



Tupistra khangii (Asparagaceae), a new species from northern Vietnam

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Abstract

Tupistra khangii (Asparagaceae) is described and illustrated as a new species from mountain areas in northern Vietnam. It is distributed widely in north-western Vietnam and adjacent territories.

Key words: *Tupistra khangii*, Asparagaceae, plant taxonomy, plant diversity, Vietnam

Introduction

Tupistra Ker Gawler (1814: 1655) is a genus of the subfamily Nolinoideae (Chase *et al.* 2009) belonging to the family Asparagaceae (e.g. APG 2009). More than fifty species have hitherto been classified under *Tupistra* (IPNI 2014), but many of them were recently transferred to *Rohdea* Roth (1821: 196) by Tanaka (2003a, 2010a). *Tupistra*, as circumscribed by Tanaka (2003b, 2010b), is distinguishable from *Rohdea* redefined by Tanaka (2003a, 2010a) by the leaves with more slender petiolar base, relatively larger stigma broader than the style, stouter columnar style almost as thick as the ovary, and usually tuberculate, non-scarlet, spherical berry-like fruit. The species of *Tupistra* are herbaceous perennials, occurring in the tropical forests of SE Asia including Indochina, where they occasionally form dense local populations. Several studies on karyology (e.g. Yang 1995, Huang & Liu 1996, Hu *et al.* 2013), breeding system (Qiao *et al.* 2010), and suitability for food (Nuntayana 2013) have been carried out, but there still are many aspects not satisfactorily investigated, including their taxonomy and phytogeography. Two of us have already described a new species, *Tupistra theana* Averyanov & Tanaka (2012: 164), from central Vietnam. In the present paper we describe a further new species from northern Vietnam.

Material and Methods

Specimens of the new species were collected in the field in northern Vietnam during the years 2006–2013. Former collections of the species by others kept in herbaria were also used as additional materials and designated as paratypes. Some portions (like flowers) of the living plants were fixed and stored in 70% ethanol. Measurements of the floral parts for the description were made on both living and fixed materials. It is noteworthy that the live flowers and their fleshy parts become shrunken up to 20–30% in the drying process of making herbarium specimens. In describing quantitative characters, infrequent extreme values (i.e. rarely occurring minimal and maximal values) of a variation range were parenthesized respectively before and after a normal variation range.

Description of the new species

Tupistra khangii Aver., N. Tanaka & N. Vislobokov, sp. nov. (Fig. 1, 2)

Differs from a related species *T. longispica* by the white stigma (vs. pale purple stigma), yellow pollen, and the shorter peduncle (vs. peduncle 20–33 cm long).

Type:—NORTHERN VIETNAM. Son La prov., Van Ho distr., Tan Xuan municipality, Cot Moc village, Xuan Nha natural reserve, eastern slopes of Pha Luong Mountain. Broad-leaved evergreen humid forest on very steep mountain slopes as well as on large mossy boulders along narrow shady rocky stream, elev. about 1000 m a.s.l., around point 20°40'33.3"N, 104°39'00.3"E. Occasional. 15 November 2013, L. Averyanov, N.T. Hiep, N.S. Khang, N.D. Thang, L.D. Qui CPC 7158 (holotype, LE!; isotypes, CPC!).

Terrestrial and occasionally lithophytic clustering perennial herb. Rhizome erect, suberect or ascending, simple to many branched, terete, stout, semi-woody, with many dense nodes, 5–10 cm long, Ø (1.5–)2–3 cm, yellowish to almost white. Roots numerous, branching, fleshy, semi-woody, wiry. Stem erect, very short, 3–5 cm tall, covered with sheath leaves (cataphylls) and many sub-distichous, imbricate, petiole-like leaf bases. Sheath leaves equitant, conduplicate, herbaceous, (5–)10–20(–25) cm long, 1–2 cm wide, yellowish-green or light green, becoming dark dirty-brown and partially disintegrated with age. Leaves (4–)5–7(–10), sometimes with few, partially disintegrated, old leaf remnants, suberect to arcuate, equitant, oblanceolate to broadly oblanceolate, gradually tapering to thick, rigid, canaliculate, petiole-like basal part, acute to shortly acuminate at apex, (0.8–)1.1–1.4(–1.8) m long, (4–)6–12(–15) cm wide, leathery, glossy, uniformly dark green, midvein prominently raised abaxially. Peduncle axillary in apical part of stem, erect, straight or slightly curved, fleshy, rigid, subterete or irregularly angled longitudinally, glabrous, (4–)5–8(–10) cm long, shorter than half of inflorescence rachis, Ø (4–)5–8(–10) mm, white. Inflorescence terminal, spadix-like spike, dense or subdense with many flowers, (12–)15–35(–40) cm long, Ø 1.5–2.2 cm. Flower-subtending bract 1 per flower, bail-shaped (or cucullate), rectangular-ovate, rigid, very fleshy at base, blunt to truncate at apex, irregularly slightly incised and scarious along margin, light green to white, (4–)5–6(–7) mm long and wide, much shorter than flowers, persistent. Floral bracteoles 1 per flower, lateral to flower, oblong, scarious and slightly crenulate along margin, 3–5 mm long, ca. 1.5–2 mm wide (see note below). Flower buds obliquely ovoid, externally white or tinged with pink or light purple-brown. Flowers sessile. Perigone broadly campanulate, 6-lobed, funnel-shaped in proximal tubular part, 9–10 mm long, Ø (15–)17–19(–20) mm (full open perigone with recurved lobes Ø (10.5–)12–14(–15) mm), fleshy, purely white to slightly dull yellowish; segments broadly triangular-ovate, irregularly incised or crenulate along distal margin, strongly recurved in mid anthesis, 4–5 mm long and wide. Stamens 6, anthers ovoid 0.9–1.1 mm long, dull yellow, ventral side facing upward, dorsifixed on short fleshy filaments about 1 mm long, Ø 1 mm; filaments inserted at base of perigone segments. Pistil 12–15 mm long, distal part prominently exerted from perigone, purely snow-white, becoming nodding, and turning gray and then black at late and final stage of anthesis. Ovary superior, inconspicuous, shortly cylindrical 1–1.5 mm long, Ø 1.5–2 mm, glabrous, glossy, 3-locular, each chamber containing 2 ovoid ovules. Style narrowly obpyramidal 9–11 mm long, Ø 1–1.3 mm at base and Ø 2–2.5 mm in distal part, slightly ribbed longitudinally, finely papillose on ribs, narrowly channeled longitudinally in middle of interior, the channel transversally triangular. Stigma in flower buds and at early anthesis hemispheric or subcapitate, Ø (5.5–)6–7 mm, entire or very indistinctly 3-sected, margins irregularly lobed and curved downwards, finely tuberculate on both front and rear surfaces; in mid and late stage of anthesis distal part of pistil becoming split into many irregular subfunnelform branches of which stigma densely papillose and style irregularly ribbed. Fruit berry-like, obovoid to almost globular, often slightly obliquely inflated, irregularly prickly tuberculate, (1.5–)2–2.5(–3) cm in longer axis, green to yellowish-green, 1-seeded, rarely 2 or 3-seeded, indehiscent.

Note:—In immature inflorescence flower-subtending bracts closely adjacent to flower buds. Therefore young bracteole is inconspicuous (Fig. 1d, e). Later inflorescence rachis continues to elongate until fruits appear (Fig. 1b, c). In developed inflorescence each flower has one flower-subtending bract and one lateral bracteole. Presence or absence of bracts and bracteoles is very important and stabile character for many monocot species (Remizova *et al.* 2013). Nevertheless in genus *Tupistra* a few species without floral bracteoles occur, e.g. *Tupistra theana*, as well as in closely related genus *Rohdea*, e. g. *Rohdea dracaenoides* Averyanov & Tanaka in Averyanov *et al.* (2014: 21).

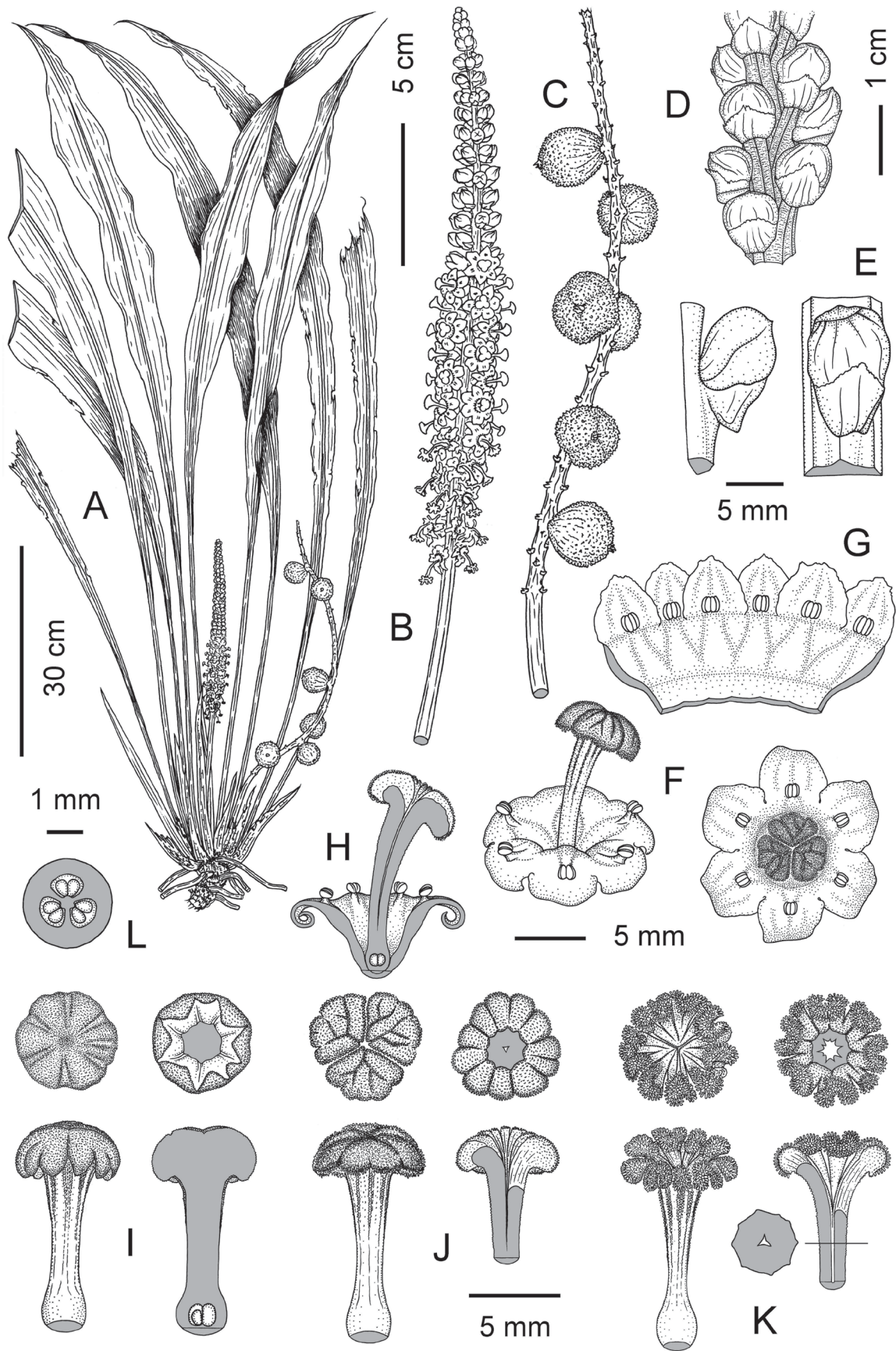


FIGURE 1. *Tupistra khangii*. A. Flowering and fruiting plant. B. Inflorescence. C. Fruits. D. Young portion of inflorescence with flower buds and floral bracts. E. Flower bud and floral bract, side and frontal views. F. Flower, upper and frontal views. G. adaxial aspect of perigone, cut and flattened. H. Flower, sagittal section. Pistil, side view and sagittal section, and frontal and rear views of stigma at early anthesis (I), at mid anthesis (J), and at late anthesis with transversal section of style (K). L. Transversal section of ovary. [All drawn by L. Averyanov and T. Maisak from the type – L. Averyanov et al., CPC 7158].

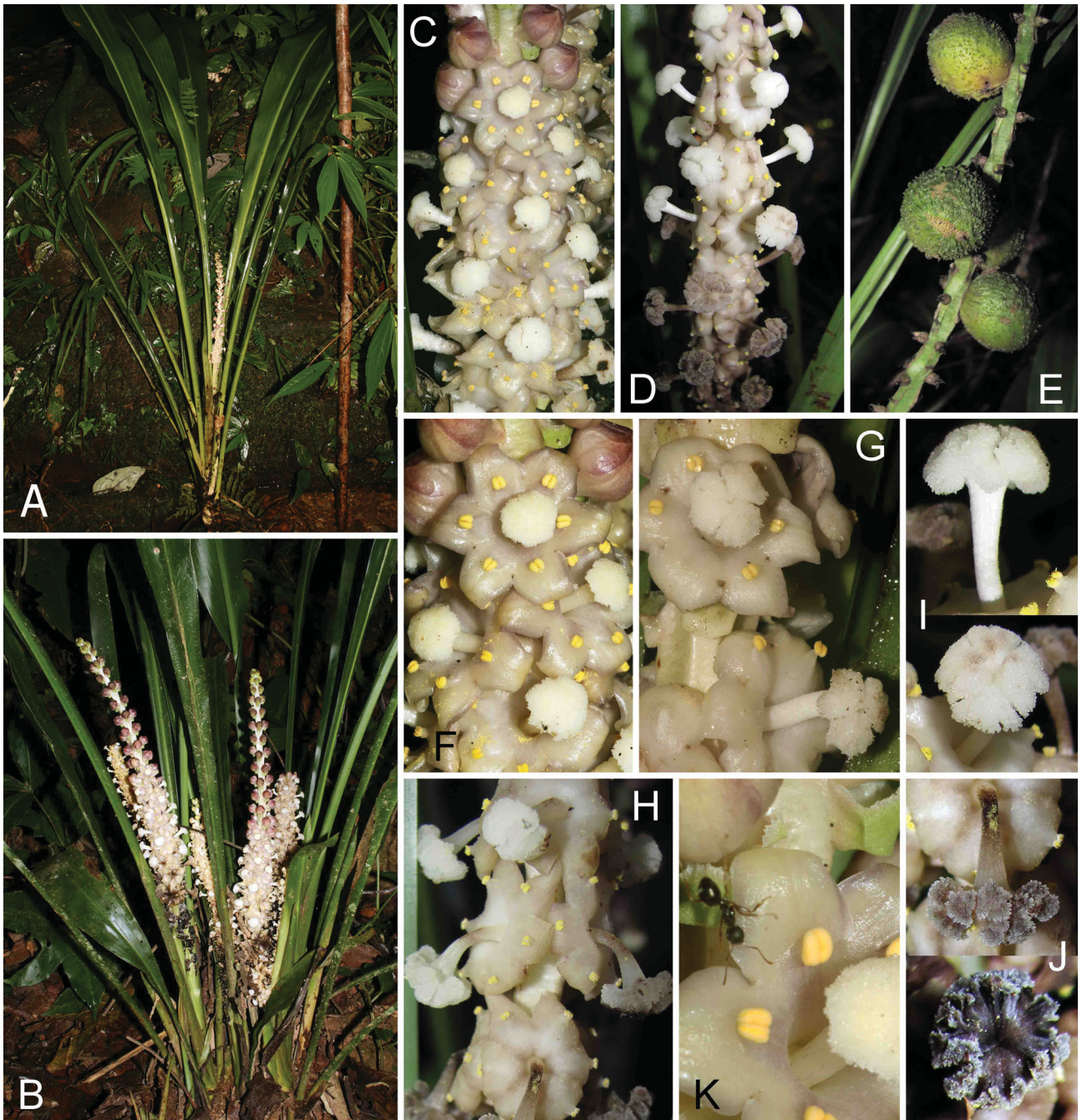


FIGURE 2. *Tupistra khangii*. A. Flowering plant in *locus classicus* (type specimen CPC 7158). B. Flowering plant in natural habitat (CPC 857). C. Portion of inflorescence at early anthesis (CPC 857). D. Portion of inflorescence at late anthesis (CPC 6344). E. Portion of infructescence with ripening fruits (CPC 6344). F. Flowers at early anthesis (CPC 857). G. Flowers at mid anthesis (CPC 7158). H. Flowers at late anthesis (CPC 6344). I. Style and stigma at mid anthesis (CPC 6344). J. Style and splitting stigma toward the end of anthesis (CPC 6344). K. Portion of flower visited by ant (K CPC 857). [All photos of L. Averyanov and N.S. Khang, image correction and design by L. Averyanov].

Additional specimens studied (paratypes):—VIETNAM. Hoa Binh prov. [Ha Son Binh], Luong Son distr., Lam Son municipality, 300 m a.s.l., 27 April 1986, *P.K. Loc, P 6051* (HNU!, LE!); Son La prov., Moc Chau distr., Chieng Hac municipality, around point 20°51'50"N, 104°31'17"E. Evergreen dry forest, elev. 1200–1300 m a.s.l. 31 October 2006, *N.T. Hiep, L. Averyanov, P.V. The, HAL 9403* (HN!, LE!, MO!); Dien Bien prov., Dien Bien distr., Muong Phang municipality. Broad-leaved forest on shaly hills. 11 December 2010, *L. Averyanov, P.K. Loc, P.V. The, N.T. Vinh, CPC 857* (HN!, CPC!, LE!); Ha Noi City area, Ba Vi district, Ba Vi Mountain, September 2013, *O. Colin s.n.* (LE!, photo); Id., Ba Vi National Park, 21°04.662'N, 105°21.859'E, elev. 658 m, 29 November 2010, *J. Leong-Škorničková* (photo); Id., Ba Vi National Park, 21°03'37"N, 105°21'49"E, elev. 1100 m, 18 June 2014, *S.P.Kuznetsova, M.S. Nuraliev 1079* (MW!); Id., Ba Vi National Park, 21°04'27"N, 105°21'48"E, elev. 780 m, 19 June 2014, *M.S. Nuraliev 1081* (MW!);

Id., mountain forest, elev. 700 m, 21°04,096'N, E 105°21,501'E. 20 October 2013, *N.A. Vislobokov 13049* (flowers in liquid collection at Moscow University, photo); Id., mountain forest, elev. 1093 m, 21°03.617'N, 105°21.809'E. 24-29 October 2013, *N.A. Vislobokov 13071/13063* (flowers and fruits in liquid collection at Moscow University); Nghe An prov., Ky Son distr., Na Ngoi municipality, eastern slopes of Phu Xai Lai Leng Mountain. Broad-leaved forest on steep mountain slopes, elev. 1300–1500 m a.s.l., around point 19°13'53.4"N, 104°12'09.7"E. 26 October 2013, *L. Averyanov, N.T. Hiep, N.S. Khang, L.M. Tuan, N.A. Trang, L.H. Dan, CPC 6344* (CPC!, LE!).

Etymology:—The new species is named after a Vietnamese botanist N.S. Khang, who collected best samples representing the species.

Ecology:—Primary and secondary broad-leaved evergreen lowland and submontane forests on sandstone, shale and granite, rarely on alluvium derived from limestone, common along damp rocky valleys or in shady humid depressions on mountain slopes, terrestrial on soils rich in humus or on large, shady, mossy, often wet boulders along mountain streams at elev. (300)500–1300(1500) m a.s.l. In optimal ecological conditions, large clump of many densely clustering stems, measuring 1.5–2.5 m across, develops from a single shortly branched rhizome. Locally often common.

Flowering:—September–December.

Fruiting:—October–February.

Pollination:—According our sporadic observations, flowers of *Tupistra khangii* visited by ants (Fig. 2k). Notable that ants were recognized as pollinators of *Rohdea* (Migliorato 1910). Also visits of ants recorded in flowers of closely related genus *Aspidistra* Ker Gawler (1822: 628) (Vislobokov *et al.* 2013). But its role in pollination of *Tupistra* is unclear.

Distribution:—Northern Vietnam. The new species is presently recorded from Ha Noi City area (Ba Vi distr.), and provinces Dien Bien (Dien Bien distr.), Hoa Binh (Luong Son distr.), Nghe An (Ky Son distr.) and Son La (Moc Chau and Van Ho distr.). It is probably a local endemic of north-eastern Indochina, ranging widely in north-western Vietnam and adjacent territories of north-eastern Laos.

Taxonomic relationships:—*Tupistra khangii* is very close to *T. longispica* Y.Wan & X.H.Lu in Wan (1984: 168) endemic to southwestern Guangxi but differs from it by the white stigma (vs. pale purple stigma), yellow pollen, and the shorter peduncle (vs. peduncle 20–33 cm long). The new species is also close to *T. hongheensis* G.W.Hu & H.Li in Hu *et al.* (2013: 230) occurring in southern Yunnan, but differs from it by the much shorter, erect or ascending rhizome (vs. long creeping rhizomes to 1 m long), the purplish flower buds (vs. greenish buds), the stamens arising from the base of perigone segments (vs. stamens from the middle of the segments), and the prickly tuberculate fruits (vs. subsmooth fruits). It is also close to *T. muricata* (Gagnepain 1934: 287) Tanaka (2003b: 335) [= *T. albiflora* Larsen (1961: 43)] occurring in northern Thailand, Laos and southern Yunnan (Tanaka 2010b), but differs by the much larger hemispheric or subcapitate stigma (vs. smaller, thin, centrally concave, peltate or subfunnel-shaped stigma). The pistil of *Tupistra khangii* is unique not only in its large subcapitate stigma which is prominently exerted from the perigone but also in the character that it becomes remarkably fissured toward the end of anthesis.

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