



Tupistra khasiana (Asparagaceae), a new species from Meghalaya, India

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ABSTRACT: *Tupistra khasiana* D.K.Roy, A.A.Mao & Aver. (Asparagaceae), a new species from Meghalaya, India is described and illustrated. It differs from similar congeners, *T. pingbianensis*, *T. fungilliformis* and *T. tupistroides* in having creeping rhizomatous stem, down curved peduncle, smaller, thick, fleshy, bract, to 3 mm long, obscurely tri-dentate bracteole, to 2 mm long, ca. 2 mm broad, comparatively shorter perianth, to 8.5 mm long, with externally light green tube and smaller lobes, 3.5–4 mm long, shorter style, 5 mm long and in dark purple stigma, with distinctly undulated margin. Key to the Indian *Tupistra* is given.

KEY WORDS: Asparagaceae, NE India, New species, Plant diversity, *Tupistra khasiana*.

INTRODUCTION

The genus *Tupistra* Ker Gawler (Asparagaceae) is greatly diversified with 27 species (Govaerts 2016, Roy *et al.* 2017) in south and south-east of continental Asia, including Nepal, Bhutan, India, Myanmar, China, Laos, Vietnam, Thailand and Malaysia (Tanaka 2003a, b, 2010a, b, Averyanov *et al.* 2016). In India, *Tupistra* is represented so far by five species, namely *Tupistra ashihoi* D.K.Roy, N.Odyuo & Aver., *T. clarkei* Hooker, *T. nutans* Wall. ex Lindley, *T. stoliczana* Kurz and *T. tupistroides* (Kunth) Dandy (Roy *et al.* 2017).

In course of the study of the genus *Tupistra* in India, we found an unusual *Tupistra* growing in the Garden of Botanical Survey of India, Eastern Regional Centre, Shillong, Meghalaya. It was unnoticed for several years and its origin could not ascertain as different species of plants growing in the garden are introduced from the diverse areas of northeastern India. Critical observations on the specimens and consultation of literature (Hooker 1894, Liang & Tamura 2000, Bhaumik & Gogoi 2008, Tanaka 2003a, 2010a, b, Averyanov & Tanaka 2012, Hu *et al.* 2013, Vislobokov *et al.* 2014, Averyanov *et al.* 2015, 2016, Roy *et al.* 2017) revealed it as a new species which resembles *T. fungilliformis* F.T. Wang & S. Yun Liang, *T. pingbianensis* J.L. Huang & X.Z. Liu and *T. tupistroides* (Kunth) Dandy, but differs clearly from them in many significant diagnostic characters. We named it *T. khasiana*, and described here with detailed photographic illustration and a note on its affinities. Taxonomic key to Indian species of *Tupistra* is also given.

TAXONOMIC TREATMENTS

Key to the Indian species of *Tupistra*

- 1a. Rhizomatous stem erect or suberect; floriferous stem upright ... 2
 1b. Rhizomatous stem ascending or repent to subrepent or creeping; floriferous stem pendulous or down curved 3

- 2a. Stigma convex to almost hemispheric, 7–8 mm in diameter; petiole up to 25 cm long; leaf-blade elliptic-oblongate, to 50 cm long, to 12 cm broad; peduncle to 14 cm long; spike to 22 cm long; bract oblong-ovate, to 4 mm long, to 5 mm broad; perianth lobes narrowly ovate, 8–9 mm long *T. ashihoi*
 2b. Stigma umbraculate, 3.5–4.5 mm in diameter; petiole up to 54 cm long; leaf-blade narrowly oblongate, to 87 cm long, to 16.5 cm broad; peduncle up to 25 cm long; spike to 29 cm long; bract ovate, deltoid or oblong, to 9 mm long, to 8 mm broad; perianth lobes oblong-ovate, 4.5–5 mm long *T. stoliczana*
 3a. Stigma hemispheric, not lobed; perianth lobes ventrally dark purple 4
 3b. Stigma peltate or subcapitate, 3-lobed; perianth lobes ventrally pale fulvous with tinged or streaked with purple 5
 4a. Rhizomatous stem creeping; peduncle down curved, to 3 cm long; spike to 3 cm long, with 5–7-flowers; bract appressed to flowers, thick, fleshy, to 3 mm long; bracteole ovate, to 2 mm long, ca. 2 mm broad, obscurely tri-dentate; perianth to 8.5 mm long, with externally light green tube *T. khasiana*
 4b. Rhizomatous stem repent to subrepent; peduncle pendulous, to 28 cm long; spike to 11 cm long, with 6–17 flowers; bract borne shortly apart from flowers, membranous, to 5 mm long; bracteole oblong or ovate, to 6 mm long, to 4.5 mm broad, without denticulation; perianth to 21 mm long, with externally ivory or whitish tube *T. tupistroides*
 5a. Leaf up to 185 cm long including petiole; peduncle to 12 cm long; Spike to 11 cm long; stigma dark purple, peltate, flat, not concealing the anthers *T. clarkei*
 5b. Leaf up to 112 cm long including petiole; peduncle to 25 cm long; spike 7 cm long; stigma white, subcapitate, depressed in center, concealing the anthers *T. nutans*

Tupistra khasiana D.K.Roy, A.A.Mao & Aver., *sp. nov.* **Fig. 1**

Differs from similar species, *T. pingbianensis*, *T. fungilliformis* and *T. tupistroides* in having creeping rhizomatous stem, down curved peduncle, smaller, thick, fleshy, bract, to 3 mm long, obscurely tri-dentate bracteole, to 2 mm long, ca. 2 mm broad, comparatively shorter perianth, to 8.5 mm long, with externally light green tube and smaller lobes, 3.5–4 mm long, shorter style, 5 mm long and in dark purple stigma, with distinctly undulated margin.

Type: **INDIA**. 20 Dec. 2016, D.K. Roy 128910

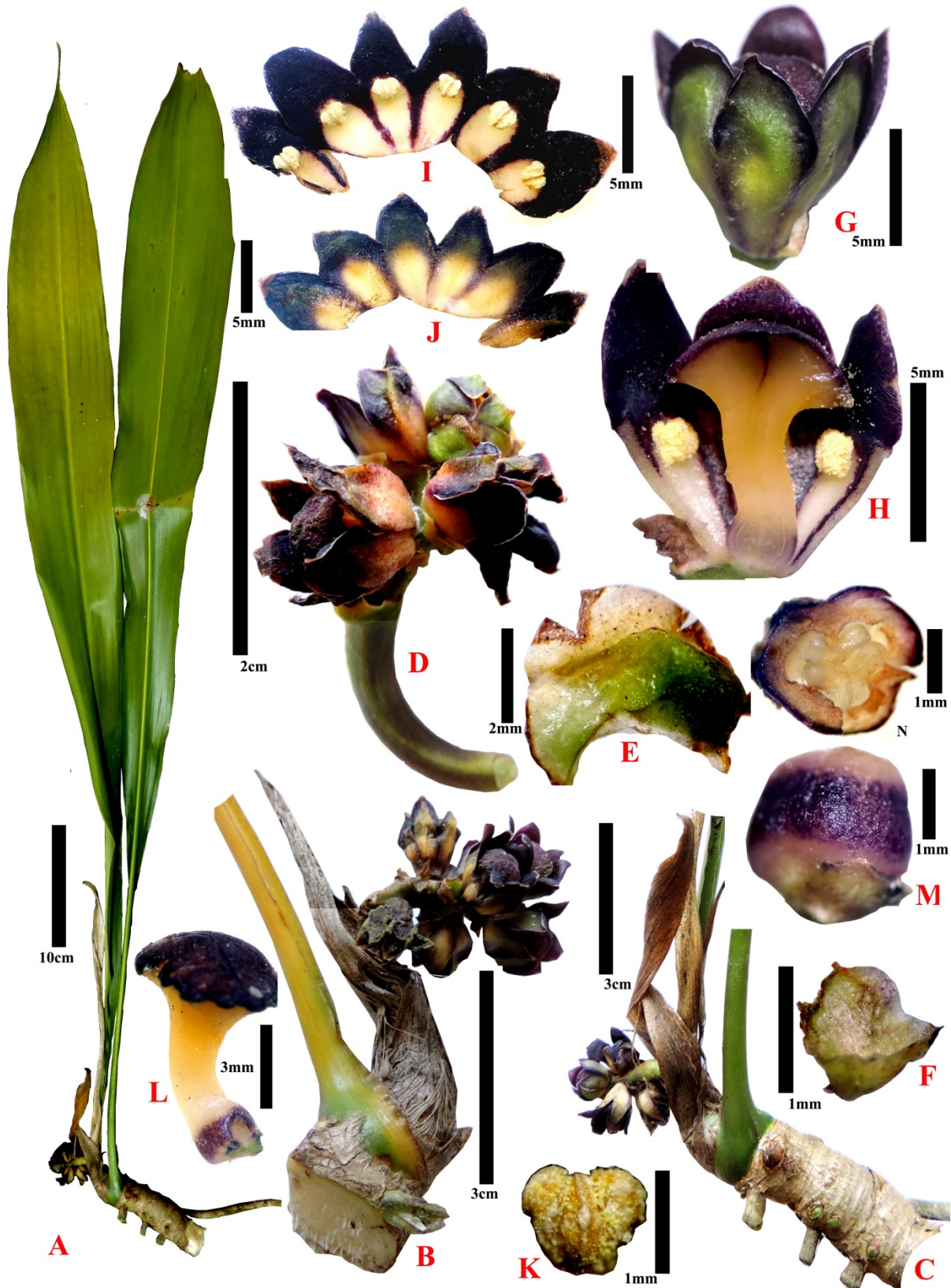


Fig. 1: *Tupistra khasiana* D.K. Roy, A.A. Mao & Aver.: A. Habit. B & C. Rhizomatous stem with inflorescence. D. Inflorescence. E. Bract. F. Bracteole. G. Flower, side view. H. Sagittal section of flower. I. Flattened perianth, adaxial surface with stamens. J. Flattened perianth, abaxial surface. K. Anther. L. Pistil. M. Ovary, side view. N. Ovary, transversal section.



(Holotype: ASSAM!; Isotype: CAL!) prepared from specimen cultivated in Garden of Botanical Survey of India, Eastern Regional Centre, Shillong, East Khasi Hills, Meghalaya.

Lithophytic, perennial herb, with leaves up to 50 cm long. Rhizomatous stem creeping, stout, ca. 1.5 cm in diam., white inside, scented. Roots many, cord-like, thick, fleshy, to 3 mm in diam., velutinous. Sheath leaves straight, ensiform, 2–15 × 0.6–1.0 cm, light green. Leaves 3–5, basal, erect, distinctly petiolate; petioles adaxially channelled, 7–14 cm long; leaf blade broadly oblanceolate, 45–55 × 5.5–6.5 cm, shortly acuminate at apex, tapering to the base, uniform glossy green, leathery, entire, with prominent midvein abaxially. Peduncle 2.5–3 cm long, ca. 5 mm in diam., arises from apical part of stem, axillary, with no sterile bracts, down curved. Spike very short, almost horizontal, 1.5–3.0 cm long, 5–7-flowered; rachis slightly angled longitudinally, fleshy. Bracts 2 per flower, concave, fleshy; outer bract borne below flower, broadly ovate, 2.5–3 × 4.5–5 mm, light green, rounded at apex; inner bract (bracteole) smaller, borne lateral to flower, ovate, 1.5–2 × 2 mm, obscurely tri-dentate, greenish white, tinged with purplish at margins. Flowers sessile. Perianth campanulate, 6-cleft, fleshy, dark purplish; tube 3.4–4.5 mm long, light green; lobes ovate, 3.5–4 × 3.5–4 mm, dark purple inside, purplish tinged with green outside, dark purple towards margins, spreading, erect or slightly reflexed to acute apex. Stamens 6; anthers sessile, dorsifixed, broadly ovate, introrse, 1 × 1 mm, light yellowish to almost white, attached to the base of perianth lobes. Pistil mushroom-shaped, 8–9 mm long including ovary; style pale yellow to almost white, columnar, slightly broadening upward, 4.5–5 × 1.5–2 mm, finely ridged longitudinally, glabrous; stigma slightly exceeds tube, hemispheric, 5.5–6 mm in diam., 2–2.5 mm in height, dark purple, distinctly undulate at margins; ovary superior, situated at base of columnar pistil, 1.5–2.0 mm high, 2–2.5 mm in diam., purple, 3-locular. Fruit not seen.

Flowering: October–November.

Etymology: The new species is named in admiration of the Khasi tribe of Khasi Hills of Meghalaya, India, for their excellent contributions in Biodiversity conservation through sacred grooves in the state of Meghalaya.

Distribution: New species is known only from cultivated specimens in the Garden of Botanical Survey of India, Eastern Regional Centre, Shillong, Meghalaya, India.

Affinities: Superficially the new species resembles *Tupistra fungilliformis* F.T. Wang & S. Yun Liang (Wang & Tang, 1978) and *Tupistra pingbianensis* J.L. Huang & X.Z. Liu (Huang & Liu, 1996) described from China and *Tupistra tupistroides* (Kunth) Dandy (Dandy, 1932) described from NE India in distinctly petiolate leaves, with wingless petioles, purple, fleshy perianth

lobes and in filaments with very short free part. But, the new species differs from *T. fungilliformis* by creeping rhizomatous stem (vs. ascending), down curved peduncle, to 3 cm long (vs. pendulous or arcuate, to 8 cm long), comparatively shorter spike, to 3 cm long, with 5–7-flowers, (vs. to 10 cm long, with up to 22 flowers), thick, flashy bract, to 3 mm long (vs. membranous, to 11 mm long), obscurely tri-dentate bracteole, to 2 mm long, ca. 2 mm broad (vs. without denticulation, to 7 mm long, to 6 mm broad), campanulate perianth, to 8.5 mm long, with externally light green tube and smaller lobes, to 4 mm long (vs. cupulate, to 16 mm long, with externally purplish tube and longer lobes, to 8 mm long), anthers located at the apex of perianth tube (vs. located slightly above the middle of the perianth tube), and in dark purple stigma, with distinctly undulated margin (vs. white, without a marked denticulation in the limb) and from *T. pingbianensis* by creeping rhizomatous stem (vs. erect or repent), down curved peduncle (vs. pendulous), thick, flashy bract, to 3 mm long (vs. subcoriaceous, to 12 mm long), obscurely tri-dentate bracteole, to 2 mm long, ca. 2 mm broad (vs. without denticulation, to 6 mm long, ca. 5 mm broad), shorter, perianth, to 8.5 mm long, with externally light green tube and smaller lobes, to 4 mm long (vs. to 16 mm long, with externally purplish tube and longer lobes, to 7 mm long), anthers located at the apex of perianth tube (vs. located slightly above the middle of the perianth tube), short style, to 5 mm long (vs. to 7 mm long) and in dark purple, hemispheric stigma, 5.5–6 mm in diam., with distinctly undulated margin (vs. peltate, ca. 3 mm in diam., slightly inflated). The new species also differs from *T. tupistroides* by creeping rhizomatous stem (vs. repent or subrepent), down curved peduncle, to 3 cm long (vs. pendulous, to 28 cm long), comparatively shorter spike, to 3 cm long, with 5–7-flowers, (vs. to 11 cm long, with 6–17 flowers), bract appressed to flowers, thick, fleshy, to 3 mm long (vs. borne shortly apart from flowers, membranous, to 5 mm long), obscurely tri-dentate bracteole, to 2 mm long, ca. 2 mm broad (vs. without denticulation, to 6 mm long, to 4.5 mm broad), comparatively shorter perianth, to 8.5 mm long, with externally light green tube and smaller lobes, to 4 mm long (vs. to 21 mm long, with externally ivory or whitish tube and longer lobes, to 10 mm long), short style, to 5 mm long (vs. to 9 mm long) and in dark purple stigma, with distinctly undulated margin (vs. purplish pink, with denticulate usually into 6 at margin) (Table 1).

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**Table 1:** Comparison of morphological characters between *T. khasiana*, *T. fungilliformis*, *T. pingbianensis* and *T. tupistroides*.

Characters	<i>T. khasiana</i>	<i>T. fungilliformis</i>	<i>T. pingbianensis</i>	<i>T. tupistroides</i>
Rhizomatous stem	Creeping	Ascending	Erect or repent	Repent or subrepent
Peduncle	Down curved, 2.5–3 cm long	Pendulous or arcuate, 3–8 cm long	Pendulous, 0.5–2.5 cm long	Pendulous, 5–28 cm long
Spike	1.5–3.0 cm long, 5–7-flowered	5.5–10 cm long, up to 22-flowered	2.5–4.5 cm long, 2–7 flowered	3–11 cm long, 6–17-flowered
Bract	Appressed to flowers, thick, fleshy, 2.5–3 mm long	Appressed to flowers, membranous, 7–11 mm long	Appressed to flowers, subcoriaceous, 10–12 mm long	Borne shortly apart from flowers, membranous, to 5 mm long
Bracteole	Ovate, to 2 mm long, ca. 2 mm broad, obscurely tri-dentate	Ovate or broadly ovate, to 7 mm long, to 6 mm broad, without denticulation	Oblong, to 6 mm long, ca. 5 mm broad, without denticulation	Oblong or ovate, to 6 mm long, to 4.5 mm broad, without denticulation
Perianth	Campanulate, 6.9–8.5 mm long; tube 3.4–4.5 mm long, light green externally; lobes 3.5–4 mm long	Cupulate, 12–16 mm long; tube 6–8 mm long, purplish externally; lobes 6–8 mm long	Campanulate, 12–15 mm long; tube 5–7 mm long, purplish externally; lobes 5–7 mm long	Campanulate, 10–21 mm long; tube 4.5–11 mm long, ivory or whitish externally; lobes 5.5–10 mm long
Anthers	Located at the apex of perianth tube	Located slightly above the middle of the perianth tube	Located slightly above the middle of the perianth tube	Located at the apex of perianth tube
Style	4.5–5 mm long	5–6 mm long	ca. 7 mm long	6–9 mm long
Stigma	Hemispheric, 5.5–6 mm in diam., dark purple, with distinctly undulate at margin	Hemispheric or subcapitate, 2.5–6.5 mm in diam., white, without a marked denticulation in the limb	Peltate, ca. 3 mm in diam., white, slightly inflated	Hemispheric, 3.5–9 mm in diam., purplish pink, with denticulate usually into 6 at margin

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