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RESEARCH ARTICLE

New Species of *Ophiopogon* and *Peliosanthes* (Asparagaceae) from Cambodia and Vietnam

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ABSTRACT: Two new species of *Ophiopogon* (*O. rupestris, O. tristylatus*) and one species of *Peliosanthes* (*P. cambodiana*) of Asparagaceae (Convallariaceae s. str.) discovered recently in southern Cambodia and in Vietnam are described and illustrated. All described species are probably local endemics with a restricted distribution. Data reported for each described species comprise a standard citation of type specimens, description, list of available paratypes, proposed species epithet etymology, data on ecology, phenology and distribution, as well as short taxonomic remarks.

KEY WORDS: Asparagaceae (Convallariaceae), Cambodia, Vietnam, new species, *Ophiopogon*, *Peliosanthes*, plant taxonomy, plant diversity.

INTRODUCTION

Recent botanical explorations in eastern Indochina have been disclosing anomalous species diversity in the family Asparagaceae (Convallariaceae s. str.). This is particularly true for such genera as *Ophiopogon* Ker Gawl. and *Peliosanthes* Andrews, whose described species dramatically rose in number in recent years as the results of active field explorations made in that area and as those of critical reexamination of herbarium materials so far collected from there (Tanaka, 1999a, 2000a, 2001, 2004; Averyanov, 2011; Averyanov, Tanaka, 2012, 2013). It is noticeable, that local floras in eastern Indochina very often include strictly endemic species of Convallariaceae having a very restricted distribution. Such species are likely to have been undiscovered due to their limited range and short flowering period. In areas hitherto not satisfactorily botanized, it is well expected that we further find out novelties.

In this paper three new species of Convallariaceae – *Ophiopogon rupestris, O. tristylatus* and *Peliosanthes cambodiana* discovered in botanically unexplored areas of Cambodia and Vietnam are described. These new species are listed below in alphabetical order. Data for each species comprise a standard citation of type specimens, list of available paratypes, description, etymology of proposed specific epithets, data on ecology and distribution, as well as short taxonomic remarks.

Ophiopogon rupestris Aver. et N.Tanaka, ***sp. nov.***
Fig. 1.

Described from northern Vietnam ("Phu Tho Prov., Tan Son Distr., Xuan Son Municipality, Du village, 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 of highly eroded solid marble-like limestone at elevations 400–600 m a.s.l. 16 February 2009, *L.Averyanov, P.K.Loc, N.T.Vinh, L.T.Son, HAL 12666*").

Type (Type specimen was prepared from cultivated plant – "October 2012, *L.Averyanov, HAL 12666a*") – LE (holotype); epitype - d-EXSICCATES OF VIETNAMESE FLORA *0196/HAL 12666* (Fig. 1).

Terrestrial perennial herb with short, erect, normally unbranching stem 5–10 cm tall, 1–1.5(2) cm in diam., covered by imbricate, narrowly ovate, papyraceous, dull yellowish-brown bracts, 3–7 cm long, with few rigid, semi-woody prop roots at base. Leaves 8–16, concentrated at stem apex, subdistichous, arching and shortly petiolate. Petiole broad, rigid, thick, recurved, 2–3 cm long, 4–5 mm wide. Leaf blade narrowly elliptic to broadly oblanceolate, often slightly oblique, (12)14–17(20) cm long, (3)3.5–4(4.5) cm wide, glabrous, coriaceous, uniformly dark grass green adaxially, light green-glaucous, with many parallel

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Fig. 1. *Ophiopogon rupestris* Aver. et N.Tanaka. Digital epitype: d-EXSICCATES OF VIETNAMESE FLORA *0196/HAL 12666* (all photos and design by L. Averyanov).

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white narrow stripes abaxially, obtuse to acute, entire along margins; main longitudinal veins indistinct 5–7; secondary veins hardly visible. Inflorescence a short sub-dense raceme with shortly distant fascicles of 2–3(4) flowers in axils of bracts; scape (peduncle) ebracteate, green to violet, 1–1.5(2) cm long, 2–2.5 mm in diam., straight; rachis of inflorescence straight or slightly flexuose, finely ridged, 2–5(7) cm long. Inflorescence bracts triangular, 3–5 mm long, 2.5–3.5 mm wide, attenuate, dull yellow-brown, often with violet tint. Floral bracts triangular, 0.5–1.5 mm long and wide, borne at base of each pedicel in axil of bract, light yellowish-brown, scarious along margin. Pedicels white, sometimes with light violet tint, straight to slightly arching, sub-perpendicular to rachis, terete, 2–4 mm long, 0.6–0.8 mm in diam., distinctly articulate with flower base at apex. Flowers lateral or cernuous, odorless, white, not much widely opening, campanulate, (4)5–6(7) mm across, 4–5 mm long. Perianth segments subsimilar, flat or with revolute margins, ovate, thick, 3–4(4.5) mm long, 2–2.5 mm wide, obtuse to rounded at apex. Anthers 6, light yellowish-green, sessile, introrse, slightly complanate narrowly conical, acute, placed at base of perianth segments, 2 mm long, 0.5–0.6 mm wide. Ovary inferior, obconical, 3.5–4 mm long, 2–3 mm wide at apex, slightly curved in basal portion, 3-locular; each locule containing 2 ovules on basal placenta; ovary apex concave at center; style erect, straight, cylindrical, slightly narrowed toward apex, 3(4) mm long, 0.3(0.4) mm in diam.; stigma shortly conical, entire to indistinctly minutely 3-lobed. Seeds ovoid, glossy blue.

Etymology: The specific epithet refers to rocky habitats of the species.

Ecology: On rocky limestone outcrops in primary broad-leaved evergreen humid forests developed on very steep slopes and on shady cliffs near mountain tops at elevations 400–600 m a.s.l. Flowers in cultivation in September–October, fruits in February. Not common.

Distribution: Northern Vietnam (Phu Tho province, Tan Son district). Endemic of limestone areas of northern Vietnam.

Notes: At the first sight, *Ophiopogon rupestris* somewhat resembles *O. tonkinensis* L.Rodr. in having coriaceous (narrowly) elliptic leaf blades (Tanaka, 1999b), and an inferior ovary. It differs, however, from the latter by the short erect stem bearing prop roots (vs. undeveloped stem with no prop root), shorter petiole, and sessile anthers (vs. anthers on short filaments; Tanaka, 1999b). It may also be near to *O. platyphyllus* Merr. et Chun in having a comparatively short stem and an inferior ovary, but it is distinguishable mainly by the (narrowly) elliptic leaf blade (vs. linear or broadly linear blade), and by the shorter perianth segments (Tanaka, 2000b).

Ophiopogon tristylatus Aver., N.Tanaka et Luu, ***sp. nov.*** Figs. 2 & 3.

Described from southern Vietnam ("Vietnam, Lam Dong Prov., Lac Duong Distr., Da Chais Municipality, near Giang Ly Forest Station around point 12°10'52''N, 108°42'44''E. Fertile and humid soil, near stream, under evergreen broad-leaved forest at elevation about 1700 m a.s.l.").

Type ("27 June 2012, *Luu Hong Truong, Pham Huu Nhan, Luu 923*") – SGN (holotype); epitype - d-EXSICCATES OF VIETNAMESE FLORA *0197/Luu 902* (LE)*, 923* (SGN).

Terrestrial perennial herb with short, erect, unbranching stem 3–4(5) cm tall, 5–8 mm in diam., leafy throughout and covered by loose, whitish, papyraceous bracts, with few rigid, semi-woody prop roots at base. Leaves more or less fasciculate, congested at stem apex, 10–16, arching, shortly petiolate. Petiole slender, rigid, recurved, 2–3 cm long, 1–2 mm wide, in basal half with broad, grey-whitish, papyraceous scarious wings embracing stem at base. Leaf blade elliptic, often slightly oblique, (5)6–9(11) cm long, 1–2(2.5) cm wide, glabrous, coriaceous, uniformly dark grass green adaxially, light green-glaucous, with many parallel white narrow stripes abaxially, obtuse to acute, entire or irregularly undulate along margins; main longitudinal veins indistinct 5–7; secondary veins hardly visible. Inflorescence a lax raceme; flowers unilateral, cernuous, 1–2(3) in axils of distant inflorescence bracts; scape (peduncle) ebracteate, olive-green to greyish-violet, 5–6(8) cm long, 1–2 mm in diam., straight or slightly arching; rachis of inflorescence straight, terete, 3–9(12) cm long. Inflorescence bracts narrowly triangular, 3–8 mm long, (1.5)2–3 mm wide, attenuate, dull greenish, often with violet tint along median vein, whitish, scarious along margins. Floral bracts narrowly triangular, to 1–2 mm long, borne at base of each pedicel in axil of inflorescence bract, light dull greenish, scarious, in apical part of inflorescence strongly reduced to very small, hardly recognizable palea. Pedicels white, sometimes with light violet tint, straight to slightly arching, sub-perpendicular to rachis, terete, 2–3.5(4) mm long, 0.5–0.6 mm in diam., distinctly articulate with flower base at apex. Flowers white, not much widely opening, rather campanulate, 5–6 mm long, 6–7(8) mm across. Perianth segments subsimilar, narrowly ovate, thick, 4–5 mm long, 1.8–2(2.2) mm wide, rounded at apex. Anthers 6, light green, shortly stalked, introrse, narrowly conical, slightly complanate, 2 mm long, 0.5–0.6 mm wide, acute; filaments trapeziform, 0.5 mm tall and wide, placed at base of perianth segments. Ovary semi-inferior, superior part tripartite, pyramidal, 0.5 mm tall, 1.5 mm wide, inferior

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Fig. 2. ***Ophiopogon tristylatus*** **Aver., N.Tanaka et Luu. Digital epitype: d-EXSICCATES OF VIETNAMESE FLORA** ***0197/Luu 902, 923*** **(all photos by Luu Hong Truong, design by L. Averyanov).**

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part slightly curved in basal portion, 3-locular, each locule containing 2 ovules on basal placenta; styles 3 (sometimes connate proximally into 1), erect, cylindrical, straight, 2–2.5 mm long, 0.2–0.3 mm in diam.; stigmas entire, shortly conical.

Etymology: The specific epithet refers to the 3 distinct styles of this species which are not found in any other congeners.

Ecology: Primary broad-leaved evergreen forests on humid fertile soils at elevations 1700–1900 m a.s.l., usually along humid mountain stream valleys. Flowers in June–July, fruits March. Not rare.

Distribution: Southern Vietnam (Lam Dong province, Lac Duong district). Endemic to Central Highlands in southern Vietnam.

Paratypes: Vietnam, Lam Dong Prov., Lac Duong Distr., Da Chais Municipality, near Giang Ly Forest Station around point 12°10’52’’N, 108°42’44’’E. Fertile and humid soil, near stream, under evergreen broad-leaved forest at elevation about 1700 m a.s.l., 27 June 2012, *Luu Hong Truong and Pham Huu Nhan, Luu 902, 924* (LE), *Luu 925* (HN), *Luu 926, 928, 929* (SGN), *Luu 930* (VNM); Lam Dong Prov., Lac Duong Distr., Da Chais Municipality, 30 km to NE from Dalat City. Primary closed evergreen broad-leaved forest on W macroslope of Bi Dup mountain system at 1700–1900 m a.s.l., around point 12°08'N 108°39'E. Terrestrial herb on steep shady slopes of deep wet stream canyon. Fruits deep blue, spheroid. Common. 24 March 1997, *L.Averyanov, N.Q.Binh, P.K.Loc, VH 3174* (HN, LE).

Notes: At the first glance, *Ophiopogon tristylatus* somewhat resembles *O. dracaenoides* (Baker) Hook.f. in having prop roots, (narrowly) elliptic leaf blades and lax racemes. It differs, however, by the shorter erect stem (vs. longer repent-ascending stem), leaves rather densely scattered on the stem (vs. leaves in distant fascicles on stem), semi-inferior ovary with a convex apex (vs. inferior ovary with a concave apex; Tanaka, 2000c), and 3 separate styles (vs. single style). The new species may also be near to *O. chingii* F.T.Wang et Tang (s. lat.) in having prop roots, scattered leaves on the stem and a convex semi-inferior ovary (Tanaka, 2000b), but differs from it by the shorter erect stem (vs. longer repent to sub-erect stem), narrowly elliptic leaf blades (vs. linear leaf blades), and 3 separate styles (vs. single style). From *O. rupestris*, it is distinguishable by its smaller leaves, longer scape (peduncle) and rachis of inflorescence surpassing the leaves, looser raceme with fewer flowers, narrowly ovate perianth segments (vs. ovate segments with a slightly narrower or subacute apex), anthers on short distinct filaments (vs. sessile anthers), convex semi-inferior ovary (vs. inferior ovary with a concave apex), and 3 separate styles (vs. single style).

As far as we know, *Ophiopogon tristylatus* is the sole species having 3 separate styles in all congeners of this genus. In this respect, it is quite a unique entity among them.

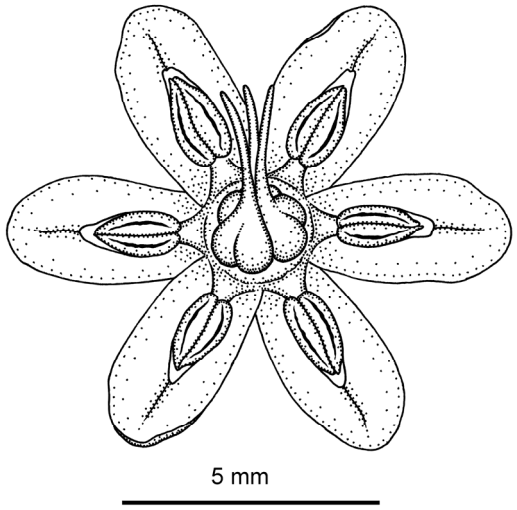


Fig. 3. *Ophiopogon tristylatus* Aver., N.Tanaka et Luu. Flower, frontal view (drawn from the paratype, *Luu 902* by L.Averyanov).

Peliosanthes cambodiana Aver. et N.Tanaka, ***sp. nov.***
Figs. 4 & 5.

Described from southern Cambodia (“Kampong Saom Prov., 7–9 km to the W. of Sihanoukville town, Kbal Chhay Waterfall area. Dry secondary evergreen broad-leaved forest on sandstone at elevations 50–100 m a.s.l., around point 10°38’611’’N 103°35’019’’E”).

Type (“26 November 2012, *M.Telepova, T.Maisak, L.Osinovets, I.Kutuzova, 967*”) – LE (holotype).

Terrestrial perennial herb with short, plagiotropic, few branching rhizome 2–3(5) cm long, 4–6 mm in diam., with numerous thick, rigid, semi-woody, densely clustering roots. Stem at apex of rhizome, erect, very short, 0.5–1 cm tall, covered with loose, broad, pale yellowish-brown, papyraceous, irregularly incised scales 0.5–1.5 cm long. Leaves erect to curved, petiolate; petiole rigid, straight or arching, (12)15–20(22) cm long; leaf blade elliptic, (10)12–16(18) cm long, (2.5)3–4(5) cm wide, glabrous, coriaceous, glossy dark green adaxially, dull green abaxially, obtuse to acute, finely papillose-serrulate along straight margin; with (5)7–9 distinct longitudinal veins and numerous subperpendicular secondary veinlets. Inflorescence hysteranthous, sub-dense raceme with many, spirally arranged flowers, 5–8(10) cm long; peduncle ascending-erect, white or white with light violet tint,

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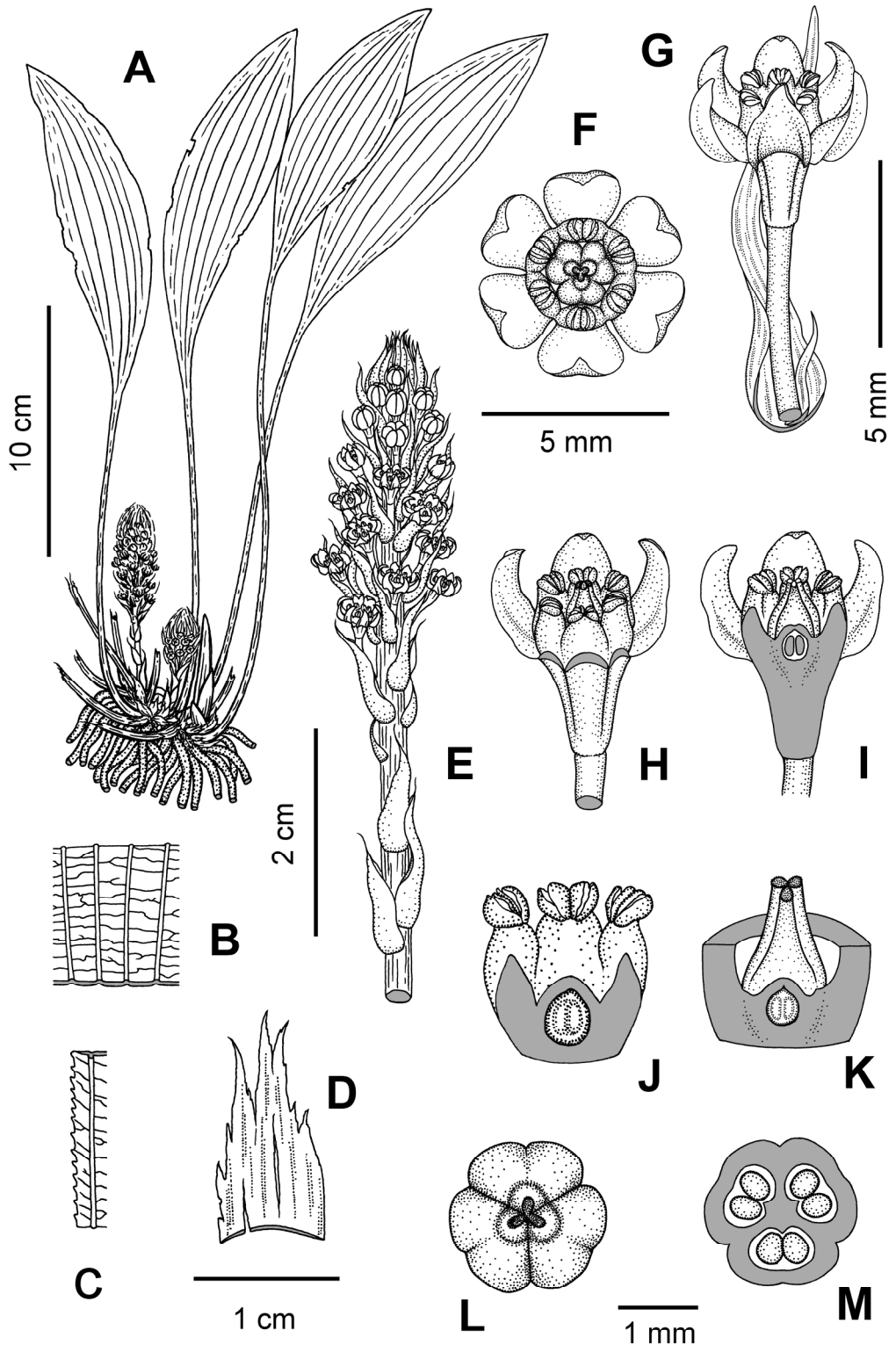


Fig. 4. ***Peliosanthes cambodiana*** **Aver. et N.Tanaka. A: Flowering plant. B: Character of leaf venation on abaxial leaf surface. C: Leaf margin. D: Stem bract. E: Inflorescence. F: Flower, frontal view. G: Floral bracts, pedicel and flower, side view. H: Flower with tepals partially removed, side view. I: Sagittal section of flower, side view. J: Corona, sagittal section of flower. K: Longitudinal section of ovary. l: Free part of ovary, view from above. M: Cross section of ovary in middle part (all drawn from the type -** ***M.Telepova et al. 967*****, coll. on 26 November 2012 by** ***L. Averyanov*** **and** ***T.Maisak*****).**

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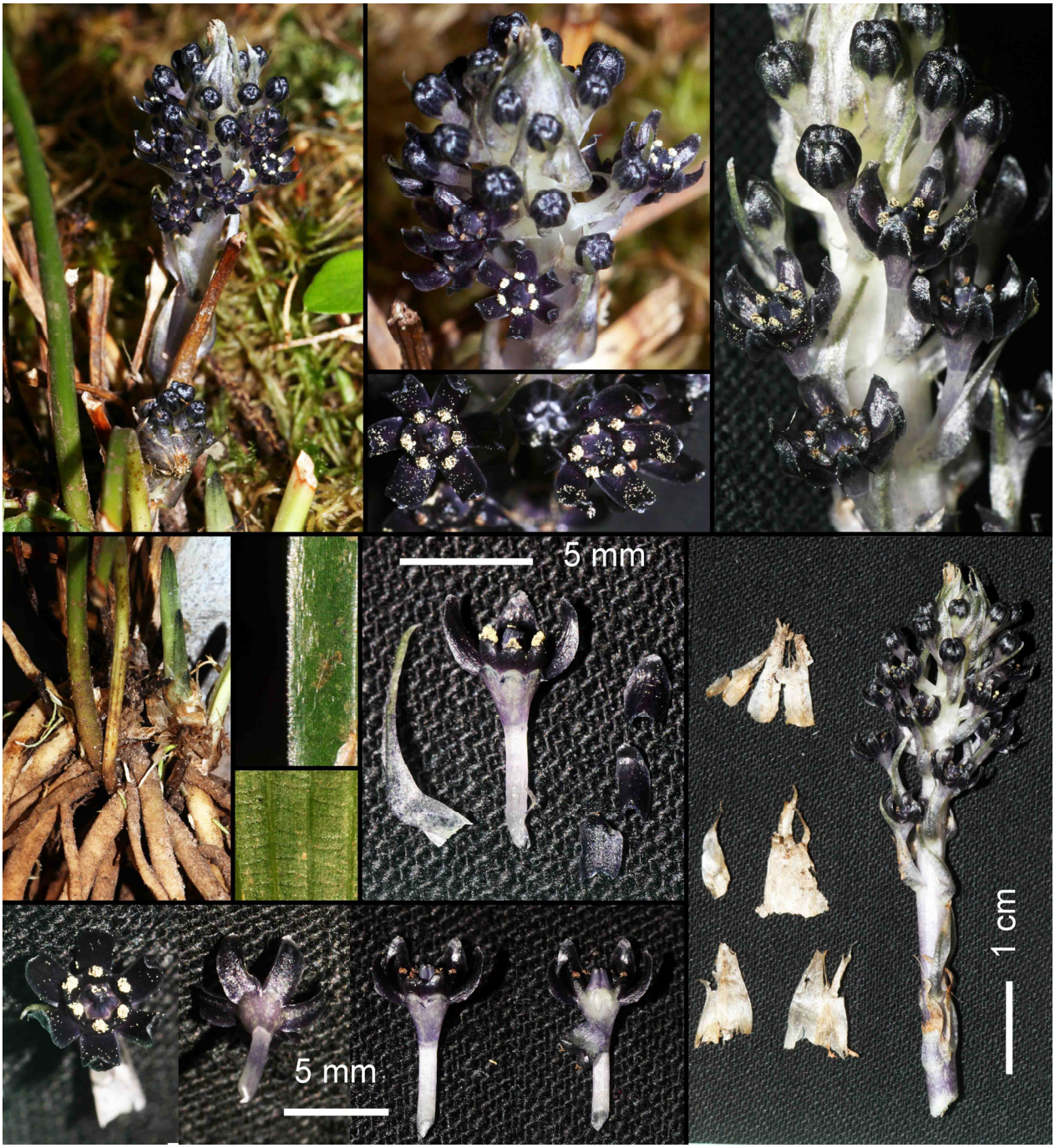


Fig. 5. *Peliosanthes cambodiana* Aver. et N.Tanaka. Type specimen, inflorescence and flowers *M.Telepova et al. 967*, coll. on 26 November 2012 (all photos and design by L. Averyanov).

straight, (1)2–3(4) cm long, 2.5–3.5 mm in diam.; sterile bracts on peduncle 4–6, distant, herbaceous, cuneate, acuminate, white, finely speckled with black-violet, 8–15 mm long, 2–3(4) mm wide at base; rachis straight, thick, white, (3)4–6(8) cm long. Floral bracts 2 at base of each pedicel, scarious, white, finely speckled with gray-violet, cuneate, gradually tapering into acute apex; outer bract (4)6–8 mm long, (0.8)1–2 mm wide; inner bract strongly reduced, much shorter, (0.5)1–3 mm long, 3–4(5) mm in diam. Pedicels white, with light violet tint, straight to slightly curved, suberect, ascending at acute angle to rachis, terete, (3)4–6 mm long, 0.6–0.8 mm in diam., distinctly articulate at apex. Flowers odorless, solitary per floral bract axil, at base articulated with pedicel, widely opening, 5–6(6.5) mm across. Perianth segments coal black with violet tint, subsimilar, strongly

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incurved, narrowly ovate to ovate, 2 mm long, 1–1.5 mm wide, obtuse or blunt, revolute along margins. Corona black to dark violet, shortly cylindrical, ring-shaped, fleshy, 2–2.2 mm across, apically with 6 triangular thick lobes bearing anthers; apical opening circular, 2–2.2 mm in diam. Anthers 6, dull yellow, introrse, globular-triangular, about 0.5–0.6 mm long and wide, sessile on apices of fleshy corona lobes. Ovary semi-inferior, base of flower narrowly obpyramidal, indistinctly hexagonal in section, 1.4–1.6 mm long, 1.5 mm wide, free part of ovary and style conical, 1.5 mm tall and wide, composed of 3 fused carpels thick and dark violet, stylar part trigonal, trisulcate; stigma entire, 3-lobed, lobes obovate, finely papillose, each 0.2–0.3 mm long. Fertile part of ovary 3-locular, each locule with 2 oblong-ovoid ovules on basal placenta.

Etymology: The specific epithet refers to the country of species origin.

Ecology: In rather open places in secondary evergreen shrubs and secondary evergreen broad-leaved forests on sandstone at elevations 50–100 m a.s.l. Flowers in cultivation in January. Not common.

Distribution: Southern Cambodia (Kampong Saom Province). Endemic of lowland areas of southern Cambodia.

Notes: *Peliosanthes cambodiana* is most close to *P. serrulata* L.Rodr. in having antrorse flowers and revolute perianth segments, but differs by the more strongly ascending pedicels, a staminal corona markedly 6-lobate distally, and more narrowly obconical-obpyramidal, longer perianth tube ca. 2 mm long. The new species also somewhat resembles *P. micrantha* Aver & N.Tanaka (Averyanov and Tanaka, 2013) from southern Vietnam in having a short scape (peduncle) and inflorescence of small flowers, but the latter species has descending fertile bracts, slightly nodding flowers, much shorter perianth tube, and perianth segments not revolute along margins. The new species may also be close to *P. cumberlegii* K.Larsen, but the latter appears to differ in having larger flowers with more strongly spreading perianth segments, a corona only slightly undulate distally, and an inferior ovary.

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LITERATURE CITED

Averyanov, L. V. 2011. *Peliosanthes yunnanensis* and *Trichosma yanshanensis* - New Additions to the Flora of Vietnam. Taiwania **56**: 143–148. doi: 10.6165/tai.2011.56(2).143

Averyanov, L. V. and N. Tanaka. 2012. New Species of *Peliosanthes* and *Tupistra* (Asparagaceae) from eastern Indochina. Taiwania **57**: 153–167. doi: 10.6165/tai.2012.57(2).153

Averyanov, L. V. and N. Tanaka. 2013. New species of *Peliosanthes* (Asparagaceae) from Vietnam. Turczaninowia **15**, 4: 000 (in print).

Tanaka, N. 1999a. Taxonomic notes on *Peliosanthes* (Convallariaceae). Acta Phytotax. Geobot. **50**: 147–155.

Tanaka, N. 1999b. Taxonomic notes on *Ophiopogon* of south Asia III. J. Jap. Bot. **74**: 261–267

Tanaka, N. 2000a. Taxonomic notes on *Ophiopogon* of south Asia VIII. J. Jap. Bot. **75**: 265–269.

Tanaka, N. 2000b. Taxonomic notes on *Ophiopogon* of south Asia VI. J. Jap. Bot. **75**: 69–79.

Tanaka, N. 2000c. Taxonomic notes on *Ophiopogon* of south Asia V. J. Jap. Bot. **75**: 127–136.

Tanaka, N. 2001. Taxonomic notes on *Ophiopogon* of south Asia X. J. Jap. Bot. **76**: 11–19.

Tanaka, N. 2004. A new species of *Peliosanthes* (Convallariaceae) from Vietnam and China. Kew Bull. **59**: 157–159.

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自越南與柬埔寨發現的沿階草屬與球子草屬（天門冬科）新種

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摘要：本文發表三個新物種，分別自越南與柬埔寨南部發現的兩種沿階草（*O. rupestris, O. tristylatus*），及一種球子草（*P. cambodiana*）；本文除提供物種的分類描述與圖片外，也提供每個物種所引用的模式標本資訊、副模標本清單、種小名之來源和生態資訊以供辨別。這三個物種很有可能都是特有種且分布範圍狹窄。

關鍵詞：天門冬科、柬埔寨、越南、新種、沿階草屬、球子草屬、植物分類學、植物多樣性。

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