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Tetrastigma planicaule (Vitaceae): a new record for Bhutan

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Abstract: We report here *Tetrastigma planicaule* (Hook.f.) Gagnep. of the Vitaceae family as a new species record in Bhutan. It is sighted inside the Tongling Kuenphen Community Forest, Gangzur Gewog in the Lhuentse district. It is an economically important plant that has medicinal properties in traditional Chinese medicine. From our field observations, it was observed to be a primary host for the rare holoparasitic *Sapria himalayana* Griff. in the current locations. Therefore, conservation of this species needs to scale up owing to its ethnobotanical use and to support the survival of the holoparasitic plant.

Keywords: Ethnobotany, Holoparasitic, *Sapria himalayana*.

Introduction

The genus *Tetrastigma* (Miq.) Planch. is one of the 16 genera of the Vitaceae (Grape) family (Trias-Blasi *et al.*, 2020). The genus is distinguished by unbranched to digitately branched tendrils, dioecious sexual system and 4-lobed stigmas in the female flowers. Under this genus, 95 species are distributed in tropical and sub-tropical Asia, primarily in Southeast Asia, and extending to Australia (Planchon, 1887; Chen *et al.*, 2011; Kochaiphath *et al.*, 2014). Among them is *Tetrastigma planicaule* (Hook.f.) Gagnep., an evergreen woody liana originally described by Hooker (1868) as *Vitis planicaulis* Hook.f. It is an economically important climber and grows in the wild in China, India, Laos, Sri Lanka, Thailand, Bangladesh and Vietnam (Chen *et al.*, 2007; Trias-Blasi *et al.*, 2020; Huang *et al.*, 2021). Hooker (1868) described this species as *Vitis planicaulis* from the plants he

cultivated at Kew from seeds he gathered in 1849 from Sikkim under Darjeeling district, India. It is a Chinese folk medicinal plant that is commonly used to treat rheumatoid arthritis, lumbar muscle strain, urticaria, and asthma and to activate blood circulation (Ma *et al.*, 2019; Huang *et al.*, 2021).

In Bhutan, ten *Tetrastigma* species were recognized in the Flora of Bhutan (Grierson & Long, 1991), including *T. planicaule*. This species was treated based on a species sighting from Darjeeling (India) close to Bhutan, with hopes of finding this species in Bhutan.

Until now, this species had never been recorded in Bhutan. The first author discovered this species inside the Tongling Kuenphen Community Forest in Gangzur Gewog, Lhuentse district, during a field revisit to the flowering sites of *Sapria himalayana* Griff. The identity of the species was confirmed after a thorough examination of available specimens and consultation of the relevant literature (Hooker, 1868; Grierson & Long, 1991; Trias-Blasi *et al.*, 2020).

Materials and Methods

Standard methods were used for collection, processing, and preparation of the herbarium specimens (Bridson & Forman, 1998). Voucher specimens have been deposited at the National Herbarium, National Biodiversity Centre, Bhutan (THIM). The geo-coordinates were recorded with an eTrex 30× global positioning system (Garmin, New Taipei City, Taiwan).

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Taxonomic Treatment

Tetrastigma planicaule (Hook.f.) Gagnep., Notul. Syst. 1(10): 319. 1910; Gagnep. in Lecomte, Fl. Indo-Chine 1: 957. 1912; Hand.-Mazz., Symb. Sin. 7: 680. 1933, Gagnep. in Humbert, Suppl. Fl. Indo-Chine 1: 876. 1950; C.L.Li & C.Y.Wu, Chin. J. Appl. Environm. Biol. 1(4): 322. 1995; C.L.Li, Fl. Reipubl. Popularis Sin. 48(2): 109. 1998; B.V.Shetty & P.Singh, Fl. Ind. 5: 317. 2000; Ren & J.Wen in Z.Y.Wu, P.H.Raven & D.Y.Hong, Fl. China 12: 201. 2007. *Vitis planicaulis* Hook.f.,

Curtis, Bot. Mag. 94: t. 5685. 1868; M.A.Lawson in Hook.f., Fl. Brit. India 1: 658. 1875. *Type*: INDIA, Sikkim, Himalaya, 3–4000 ft., *J.D. Hooker s.n.*, (syn K [K000701126!, K000701127!, K000701128!, K000701129!, K000701130!]).

Tetrastigma laoticum Gagnep., Bull. Soc. Bot. France 91: 34. 1944; in Humbert, Suppl. Fl. Indo-Chine 1: 874. 1950. *Type*: LAOS, entre Pin-ha et Lao-phu-tai, sur piste de Phong-Saly a Laichau, 1000 m, ♂ fl., 27.04.1936, *E. Poilane* 25917 (holo P [P00526372!]; iso P [P00526373!]).

Fig. 1

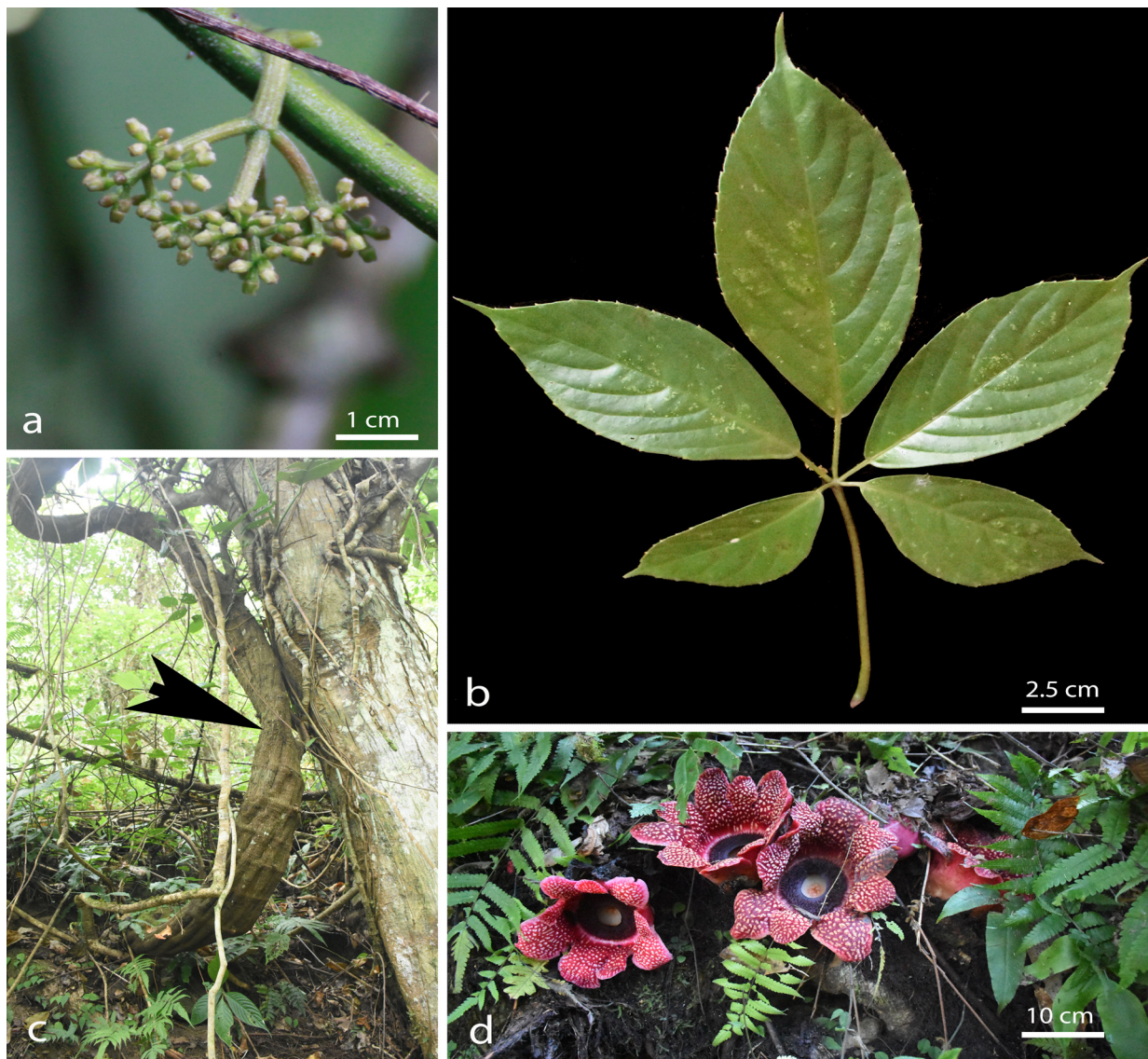


Fig. 1. *Tetrastigma planicaule* (Hook.f.) Gagnep.: **a.** Flower buds; **b.** Leaf; **c.** Black arrow indicates old stem; **d.** Flowers of *Sapria himalayana* Griff. (photos a by Gyeltshen; b-d by Rinchen Dorji).

Large dioecious, climbers. Young branches slightly verrucose or puberulent, mature stem flattened with age, smooth, corky; tendrils bifurcate. Stipules 2, scale-like with age. Leaves palmately (3–)5(–7)–foliolate; petioles 5.5–12 cm long, glabrous or pubescent, with enlarged proximal pulvinus; leaflet blade coriaceous, lanceolate to elliptic; terminal leaflet petiolule 0.4–3.5 cm long, blade 7.5–21 × 3–6 cm, base cuneate to attenuate, margin coarsely and distantly serrate with minute veins tip protruding, apex attenuate, acuminate; lateral leaflets petiolule 0.2–3 cm long, glabrous or pubescent, blade 5–18.5 × 1.8–5.5 cm, base attenuate, cuneate to asymmetrical, margin as terminal leaflet, apex caudate attenuate or acuminate; veins protruding, 1 main basal vein, 8–10 pairs of secondary veins, veinlets conspicuous on lower surface. Female inflorescences axillary on young stems, 1 per node, compound umbels, *c.* 14 cm long, lax peduncles *c.* 7.5 cm, pubescent. Female floral buds 2–2.5 mm long; pedicels 2–3 mm long, puberulous; calyx disciform, margin undulate, ciliate; petals lanceolate to ovate, 2.5–2.7 × 1.5 mm, apex hooded, rounded, squarrose at anthesis, outer

surface papillose; disc inconspicuous; staminode clavate, 1–1.2 mm long; ovary coniculate, *c.* 1.5 × 1.5 mm; style sessile; stigma 4-lobed, round, smooth. Male inflorescence not seen. Fruit globose or ellipsoid, 1.5–2.5 × 1–2 cm, 1–4-seeded. Seeds oblongoid to ellipsoid, convex, 1.2–1.5 × 1–2 cm.

Habitat: *Tetrastigma planicaule* was found creeping on *Acer oblongum* Wall. ex DC. in two different locations (Fig. 2) in a warm broad-leaved forest. A rare holoparasitic species, *Sapria himalayana*, was observed at the root of this climber (Fig. 1d).

In one location, *T. planicaule* was found near a small perennial stream, and in the other, it was observed in an area dominated by *Chimonobambusa callosa* (Munro) Nakai. In general, the site was associated with tree species such as: *Alnus nepalensis* D. Don, *Betula alnoides* Buch. Ham. ex D. Don (Betulaceae), *Daphniphyllum himalayense* (Benth.) Müll. Arg. (Daphniphyllaceae), *Itoa orientalis* Hemsl. (Salicaceae), *Macaranga denticulata* (Blume) Müll. Arg. (Euphorbiaceae), *Macropanax dispermus* (Blume) Kuntze (Araliaceae), *Schima khasiana* Dyer (Theaceae), *Toxicodendron succedaneum* (L.) Kutze (Anacardiaceae) and *Toona ciliata* M. Roem. (Meliaceae).

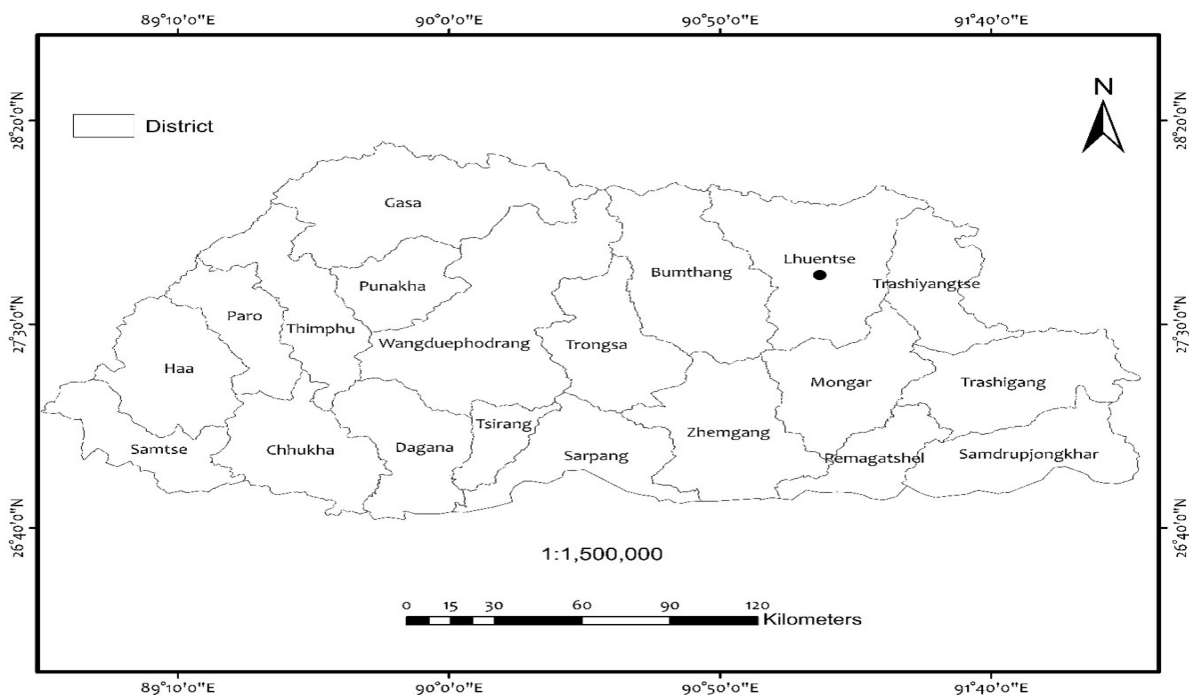


Fig. 2. Map showing the locations (black circle) of *Tetrastigma planicaule* (Hook.f.) Gagnep.

According to Trias-Blasi *et al.* (2020), this species occurs in shaded areas, edges of forest or by streams in evergreen forests within the elevation range of 700–1700 m, flowering between February–March and fruiting between April–November (–January). However, according to Chen *et al.* (2007), the species occurs within the elevation range of 100–2100 m in valleys and rocky areas with flowering times from April–June and fruiting August–December. Our observations in Bhutan suggest flowering starts in May.

Distribution: Bangladesh, Bhutan (Fig. 2), China, India, Laos, Sri Lanka, Thailand, Vietnam.

Specimens examined: BHUTAN, **Lhuentse**, Gangzur Gewog, inside Tongling Kuenphen Community Forest, N 27°42'4.97", E 91°08'22.27", 1492 m, 11.11.2020, R. Dorji & Gyeltshen 001 (THIM). INDIA, Sikkim, Darjeeling, 5000 ft, 0.1881, J.S. Gamble 9894 (K!); Manipur, Caehar hills, 4000 ft, 5.1882, G. Watt 7240, 7241 (K).

Conservation status: The locations of the *T. planicaule* sightings were inside a Community Forest and no direct conservation threats were observed at the sites. However, it is felt very important to strengthen the conservation efforts on this species since it has been reported to have ethnobotanical uses in traditional Chinese medicine and ecological functions.

In line with previous observations, the rare holoparasitic *Sapria himalayana* has been found distributed across six eastern districts of Bhutan. However, its host plant has not been evaluated across its distribution range. Therefore, to garner its conservation status and distribution information for the host, further detailed studies need to be conducted based on the occurrence information of *S. himalayana*. The conservation of *Tetrastigma planicaule* is indispensable in conserving its species-specific parasitic plant.

Notes: *Tetrastigma planicaule* is most similar to *T. campylocarpum* Planch. and differs from this species by having lanceolate to elliptic leaflets (*vs.* ovate to broadly ovate, elliptic to broadly elliptic or obovate), attenuate or acuminate apex (*vs.* caudate); 2–3 mm long pedicels (*vs.* less than 2 mm long); disciform calyx (*vs.* cupuliform); lanceolate to ovate petals 2.5–2.7 by 1.5 mm

(*vs.* ovate to elliptic 1–1.5 by 0.5–0.7 mm) (Trias-Blasi *et al.*, 2020).

Acknowledgements

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