



Aspidistra heterotepala (Asparagaceae), a new species from southern Vietnam

Tian-Chuan HSU^{1,*}, Hong Truong LUU², Chia-Wei LI³

1. Botanical Garden Division, Taiwan Forestry Research Institute, Taipei 10066, Taiwan. 2. Southern Institute of Ecology, Vietnam Academy of Science and Technology, Ho Chi Minh City, Vietnam. 3. Institute of Molecular and Cellular Biology, National Tsing Hua University, Hsinchu 30013, Taiwan. *Corresponding author's email: lecanorchis@gmail.com

(Manuscript received 22 July 2021; Accepted 29 November 2021; Online published 3 January 2022)

ABSTRACT: A new species of *Aspidistra* (Asparagaceae) from Southern Vietnam, *A. heterotepala* T.C. Hsu & Luu (Asparagaceae), is described and illustrated. *A. heterotepala* is similar to *A. ventricosa* Tillich & Škorničk. but distinguishable by the significantly narrower leaves, ellipsoidal perigone tube and adaxially whitish, sub-heteromorphic perigone lobes. Available data on its distribution, ecology and conservation status are also presented.

KEY WORDS: *Aspidistra ventricosa*, Flora of Indochina, Lang Biang Biosphere Reserve, Ninh Thuan Province, Nolinoideae.

INTRODUCTION

The genus *Aspidistra* (Asparagaceae) comprises more than 200 species inhabiting subtropical and tropical forests in Southeast Asia (Ding *et al.*, 2021). Reports of new taxa have been continued from its range, including southwestern China (Ding *et al.*, 2021), Taiwan (Lu *et al.*, 2020) and Laos (Ding *et al.*, 2021). The genus is particularly diversified particularly in southern China and northern Vietnam (Averyanov *et al.*, 2021). In his revision of the genus from Vietnam, Tillich (2014) recognized 43 species, but other papers published in and after 2014 nearly the same number of new species, bringing the total to ca. 84 species (Leong-Škorničková *et al.*, 2014; Vislobokov *et al.*, 2014a, b, 2016, 2019a, b, c; Averyanov and Tillich, 2015, 2016, 2017, Collin, 2015, Vislobokov, 2015, 2016, Averyanov *et al.*, 2016, 2017, 2018a, b, 2019a, b, 2020, 2021, Ly and Tillich, 2016, 2017, Ly *et al.*, 2017, 2021, Nguyen *et al.*, 2017, 2020a,b, Tillich *et al.*, 2017, Tillich and Averyanov, 2018). *Aspidistra* also appears highly diversified in southern Vietnam, judging from recent papers such as Vislobokov *et al.* (2019a, b, c). It can be expected that more novelties will be found if closer extensive field surveys are carried out across the nation. Recently we had opportunities to conduct field surveys in southern Vietnam and came across an unusual, *Aspidistra* species under a lowland forest in Khanh Hoa Province. After closer investigations, we reached the conclusion that this species is new to science. Herein, we describe and illustrate it as *Aspidistra heterotepala*.

MATERIALS AND METHODS

Materials were collected during 2018–2020 from southern Vietnam and were photographed and measured while fresh. Voucher specimens were deposited in the

herbarium of Southern Institute of Ecology, Vietnam Academy of Science and Technology (SGN), and duplicates, if available, were deposited in the herbaria of Taiwan Forestry Research Institute (TAIF) and National Museum of Natural Science (TNM). As the detailed floral characteristics of *Aspidistra* are generally badly preserved in dehydrated herbaria specimens (Tillich, 2014), morphological information on the taxonomically related species of *Aspidistra* from Vietnam and neighboring countries was gained mainly from the protologues and taxonomic papers cited in INTRODUCTION. Assessment of the conservation status of the new species was made in accordance with the latest guidelines available on the IUCN website (IUCN Standards and Petitions Committee, 2019).

TAXONOMIC TREATMENT

Aspidistra heterotepala T.C. Hsu & Luu, *sp. nov.*

Fig. 1.

Type: VIETNAM. Khanh Hoa Province: Ninh Hoa Town, Ninh Phu Commune, 100–200 m elev., 23 September 2018, T.C. Hsu 10951 (holotype: SGN!; isotype: TAIF-537142!, TNM!).

Diagnosis: Similar to *Aspidistra ventricosa* Tillich & Škorničk. in the shape and coloration pattern of perigones, but clearly distinguishable by its significantly narrower (2–4.5 vs. 4.5–9 cm) leaves, ellipsoid (vs. broadly ovoid) perigone tubes widest near the middle (vs. near the base), and adaxially whitish (vs. dark purplish), sub-heteromorphic (vs. homomorphic) perigone lobes.

Morphology: Perennial rhizomatous herb ca. 40–60 cm tall. Rhizome shallowly hypogeous, horizontal, 4–8 mm in diam., with numerous rigid roots, composed by repeated units; each unit ca. 5 mm long, apically with 1 or 2 leaves sheathed by 3 cataphylls. Cataphylls pale greenish, up to 6 cm long, caducous and degraded into



Fig. 1. Morphology of *Aspidistra heterotepala* T.C. Hsu & Luu, from *Hsu 10951*. **A.** Habitat and habits. **B.** Flowering habit. **C.** Leaves. **D–F.** Flowers. **G–K.** Flowers along with peduncles. **L.** Uppermost bract. **M–N.** Perigone lobes, showing two inner lobes at sides and one outer lobe in middle. **O–Q.** Flower with longitudinally sectioned perigone. **R–T.** Flower with cross sectioned perigone. **U–Y.** Pistils. **Z–BB.** Stamens. Photographed and designed by T.C. Hsu.

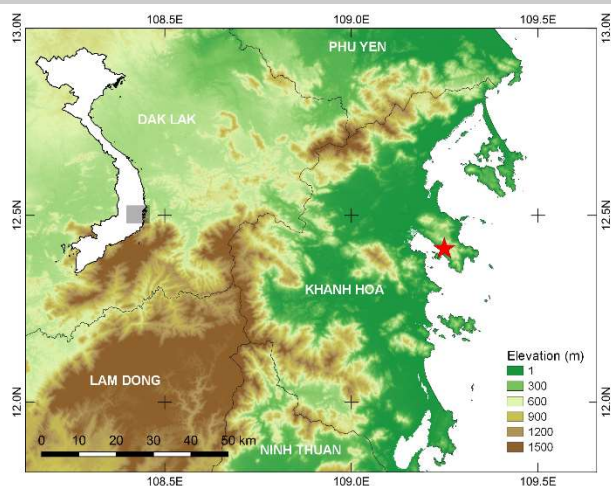


Fig. 2. Distribution map of *Aspidistra heterotepala* (red star) in southern Vietnam.

pale brownish fibers. Leaves distinctly differentiated into petioles and blades; petioles stiff, erect, 15–40 cm long, adaxially grooved, slightly swollen at base; blades leathery, ascending or arching, narrow-elliptic, 18–30 × 2–4.5 cm, acuminate at apex, long attenuate at base, margin entire, flat or slightly undulate, adaxially grassy green to dark green, sometimes with light yellow spots, abaxially slightly paler; midvein prominent, grooved adaxially and elevated abaxially; lateral veins numerous, obscure or sometimes slightly visible. Flower solitary, arising laterally from leafy part of the rhizome. Peduncle ascending, 1–1.5 cm long, ca. 3 mm in diam., with 5 or 6 sheathing bracts, the lower 2 or 3 embracing the peduncle and the upper 3 subtending the flower; bracts broadly ovate, membranous, apex obtuse, 7–10 × 8–11 mm when expanded and flattened, whitish or slightly tinged with purple and/or yellowish green. Perigone erect, distinctly urceolate, 18–21 mm long, 14–17 mm in diam., fragile-fleshy, 6-lobed at apex; perigone tube ellipsoid in outline, widest around middle, 15–18 mm long, 14–16 mm in diam., outside dark purple, finely verruculose, inside blackish purple, smooth and slightly glossy below middle, minutely tuberculate and 12-ribbed above middle, 6 of the ribs connecting to the medial ribs of the lobes, and the other 6 ribs forked at the throat into lateral ridges of adjoining lobes; perigone lobes spreading, subequal in size and shape but subheteromorphic in adaxial ornamentation, deltoid-ligulate, 6–8 × ca. 4 mm, apex blunt, strongly thickened toward base, adaxially ribbed, minutely tuberculate, white mottled dark purple at base and in furrows among ribs, abaxially verruculose, dark purplish; the outer lobes bearing a prominent medial rib and two lower or sometimes obscure lateral ribs aside; the inner lobes bearing a low or sometimes obscure medial rib and two much prominent lateral ribs along margins. Stamens 6, inserted slightly above base of the perigone tube; anthers subsessile, dorsifixed, anther thecae bean-shaped, ca. 2.0 × 1.3 mm; pollen bright yellow. Pistil table-shaped, ca. 7 mm tall; style shortly cylindrical, stout, ca. 2 mm tall, 3 mm in

diam.; stigma large, obconoid-peltate, orbicular-hexagonal in top view, 11–13 mm in diam., sometimes shallowly 6-lobed, lower surface dark purple, tuberculate, with 12 radiate low acute ribs, upper surface beige mottled dark purple or nearly entirely grayish purple, densely papillate, with 12 radiate deep furrows or with alternatively arranged 6 deep furrows and 6 broader sinuses. Ovary inconspicuous, superior, 3-locular. Fruit subglobose, ca. 1.8 cm long, pale green, sparsely dark-purple-dotted, verruculose.

Distribution: Endemic to southern Vietnam (Khanh Hoa Province; Fig. 2).

Habitat and phenology: Growing under semi-arid broadleaved forest between 100–200 m ca. 1 km away from the coast. Flowering observed in September and October; fruiting observed in April.

Etymology: The specific epithet refers to the heteromorphy between the inner and the outer lobes of the perigone. Suggested Vietnamese name: “Tỏi rừng Hòn Hèo”.

Conservation status: This new species is currently known only from its type locality where it is abundant. Its exact geographic range, population size and potential threat remain uncertain, as no extensive surveys in and around the known habitat have been carried out. The status is tentatively assessed as DD (Data Deficient) in accordance with the IUCN Red list categories and criteria.

Additional specimens examined: VIETNAM. Khanh Hoa Province, Ninh Hoa Town, Ninh Phu Commune, 100–200 m, 16 October 2020, Hsu 13106 (SGN, TAIF, TNM).

Taxonomic remarks: *Aspidistra heterotepala* is remarkable in having heteromorphic perigone lobes, whose medial ribs are raised higher in the outer lobes and lateral ribs are raised higher in the inner lobes (Fig. 1, M & N). Since the perigone lobes of *Aspidistra* are mostly undifferentiated among species (Tillich, 2014; Vislobokov *et al.*, 2014a), the heteromorphic perigone lobes of the new species appear unusual. The new species is closely related to *A. ventricosa* Tillich & Škorničk. described from neighboring Ninh Thuan Province (Leong-Škorničková *et al.*, 2014), as they share a similar habitat preference and floral morphology including urceolate, dark purple, 6-lobed perigone, 3-ribbed perigone lobes, subsessile stamens, and table-shaped pistils. The two species are, however, readily distinguished by the characteristics of the leaves and flowers mentioned in *Diagnosis*.

ACKNOWLEDGMENTS

We are grateful to Mr. Cheng-Wei Chen and Mr. Hsin-Chieh Hung for their assistance during the field work. We also thank Mr. Tran Gioi and Mr. Le Dung Lam for their kind supports and permits for our field survey at the Orchid Island of Long Phu Tourism Joint Stock Company. This study was carried out as a part of the project “Botanical survey in Lang Biang Plateau, Vietnam”, the finance of which was partly supported by Taiwan Ministry of Science and Technology (MOST-107-2911-I-007-301) and by the Higher Education Sprout Project, Taiwan Ministry of Education. HTL is



supported by Vietnam Academy of Science and Technology through the project QTRU01.12/21-22.

LITERATURE CITED

- Averyanov, L.V. and H.J. Tillich. 2015. *Aspidistra laotica*, *A. multiflora*, *A. oviflora* and *A. semiaperta* spp. nov. (Asparagaceae, Convallariaceae s.s.) from eastern Indochina. Nord. J. Bot. **33**(3): 366–376.
- Averyanov, L.V. and H.J. Tillich. 2016. *Aspidistra anomala*, *A. elegans* and *A. sinensis* spp. nov. (Asparagaceae, Convallariaceae s.s.) from China, Laos and Vietnam. Nord. J. Bot. **34**(2): 141–147.
- Averyanov, L.V. and H.J. Tillich. 2017. Notes on taxonomy and new taxa of *Aspidistra* (Ruscaceae) in the flora of Laos and Vietnam. Nord. J. Bot. **35**(1): 48–57.
- Averyanov, L.V., H.J. Tillich, K.S. Nguyen and T.V. Maisak. 2018a. *Aspidistra bella* (Asparagaceae), a new species from northern Vietnam. Phytotaxa **364**(2): 205–208.
- Averyanov, L.V., H.J. Tillich, V.T. Pham, S.K. Nguyen, T.A. Le, H.T. Nguyen, T.V. Maisak, A.H.L. Tuan, D.D. Nguyen, Q.C. Truong, T.L.T. Nguyen and T.C. Vu. 2018b. New taxa and taxonomic notes in *Aspidistra* (Convallariaceae s.s.) in China, Laos and Vietnam. Nord. J. Bot. **36**(7): e01833.
- Averyanov, L.V., T.A. Le, K.S. Nguyen, H.J. Tillich, D.D. Nguyen, L.T.A. Hoang, H.D. Tran, P.T.T. Dat, T.V. Maisak. 2019a. *Aspidistra erosa*, *A. sarcantha*, and *A. verruculosa* (Asparagaceae), three new species from Vietnam. Phytotaxa **404**(3): 102–110.
- Averyanov, L.V., K.S. Nguyen, H.T. Son, H.J. Tillich and T.V. Maisak. 2019b. New taxa and taxonomic notes in *Aspidistra* (Convallariaceae s.s.) of Laos and Vietnam. Nord. J. Bot. **37**(7): e02352.
- Averyanov, L.V., K.S. Nguyen, H.T. Son, H.J. Tillich, B. Wynn-Jones and T. Maisak. 2020. New taxa and new records in *Aspidistra* (Convallariaceae s.s.) of Laos and Vietnam. Nord. J. Bot. **38**(9): e02877.
- Averyanov, L.V., B.V. Truong, B.N. Trinh, S.V. Dang, V. H. Bui, T.A. Le, T.H.A. Nguyen, T.T.H. Do, C.V. Nguyen, T.V. Maisak, K.S. Nguyen and H.-J. Tillich. 2021. *Aspidistra peltata*, Convallariaceae (Asparagaceae s.l.) a new species from northern Vietnam. Nord. J. Bot. **39**(6): e03090.
- Colin, O. 2015. *Aspidistra tillichiana* (Asparagaceae), a new species from Northern Vietnam. Phytotaxa **212**(3): 243–245.
- Ding, H.B., K.C. Xiong, B. Yang, J.T. Yin, S. Bouamanivong and Y.H. Tan. 2021. New species and taxonomic notes of *Aspidistra* for the flora of China and Laos. Taiwania **66**(4): 439–449.
- IUCN Standards and Petitions Committee. 2019. Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Committee. Downloadable from: <https://www.iucnredlist.org/resources/redlistguidelines>
- Leong-Škorničková, J., H.J. Tillich and Q.B. Nguyễn. 2014. Two new species and one new variety of *Aspidistra* (Asparagaceae: Nolinoideae) from southern Vietnam. Gard. Bull. Singapore **66**(1): 27–37.
- Lu, C.T., K.C. Chuang, Y.H. Tseng, C.C. Wang and J.C. Wang. 2020. Taxonomic revision of *Aspidistra* Ker-Gawl. (Asparagaceae) in Taiwan. Taiwania **65**(3): 277–285.
- Lý, N.S. and H.J. Tillich. 2017. *Aspidistra averyanovii* and *A. parviflora* (Asparagaceae), two new species Central Vietnam. Phytotaxa **282**(1): 53–60.
- Lý, N.S. and H.J. Tillich. 2017. *Aspidistra cadamensis* (Asparagaceae), a new species from Central Vietnam. Phytotaxa **303**(1): 84–88.
- Lý, N.S., T. Haevermans and H.J. Tillich. 2017. *Aspidistra quangngaiensis*, a new species of Asparagaceae from Vietnam. Phytotaxa **312**(1): 123–128.
- Lý, N.S., K.S. Nguyen, T.S. Hoang, V.N. Do and H.J. Tillich. 2021. *Aspidistra magnifica* (Asparagaceae), a new species from Central Vietnam. Phytotaxa **480**(1): 22–28.
- Nguyen, K.S., L.V. Averyanov, H.J. Tillich, V.T. Pham, T.V. Maisak and N.S. Ly. 2017. *Aspidistra cyathiflora* var. *bifolia* and *A. neglecta* spp. nov. (Convallariaceae) from northern Vietnam. Nord. J. Bot. **35**(4): 482–487.
- Nguyen, K.S., L.V. Averyanov, H.J. Tillich, T.M.L. Le and T.H. Nguyen. 2020a. *Aspidistra babensis* (Asparagaceae), a new species from northern Vietnam. Ann. Bot. Fennici **57**(1–3): 17–22.
- Nguyen, S.K., T.S. Hoang and T.T. Nguyen. 2020. *Aspidistra papillata* G.Z.Li (Asparagaceae Juss.): A new record for the Flora of Vietnam. VNU Journal of Science: Natural Sciences and Technology **36**(4): 69–76.
- Tillich, H.J. 2014. The genus *Aspidistra* Ker-Gawl. (Asparagaceae) in Vietnam. Taiwania **59**(1): 1–8.
- Tillich, H.J., C.R. Lin and L.V. Averyanov. 2017. What is *Aspidistra tonkinensis* (Gagnep.) Wang et Lang (Asparagaceae)? Feddes Repert. **128**(3–4): 102–104.
- Tillich, H.J. and L.V. Averyanov. 2018. A critical survey of infraspecific taxa in the genus *Aspidistra* (Asparagaceae). Feddes Repert. **129**(3): 185–188.
- Vislobokov, N.A. 2015. Two new species of *Aspidistra* (Asparagaceae, Nolinoideae) from northern Vietnam: *A. clausa* and *A. triradiata*. Phytotaxa **207**(3): 265–272.
- Vislobokov, N.A. 2016. *Aspidistra obtusata* sp. nov. (Asparagaceae) from Vietnam. Nord. J. Bot. **34**(6): 694–698.
- Vislobokov, N.A., D.D. Sokoloff, G.V. Degtjareva, C.M. Valiejo-Roman, A.N. Kuznetsov and M.S. Nuraliev. 2014a. *Aspidistra paucitepala* (Asparagaceae), a new species with occurrence of the lowest number in flowers of Asparagales. Phytotaxa **161**(4): 270–282.
- Vislobokov, N.A., D.D. Sokoloff, G.V. Degtjareva, C.M. Valiejo-Roman and A.N. Kuznetsov. 2014b. *Aspidistra xuansonensis* (Asparagaceae), a new species from northern Vietnam. Phytotaxa **173**(3): 226–234.
- Vislobokov, N.A., M.S. Nuraliev, A.N. Kuznetsov and S.P. Kuznetsova. 2016. *Aspidistra globosa* (Asparagaceae, Nolinoideae), a new species with erect stem from southern Vietnam. Phytotaxa **282**(1): 46–52.
- Vislobokov, N.A., A.N. Kuznetsov, S.P. Kuznetsova, M.S. Romanov and M.S. Nuraliev. 2017. *Aspidistra viridiflora* (Asparagaceae, Nolinoideae), a new species from Vietnam. Phytotaxa **313**(2): 203–209.
- Vislobokov, N.A., A.N. Kuznetsov, S.P. Kuznetsova and E.A. Kuzmicheva. 2019a. *Aspidistra corniculata* (Asparagaceae, Nolinoideae), a new species from Vietnam. Phytotaxa **397**(1): 125–128.
- Vislobokov, N.A., A.N. Kuznetsov, S.P. Kuznetsova, M.S. Romanov and M.S. Nuraliev. 2019b. *Aspidistra minor* (Asparagaceae, Nolinoideae), a tiny new species from Vietnam. Phytotaxa **402**(1): 63–67.
- Vislobokov, N.A., M.S. Nuraliev, A.N. Kuznetsov and S.P. Kuznetsova. 2019c. *Aspidistra micrantha* (Asparagaceae, Nolinoideae), a new species from Vietnam with unusually small flowers. Phytotaxa **422**(3): 289–294.