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NEW RECORDS FOR THE BRYOFLORA OF VIETNAM, 7
From Ba Vì and Tam Đảo National Parks

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Cololejeunea chittagongensis, *Kurzia sinensis*, *Dicranoloma reflexum*, *Fissidens gedehensis* and *Telaranea semperiana* are new for the bryoflora of Vietnam. Nine further species were reported with their expanded distribution from other parts of the country. The occurrence of the endemic *Yakushimabryum brevigemmium* at its type locality confirmed and its sporophyte described.

Key words: endemism, Indochina, liverworts, mosses, national parks

INTRODUCTION

Ba Vì is an isolated, triple peaked mountain 50 km west of the capital, reaching 1,296 m elevation. It has been a popular resort since the French colonial time and became the Ba Vì National Park in 1991, spanning an area more than 10,000 ha, well covered by natural and secondary tropical forests with high biodiversity. We collected bryophytes here for the first time, while we visited Tam Đảo National Park in Vĩnh Phúc Province already several times (Ninh 1993, Pócs 2024*a*, *b*, Pócs and Sass-Gyarmati 2024, Pócs *et al.* 1967), but still have found further species new to the mountains. In this publication five species are published, as new to Vietnam and further nine, which were recorded only recently (Shu *et al.* 2017) from other parts of the country. Our visits at these places during the November of 1998, were guided by Prof. Trần Ninh from Hanoi University of Science, accompanied by the botanists, Dr Nguyễn Quốc Bình and the late Géza Kósa.

SPECIES NEW TO VIETNAM

Cololejeunea chittagongensis Tixier – BA-VÌ, remnants of submontane rain forests between Son Tai Forest Station and Šinh village, on siliciferous rocks, at 540–620 m elev., 21° 4.9′ N, 105° 21.6′ E. Coll.: Pócs and Kósa 98107/V (EGR). The species is characterised by its leaves without hyaline margin, with liguliform lobule and filiform style. Previously known only from its type locality at Cox Bazar in Bangladesh (Tixier 1985).

Dicranoloma reflexum (Müll. Hal.) Ren. – TAM-ĐẢO, montane rain forest SE of Tam Đảo town, on the stony SW slopes of Mt Mo Qua, on canopy branches, at 910 m elev., 21° 26.9′ N, 105° 38.7′ E. Coll.: Pócs and Ninh 9899/Q (EGR, HNU). A species recognisable by its densely grey tomentose stems and by its strongly curved, plicate leaves. New to Indochina, known in the Malesian Archipelago and Peninsula (Eddy 1988).

Fissidens gedehensis M. Fleisch. – TAM-ĐẢO, montane rain forest SE of Tam Đảo town, on the stony SW slopes of Mt. Mỏ Quạ, on stone stairs, at 910 m elev., 21° 26.9′ N, 105° 38.7′ E. Coll.: Pócs and Kósa 9895/S; Montane rain forest NW from Tam Šao town, on the NE slope of Rùng Rình summit, on rocks, at 1,050–1,150 m elev., 21° 28.9′ N, 105° 38.2′ E. Coll.: Pócs and Ninh 98105E (EGR, HNU, PHH). Similar to the common *Fissidens zippelianus* Dozy et Moelk., but has smaller cells, shorter leaves and strongly excurrent costa. Malesian element distributed from Sumatra to New Guinea (Eddy 1988).

Kurzia sinensis Chang. (Fig. 1) – TAM-ĐẢO, mossy elfin woodland with Melastomataceae, Ericaceae (*Vaccinium* sp.) and Theaceae shrubs and small (1–3 m) trees on the Rùng Rình summit, on decaying wood, at 1,335–1,345 m elev., 21° 28.76′ N, 105° 37.88′ E. Coll.: Pócs and Ninh 9897/G (EGR, HNU, PHH). It is characterised by its very small stature, stem leaf segments turning uprights from their base, consisting of only 2–4 cells. It is close to the Bornean *Kurzia lineariloba* Mizut. The species was known only from its type locality: Chekiang (Zheijang) Province in southeast China (Chang and Giao 1984, Mizutani and Chang 1986).

Telaranea semperiana (Steph.) Del Ros. (Figs 2–4). – TAM-ĐẢO, Mt Cái Keng N of Tam Đảo town. Montane rain forest on the S slopes between 1,015 and 1,185 m, with many *Cylindrokelupha alternifoliolata* trees, rich in bryophytes along streamlet, on decaying logs. 21° 27.6′ N, 105° 38.8′ E. Coll.: Pócs and Ninh 98103/AC (EGR, PHH). Very characteristic by its thin stems (diam. 100–200 μm) with 10–12 thin-walled cortical cells. Unipinnate, with perpendicular, *Frullania* type branches, distant stem leaves and very densely arranged branch leaves. The stem leaves are 4 segmented with 1⅓–3 cells high and 8 cells wide discus. The filamentous segments one cell wide and 7–10 cells long, often with rhizoid bundles at their base. The underleaves have reduced segments, often ending in a slime papilla. Indomalesian species distributed from Sri Lanka to the Philippines and Malaysia, occurring also in Hainan Island of China (Sharma and Srivastava 1993, Shi and Zhu 2008).

RARE SPECIES RECORDED RECENTLY FROM OTHER PARTS OF VIETNAM

Cephalozia hamatiloba subsp. ***siamensis*** (N. Kitag.) Váňa – TAM-ĐẢO township area, on stone walls, at 900–950 m elev., 21° 27.7′ N, 105° 38.6′ E.

Coll.: Pócs and Kósa 9894/V; Mt Cái Keng N of Tam Đảo town. Montane rain forest on the S slopes between 1,015 and 1,185 m, with many *Cylindrokelupha alternifoliolata* trees, rich in bryophytes along streamlet, on rocks, 21° 27.6′ N, 105° 38.8′ E. Coll.: Pócs and Ninh 98103/AA (EGR, HNU, PRC). The species and subspecies have Sino-Himalayan distribution, and their characters are

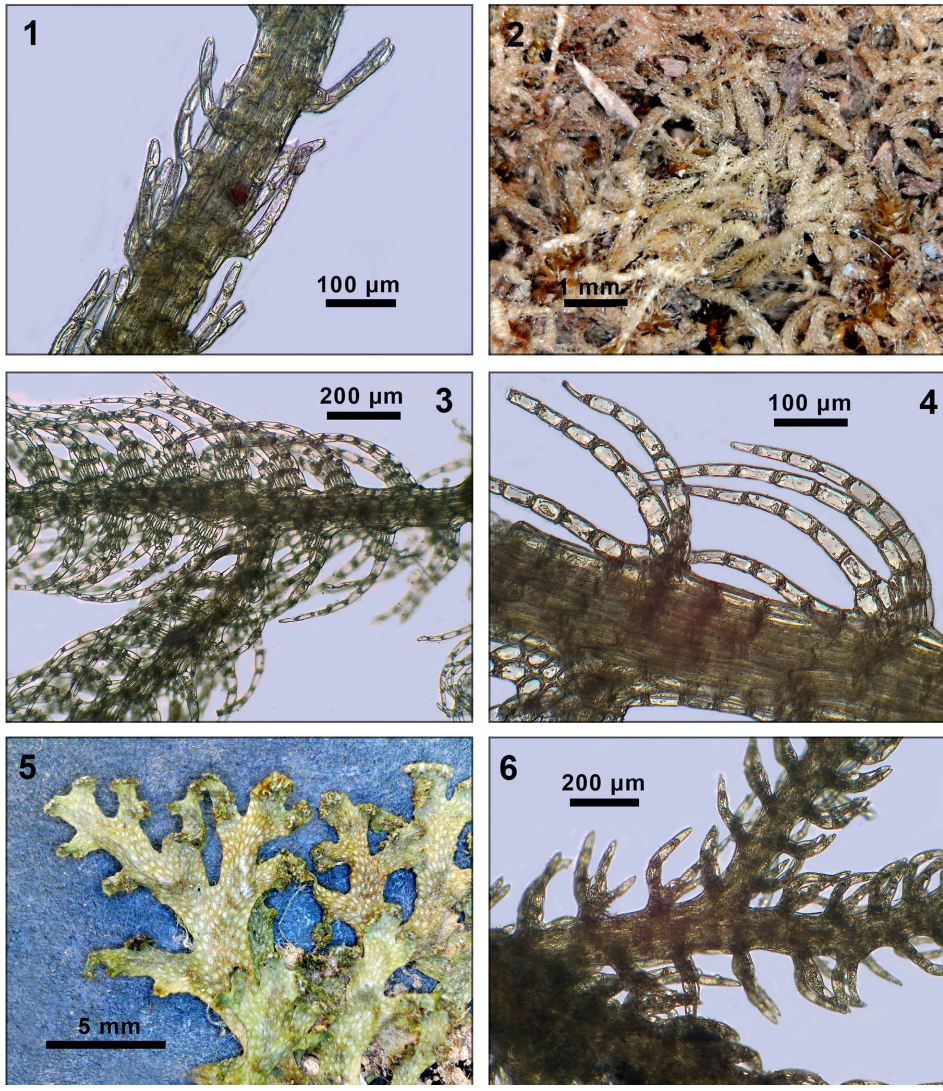


Fig. 1. Kurzia sinensis Chang.: habit, ventral view. – *Figs 2–4. Telaranea semperiana* (Steph.) Del Ros., 2: habit on the decaying log; 3–4: habit, dorsal view. – Fig. 5. *Conocephalum japonicum* (Thunb.) Grolle: habit, dorsal view. – Fig. 6. *Kurzia gonyotricha* (Sande Lac.) Grolle: habit, dorsal view

discussed by Váňa and Long (2011). In Vietnam known only from Cao Bằng province (Shu *et al.* 2017).

Conocephalum japonicum (Thunb.) Grolle (Syn.: *Conocaphalum supradecompositum* (Lindb.) Steph.) (Fig. 5) – TAM – ĐẢO, secondary montane rain forest with tree ferns on the SE slopes of Mt Cai Keng, NW of Tam Đảo town, on roadcut surface at 950–1,050 m elev., 21° 28′ N, 105° 39′ E. Coll.: Pócs and Kósa 9895/G (EGR, HNU). Sino-Himalayan species known from eastern Siberia and Kamchatka to the Himalayas, China and Korea. Recently published from Cao Bằng and Hà Giang Provinces in Vietnam (Shu *et al.* 2017).

Kurzia gonyotricha (Sande Lac.) Grolle (Fig. 6). – TAM-ĐẢO, montane rain forest with many bamboos NW from Tam Đảo town, along the path to Rùng Rình summit, on humus covered rock at 950–1,330 m elev., 21° 28.8′ N, 105° 38′ E. Coll.: Pócs and Ninh 9896/K (EGR, HNU, PHH); same locality, as *Telaranea semperiana*, on roadcut surface, Coll.: Pócs and Ninh 98103/AB (EGR); BA-VÌ, remnants of submontane rain forests between Son Tai Forest Station and Šinh village, at 540–620 m elev., 21° 4.9′ N, 105° 21.6′ E, on roadcut and shady rocks. Coll.: Pócs and Kósa 98107/Q, 98109/B (EGR, PHH). Unique character of the species are the acute ends of leaf segments. A Malesian-Pacific species (Mizutani 1974, Piippo 1985, Pócs *et al.* 2011). Recently published from Hà Giang province in Vietnam (Shu *et al.* 2017).

Marchantia papillata Raddi subsp. ***grossibarba*** (Steph.) Bischl. – BA-VÌ, at the same locality as 1. on roadcut surface. Coll.: Pócs and Kósa 98107/C (EGR). Both male and female specimens were collected. *M. papillata* subsp. *papillata* is widespread in the Neotropics, while subsp. *grossibarba*, a tyical Sino-Himalayan element, is known only from the Himalayas, S-China: Yunnan and from Thailand (Bischler 1989). Bakalin *et al.* (2018) reported it from the Phan Xi Pan National Park and from the neighbouring Ta Phin area.

Nowellia curvifolia (Dicks.) Mont. – TAM-ĐẢO, together with the previous species, on decaying log. Coll.: Pócs and Ninh 9896/A (EGR, HNU). A very easily recognisable liverwort forming a water sack by its infolded leaf margin. It grows almost always on rotting wood, typically in the northern temperate belt, but occurs also in the tropics in America, Asia and Australasia (Gradstein and Váňa 1987, Grolle 1968, Pócs *et al.* 2012). In Vietnam only known from Cào Bằng province (Shu *et al.* 2017).

Odontoschisma grosseverrucosum Steph. – BA-VÌ, rocky NW slope of Đền Thượng peak (the highest summit), montane rain forest with many evergreen Fagaceae and bamboos, on shady cliff, at 1,280 m elev., 21° 4.4′ N, 105° 23.1′ E. Coll.: Pócs and Kósa 98108/K (EGR, HNU, PRC). The large papillae on cuticle are unique among the subtropical Southeast Asian species (Gradstein and Ilkiu-Borges 2015). Recently discovered in Cao Bằng province of Vietnam (Shu *et al.* 2017).

Pleurozia acinosa (Mitt.) Trev. – TAM-ĐẢO, mossy elfin woodland with Melastomataceae, Ericaceae (*Vaccinium* sp.) and Theaceae shrubs and small (1–3 m) trees on the Rùng Rình summit, on twigs, at 1,335–1,345 m elev., 21° 28.76′ N, 105° 37.88′ E. Coll.: Pócs and Ninh 9897/M (EGR, HNU); Yên Mỹ, at 1,100–1,300 m elev., on twigs in montane rainforest. Coll.: Ninh 68350 (EGR, PHH). Peculiar by its water retaining, valved leaves and dimorphic perianths. Indomalesian species known from Sri Lanka to Thailand (Thiers 1993). Recently found in Cao Bằng province of Vietnam (Shu *et al.* 2017).

Solenostoma comatum (Nees) C. Gao – BA-VÌ, remnants of submontane rain forests between Son Tai Forest Station and Šinh village, on roadcut surface, at 540–620 m elev., 21° 4.9′ N, 105° 21.6′ E. Coll.: Pócs and Kósa 98107/F, 97109/D (EGR, PRC). One of the species where rhizoid bundles originate from basal leaf cells. Indo-Pacific species, distributed from India to Bonin islands (Váňa 1972, sub *Jungermannia comata* Nees, Váňa and Piippo 1989). In Vietnam known only from Ha Giang province (Shu *et al.* 2017).

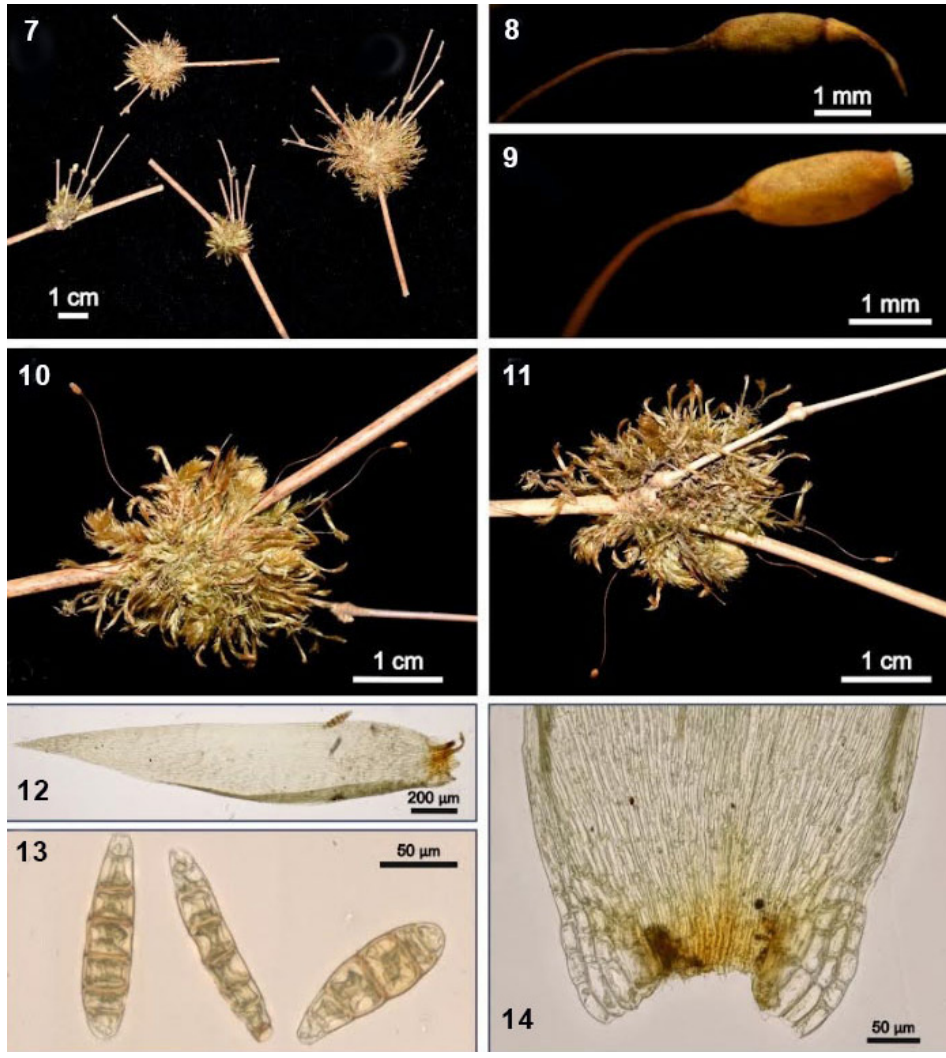
Solenostoma tetragonum (Lindenb.) R. M. Schust. ex Váňa et D. G. Long – BA-VÌ, rocky NW slope of Đền Thượng peak, montane rain forest with many evergreen Fagaceae and bamboos, on roadcut and on shady cliff, at 1,280 m elev., 21° 4.4′ N, 105° 23.1′ E. Coll.: Pócs and Kósa 98108/N (EGR, PRC). Rhizoids originating mostly from the stem epidermis. Indo-Pacific species distributed from India to Samoa (Váňa and Piippo 1989). Recently collected in Cao Bằng province of Vietnam (Shu *et al.* 2017).

Yakushimabryum brevigemmium H. Akiyama et al. (Figs 7–14). – TAM-ĐẢO, mossy elfin woodland with Melastomatace, Ericaceae (*Vaccinium* sp.) on the Rùng Rình summit at 1,340 m elev., 21° 28.76′ N, 105° 37.88′ E. Coll.: Pócs and Ninh 9897/T (EGR, PHH); Montane rain forest with many bamboos on steep slopes, NW from Tam Đảo town, along the path to Rùng Rình summit, on bamboo branches at 1,170 m elev., 21° 28.8′ N, 105° 38′ E. Coll.: Pócs and Ninh 9896/AA (EGR, PHH).

The genus *Yakushimabryum* was described not long ago by Akiyama *et al.* (2011), within the family of Pylaisiadelphaceae (Goffinet *et al.* 2004). Characteristic properties of the new genus are the yellowish green plants with naked dormant branch buds, absence of costa, smooth linear lamina cells and alar groups composed of a number of quadrate cells arranged in a scalariform manner. Ascending branches often elongate into slender tips and filamentous gemmae consisting of smooth, rectangular cells.

Yakushimabryum brevigemmium has a typical appearance, growing as small tuffs on nodal rings of bamboo branches, and bears abundant short fusiform gemmae between leaf axis at the shoot apex. One of the two specimens (Pócs and Ninh 9896/AA) produced sporophytes. Sporophytes similar to *Y. subintegrum* (P. Tixier) H. Akiyama. Setae 15–20 mm long, smooth. Capsules

exserted, slender cylindrical, 1.5–2 mm long, suberect to slightly inclined, brownish orange when dry. Opercula oblique with long peaks, calyptra unseen. The species was first described by H. Akiyama in 2017, and known only from a single sterile specimen (type, H. Akiyama 24142, at about the same location). With two more specimens collected in 1998, we confirm the existence of this species in Tam Đảo.



Figs 7–14. Yakushimabryum brevigemmium H. Akiyama et al., 7: habit; 8–9: sporophytes with and without operculum; 10: habit, dorsal view; 11: habit, ventral view; 12: branch leaf; 13: gemmae; 14: basal regions and alar cells of branch leaves. (7, 12, 14 from specimen Pócs and Ninh 9896/AA, 8–9 from specimen Pócs and Ninh 9897/T, photos are taken by N. K. T. Tram)

DISCUSSION

As it can be seen, it is still worthwhile to study critical liverwort groups in Vietnam, like Anastrophyllaceae, Lepidoziaceae, Lejeuneaceae, Jungermanniaceae, even from materials from well collected localities. The known number of Vietnamese liverworts, through several recent studies (Bakalin and Vilnet 2018, Bakalin *et al.* 2018, 2020, Pócs 2023*a*, *b*, 2024*a*, *b*, Pócs and Sass-Gyarmati 2024, Pócs *et al.* 2019), increased by 126 to 556 species, with more than third of the number known 7 years ago (Shu *et al.* 2017: 430 species), including a genus (*Vietnamiella*, Bakalin *et al.* 2020) and a few species new to science.

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