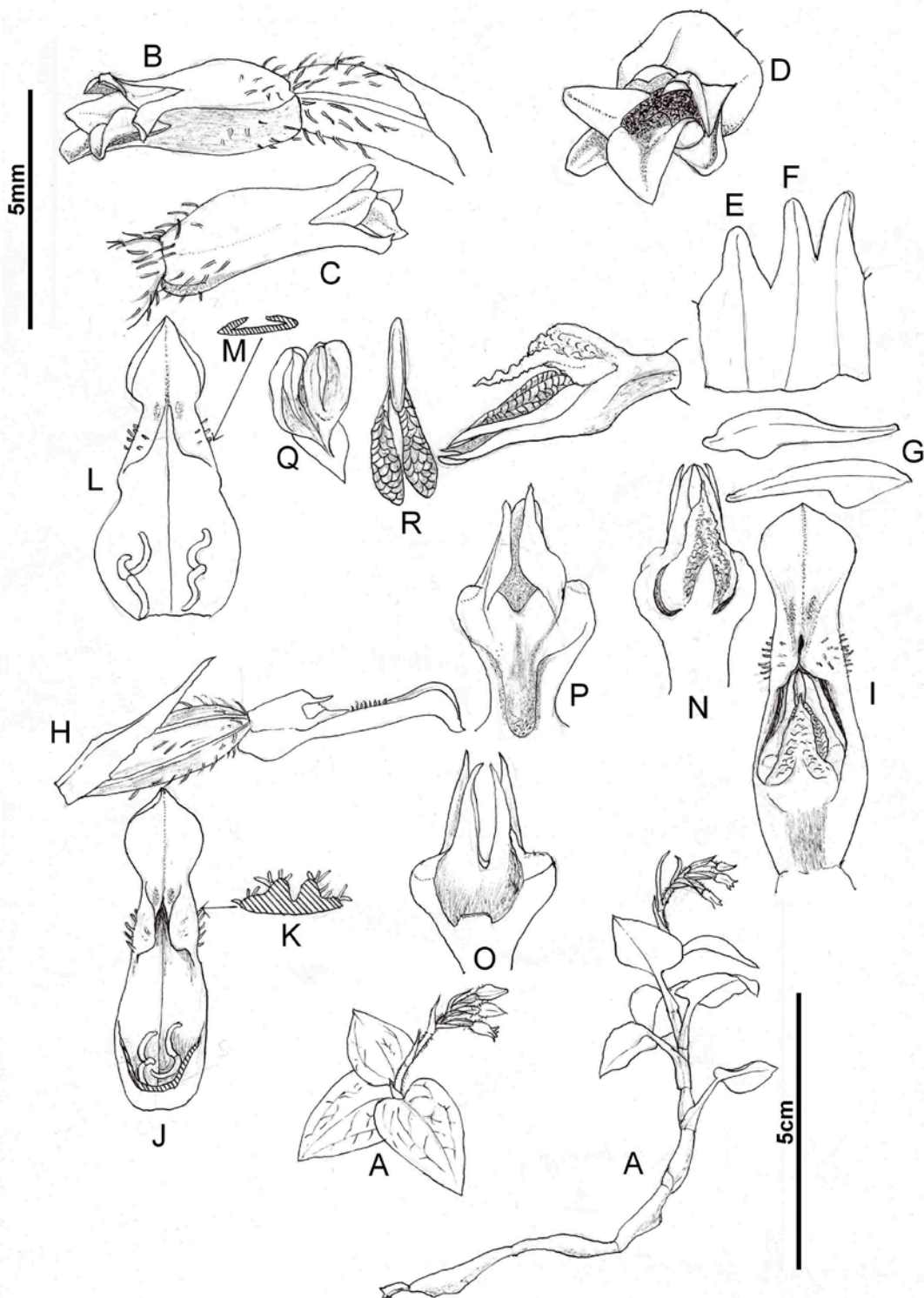
**Fig. 1.** *Aphyllorchis montana* forma *pingtungensis*, *Cheirostylis nantouensis*, and *Cheirostylis pusilla* var. *simplex* in their native habitats. **A** and **B**: Plant and enlarged labellum of *Aphyllorchis montana* forma *pingtungensis*. **C** and **D**: Plant and enlarged labellum of *Cheirostylis nantouensis*. **E** and **F**: Plant and enlarged column and labellum of *Cheirostylis pusilla* var. *simplex*.

identical to *C. liukuensis* var. *derchiensis*, which is a peloric flower of *C. liukuensis*, and can only be separated by the labellum feature. This is rare among our native orchids to find a pair of species which cannot be distinguished by their gross morphology. It is reasonable to assume that *C. nantouensis* is evolved

from *C. liukuensis* because the lip base containing two tubular appendages each side and column features are same for both species. I tentatively treated *C. nantouensis* as a new species but not a forma or variety of *C. liukuensis* because the mutation mechanism is not known.



**Fig. 2.** *Aphyllorchis montana* forma *pingtungensis* T.P. Lin. **A:** Plant body and inflorescence. **B:** Flower and floral bract. **C:** Oblique view of flower. **D:** Front view of flower. **E:** Upper sepal (dashed line refers to when it is spread out). **F:** Lateral sepal. **G:** Petal. **H:** Lip in a natural state. **I:** Lip spread out. **J:** Lip spread out. **K:** Longitudinal section of J. **L:** Side view of column with lip attached. **M:** Side view of column with anther attached. **N:** Dorsal view of column with anther attached. **O:** Dorsal view of column with anther removed. **P:** Ventral view of column showing pollinia and stigma. **Q:** Ventral view of anther cap.



**Fig. 3.** *Cheirostylis nantouensis* T.P. Lin. **A:** Plant body and inflorescence. **B:** Oblique view of flower. **C:** Side view of flower. **D:** Front view of flower. **E:** Upper sepal. **F:** Lateral sepal. **G:** Petal. **H:** Flower after removing the tepals. **I:** Top view of column and labellum. **J:** Top view of mature labellum, 5 mm long. **K:** Cross-section of claw of labellum showing glandular hairs. **L:** Top view of developing labellum, 4 mm long. **M:** Cross-section of claw of labellum. **N:** Top view of column with anther attached. **O:** Top view of column with anther removed. **P:** Ventral view of column showing stigma appendages. **Q:** Ventral side of anther cap. **R:** Pollinia attached to a transparent disc.



*Cheirostylis pusilla* Lindl. var. *simplex* T.P. Lin, var. *nov.* 沈氏指柱蘭 Figs. 1E, F, 4

Typus: TAIWAN: Nantou County, 1500 m, Nov. 2, 2016, *Po-Neng Shen s.n.* (holotype TAI286822).

Terrestrial herb. Rhizome decumbent, fleshy, moniliform. Plant usually 5~6 cm tall, deep-greenish but with a lighter-colored leaf-sheath. Leaves 3~5, loosely distributed on stem, ovate to triangular, can grow up to 2 cm long but usually not over 1.3 cm long, velvet, acute, subcordate at base, deep-greenish on both surfaces. Inflorescence terminal, short, about 2 cm long, hairless, sub-densely 2~4-flowered. Bracts ovate, acute, 4 mm long, shorter than pedicellate ovary. Ovary glabrous, 5~6 mm long. Flowers secund; sepals whitish, glabrous, apex acute, 3.4~3.8 mm long, sepals joined for 1/2~2/3 of their length, ventral side of tubular sepal flat, about 2 mm wide; petals connate with upper sepal, oblong-ob lanceolate, 3.3 × 1.3 mm, white, obtuse. Lip petalized, simple, 3.7 mm long and 1.3 mm wide, whitish, bearing one central vein. Column shorter than 2 mm, with a long and deeply bifid rostellum, appendages of stigma shorter than rostellum and close to it; stigma located on both sides of column. Pollinia 2, yellow, attached to an elongate transparent disc.

Flowering time: October–November.

Occurrence: Endemic. Only one small population of about 15 individuals was found in Nantou Co. in a bamboo plantation at an elevation of about 1500 m.

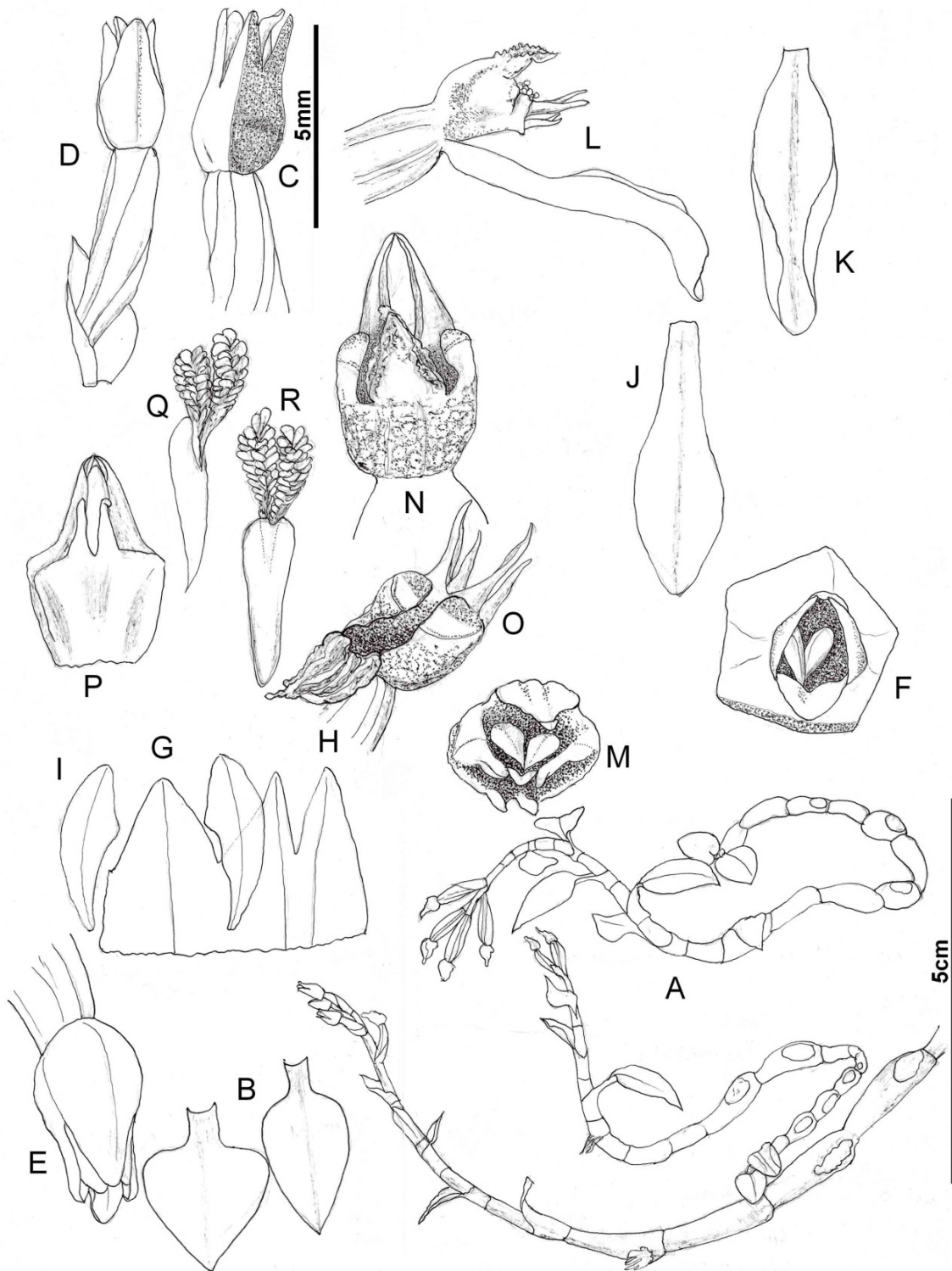
Note: This is a peloric flower of *Cheirostylis pusilla* Lindl. which is found in Bangladesh, NE India, Myanmar, China, Hong Kong, Thailand, and Peninsular Malaysia according to Gale *et al.* (2013) but not in Taiwan. *Cheirostylis pusilla* is characterized by the stem bearing scattered leaves, which is only shared by *Cheirostylis octodactyla* Ames, but not other Taiwan species of *Cheirostylis*. A peloric flower refers to an aberration in which a plant that normally produces zygomorphic flowers instead produces actinomorphic flowers. Peloric orchid flowers are abundant in Taiwan, especially in the genus, *Cheirostylis*, where 30% of species exhibit peloria (Lin *et al.* 2016). The genetic basis of peloria in orchids was revealed based on

studies of *Phalaenopsis* flower. Higher expressions of B-class MADS-box clade 3 and 4 genes were associated with labellum specification (Mondragón-Palomino and Theißen, 2011, Pan *et al.* 2011), and overexpression of the *PhAGL6b* gene leads to conversion into a lip-like structure (Huang *et al.* 2017). A species and its peloric form although morphologically different have the same genetic makeup and cannot be detected by molecular tools generally used for phylogenetic studies, because only one or a few genes change in the petal and lip tissues. In this case, the peloric flower should be considered an intraspecific variation.

It is arguable the status of peloric flower to be treated as a forma or variety. My principle is: a peloric flower is a forma if it occurs in the same population of normal plant, and a variety if this mutant plant occurs as an independent population.

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**Fig. 4. *Cheirostylis pusilla* Lindl. var. *simplex* T.P. Lin.** A: Plant body and inflorescence. B: Leaves. C: Ventral view of flower. D: Dorsal view of flower. E: Dorsal view of flower. F: Front view of flower. G: Upper sepal. H: Lateral sepal. I: Petal. J: Petalized labellum spread out. K: Labellum in a natural state. L: Side view of column and labellum. M: Front view of column. N: Top view of column with anther attached. O: Top view of column with anther cap opened. P: Ventral view of column showing the stigma appendages shorter than the rostellum. Q: Side view of pollinia attached to a transparent disc. R: Ventral view of pollinia and disc.