

## *Aspidistra cyathiflora* var. *bifolia* and *A. neglecta* spp. nov. (Convallariaceae) from northern Vietnam

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This paper continues the publication of new results of a successive investigation of the genus *Aspidistra* in Vietnam. It includes descriptions and illustrations of two new taxa discovered in northern Vietnam, *A. cyathiflora* Y. Wan & C.C. Huang var. *bifolia* Aver., Tillich & K.S. Nguyen and *A. neglecta* Aver., Tillich & K.S. Nguyen. Both plants are local endemics of karstic limestone areas in northern Vietnam. Data on ecology, phenology, tentative relations, distribution and expected conservation status are reported for all mentioned taxa.

The genus *Aspidistra* Ker-Gawler (1822, p. 628) is presently one of the most fast-growing taxonomic groups of flowering plants. Available data indicate Vietnam and surrounding countries as the largest center of species diversity of this genus. The most recent account of the genus in Vietnam reported 43 species occurring in the country (Tillich 2014). Since then, at least 25 additional species have been discovered and described (Averyanov and Tillich 2014, 2015, 2016, Leong-Skornickova et al. 2014, Vislobokov et al. 2014a, b, 2016, Colin 2015, Ngoc Sam and Tillich 2015, Vislobokov 2015, 2016, Averyanov et al. 2016). Still, the diversity of the genus in Vietnam and surrounding countries remains insufficiently inventoried. This paper continues the publication of new results of a successive investigation of the genus *Aspidistra* in Vietnam. It includes descriptions of two new taxa discovered in northern Vietnam, *A. cyathiflora* Y. Wan & C.C. Huang (Wan 1989, p. 100) var. *bifolia* Aver., Tillich & K.S. Nguyen and *A. neglecta* Aver., Tillich & K.S. Nguyen. Both these species are local endemics of karstic limestone areas of northern Vietnam. When the new data provided here are included, the number of *Aspidistra* species known in Vietnam exceeds 70.

Plants mentioned in this paper were collected during fieldwork in 2016. Studied listed herbarium specimens are presently housed in the herbaria HN, LE and in the Herbarium of The Center for Plant Conservation of the Vietnam Union of Science and Technology Associations (Vietnam, Hanoi).

*Aspidistra* flowers are always fleshy, and their structures are generally largely distorted in the process of making

herbarium specimens. Therefore, observations of flowers were mostly made on living plants. Flowers were also preserved in 50–60% ethanol for subsequent studies. Measurements of floral parts for description were made on both living and liquid preserved material. Detailed analytical photos of plant parts compiled into plates referred to here as ‘digital epitypes’ were made from the living plants prior to preparation of the type herbarium specimens.

***Aspidistra cyathiflora* Y. Wan & C.C. Huang var. *bifolia* Aver., Tillich & K.S. Nguyen var. sp. nov. (Fig. 1)**

**Type:** Northwestern Vietnam, Son La province, Moc Chau district, Chieng Son commune, about 1 km to northeast from Chieng Son village, around point 20°46′02.0″N, 104°37′03.1″E, remnants of primary broad-leaved evergreen forest on tops of hills composed with karstic highly eroded yellow-white limestone at elevation 1150–1250 m a.s.l., terrestrial herb in shady rocky place, locally very common, 27 Sep 2016, L. Averyanov, N. T. Hiep, N. S. Khang, C. Q. Ngan, T. V. Maisak, N. T. Son, CPC 8057 (holotype: LE, isotypes: LE) (Fig. 1) (plate, d = digital exsiccatae of Vietnamese flora 0263/CPC 8057).

### **Etymology**

The variety epithet refers to leafy shoots bearing regularly two normally developed leaves.

### **Description**

Terrestrial perennial herb with long hypogeous plagiotropic rhizome ventrally bearing sparse, distant, thick, straight,



Figure 1. *Aspidistra cyathiflora* var. *bifolia* var. nov. Digital epitope, L. Averyanov et al. 0263/CPC 8057. Photos by L. Averyanov and Khang Sinh Nguyen, correction and design by L. Averyanov.

whitish to dull yellowish roots. Rhizome dull brownish to pale yellowish-brown, simple or few branching, thick, to 15–20 cm long, (6)8–11(12) mm in diameter, consisting of numerous many-nodal sympodial portions, each (1.0)1.5–2.0(2.2) cm long, densely covered by many dark brownish fibrous remains of cataphylls; (2)3–4(6) apical sympodial rhizome portions bearing ascending leafy stems

(2)3–5(7) mm tall, each with (1)2(3) leaves. Cataphylls during anthesis dry, dull pale brownish to dark brown, narrowly lanceolate to linear, acute to acuminate, straight, upright, (2)4–8(10) cm long, (2)4–8(10) mm wide (being flattened), somewhat broadening at the base, early disintegrated into irregular fibres. Leaves on individual shoot (1)2(3), usually approached in pairs, petiolate; petiole

light green, stiff, rigid, erect, straight, (16)20–25(30) cm long, (1.2)1.5–2.0(2.5) mm in diameter, adaxially grooved; leaf blade arching, leathery, more or less flat or slightly conduplicate, narrowly lanceolate to almost linear, tapering to base and acuminate apex, (25)30–55(60) cm long, (1.2)1.5–2.2(2.5) cm wide, irregularly wavy along margin, uniformly glossy dark grass-green on both sides, with prominent median vein and rather insignificant secondary veins. Flowers 1–3(4), solitary, arising laterally from leafless basal part of the second (two-year old) sympodial portion of rhizome, long pedunculate, not widely opening, outside white to light yellowish with sparse purple marks, inside dark brown-purple below lobes, white on bottom. Peduncle erect or spreading, (2.0)3.0–4.5(5.5) cm long, white to densely speckled with dirty purple, with (3)4–5(7) distant, broadly ovate, sterile bracts; sterile bracts white finely speckled with purple, ovate to broadly ovate, obtuse or roundish at apex, with broad base, concave, herbaceous, (3)4–6(7) mm long, (2.5)3.0–4.5(5.5) mm wide (being flattened). Perigone (10)11–12(13) mm long and wide, with 6 free lobes, syntepalous part shallowly urceolate, concave at the base, (4)5–6(7) mm long, inside purple, outside white with purple spots. Perigone lobes subequal, fleshy, almost flat, straight, smooth and glossy, white with crowded purple marks on both sides, triangular, (3.8)4.0–4.5(4.8) mm long and wide, obtuse or roundish at apex. Stamens 6, placed on the broadly conical base of style, distant from each other; filaments fleshy, thick, 1.0–1.2 mm tall, 1.6–1.8 mm wide slightly recurved providing anthers to extrorse position; anthers ovoid, (1.2)1.4–1.5(1.6) mm long, (1.0)1.2–1.4(1.5) mm wide; pollen bright yellow. Pistil white, obscurely mushroom-shaped; style fleshy, conoid, broadening to the base, (3.6)3.8–4.2(4.5) mm tall, (1.8)2.0–2.2(2.4) mm in diameter; stigma dark purple-brown to almost black, flat to slightly convex, (4.0)4.5–5.0(5.5) mm in diameter, circular in outline, shallowly 3-lobed, each lobe entire, marginally roundish. Ovary inconspicuous, very indistinct, white. Fruits berry-like, globose, (0.8)1.0–1.2(1.4) cm in diameter, glabrous and sparsely prickled in apical half, white, later dirty purple-brownish with green tint, (2)3(4)-seeded, indehiscent.

#### **Distribution**

Northwestern Vietnam (Son La province, Moc Chau district). Endemic.

#### **Habitat, phenology and conservation status**

*Aspidistra cyathiflora* var. *bifolia* is a terrestrial rhizomatous herb growing in primary and secondary evergreen broad-leaved forests on karstic highly eroded yellow-white limestone at elevation 1150–1250 m a.s.l., commonly in shady rocky place. Flowering in August to September. Locally common. The species was observed in the studied area as a common plant and probably does not need special protection.

#### **Similar species**

*Aspidistra cyathiflora* var. *bifolia* may be close to *A. cyathiflora* Y. Wan & C.C. Huang var. *cyathifolia* (Wan 1989, p. 100) described from southern China (Guangxi province) without precise locality (Wan 1989), and may be regarded as a variety of it. From the type of the species, our plant visually differs

in leaf blade narrowly lanceolate to lineate, 30–55 × 1.5–2.0 cm, with an distinct petiole 20–25 cm long (vs leaf blade broadly lanceolate to lanceolate, 25–45 × 1.8–3.5 cm wide, with an indistinct short petiole), slightly urceolate perigone tube, 11–12 mm wide, 5–6 mm tall, white with purple spots outside (vs cupulate perigone tube, 13–15 mm wide, 7 mm tall, yellow-green and red mottled outside), perigone lobes 4.5 mm long and wide, white with purple marks inside and outside (vs perigone lobes 5–7 mm long, 5–6 mm wide, yellow), perigone base pronouncedly bulged downward (vs concave cap-like perigone base), stamens adjacent to the base of pistil, oblique, pollen sacs extrorse (vs stamens at the very base of tube, somewhat distant from style base, erect, pollen sacs sub-introrse), twice smaller anthers 1.2–1.6 mm long (vs 2–3 mm long), pistil 3.8–4.5 mm tall (vs pistil ca 5 mm tall), and stigma flat or slightly convex, 4.5–5.0 mm across, entirely dark purple-brown (vs stigma convex, 5–6 mm across, purple with yellow center). The mentioned characters well segregate this plant from its Chinese relative. In particular, the anthers in *A. cyathiflora* var. *cyathiflora*, like many other congeners, arise from the basal part of the perianth tube, being introrse or sub-introrse. In flowers of *A. cyathiflora* var. *bifolia*, the fleshy filaments arise from the base of style and they are slightly recurved bringing the anthers in clear extrorse position. This is a rather rare morphological feature in the genus, known in similar form only in *A. tenuifolia* C.R. Lin & Y.C. Yang (Meng et al. 2014, p. 289).

#### ***Aspidistra neglecta* Aver., Tillich & K.S. Nguyen sp. nov. (Fig. 2)**

**Type:** Northern Vietnam, Ha Giang province, Quan Ba district, Can Ty commune, Dau Cau 1 village, around point 23°05'45.1"N, 105°01'02.7"E, 1050 m a.s.l., primary evergreen broad-leaved forest mixed with conifers (*Xanthocyparis vietnamensis*, *Nageia fleuryi*, *Pseudotsuga sinensis*, *Calocedrus rupestris*) at the top of rocky limestone mountain, under shaded places at the base of mountains, terrestrial perennial herb, tepals green and turn brown when dried, very common, 17 Dec 2016, Nguyen Sinh Khang, Nguyen Phuong Hanh, Ly Ngoc Sam, T. Haevermans, VP 26 (holotype: HN!, isotypes: HN!, LE!, VNM!) (Fig. 2) (plate, d = digital exsiccatae of Vietnamese flora 0272/VP 26).

#### **Etymology**

The species epithet reflects fact that plant was neglected during previous field studies and floristic surveys due to the small unattractive flowers.

#### **Description**

Terrestrial perennial herb with long semi-epigeous creeping plagiotropic rhizome bearing ventrally sparse, distant, thick, straight, whitish to whitish-gray roots. Rhizome dark gray or dark gray-brownish, simple or few-branching, thick, to 20–25 cm long, (6)8–12(14) mm in diameter, consisting of numerous many-nodal sympodial portions, each (1.0)1.5–2.0(2.2) cm long, densely covered by many dull brownish papyraceous or fibrous remains of cataphylls; (2)3–4(6) apical sympodial rhizome portions bears ascending leafy stems (2)3–5(7) mm tall, each with (1)2(3) leaves. Young

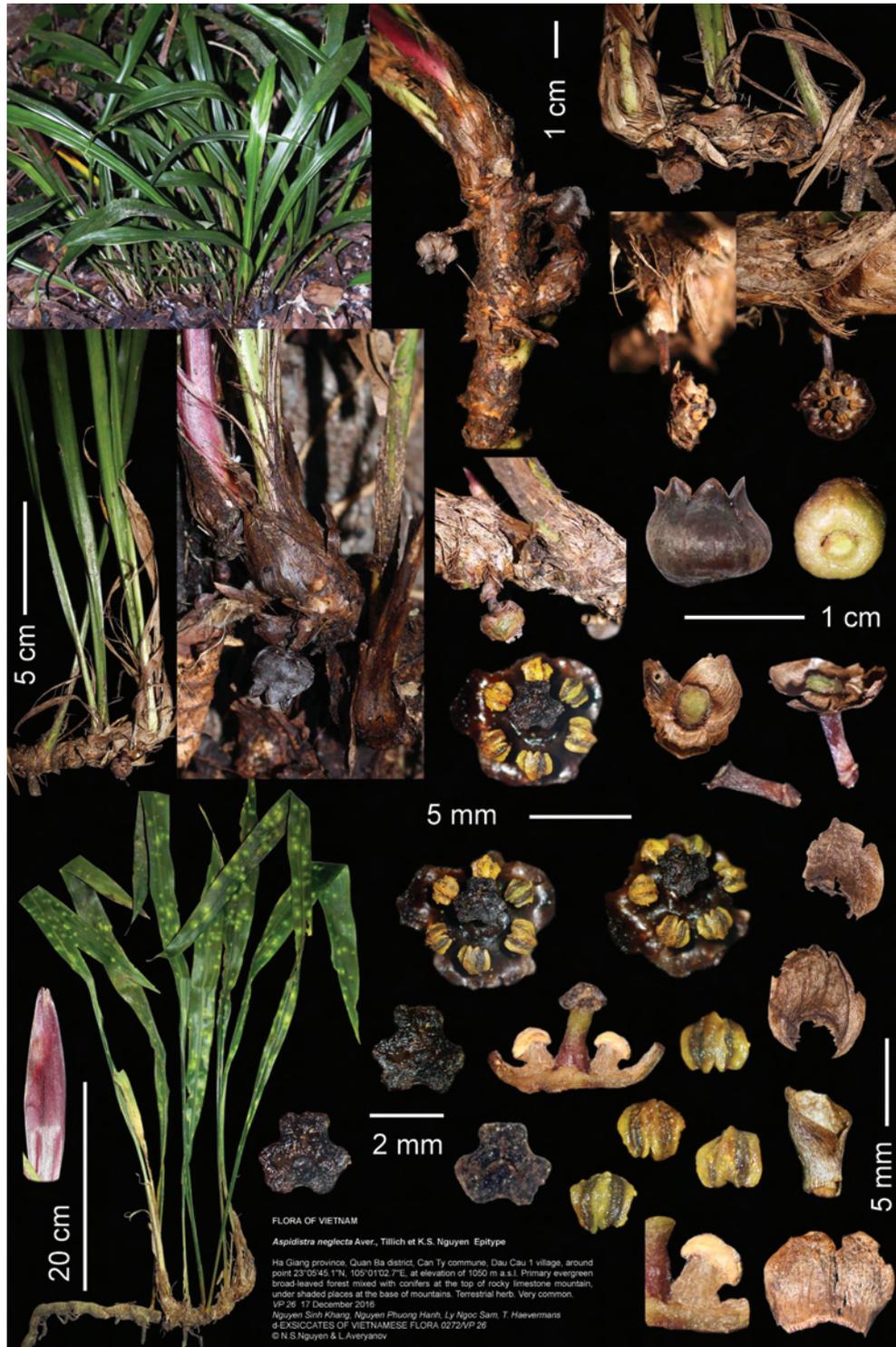


Figure 2. *Aspidistra neglecta* sp. nov. Digital epitype, Khang Sinh Nguyen, 0272/VP 26. Photos by Khang Sinh Nguyen, correction and design by L. Averyanov.

cataphylls pink to purple, erect, ensiform, during anthesis dry, dull pale brownish, narrowly lanceolate, acute to acuminate, straight, upright, (2)5–14(16) cm long, (3)4–10(14) mm wide (when flattened), somewhat broadening at the base, early disintegrated into irregular fibres. Leaves on individual shoot (1)2(3), petiolate to indistinctly petiolate; petiole grass green, stiff, rigid, erect, straight, (6)8–12(14) cm

long, (1.6)2.0–2.5(3.0) mm in diameter, adaxially grooved; leaf blade arching, leathery, more or less flat, narrowly lanceolate to lanceolate, tapering to base and an acuminate apex, (24)28–50(55) cm long, (2.0)2.5–3.5(4.0) cm wide, irregularly wavy along margin, uniformly grass-green or with many fuzzy dull yellowish spots, with prominent median vein and rather insignificant secondary veins. Flowers

1–2(3), solitary, arising laterally from apical sympodial portion of rhizome, shortly pedunculate, not widely opening, dark dirty purple-violet to almost black with greenish free lobes. Peduncle spreading, sub-horizontal, (4)6–8(10) mm long, dull purple to pale dirty purple-violet, with (3)4–5(6) distant, broadly ovate, sterile bracts; sterile bracts speckled with dirty purple, ovate to broadly ovate, obtuse or roundish at apex, with broad base, concave, herbaceous, (3)4–6(7) mm long, (2.5)3.0–4.5(5.5) mm wide (when flattened), often irregularly splitting at apex. Perigone (8.0)8.5–9.0(9.5) mm long, with 6 free lobes, syntepalous part urceolate to almost globular, (6.0)6.5–7.0(7.5) mm long, (8)9–10(11) mm in diameter in broadest part, when opening reduced to ca 7 mm; lobes subequal, fleshy, slightly longitudinally concave, straight, smooth and glossy, broadly triangular, (1.8)1.9–2.1(2.3) mm long, (2.6)2.8–3.0(3.2) mm wide, obtuse at apex. Stamens 6, filamentous, inserted at base of perianth tube, distant from each other; filaments fleshy, thick, erect, straight, 0.9–1.1 mm tall and wide; anthers dorsifixed, semi-extrorse, broadly ovoid, (1.0)1.2–1.4(1.6) mm long and wide; pollen yellow. Pistil dull pale olive-greenish, tinged with dirty purple to the base, obscurely mushroom-shaped; style fleshy, conoid, broadening to the base, (2.5)2.8–3.0(3.2) mm tall, (1.0)1.2–1.4(1.5) mm in diameter; stigma uniformly dark purple-violet to almost black, peltate to slightly convex, (2.6)2.8–3.0(3.2) mm in diameter, circular in outline, distinctly 3-lobed, each lobe entire, subquadrate, truncate to slightly emarginate at apex. Ovary inconspicuous, very indistinct, dull dirty purple.

#### Distribution

Northern Vietnam (Ha Giang province, Quan Ba district, Bat Dai Son Mountains). Endemic.

#### Habitat, phenology and conservation status

*Aspidistra neglecta* is a terrestrial rhizomatous herb which grows in primary evergreen broad-leaved, mixed and coniferous forests (with *Calocedrus rupestris*, *Nageia fleuryi*, *Pseudotsuga sinensis*, *Taxus chinensis* and *Xanthocypris vietnamensis*) on karstic highly eroded limestone at 1000–1200 m a.s.l., commonly in shady places on rocky steep slopes. Flowering in (October) November to December. Locally very common. The estimated IUCN red list status is 'Least Concern' (LC).

#### Similar species

*Aspidistra neglecta* is close to *A. cyathiflora* Y. Wan & C. C. Huang (Wan 1989, p. 100), but differs in its long creeping rhizome with distant two-leaved sympodial portions, short peduncles, distinctly smaller, abaxially uniformly dirty purple flowers (vs outside pale yellow-green), (8.0)8.5–9.0(9.5) mm long, (8)9–10(11) mm in diameter (vs 12–14 × 13–15 mm long and wide, pronouncedly urceolate perigone tube (vs cupulate), small anthers (1.0)1.2–1.4(1.6) mm long and wide (vs 2–3 mm) and small uniformly dark purple stigma (2.6)2.8–3.0(3.2) mm in diameter (vs stigma white grooved, 5–6 mm in diameter). The new species also resembles *A. stenophylla* C.R. Lin & R.C. Hu (Hu et al. 2014, p. 53), but differs by smaller flowers 8.5–9.0 mm long, 9–10 mm wide (vs 15 × 14–15 mm), perigone lobes

smooth (vs with two prominent fleshy keels), stigma 2.8–3.0 mm across, flat (vs 10 mm across, with radial ribs).

#### Additional specimens examined

Northern Vietnam, Ha Giang province, Quan Ba district, Can Ty commune, Bat Dai Son nature reserve, 23°05'34"N, 105°01'13"E, primary coniferous forest with *Pseudotsuga sinensis*, *Xanthocypris vietnamensis*, *Calocedrus rupestris* on remnant highly eroded limestone ridge at elevation 1000–1200 m a.s.l., occasionally, 16 Apr 2013, Nguyen Quang Hieu et al., CPC 5580 (Herbarium of the Center for Plant Conservation, Hanoi). Northern Vietnam, Ha Giang province, Quan Ba district, Thanh Van commune, Ma Hong village, around point 23°06'10.5"N, 104°58'36.2"E, 1000 m a.s.l., primary evergreen broad-leaved forest of rocky limestone mountain, under shaded places near top of mountains, terrestrial or lithophytic perennial herb, tepals green and turn brown when dried, not common, 18 Dec 2016, Nguyen Sinh Khang et al., VP 40 (HN!, LE!, VNM!). Northern Vietnam, Ha Giang province, Quan Ba district, Can Ty commune, Dau Cau 1 village, around point 23°06'20.5"N, 105°01'04.5"E, 1100 m a.s.l., primary evergreen broad-leaved forest mixed with conifers (*Xanthocypris vietnamensis*, *Nageia fleuryi*, *Pseudotsuga sinensis*, *Calocedrus rupestris*, *Taxus chinensis*) at the top of rocky limestone mountain, under shaded places at the middle of mountains, terrestrial or lithophytic perennial herb; single flower at adaxial leaf base, tepals green and turn brown when dried, very common, 19 Dec 2016, Nguyen Sinh Khang et al., VP 53 (HN!, LE!, VNM!).

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