

## TWENTY-FIVE NEW SPECIES RECORDS IN THE FLORA OF LAOS

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### ABSTRACT

Twenty-five plant taxa in 14 families are newly recorded for the flora of Laos. The genus *Sarcopyramis* (Melastomataceae) is new to the country. For each taxon, voucher specimens, the general distribution and photographs, together with taxonomic notes, are provided.

Keywords: angiosperms, Bolaven Plateau, Dong Hua Sao National Protected Area, Indochina, taxonomy

### INTRODUCTION

Laos maintains a large area of forests where the flora is composed of a unique mixture of Himalayan elements, Chinese elements, Indochinese elements and Malaysian elements in various proportions (ZHU, 2017). However, the inventory of Lao plants is far from being completed because the activities of plant taxonomists in the country are limited and the number of plant specimens in herbaria is the fewest among the Southeast Asian countries (only three specimens per 100 km<sup>2</sup>, NEWMAN *ET AL.*, 2007). Consequently, recent efforts to make new collections have resulted in the discovery of previously unknown species in Laos. For example, among the 181 plant taxa collected from Nam Kading National Protected Area, Bolikhamxai Province, eight species (4.4%) were undescribed (SOULADETH *ET AL.*, 2017, 2019; TAGANE *ET AL.*, 2018a; SOUVANNAKHOUUMMANE *ET AL.*, 2019; YANG *ET AL.*, 2018) and 30 species (16.5%) were newly recorded in Laos (TAGANE *ET AL.*, 2018b). Further efforts for botanical inventories and taxonomic studies are required to accurately know the plant diversity of Laos.

Here, we report discoveries from our botanical surveys on the Bolaven Plateau, located mostly in Champasak Province, and partly in Saravan, Sekong and Attapeu (Attapu) Provinces in southern Laos (Fig. 1). The area of the plateau is approximately 4,800 km<sup>2</sup>, mostly ranging from 900–1400 m msl (above mean sea level) and surrounded by lowland around 100–200 m msl with cliffs and steep escarpments, especially on the southern and eastern sides. The climate on the plateau is moist and cool all year-round: average annual temperature 20.2 °C

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and annual rainfall over 3,800 mm in Paksong Town at ca. 1290 m msl (CLIMATE-DATA.ORG, 2019). The area is protected mainly for biodiversity conservation at the national level (Dong Hua Sao National Protected Area) and partly at the district level. Forest types are diverse along the altitudinal gradient: lowland evergreen forest to wet evergreen forest at high elevation, with open grassland and sparse pine forest. Recent botanical surveys of the Bolaven Plateau have discovered five new species (PICHEANSOONTHON ET AL., 2008; WONGSUWAN, 2008; RODDA & MEVE, 2017; NAGAHAMA ET AL., 2019; SUDDEE ET AL., 2020) and nine orchids new to the country (AVERYANOV ET AL., 2016). All the new species are considered to be endemic to this area, suggesting that it has high plant diversity and also high endemism.

The dynamic land use changes currently taking place in the Bolaven Plateau region are caused mainly by expansion of coffee plantations, bauxite mining and hydropower dam construction (DELANG ET AL., 2013). The land-use changes often occur even in protected areas. Thus, many vascular plants, including species reported here, are threatened and inventories of their habitats are urgently needed to develop better conservation plans.

To document the flora of the Bolaven Plateau, we carried out three field surveys during 9–14 December 2018, 19–24 February 2019, and 3–8 July 2019, and collected a total of 925 specimens. In this study, we report 25 vascular plants as new records for the flora of Laos.

## MATERIALS AND METHODS

To identify species and confirm distribution records in Laos, we examined herbarium specimens at The Forest Herbarium, Bangkok (BKF), The Herbarium of Faculty of Forest Science, National University of Laos, Vientiane (FOF), The Kagoshima University Museum (KAG), The Herbarium of Kyushu University, Fukuoka (FU), and National Herbarium of Laos (NHL); we also examined specimen images on the web (e.g. JSTOR Global Plant, <https://plants.jstor.org/>; Royal Botanic Garden Edinburgh (E), <https://data.rbge.org.uk/search/herbarium/>; Muséum national d'Histoire naturelle (P), <https://science.mnhn.fr/institution/mnhn/collection/p/item/search/>; Naturalis (L), <http://biportal.naturalis.nl>); we also consulted a checklist of Laos (NEWMAN ET AL., 2007) and *A Checklist of the Vascular Plants of Lao PDR* (<https://padme.rbge.org.uk/laos/list/>), as well as the taxonomic literature on particular groups and regional floras including *Flore du Cambodge, du Laos et du Vietnam* (AUBRÉVILLE ET AL., 1960–present), *Flora of Thailand* (SMITINAND & LARSEN ET AL., 1970–present) and *Flora of China* (WU ET AL., 1994–2013). Voucher specimens were deposited at the herbaria of FOF, FU and KAG, and partly at BKF and TNS.

## SPECIES NEWLY RECORDED IN LAOS

### *Macropanax schmidii* C.B.Shang [Araliaceae]—Fig. 2A, B

Bull. Mus. Natl. Hist. Nat., B, Adansonia Ser. 4, 5(1): 50 (1983).

This is a shrubby tree to 5 m tall, originally described from “Daa Tang La (10 km south of Da Lat), alt. 1000–1200 m”, southern Vietnam. In Laos, only one species of *Macropanax*, *M. dispersum* (Blume) Kuntze has been reported (XIANG & LOWRY, 2007), and *M. schmidii* is easily distinguished from this by its smaller and narrower leaflets with entire margin (serrulate leaflet margins in *M. dispersum*).

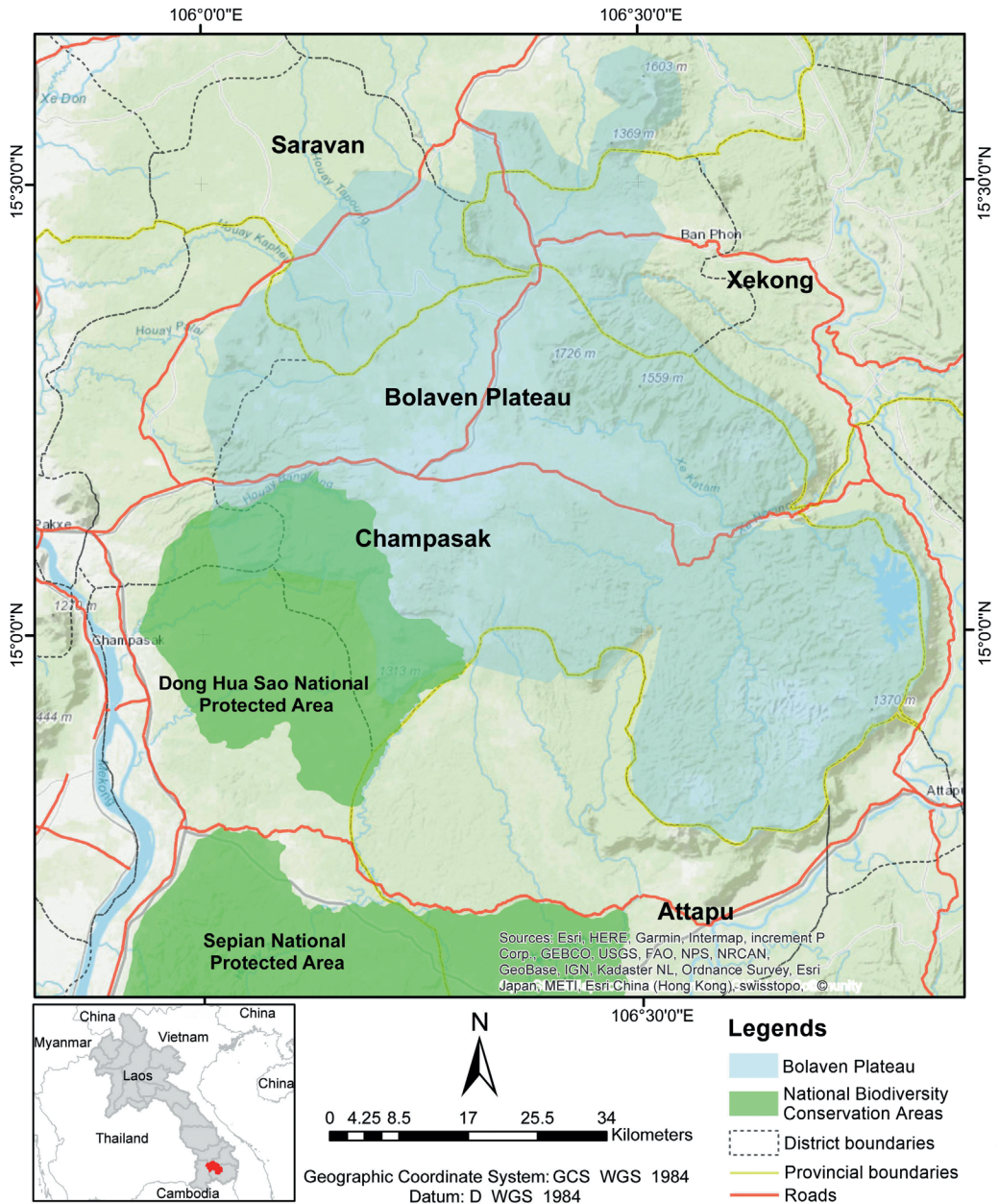


Figure 1. The location of the Bolaven Plateau in Laos.

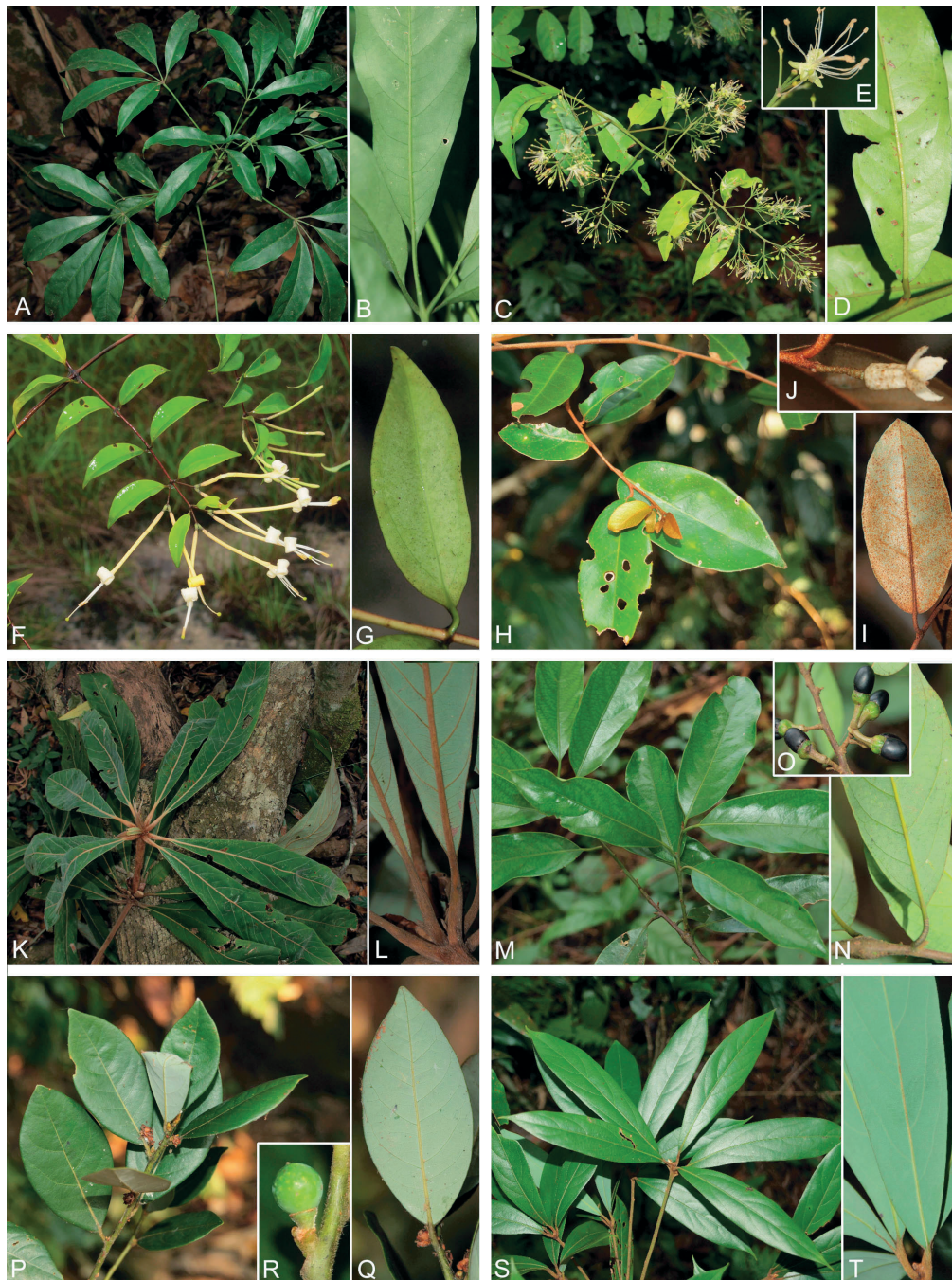


Figure 2. (A, B) *Macropanax schmidii* C. B. Shang: A, leafy twig. B, portion of lower leaf surface. (C–E) *Capparis cantoniensis* Lour.: C, flowering twig. D, portion of lower leaf surface. E, flower. (F, G) *Lonicera sumatrana* Miq.: F, flowering twig. G, lower leaf surface. (H–J) *Elaeagnus elongatus* Tagane & V. S. Dang: H, leafy twig. I, lower leaf surface. J, flower. (K, L) *Actinodaphne sesquipedalis* var. *cambodiana* Lecomte: K, leafy twig. L, portion of lower leaf surface. (M–O) *Litsea laeta* (Wall. ex Nees) Hook.f.: M, fruiting twig. N, portion of lower leaf surface. O, fruits. (P–R) *Litsea rotundifolia* Hemsl. var. *oblongifolia* (Nees) C. K. Allen: P, twigs with male flowers. Q, lower leaf surface. R, immature fruit. (S, T) *Neolitsea elaeocarpa* H. Liu: S, leafy twig. T, portion of lower leaf surface. Photographs by Shuichiro Tagane.

Specimen examined: LAOS. Sekong Province: Thateng District, in evergreen forest near Palaeng Tai Village, 15°28'40.2"N, 106°19'51.0"E, 545 m msl, 22 Feb. 2019, *Souladeth et al.* L2713 [ster.] (FOF, FU, KAG).

Distribution: Laos (Bolaven), Vietnam.

***Capparis cantoniensis*** Lour. [Capparaceae]—Fig. 2C–E

Fl. Cochinch. 1: 330 (1790).

We encountered one flowering individual at edge of hill evergreen forest at 783 m msl. The species is widely distributed from India to China extending to Malesia, but we could not find any records in the Lao checklist as well as no specimen images at major herbaria. Therefore, we here report it as a new record in the flora of Laos. Among the species of *Capparis* in Laos, it is distinguished by its elliptic to oblong leaves, flowers in subumbels arranged in terminal or axillary leafy panicle, and small gynophore shorter than 8 mm (CHAYAMARIT, 1991; ZHANG & TUCKER, 2008).

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, Paksong District, near border with Sanamxai District, in hill evergreen forest, 15°00'18.27"N, 106°12'31.64"E, 783 m msl, 8 July 2019, *Souladeth et al.* L3268 [fl.] (FOF, KAG).

Distribution: Bhutan, China, India, Indonesia, Laos (Bolaven), Myanmar, Philippines, Thailand, Vietnam.

***Lonicera sumatrana*** Miq. [Caprifoliaceae]—Fig. 2F, G

Fl. Ned. Ind., Eerste Bijv. 3: 537 (1861).

*Lonicera sumatrana* is scattered at edge of wet evergreen forest on the plateau. It is easily recognized by its entirely glabrous body (except few negligible hairs on stamens and style and some ciliae on bracts and calyx), elliptic-oblong leaves glaucous below, 3–4 pairs of secondary veins, indistinct tertiary veins, inflorescence not forming flower cluster (2-flowered) and corolla 6–7.3 cm long (KERN & STEENIS, 1951; FUKUOKA, 2015). Both KERN & STEENIS (1951) and FUKUOKA (2015) mentioned its occurrence in China and Myanmar, but we have not confirmed the materials from these two countries. YANG *ET AL.* (2011) did not treat this species in *Flora of China*.

Specimens examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, Paksong District, at edge of wet evergreen forest, 15°04'40.46"N, 106°12'22.05"E, 1257 m msl., 3 July 2019, *Souladeth et al.* L2845 [fl.] (FOF, KAG); 15°03'38.57"N, 106°12'31.10"E, 1278 m msl., 4 July 2019, *Souladeth et al.* L2951 [fl.] (KAG, FOF).

Distribution: China (Yunnan)?, Indonesia (Sumatra), Laos (Bolaven), Myanmar?, Thailand (Peninsular).

***Elaeagnus elongatus*** Tagane & V. S. Dang [Elaeagnaceae]—Fig. 2H–J

Thai Forest Bull., Bot. 43: 30 (2015).

*Elaeagnus elongatus* is a scandent shrub to climber described by the first author in 2015 based on specimens from Cambodia and Thailand (TAGANE *ET AL.*, 2015). It is characterized by its lower leaf surface covered with dark brown to yellowish white scales, 4-angular calyx tube and elongated pedicels in fruit (fruits not yet seen on Lao materials). The species grows in

hill evergreen forest to lower montane forest, at 500–1300 m msl in Cambodia and Thailand, and our collection site in Laos is exactly that.

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, at the edge of evergreen forest near Seua Waterfall, 15°04'10.3"N, 106°12'20.1"E, 1051 m msl, 19 Feb. 2019, *Souladeth et al. L2511* (FOF, KAG).

Distribution: Cambodia (Mt. Bokor, type), Laos (Bolaven), Thailand (NE and N).

*Actinodaphne sesquipedalis* Hook.f. & Thomson ex Meisn. [Lauraceae]—Fig. 2K, L

var. *cambodiana* Lecomte, Nouv. Arch. Mus. Hist. Nat. Paris, sér. 5, 5: 93 (1913).

We found one tree in evergreen forest. Though our collection is vegetative state, *Actinodaphne sesquipedalis* is easily recognized by its terminal buds surrounded by leaf-like scales, elliptic-oblong to narrowly lanceolate leaves 20–45 cm long, and petiole 2–4 cm long and yellowish hairy (TANAROS ET AL., 2010).

Specimen examined: LAOS. Sekong Province: Thateng District, Had Saiy Village, 15°24'21.6"N, 106°22'44.1"E, 1081 m msl., 23 Feb. 2019, *Souladeth et al. L2759* (FOF, KAG).

Distribution: Cambodia, Laos (Bolaven), Thailand (SE).

*Litsea laeta* (Wall. ex Nees) Hook.f. [Lauraceae]—Fig. 2M–O

Fl. Brit. India [J. D. Hooker] 5(13): 169 (1886).

*Litsea laeta* is a tree to 9 m tall found in wet evergreen forest on the plateau. It is distinguished by its oblong-lanceolate leaves glaucous below, inflorescences bearing reduced branchlets in clusters of umbels 1–4 cm long, and ovoid to ellipsoid fruits (HOOKER, 1886; NGERNSAENG SARUAY ET AL., 2011). In addition to our collection in Laos, we also collected this species in lower montane forest in Bidoup Nui Ba National Park, southern Vietnam, both of which extend its distribution range to its eastern limit in Vietnam.

Specimens examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area (Bolaven Plateau), near Nong Luang Village, in evergreen forest, 15°04'19.26"N, 106°12'38.67"E, 1248 m msl, 11 Dec. 2018, *Tagane et al. L2066* [ster.] (FOF, FU, KAG); 15°04'05.58"N, 106°12'50.26"E, 1238 m msl, 11 Dec. 2018, *Tagane et al. L2085* [fr.] (FOF, FU, KAG); 15°03'54.16"N, 106°12'50.41"E, 1218 m msl, 4 July 2019, *Souladeth et al. L2889* [female fl.] (FOF, KAG). VIETNAM. Lam Dong Province, Bidoup Nui Ba National Park: Dinh Gia Rieng, 12°09'36.61"N, 108°32'11.16"E, 1656 m msl, 16 June 2018, *Yahara et al. V8405* [male fl.] (DLU, FU); Cong Troi, 12°06'06.85"N, 108°23'00.32"E, 1866 m msl, 27 June 2018, *Nagahama et al. V9127* [female fl.] (DLU, FU).

Distribution: Bhutan, India, Laos (Bolaven), Myanmar, Pakistan, Thailand (N, NE, SW, SE, P), Vietnam (Lam Dong).

*Litsea rotundifolia* Hemsl. [Lauraceae]—Fig. 2P–R

var. *oblongifolia* (Nees) C. K. Allen, Ann. Missouri Bot. Gard. 25: 386 (1938).

This is a shrub, 1.5 m tall, locally common in open grassland on and near rocky surfaces on the summit of the Bolaven Plateau. It is easily distinguished from the other previously known species of *Litsea* in Laos by its smallest leaves to 6 cm long and fruit <6 mm in diam. We collected this species also in Phou Khao Khouay National Protected Area, Vientiane Capital, as exemplified by the specimens shown below.

Specimens examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area (Bolaven Plateau), near Nong Luang Village, in open grassland, 15°04'16.2"N, 106°12'35.6"E, 1239 m msl, *Souladeth et al. L2483* [fr.] (FOF, KAG); 15°03'45.37"N, 106°12'37.74"E, 1260 m msl, 4 July 2019, *Souladeth et al. L2930* [fl. bud] (FOF, KAG). Vientiane Capital: Phou Khao Khouay, in open pine forest, 18°22'35.28"N, 102°51'29.46"E, 905 m msl, 25 Dec. 2017, *Yahara et al. L1810* [ster.], *L1864* [male fl.], *L1865* [fr.] (FOF, FU). Distribution: Laos (Bolaven, Phou Khao Khouay), China, Taiwan, Vietnam.

*Neolitsea elaeocarpa* H. Liu [Lauraceae]—Fig. 2S, T

Laurac. Chine et Indochine: 144 (1932).

We encountered this species at the edge of hill evergreen forest on the Bolaven Plateau. The species is somewhat commonly distributed in lowland to hill evergreen forests in central and southern Vietnam, and we have collected the plants many times in many localities in these areas. Although the specimens we collected in Laos were in a vegetative state, the Lao materials highly matched its types and our materials. This species is easily distinguished from the other species of *Neolitsea* in Indochina by having narrowly obovate-elliptic leaves with acuminate apex, scalariform tertiary venation, and young twigs and petiole densely covered with short brown hairs.

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area (Bolaven Plateau), near Nong Luang Village, 15°04'36.61"N, 106°12'31.69"E, 1221 m msl, 11 Dec. 2018, *Tagane et al. L2132* [ster.] (FOF, FU, KAG).

Distribution: Laos (Bolaven), Vietnam (type).

*Medinilla rubicunda* (Jack) Blume [Melastomataceae]— Fig. 3A–C

Flora 14: 512 (1831).

*Medinilla rubicunda* is a subepiphytic shrub, widely distributed in humid evergreen forest in higher elevation in the continental Southeast Asia. It is distinguished by its 4-angular young twigs, short petiole <3 mm long, and few-flowered cymes occurring at leaf scars on old leafless branches (CHEN & RENNER, 2007).

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, near Nong Luang Village, 15°04'26.35"N, 106°12'24.15"E, 1210 m msl, 9 Dec. 2018, *Tagane et al. L1876* [fr.] (FOF, FU, KAG).

Distribution: Bhutan, Cambodia (Mt. Bokor), China, India, Laos (Bolaven), Malaysia, Myanmar, Nepal, Thailand.

*Sarcopyramis napalensis* Wall. [Melastomataceae]—Fig. 3D–F

Tent. Fl. Nepal. 1: 32 (1824).

We found this small herb in the shady understory beside a stream in evergreen forest on the plateau. It has been recorded widely from India and Nepal in the west to Indonesia and Philippines to the east, but not in Laos (RENNER *ET AL.*, 2001; CHEN & RENNER, 2007; NEWMAN *ET AL.*, 2007). Our collection from Laos thus fills a gap in its distribution.

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, in disturbed evergreen forest, near Nong Luang Village, 15°04'05.58"N, 106°12'50.26"E, 1238 m msl, 11 Dec. 2018, *Tagane et al. L2096* [fl. & fr.] (FOF, FU, KAG).

Distribution: Bhutan, China, India, Indonesia, Laos (Bolaven), Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam.

***Aglaia macrocarpa*** (Miq.) Pannell [Meliaceae]—Fig. 3G–I

Taxon. Monog. Gen. *Aglaia* (Kew Bull. Addit. Ser., 16): 65 (1992).

Only one young tree (5 m tall, g.b.h. 5.5 cm) was found in humid evergreen forest on the plateau. It is distinct by its leaves sparsely hairy to glabrous on both surfaces, 5–8 pairs of subopposite leaflets which are cuneate and asymmetrical at base and acuminate or caudate at apex, 6–11 pairs of secondary veins, and apical leaflet obovate or oblanceolate less than 13 cm long (PANNELL, 1992; WONGPRASERT ET AL., 2011).

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, in evergreen forest, 15°04'19.26"N, 106°12'38.67"E, 1248 m msl, 10 Dec. 2018, *Tagane et al. L1999* [ster.] (FOF, FU, KAG).

Distribution: Brunei, Indonesia, Laos (Bolaven), Malaysia, Singapore, Thailand, Vietnam.

***Syzygium tetragonum*** (Wight) Wall. ex Wight [Myrtaceae]—Fig. 3J–L

J. Bot. Syst. 2: 179 (1843).

*Syzygium tetragonum* is easily recognized by the strongly 4-angled young branches and inflorescences occurring on leafless branches behind the leaves. In Indochina, this species is documented in Vietnam only, though its occurrence in Cambodia and Laos was expected (SOH & PARNELL, 2015). On the Bolaven Plateau, *S. tetragonum* is locally common beside a rocky stream in humid evergreen forest, at around 1200 m msl.

Specimens examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, in evergreen forest, along a stream, 15°04'26.35"N, 106°12'24.15"E, 1210 m msl, 9 Dec. 2018, *Tagane et al. L1897* [fl.] (FOF, FU, KAG); 15°03'54.16"N, 106°12'50.41"E, 1218 m msl, 11 Dec. 2018, *Tagane et al. L2090* [fl.] (FOF, FU, KAG).

Distribution: Bhutan, China, India, Laos (Bolaven), Myanmar, Nepal, Thailand, Vietnam.

***Adinandra integerrima*** T. Anderson ex Dyer [Pentaphylacaceae]—Fig. 3M–O

Fl. Brit. India [J. D. Hooker] 1(2): 282 (1874).

*Adinandra integerrima* is a tree to 15 m tall, found at edge of hill evergreen forest beside a passion fruit field. It differs from *A. laotica* Gagnep., only the species has been recorded from Laos, in having densely pubescent twigs, leaves, calyx, petals and pedicel (vs. glabrous), and bracteoles immediately below the calyx (vs. short distance below the calyx) (KENG, 1972). Our materials in Laos matched *Adinandra phlebophylla* Hance (type Cambodia), which is now treated as a synonym of *A. integerrima* (KENG, 1972; MIN & BARTHOLOMEW, 2007).

Specimen examined: LAOS. Champasak Province: Bolaven Plateau, Paksong District, in the vicinity of Tad Gneuang Waterfall, 15°10'36.26"N, 106°08'48.05"E, 988 m msl, *Souladeth et al. L3004* [fl.] (FOF, KAG).

Distribution: Cambodia, China (Yunnan), Laos (Bolaven), Malaysia (Peninsular, type), Myanmar, Singapore, Thailand, Vietnam.



***Ternstroemia wallichiana*** (Griff.) Engl. [Pentaphylacaceae]—Fig. 3P–R

Nat. Pflanzenfam. Nachtr. [Engler & Prantl] 1: 246 (1897).

We found one fruiting tree at the edge of a slightly disturbed hill evergreen forest. In Laos, two species of *Ternstroemia*, *T. gymnanthera* Wight & Arn. and *T. microphylla* Merr. (synonym, *T. pseudovercillata* Merr. & Chun), have been recorded (NEWMAN *ET AL.*, 2007). *Ternstroemia wallichiana* is distinguished from these two by its thicker leaves, bracteoles on the upper part of the pedicel (vs. immediately below flowers) and larger fruits, 3–4 cm long (vs. less than 1.5 cm) (KENG, 1972; MIN & BARTHOLOMEW, 2007; GARDNER *ET AL.*, 2018).

Specimens examined: LAOS. Sekong Province: Thateng District, Phou Chouam Protection Forest, on the slope of a mountain behind Houay Saiy Village, 15°24'32.4"N, 106°22'58.5"E, 950 m msl, 23 Feb. 2019, *Souladeth et al. L2730* [fr.] (FOF, FU, KAG).

Distribution: Cambodia, Laos (Bolaven), Malaysia (Peninsula), Thailand, Vietnam.

***Piper politifolium*** C. DC. [Piperaceae]—Fig. 3S, T

Fl. Indo-Chine [P.H. Lecomte et al.] 5: 81 (1910).

This is a climber, occasional in evergreen forest at 158–545 m msl. The species is characterized by its obliquely cordate leaf base, pairs of basal thickest secondary veins reaching the middle of the leaf blade, spikes ca. 8 cm long and subglobose fruits on pedicels ca. 4 mm long (Hô, 1999).

Specimens examined: LAOS. Sekong Province: Thateng District, in lowland evergreen forest, 14°53'44.73" N, 106°01'02.36"E, 158 m msl, 13 Dec. 2018, *Souladeth et al. L2255* [ster.] (FOF, KAG); near Palaeng Tai Village, in evergreen forest, 15°28'40.2"N, 106°19'51.0"E, 545 m msl, 21 Feb. 2019, *Souladeth et al. L2602* [fr.] (FOF, KAG).

Distribution: Laos (Bolaven), Vietnam.

***Pittosporum pauciflorum*** Hook. & Arn. [Pittosporaceae]—Fig. 3U–W

Bot. Beechey Voy. 168, t. 32. (1833).

var. ***pauciflorum***

This is a shrub to 2 m tall, found along a stream in wet evergreen forest on the plateau. Two varieties, var. *pauciflorum* and var. *oblongum* H. T. Chang & S. Z. Yan, are known in China (ZHANG *ET AL.*, 2003) and our collection belongs to var. *pauciflorum* which has subglobose to ovoid capsules (vs. long cylindrical, ca. 1.8 × 0.7 cm in var. *oblongum*).

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, in evergreen forest, along a stream, 15°03'54.16"N, 106°12'50.41"E, 1218 m msl, 11 Dec. 2018, *Tagane et al. L2091* [fr.] (FOF, FU, KAG).

Distribution: Cambodia (Bokor), China (type), Laos (Bolaven), Thailand (NE), Vietnam.

***Ardisia perpendicularis*** Walker [Primulaceae]—Fig. 4A–C

Lingnan Sci. J. 20: 191 (1942).

var. ***perpendicularis***

One individual was encountered in the understorey of a new coffee plantation field just converted a year previously. This species is easily distinguished by its winged petiole, finely serrate leaf margin and paniculate inflorescence (HU & VIDAL, 2004). *Ardisia perpendicularis* belongs to subgenus *Bladhia* (Thunb.) Mez (YANG & DWYER, 1989; HU & VIDAL, 2004). In

Indochina, nine species belonging to subgenus *Bladhia* have been reported, all of which were recorded from Vietnam alone, not from Cambodia or Laos. Our collection is the first record of the occurrence of subgenus *Bladhia* in Laos.

Specimens examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area (Bolaven Plateau), near Nong Luang Village, in disturbed evergreen forest, 15°04'05.58"N, 106°12'50.26"E, 1238 m msl, *Tagane et al. L2084* [fr.] (FOF, FU, KAG); 15°04'19.26"N, 106°12'38.67"E, 1248 m msl, 4 July 2019, *Souladeth et al. L2911* [fr.] (FOF, KAG).

Distribution: Laos (Bolaven), Vietnam.

***Rapanea neriifolia*** (Siebold & Zucc.) Mez [Primulaceae]—Fig. 4D–F

var. *macrocarpa* (Pit.) C. M. Hu, Fl. Cambodge, Laos & Vietnam 32: 182 (2004).

We collected this species at the edge of wet evergreen forest on the plateau. This variety is different from the type variety by its elliptic to elliptic-lanceolate leaves, 8–18 × 2.5–6 cm and thicker pedicels 0.5–2 mm long (HU & VIDAL, 2004). In the *Checklist of Vascular Plants of Lao PDR* by NEWMAN ET AL. (2007), *Newman et al. LAO1446* (E) is listed under *Rapanea neriifolia* and *Nanthvong & Ridsdale BT481* (E, L) is listed under *Rapanea neriifolia* var. *neriifolia*. Thus, we report var. *macrocarpa* here for the first time in the flora of Laos.

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, near Nong Luang Village, 15°03'38.57"N, 106°12'31.10"E, 1278 m msl, 11 Dec. 2018, *Tagane et al. L2127* [fr.] (FOF, FU, KAG).

Distribution: Cambodia, China, India, Laos (Bolaven), Thailand, Vietnam.

***Helicia vestita*** W. W. Sm. [Proteaceae]—Fig. 4G–I

Notes Roy. Bot. Gard. Edinburgh 10: 181 (1918).

This is a tree, 8 m tall, scattered in hill evergreen forest on the Bolaven Plateau. Although our collection is in a sterile state, it is easily distinguished by its large, broadly obovate leaves in young trees (leaves narrowly elliptic in adult), and young twigs and lower leaf surfaces densely covered with ferruginous tomentose hairs.

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, Tad Fane Waterfall, in hill evergreen forest, 15°10'57.24"N, 106°07'36.82"E, 950 m msl, 12 Dec. 2018, *Tagane et al. L2161* [ster.] (FOF, FU, KAG).

Distribution: Cambodia (Bokor), Laos (Bolaven), Thailand (NE).

***Prunus fordiana*** Dunn [Rosaceae]—Fig. 4J, K

var. *balansae* (Koehne) J. E. Vidal, *Adansonia* 4: 143 (1964).

We have not seen flowers or fruits of this species yet but this variety is easily recognized in having lustrous and coriaceous leaf texture, serrate leaf margins and many gland dots on the lower surface of the lamina when dry (VIDAL, 1968). This taxon was first described as *Prunus phaeosticta* var. *dimorphophylla* J. E. Vidal in 1948 based on Vietnamese material but later changed by Vidal to *P. fordiana* var. *balansae*.

Specimen examined: LAOS. Sekong Province: Thateng District, Phou Chouam Protection Forest, in evergreen forest slightly disturbed, on the slope of a mountain behind Houay Saiy Village, 15°24'16.9"N, 106°22'34.5"E, 1211 m msl, 23 Feb. 2019, *Souladeth et al. L2773* [ster.] (FOF, KAG).

Distribution: Cambodia (Bokor), China (Hainan), Laos (Bolaven), Vietnam.

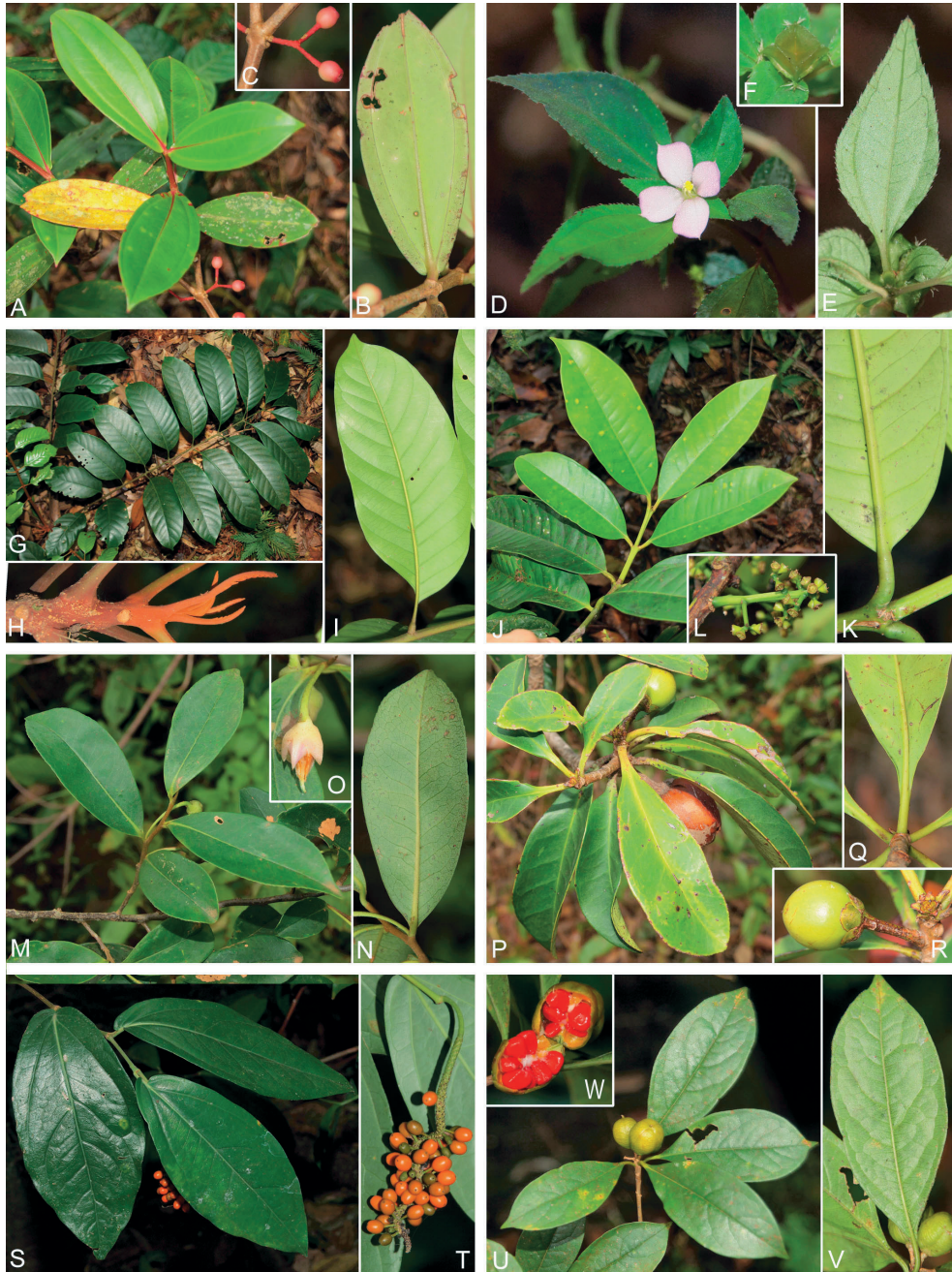


Figure 3. (A–C) *Medinilla rubicunda* (Jack) Blume: A, fruiting twig. B, lower leaf surface. C, fruits. (D–F) *Sarcopyramis napalensis* Wall.: D, habit. E, lower leaf surface. F, fruit. (G–I) *Aglaia macrocarpa* (Miq.) Pannell: G, leafy twig. H, shoot apex. I, lower leaf surface. (J–L) *Syzygium tetragonum* (Wight) Wall. ex Wight: J, leafy twig. K, portion of lower leaf surface. L, inflorescence. (M–O) *Adinandra integerrima* T. Anderson ex Dyer: M, flowering twig. N, lower leaf surface. O, flower. (P–R) *Ternstroemia wallichiana* (Griff.) Engl.: P, fruiting twig. Q, portion of lower leaf surface. R, fruit. (S, T) *Piper politifolium* C. DC.: S, fruiting branch. T, infructescence. (U–W) *Pittosporum pauciflorum* Hook. & Arn. var. *pauciflorum*: U, fruiting twig. V, lower leaf surface. W, seeds. Photographs by Shuichiro Tagane.

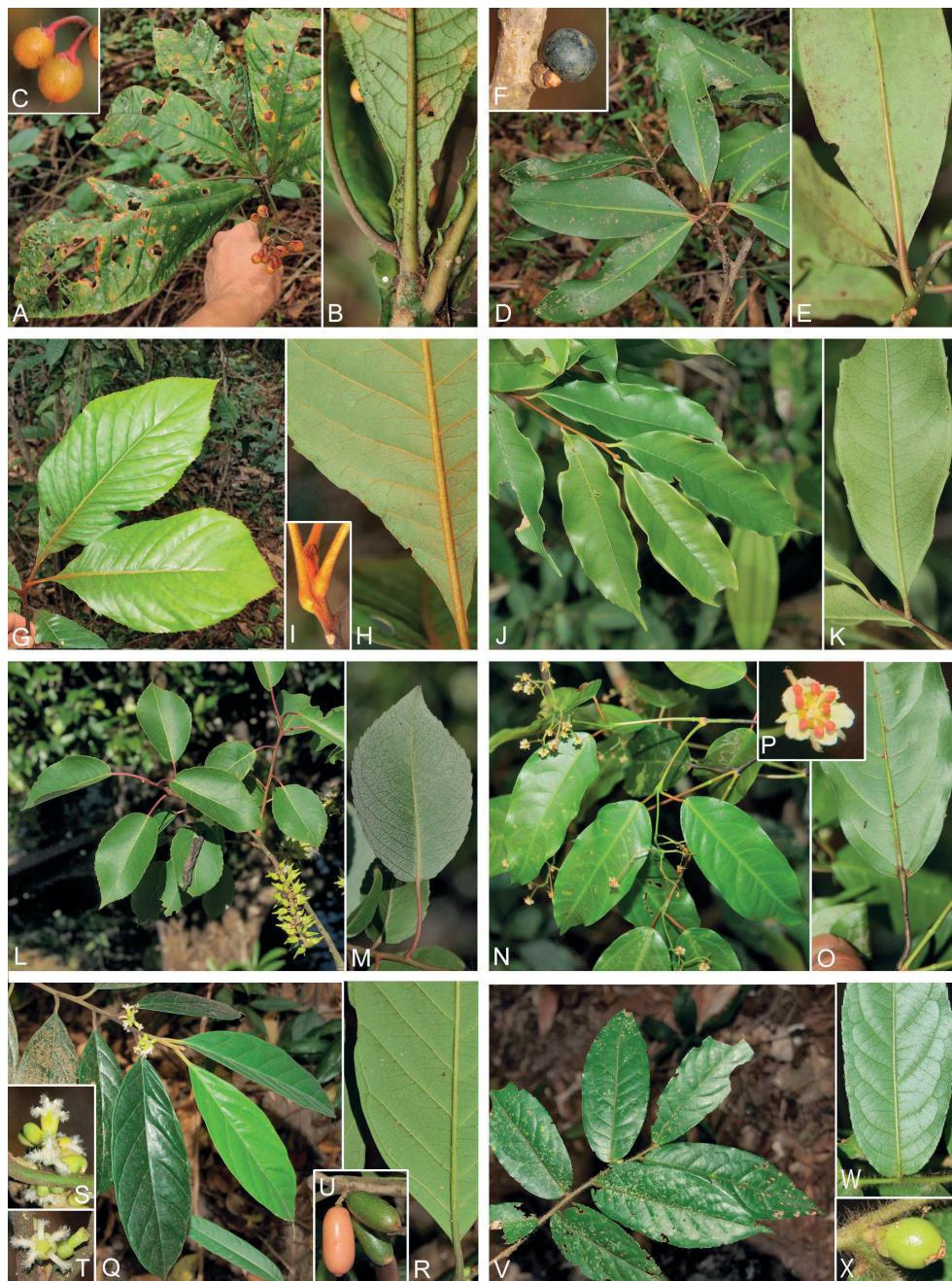


Figure 4. (A–C) *Ardisia perpendicularis* Walker var. *perpendicularis*: A, fruiting branch. B, portion of lower leaf surface. C, fruits. (D–F) *Rapanea neriifolia* (Siebold & Zucc.) Mez var. *macrocarpa* (Pit.) C. M. Hu: D, leafy twig. E, portion of lower leaf surface. F, fruit. (G–I) *Helicia vestita* W. Sm.: G, leafy twig. H, portion of lower leaf surface. I, shoot apex. (J, K) *Prunus fordiana* Dunn var. *balansae* (Koehne) J. E. Vidal: J, leafy twig. K, portion of lower leaf surface. (L, M) *Salix thorelii* Dode: L, fruiting twigs. M, lower leaf surface. (N–P) *Acer erythranthum* Gagnep.: N, flowering twig. O, portion of lower leaf surface. P, flower. (Q–U) *Gomphandra donnaiensis* (Gagnep.) Sleumer: Q, flowering twig. R, portion of lower leaf surface. S, staminal flowers. T, pistillate flowers. U, fruits. (V–X) *Symplocos dolichotricha* Merr.: V, fruiting twig. W, portion of lower leaf surface. X, fruit. Photographs by Shuichiro Tagane.

*Salix thorelii* Dode [Salicaceae]—Fig. 4L, M

Bull. Soc. Dendrol. France 1930: 99 (1930).

We encountered this species along a river, near Tad Yuang (Tad Gneuang) Waterfall. Our collection matched the specimens marked as “isotypes” (*Thorel 2748*, P: P00741176, P00741177, P00741178, image!) and several other collections from Vietnam at P, as well as the protologue by Dode. However, the three specimens marked as “isotype” do not have the name *Salix thorelii* on the sheet, and the protologue by Dode did not cite any specimens including *Thorel 2748*. Thus we are not sure *Thorel 2748* is true type of this species, and further careful examination might be needed. In this paper, however, we consider we could use the name *Salix thorelii* for our collection to report the occurrence of this species in Lao, given that the name is widely used at present (e.g. Hô, 2003). The specimens *Thorel 2748* collected during the expedition of Mekong area in 1866–1868, but the country name was not exactly mentioned on the label (only “Expédition du Me-kong” and “Ubon” on the label), though the protologue mentioned the occurrence in Lao as “Hab.: Laos”. Also, this species was not listed in the checklist of Lao Plants (NEWMAN *ET AL.*, 2007) and therefore we here report an exact record based on our fruiting specimens. In addition to its distribution in Laos and Vietnam (Hô, 2003), we report a new record of this species to the flora of Cambodia. We collected this species in Monduliri Province, southwestern Cambodia, as in the specimen cited below. In Laos, *Salix thorelii* is easily distinguished from the other species of *Salix*, *S. tetrasperma* Roxb. (NEWMAN *ET AL.*, 2007) in having ovate to elliptic leaves (vs. narrowly lanceolate in *S. tetrasperma*).

Specimens examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, Tad Yuang Waterfall, riverside, 15°10'45.27"N, 106°08'21.36"E, 958 m msl, 12 Dec. 2018, *Tagane et al. L2142* [fr.] (FOF, FU, KAG). CAMBODIA. Monduliri Province: Pechr Chenda District, Bousra Waterfall, 12°34'03.67"N, 107°25'08.20"E, 479 m msl, 27 Jan. 2015, *Tagane et al. 6923* [fl. bud] (FU, the herbarium of Forest Administration of Cambodia).

Distribution: Cambodia (Monduliri), Laos (Bolaven), Vietnam (southern to central highland)

*Acer erythranthum* Gagnep. [Sapindaceae]—Fig. 4N–P

Notul. Syst. (Paris) 13: 193 (1948).

*Acer erythranthum* is locally common in humid evergreen forest on the plateau. In Dong Hua Sao National Protected Area, another species of *Acer*, *A. laurinum* Hassk. is also found (*Tagane et al. L2158*, FOF, FU, KAG). Both species have entire leaves but *A. erythranthum* differs from *A. laurinum* in having smaller and thinner leaves with domatia in the axils of the secondary veins on the lower surface, a greenish lower leaf surface (vs. glaucous), terminal inflorescences (vs. in axils of fallen leaves) and reddish anthers (vs. pale yellowish).

Specimens examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, at the edge of evergreen forest near Nong Luang Village, 15°03'54.16"N, 106°12'50.41"E, 1218 m msl, 11 Dec. 2018 *Tagane et al. L2102* [fl. and young fr.] (FOF, FU, KAG); 15°04'36.40"N, 106°12'20.64"E, 1268 m msl, 19 Feb. 2019, *Souladeth et al. L2466* [fl.] (FOF, FU, KAG); *ibid.*, *Souladeth et al. L2472* [fl.] (FOF, FU, KAG).

Distribution: Laos (Bolaven), Vietnam.

***Gomphandra donnaiensis*** (Gagnep.) Sleumer [Stemonuraceae]—Fig. 4Q–U

Blumea 17: 192 (1969).

We found this species in hill evergreen forest, at 950–1100 m msl in the national park where it was common. *Gomphandra donnaiensis* is easily distinguished from all other continental Asian species of *Gomphandra* by its large obovate-elliptic leaves to 26 × 10.8 cm and dense, short pubescence on twigs and lower leaf surfaces. It is apparently similar to *Gomphandra mollis* Merr. distributed in China and northern Vietnam but differs by its short axillary inflorescences (vs. terminal or leaf-opposite, and with long peduncle to 2 cm long) and larger fruits to 3.8 cm long (PENG & HOWARD, 2008; SCHORI, 2010).

Specimens examined: LAOS. Sekong Province: Thateng District, Phou Chouam Protection Forest, in evergreen forest slightly disturbed, on the slope of a mountain behind Houay Saiy Village, 15°24'33.6"N, 106°22'14.6"E, 1041 m msl, 23 Feb. 2019, *Souladeth et al. L2744* [female fl. & fr.] (FOF, KAG); *ibid.*, *Souladeth et al. L2756* [male fl.] (FOF, KAG). Champasak Province: Dong Hua Sao National Protected Area, Tad Fane Waterfall, 15°10'57.24"N, 106°07'36.82"E, 950 m msl, 12 Dec. 2018, *Tagane et al. L2157* [ster.] (FOF, KAG).

Distribution: Laos (Bolaven), Vietnam (Lam Dong, Dak Lak).

***Symplocos dolichotricha*** Merr. [Symplocaceae]—Fig. 4V–X

Lingnan Sci. J. 7: 320 (1931).

*Symplocos dolichotricha* is a tree 6 m tall, scattered in wet evergreen forest on the plateau. It is easily distinguished from the other species of *Symplocos* in Laos by its twigs and leaves being covered with a mixed indumentum of short hairs and slender 2.5–3 mm hairs, and subglobose fruits ca. 5 mm in diam. (NOOTEBOOM & VIDAL, 1977; WU & NOOTEBOOM, 1996).

Specimens examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area (Bolaven Plateau), near Nong Luang Village, in evergreen forest, 15°04'19.26"N, 106°12'38.67"E, 1248 m msl, 11 Dec. 2018, *Tagane et al. L2086* [young fr.] (FOF, FU, KAG); 15°04'10.3"N, 106°12'20.1"E, 1051 m msl, 19 Feb. 2019, *Souladeth et al. L2519* [fr.] (FOF, KAG).

Distribution: China, Laos (Bolaven), Vietnam.

***Symplocos sulcata*** Kurz [Symplocaceae]—Fig. 5A, B

J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 40(1): 65 (1871).

This is a tree 12 m tall, occasional in wet evergreen forest on the plateau. Even in sterile state, this species is recognized by its twigs and petiole being densely covered with brown hairs, and narrowly ovate-elliptic leaves, of which lower surfaces are minutely appressed hairy (WU & NOOTEBOOM, 1996). In the regional revision of *Symplocaceae* in Indochina by NOOTEBOOM & VIDAL (1977), this species was treated as *S. macrophylla* Wall. ex DC. subsp. *sulcata* (Kurz) Noot. var. *sulcata* (Kurz) Noot.

Specimen examined: LAOS. Champasak Province: Dong Hua Sao National Protected Area, near Ban Nong Luang; at edge of evergreen forest, 15°03'48.32"N, 106°12'41.29"E, 1240 m msl, 11 Dec. 2018, *Tagane et al. L2103* [ster.] (FOF, FU, KAG).

Distribution: Cambodia, China, Laos (Bolaven), Thailand, Vietnam.

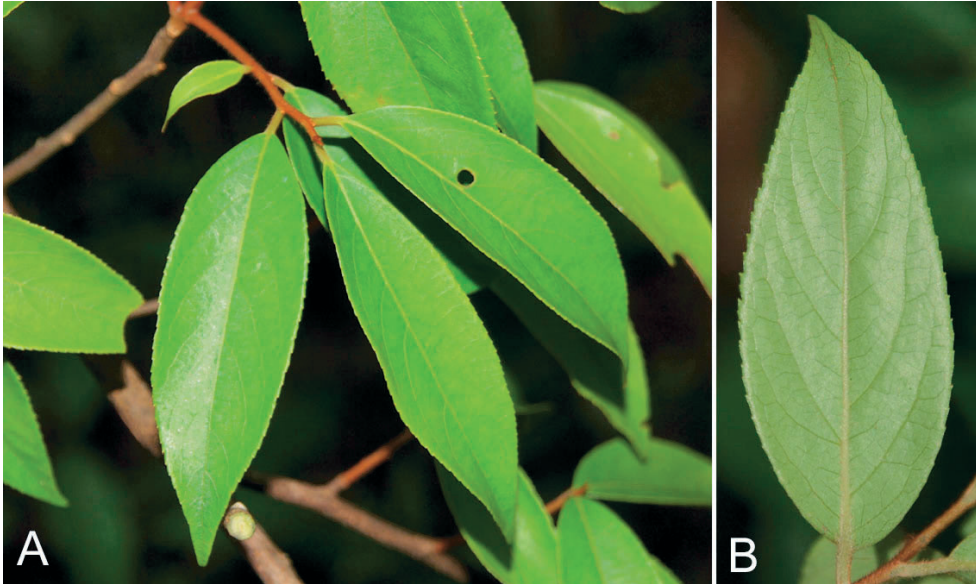


Figure 5. (A, B) *Symplocos sulcata* Kurz: A, leafy twig. B, lower leaf surface. Photographs by Shuichiro Tagane.

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