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A New Species and Two New Records of *Ophiopogon* and *Peliosanthes* (Asparagaceae) in the Flora of Laos

Leonid V. Averyanov[(1)*], Noriyuki Tanaka[(2)], Khang Sinh Nguyen[(3)] and Eugene L. Konstantinov[(4)]

1. Komarov Botanical Institute, Russian Academy of Science, St. Petersburg, Prof. Popov Str., 2, Russia, RU–197376.
2. 98–11, Otsuka, Hachioji, Tokyo, 192-0352, Japan.
3. Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Ha Noi, Vietnam; and Key Laboratory of Plant Resources Conservation and Sustainable Utilization, South China Botanical Garden, Chinese Academy of Sciences, Guangzhou 510650, P. R. China; University of Chinese Academy of Sciences, Beijing 100049, P. R. China.
4. Kaluga State University, Kaluga, Stepan Razin str., 26, Russia, RU–248023.
** Corresponding author: av_leonid@mail.ru; av_leonid@yahoo.com*

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ABSTRACT: One species of *Peliosanthes* from Laos, named *P. irinae*, is described as new to science. This species is quite unusual especially in having a thick fleshy inflorescence rachis to which sessile flowers are sparsely adpressed. *Ophiopogon griffithii* and *Peliosanthes sinica* are also recorded as new to the flora of Laos. Taxonomic accounts of these species including illustrations are provided.

KEY WORDS: Laos, new species, *Ophiopogon*, *Peliosanthes*, plant diversity, plant taxonomy.

INTRODUCTION

In Asia, there still remain vast areas of which the flora is insufficiently explored. Among others, our current knowledge of the flora of the Lao People's Democratic Republic still stays rather poor. Geographically the country lies in the tropical to subtropical zone of Southeast Asia, which is blessed with a warm climate with an ample amount of rainfall, and this situation promises for the development of a luxuriant vegetation and a rich flora. Recently, an attempt at making an inventory of the vascular plants of Lao PDR was made by Newman et al. (2007). Their number of species is likely to further increase in the future if more intensive surveys are conducted over wider areas of that country because the neighboring regions (Vietnam, Cambodia and the province of Yunnan in China) are known to hold very rich floras (regarding *Ophiopogon* and *Peliosanthes* in these regions, see Yang 1997; Tanaka 1999a, 2000, 2001, 2004; Averyanov and Tanaka 2012, 2013; Averyanov et al. 2013, 2014, 2015a, b; Tanaka et al. 2013). In the near future we may find that the species diversity present in Lao PDR is not at all less wealthy than that of the adjacent countries.

Recently, we had opportunities to carry out floristic surveys in Laos. During the surveys we discovered a new species named *Peliosanthes irinae* here, which is rather unusual and seems to be taxonomically remote from any of its congeners. We also found two further species, *Ophiopogon griffithii* and *Peliosanthes sinica*, which have hitherto not been recorded from that country. We consider it essential, especially at this stage, to accumulate basic facts and records in order to elucidate the still largely mysterious flora of Laos.

This paper focuses on the new species as well as the two other species new to the flora of Laos. Their taxonomic accounts, including illustrations, field records and notes, are provided herein.

TAXONOMIC TREATMENT

Ophiopogon griffithii (Baker) Hook.f., Fl. Brit. India 6: 270, 1892; N. Tanaka, J. Jap. Bot. 74 324, 1999b. - *Flueggea griffithii* Baker, J. Linn. Soc., Bot. 17: 502, 1879. - *Mondo japonicum* var. *griffithii* (Baker) Farw., Amer. Midl. Nat. 7: 42, 1921. Described from NE. India ("Upper Assam, Patkaye hills, alt. 4500 ft."). Type ("*W. Griffith 5839*") - K! = *O. revolutus* F. T. Wang & L. K. Dai, Fl. Reipubl. Popul. Sin. 15: 253, 156, t. 52, fig. 1–3, 1978. Described from southern China ("China: Yunnan: Jinghong, 1000–1900 m"). Type ("*C.W. Wang 79252*") - PE. Figs. 1A–C.

Habitat, phenology and conservation status: Terrestrial rosulate herb with short underground rhizome. Usually on shady steep N-facing slopes in dry and rather open, primary or secondary broad-leaved evergreen or semideciduous submontane forests on rocky solid limestone. Elevation 700–900 m a.s.l. Fl.: September – November. Locally common. Estimated IUCN Red List status -LC.

Distribution: Central Laos, Vientiane Province (Kasi Districts); NE. India; Central Myanmar; N.

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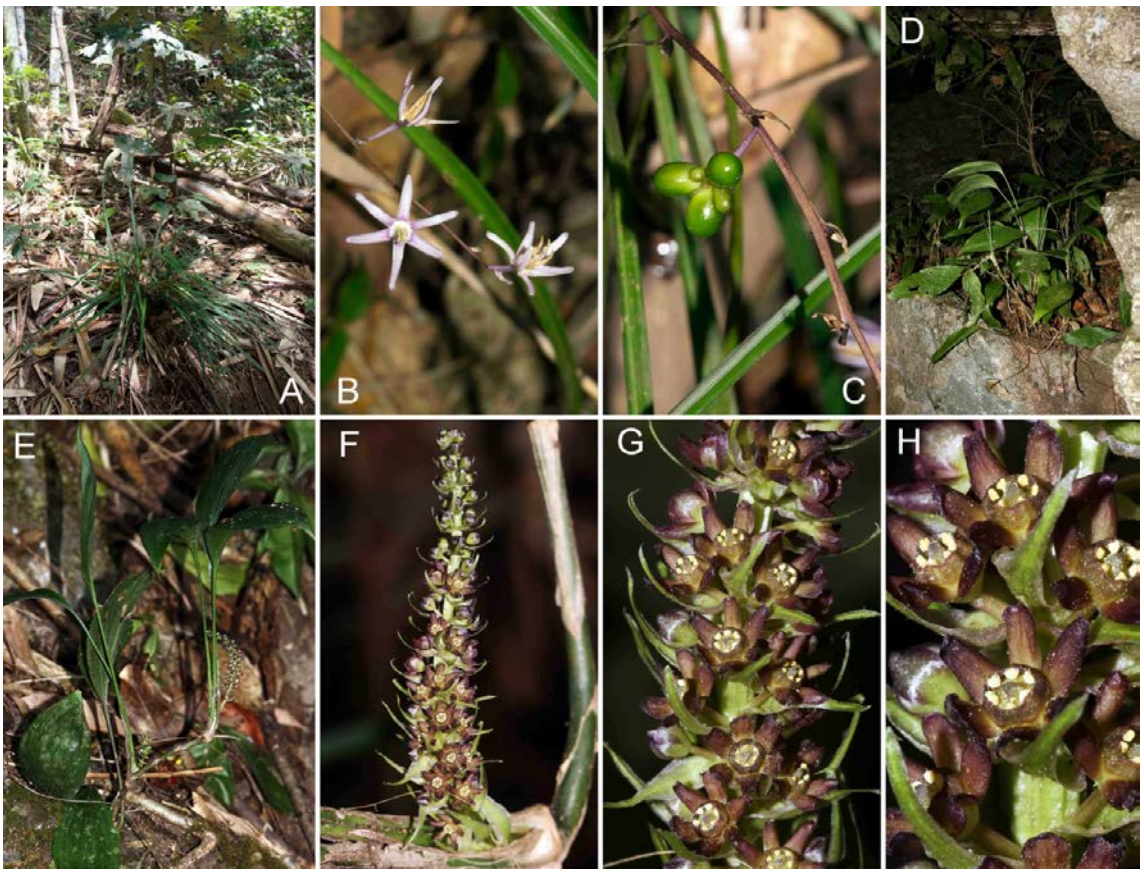


Fig 1. *Ophiopogon griffithii* (Baker) Hook.f. A – plant in natural habitat. B – Flowers. C – young seeds (*K284*). *Peliosanthes sinica* F. T. Wang & Tang. T – plant in typical habitat (*VN 434*). E – flowering plant in natural habitat. F–H – inflorescence and flowers (*LA-VN 723*). Photos by L. Averyanov and E. Konstantinov, correction and design of photographic plate by L. Averyanov.

Thailand and S China (SW. Yunnan).

Studied specimens: **LAOS**: Central Laos, Vientiane Province, Kasi district, Kasi town area, Khuang Lang Cave, around point 19°18.026'N 102°31.221'E, dry broad-leaved forest on rocky solid limestone with *Arenga westerhoutii* Griff., *Croton argyratus* Blume, *Ficus religiosa* L., *Pometia eximia* Bedd. and *Tetrameles nudifora* R.Br. at elevation of about 800 m, 25 October 2014, *E. Konstantinov, K284* (LE).

Notes: *Ophiopogon griffithii* is variable especially as to the width of leaves (Tanaka 1999b). The plants with comparatively wide leaves occur in NE India, central Myanmar, and S China, while those with narrow leaves occur in W Myanmar, N Thailand, central Laos, and S. China. As shown in Fig. 1B, it is characterized by the spreading, slightly recurved, linear-lanceolate tepals and narrowly linear-triangular anthers which are often laterally adherent. Chen and Tamura (2000) included *O. griffithii* in *O. intermedius* D. Don, but these are to be regarded as different entities. The present discovery of *O. griffithii* in Laos not only extends its geographical range further southeast, but also implies the strong floristic relationship between central Laos and the other regions so far known as the habitats of the species.

Peliosanthes irinae Aver. & N. Tanaka, ***sp. nov.***

Described from central Laos ("Vientiane province, Vang Vieng district, Nathong village, about 5 km to the W of Vang Vieng town, Tham Kang Mt., around point 18°55'51.4"N 102°23'50.6"E at elevations 300–400 m, 14 March 2013, *N. T. Hiep, L. Averyanov, N. S. Khang, P. V. The, S. Lorphengsy, LA-VN 421*"). Type: herbarium specimen prepared from cultivated plant on 6 March 2015 by *L. Averyanov, LA-VN 421a* - LE (holotype). Epitype - d-EXSICCATES OF VIETNAMESE FLORA *0225/LA-VN 421* Fig. 2

Terrestrial, rhizomatous, clustering, perennial herb. Rhizome subterranean, erect to suberect, often many branched, (1)1.5–2.5(3.5) cm long, bearing many, fleshy to semi-woody, dull brownish, rather straight thick roots covered densely with short brownish root hairs. Stems ascending to erect, 5–10 mm tall, covered densely with white to dull yellowish papyraceous or scarious scales (cataphylls). The scaly leaves at anthesis

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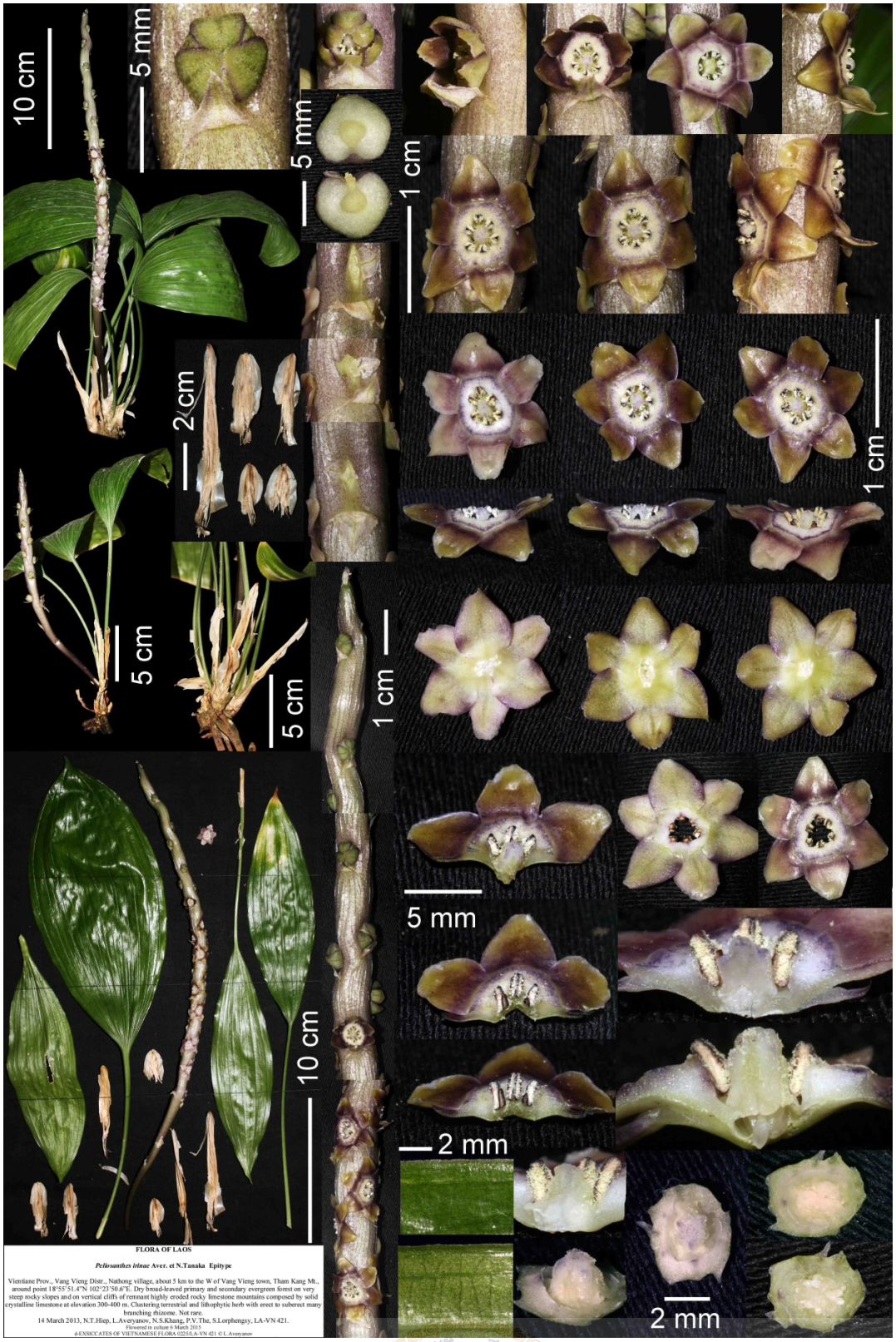


Fig 2. *Peliosanthes irinae* Aver. & N. Tanaka. Epitype – d-EXSICCATES OF VIETNAMESE FLORA 0225/LA-VN 421.

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oblong ovate to triangular lanceolate, broadly obtuse, papyraceous with scarious wing-like margins, slightly conduplicate or almost flat, spirally and loosely arranged, (1)2–8(10) cm long, (4)5–10(14) mm wide. Leaves suberect to arching, petiolate, (30)50–70(80) cm tall; petiole rigid, slightly curved, (15)25–35(45) cm long; leaf blade narrowly to broadly elliptic, narrowing equally to the base and to the shortly acuminate or acute apex, margins entire, edged with row of colorless hyaline cells, glabrous, glossy, uniformly green on both sides, (15)20–30(35) cm long, (3)5–10(12) cm wide; longitudinal veins many, prominent, crossed sub-perpendicularly with many dichotomously branching transversal veinlets. Flowering stem (scape) arising laterally from mature rhizome, peduncle and rachis narrowly fusiform, dark olive green to dirty violet with many fine violet streaks, bearing lax spike distally; peduncle ascending to erect, stout, inflated distally, (6)8–10(12) cm long, 5 mm in diam. at base and about 10 mm in diam. at apex; sterile bracts on peduncle 1–2(3), triangular, shortly acuminate, whitish, scarious, (5)6–8(10) mm long and (3.5)5–6(7) mm wide; rachis loosely many-flowered, thick, fleshy, succulent, hollowed at floral base, often slightly zigzag distally, finely striate longitudinally, (12)15–25(30) cm long, (7)8–10(12) mm in diam. Floral bracts 2, triangular, acute, white, scarious, 1-veined; bract located below flower, (3)4–5(6.5) mm long and wide, erect or ascending at early stages when flower staying as bud, later becoming descending with opening of flower; bracteole located lateral to flower, subsimilar to bract in shape, twice smaller, (1.2)2–2.5(3) mm long and wide. Flowers odorless, borne in pits, sessile, tightly adpressed to rachis, broadly open, (10)11–12(12.5) mm across; basal syntepalous part broadly obconical, (2.5)3(3.5) mm across, 0.5–1 mm long, base solidly fused with rachis. Perianth segments 6, subsimilar, dirty pale brown-violet, explanate to slightly recurved, blunt or truncate at apex, margins entire or irregularly slightly denticulate and undulate, broadly triangular ovate, (1.8)2(2.2) mm long and wide; outer segments a little longer and obtuse at apex, largely covering inner segments while flower staying as bud. Corona white, with sparse violet markings on periphery, indistinctly hexagonal, (2.8)3(3.4) mm across, nearly flat, inner margin almost vertical, the orifice (1.4)1.6–1.8(2) mm in diam., with 6 teeth. Anthers 6, sessile, introrse, inserted at distal inner vertical margin of corona, oblong ovoid, (1.6)1.8(2) mm long, 0.6–0.8 mm wide, black, pollen grains white. Ovary half-inferior, free part (style) shortly cylindric or broadly conic, longitudinally 6-angulate, 2–2.2 mm high, 1.8–2 mm across, broadened toward base, obscurely 3-lobed, massively fused with inner basal syntepalous part of perianth, the interior of inferior part of ovary imperfectly partitioned into 3 chambers by 3 fleshy septa; each chamber slightly open with narrow longitudinal slit at central axial portion of ovary, containing (3)4(5) ovules on basal placenta; stigma 3-partite, the lobes narrowly obovate, finely papillulate, white with dull violet markings. Seeds unknown.

Etymology: The specific epithet is named after Mrs. Irina Kutuzova, a staff member and a professional gardener of the Komarov Botanical Institute of the Russian Academy of Sciences, who skillfully kept our living plant collections for our research.

Habitat, phenology and conservation status: Terrestrial and lithophytic clustering herb with underground rhizome. Common on shady, very steep slopes in dry, primary or secondary broad-leaved evergreen forests on rocky solid limestone. Elevation 300–400 m a.s.l. Flower in cultivation: February – May. Not rare. Estimated IUCN Red List status – LC.

Distribution: Central Laos: Vientiane Province (Vang Vieng District). Endemic.

Notes. *Peliosanthes irinae* is characterized by a unique combination of features such as thick fleshy rachis, triangular bracts, sparse sessile flowers which are tightly adpressed to the rachis, a nearly flat corona of which the basal rim is distinctly demarcated from the perianth segments, and comparatively large anthers. The thick fleshy rachis and sessile flowers are no doubt derived, specialized character states. Further, the rachis becomes a bit juicy and sweetish toward the end of anthesis. These specialized character states are likely to serve as effective means for attaining a successful sexual reproduction and have evolved as a result of adaptation to some kinds of insects.

This new species is so unusual that its affinity with other species is unknown at present. It has some resemblance with *P. subcoronata* N. Tanaka, also described from Laos (Tanaka 1999a), in having large anthers, but differs markedly in various other respects. Further field surveys may disclose the existence of the missing link between these unusual species.

Peliosanthes sinica F. T. Wang & T. Tang, in Fl. Reipubl. Popul. Sin. 15: 253, 1978; Chen Xinqi, M. N. Tamura, in Fl. China 24: 261, 2000. Described from S. China ("Yunnan: sine loco."). Type ("Exp. comb. Yunnan. 8178") - PE. Figs. 1D–H.

Habitat, phenology and conservation status: Terrestrial, erect or creeping herb to 0.6 m tall. Common on shady, very steep slopes in primary or old secondary broad-leaved evergreen submontane forests on rocky solid limestone or shale. Elevation 300–900 m a.s.l. Fl.: April–May. Locally common. Estimated IUCN Red List status -LC.

Distribution: Northeastern and central Laos: Xiangkhouang (Kham District), Houphan (Hem District)

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and Vientiane provinces (Vang Vieng and Kasi districts). S. China (S. Guangxi and S. Yunnan).

Studied specimens: **LAOS**: North-eastern Laos, Xiangkhouang province, Kham district, Huad village, Phou tat Vinh mt., around point 19°32'31.6'N 103°39'40.4'E, primary or secondary broad-leaved evergreen or semideciduous dry forest on very steep slopes of highly eroded mountain composed of solid marble-like limestone at elevations 1200–1400 m a.s.l., terrestrial erect to arching herb with stem to 0.5 m long in shady place, flowers dark violet-brown, common, 4 April 2015, *N.T.Hiep, L.Averyanov, N.S.Khang, N.Q.Hieu, T.Maisak, Pheng Phengsintham LA-VN 1074* (CPC Herbarium, LE, NHOL, NUOL). North-eastern Laos, Houphan province, Hem district, Na Puok village, Pu Tham Nhon Mountain around point 20°10'00.0"N 103°24'37.0"E, dry primary or secondary broad-leaved evergreen forest on very steep slopes of highly eroded mountain composed of solid marble-like limestone at elevations 1050–1150 m a.s.l., terrestrial herb with semi-woody stem to 0.5 m tall on steep shady slope, Occasional, 11 April 2015, *N.T.Hiep, L.Averyanov, N.S.Khang, N.Q.Hieu, T.Maisak, Pheng Phengsintham LA-VN 1344* (CPC Herbarium, LE, NHOL, NUOL). North-eastern Laos, Houphan province, Hem district, Nacoc village, Pu He Mountain, around point 20°10'36.7"N 103°11'39.2"E, open dry secondary broad-leaved evergreen forest with bamboo on very steep slopes of mountain composed of shaly limestone at elevations 700-900 m a.s.l., terrestrial herb on steep shady slope to 0.5 m tall, flowers dark brown-violet, locally common, 12 April 2015, *N.T.Hiep, L.Averyanov, N.S.Khang, N.Q.Hieu, T.Maisak, Pheng Phengsintham LA-VN 1378* (CPC Herbarium, LE, NHOL, NUOL). Central Laos, Vientiane province, Vang Vieng district, Phol Xai village, about 8 km to the W. of Vang Vieng town, Phar Poon Mt., around point 18°56'11.5"N 102°20'05.0"E, shady dry primary or secondary broad-leaved evergreen forest on very steep rocky slopes and on vertical cliffs of remnant highly eroded mountain composed of solid crystalline limestone at elevations 300–900 m, terrestrial herb with erect, not branching stem to 0.6 cm tall, leaves dull green on both sides, fruits glossy blue, ovoid, 0.8–1 cm long, common at elevations of 300–800 m, 15 March 2013, *N. T. Hiep, L. Averyanov, N. S. Khang, P. V. The, S. Lorphengsy LA-VN 434* (CPC Herbarium, LE, NHOL, NUOL). Central Laos,Vientiane province, Kasi district, Thong Mout village, Num Pong Mt., around point 19°21'46.9"N 102°09'29.8"E, occasional in shady primary or secondary broad-leaved evergreen forest on steep shale slopes along stream at elevation of about 900 m, terrestrial creeping herb, tepals and corona brown, 22 March 2013, *L. Averyanov, N. S. Khang, S. Lorphengsy LA-VN 723* (CPC Herbarium, LE, NHOL, NUOL).

Notes: This creeping species has hitherto been known only from southern Yunnan and Guangxi, China. Our discovery of this species in Laos extended its geographical range further south. At the same time, it suggests the presence of a close floristic and environmental similarity between Laos and those regions of southern China. A comparison of this species with two other close congeners *P. pachystachya* W. H. Chen & Y. M. Shui and *P. minutiflora* N. Tanaka, J. Murata & S. K.Wu is made in Tanaka et al. (2013).

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