

New and rare orchid species (*Orchidaceae*) in the flora of Cambodia and Laos

Новые и редкие виды орхидных (*Orchidaceae*) во флоре Камбоджи и Лаоса

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Abstract. The herbarium material collected in 2012–2017 in Cambodia and Laos provides data on 281 new localities of 110 orchid species from 48 genera for Laos, and 4 new localities of 4 species from 4 genera for Cambodia. Among them, 3 species present new records for the flora of Cambodia (*Eria ochracea* Rolfe, *Luisia macrotis* Rchb. fil., *Trichoglottis seidenfadenii* Aver.); 1 genus (*Abdominea* J. J. Sm.), and 13 species are new to the flora of Laos (*Abdominea minimiflora* (Hook. fil.) J. J. Sm., *Bulbophyllum nanopetalum* Seidenf., *Chiloschista parishii* Seidenf., *Cleisostoma tricornutum* Aver., *Didymoplexis vietnamica* Ormerod, *Gastrochilus hainanensis* Z. H. Tsi, *Hetaeria alata* Ridl., *Malleola seidenfadenii* Christenson, *Phaius takeoi* (Hayata) H. J. Su, *Sarcoglyphis yunnanensis* Z. H. Tsi, *Schoenorchis fragrans* (E. C. Parish et Rchb. fil.) Seidenf. et Smitinand, *Thrixspermum fragrans* Ridl., *T. hystrix* (Blume) Rchb. fil.). One new species is described, *Bulbophyllum pseudorufinum* Aver. The reported data provide a substantial basis for the understanding of the present-day distribution of rare species in Eastern Indochina.

Keywords: *Orchidaceae*, Cambodia, Laos, flora, plant diversity.

Аннотация. Гербарные сборы 2012–2017 гг. документируют 281 новое местонахождение 110 видов орхидных, входящих в 48 родов, для Лаоса, и 4 новых местонахождения 4 видов из 4 родов — для Камбоджи. Из них 3 вида являются новыми для флоры Камбоджи (*Eria ochracea* Rolfe, *Luisia macrotis* Rchb. fil., *Trichoglottis seidenfadenii* Aver.); 1 род (*Abdominea* J. J. Sm.) и 13 видов — новыми для флоры Лаоса (*Abdominea minimiflora* (Hook. fil.) J. J. Sm., *Bulbophyllum nanopetalum* Seidenf., *Chiloschista parishii* Seidenf., *Cleisostoma tricornutum* Aver., *Didymoplexis vietnamica* Ormerod, *Gastrochilus hainanensis* Z. H. Tsi, *Hetaeria alata* Ridl., *Malleola seidenfadenii* Christenson, *Phaius takeoi* (Hayata) H. J. Su, *Sarcoglyphis yunnanensis* Z. H. Tsi, *Schoenorchis fragrans* (E. C. Parish et Rchb. fil.) Seidenf. et Smitinand, *Thrixspermum fragrans* Ridl., *T. hystrix* (Blume) Rchb. fil.). Один вид, *Bulbophyllum pseudorufinum* Aver., описан в качестве нового для науки. Полученные данные вносят значимый вклад в современное представление о распространении редких исчезающих растений восточного Индокитая.

Ключевые слова: *Orchidaceae*, Камбоджа, Лаос, флора, разнообразие растений.

The orchid flora of Cambodia and Laos remains poorly studied until now compared to other floras of Mainland Asia. About 200 orchid species totally were

recorded in Cambodia (Seidenfaden, 1992; Averyanov, 2013; Leti et al., 2013; Schuiteman, 2016; Schuiteman et al., 2008, 2015; Tagane et al., 2015; Hu et al., 2017;

Orchidcambodia, 2018), and about 530 species in Laos (Newman et al., 2007; Schuiteman et al., 2008; Averyanov, 2013). At the same time, the documented relatively well studied orchid floras in neighbouring countries number much more species now: at least 1243 in Vietnam (Averyanov et al., 2018), and about 1100 in Thailand (Schuiteman, de Vogel, 2000). Meanwhile, natural conditions are rather similar in all mentioned countries. It is important that Cambodia and especially Laos still retain relatively large areas of primary vegetation with various intact habitats. Even taking into account the smaller area of these countries compared to Vietnam and Thailand, the total number of orchid species can presumably be similar or at least comparable. The review of the earlier data and some new discoveries were presented in a series of recent publications (Schuiteman, Bonnet, 2009; Averyanov, 2013, 2016; Groß et al., 2014; Gale et al., 2016; Kumar et al., 2016, 2018; Gale, Phaxaysombath, 2017). However, the orchid floras in Cambodia and Laos are still far from acceptable inventory and understanding.

This paper continues the publication (Averyanov, 2013, 2016) of new data obtained during field studies in remote poorly studied regions of Cambodia and Laos mostly in 2012–2017. It provides 281 new localities of 110 species from 48 genera for Laos and 4 new localities of 4 species from 4 genera for Cambodia.

In the following list of the localities, abbreviated and unified texts of herbarium labels are cited, including geographical location, coordinates, elevation, collection date and collectors' names. The localities are arranged in an alphabetic order of countries (Cambodia, then Laos); within Laos in an alphabetic order of provinces, then districts; within the districts — chronologically. The standard abbreviations used are: Prov. (province), distr. (district), elev. (elevation, elevations), Mt. (mountain, mountains). Coordinates are rounded to minutes (or decimal values) to conceal exact localities of rare species.

CAMBODIA

1 — Sianukwille town area, to the N of Sianukwille town, Kaoh Rong Samoloem Khong Island in Siam Gulf, low hills around point 10°37' N 103°19' E, dry evergreen lowland forest, 20 XI 2011, T. Maisak et al.

2 — Sianukwille town area, to the N of Sianukwille town, Kaoh Rong Samoloem Khong Island in Siam Gulf, low hills around point 10°37' N 103°19' E, dry evergreen lowland forest at elev. about 78 m, 30 XI 2012, T. Maisak et al.

3 — Kampong Speu Prov., Aoral Mt., 11°45.5' N 104°07.3' E, 23 XI 2012, T. Maisak et al.

4 — Kampot Prov., Phnom Bokor National Park, 10°38.0' N 104°01.0' E, 21 XII 2012, E. Konstantinov et al.

LAOS

Bolikhamsai Prov.:

5 — [Thaphabat distr.,] Phou Khao Khouay National Protected Area, Tad Xay, Pha Xay waterfall, Buffalo Horn Mt., 18°27' N 103°08' E, 343 m, 5–11 XI 2016, N. Orlov, L. Ioganssen.

6 — Thaphabat distr., Tad Xay, Phou Khao Khouay National Protected Area, Pha Xay waterfall, Buffalo Horn Mt., around point 18°27' N 103°08' E, at elev. about 340 m, 26–30 XI 2016, N. Orlov, L. Ioganssen.

7 — Thaphabat distr., Nam Bon village, Phou Khao Khouay National Park, Tad Xai waterfall, around point 18°27' N 103°08' E, degraded primary and secondary evergreen dry forest along river on eroded sandstone at elev. about 340 m, 11 IV 2017, L. Averyanov et al.

Champasak Prov.:

8 — Bolaven Plateau, road Paksong — Ban Houay Kong, 1170 m, 15°14.2' N 106°25.7' E, 26 XI 2015, E. Konstantinov et al.

9 — Bolaven plateau, road Paksong — Thateng, to north from Paksong, around point 15°24.0' N 106°21.4' E, at elev. 1030 m, S slope, 16 XII 2015, E. Konstantinov, T. Vongsa.

Houa Phang Prov.:

10 — Xon distr., Hay Lao village, around point 20°33' N 103°83' E, at elev. around 850 m, 6–11 XI 2017, N. Orlov, L. Ioganssen.

11 — Xon distr., Hay Lao village, around point 20°34' N 103°83' E, at elev. around 850 m, 6–11 XI 2017, N. Orlov, L. Ioganssen.

Kham Mouan Prov.:

12 — Bounlapha distr., Thong Sam village, Hin-nam No Protected Area, Pu Pha Song Mt. composed by sandstone, around point 17°35' N 105°48' E, primary evergreen broadleaved and mixed forest on W macro-slope, at elev. about 800 m, 9 III 2013, L. Averyanov et al.

Luang Prabang Prov.:

13 — Ngoy distr., Nong Khiew village, Ta Nang Non Mt. around point 20°33' N 102°37' E, secondary semi-deciduous and evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 600–650 m, 31 III 2017, L. Averyanov et al.

14 — Ngoy distr., Nong Khiew village, Pha Deng Mt., around point 20°34' N 102°38' E, secondary semi-deciduous and evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly

eroded limestone at elev. 700–800 m, 31 III 2017, L. Averyanov et al.

15 — Ngoy distr., Nong Khiew village, Pha Deng Mt., around point 20°34' N 102°38' E, secondary semi-deciduous and evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 700–850 m, 31 III 2017, L. Averyanov et al.

16 — Ngoy distr., Ngoy village, Pha Noi Mt., around point 20°43' N 102°41' E, remnants of primary evergreen forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 400–450 m, 1 IV 2017, L. Averyanov et al.

17 — Ngoy distr., Ngoy village, around point 20°43' N 102°41' E, remnants of primary evergreen forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 800–900 m, 1 IV 2017, L. Averyanov et al.

18 — Ngoy distr., Don Khun village, near waterfall, around point 20°32' N 102°35' E, remnants of primary evergreen forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 450–550 m, along mountain stream, 2 IV 2017, L. Averyanov et al.

19 — Pon Xay distr., Houay Man village, Phou Tham Keo Mt., around point 19°57' N 102°26' E, degraded primary evergreen and semideciduous forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 500–650 m, 4 IV 2017, L. Averyanov et al.

20 — Pon Xay distr., Houay Man village, Phou Tham Keo Mt., around point 19°58' N 102°26' E, degraded primary evergreen and semideciduous forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 500–650 m, 4 IV 2017, L. Averyanov et al.

21 — Pon Xay distr., Houay Man village, Phou Pak Sang Mt., around point 19°59' N 102°25' E, degraded primary evergreen and semideciduous forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 1000–1150 m, 4 IV 2017, L. Averyanov et al.

22 — Pon Xay distr., between Houay Man and Nam Bo villages, Phou Hua Ben Toc Mt., around point 19°57' N 102°25' E, degraded primary evergreen and semideciduous forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 500–650 m, 5 IV 2017, L. Averyanov et al.

23 — Pon Xay distr., between Houay Man and Nam Bo villages, Phou Hua Ben Toc Mt., around point 19°58' N 102°25' E, degraded primary evergreen and semideciduous forest on very steep rocky mountain

slopes composed by solid marble-like highly eroded limestone at elev. 500–650 m, 5 IV 2017, L. Averyanov et al.

24 — Pon Xay distr., along the way to Bane Phou Souong village, Pha Hiua Bin Toc Mt., around point 19°58' N 102°25' E, degraded primary evergreen and semideciduous forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 600–850 m, 5 IV 2017, L. Averyanov et al.

25 — Pon Xay distr., Nam Bo village, around point 19°57' N 102°26' E, degraded primary evergreen and semideciduous forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 650–750 m, 6 IV 2017, L. Averyanov et al.

Luong Nam Tha Prov.:

26 — Nam Tha distr., Nam Kong village, Luong Nam Tha, around point 21°11' N 101°23' E, at elev. about 1100 m, 26 IX – 2 X 2017, N. Orlov, L. Ioganssen.

27 — Nam Tha distr., Nam Kong village, Luong Nam Tha, around point 21°12' N 101°23' E, at elev. about 1100 m, 26 IX – 2 X 2017, N. Orlov, L. Ioganssen.

Vientiane Prov.:

28 — Kasi distr., Khuang Lang Cave, broadleaved evergreen forest along stream with *Tetrameles nudiflora*, *Pometia eximia*, *Croton argyratus*, *Arenga westerhoutii*, *Ficus religiosa*, 631 m, 19°18.2' N 102°09.0' E, 21 XI 2013, E. Konstantinov.

29 — Kasi distr., between San and Tham Tai villages, around point 19°18' N 102°09' E, secondary broadleaved evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 900–1000 m, 25 III 2017, L. Averyanov et al.

30 — Kasi distr., between Pa Chao and Nam Ken villages, Pa Chao Mt., around point 19°20' N 102°21' E, secondary broadleaved evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 1000–1100 m, 26 III 2017, L. Averyanov et al.

31 — Kasi distr., between Pa Chao and Nam Ken villages, Pa Chao Mt., around point 19°20' N 102°23' E, secondary broadleaved evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 1100–1200 m, 27 III 2017, L. Averyanov et al.

32 — Kasi distr., Si Sang Vone village, around point 19°06' N 102°10' E, secondary broadleaved evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at

elev. 600–700 m, 28 III 2017, L. Averyanov et al., LA-VN 1785a (LE).

33 — Kasi distr., Si Sang Vone village, around point 19°06' N 102°10' E, secondary and primary evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 600–750 m, 28 III 2017, L. Averyanov et al.

34 — Kasi distr., Si Sang Vone village, around point 19°06' N 102°11' E, secondary and primary evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 550–600 m, 28 III 2017, L. Averyanov et al.

35 — Kasi distr., Si Sang Vone village, around point 19°06' N 102°11' E, secondary broadleaved evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 600–700 m, 28 III 2017, L. Averyanov et al.

36 — Kasi distr., Si Sang Vone village, around point 19°06' N 102°11' E, secondary and primary evergreen dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 600–750 m, 28 III 2017, L. Averyanov et al.

37 — Vang Vieng distr., Oa Hom village, around point 19°07' N 102°23' E, secondary broadleaved evergreen and semideciduous dry forest with on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 550–650 m, 22 III 2017, L. Averyanov et al.

38 — Vang Vieng distr., Oa Hom village, around point 19°06' N 102°23' E, secondary broadleaved evergreen and semideciduous dry forest with on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 650–750 m, 22 III 2017, L. Averyanov et al.

39 — Vang Vieng distr., Khan Mac village, around point 18°51' N 102°29' E, secondary broadleaved deciduous open dry forest with *Euphorbia antiquorum* on

very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. 400–500 m, 23 III 2017, L. Averyanov et al.

40 — Vang Vieng distr., Patang village, around point 19°04' N 102°25' E, secondary broadleaved semideciduous dry forest on very steep rocky mountain slopes composed by solid marble-like highly eroded limestone at elev. about 670 m, 23 III 2017, L. Averyanov et al.

In the list of new discoveries, the orchid names are arranged in an alphabetic order. The names of the species new to the flora are marked with an asterisk (*), the name of the genus new to the flora with two asterisks (**), and the newly described species with three asterisks (***). General texts of herbarium labels are designated by numbers corresponding to those in the above list of localities. Additional data cited include habitats and morphological peculiarities of the plants as specified in the original labels, collection numbers and acronyms of the Herbaria where the specimens are housed: LE — Herbarium of the Komarov Botanical Institute, Russian Academy of Sciences, St. Petersburg, Russian Federation; FOF — National University of Laos. Prefix “LA-VN” at collecting numbers indicates the Laos-Vietnamese Expedition (this herbarium series was collected in expeditions managed by the Center for Plant Conservation, Vietnam Union of Science and Technology Associations with main collectors — Leonid V. Averyanov and Nguyen Tien Hiep). Other prefixes indicate the gatherings by the following collectors: “AL” — Leonid V. Averyanov, “K” — Eugene L. Konstantinov, “NLO” — Nikolay L. Orlov, “TM” — Tatiana V. Maisak with their co-workers.

The mentioned novelties give a significant addition to our previous knowledge summarized in earlier accounts for Cambodian (Seidenfaden, 1992) and Laotian floras (Newman et al., 2007; Schuitman et al., 2008).

New records of orchids in the flora of Cambodia

Bulbophyllum oretopetalum

**Eria ochracea*

**Luisia macrotis*

**Trichoglottis seidenfadenii*

New records of orchids in the flora of Laos

***Abdominea minimiflora*

Acampe rigida

Aerides flabellata

A. odorata

Agrostophyllum planicaule

Appendicula torta

Arundina caespitosa

Bulbophyllum ambrosia

B. flabellum-venersis

B. lilacinum

**B. nanopetalum*

****B. pseudorufinum*

B. rufilabrum

B. umbellatum

B. wendlandianum

Calanthe sylvatica

Cheirostylis spatulata

**Chiloschista parishii*

Cleisostoma arietinum

C. fuerstenbergianum

C. rostratum

C. subulatum

**C. tricornutum*

C. williamsonii

Coeloglyne flaccida

C. ovalis

C. trinervis

C. viscosa

Corymborkis veratrifolia

Cymbidium aloifolium

C. dayanum

C. lancifolium

Dendrobium aphyllum

D. capillipes

D. chrysanthum

D. chrysotoxum

D. crepidatum

D. dioxanthum

D. falconeri

D. fimbriatum

<i>D. jenkinsii</i>	<i>E. pachyphylla</i>	<i>O. falcata</i>	<i>*S. yunnanensis</i>
<i>D. langbianense</i>	<i>E. pannea</i>	<i>O. falconeri</i>	<i>*Schoenorchis fragrans</i>
<i>D. lindleyi</i>	<i>E. perpusilla</i>	<i>Panisea uniflora</i>	<i>Sunipia scariosa</i>
<i>D. loddigesii</i>	<i>E. siamensis</i>	<i>Paphiopedilum concolor</i>	<i>Thelasis khasiana</i>
<i>D. oligophyllum</i>	<i>Flickingeria angustifolia</i>	<i>Pelatantheria ctenoglossum</i>	<i>T. pygmaea</i>
<i>D. parciflorum</i>	<i>F. fimbriata</i>	<i>Phaius flavus</i>	<i>*Thrixspermum fragrans</i>
<i>D. pendulum</i>	<i>*Gastrochilus hainanensis</i>	<i>*P. takeoi</i>	<i>*T. hystrix</i>
<i>D. salaccense</i>	<i>G. suavis</i>	<i>Phalaenopsis gibbosa</i>	<i>Trichoglottis orchidea</i>
<i>D. spatella</i>	<i>*Hetaeria alata</i>	<i>Pholidota articulata</i>	<i>Trichotosia pulvinata</i>
<i>D. strongylanthum</i>	<i>Kingidium deliciosum</i>	<i>P. imbricata</i>	<i>Tropidia angulosa</i>
<i>D. thyrsiflorum</i>	<i>Liparis pumila</i>	<i>P. recurva</i>	<i>T. curculigoides</i>
<i>Didymoplexis pallens</i>	<i>L. viridiflora</i>	<i>Podochilus oxystophylloides</i>	<i>Vanda brunnea</i>
<i>*D. vietnamica</i>	<i>Luisia morsei</i>	<i>Polystachya concreta</i>	<i>V. denisoniana</i>
<i>Eria acervata</i>	<i>L. zollingeri</i>	<i>Pomatocalpa maculosum</i>	<i>V. flavobrunnea</i>
<i>E. amica</i>	<i>*Malleola seidenfadenii</i>	<i>P. spicatum</i>	<i>Vandopsis gigantea</i>
<i>E. calcarea</i>	<i>Micropora pallida</i>	<i>Robiquetia succisa</i>	<i>Zeuxine flava</i>
<i>E. globulifera</i>	<i>Nervilia kasiensis</i>	<i>Sarcoglyphis mirabilis</i>	
<i>E. javanica</i>	<i>Oberonia cavaleriei</i>	<i>S. thailandica</i>	

*****Abdominea minimiflora*** (Hook. fil.) J. J. Sm.

LAOS. Vientiane Prov.: 29 — epiphyte on large mossy trees on rocky slope, flowers pinkish, rare, LA-VN 1683/3 (LE).

Acampe rigida (Sm.) P. F. Hunt

LAOS. Houa Phang Prov.: 10 — NLO-49a (LE). **Luang Prabang Prov.: 19** — lithophytic undershrub to 2 m tall on rocky mountain tops, very common, LA-VN 2074 (FOF, LE); **22** — lithophytic undershrub on open steep rocky slope near mountain top, common, LA-VN 2127 (FOF, LE). **Vientiane Prov.: 31** — lithophytic undershrub on open steep rocky slope, common, LA-VN 1755 (FOF, LE); **39** — clustering epiphytic undershrub, locally common, LA-VN 1564 (FOF, LE).

Aerides flabellata Downie

LAOS. Luang Prabang Prov.: 13 — epiphyte on old mossy tree on rocky mountain top, not common, LA-VN 1920 (FOF, LE); **16** — epiphyte in shady place near mossy rocky mountain top, occasional, LA-VN 1990 (FOF, LE); **25** — epiphyte on old tree on mossy rocky mountain top, not rare, LA-VN 2174 (FOF, LE). **Vientiane Prov.: 30** — epiphyte on tall mossy trees on rocky steep slope, not rare, LA-VN 1735 (FOF, LE).

Aerides odorata Lour.

LAOS. Luang Prabang Prov.: 23 — epiphyte on mossy trees near mountain top, flower buds light green with purple tint, not rare, LA-VN 2095 (FOF, LE); **24** — epiphyte on mossy tree on mossy rocky mountain top, flower buds white with purple tint, occasional, LA-VN 2160 (FOF, LE). **Vientiane Prov.: 30** — epiphyte on tall mossy trees on rocky steep slope, not rare, LA-VN 1736 (FOF, LE); **36** — epiphytic and occasionally lithophytic undershrub to 0.5 m tall on rocky mossy mountain top, not rare, LA-VN 1865 (FOF, LE); **38** —

epiphyte on mossy tree on rocky mountain top, not rare, LA-VN 1541 (FOF, LE).

Agrostophyllum planicaule (Lindl.) Rchb. fil.

LAOS. Vientiane Prov.: 36 — epiphyte on tall mossy trees and occasional lithophyte on rocky mountain top, common, LA-VN 1801 (FOF, LE), LA-VN 1869 (FOF, LE); **38** — clustering epiphyte and occasional lithophyte on rocky mossy mountain top, common, LA-VN 1553 (FOF, LE).

Appendicula torta Blume

LAOS. Vientiane Prov.: 29 — epiphyte on tall mossy trees on shady rocky slope, not rare, LA-VN 1681 (FOF, LE); **30** — clustering epiphyte on mossy trees on steep rocky shady slope, common, LA-VN 1714 (FOF, LE); **36** — epiphyte on mossy old tree on rocky mountain top, not rare, LA-VN 1839 (FOF, LE); **40** — lithophytic herb, not common, LA-VN 1576 (FOF, LE).

Arundina caespitosa Aver.

LAOS. Bolikhamsai Prov.: 7 — clustering dense lithophyte on wet, open stream rocks, common, LA-VN 2203 (LE).

Bulbophyllum ambrosia (Hance) Schltr.

LAOS. Luong Nam Tha Prov.: 27 — NLO-9 (LE), NLO-27 (LE).

Bulbophyllum flabellum-veneris (J. Koenig) Aver.

LAOS. Bolikhamsai Prov.: 6 — NLO-76, fl. 24 III 2018 (LE).

Bulbophyllum lilacinum Ridl.

LAOS. Kham Mouan Prov.: 12 — epiphyte in dense forest, not common, LA-VN 320, fl. 9 XII 2016 (FOF, LE).

****Bulbophyllum nanopetalum*** Seidenf. (Fig. 1, 1, 2).

LAOS. Champasak Prov.: 9 — K-403 (LE).

Bulbophyllum orectopetalum Garay, Hamer et Siegerist.

CAMBODIA. 4 – K-028 (LE).

******Bulbophyllum pseudorufinum*** Aver., sp. nova (sect. *Anisopetalon* (Hook.) Lindl.; = sect. *Racemosae* Benth. et Hook. fil.; = sect. *Careyana* Pfitzer). – Fig. 1, 3, 4; 2.

Creeping trunk and branch epiphyte with long wiry stout rhizome and large, erect pseudobulbs. Rhizome semi-woody, dull yellowish-gray, flexuose, (2)2.2–2.8(3) mm in diam., to 20 cm long. Pseudobulbs 1-leaved, distant at (1.5)2–3(3.5) cm, glossy, dark purple-brown, ovoid, (1.8)2.2–3(3.4) cm tall, (1.4)1.6–2(2.2) cm wide, with many greenish to greenish-gray roots densely clustering at the base; young pseudobulbs with remnants of papyraceous or membranaceous bract remnants, almost naked when old, sometime longitudinally obscurely angled. Leaves sessile, dark purple or dark green with purple tint; leaf blade thick and rigid to leathery, oblong broadly lanceolate, (6)7–10(11) cm long, (1.2)1.4–1.8(2.2) cm wide, obtuse, narrowing into short almost terete, grooved petiole-like base (0.5)0.6–1(1.4) mm long. Inflorescence spreading to pendulous, long loose raceme; peduncle thin, rigid, spreading to nodding downward, (8)10–14(16) cm long, dark purple-brown, glossy, with (2)3–4(5) light dirty-purple papyraceous sterile bracts; rachis (12)14–18(20) cm long, straight or slightly flexuose, nutant, with loose, spirally arranged flowers. Floral bracts dull dirty-purple, herbaceous, at acute angle to rachis, lanceolate, longitudinally concave, acute, (3.5)4–6(6.5) mm long, shorter than flowers, (0.6)0.8–1(1.2) mm wide (when flattened), glabrous. Pedicel and ovary (2.8)3–3.5(4) mm long, glossy, purple-brown; pedicel terete; ovary little broader than pedicel, longitudinally 6-grooved, (1.8)2–2.5(3) mm long, (0.8)0.9–1(1.1) mm in diam. Flowers not resupinate, not widely opening, (7.2)7.5–8(8.4) mm long, (2.4)2.6–2.8(3) mm wide; sepals and petals glossy, glabrous, purple-brown, speckled with green, lip reddish-brown, column yellowish, steli-dia reddish-brown at apex. Median sepal erect, ovate, 3-nerved, (2.8)3–3.2(3.4) mm long, (2)2.1–2.2(2.3) mm wide, with recurved cucullate acute apex, with entire margin, sparsely verruculose outside. Lateral sepals obliquely narrowly triangular ovate, 3-nerved, (6)6.5–7(7.4) mm long, (2.2)2.4–2.6(2.8) mm wide (when flattened), joined along lower edges completely and along upper edge in apical part (sometimes free at apex), sparsely verruculose outside. Petals very small, straight, forward directed, triangular, (0.8)1(1.2) mm long and wide, acute, finely erose-denticulate along margin, with 1 obscure vein. Lip fleshy, oblong obovoid, glabrous, finely papillulose, (2.8)3–3.2(3.4) mm

long, (1.7)1.8–2(2.1) mm wide, recurved and slightly grooved near base, blunt at apex, with broadly oblong falcate, forward directed auricles in basal part, (0.7)0.8–0.9(1) mm long, finely erose-denticulate at almost roundish apex. Column erect, shortly cylindric, (1.4)1.5–1.6(1.7) mm tall, (1.7)1.8–2(2.1) mm wide, with distinct forward directed foot (0.8)1–1.2(1.4) mm long, with obovate, concave stigma and small (but distinct) conoid callus rising just below stigma, laterally with large stout erect stelidia (2.6)2.8–3(3.2) mm long (from base to apex), apically narrowing and shortly furcate, forming slightly flattened broad bilobulate apex exceeding operculum. Operculum yellowish, helmet-shaped, (0.9)1(1.1) mm tall and wide, glabrous, truncate at front, with opening exposing pollinia. Pollinia 2, narrowly ovoid, each almost entirely divided into 2 halves. Fruits unknown.

Holotype: Central Laos, Bolikhamsai province, “15 XII 2018, N. Orlov, L. Ioganssen, L. Averyanov, NLO-52”, prepared from cultivated plant collected in Lao PDR, Bolikhamsai Province, Thaphabat district, Tad Xay, Phou Khao Khouay National Protected Area, Pha Xay waterfall, Buffalo Horn Mountain, around point 18°27' N 103°08' E at elevation about 340 m a. s. l., 26–30 XI 2016, Nikolai L. Orlov, Larissa K. Ioganssen, s. n. (LE: LE01042152).

Affinity. The new species belongs to the section *Anisopetalon* and morphologically is very close to *B. rufinum* Rehb. fil. and *B. dissitiflorum* Seidenf. From the both related species (as well as from most members of the section) the new species differs in very small petals and proportionally very large stout stelidia narrowing and furcating at the apex, much longer than petals. Such combination of morphological characters is not observed in any species of the section.

Distribution. Central Laos (Bolikhamsai province, Thaphabat district, Phou Khao Khouay National Protected Area). Endemic.

Habitat, phenology and conservation status. Creeping trunk and branch epiphyte. Evergreen broadleaved lowland forests on sandstone, 300–350 m a. s. l. Fl. in culture I–II. Occasional. Estimated IUCN Red List status – DD.

Etymology. The specific epithet refers to the name of species closely allied to discovered plant on its morphological characters.

Bulbophyllum rufilabrum Hook. fil.

LAOS. Bolikhamsai Prov.: 6 – NLO-69, fl. VI–VII 2017 and II–III 2018 (LE).

Bulbophyllum umbellatum Lindl.

LAOS. Vientiane Prov.: 30 – creeping epiphyte on tall mossy trees on rocky steep slope, flowers white,



Fig. 1. New and rare orchids in the flora of Cambodia and Laos.

1, 2 – *Bulbophyllum nanopetalum* (E. Konstantinov, T. Vongsa, K-403); 3, 4 – *Bulbophyllum pseudorufinum* (N. Orlov, L. Ioganssen, L. Averyanov, NLO-52); 5, 6 – *Cleisostoma tricornutum* (N. Orlov, L. Ioganssen, NLO-42); 7, 8 – *Didymoplexis vietnamica* (L. Averyanov et al., LA-VN 1947a); 9 – *Eria ochracea* (T. Maisak et al., TM-942). Photos by L. Averyanov (1, 2, 9), N. Orlov (3–6) and Khang Sinh Nguyen (7, 8), correction and design by L. Averyanov.

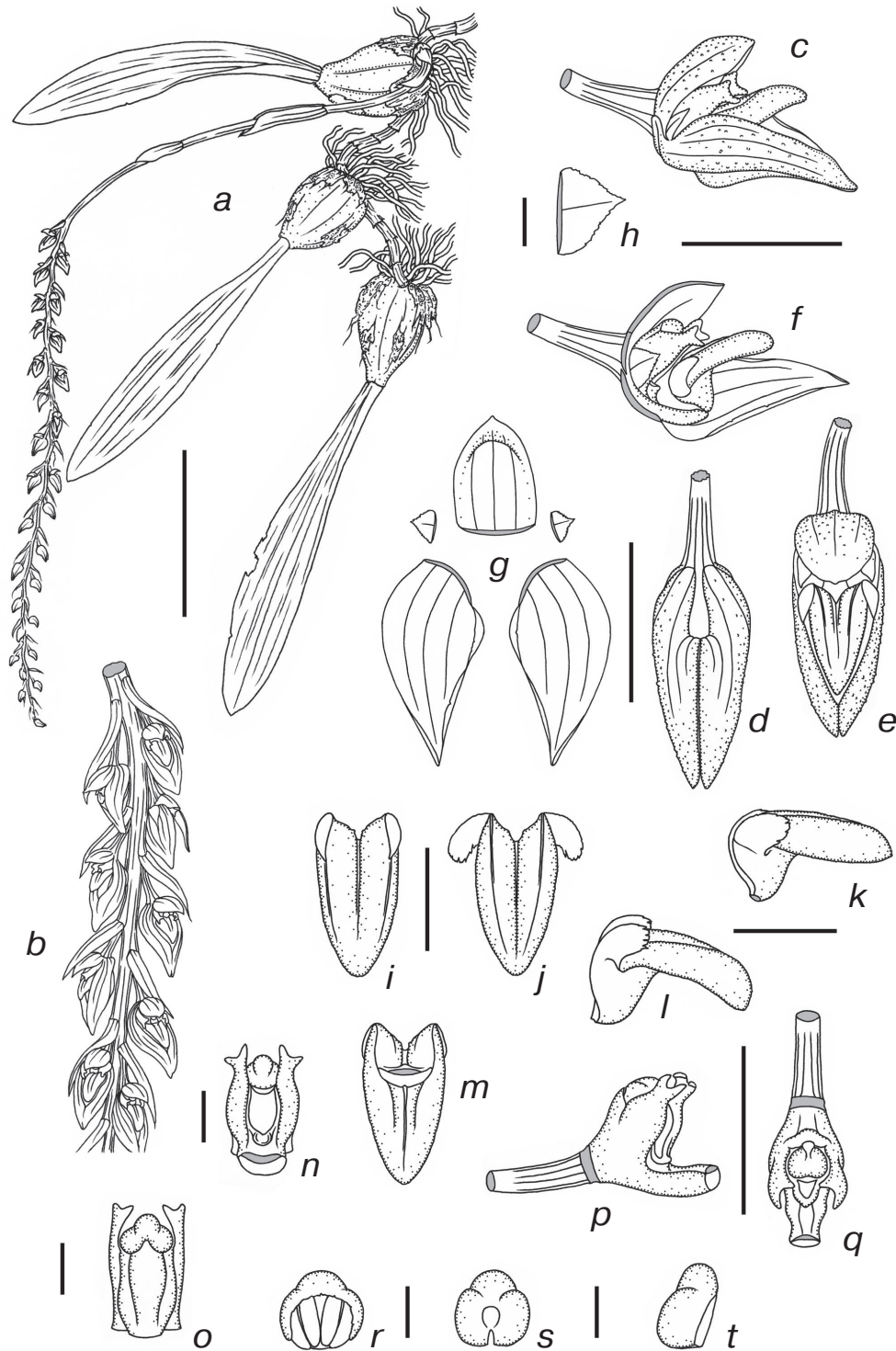


Fig. 2. *Bulbophyllum pseudorufinum*.

a – flowering plant; *b* – portion of inflorescence; *c* – intact flower, side view; *d*, *e* – intact flower, view from below (*d*) and from above (*e*); *f* – flower, with lateral sepal and petal removed, side view; *g* – flattened sepals and petals; *h* – petal; *i*, *j* – intact lip (*i*) and lip with artificially recurved auricles (*j*), view from above; *k*, *l* – intact lip (*k*) and lip with artificially recurved auricles (*l*), side view; *m* – intact lip, view from below; *n*–*q* – column, front view (*n*), back view (*o*), side view (*p*), and view from above (*q*); *r*–*t* – operculum, front view (*r*), back view (*s*), and side view (*t*). Scale bars: *a* – 5 cm; *c*–*g*, *p*, *q* – 5 mm; *h*, *n*, *o*, *r*–*t* – 1 mm; *i*–*m* – 2 mm. All drawn from the type (NLO-52, LE01042152) by L. Averyanov and T. Maisak.

with many small purple marks, not rare, LA-VN 1743 (FOF, LE).

Bulbophyllum wendlandianum (Kraenzl.) Dammer
LAOS. Bolikhamsai Prov.: 6 – NLO-55 (LE).

Calanthe sylvatica (Thouars) Lindl.
LAOS. Luong Nam Tha Prov.: 27 – NLO-10 (LE).

Cheirostylis spathulata J. J. Sm.

LAOS. Vientiane Prov.: 34 – lithophytic herb on open mossy rocks on steep rocky slope, flowers white, not common, LA-VN 1806 (FOF, LE).

**Chiloschista parishii* Seidenf.

LAOS. Houa Phang Prov.: 10 – NLO-37 (LE).
Luong Nam Tha Prov.: 27 – NLO-7 (LE).

Cleisostoma arietinum (Rchb. fil.) Garay.

LAOS. Luang Prabang Prov.: 24 – epiphyte on tall tree on rocky slope near mountain top, occasional, LA-VN 2164 (FOF, LE).

Cleisostoma fuerstenbergianum Kraenzl.

LAOS. Luang Prabang Prov.: 23 – epiphyte with pendulous stems on mossy trees on mountain top, not common, LA-VN 2101 (FOF, LE). **Vientiane Prov.: 29** – epiphyte with pendulous stems to 1 m long on tall trees, common, LA-VN 1617 (FOF, LE); **30** – clustering epiphyte with pendulous stems to 1 m long on mossy trees on steep rocky shady slope, common, LA-VN 1713 (FOF, LE); **36** – epiphyte on mossy old tree on rocky mountain top, occasional, LA-VN 1838 (FOF, LE).

Cleisostoma rostratum Aver.

LAOS. Luong Nam Tha Prov.: 26 – NLO-24b (LE).

Cleisostoma subulatum Blume

LAOS. Vientiane Prov.: 30 – pendulous epiphyte and lithophyte on steep rocky shady slope, not rare, LA-VN 1725 (FOF, LE); **40** – lithophyte on shady cliff, occasional, LA-VN 1592 (FOF, LE).

**Cleisostoma tricornerutum* Aver. (Fig. 1, 5, 6).

LAOS. Houa Phang Prov.: 11 – NLO-42 (LE), NLO-45 (LE).

Cleisostoma williamsonii (Rchb. fil.) Garay

LAOS. Houa Phang Prov.: 11 – NLO-48 (LE).

Coelogyne flaccida Lindl.

LAOS. Vientiane Prov.: 30 – lithophytic creeping herb on open mossy rocks, flowers white, lip with yellow center, locally common, LA-VN 1730 (FOF, LE).

Coelogyne ovalis Lindl.

LAOS. Luong Nam Tha Prov.: 27 – NLO-8 (LE). **Vientiane Prov.: 35** – epiphyte and lithophyte on rocky mountain top, not rare, LA-VN 1779 (FOF, LE).

Coelogyne trinervis Lindl.

LAOS. Luang Prabang Prov.: 21 – creeping lithophyte and epiphyte on mossy exposed rocks near mountain top, common, LA-VN 2028 (FOF, LE). **Vientiane Prov.: 29** – epiphyte and lithophyte on rather open mossy cliff, locally common, LA-VN 1667 (FOF, LE);

Coelogyne viscosa Rchb. fil.

LAOS. Luang Prabang Prov.: 15 – epiphyte and lithophyte on mossy mountain top, locally common, LA-VN 1880 (FOF, LE), LA-VN 1898 (FOF, LE); **16** – creeping lithophyte on mossy rocks on rocky mountain top, locally abundant, LA-VN 1983 (FOF, LE); **20** – lithophytic creeping herb on open karstic rocks on mountain top, abundant, LA-VN 2084 (FOF, LE); **23** – creeping lithophytic herb on mountain top, very common, LA-VN 2103 (FOF, LE). **Vientiane Prov.: 29** – epiphyte and lithophyte on rather open mossy cliff, locally common, LA-VN 1668 (FOF, LE); **30** – epiphyte on tall mossy trees on steep rocky shady slope, common, LA-VN 1710 (FOF, LE), LA-VN 1722 (FOF, LE); **36** – creeping epiphytic and lithophytic herb on rocky mountain top, common, LA-VN 1858 (FOF, LE).

Corymborkis veratrifolia (Reinw.) Blume

LAOS. Vientiane Prov.: 36 – terrestrial herb to 3 m tall on shady steep rocky slope, occasional, LA-VN 1818 (FOF, LE); **37** – terrestrial undershrub to 3 m tall on shady steep rocky slope, common, LA-VN 1520 (FOF, LE); **38** – terrestrial herb or undershrub to 3 m tall on shady rocky slope, not rare, LA-VN 1549 (FOF, LE).

Cymbidium aloifolium (L.) Sw.

LAOS. Houa Phang Prov.: 11 – NLO-36 (LE). **Luang Prabang Prov.: 16** – lithophytic herb on open mossy rocks on mountain top, not rare, LA-VN 1965 (FOF, LE); **Luang Prabang Prov.: 18** – LA-VN 2016 (FOF, LE); **23** – epiphytic or lithophytic herb on mossy rocks near mountain top, common, LA-VN 2094 (FOF, LE); **25** – clustering epiphyte and lithophyte near mountain top, flowers: tepals light dull yellowish with purple-brown median stripe, very common, LA-VN 2185 (FOF, LE);

Cymbidium dayanum Rchb. fil.

LAOS. Luong Nam Tha Prov.: 26 – NLO-1 (LE). **Vientiane Prov.: 31** – epiphyte on mossy tree on shady steep rocky slope, occasional, LA-VN 1766 (FOF, LE).

Cymbidium lancifolium Hook.

LAOS. Vientiane Prov.: 29 – terrestrial herb in shady rocky place, not common, LA-VN 1635 (FOF, LE).

Dendrobium aphyllum (Roxb.) C. E. C. Fisch.

LAOS. Luang Prabang Prov.: 15 – epiphyte on mossy old trees on rocky mountain top, not too

common, LA-VN 1887 (FOF, LE); **16** – epiphyte and lithophyte on mossy rocky mountain top, common, LA-VN 1985 (FOF, LE); **18** – epiphyte on tall trees, flowers white with purple tint, lip light yellowish, common, LA-VN 1994 (FOF, LE); **21** – clustering epiphyte on tall mossy trees and lithophyte on mountain top, common, LA-VN 2036 (FOF, LE), LA-VN 2062 (FOF, LE); **25** – epiphyte on old mossy trees near mountain top, flowers: tepals light pink-purple, lip light yellowish to almost white, common, LA-VN 2184 (FOF, LE). **Vientiane Prov.: 30** – epiphyte on tall mossy tree on steep rocky slope, flowers light pink-violet or light pink to almost white, lip almost white to light yellowish, common, LA-VN 1691 (FOF, LE), LA-VN 1738 (FOF, LE); **31** – lithophytic or epiphytic herb on mossy trees on shady steep rocky slope, flowers white with pink tint, occasional, LA-VN 1758 (FOF, LE), LA-VN 1773 (FOF, LE); **36** – epiphyte on mossy trees on shady rocky slope, common, LA-VN 1824 (FOF, LE); **38** – epiphyte on mossy tree on rocky mountain top, occasional, LA-VN 1531 (FOF, LE); **40** – lithophyte or epiphyte on mossy tree in shady place, common, LA-VN 1589 (FOF, LE), LA-VN 1593 (FOF, LE), LA-VN 1602 (FOF, LE).

Dendrobium capillipes Rchb. fil.

LAOS. Luang Nam Tha Prov.: 27 – NLO-20 (LE), NLO-23 (LE), NLO-33 (LE).

Dendrobium chrysanthum Lindl.

LAOS. Houa Phang Prov.: 11 – NLO-38 (LE). **Vientiane Prov.: 30** – lithophyte and epiphyte on steep rocky slope, occasional, LA-VN 1697 (FOF, LE).

Dendrobium chrysotoxum Lindl.

LAOS. Luang Prabang Prov.: 21 – clustering epiphyte and lithophyte on mossy rocky mountain tops, flowers bright yellow, fragrant, common, LA-VN 2063 (FOF, LE). **Vientiane Prov.: 36** – epiphyte and lithophyte on rocky mountain top, flowers bright yellow, fragrant, not rare, LA-VN 1811 (FOF, LE), LA-VN 1872 (FOF, LE); **40** – epiphyte on mossy trees, flowers yellow, not common, LA-VN 1582 (FOF, LE).

Dendrobium crepidatum Lindl. et Paxton

LAOS. Luang Prabang Prov.: 21 – epiphyte on old mossy trees near mountain top, flowers pink-purple, lip with yellow spot, common, LA-VN 2029 (FOF, LE). **Vientiane Prov.: 29** – epiphyte on large mossy trees on rocky slope, flowers pink, lip with yellow center, not rare, LA-VN 1683 (FOF, LE); **30** – epiphyte on tall mossy tree on steep rocky slope, flowers pink-purple or white, tepals with purple apices, lip with yellow center, common, LA-VN 1692 (FOF, LE), LA-VN 1742 (FOF, LE); **31** – epiphyte on mossy tree on shady steep rocky

slope, flowers purple, lip with yellow center, common, LA-VN 1767 (FOF, LE); **39** – epiphyte, flower buds pink, not rare, LA-VN 1560 (FOF, LE); **40** – epiphyte on mossy trees, flower buds pink, not rare, LA-VN 1583 (FOF, LE).

Dendrobium dixanthum Rchb. fil.

LAOS. Luang Prabang Prov.: 24 – lithophytic clustering herb on open mossy rocky mountain top, flowers yellow, not common, LA-VN 2158 (FOF, LE).

Dendrobium falconeri Hook.

LAOS. Vientiane Prov.: 30 – clustering epiphyte on tall mossy trees on rocky steep slope, not rare, LA-VN 1740 (FOF, LE).

Dendrobium fimbriatum Hook.

LAOS. Luang Prabang Prov.: 16 – lithophyte on mossy rocks on rocky mountain top, common, LA-VN 1970 (FOF, LE); **20** – epiphyte and lithophyte on mossy mountain tops, very common, LA-VN 2080 (FOF, LE); **21** – clustering epiphyte and lithophyte on mossy rocky mountain top, very common, LA-VN 2047 (FOF, LE); **22** – epiphyte and lithophyte on open mossy rocky mountain top, flowers bright yellow, lip center dark brown, common, LA-VN 2116 (FOF, LE); **25** – epiphytic and lithophytic herb on mossy rocky mountain top, flowers buds yellow, very common, LA-VN 2167 (FOF, LE). **Vientiane Prov.: 30** – clustering lithophyte and epiphyte on tall mossy trees on rocky steep slope, not rare, LA-VN 1704 (FOF, LE), LA-VN 1741 (FOF, LE); **31** – lithophytic and epiphytic herb on rather open steep rocky slope, common, LA-VN 1772 (FOF, LE); **33** – epiphyte on mossy trees on shady rocky slope at the mountain top, occasionally also lithophyte, common, LA-VN 1827 (FOF, LE).

Dendrobium jenkinsii Lindl.

LAOS. Luang Prabang Prov.: 14 – LA-VN 1901 (FOF, LE); **25** – adpressed epiphyte on old tree on mossy rocky mountain top, flowers bright yellow, locally common, LA-VN 2176 (FOF, LE).

Dendrobium langbianense Gagnep.

LAOS. Luang Nam Tha Prov.: 27 – NLO-4 (LE).

Dendrobium lindleyi Steud.

LAOS. Luang Prabang Prov.: 15 – epiphyte on mossy old trees on rocky mountain top, not too common, LA-VN 1886 (FOF, LE).

Dendrobium loddigesii Rolfe

LAOS. Vientiane Prov.: 33 – epiphyte on mossy old tree on rocky mountain top, not rare, LA-VN 1856 (FOF, LE).

Dendrobium oligophyllum Gagnep.

LAOS. Luang Prabang Prov.: 25 — epiphyte at base of old mossy trees on rocky slope near mountain top, locally common, LA-VN 2179 (FOF, LE).

Dendrobium parviflorum Lindl.

LAOS. Champasak Prov.: 8 — epiphyte in canopy of tall tree, AL-166 / K-392, fl. 30 VI 2016 (LE).

Dendrobium pendulum Roxb.

LAOS. Vientiane Prov.: 30 — epiphyte on tall mossy tree on steep rocky slope, not common, LA-VN 1690 (FOF, LE).

Dendrobium salaccense (Blume) Lindl.

LAOS. Vientiane Prov.: 30 — clustering epiphyte on mossy trees on steep rocky shady slope, occasional, LA-VN 1712 (FOF, LE), LA-VN 1739 (FOF, LE); **38** — epiphyte on mossy tree on rocky mountain top, not rare, LA-VN 1533 (FOF, LE).

Dendrobium spatella Rchb. fil.

LAOS. Luong Nam Tha Prov.: 27 — NLO-2 (LE).

Dendrobium strongylanthum Rchb. fil.

LAOS. Vientiane Prov.: 33 — epiphyte on mossy trees on shady rocky slope at the mountain top, rare, LA-VN 1830 (FOF, LE).

Dendrobium thyrsiflorum B. S. Williams

LAOS. Luang Prabang Prov.: 21 — epiphyte on tall trees, common, LA-VN 2039 (FOF, LE); **Luong Nam Tha Prov.: 27** — NLO-3 (LE). **Vientiane Prov.: 29** — epiphyte on tall mossy trees on shady rocky slope, common, LA-VN 1679 (FOF, LE); **33** — epiphyte on mossy trees on rocky mossy mountain top, common, LA-VN 1876 (FOF, LE).

Didymoplexis pallens Griff.

LAOS. Vientiane Prov.: 29 — terrestrial achlorophyllous herb in bamboo forest, flowers white, locally very common, LA-VN 1665 (FOF, LE).

**Didymoplexis vietnamica* Ormerod (Fig. 1, 7, 8).

LAOS. Luang Prabang Prov.: 17 — achlorophyllous terrestrial tuberiferous mycotrophic herb, rare, LA-VN 1947a (FOF, LE); **21** — achlorophyllous aphyllous terrestrial herb, flowers whitish, occasional, 4 LA-VN 2030a (FOF, LE).

Eria acervata Lindl.

LAOS. Luang Prabang Prov.: 24 — epiphyte on mossy tree on open mossy rocky mountain top, not rare,

LA-VN 2155 (FOF, LE). **Vientiane Prov.: 30** — epiphyte on tall mossy trees on steep rocky shady slope, not rare, LA-VN 1709 (FOF, LE); **33** — epiphytic clustering herb on rocky mountain top, not common, LA-VN 1861 (FOF, LE).

Eria amica Rchb. fil.

LAOS. Luang Prabang Prov.: 21 — epiphyte and lithophyte on mossy rocky mountain tops, common, LA-VN 2040 (FOF, LE). **Vientiane Prov.: 30** — clustering epiphyte on old mossy trees on steep rocky shady slope, common, LA-VN 1723 (FOF, LE); **31** — lithophyte and epiphyte on mossy trees on shady steep rocky slope, occasional, LA-VN 1759 (FOF, LE).

Eria calcarea V. N. Long et Aver.

LAOS. Luong Nam Tha Prov.: 27 — NLO-29 (LE). **Vientiane Prov.: 31** — creeping lithophyte on rather open steep rocky slope, occasional, LA-VN 1761 (FOF, LE).

Eria globulifera Seidenf.

LAOS. Vientiane Prov.: 28 — K-109, fl. 22 VIII 2017 (LE).

Eria javanica (Sw.) Blume

LAOS. Luang Prabang Prov.: 16 — clustering lithophyte on mossy rocky mountain top, abundant, LA-VN 1987 (FOF, LE). **Vientiane Prov.: 29** — epiphyte and lithophyte in rather open rocky mossy slope, not common, LA-VN 1659 (FOF, LE); **33** — lithophytic clustering herb on open mossy rocks on rocky mountain top, not common, LA-VN 1860 (FOF, LE).

**Eria ochracea* Rolfe (Fig. 1, 9; 3, 1).

CAMBODIA. 3 — TM-942, fl. 2017 (LE).

Eria pachyphylla Aver.

LAOS. Luang Prabang Prov.: 22 — creeping epiphyte on mossy trees and lithophyte on mossy rocks on mountain top, flowers yellowish with purple-brown, not common, LA-VN 2096 (FOF, LE). **Vientiane Prov.: 29** — lithophytic creeping herb in rather open rocky mossy slope, flowers yellowish, not common, LA-VN 1664 (FOF, LE).

Eria pannea Lindl.

LAOS. Luang Prabang Prov.: 22 — creeping epiphyte on mossy trees on rocky mountain top, flowers yellow-orange, lip dark brown, not common, LA-VN 2113 (FOF, LE). **Vientiane Prov.: 33** — creeping epiphyte on mossy tree near mountain top, common, LA-VN 1845 (FOF, LE).

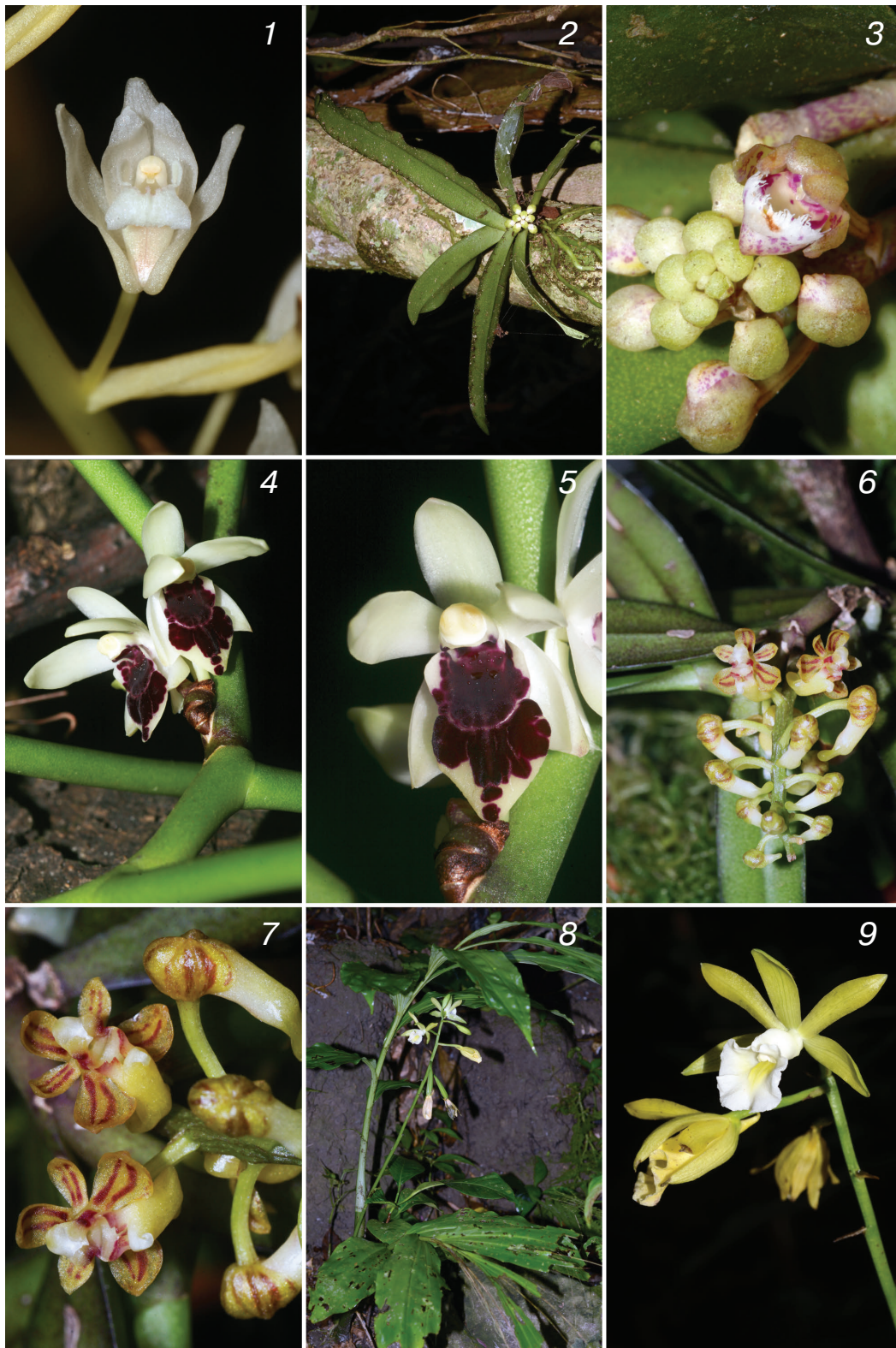


Fig. 3. New and rare orchids in the flora of Cambodia and Laos.

1 – *Eria ochracea* (T. Maisak et al., TM-942); 2, 3 – *Gastrochilus hainanensis* (N. Orlov, L. Ioganssen, NLO-41); 4, 5 – *Luisia macrotis* (T. Maisak et al., TM-57); 6, 7 – *Malleola seidenfadenii* (L. Averyanov et al., LA-VN 1785a); 8, 9 – *Phaius takeoi* (N. Orlov, L. Ioganssen, NLO-46). Photos by L. Averyanov (1, 4–7) and N. Orlov (2, 3, 8, 9), correction and design by L. Averyanov.

Eria perpusilla E. C. Parish et Rchb. fil.

LAOS. Bolikhamsai Prov.: 7 — adpressed lithophyte on large mossy open boulders, leafless during anthesis, flowers white, common, LA-VN 2202 (LE).

Eria siamensis Schltr.

LAOS. Bolikhamsai Prov.: 6 — NLO-70, fl. II–III 2018 (LE).

Flickingeria angustifolia (Blume) A. D. Hawkes

LAOS. Luang Prabang Prov.: 13 — epiphyte on old mossy tree on rocky mountain top, occasional, LA-VN 1940 (FOF, LE); **16** — lithophyte on mossy rocks on rocky mountain top, common, LA-VN 1981 (FOF, LE); **21** — creeping epiphyte and lithophyte on mossy rocky mountain tops, common, LA-VN 2060 (FOF, LE). **Vientiane Prov.: 39** — epiphyte on middle tall trees, very common, LA-VN 1558 (FOF, LE).

Flickingeria fimbriata (Blume) A. D. Hawkes

LAOS. Vientiane Prov.: 30 — epiphyte on tall mossy tree on steep rocky slope, common, LA-VN 1689 (FOF, LE), LA-VN 1737 (FOF, LE), LA-VN 1744 (FOF, LE); **33** — clustering lithophyte and occasionally epiphyte on rocky mossy mountain top, common, LA-VN 1873 (FOF, LE).

**Gastrochilus hainanensis* Z. H. Tsi (Fig. 3, 2, 3).

LAOS. Houa Phang Prov.: 10 — NLO-41 (LE), NLO-47 (LE), NLO-49b (LE).

Gastrochilus suavis Seidenf.

LAOS. Luang Prabang Prov.: 16 — epiphyte in shady place on rocky mountain top, common, LA-VN 1964 (FOF, LE), LA-VN 1974 (FOF, LE); **20** — epiphyte on mossy trees in shady place near mountain top, not rare, LA-VN 2090 (FOF, LE). **Vientiane Prov.: 30** — LA-VN 1751 (FOF, LE); **33** — epiphyte on mossy trees on shady rocky slope at the mountain top, not rare, LA-VN 1828 (FOF, LE).

**Hetaeria alata* Ridl.

LAOS. Vientiane Prov.: 29 — creeping terrestrial herb on shady rocky slope, leaves dark uniform green, not common, LA-VN 1645 (FOF, LE).

Kingidium deliciosum (Rchb. fil.) H. R. Sweet

LAOS. Vientiane Prov.: 29 — epiphyte in shady place, common, LA-VN 1680 (FOF, LE).

Liparis pumila Aver.

LAOS. Vientiane Prov.: 29 — epiphyte on tall mossy tree on steep shady stream slope, not rare,

LA-VN 1622 (FOF, LE); **30** — epiphyte on tall mossy trees on steep rocky shady slope, not rare, LA-VN 1708 (FOF, LE); **33** — epiphyte on mossy trees on shady rocky slope at the mountain top, occasional, LA-VN 1831 (FOF, LE).

Liparis viridiflora (Blume) Lindl.

LAOS. Luang Prabang Prov.: 16 — lithophytic herb on shady very steep rocky slope near mountain top, not rare, LA-VN 1963 (FOF, LE); **20** — lithophytic herb on open karstic rocks on mountain top, common, LA-VN 2083 (FOF, LE); **21** — epiphyte and lithophyte on open rocky mossy mountain tops, common, LA-VN 2055 (FOF, LE); **22** — lithophytic herb on mossy rocks on mountain top, not rare, LA-VN 2093 (FOF, LE), LA-VN 2098 (FOF, LE). **Vientiane Prov.: 29** — lithophyte in rather open rocky mossy slope, common, LA-VN 1660 (FOF, LE); **30** — epiphyte and lithophyte on steep rocky shady slope, not rare, LA-VN 1726 (FOF, LE); **33** — clustering lithophyte and occasionally epiphyte on rocky mossy mountain top, not common, LA-VN 1871 (FOF, LE).

**Luisia macrotis* Rchb. fil. (Fig. 3, 4, 5).

CAMBODIA. 2 — TM-57, fl. 30 XI 2017 (LE).

Luisia morsei Rolfe

LAOS. Luang Prabang Prov.: 15 — epiphyte on mossy cliff on rocky mountain top, not common, LA-VN 1897 (FOF, LE); **21** — epiphyte on mossy trees on rocky mountain top, not rare, LA-VN 2032 (FOF, LE), LA-VN 2046, fl. 23 VIII 2017 (FOF, LE).

Luisia zollingeri Rchb. fil.

LAOS. Vientiane Prov.: 38 — epiphyte on mossy tree on rocky mountain top, occasional, LA-VN 1529 (FOF, LE).

**Malleola seidenfadenii* Christenson (Fig. 3, 6, 7).

LAOS. Vientiane Prov.: 32 — LA-VN 1785a (LE).

Micropera pallida (Roxb.) Lindl.

LAOS. Luang Prabang Prov.: 16 — epiphytic and lithophytic climbing vine to 2 m long on mossy rocky mountain top, locally very common, LA-VN 1977 (FOF, LE).

Nervilia kasiensis S. W. Gale et Phaxaysombath

LAOS. Luang Prabang Prov.: 25 — terrestrial tuberiferous herb with leafless inflorescence to 20 cm tall, old flowers light brownish, not common, LA-VN 2173 (FOF, LE).

Oberonia cavaleriei Finet

LAOS. Vientiane Prov.: 30 – lithophyte on vertical shady cliff on steep rocky slope, not common, LA-VN 1727 (FOF, LE); **33** – lithophyte on shady vertical cliff at the mountain top, occasional, LA-VN 1832 (FOF, LE).

Oberonia falcata King et Pantl.

LAOS. Vientiane Prov.: 38 – epiphyte on mossy trees on rocky mountain top, not rare, LA-VN 1554/13, fl. 10 XI 2017 (LE).

Oberonia falconeri Hook. fil.

LAOS. Luang Nam Tha Prov.: 27 – NLO-32 (LE). **Vientiane Prov.: 38** – epiphyte on mossy trees on rocky mountain top, not rare, LA-VN 1554/9, fl. 10 XI 2017 (LE).

Panisea uniflora (Lindl.) Lindl.

LAOS. Bolikhamsai Prov.: 6 – NLO-71, fl. I–III 2018 (LE); NLO-78, fl. X–XI 2017 and II–IV 2018 (LE). **Vientiane Prov.: 30** – epiphyte and lithophyte on steep rocky slope, flowers light yellowish-pink, not rare, LA-VN 1747 (FOF, LE); **32** – clustering epiphyte and lithophyte on shady cliff near mountain top, not rare, LA-VN 1776 (FOF, LE); **38** – clustering epiphyte and lithophyte on mossy rocky mountain top, common, LA-VN 1543 (FOF, LE); **39** – clustering epiphyte, locally common, LA-VN 1569 (FOF, LE); **40** – creeping lithophyte and epiphyte in shady place, common, LA-VN 1588 (FOF, LE).

Paphiopedilum concolor (Lindl. ex Bateman) Pfitzer

LAOS. Luang Prabang Prov.: 13 – lithophytic rosulate herb with tessellated leaves on mossy rocky mountain top, rare, LA-VN 1926 (FOF, LE); **15** – lithophytic rosulate herb in mossy rocky crevices in shady places on rocky mountain top, locally common, LA-VN 1885 (FOF, LE); **16** – lithophytic rosulate herb on steep cliffs on mossy rocky mountain top, locally common, LA-VN 1978 (FOF, LE); **21** – lithophytic rosulate herb in crevices of mossy cliff, locally common, LA-VN 2043 (FOF, LE); **22** – lithophytic herb on crevices of mossy rocks on rocky mountain top, locally common, LA-VN 2106 (FOF, LE), LA-VN 2153 (FOF, LE). **Vientiane Prov.: 33** – lithophytic herb on open mossy rocks near mountain top, not common, LA-VN 1848 (FOF, LE).

Pelatantheria ctenoglossum Ridl.

LAOS. Vientiane Prov.: 33 – clustering lithophytic undershrub to 0.5 m tall on rocky mossy mountain top, locally common, LA-VN 1874 (FOF, LE).

Phaius flavus (Blume) Lindl.

LAOS. Luang Prabang Prov.: 24 – terrestrial and lithophytic herb on rocky mountain slope, not common, LA-VN 2135 (FOF, LE).

**Phaius takeoi* (Hayata) H. J. Su (Fig. 3, 8, 9).

LAOS. Houa Phang Prov.: 10 – NLO-46 (LE). **Luang Nam Tha Prov.: 27** – NLO-34 (LE);

Phalaenopsis gibbosa H. R. Sweet

LAOS. Bolikhamsai Prov.: 6 – NLO-72, fl. II–III 2018 (LE). **Luang Prabang Prov.: 21** – epiphyte in shady places in mossy rocky mountain tops, very common, LA-VN 2065a (LE); **22** – epiphyte in shady place near mountain top, not common, LA-VN 2112 (FOF, LE); **25** – epiphyte in shady place near mountain top, not common, LA-VN 2183 (FOF, LE).

Pholidota articulata Lindl.

LAOS. Luang Prabang Prov.: 21 – epiphyte and lithophyte on mossy rocky mountain tops, common, LA-VN 2041 (FOF, LE).

Pholidota imbricata Lindl.

LAOS. Luang Nam Tha Prov.: 27 – NLO-25 (LE). **Vientiane Prov.: 33** – clustering epiphyte on mossy trees on shady rocky slope at the mountain top, also occasionally as lithophyte, not rare, LA-VN 1834 (LE); **39** – clustering epiphyte, not common, LA-VN 1563 (LE); **40** – lithophyte and epiphyte in shady place, common, LA-VN 1596 (LE).

Pholidota recurva Lindl.

LAOS. Luang Prabang Prov.: 14 – epiphyte on mossy tree on rocky mossy mountain top, occasional, LA-VN 1879 (FOF, LE); **20** – creeping herbaceous vine to 1 m long on open mossy rocks on mountain tops, common, LA-VN 2071 (FOF, LE). **Vientiane Prov.: 33** – epiphyte on old mossy trees on rocky mountain top, not rare, LA-VN 1783 (FOF, LE), LA-VN 1825 (FOF, LE); **39** – creeping epiphyte, not rare, LA-VN 1562 (FOF, LE).

Podochilus oxystophylloides Ormerod

LAOS. Luang Prabang Prov.: 16 – creeping lithophyte on shady vertical cliff near mossy rocky mountain top, locally common, LA-VN 1986 (FOF, LE); **22** – lithophytic adpressed herb on shady cliff near mountain top, locally common, LA-VN 2102 (FOF, LE). **Vientiane Prov.: 31** – lithophyte on shady vertical cliff on shady steep rocky slope, not common, LA-VN 1765 (FOF, LE).

Polystachya concreta (Jacq.) Garay et H. R. Sweet

LAOS. Luang Prabang Prov.: 13 — epiphyte on old mossy tree on rocky mountain top, occasional, LA-VN 1922 (FOF, LE); **17** — epiphyte on tall mossy trees on rocky steep mountain slope, occasional, LA-VN 1946 (FOF, LE). **Luong Nam Tha Prov.: 27** — NLO-12 (LE).

**Pomatocalpa maculosum* (Lindl.) J. J. Sm.

LAOS. Luang Prabang Prov.: 16 — erect under-shrub to 1 m tall on mossy rocks on rocky mountain top, locally common, LA-VN 1982 (FOF, LE); **20** — lithophytic undershrub to 1.5 m tall on rocky mountain tops, not common, LA-VN 2073 (FOF, LE); **22** — lithophytic undershrub to 1.5 m tall on rocky mountain tops, not common, LA-VN 2125 (FOF, LE).

Pomatocalpa spicatum Breda, Kuhl et Hasselt

LAOS. Luang Prabang Prov.: 17 — epiphyte on mossy trees on shady place, occasional, LA-VN 1947 (FOF, LE); **25** — epiphyte on mossy tree on rocky mountain slope, flowers entirely yellow, rare, LA-VN 2187 (FOF, LE).

Robiquetia succisa (Lindl.) Seidenf. et Garay

LAOS. Luong Nam Tha Prov.: 27 — NLO-14 (LE).

Sarcoglyphis mirabilis (Rchb. fil.) Garay

LAOS. Luang Prabang Prov.: 16 — epiphyte in shady places on mossy rocky mountain top, flowers odorless, tepals white with pink tint, lip purple, very common, LA-VN 1979 (FOF, LE); **22** — epiphyte on mossy trees on mountain top, not common, LA-VN 2101a (LE). **Vientiane Prov.: 31** — epiphyte on mossy tree on shady steep rocky slope, not common, LA-VN 1764 (FOF, LE); **33** — epiphyte on mossy trees on shady rocky slope at the mountain top, not rare, LA-VN 1829 (FOF, LE); **38** — epiphyte on mossy trees on rocky mountain top, not rare, LA-VN 1554 (FOF, LE); **40** — epiphyte in shady place, not common, LA-VN 1575 (FOF, LE).

Sarcoglyphis thailandica Seidenf.

LAOS. Luang Prabang Prov.: 13 — epiphyte on old mossy trees on rocky mountain top, fruits pale dull yellowish-green, not common, LA-VN 1924 (FOF, LE); **20** — short-stemmed epiphyte on mossy trees on rocky mountain tops, flowers: tepals yellowish-green, lip apex purple, locally common, LA-VN 2072 (FOF, LE).

**Sarcoglyphis yunnanensis* Z. H. Tsi

LAOS. Luang Prabang Prov.: 25 — epiphyte on old tree on mossy rocky mountain top, flowers: tepals light yellowish to pink or almost white, epichile dark purple, very common, LA-VN 2172 (FOF, LE).

**Schoenorchis fragrans* (E. C. Parish et Rchb. fil.) Seidenf. et Smitinand

LAOS. Vientiane Prov.: 33 — adpressed epiphyte on mossy tree (*Pistacia weinmanniifolia*) near mountain top, not common, LA-VN 1844 (FOF, LE).

Sunipia scariosa Lindl.

LAOS. Vientiane Prov.: 38 — creeping epiphyte on mossy trees on rocky mountain top, not common, LA-VN 1544 (FOF, LE).

Thelasis khasiana Hook. fil.

LAOS. Luang Prabang Prov.: 22 — clustering epiphyte on mossy tree on rocky mountain top, not common, LA-VN 2105 (FOF, LE). **Vientiane Prov.: 33** — clustering epiphyte on mossy old tree on rocky mountain top, occasional, LA-VN 1809 (FOF, LE), LA-VN 1846 (FOF, LE); **40** — epiphyte on mossy tree in shady place, not common, LA-VN 1597 (FOF, LE).

Thelasis pygmaea (Griff.) Lindl.

LAOS. Vientiane Prov.: 30 — epiphyte on tall mossy trees, not common, LA-VN 1707 (FOF, LE).

**Thrixspermum fragrans* Ridl. (Fig. 4, 1, 2).

LAOS. Bolikhamsai Prov.: 5 — NLO-82 (LE). **6** — NLO-81 (LE).

**Thrixspermum hystrix* (Blume) Rchb. fil. (Fig. 4, 3, 4).

LAOS. Houa Phang Prov.: 10 — NLO-39 (LE).

Trichoglottis orchidea (J. Koenig) Garay

LAOS. Luang Prabang Prov.: 20 — epiphyte with pendulous shoots to 0.5 m long in shady place near mountain tops, flowers: tepals orange, lip white, very common, LA-VN 2079 (FOF, LE); **21** — epiphyte in shady places in mossy rocky mountain tops, flower tepals yellow-orange, lip white, very common, LA-VN 2065 (FOF, LE); **25** — epiphyte with pendulous stem to 0.5 m long on old mossy trees on rocky slope near mountain top, flowers: tepals orange, lip white, very common, LA-VN 2180 (FOF, LE). **Vientiane Prov.: 30** — epiphyte with pendulous stems to 1 m long on shady rocky steep slope, not rare, LA-VN 1734 (FOF, LE); **32** — pendulous epiphyte with drooping stems to 1 m long, flower buds orange, not rare, LA-VN 1782 (FOF, LE); **39** — clustering epiphyte with stems to 1.5 m long, tepals light yellow with dull orange spots, lip white, locally common, LA-VN 1570 (FOF, LE); **40** — clustering epiphyte with long pendulous stems, not rare, LA-VN 1600 (FOF, LE).

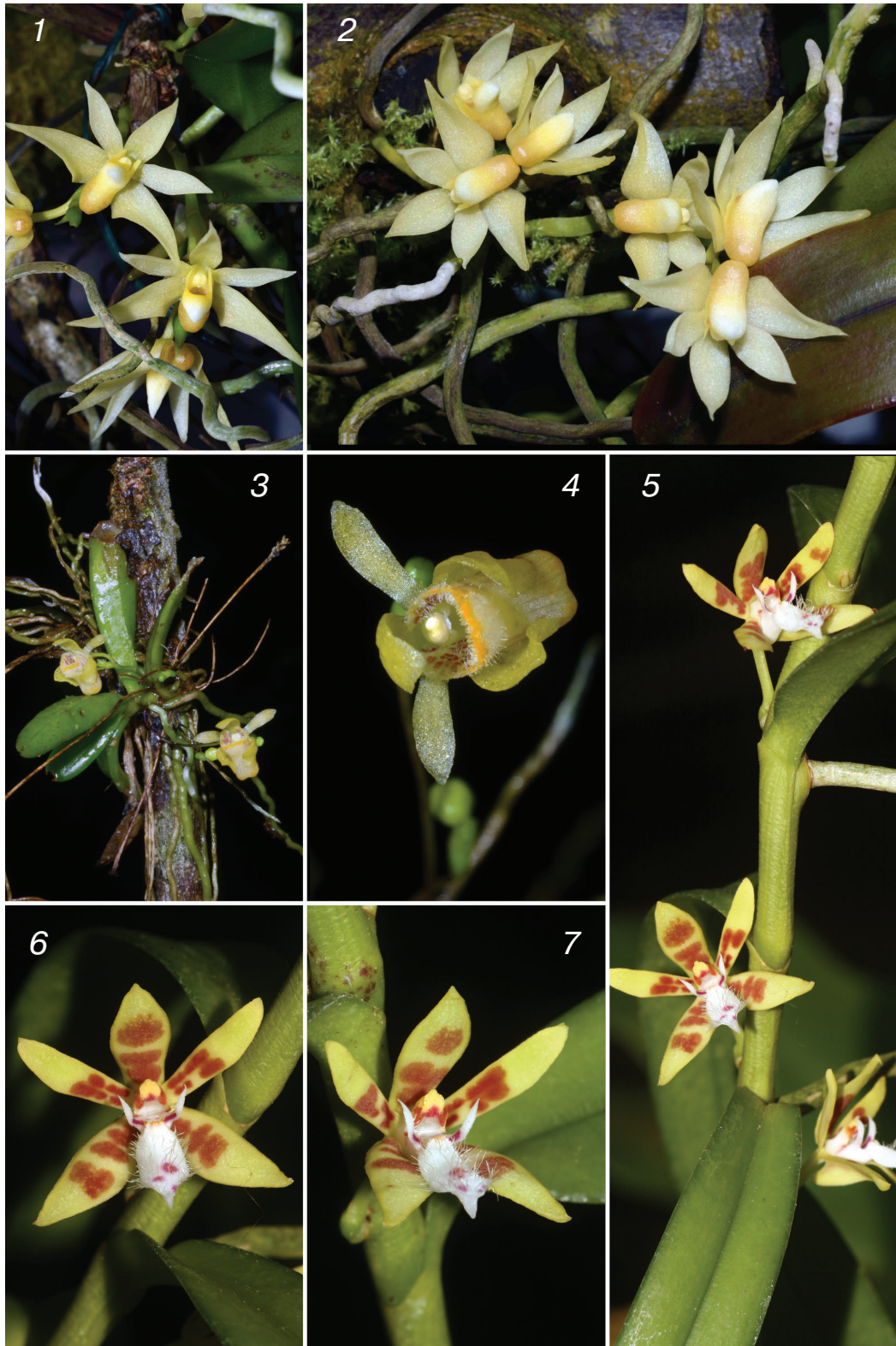


Fig. 4. New and rare orchids in the flora of Cambodia and Laos.

1, 2 – *Thrixspermum fragrans* (N. Orlov, L. Iohanssen, NLO-82); 3, 4 – *Thrixspermum hystrix* (N. Orlov, L. Iohanssen, NLO-39); 5–7 – *Trichoglottis seidenfadenii* (T. Maisak et al., TM-837). Photos by N. Orlov (1–4) and L. Averyanov (5–7), correction and design by L. Averyanov.

**Trichoglottis seidenfadenii* Aver. (Fig. 4, 5–7).
CAMBODIA. 1 – TM-837, fl. 26 VI 2017 (LE).

Trichotosia pulvinata (Lindl.) Kraenzl.

LAOS. Vientiane Prov.: 33 – clustering pendulous epiphyte on mossy tree near mountain top, not common, LA-VN 1843 (FOF, LE).

Tropidia angulosa (Lindl.) Blume

LAOS. Vientiane Prov.: 29 – terrestrial herb on shady rocky slope, not rare, LA-VN 1647 (FOF, LE); 32 – terrestrial herb on rocky steep shady slope, not rare, LA-VN 1799 (FOF, LE); 37 – terrestrial herb on shady rocky steep slope, common, LA-VN 1525 (FOF, LE); 38 – terrestrial herb in shady places on shady rocky mountain top, common, LA-VN 1537 (FOF, LE).

Tropidia curculigoides Lindl.

LAOS. Vientiane Prov.: 29 – terrestrial herb on shady rocky slope, not common, LA-VN 1646 (FOF, LE).

Vanda brunnea Rchb. fil.

LAOS. Luang Prabang Prov.: 21 – epiphyte on tall mossy trees on mountain top, flowers fragrant, tepals brown, lip epichile and column white, locally very common, LA-VN 2033 (FOF, LE); 24 – epiphyte on mossy tree on open mossy rocky mountain top, flowers brownish, occasional, LA-VN 2156 (FOF, LE).

Vanda denisoniana Benson et Rchb. fil.

LAOS. Luang Prabang Prov.: 21 – epiphyte on tall trees on rocky slope near mountain top, flowers light yellowish, locally common, LA-VN 2049 (FOF, LE).

Vanda flavobrunnea Rchb. fil.

LAOS. Vientiane Prov.: 31 – epiphyte on mossy tree on shady steep rocky slope, not rare, LA-VN 1768 (FOF, LE).

Vandopsis gigantea (Lindl.) Pfitzer

LAOS. Luang Prabang Prov.: 16 – lithophytic undershrub on mossy rocks on rocky mountain top, flowers yellow with brown spots, lip white with violet tint, rare, LA-VN 1969 (FOF, LE). Vientiane Prov.: 33 – lithophytic undershrub on open mossy rocks on rocky mountain top, not common, LA-VN 1859 (FOF, LE).

Zeuxine flava (Wall. ex Lindl.) Trimen

LAOS. Vientiane Prov.: 32 – terrestrial and lithophytic creeping herb on shady steep rocky slope, sepals olive-brownish, lip yellow, not common, LA-

VN 1787 (FOF, LE); 39 – terrestrial and lithophytic herb in shady place, petals olive-brownish, lip yellow, occasional, LA-VN 1555a (LE).

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