

Aspidistra laotica, *A. multiflora*, *A. oviflora* and *A. semiaperta* spp. nov. (Asparagaceae, Convallariaceae s.s.) from eastern Indochina

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Aspidistra laotica, *A. multiflora*, *A. oviflora* and *A. semiaperta* discovered recently are described and illustrated as species new to science. All novelties are local endemics of northern Vietnam and central Laos.

The knowledge of the southeast-Asian genus *Aspidistra* Ker-Gawl. has increased dramatically during the past three decades. For a long time these plants were more or less overlooked. Meanwhile it became clear that its diversity of flower shapes, sizes and colours places this genus among the most spectacular among Monocotyledons (Tillich 2014). The flower size ranges from 4 mm in diameter (*A. minutiflora* Stapf, see Stapf 1903) to 8–9 cm (*A. nikolaii* Aver. & Tillich, see Tillich and Averyanov 2008), the perigone opening may be reduced to a pore of 1.5 mm (e.g. *A. locii* Arnautov & Bogner, see Bogner and Arnautov 2004), the number of perigone lobes varies between 3 (*A. paucitepala* Vislobokov et al. 2014) and 14 (*A. longiloba* G. Z. Li 1988), the perigone colour shows all shades between white, yellow, blue, purple, to almost black. Most species have a creeping rhizome, but some possess an erect or ascending stem up 1 m tall (e.g. *A. erecta* Y. Liu & C.-I Peng, see Liu et al. 2011). While the latest comprehensive key (Tillich 2008) considered 93 species, the total number is now beyond 130. Field trips of the first author in northern Vietnam and central Laos revealed still more new species, which are described and illustrated below.

Aspidistra laotica Aver. et Tillich sp. nov. (Fig. 1–2)

Type: Laos, Vientiane prov., Vang Vieng distr., Nam Pe village, about 12 km to the west of Vang Vieng town, around point 18°58'41.0"N, 102°18'54.1"E. Flowered under cultivation, 15 Jun 2013, L. Averyanov, LA-VN 554a (holotype: LE).

Paratype: Laos, Vientiane prov., Vang Vieng distr., Nam Pe village, about 12 km to the west of Vang Vieng town, around point 18°58'41.0"N, 102°18'54.1"E, 300–1000 m a.s.l., 18 Mar 2013, N. T. Hiep, L. Averyanov, K. Chantthavongsa, N. S. Khang, P. V. The, S. Lorphengsy, LA-VN 554 (LE, Herbarium of the Center for plant conservation, Hanoi).

Etymology

The species name refers to the country where this new species was found.

Description

Shoot erect, simple or sparsely branching, 3–5 cm tall, 5–6 mm in diameter, densely nodal, with few thick, rigid, semi-woody, straight, down-directed prop roots. Cataphylls convolute, narrowly triangular, when young light greenish to dull purple–brown, later becoming pale yellowish to almost white, papyraceous, with prominent nerves, up to 5 cm long, early splitting into persistent fibrous remains. Leaves (2)3(4), petiolate. Petiole stiff, erect, almost straight, (4)5–12(14) cm long. Leaf blade normally almost horizontal, ovate to broadly elliptic, cordate at base and shortly attenuate at apex, (8)10–14(16) cm long, (4.5)5.0–7.0(8.5) cm wide, irregularly undulate along margin, brightly uniform green on both sides, with 7 prominent veins radiating from the leaf base. Flowers solitary, arising from the apical part of shoot, pedunculate. Peduncle arising horizontally, straight or slightly flexuose, light green, terete, 2–3 cm long, 1.5–2.0 mm in diameter, with 2–4(5) sterile bracts; bracts broadly ovate, concave, thin, scarios, white to light greenish, later dull yellowish–brown, papyraceous, obtuse to acute, 0.8–1.0(1.5) cm long, and 2–3(5) mm wide; uppermost bract narrowly ovate to oblong, concave, thin, scarios, almost white to light greenish, obtuse, 0.8–1.0 cm long, 2–4 mm wide, with 3 veins, distant from flower. Perigone tube urceolate, white on both surfaces, longitudinally ridged outside, 4–6 mm long and wide, with 6 free lobes at apex. Perigone lobes subequal, ovate, obtuse to blunt at apex, flat and smooth, well recurved, 3.4–4.0 mm long, 3.0–3.5 mm wide at base, dark brown to almost black; petals (inner perigone lobes) somewhat wider and

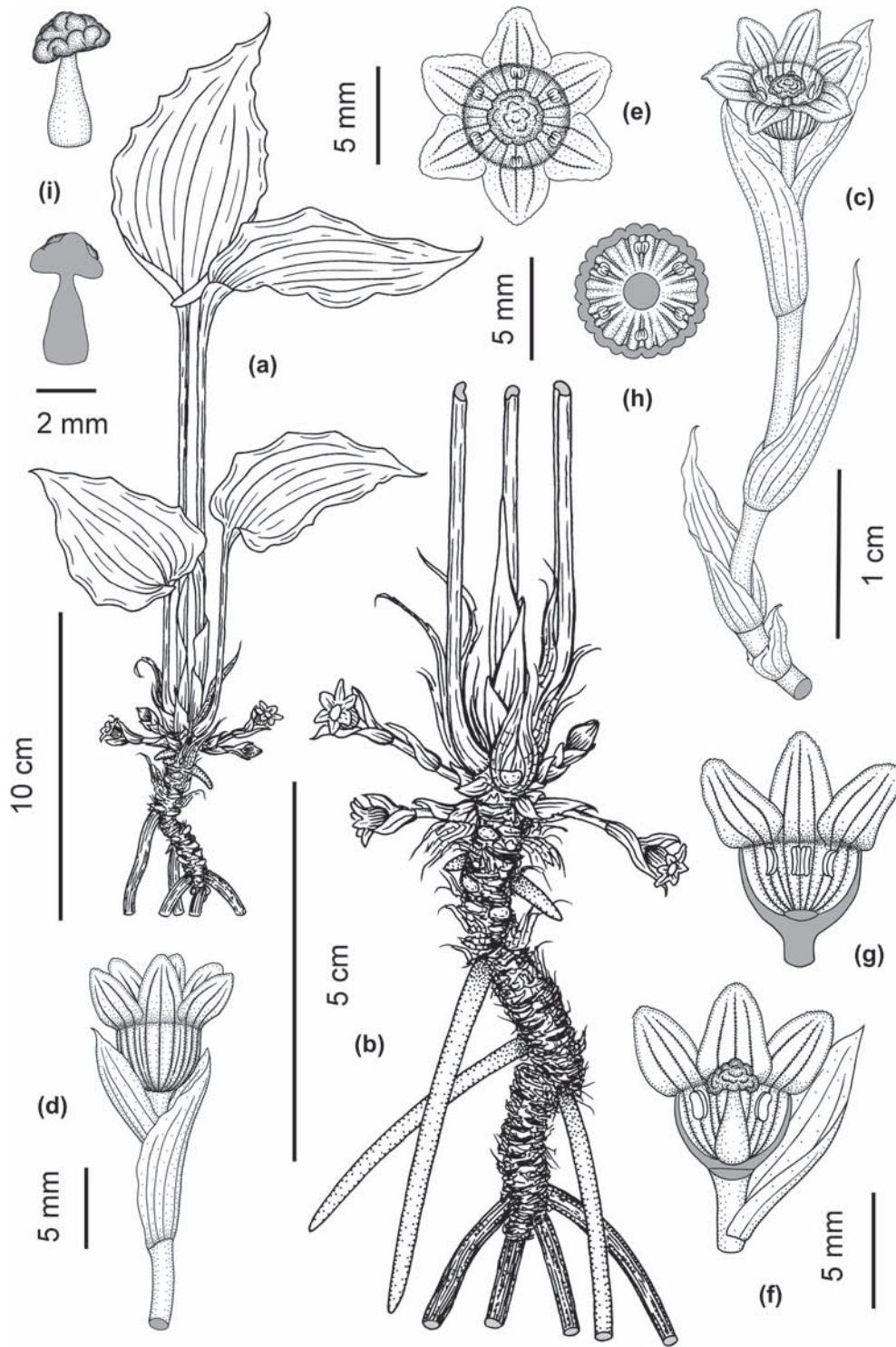


Figure 1. *Aspidistra laotica* sp. nov. (a) flowering plant, (b) base of flowering plant, (c) peduncle and flower, side view, (d) flower, half-side view from below, (e) flower, frontal view, (f) sagittal section of flower, (g) sagittal section of flower with removed pistil, (h) transversal section of perigone with removed pistil, view from above, (i) pistil and its sagittal section. All drawn from the type, L. Averyanov, LA-VN 554a by L. Averyanov and T. Maisak.

shallowly auriculate at the base. Stamens 6, sessile, inserted on tube wall closely below perigone lobes; anthers narrowly bean-shaped, 1.0–1.2 mm long, 0.5–0.7 mm wide; pollen sacs introrse; pollen light dull yellow. Pistil mushroom-shaped;

style white, fleshy, pyramidal, 3.5–4.5 mm tall, 1.4–1.8 mm in diameter at the base, attenuate towards apex; stigma umbrella-like, 2.0–2.5 mm in diameter, entire, circular or slightly oblique, fleshy, its upper surface irregularly



Figure 2. *Aspidistra laotica* sp. nov. Vegetative and floral details of the type specimen, L. Averyanov, LA-VN 554a. Photos by L. Averyanov.

verrucose, brown. Ovary inconspicuous, light greenish. Fruits globular, 1 cm in diameter, dirty purple, rugose.

Distribution

Central Laos (Vientiane province, Vang Vieng district). Endemic.

Ecology

Shady rocky places in primary and secondary broad-leaved evergreen and semi-deciduous dry forest on very steep rocky slopes of remnant highly eroded limestone mountains composed of solid crystalline limestone at elevations of 300–500 m a.s.l. Flowering in April–May, fruits in February–March. The species is considered to be of ‘Least Concern’ (LC) (IUCN 2012).

Similar species

Two more species are known with erect stems and urceolate perigone tubes: *A. erecta* Y. Liu & C.-I Peng differs in stems up to 1.2 m tall, perigone tube inside dark purple, lobes white, stigma hemispherical, red. *Aspidistra lubae* Aver. & Tillich (recently described by Averyanov and Tillich 2014) differs in the tube 14–18 mm across, inside dark purple, lobes deltoid, erect, stigma slightly convex, pale green to white.

***Aspidistra multiflora* Aver. et Tillich sp. nov. (Fig. 3–4)**

Type: Vietnam, Thanh Hoa prov., Thuong Xuan distr., Van Xuan Municipality, Quan village, Xuan Lien Natural Reserve, secondary broad-leaved evergreen forest on sandstone hills at elevation 300–500 m a.s.l. around point 19°51'27.0"N, 105°12'46.0"E, 7 Nov 2013, L. Averyanov, N. T. Hiep, N. S. Khang, N. D. Thang, L. D. Qui, CPC 6841 (holotype: LE).

Digital epitype: d-EXSICCATES OF VIETNAMESE FLORA 0214/CPC 6841 (Fig. 4).

Etymology

The species name refers to the dense cluster of numerous flowers at the apex of individual shoots.

Description

Rhizome terete, ascending or erect, sparsely branching, 5–8(10) mm in diameter, densely nodal, with thick rigid, light gray, semi-woody, straight stilt roots. Cataphylls convolute, cuneate, greenish when young, later light dull gray–brownish, papyraceous, to 10 cm long and 1 cm wide, early splitting into irregular fibres, enveloping petioles by fibrous–papyraceous remains. Leaves 1–3, petiolate. Petiole

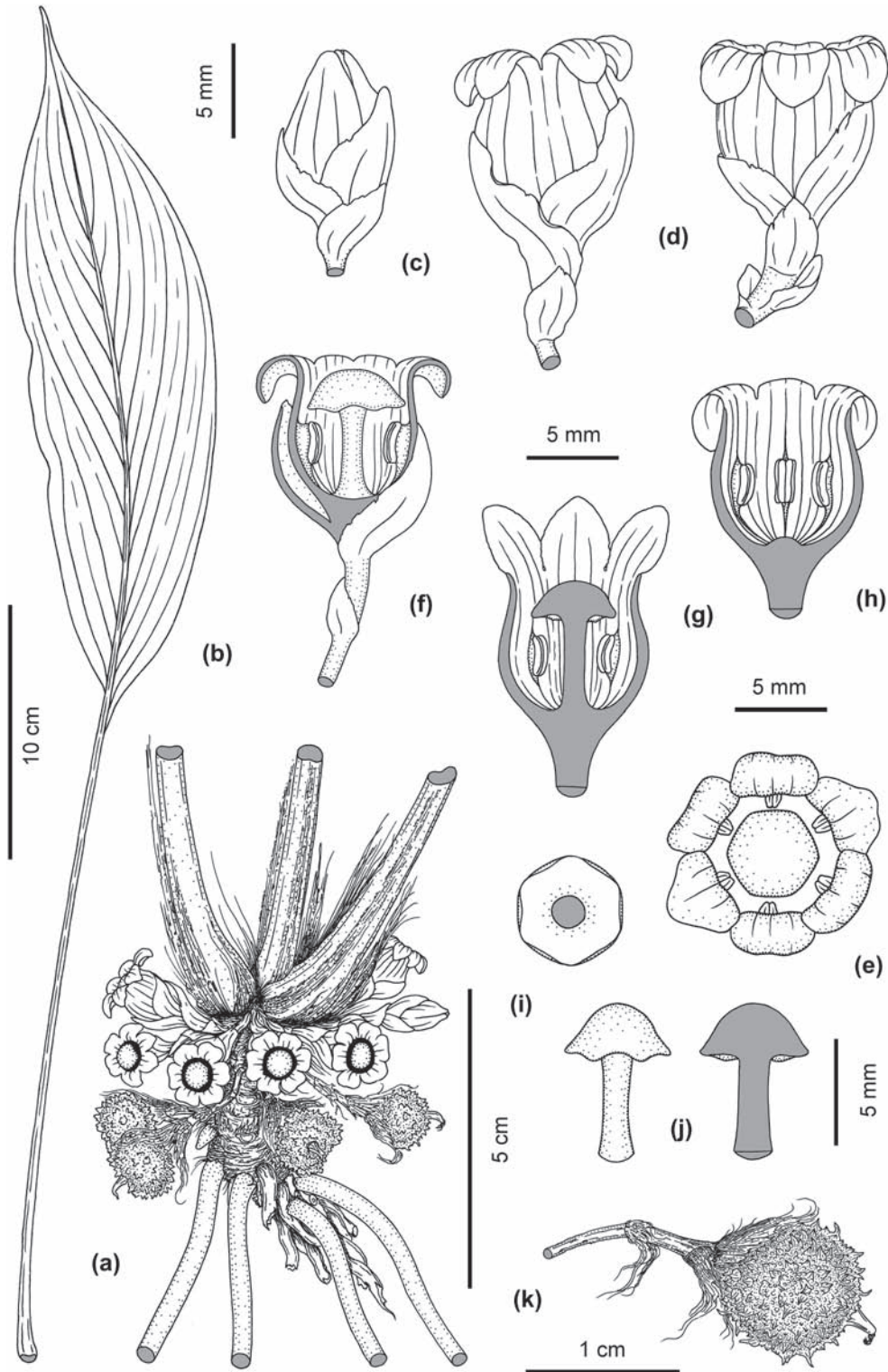


Figure 3. *Aspidistra multiflora* sp. nov. (a) base of flowering plant, (b) leaf, (c) flower bud, (d) peduncles and flowers, side view, (e) flower, frontal view, (f) flower, sagittal section with intact pistil, (g) flower, sagittal section, (h) flower, sagittal section, pistil removed, (i) stigma, view from below, (j) pistil, side view and its sagittal section, (k) fruit, side view. All drawn from the type, L. Averyanov et al. CPC 6841 by L. Averyanov and T. Maisak.



Figure 4. *Aspidistra multiflora* sp. nov. Digital epitype, L. Averyanov et al. CPC 6841. Photos, correction and design by L. Averyanov.

stiff, erect, straight, or slightly curved, (14)15–25(27) cm long. Leaf blade upright and arching, elliptic, attenuate at base and apex, (20)25–30(35) cm long, (4)5–8(10) cm wide, plicate, uniformly dull green above and below, with prominent midvein and 3–5 secondary veins well seen on both sides, arising from midvein in basal half of leaf blade. Flowers odorless, numerous, pedunculate, kept in horizontal or slightly ascending position, widely open. Peduncles appearing

in groups just below the foliage leaves, dirty purple to olive brown, (6)8–12(14) mm long, 1 mm in diameter, horizontal to obliquely ascending, with 2–3 bracts; bracts triangular ovate, concave, papyraceous, with scarious, lacerate margins, dirty purple to olive greenish, acute to obtuse, (3)4–6(7) mm long and 2–4 mm wide. Perigone tube urceolate, 7.0–8.5(9.5) mm long and wide, glossy, white on both surfaces, inside with 6 longitudinal dark purple-brown stripes

(reaching to between the stamens), with 6 lobes. Perigone lobes subequal, broadly triangular ovate, slightly convex, blunt to almost round at apex, fleshy, smooth, revolute, 4–5 mm long and wide, adaxial surface smooth or shallowly longitudinally grooved, glossy dark purple–brown, abaxial surface white speckled with dirty purple. Stamens 6, inserted at middle part of tube; filaments short, laterally flattened, 0.6–0.8 mm tall, base 1.6–1.8 mm long; anthers bean-shaped, 2.0–2.2 mm long, 0.8–1.2(1.4) mm wide, with pollen sacs facing the style and narrow connective; pollen brightly yellow. Pistil mushroom-shaped, white; ovary inconspicuous, dirty purple speckled; style stout, white, cylindrical, slightly broadening to the base and apex, (3.0)4.0–5.0(5.5) mm tall, (1.0)1.2–1.4(1.6) mm in diameter; stigma almost hemispherical, fleshy, almost white, sub-circular or indistinctly hexagonal, (4.0)4.5–5.0(5.5) mm in diameter, its upper surface smooth. Fruits oblique–globular, (6)7–9(11) mm in diameter, dirty gray-brown to dull black, densely irregularly thorned, 1-seeded.

Distribution

Northern Vietnam (Thanh Hoa province, Thuong Xuan district). Endemic.

Ecology

Very steep shady slopes in primary and secondary evergreen broad-leaved lowland forest on sandstone hills at elevations of 300–500 m a.s.l., Flowering in October–November, fruits in September–December. The species is considered to be of ‘Least Concern’ (LC) (IUCN 2012).

Similar species

The species is closest to *A. zinaidae* Aver. et Tillich (2012), but distinctly differs in its tube diameter 7–9 mm (not 4–5 mm), tube inside glossy white (not deep purple), lobes revolute (not erect), and leaf blades elliptic and 5–8 cm wide (not lanceolate and 2–5 cm wide).

***Aspidistra oviflora* Aver. et Tillich sp. nov. (Fig. 5–6)**

Type: Vietnam, Cao Bang prov., Nguyen Binh distr., Yen Lac Municipality, Chi Doi village, around point 22°45′34″N, 105°51′48.7″E. Primary somewhat logged coniferous forest with *Pseudotsuga sinensis* along highly eroded rocky limestone ridge at elevation about 1400 m a.s.l., 5 Oct 2013, L. Averyanov, N. T. Hiep, L. M. Tuan, N. S. Khang, T. Maisak, L. Osinovets, CPC 5425 (holotype: LE, isotypes: LE, Herb. of the Center for Plant Conservation, Hanoi).

Etymology

The species name refers to the egg-like shape of the flower.

Description

Rhizome hypogeous, plagiotropic, creeping, to 30 cm long, much branched, densely nodal, forming large dense clusters of erect leaves, covered by numerous long persistent fibres. Roots numerous, almost white, semi-woody, straight, spreading. Cataphylls convolute, linear to narrowly cuneate, light green to green when young, later becoming dull pale brownish, up to 15(20) cm long, enveloping petiole, later

splitting into fibrous–papyraceous persistent remains. Leaves (3)4–6(8), densely crowded near rhizome apex, indistinctly petiolate, linear–lanceolate, gradually narrowing from the middle to base and apex, 70–90 cm long, 1.5–2.5 cm wide at the middle, straight and slightly arching toward attenuate apex, uniform dark glossy green, straight or slightly wavy along margin, with strongly prominent midvein and few parallel secondary veins; base of leaf rigid, conduplicate, petiole-like. Flowers solitary, arising from rhizome near apex, pedunculate. Peduncle arising horizontally, white, terete, (2)3–5(6) cm long, 2.0–3.0(4.5) mm in diameter, with (2)3–4 sterile bracts along the axis and 1–2 at perigone base; bracts along the axis broadly ovate, concave, rather fleshy, white with sparse small dirty purple speckles, blunt to obtuse at apex, 0.8–1.2 cm long and wide, those adpressed to perigone broadly triangular–ovate, concave, 1.4–1.5 cm long, 1.5–2.0(2.2) cm wide, commonly splitting into 2–3 lobes. Flowers pink–purple, purple–violet to almost black, ascending to erect, perigone ovoid to almost globular, outside verruculose, 2.0–2.5 cm long and wide. Perigone tube broadly urceolate, very thick, fleshy, with 6 prominent warts 2 mm in diameter below sinuses of perigone lobes. Lobes 6, subequal, very fleshy, straight, 6–8 mm long, 3–4 mm wide, blunt at apex, laterally fused to each other, forming a conical structure with a very small apical opening and a narrow canal inside; sepals slightly broader with small scarious auricles (rudimentary tepals?) at the base; each perigone lobe inside with 2 paired tall densely papillose crests almost completely closing perigone entrance and extending down inside perigone as 2 paired warty keels. Stamens 6, with short filaments, inserted near base of perigone; filaments fleshy, massive, 1 mm tall, with base 1.5 mm long; anthers bean-shaped 3.0–3.5 mm long and wide; pollen sacs introrse, upward directed, dull yellow. Pistil dark violet to almost black, mushroom-shaped; ovary inconspicuous; style stout, shortly cylindrical, glossy black–violet, 3 mm tall, 5 mm in diameter, broadening to the base and apex; stigma fleshy, umbrella-like, convex, 1.5–1.8 cm in diameter, papillose in central part of upper surface, shallowly 6-lobed; each lobe entire, round or obtuse at apex, with erect folds between lobes.

Distribution

Northern Vietnam (Cao Bang province, Nguyen Binh district). Endemic.

Ecology

Primary broad-leaved and coniferous forest with *Pseudotsuga sinensis* along highly eroded rocky limestone ridge at elevation about 1400 m a.s.l., most frequent in shady humid depressions between shady cliffs in middle part of the range slope. Flowering in October–November. The species is considered to be of ‘Least Concern’ (LC) (IUCN 2012).

Similar species

The species is outstanding in the genus. There are only two more species with the entrance to the perigone reduced to a pore of 1.0–1.5 mm: *A. recondita* Tillich (Tillich et al. 2007) and *A. locii* Arnautov & Bogner. In both latter cases this can be interpreted in two ways: either the perigone lobes

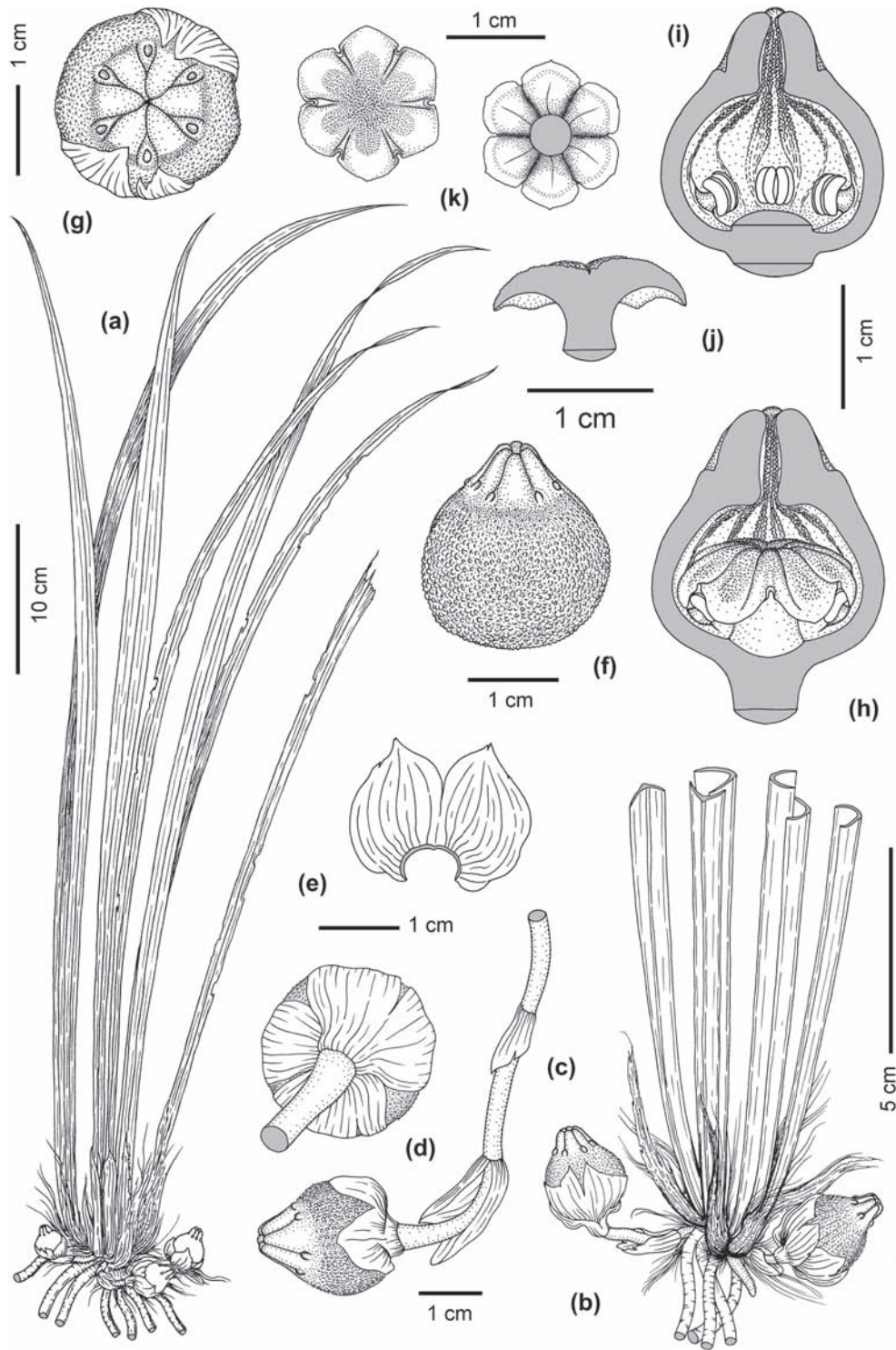


Figure 5. *Aspidistra oviflora* sp. nov. (a) flowering plant, (b) base of flowering plant, (c) peduncle and flower, side view, (d) flower, view from below, (e) floral bract, (f) flower, side view, (g) flower, view from above, (h) flower, sagittal section with intact pistil, (i) flower, sagittal section, pistil removed, (j) sagittal section of pistil, (k) stigma, views from above and from below. All drawn from the type, L. Averyanov et al., CPC 5425 by L. Averyanov and T. Maisak.



Figure 6. *Aspidistra oviflora* sp. nov. Vegetative and floral details of the type specimen L. Averyanov et al. CPC 5425. Photos, correction and design by L. Averyanov.

are completely missing, and the perigone tube opening is reduced to a small pore, or the lobes are fused congenitally. In *A. oviflora*, the lobes are well visible but fused along their lateral margins. The question is left open whether this fusion develops congenitally or postgenitally.

***Aspidistra semiaperta* Aver. et Tillich sp. nov.**
(Fig. 7–8)

Type: Vietnam, Hoa Binh prov., Lac Son distr., Tu Do municipality, Mon village, around point 20°25'29"N, 105°19'36"E. Flowered under cultivation, Nov–Jan 2014, L. Averyanov, P. Efimov, CPC 1566b/sp.9 (holotype: LE, isotype: LE).

Paratype: Vietnam, Hoa Binh Prov., Lac Son Distr., Tu Do Municipality, Mon village, around point 20°25'29"N, 105°19'36"E. Primary broad-leaved forest on steep rocky slopes of remnant mountain composed of solid crystalline highly eroded limestone at elevation about 500–700 m a.s.l., 25 Mar 2011, L. Averyanov, L. Osinovetz, T. Maisak et al., CPC 1566b (LE).

Etymology

The species name refers to its hardly opening flowers.

Description

Rhizome terete, epigeous to hypogeous, creeping, plagiotropic, much branched; branches 7–10(12) mm in diameter, 5–10(15) cm long, densely nodal, covered by dissected

papyraceous remains of cataphylls, with many distant erect leaves. Cataphylls convolute, linear to narrowly cuneate, dark chestnut brown, 5–15 cm long. Leaves numerous, throughout apical parts of rhizomes, indistinctly distichous, petiolate, internodes 5–10 mm long. Petiole slender, erect, straight, to 50 cm long. Leaf blade upright to almost horizontal, ovate to elliptic, cuneate at base, shortly attenuate at apex, (14)17–28(32) cm long, (4)6–8(10) cm wide, uniformly dark glossy green, plicate, with prominent midvein on lower surface and (1)2(3) inconspicuous secondary veins at both sides. Flowers odorless, solitary, shortly pedunculate. Peduncle dirty purple–violet, (6)8–10(12) mm long, 2.0–2.5 mm in diameter, with 2–3(4) scattered and 1–2 bracts at base of perigone; lower bracts broadly ovate, papyraceous, white with fine irregular dirty–purple markings, blunt to obtuse at apex, 5–8(10) mm long and wide, the distal bracts adpressed to perigone, broadly triangular-ovate, concave, 5–8(10) mm long, 5–10(12) mm wide, often splitting longitudinally into 2–3 lobes. Perigone tube depressed urceolate, 10–15(16) mm in diameter, (4)5–6(7) mm tall, finely verruculose, purple–brown or dark purple–violet to almost black on both surfaces, with 6 lobes. Perigone lobes subsimilar, triangular, blunt to obtuse at apex, fleshy, with narrow scarious margin, rugose or finely verruculose, straight erect or with approaching tips, 4–5(6) mm long, (4.0)5.0–6.0(6.5) mm wide, each inside with 2 ridge-like fleshy roughly papillose keels running down to the middle of perigone tube. Stamens 6; anthers sessile, flat, broadly ovate, cordate at base, 1.8–2.2 mm long, 1.4–1.6 mm wide, adpressed

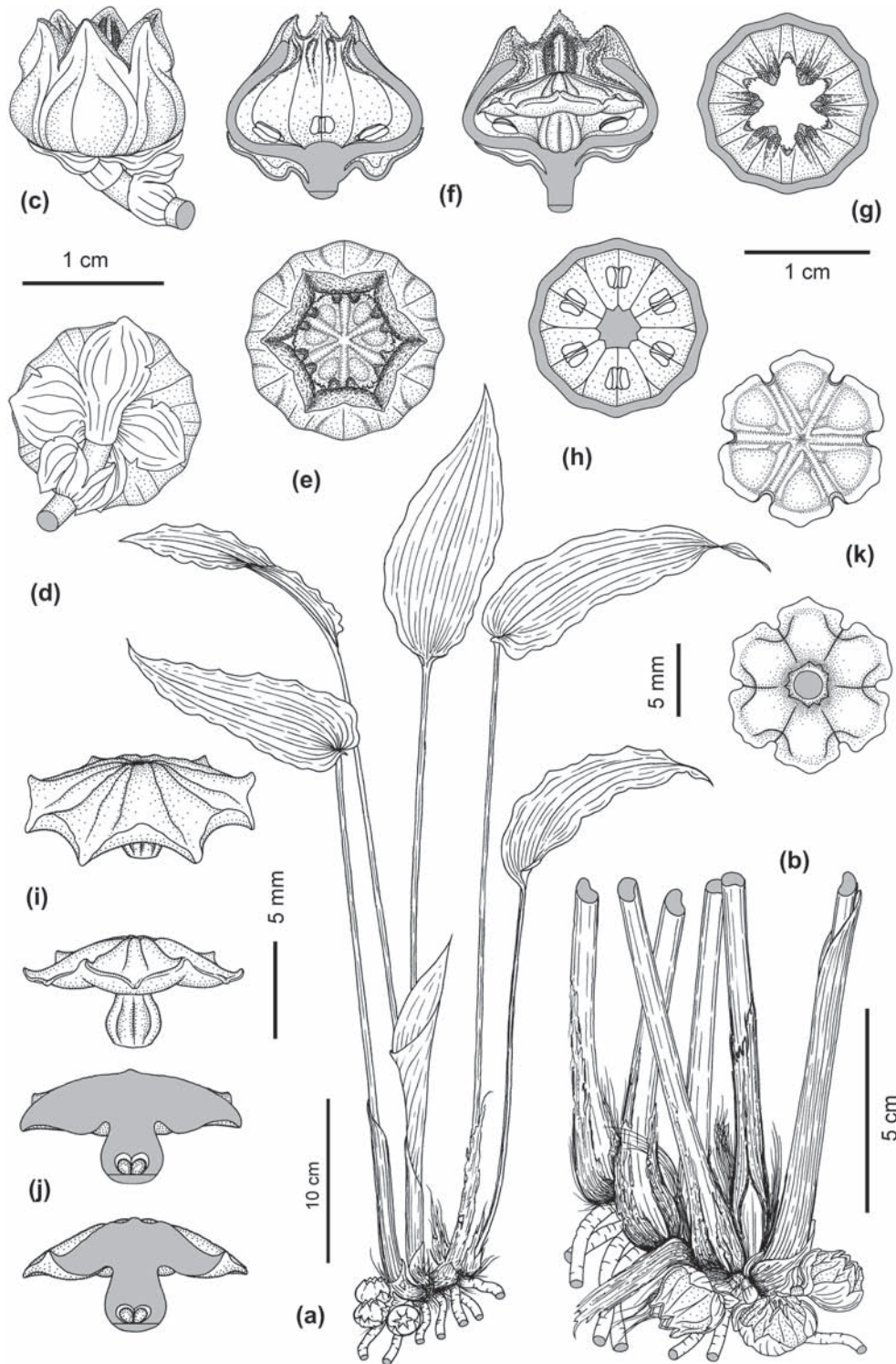


Figure 7. *Aspidistra semiaperta* sp. nov. (a) flowering plant, (b) base of flowering plant, (c) peduncle and flower, side view, (d) flower, view from below, (e) flower, apical view, (f) flower, sagittal section with intact and removed pistil, (g) transversal section of perigone, view from below, (h) transversal section of perigone, pistil removed, view from above, (i) pistil, side view, (j) sagittal sections through pistil along and between stigma lobes, (k) stigma, style removed, views from above and from below. All drawn from the type L. Averyanov and P. Efimov CPC 1566b/sp.9 by L. Averyanov and T. Maisak.

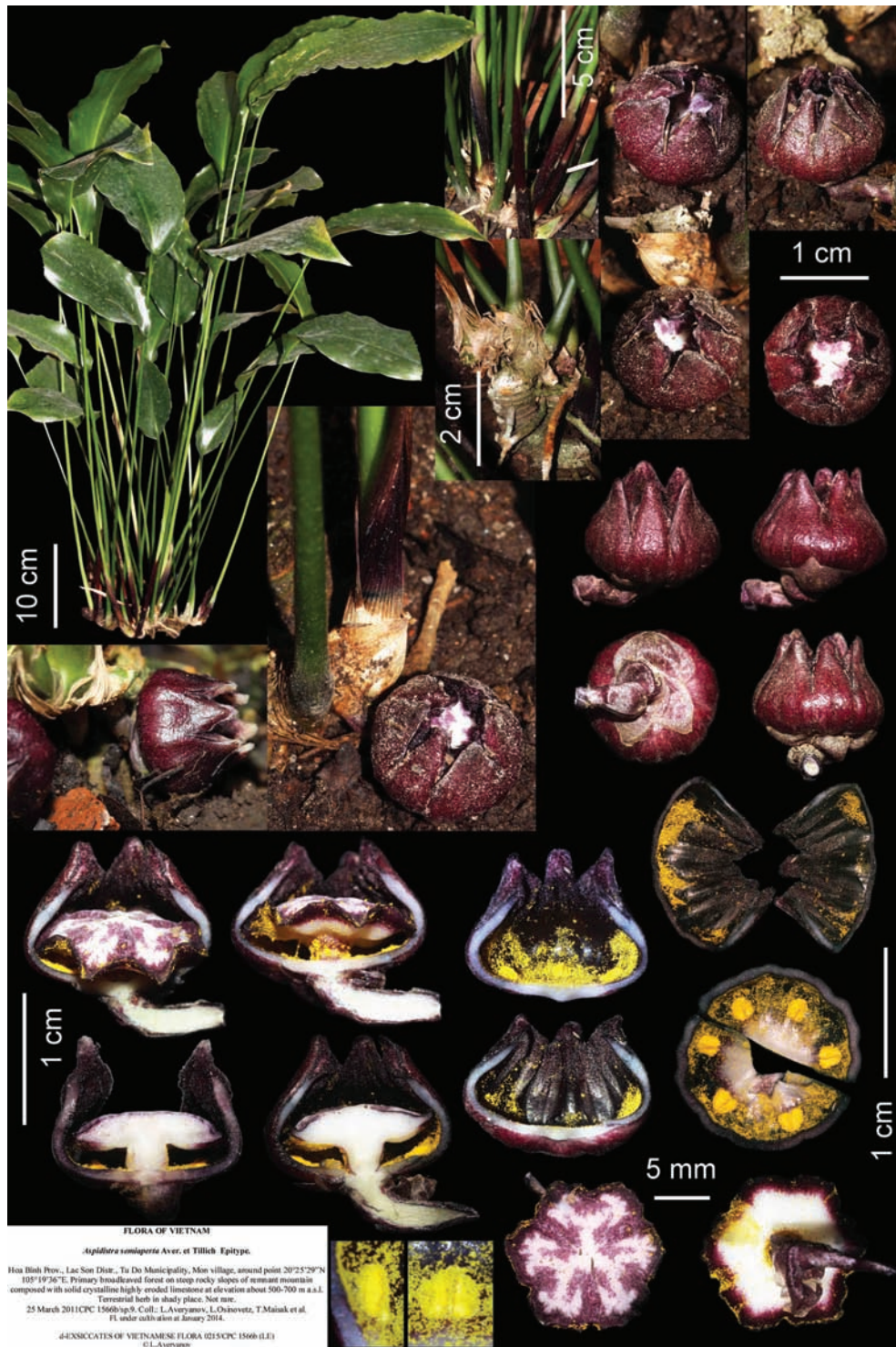


Figure 8. *Aspidistra semiaperta* sp. nov. Digital epitype, L. Averyanov et al., CPC 1566b/sp.9. Photos, correction and design by L. Averyanov.

to the base of perigone tube, horizontally spreading with pollen sacs oriented upwards; pollen bright yellow. Pistil mushroom-shaped, with peltate stigma; ovary inconspicuous; style stout, white with many dirty purple marks, shortly obpyramidal, broadening to the apex from the base, 1.5–2.5(3.0) mm tall, 2.5–3.0 mm in diameter. Stigma large, fleshy, hexagonal, (9)10–12(14) mm in diameter, indistinctly

6-lobed, white with dark purple–violet margin, upwards incurved at sinuses of stigma lobes, upper surface flat, papillose, with dirty purple–violet irregular palmate markings.

Distribution

Northern Vietnam (Hoa Binh province, Lac Son district). Endemic.

Ecology

Shady humid depressions in primary broad-leaved forest on steep rocky slopes of remnant of mountain composed of solid crystalline highly eroded limestone at elevation about 500–700 m a.s.l. Soil rich in humus. Flowering in Nov–Jan. The species is considered to be of ‘Least Concern’ (LC) (IUCN 2012).

Similar species

Aspidistra semiaperta is most similar to *A. stenophylla* C. R. Lin & R. C. Hu, known from Guangxi, China (Hu et al. 2014), but differs clearly in the perigone tube depressed urceolate (versus urceolate to subglobular), the stigma white, flat, papillose (versus purple, with 3 prominent radial ridges and 3 C-shaped swellings in between), and leaf blades ovate ca 15–30 × 5–9 cm (versus linear 50–60 × 1.5–2.5 cm).

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