RESEARCH ARTICLE

Three New Species of Orchids (Orchidaceae) from Vietnam

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ABSTRACT: Three new orchid species are described from Vietnam as a new for science. They are - *Cheirostylis cristata* (related to *C. bipunctata* and *C. chinensis*), *Didymoplexiella denticulata* (related to *D. ornata* and *D. siamensis*) and *Habenaria luceana* (similar superficially to *H. geniculata, H. ecalcarata, H. malintana* and *H. paragenicula*, but having rather isolated taxonomic position). Detailed description, illustrations, data on flowering time, ecology and distribution are provided for each recognized species.

KEY WORDS: Orchidaceae, taxonomy, new species, *Cheirostylis cristata, Didymoplexiella denticulata, Habenaria luceana,* Vietnam.

INTRODUCTION

Three species of orchids were recognized as new for science during proceeded work under treatment of the orchid family in the flora of Vietnam (Averyanov and Averyanova, 2003; Averyanov, 2008). All these reports are based on recent collections made in course of exploration programs of USA National Geographic Society and Henry Luce Foundation and housed mainly at Herbarium of Institute of Ecology and Biological Resources of the National Centre for Natural Science and Technology of Vietnam (HN). Discovered species are described and illustrated below.

TAXONOMIC TREATMENTS

Cheirostylis cristata Aver., *sp. nov*. Figs. 1 & 2

Herbae terrestres vel lithophilae ad 17 cm alt., basi foliis 2-4(5). Rhizoma succulentum, repens, arrhizum. Folia triangulari-ovata, acuta, 2-6 cm lg., 1-3 cm lt. Scapus pilosus, floribus 3–6. Ovarium pubescens. Flores albi, 5.5-7 mm lg. Sepala ovata, 5.5-7 mm lg., 1.5-2.5 mm lt., tubum latum constituentia. Petala oblonga, 5.5-7 mm lg., 1-1.2 mm lt. Labellum 10-12 mm lg. Hypochilium concavum, ab utroque latere interiore jugo papilloso. Epichilium integrum, inaequaliter crenatum ad bilobo, irregulariter dentatum. Columna ovata, 3.5 mm lg., 1.5-2 mm lt., stelidiis cylindricis antrorsis duobus et rostelli brachiis subulatis duobus, 1.5 mm lg. Anthera ovoidea, 1.6-1.8 mm lg.

Type: VIETNAM, Phu Tho province, Tan Son district, Xuan Son municipality, Du village (Xuan Son national park), around point 21°06’57”N 104°57’17”E. Primary broad-leaved closed wet forest on very steep rocky slopes and cliffs of low remnant mountains composed with highly eroded solid marble-like limestone at elevation 400-500 m a.s.l. Terrestrial creeping herb in mossy wet place on shady rocky slope. Flowers white, sepals greenish to the base. Very rare. 16 February 2009. *L.Averyanov, P.K.Loc, N.T.Vinh, L.T.Son, HAL 12692a* (HN, holotype; LE, isotype).

Terrestrial or lithophytic herb with creeping rhizome and ascending leafy floriferous stem. Rhizome leafless, to 15 cm long and 1 cm wide, light dull yellowish-green, fleshy, succulent, irregularly swollen at internodes, with warty pillows densely cowered with root hairs. Floriferous stem erect, 14-17 cm tall, with 2-4(5) leaves at basal part; in upper part with 3-4 small, green to membranaceous, cuneate, acuminate sterile bracts; sparsely hairy with soft simple hairs. Leaves shortly petiolate; petiole and sheath 1-2 cm long; leaf blade rather thick, elliptic, to triangular-ovate, acute, 2-6 cm long, 1-3 cm wide, uniform green. Scape to 12(15) cm long, sparsely tomentose with soft simple hairs bearing 3-6 (and more?) flowers in sub-dense spice. Floral bracts whitish, sub-hyaline, triangular-cuneate, acuminate, 8-9 mm long, 3-6 mm wide, sparsely hairy, longer than ovary. Ovary sub-erect, 2.5-3 mm long, 2 mm wide, densely pubescent with simple multicellular hairs. Flowers, hardly opening, tubuliformis, 5.5-7 mm long, resupinate, sessile. Sepals sub-similar (median sepal slightly broader), outside sparsely pubescent, light olive-green, narrowly-ovate to ovate, obtuse, 5.5-7 mm long, 1.5-2.5 mm wide, joined on 1/2-2/3 of their length into broad tube. Petals white, very thin, almost hyaline, oblong, connivent at the apex to median sepal forming hood, 5.5-7 mm long, 1-1.2 mm wide. Lip white, 10-12 mm long, divided into distinct hypochile, mesochile and epichile. Hypochile concave, 3.5 mm long, 2.5 mm wide, basally with linear ridge of numerous small glands on each side along lateral vein. Claw short, bended. Epichile with narrow base, entire (with irregularly-crenate margin) to 2-lobed (with the lobes spreading at right angle, rectangular, each 2 mm long, 1.5 mm wide, with

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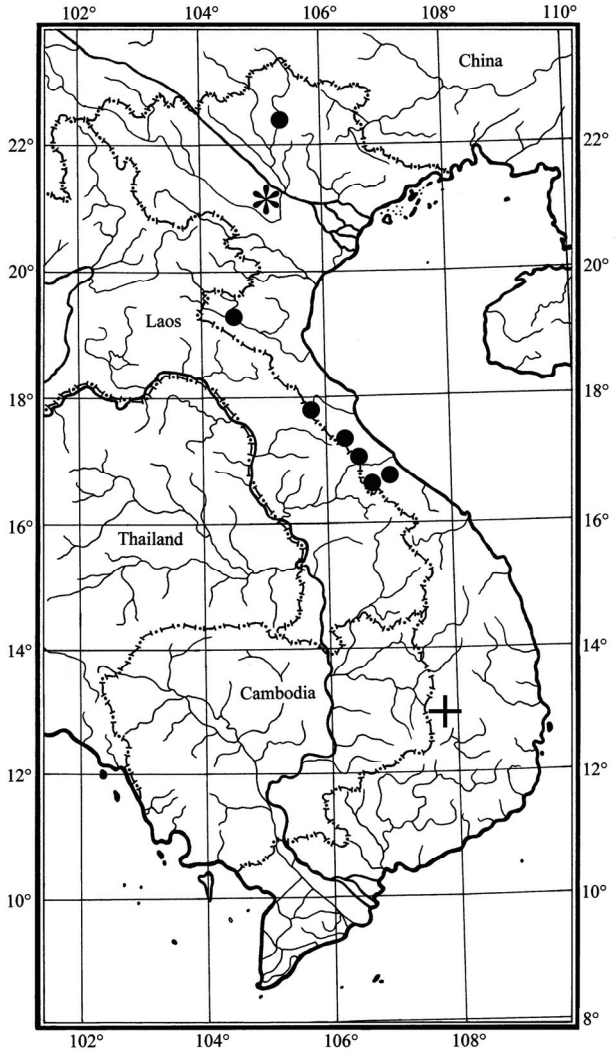


Fig. 1. Distribution of *Cheirostylis cristata, Didymoplexiella denticulata* and *Habenaria henryana.* Observed populations of described species are marked on the map with following symbols: asterisk – *Cheirostylis cristata*, black rings - *Didymoplexiella denticulata*, plus sign - *Habenaria henryana.*

3-5 irregular-erose dents along distal margin). Column forward directed, ovate, 3.5 mm long, 1.5-2 mm wide; with 2 lateral convex stigmas; at front with 2 forward directed finger-like stelidia and 2 subulate rostellar arms, 1.5 mm long. Anther large, half-ovoid, 1.6-1.8 mm long. Pollinia 2, sectile, with linear stipe and small viscidium. Fruits unknown.

Flowering period. February-March.

Ecology. Broad-leaved closed evergreen humid forests on rocky limestone at elev. 400-500 m a.s.l. Creeping terrestrial or lithophytic herb on shady slopes, usually in humid karstic depressions.

Distribution. Vietnam: Phu Tho province (Tan Son District).

Etymology. Species name refers peculiar cristate papillae ridges on lateral sides inside hypochile.

Notes. New species may be close to *Cheirostylis bipunctata* Aver. and *C. chinensis* Rolfe, that has similar papillae structure inside hypochile, but distinctly differs in broad, sub-entire, crenate to 2-lobed, irregularly erose-dentate epichile. All three species are endemics of rocky limestone areas of southern China and northern Indochina.

Didymoplexiella denticulata Aver., *sp. nov.* Figs. 1, 3 & 4

Planta tuberifera saprophytica terrestris. Caulis simplex, erectus, tenuis, (5)10-25(35) cm alt. Inflorescentia multiflora. Flores odoratissimi, bilabiati, albi, paulum roseoli vel violascentes, 10-15 mm in diam. Sepala petalaque inter se subsimilia, obovata, 6-9 mm lg., 2.5-4 mm lt. Labellum 5-7 mm lg., 2.5-3 mm lt., anguste obovatum, trilobatum, margine denticulatum, callo carnoso.

Type: VIETNAM, Quang Binh province, Le Thuy district, Kim Thuy municipality, around Lang Ho village at 16º59’31’’N 106º38’31’’E, old secondary broad-leaved closed forest on steep shale slopes of Khe Nuoc Trong River at elevation 150-200 m a.s.l., terrestrial achlorophyllous herb on steep shady slope, flowers light violet-brown, lip light violet with white apex, column white, not common, 9 April 2008, *Averyanov L., P.K. Loc, N.T. Vinh et al., HAL 11443* (HN, holotype; LE, isotype); d-EXSICCATES OF VIETNAMESE FLORA *0129/HAL 11443*.

Terrestrial achlorophyllous leafless tuberiferous herb. Tubers horizontal or inclined, thick, cylindrical- fusiform, 2-12 cm long, to 0.8 cm in diameter, longitudinally wrinkled, with few small sparse decaying adprerssed scales at the apex. Stem simple, erect, slender, (5)10-25(35) cm tall, 1-1.5 mm wide, olive-brownish to dull gray-brownish or nearly black, with few thin roots at the base, 1-3 small distant triangular bracts and terminal simple inflorescence. Inflorescence racemose, with many flower buds densely arranged at the apex. Floral bracts triangular, 1-1.2 mm long and broad. Flowers 1 day lasting, opening in succession one by one. Inflorescence rachis elongate after flowering to 12 cm long. Pedicel and ovary at flowering, sub-erect, 6-9 mm long. Flowers very fragrant, widely opening to sub-campanulate, 2-labiate, 10-15 mm across. Sepals and petals all joined together near their base, white, with pink, lilac, violet, bluish or brownish tint, occasionally nearly pure white, sub-similar in shape, obovate, 6-9 mm long, 2.5-4 mm wide, with obtuse to roundish apex; median sepal slightly longer; dorsal sepal connate to petals for 1/2-2/3 of their length; lateral sepals united basally for half way. Lip light violet with white apex, 5-7 mm long, 2.5-3 mm wide, narrowly obovate, widening from narrow base, 3-lobed, with fleshy triangular, slightly emarginate callus near the apex, free

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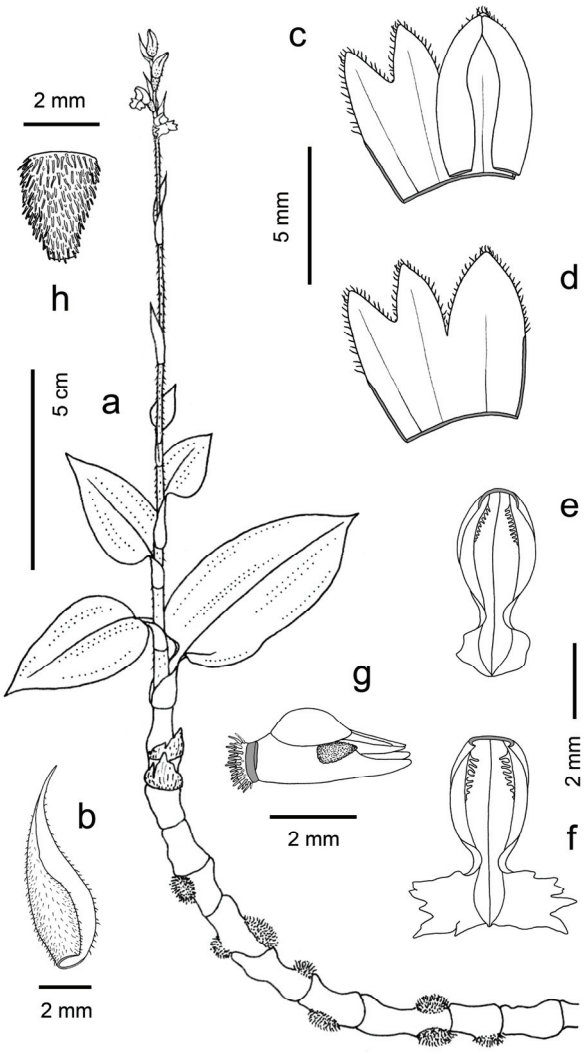


Fig. 2. *Cheirostylis cristata* Aver. a: Flowering plant. b: Floral bract. c: Flattened sepals and petals. d: Flattened sepals. e, f: Flattened lip, view from above. g: Column, side view. h: Ovary (all drown from the type *HAL 12692a* by author).

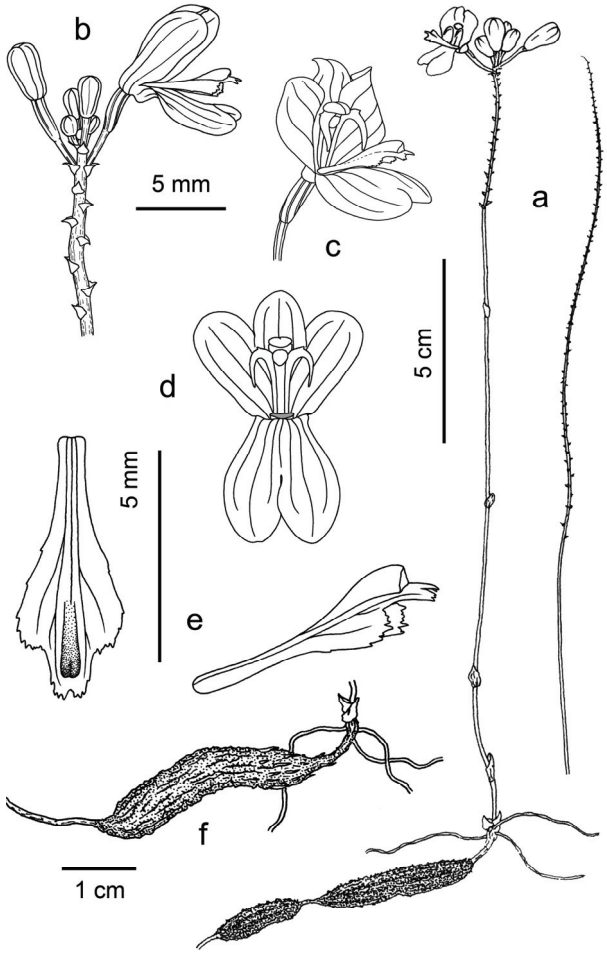


Fig. 3. *Didymoplexiella denticulata* Aver. a: Flowering plant and inflorescence rachis out of flowering. b: Apex of inflorescence. c: Flower. d: Flattened flower, without lip. e: Flattened lip and lip, side view. f: Tuber (all drown from the type *HAL 11443* by author).

from petals; side-lobes broadly rounded, with down deflexed irregularly denticulate margins; median lobe bluntly rectangular or sub-quadrate, slightly emarginate and usually irregularly denticulate at apex. Column erect, 3-5 mm tall, footless, widening to the apex, with long, slender, downwards curved, hook-like lateral stelidia more than half of column length; anther with 4 soft pollinia; operculum hemispheric, slightly flattened, finely papillose, fastened by a rather long filament. Fruit unknown.

Flowering period: March-April.

Ecology: Terrestrial ephemeroid herb. Shady broad-leaved evergreen primary and secondary lowland and submontane forests (particularly with bamboo) on any kind of soils at elevation 150-1000 m a.s.l.

Distribution: Vietnam: Tuyen Quang province (Na Hang district), Nghe An prov. (Tuong Duong distr.), Quang Binh prov. (Le Thuy, Minh Hoa and Quang Ninh distr.), Quang Tri prov. (Da Krong and Huong Hoa distr.). Laos: Bolikhamxai and Khammouan provinces.

Etymology: Species name refers finely dentate margin of the lip.

Notes: Species may be close to *Didymoplexiella ornata* and *D. siamensis* found in western Malesia and Thailand, but distinctly differ from both these species in low, broad, denticulate lip side lobes. I think all specimens that I have seen from Vietnam belong to this species. It's flowers, however, is very delicate hence lip morphology may be actually analyzed only in fresh material. In dry and even liquid fixed flowers, very thin lip margins usually decurve down and adjoin densely to lower lip surface. As a result, lip sides look straight (not denticulate) and even unlobed exactly resembling lip of *D. siamensis*. It is quite possible

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Fig. 4. ***Didymoplexiella denticulata*** **Aver. Digital herbarium specimen (all images prepared from the type** ***HAL 11443*** **by author).**

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that plants from Hainan, Taiwan and Japan reported under this name actually belong to our species.

In some areas new species was observed just along Vietnam-Laotian border, actually on eastern border of Bolikhamxai and Khammouan provinces, why we include Laos in species distribution area.

Paratypes: VIETNAM, Tuyen Quang province, Na Hang district, Xuan Tam municipality, near Ban Cai village, 22º29'18"N 105º19'47"E, primary broad-leaved evergreen dry forest on very steep slopes of highly eroded remnant limestone ridge at elevation 450-500 m a.s.l., terrestrial tuberiferous saprophyte on dry steep slope with bamboo, flowers with strong, very pleasant fragrance, tepals light purple-violet, column white, rare, 22 March 2001, *P.K.Loc, N.X.Tam, Averyanov L., HAL 218*. Nghe An province, Tuong Duong district, Tam Quang municipality, Tung Huong village, along Khe Mat stream around point 19º03’07’’N 104º36’57’’E, at elevation about 400-500 m a.s.l., lowland closed secondary old evergreen forest on steep slopes along rocky stream valley composed with stratified solid shale and sandstone, terrestrial achlorophyllous herb along ridge edge, flowers bluish, very fragrant, very rare, 17 March 2007, *Averyanov L., P.K.Loc, N.V.Trai et al., HLF 6672*. Quang Binh province, Quang Ninh district, Truong Son municipality, around Chan Trong village at 17º10’49’’N 106º29’22’’E, secondary dry broad-leaved forest on tops and steep slopes of highly eroded karst limestone mountain composed with gray solid marble limestone allied to Long Dai River, at elevation 300-400 m a.s.l., terrestrial achlorophyllous dull gray-brownish saprophyte, flowers light violet, not rare, 13 April 2008, *Averyanov L., P.K.Loc, N.T.Vinh et al., HAL 11521*. Quang Binh province, Minh Hoa district, Dan Hoa municipality, Chuong Lon mountain, Vietnam-Laotian border, about 6 km to N of Cha Lo borders station, around point 17º44’04’’N 105º46’53’’E, primary broad-leaved forest on very steep slopes and rocky cliffs of remnant mountain composed with solid marble-like highly eroded limestone at elevation 400-700 m a.s.l., terrestrial achlorophyllous saprophyte, flowers light pink-lilac, very fragrant, rare, 19 April 2008, *Averyanov L., P.K.Loc, N.T.Vinh et al., HAL 11676*. Quang Tri province, Da Krong district, Huc Nghi municipality, in vicinities of La To village around point 16º29’16’’N 107º00’32’’E, at elevation about 414 m a.s.l., secondary broad-leaved evergreen lowland forest on hills composed with shale, achlorophyllous terrestrial herb on very steep shady wet slope, flower white, very rare, 26 March 2006, *Averyanov L., P.K.Loc, P.V.The et al., HLF 6216*; d-EXSICCATES OF VIETNAMESE FLORA *061a/HLF6216*. Quang Tri province, Huong Hoa district, Huong Phung municipality, Sa Mui pass, around point 16º47’42’’N 106º35’50’’E, at elevation about 1000 m a.s.l., secondary broad-leaved evergreen submontane forest on shale mountains, terrestrial achlorophyllous olive-brownish to nearly black saprophyte on rocky shady stream slope with bamboo, flowers white, lip light blue-violet, not common, 28 March 2006, *Averyanov L., P.K.Loc, P.V.The, HLF 6263*; d-EXSICCATES OF VIETNAMESE FLORA *061b/HLF6263*.

Habenaria luceana Aver., *sp. nov*. Figs. 1, 5 & 6

Herbae terrestres ad 30 cm alt. Folia subradicalia, 4-6, anguste ovata, 6-11 cm lg., 1.8-2.5 cm lt., acuta et breviter mucronata. Inflorescentia racemosa, rara, floribus 5-10. Flores sessiles, anguste aperti, 7-8 mm in diam., laete virides. Sepala anguste ovata vel ovata, acuta, 6-8 mm lg., 3-3.5 mm lt. Petala triangularia, 4-4.5 mm lg., bipartita. Labellum triangulare, 3-4 mm lg., 1.5-1.8 mm lt., ecalcaratum. Columna 3.5-4 mm alt., 2.5-3 mm lt.; viscidiophori 2-2.2 mm lg., sursum vergentes; stigmatis lobi cylindrici, 0.4 mm lg.

Type: VIETNAM, Dac Lac province, Buon Don district, Krong Na municipality, Yok Don national park, around point 13°04’13”N 107°37’57”E. Open dry semi-deciduous *Dipterocarpus* forest and woodlands on thin ferralite gray to brown rocky soils at elevation about 200 m a.s.l. Terrestrial tuberiferous ephemeroid herb with erect stem to 25 cm tall on rocky slope of small dry streamlet. Very rare. 27 March 2008. *N.T.Hiep, Averyanov L., P.K.Loc, N.T.Vinh, N.S.Khang, T.H.Thai, N.V.Trai, HLF 7407b* (HN, holotype; LE, isotype).

Terrestrial ephemeroid tuberiferous herb 25-30 cm tall, with 4-6 sub-erect leaves in lower part of erect floriferous stem. Tubers cylindrical, 1.5-2.5 cm long, 0.5-1 cm broad. Stem with a few fleshy roots and 3-5 short broad hyaline yellowish scales at the base. Leaves narrowly ovate or elliptic, 6-11 cm long, 1.8-2.5 cm wide, acute and shortly mucronate at the apex. Inflorescence a few flowered lax spike, 20-25 cm tall, with 5-10 flowers. Scape glabrous, 10-14 cm long, 2-3 mm thick, with 4-5 green, herbaceous, cuneate, acuminate bracts, 2-3 cm long, 2-4 mm wide near base. Rachis 2-4 cm long. Flower bracts narrowly cuneate, attenuate-acuminate, finely papillose along margin, with broad conduplicate base, 8-15 mm long, 1-2 mm wide, as long as ovary, or a little bit longer. Flowers odorless, sessile, not widely opening, 7-8 mm across, sepals, petals and lip light green with white base. Sepals 6-8 mm long, finely papillose along margin; median sepal ovate, acute, 3-3.5 mm wide; lateral sepals narrowly ovate, oblique, attenuate and shortly mucronate, 2.3-2.5 mm wide. Petals 4-4.5 mm long, bipartite, finely papillose along margin; lower lobe large, triangular, acute, 2 mm wide at the base, with 1 nerve; upper lobe in form of small oblique obtuse triangular dent, 0.5-0.6 mm long and wide at the base. Lip fleshy, triangular, 3-4 mm long, 1.5-1.8 mm wide at the base, shortly attenuate to acute apex, shortly canaliculate

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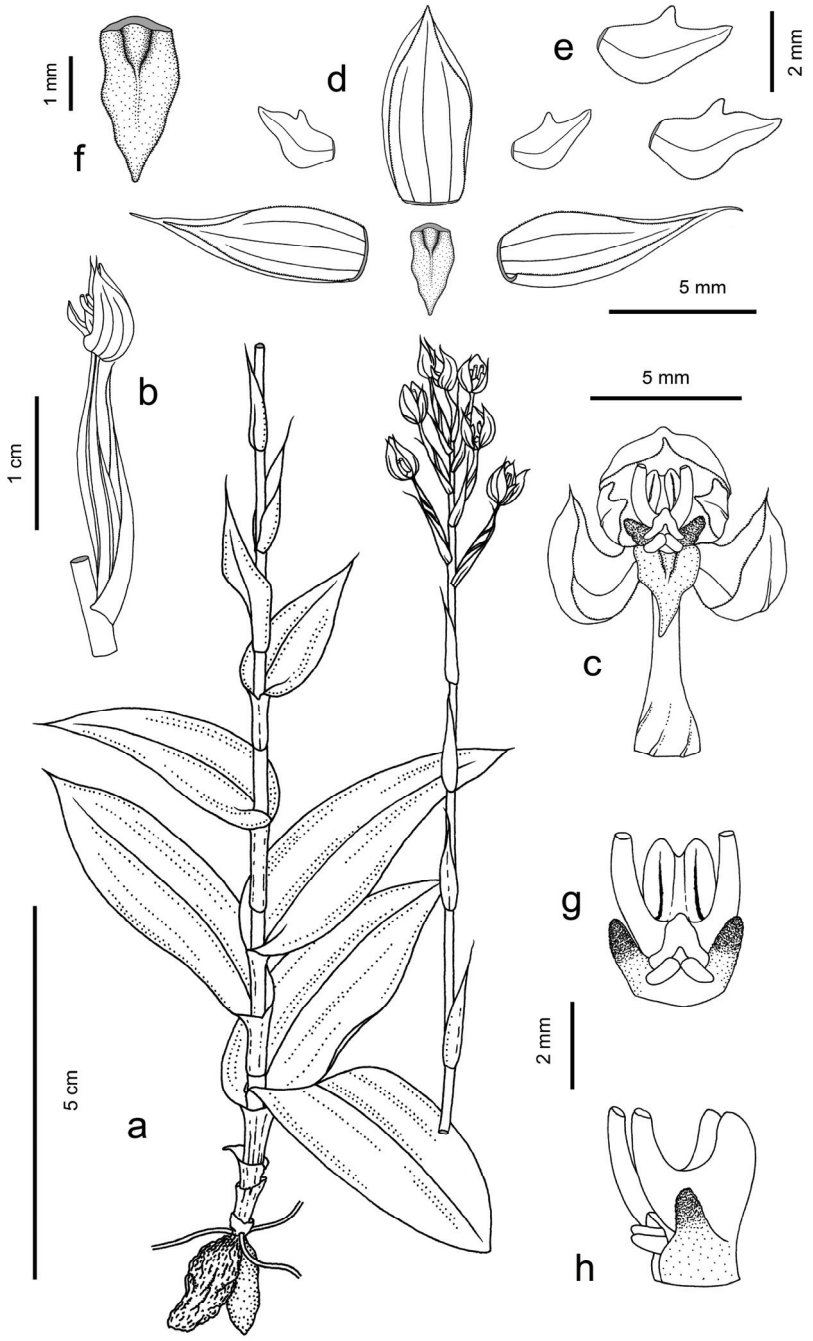


Fig. 5. ***Habenaria luceana*** **Aver. a: Flowering plant. b: Flower, ovary and floral bract. c: Flower, frontal view. d: Flattened sepals, petals and lip. e: Flattened petals. f: Flattened lip. g, h: Column, frontal and side view (all drown from the type** ***HLF 7407b*** **by author).**

at the base, spurless, finely papillose along margin. Column white, 3.5-4 mm tall, 2.5-3 mm wide; anther yellow, erect, rectangular, thecae yellow, distant, narrow and parallel; viscidiophores (rostellar arms) 2-2.2 mm long, as long as anther or little bit longer, upward arising, each with apical viscidium; stigma lobes small, fleshy, shortly cylindrical, much shorter than viscidiophores, about 0.4 mm long, placed at the base of anther; auricles lateral, broadly conical, with irregular verrucose surface. Ovary erect to sub-erect, narrowly ellipsoid, 1.4-2 cm long, to 3 mm broad, attenuate toward the apex into narrow sterile stalk 2-5 mm long.

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Fig. 6. *Habenaria luceana* Aver. Digital herbarium specimen (all images prepared from the type *HLF 7407b* by author).

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Flowering period. December (in cultivation).

Ecology. Terrestrial ephemeroid herb. Open dry *Dipterocarpus* forest and woodlands on thin ferralite gray-brown rocky soils at elevation about 200 m a.s.l. Commonly on rocky slopes of small temporary streamlets drying during rainless season.

Distribution. Vietnam: Dac Lac province (Buon Don District, territory of Yok Don national park). Cambodia?

Etymology: Species named in honour of Mr. Henry Luce which scientific foundation (Henry Luce Foundation) for a many years supported our exploration activity in Vietnam.

Notes: We do not see any certain relations for this species. Formally, it may be close to representatives of the genus having simple lip lacking spur, like *Habenaria geniculata* D.Don var. *ecalcarata* King & Pantl., *H. malintana* (Blanco) Merrill, *H. parageniculata* Tang & F.T.Wang and some forms of *H. dentata* (Sw.) Schleichter. However, bipartite petals; short, very small, triangular, fleshy lip; not fully opening flowers and mucronate sepals indicate isolated taxonomic position of this species.

Species was discovered in locality closely allied to territory of Cambodia where this plant may be also certainly found.

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越南蘭科植物三新種

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摘要：本文介紹越南三種蘭科新植物，他們分別是 *Cheirostylis cristata* (與 *C. bipunctata*，*C. chinensis* 相似)，*Didymoplexiella denticulata* (與 *D. ornata*，*D. siamensis* 相似) 與 *Habenaria luceana* (與 *H. geniculata, H. ecalcarata, H. malintana* and *H. parageniculata* 諸種類似)。此外並提供每一物種之詳細描述、手畫圖、開花時間、生態與分佈。

關鍵詞：蘭科、分類、新種、越南、*Cheirostylis cristata*、*Didymoplexiella denticulata*、*Habenaria luceana*。

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