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Akaniaceae, a new family record for Laos

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ABSTRACT

A collection from Phou Chom Voy Provincial Protected Area, Bolikhamxai, represents the first records for the family Akaniaceae as well as the genus *Bretschneidera* and the species *Bretschneidera sinensis* in Laos. Here we report the new and extended distributional range. A detailed description and photographs are provided for easy identification.

KEYWORDS: Brassicales, Bretschneideraceae, extended distribution, Indo-China.

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INTRODUCTION

The high moist mountainous area “Phou Chom Voy”, part of the Annamite Mountain Range, is located in the Phou Chom Voy Provincial Protected Area of Bolikhamxay Province. It extends to the Laotian-Vietnamese border and encompasses the Khamkeut and Xaychamphone Districts. “Phou Chom Voy” has been shown to have a rich biodiversity and natural water resources, as well as potential recreational and tourist opportunities. It is a diversity hotspot of taxa, home to moist and clouded high montane evergreen forests, at elevations of 800–1,820 m asl. The area is difficult to access and probably contains many endemic and unexplored species. At present, scientific data of the flora from this area are insufficient (V. Lamxay pers. comm.).

In the past few years, there were two new records of orchids for Laos, namely *Odontochilus elwesii* C.B. Clarke ex Hook. f. and *O. putaoensis* X.H. Jin, L.A. Ye & A.T. Mu. (Lanorsavanh *et al.*, 2019). A year later, the new species, *Begonia phouchomvoyensis* Lanors., Lamxay & Souvann., was discovered from the same area (Lanorsavanh *et al.*, 2020).

Botanical surveys in the Phou Chom Voy Provincial Protected Area were undertaken between 2018 to 2021. Some plant collections, identified with

Hemsley (1901), Niyomdham (1991), Lu & Boufford (2005) and Gardner *et al.* (2007), appeared to be *Bretschneidera sinensis* Hemsl. (Akaniaceae), a new family, genus and species record for Laos. Vouchers are deposited in the Biology Herbarium of the National University of Laos and distributed to the National Herbarium of Laos (HNL).

Bretschneidera Hemsl. was formerly placed in the family Sapindaceae by Hemsley (1901) and later in Bretschneideraceae with a possible close relationship to Hippocastanaceae and Sapindaceae (Boufford *et al.*, 1989; Tobe & Peng, 1990; De Craene *et al.*, 2002; Lu & Boufford, 2005). More recently, proof was provided that the genus has to be included in the family Akaniaceae Stapf (Soltis *et al.*, 2000; APG IV, 2016). This position was already earlier pointed out by Tobe & Peng (1990), Rodman (1991), Rodman *et al.* (1993), Tobe & Raven (1995), Doweld (1996) and De Craene *et al.* (2002).

Akaniaceae, a small family of flowering plants classified in the order Brassicales, comprises two monotypic genera, *Akania* Hook. f., a native species of Australia, and *Bretschneidera*, confined to South-East Asia (Lu & Boufford, 2005; APG IV, 2016). The family is characterized by combinations of being a tree, having compound leaves, opposite to

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subopposite leaflets, absence of stipels, bisexual flowers, campanulate calyces with 5 lobes, corolla with 5 lobes, a superior ovary with 3–5 locules, axile placentation and capsular fruits.

The genus *Bretschneidera* differs from *Akania* by having imparipinnate leaves (vs paripinnate in *Akania*), entire leaflet margins (vs serrate in *Akania*), a racemose inflorescence (vs paniculate inflorescence in *Akania*), zygomorphic flowers (vs actinomorphic flowers in *Akania*) and presence of a floral disk (vs absent in *Akania*).

In this communication, we report *Bretschneidera*, a monotypic genus, and *Bretschneidera sinensis* as new records for Laos. Previously, the species was reported ranging from India, southern China and northern Vietnam to confined areas in Northern Thailand (Doi Phu Kha National Park, Nan Province; Niyomdham, 1991; Gardner *et al.*, 2007; Kumar *et al.*, 2017), but now it is known to have a wider distribution, extending into Laos. The species was not yet recorded in the plant check-list of Laos (Newman *et al.*, 2007; Jin *et al.*, 2016), and the online check-list, which is continuously updated by the Royal Botanic Garden Edinburgh (<https://padme.rbge.org.uk/laos/list/>). Although, it was assumed to occur in Laos by Lu & Boufford (2005); Wang *et al.* (2018), but no specimen was recorded yet.

NEW RECORD

Akaniaceae Stapf, Bull. Misc. Inform. Kew, 1912: 380. 1912; C.Bayer & O.Appel in Kubitzki, Fam. & Gen. Vasc. Pl. 5: 21. 2002; APG IV, Bot. J. Linn. Soc. 181: 18. 2016; Chamch. *et al.*, Threat. Pl. Thailand. 25. 2017. Type: *Akania* Hook f.

Trees. *Leaves* alternate, paripinnate or imparipinnate; stipules present or absent; veins pinnate; stipels absent. *Inflorescence* racemose or paniculate, axillary or terminal, erect; bracts present. *Flowers* bisexual, actinomorphic or zygomorphic, 5-merous, white or pink. *Calyx* broadly campanulate, 5-lobed. *Petals* 5, convolute or imbricate. *Stamens* 5–10; filaments filiform, hairy; anthers dorsifixed, opening length-wise. *Disk* absent or present. *Ovary* superior, 3–5 locules; placentation axile; ovules 2 per locule, pendulous; style longer than stamens; stigma capitate, small. *Fruit* a capsule, ellipsoid-globose to subglobose

to ovoid or obovoid to pyriform; loculicidally dehiscent. *Seeds* red or yellow, ellipsoid-globose to ovoid, compressed, without endosperm and aril.

Two genera: *Akania* and *Bretschneidera*. The first genus is native to Australia. Only *Bretschneidera* was previously recorded from India, S China, Taiwan, N Thailand and N Vietnam. It is now also known for Laos.

Bretschneidera Hemsl., Hooker's Icon. Pl. 28(1): 2708. 1891; L.L.Lu & Boufford in C.Y.Wu & P.H.Raven, Fl. China 8: 197. 2005; C.Bayer & O.Appel in Kubitzki, Fam. & Gen. Vasc. Pl. 5: 23. 2002; Chamch. *et al.*, Threat. Pl. Thailand: 25. 2017. Type: *Bretschneidera sinensis* Hemsl.

Tree 10–25 m tall. *Bark* grey-brown, young twigs with lenticels and leaf scars. *Leaves* imparipinnate, with 8–31 leaflets; venation pinnate; stipules present, caducous; leaflets opposite or lower ones alternate, margin entire. *Inflorescence* racemose, terminal. *Flowers* zygomorphic. *Calyx* 5-lobed. *Petals* 5, imbricate, free, adnate at middle to upper part of calyx tube, upper petal hood-like, covering stamens and style. *Stamens* 8 (4+4). *Disk* present. *Ovary* 3-locular, hairy; ovules pendulous; style apically bent abruptly downward.

A monospecific genus; *Bretschneidera sinensis*; previously known from India, S China, Taiwan, N Thailand and N Vietnam, it is now also known for Laos.

Bretschneidera sinensis Hemsl., Hooker's Icon. Pl. 28: t. 2708. 1901; Gagnep. in Lecomte, Fl. Indo-Chine, Suppl. 1: 1001. 1950; Santisuk, Nat. Hist. Bull. Siam Soc. 37(2): 173. 1989; Niyomdham in Smitinand & K.Larsen, Fl. Thailand 5(3): 239. 1991; L.L.Lu & Boufford in C.Y.Wu & P.H.Raven, Fl. China 8: 197. 2005. Type: China, Szemao, Yunnan, at 5,000 ft., *A. Henry 11651* (lectotype **K** [K000681003!], designated by Kumar *et al.* 2017; isolectotypes **A** [A00050653!], **K** [K000681002!]). Fig. 1.

— *Bretschneidera yunshanensis* Chun & F.C.How, Acta Phytotax. Sin. 7(1): 68. 1958. Type: China, Hunan, Hengshan, Fangkwang, Tzu, 9 May 1955, *K.H. Chu 99* (holotype **SCBI**).



Figure 1. *Bretschneidera sinensis* Hemsl.: A. Leafy twig with inflorescences; B. Bark; C. Flowers; D. Corolla with 5 lobes (dissected). E. Calyx (corolla lobes removed) showing inside of calyx, attachment of ovary and stamens (above) and outside of calyx with minute lobes (below). F. Stamens. Scale bars: 1 cm. All from SL2157 by S. Lanorsavanh.

Leaves: petioles 11–17.2 cm long; rachis 11–21 cm long, pubescent; ultrajugal part 1.4–4.2 cm long, slightly greenish, reddish adaxially, sparsely hairy, glabrescent. *Leaflets* 7–17; petiolules 3–9 mm long; lamina obliquely lanceolate, oblong-lanceolate, ovate-lanceolate or elliptic, 6–19.5 × 2.7–7.7 cm, chartaceous, base obtuse to rounded to cuneate, apex

acuminate to acute or caudate, adaxial surface green to somewhat pale green, glabrous, abaxial surface grey, minutely pubescent, lateral veins 10–16 pairs. *Racemes* 12–30 cm long, hairy. *Flowers* pink or pink-white or rose-white. *Pedicels* 2–3.2 cm long, hairy. *Calyx* broadly campanulate, 1.1–1.7 × 2–2.5 cm; lobes broadly triangular, 2–3 mm long, hairy

on both sides. *Petals* broadly spatulate to obovate, 1.8–2.7 × 1.5–2.2 cm, base cuneate, apex weakly notched; upper petal pink to white, becoming darker with age, red striate. *Stamens*: filaments 2.2–2.5 cm long, hairy at base, curving downward apically; anthers oblong, 5–6.5 × 1.5–2 mm. *Disk* annular. *Ovary* ellipsoid-globose to subglobose to ovoid or obovoid, 3–4 × ca 3 cm; style 2.2–2.4 cm long, hairy; stigma ca 1 mm diam. *Fruit* not seen.

Distribution.— See under genus.

Ecology & Phenology.— In Laos collected near a stream in evergreen forest at ca 1,100 m alt. Flowering in March.

Vernacular.— ດອກພວງບົວຈອມວອຍ (Dok phueng boua chom voy).

Specimens examined.— Laos: Bolikhamxai, Khankeut District, Nahueng Village, Phou Chom Voy Provincial Protected Area, 18°25'10.3"N, 105°03'13.4"E, 1,084 m, 3 Mar. 2021, *Lanorsavanh et al.* SL2157 (HNL, NLS=National University of Laos, Faculty of Natural Science).

Conservation status— The species is present with less than a 100 individual trees in Laos over an area of ca 10 km² that is only at one site a Protected Area; therefore, in Laos it is rare and Endangered (Sun, 1998).

Note.— *Bretschneidera sinensis* is characterized by its imparipinnate leaves, erect racemes, 5-lobed corolla, corolla lobes broadly spatulate to obovate, base cuneate, upper petal hood-like covering the stamens and the style, 8 stamens and a 3-locular ovary.

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