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RESEARCH ARTICLE

Vietorchis furcata (Orchidaceae, Vietorchidinae) - a New Species from Southern Vietnam

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ABSTRACT: *Vietorchis furcata*, an achlorophyllous orchid, discovered in southern Vietnam is described and illustrated as new for science. This is the second species of the genus regarded earlier as monotypic. A key for identification of both species of the genus and short notes on their taxonomy and biology are provided. Closely related genera - *Vietorchis* and *Silvorchis* are segregated in rank of subtribe Vietorchidinae due to their isolated taxonomical position.

KEY WORDS: Nature protection, Orchidaceae, plant diversity, plant taxonomy, Vietnam, Vietorchidinae, *Vietorchis furcata*.

INTRODUCTION

The genus *Vietorchis* was originally described in 2002 as a monotypic taxon with a single species, - *V. aurea*, discovered in lowland limestone area of Cuc Phuong national park situated in northern Vietnam a hundred km to the south of Hanoi (Averyanov and Averyanova, 2003). Two years later botanists of the national park collected a few additional plants from the same population. Their perfectly preserved material allowed essential amending of the description and illustrations of this species (Averyanov, 2010). Close additional studies revealed very isolated taxonomical position of the discovered plant among its known relatives and provided certain arguments for segregation of this genus in rank of separate subtribe closely related to subtribe Orchidinae. Achlorophyllous habit, holomycotrophic mode of life, rootless, fleshy, branching rhizome, as well as specific column and lip structure obviously differ this genus from other representatives of subfamily Orchidoideae. A poorly known monotypic genus *Silvorchis* J.J.Sm. discovered in Java in 1907 may be tentatively regarded as a nearest *Vietorchis* relative and a second member of this evolutional line. Unfortunately, the only *Silvorchis* species - *S. colorata* J.J.Sm., has never been collected since its discovery, beside a single type collection, and is probably extinct. Lack of material does not allow us to understand the nature of this taxon well. Formal speculative merging of *Silvorchis* and *Vietorchis* (Szlachetko et al., 2006) was not based on study of any material and cannot be regarded as scientifically argued. Curiously, this surprising disposition was accepted by the prestigious database - The Plant List, A working list of all plant species (http://www.theplantlist.org).

Meanwhile, some markedly different views on the systematic position of *Silvorchis* have been expressed by competent taxonomists over the years. J.B. Comber (1990) following J.J. Smith (1907) placed it close to *Platanthera* Rich. (subfam. Orchidoideae, tribe Orchideae), but indicates its “quite difference in many ways”. In contrast, L.A. Garay (1986) assigned it to the subtrib. *Epipogiinae* (subfam. Epidendroideae) regarding it as “well defined evolutionary line in the Neottioideae, which is not only comparable in advancement to, but which has also evolved in a parallel manner with the line of the Orchidoideae”. The latter point of view was generally accepted later by R.L. Dressler (1993) and A.M. Pridgeon et al. (2005) who placed *Silvorchis* into tribe Nervilieae, subtrib. Epipogiinae together with *Epipogium* Borkh. and *Stereosandra* Blume. In contrast to this widely accepted interpretation, D.L. Szlachetko and P. Rutkowski (2000) following early opinion of R.L. Dressler (1981) again referred the genus to subfam. Orchidoideae ("...its drawing in K univocally indicates that *Silvorchis* is close to *Brachycorythis* Lindl. It is possible that it represents just a saprophytic form of the latter").

In fact, mentioned highly conflicting views are result of specific morphology of *Silvorchis* and *Vietorchis*, which are very similar to some representatives of Orchidinae in details of gynostemium structure and pollinaria, particularly to *Brachycorythis* and *Platanthera*. At the same time, underground part of plants in both genera is presented

by plagiotropic, thick, fleshy, branching, rootless rhizome typical for such primitive genera of Epidendroideae as *Epipogium* J.F. Gmel. ex Borkh. (Epipogiinae), *Cyrtosia* Blume, *Galeola* Lour. (Galeolinae), *Lecanorchis* Blume (Lecanorchidinae), *Yoania* Maxim. (Gastrodiinae) and also observed in some holomycotrophic species of Spirantoideae, like *Odontochilus* Blume. Such combination of morphological features in species of *Silvorchis* and *Vietorchis* observed in fairly distant taxa having no close relatives gives certain reason for segregating them in rank of separate clade. Most probably, this clade has been evolved from some primitive representatives of Orchidoideae having "*Brachycorythis*–like flowers" on the way of holomycotrophic specialization. Few solitary representatives of Orchidinae exhibit initial trends of such specialization (e.g. *Platanthera saprophytica* J.J.Sm., *Brachycorythis lastii* Rolfe.) but they always retain normal roots and tubers typical for representatives of the subtribe. On the other hand, this clade may originate from primitive representatives of Epidendroideae with primarily highly specialized rhizome as it was primarily supposed by L.A. Garay (1986). In this case, formation of "*Brachycorythis*–like flowers" should be regarded as result of convergent evolution with large-flowered representatives of Orchidinae. The latter scenario is less probable to our opinion.

Analysis of available data on *Silvorchis* and *Vietorchis* exhibits their clear morphological similarity. Species of both genera have distinctly "*Brachycorithis*-like" column and pollinaria, "*Epipogium*-*Cyrtosia*-like" rootless, branching, fleshy rhizome and 3-lobed, spurless lip, bearing very characteristic keels and callosities. Mentioned genera form distinctly separate clade irrespectively of various versions of their origin. Molecular studies will be able to add some ideas about their relation, but specificity and independence of this group looks doubtless.

Vietorchis was regarded as a monotypic genus for a number of years since its discovery. It seemed that rather little chance existed to find any additional unknown species in such relict, highly specialized and easily recognizable genus. Nevertheless, one more species of *Vietorchis* was recently discovered during integrative expedition of the Russian-Vietnamese Tropical Centre in Chu Yang Sin Mountains in April 2012. This surprising unique discovery confirms outstandingly high orchid diversity of eastern Indochina that still remains very far from more or less full inventory. A short taxonomic treatment is presented below. It includes descriptions of a new subtribe, new species, key for species identification and brief notes about taxonomy, ecology, phenology and biology of studied species.

TAXONOMIC TREATMENT

Fam. Orchidaceae, tribe Orchideae, subtribe Vietorchidinae Aver., subtrib. nov.

Type: *Vietorchis* Aver. et Averyanova.

Small terrestrial, holomycotrophic, achlorophyllous, rootless herbs with underground thick branching tuberoid rhizome. Stem erect to ascending with loose large bracts and 1–5 flowers. Floral bracts large, enveloping long, erect ovary. Flowers sessile, resupinate, widely opening, 1.5–2.5 cm across. Sepals and petals free. Lip thick, spurless, firmly adnate to column, 3-lobed, with massive callus and rising longitudinal keel. Column short and broad, with prominent lateral wings (*Vietorchis*), or wingless (*Silvorchis*); anther erect, with small rostellum and 2 subglobular auricles; pollinaria 2, each with individual caudicle and viscidium covered by bursicles; stigma entire, transversely oblong.

2 genera: *Silvorchis* J.J.Sm. and *Vietorchis* Aver. et Averyanova with 3 species distributed in Vietnam and Java.

Achlorophyllous habit and holomycotrophic mode of life together with specific rhizome, column and lip structure segregate representatives of newly described subtribe from all genera of the closest subtribe Orchidinae, as well as from all other representatives of subfamily Orchidoideae.

Vietorchis Aver. et Averyanova, 2003, Updated Checklist Orch. Viet.: 92; Aver., 2010, Turczaninowia, 13 2: 22.

Type: *Vietorchis aurea* Aver. et Averyanova.

2 species, endemic for Vietnam.

Key to species

1a. Median lip lobe flat, spatulate, truncate; lip side lobes narrowly oblong, longer than wide; anther narrowly obovate, thecae parallel; column wings narrow, much longer than wide, bidentate at apex; petals obliquely obtriangular, much shorter than sepals; plant 10–30 cm tall, with 1–5 flowers ……..……. ***V. aurea***

1b. Median lip lobe conical-terete, narrowing from base, divided at apex into 2 flat linear, divergent lobules; lip side lobes oblique, half circular, as long as wide; anther broadly obovate, thecae divergent from base; column wings half circular, as long as wide, round at apex; petals narrowly ovate, hardly shorter than sepals; plant 3–6 cm tall, with 1–2(3) flowers ……..…..... ***V. furcata***

Vietorchis aurea Aver. et Averyanova, 2003, Updated Checkl. Orch. Vietnam: 61, 95, Fig. 10; Aver., 2010, Turczaninowia 13, 2: 22, fig. 11, 16e, f.; *Silvorchis aurea* (Aver. et Averyanova) Szlach., 2006, Richardiana 6: 89.

Described from northern Vietnam ("Ninh Binh Prov., Nho Quan Distr., Cuc Phuong Municipality, Cuc Phuong national park"). Type ("22 May 2002 *N.M.Cuong, M.V.Xinh, N.H.Quang NMC 1643*") – Herbarium of Cuc Phuong national park (holotype), HN, LE (isotypes).

Appropriate description and illustrations of this species were published earlier (Averyanov, Averyanova, 2003; Averyanov, 2010, http://ssbg.asu.ru/turcz/turcz_13_2_2010.pdf).

Ecology: Closed evergreen broad-leaved valley forest on alluvial soil between rocky limestone ridges. 350 m. Fl. April–June. Very rare (CR).

Distribution: Vietnam (Ninh Binh).

Studied specimens: **VIETNAM.** Ninh Binh, Cuc Phuong national park, May 2004, *M.V.Xinh, MVX 261* (Herbarium of Cuc Phuong national park, HN, LE).

Notes: Very rare relic species of primary lowland limestone flora of northern Vietnam. The plant has not been observed up to now anywhere outside its "*locus classicus*" where it is presented by the last, very small surviving population of this strictly endemic taxon.

Vietorchis furcata Aver. et Nuraliev, ***sp. nov.***

Figs. 1 & 2

Described from southern Vietnam ("Dak Lak Prov., Lak Distr., Bong Krang Municipality Chu Yang Sin national park. Mixed forest on leveled terrace of Chu Yang Sin mountain system at elevation about 1000 m a.s.l., around point 12°23'50''N 108°20'50''E"). Type ("11 April 2012 *M.Nuraliev 518*") – LE (holotype).

Terrestrial achlorophyllous leafless, milky-white holomycotrophic herb. Floriferous stem erect or ascending, glabrous, 3–5(7) cm tall, 1.5–2.5 mm thick, with 1–2(3) lax apical flowers, covered by loose, overlapping white (to light yellowish-white), oblong, obtuse bracts (0.5)1.2–1.5 cm long, 4–6(7) mm wide. Floral bracts almost white, membranaceous, oblongly ovate, obtuse, 1.5–2 cm long. 6–8(10) mm wide. Ovary white to yellowish-white, erect, cylindrical, curved at apex, strongly 6-ridged, 1.5–2(2.2) cm long, 2–2.5 mm in diam., twisted at base on 180°, straight, untwisted in apical half. Flowers sessile, resupinate, widely opening, 1.5–2 cm across, bright yellow; column wings, lip callus and lip side lobes with more or less heavy dull reddish-orange markings. Sepals with entire margin; median sepal broadly elliptic to broadly ovate, with rounded apex, often slightly cucullate, 6–8 mm long, 5–6 mm wide; lateral sepals obliquely ovate, obtuse, 7–12 mm long, 4–6 mm wide. Petals obliquely ovate to broadly ovate, roundish or blunt at apex, entire or shallowly irregular dentate or crenulate along margin, 6–9 mm long, 4–6 mm wide. Lip fleshy, thick, firmly adnate to column, bent upward, 3-lobed, 7–9 mm long, 4–6 mm wide (across flattened side lobes); basally with large, glossy, prominent half ovoid callus, massively connate to column base and with tall, thick longitudinal keel on abaxial and adaxial sides. Side lip lobes half circular, oblique, concave, 2.5–3 mm tall, 3–3.5 mm wide. Median lip lobe narrowly conical, narrowing from the base, 3–4 mm long, 0.7–0.3 mm in diam., at apex furcately divided into 2 flat, thin, linear, divergent lobes 1.5 mm long. Column yellow, 3 mm tall and wide; with large, fleshy, half circular, concave, cup-like, lateral wings 1.5–2 mm long and wide, smooth or irregularly verruculose outside; auricles at base of anther white, half globular, finely verruculose, 1 mm in diam.; rostellum in the form of small, insignificant fold placed between bases of thecae. Anther apical, erect, obovoid, 2 mm tall and wide, dark reddish-violet, finely papillose, with divergent thecae and narrow connective, bursicles 2, bluish, half obovoid, touching each other; pollinaria 2, clavate, 1.5 mm long, each with narrow cylindrical individual caudicle and small discoid viscidium. Stigma placed below bursicles, transversally oblong to lunate, finely papillose, entire, slightly concave.

Ecology: Primary evergreen broad-leaved and mixed humid forests on leveled terraces of mountain slopes composed with silicate mother rocks. 1000-1500 m. Fl. March–April. Very rare (CR).

Distribution: Vietnam (Dak Lak, Khanh Hoa, Lam Dong).

Etiology: Species name reflects characteristic furcate lip apex.

Paratypes: **VIETNAM.** Khanh Hoa Prov., Dien Khanh Distr., Suoi Cat Municipality, Hon Ba Range, around point 12°07'N 108°56'E, at elev. 1500 m a.s.l. 15–20 April 2006, *Kuznetsov et al.*, s.n. (LE – photo). Dak Lak Prov., Lak Distr., Bong Krang Municipality, Chu Yang Sin national park. Forest on slope of mountain ridge of Chu Yang Sin mountain system around point 12°23'50''N 108°20'50''E at elevation about 1000 m a.s.l. Locally common. 1 April 2013, *Nuraliev 747* (LE). Lam Dong Prov., Bao Lam Distr., Loc Bac Municipality, around point 11°44'48''N 107°43'04''E, at elev. 1200 m a.s.l. 10 April 2013, *Kuznetsov, Kuznetsova, Nuraliev 810* (LE).

Notes: Most probably, *V. furcata* is rare local endemic with very restricted distribution in Central Highlands of central Vietnam, where a few populations were discovered. No nectar has been observed in the flowers, and they are probably pollinated through food deception of insects. The bright yellow flowers are easy to see on the forest floor, and some of the observed flowers had empty thecae; probably the pollinia had been removed by pollinators.

Vietorchis furcata and *V. aurea* are two striking examples of local endemics without close relatives and their protection should be a matter of the highest priority.

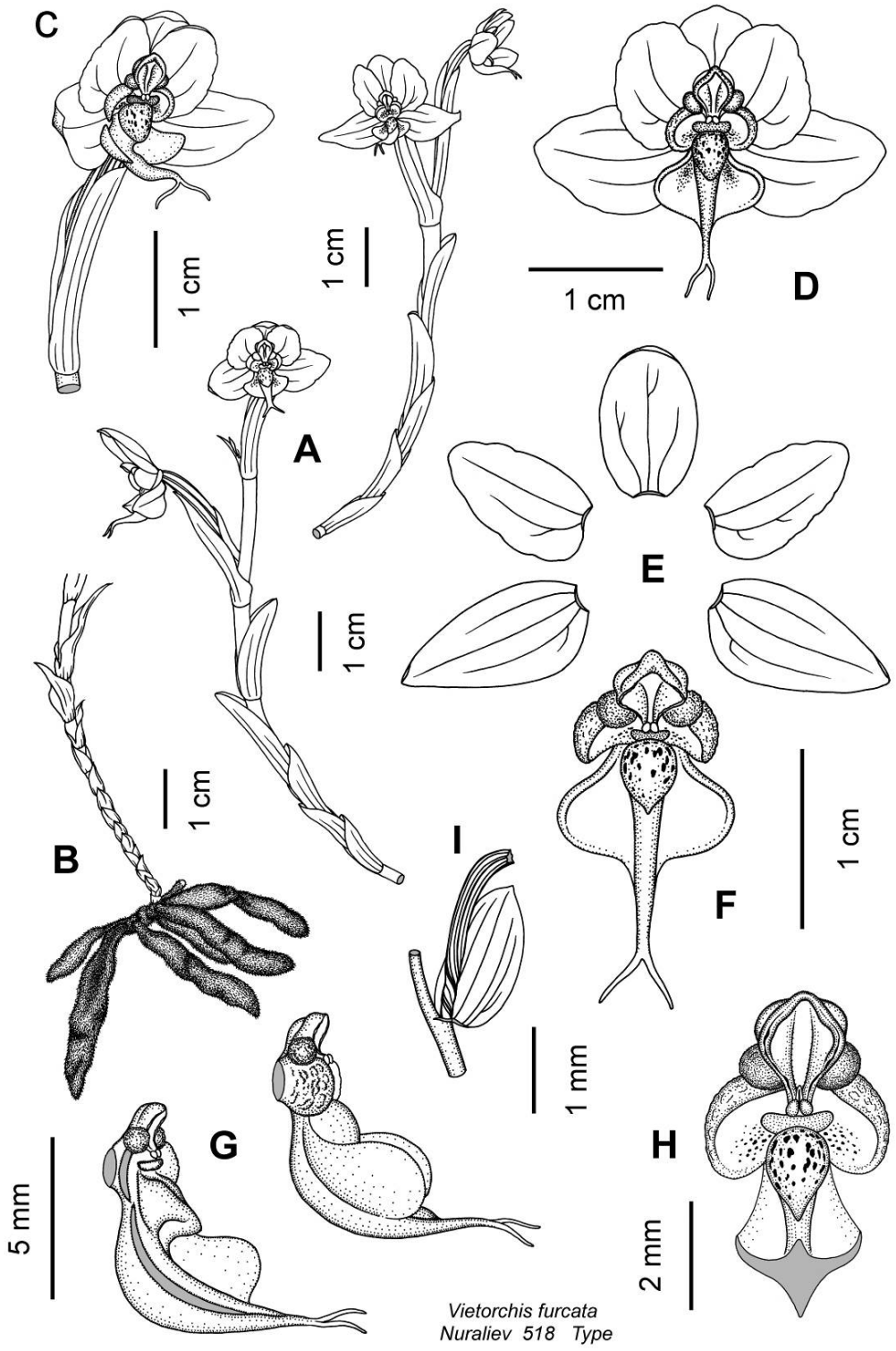

Fig. 1. *Vietorchis furcata*. A: Flowering plants (above-ground part). B: Basal and subterranean part of flowering plant. C: Flower with ovary covered by floral bract, half-side view. D: Flower, frontal view. E: Flattened sepals and petals. F: Column and lip, frontal view. G: Column and lip side views. H: Column and lip base, frontal view. I: Ovary and flattened floral bract. All drawn from the type – *Nuraliev 518* (except B - from paratype *Kuznetsov, Kuznetsova, Nuraliev 810*) by L.Averyanov.

Fig. 2. *Vietorchis furcata*. Flowering plants in natural habitat, flowers and column (type – *Nuraliev 518*). All photos of M.Nuraliev.

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越南南部發現的蘭科新種－*Vietorchis furcata*

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摘要：本文發表一種在越南南部發現的非光合作用蘭科植物*Vietorchis furcata*，並提供描述與手繪圖。本種的發現也為原本認為是單種屬的*Vietorchis*屬增添一員，本文也提供了檢索表與分類概要以供辨別此屬內的兩物種。*Vietorchis*屬與*Silvorchis*屬因為彼此特有的分類地位而歸類於Vietorchidinae亞族中。

關鍵詞：天然保護、蘭科、植物多樣性、植物分類學、越南、Vietorchidinae、*Vietorchis furcata*。