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Research Article

Breynia phuongiana (Phyllanthaceae), a new species from the Central Highlands of Vietnam

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A new species, *Breynia phuongiana* (Phyllanthaceae subgen. *Sauropus*), is described and illustrated from the Central Highlands of Vietnam. It is morphologically similar to *B. beillei*, *B. bonii*, and *B. thorelii*, but differs in having oblong-elliptic leaves, sepals marked with reddish striations, an androphore exceeding 1 mm in length, and distinctly hexagonal, starfish-shaped fruits with erect and persistent stigmas. A detailed morphological comparison with related species is provided. A preliminary conservation assessment categorizes it as 'Data Deficient' (DD) based on IUCN Red List criteria.

Keywords: *Breynia*, flora of Vietnam, plant diversity, plant endemism, taxonomy



Introduction

Breynia J.R.Forst. & G.Forst., with *B. disticha* J.R.Forst. & G.Forst. as the type species (Forster and Forster 1776), belongs to the family Phyllanthaceae. It was used to be treated as part of *Sauropus* Blume (Beille 1925, van Welzen 2003). However, molecular analyses by Pruesapan et al. (2008) led to the transfer of all *Sauropus* species to *Breynia*. The genus *Breynia* is therefore morphologically characterized by staminate flowers that typically possess scales, fruits that are wider than tall, and seeds with smooth surfaces (van Welzen et al. 2014). The genus currently comprises a total of 98 accepted species distributed from India, China through Southeast Asia to Australia and the western Pacific (Chang et al. 2025, Hassler 1994–2025, POWO 2025, Wang et al. 2025).



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In Vietnam, *Breynia* includes 37 species, of which 15 are considered endemic (Hassler 1994–2025). During a floristic survey in Dak Lak Province, located in the Central Highlands of Vietnam, an unusual species of *Breynia* was discovered. After examining similar specimens available at Global Biodiversity Information Facility (GBIF), consulting taxonomic literatures (Beille 1925, van Welzen 2001, Phamhoang 2003, Nguyen 2007), and communicating personally with an expert on the genus (van Welzen, per. comm.), no species matching the characteristics of the collected material was found. Consequently, the plant is described here as a new species.

Material and methods

The plant and its parts were collected and photographed in the field. The morphological characteristics were studied and measured under Kruss MSZ5000-IL stereomicroscope. The terminology used follows van Welzen (2003), Pruesapan et al. (2008), and van Welzen et al. (2014). Voucher specimens are deposited in the herbarium of the Komarov Botanical Institute (LE) and the herbarium of the Institute of Life Sciences, Vietnam Academy of Science and Technology (VNM). The voucher specimens can be access through website of LE herbarium at: <https://en.herbariumle.ru/?t=occ>.



Figure 1. *Breynia phuongiana* N.K.T. Tram, Vuong, Aver. & V.C. Nguyen (A) Flowering plant in its habitat, (B) inflorescence, (C–D) a staminate flower, (E) flowers from different views; a pistillate flower (left) and a staminate flower (right), (F) fruit with erect stigmas. All photos from holotype specimen AL2456 by Van Canh Nguyen, correction and design by Ba Vuong Truong.

The extinction risk assessment was conducted based on the guideline of the International Union for Conservation of Nature (IUCN 2024).

Results

Taxonomic treatments

Breynia phuongiana N.K.T. Tram, Vuong, Aver. & V.C. Nguyen sp. nov. (Fig. 1–4)

Diagnosis

The species is characterized by a combination of the following features: cauliflorous inflorescences and infructescences arising near the ground, sepals with reddish striations, an androphore more than 1 mm long, and distinctly hexagonal, starfish-shaped fruits with erect and persistent stigmas.

Type: Dak Lak (Đắk Lắk) Province, Ea H'leo District, evergreen forest at elevation of about 700 m a.s.l., 15 Feb. 2023,

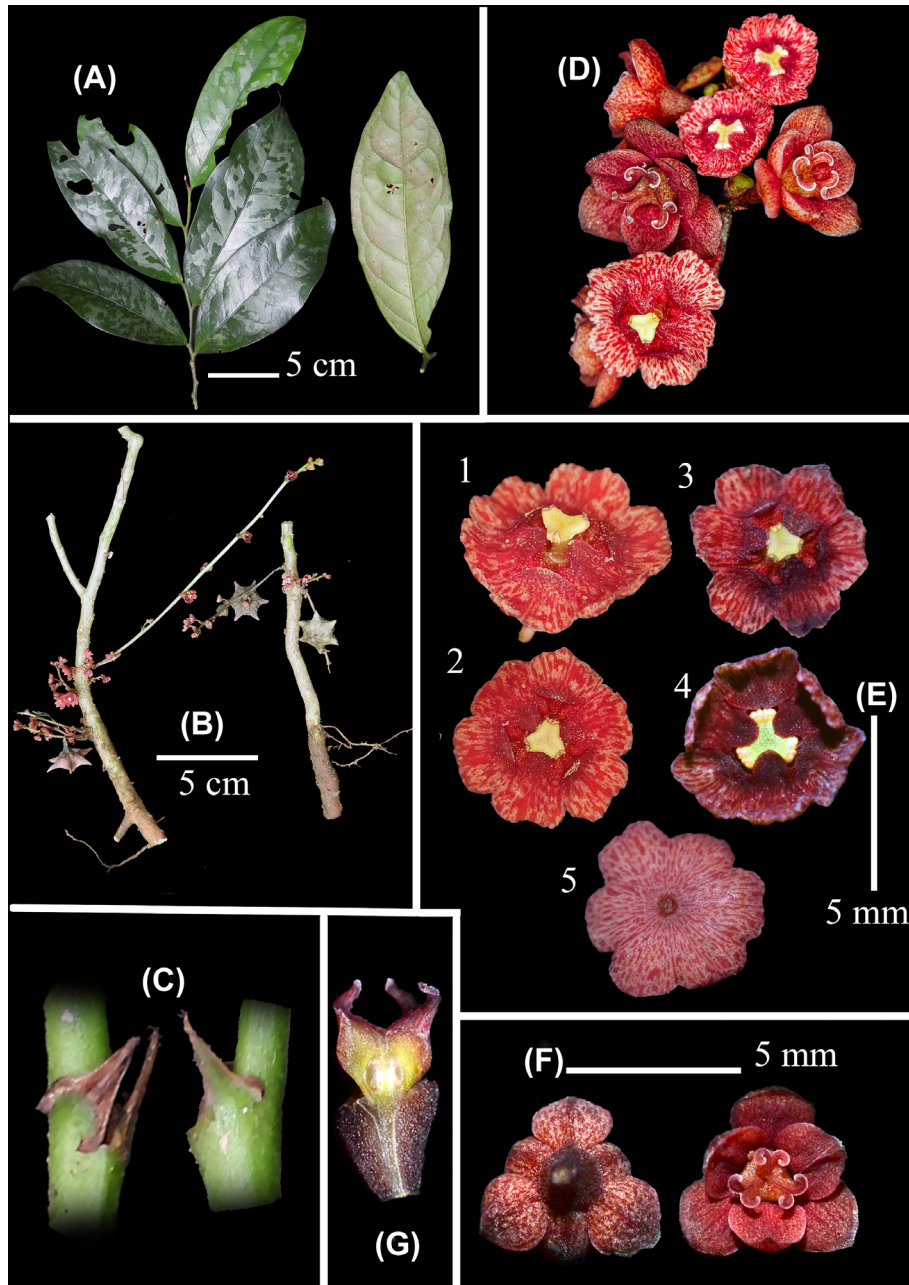


Figure 2. *Breynia phuongiana* N.K.T. Tram, Vuong, Aver., & V.C. Nguyen (A) Leaves and branches, (B) inflorescences, (C) stipules, (D) portion of inflorescence, (E) staminate flower from different views: (1–4) adaxial surface, (5) abaxial surface, (F) pistillate flower from different views, (G) longitudinal section through the pistil and pedicel. All from holotype specimen AL2456 by Van Canh Nguyen, correction and design by Ba Vuong Truong.

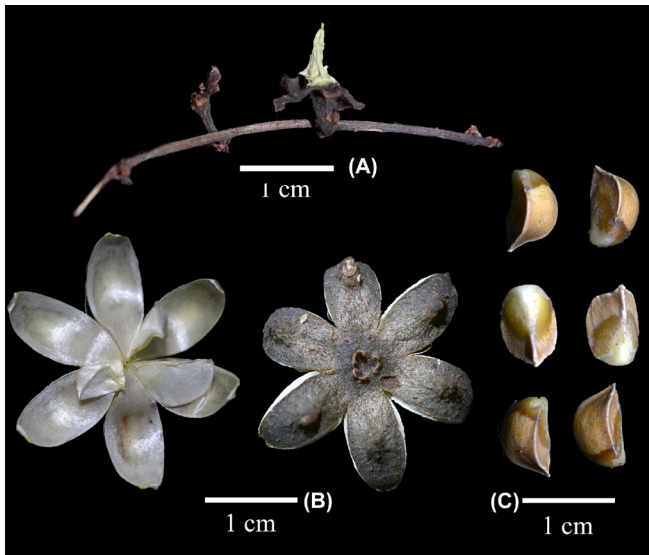


Figure 3. *Breynia phuongiana* N.K.T. Tram, Vuong, Aver. & V.C. Nguyen (A) Infructescence, (B) dry open fruit, (C) seeds. All photos from holotype specimen AL2456 by Van Canh Nguyen, correction and design by Ba Vuong Truong.

Nguyen Van Canh, AL 2456 (**Holotype**, LE01253939 <https://en.herbariumle.ru/?t=occ&id=215273>, photos from the type species LE01124733 <https://en.herbariumle.ru/?t=occ&id=208242>). **Paratype**: Dak Lak (Đắk Lắk) Province, Ea H'leo District, evergreen forest, 15 Feb. 2023, Nguyen Van Canh, Leonid Averyanov & Truong Ba Vuong, BV 1932 (VNM 00070765)

Etymology

The species name honours Ms. Ha Thi Phuong (Hà Thị Phương), who first discovered the species.

Description

Undershrub ca 50 cm high, monoecious. Young twigs glabrous or sparsely papillose. Stipules persistent, ovate with a long acumens, 4–6 × 2.5–3.0 mm, purplish brown. Leaves distichous, simple, petiolate; petiole 3–4 mm long, glabrous; leaf blade elliptic to oblong-elliptic, 17.0–17.5 × 5.7–6.1 cm, glabrous at both surfaces, cuneate at base, mucronate to spinose at apex, with entire margin; venation pinnate with lateral veins in 7–9(12) pairs, interconnected near the margin. Inflorescence axillary, 13.4–17.2 cm long, in clusters of 2–3 flowers per node, commonly comprising 1–2 staminate and 1 pistillate flower; bracts triangular, with hyaline margin. Flowers red, mottled with dark red streaks, actinomorphic, pedicellate, horizontally directed to erect. Staminate flowers 7.0–7.5 mm in diameter, rose-taupe with reddish streaks, darker on inner surface; pedicel 2–5 mm long, sparsely papillose; calyx 6-lobed, coriaceous; lobes truncate to slightly emarginate; internal scales present at lobe base, outer ones half-circular, broader than long, inner ones oblong, longer than broad, reaching side of androphore; androphore pale yellow, 1.0–1.5 mm long, flat at apex, 3-lobed. Stamens 3, inserted at lobe apex; anthers 0.6–0.8 mm long, dehiscing by

longitudinal slits, extrorse. Pistillate flowers 8.0–8.5 mm in diameter, dark red, abaxially mottled with white; pedicel 2.5–4.0 mm long, thicker than in staminate flowers; calyx coriaceous, 6-lobed; lobes ovate, verruculose with warts denser abaxially. Ovary in transversal section triangular with three blunt angles, ca 2 × 2 mm, 3-locular, without a marginal rim; stigmas 3, bifid up to $\frac{3}{4}$ their length, twisted on ca. 360°; ovules 2 per locule, yellowish white. Fruit ca 2.3 cm in diameter dark grey, dark brown to almost black, with asperities and persistent erect stigmas, when open composed of 6 free lobes, starfish-like, lobes ca 5 mm long, 3–4 mm wide; calyx accrescent. Seeds trigonous, smooth, 6.8–9.0 × ca 6 mm.

Phenology

Flowering and fruiting in February to April.

Distribution, ecology and habitat

The species so far found only known from its type location in Central Highlands of Vietnam (Đắk Lắk Province). It grows in primary evergreen broad-leaved forests mixed with Dipterocarp deciduous woodlands at the altitude of ca 700 m a.s.l. The forest has three layers with the canopy up to 20 m high. The associated species include ferns, species of Zingiberaceae, *Camellia daeseobii* V.C.Nguyen & Vuong, *Symplocos* spp., *Acer* spp., etc.

Proposed conservation status

The species is known only from a single population occupying an area of less than 150 ha. The habitat is in good condition, with no evidence of disturbance such as logging or conversion to agricultural land. Several hundred mature individuals with good seed production have been observed. Although the species area of occupancy is small and it is known from only one location, there are currently no direct threats to its habitat or population. Based on the current data, the species is assessed as 'Data Deficient' (DD) and should be monitored for its conservation.

Remarks

Breynia phuongiana sp. nov. shows close resemblance to *B. beillei* Welzen & Pruesapan (syn. *Sauropus racemosus* Beille) and *B. bonii* (Beille) Welzen & Pruesapan in the position of the inflorescences, which are borne near the base of the stem, and in flower shape, but it differs in leaf size, number of lateral veins, persistent stipules, and androphore length. It is also similar to *B. thorelii* (Beille) Welzen & Pruesapan in flower shape and fruit morphology, but differs in leaf shape and size, inflorescence position and length. It is somewhat similar to *B. discocalyx* (Welzen) Welzen & Pruesapan, but differs in several characters. The pedicels are much shorter (2–5 mm in staminate flowers and 2.5–4.0 mm in pistillate flowers, versus 13.5–15.0 mm and ca. 13 mm in *B. discocalyx*). The flowers are also smaller (7.0–7.5 mm in staminate and 8.0–8.5 mm in pistillate flowers, compared with 12–13 mm in both flower types of *B. discocalyx*). In addition, the calyx lobes differ in shape: they are lobed and ovate in the new taxon, whereas those of *B. discocalyx* are barely lobed and obovate (van Welzen 2001). A detailed comparison between



Figure 4. *Breynia phuongiana* N.K.T. Tram, Vuong, Aver. & V.C. Nguyen (A) A plant with inflorescences and infructescences, (B) stipules, (C) leaf from different views: adaxial (upper), abaxial (lower), (D) staminate flower from different views, (E) pistillate flower from different views, (F) inflorescences and infructescences, (G) fruit, (H) open fruit and seeds. Drawing from type specimens by Thanh Nha Phan-Thi.

B. phuongiana and its closest relatives is provided in Table 1. Our study indicates the fruit shape and size as the most significant diagnostic characters of the new species well segregating it from its relatives.

Specimens examined

Breynia beillei, syntypes: Balansa 3202 (P00208313 photo!, P00360941 photo!, P00360942 photo!, K001081018

photo!), Vietnam, vallée de Lankok (mont Bavi), dans les forêts, 27 avril 1887, *Breynia bonii*, syntypes: Bon 2873 (P00207357 photo!, P00208305 photo!, P00324066 photo!, A00277327 photo!, A00135514 photo!), Vietnam, Kiện Khê in mont. vallis Đồng Bàu, 31 Mart. 1885, *Breynia thorelii*, syntypes: Thorel 3227, Laos, Pak-lay (P00208315 photo!, P00360955 photo!), Lakhone (P00360956 photo!, P00360957 photo!)

Table 1. Comparison of morphological characteristics of *B. phuongiana* and its relatives. The characteristics of the species in the table were based on the data of van Welzen (2003) for *B. thorelii*, and that of Beille (1925) and Pham-hoang (2003) for *B. beillei* and *B. bonii*. Dash (-) means data unavailable.

	<i>B. phuongiana</i>	<i>B. beillei</i>	<i>B. bonii</i>	<i>B. thorelii</i>
Sexual system	monoecious	–	monoecious	monoecious
Leaf shape and size	elliptic to oblong-elliptic, 17–17.5 × 5.7–6.1 cm	ovate-lanceolate, ca 15 × 4.8 cm	ovate-lanceolate, 7–12 × 4–5 cm	ovate to elliptic, 2.6–10.1 × 1.2–3.0 cm
Lateral veins	7–9(12) pairs	5–6 pairs	7–11 pairs	(3)7 pairs
Petiole length	3–4 mm	4–5 mm	3–6 mm	2.0–2.3 mm
Stipule shape, size and persistence	ovate with a long tail, 4–6 × 2.5–3.0 mm, persistent	triangular-acuminate, ca 4 mm, deciduous	triangular, narrow, acuminate, ca 5 mm	triangular, 1.5–3.0 × 0.5–1.2
Inflorescences position and length	cauliflorous, 13.4–17.2 cm	cauliflorous, 20–30 cm	cauliflorous, up to more than 30 cm	ramiflorous, 11–15 cm
Staminate flowers	pedicel 2–5 mm long; flowers 7.0–7.5 mm Ø, androphore 1.0–1.5 mm long	pedicel 2–10 mm long; flowers 6–7 mm Ø (dried), androphore very short or absent	pedicel 2–3 mm long; flowers 3–5 mm Ø, androphore very short	pedicel, 4.3–7.5 mm; flowers 4.0–7.5 mm Ø, androphore 0.2–0.7 mm long
Pistillate flowers	pedicel 2.5–4.0 mm long; flowers 8.0–8.5 mm Ø	–	pedicel 4–6 mm long; flowers ca 8 mm Ø.	pedicel 2–4 mm long; flowers 6–7 mm Ø.
Fruit	starfish-shaped, 2.3 cm Ø, with asperities	–	depressed-globose, 2 by 1.5 cm, glabrous	7 by 4 mm, with blunt edges and rows of asperities when young

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Author contributions

Van Canh Nguyen: Conceptualization (equal); Investigation (equal); Methodology (equal); Supervision (equal); Visualization (equal); Writing – original draft (equal); Writing – review and editing (equal). **Thi Thuy Nhan Tran:** Conceptualization (equal); Funding acquisition (equal); Writing – original draft (equal); Writing – review and editing (equal). **Ba Vuong Truong:** Conceptualization (equal); Data curation (equal); Methodology (equal); Visualization (equal); Writing – original draft (equal); Writing – review and editing (equal). **Leonid V. Averyanov:** Conceptualization (equal); Data curation (equal); Writing – original draft (equal); Writing – review and editing (equal). **Thi Hoa Nguyen:** Investigation (equal); Writing – original draft (equal); Writing – review and editing (equal). **Thanh Nha Phan-Thi:** Conceptualization (equal); Visualization (equal); Writing – original draft (equal); Writing – review and editing (equal). **Nguyen-Khanh-Trinh Tram:** Conceptualization (equal); Writing – original draft (lead); Writing – review and editing (equal).

Data availability statement

This article has no additional data.

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