European Journal of Taxonomy 201: 1–12
http://dx.doi.org/10.5852/ejt.2016.201

ISSN 2118-9773
www.europeanjournaloftaxonomy.eu
2016 · Kochaiphat P. *et al.*

Research article

Two new species of *Tetrastigma* (Miq.) Planch. (Vitaceae) from Thailand

Phongsakorn KOCHAIPHAT[1], Anna TRIAS-BLASI[2]
& Pimwadee PORNPONGRUNGRUENG[3,*]

[1,3] Applied Taxonomic Research Center, Department of Biology, Faculty of Science, Khon Kaen University, Khon Kaen 40002, Thailand.
[2] Royal Botanic Gardens Kew, Richmond, Surrey TW9 3AE, England, U.K.

[*] Corresponding author: ppimwa@kku.ac.th
[1] Email: phongsakorn.s@gmail.com
[2] Email: a.triasblasi@kew.org

Abstract. Two new species of *Tetrastigma* from Thailand, *T. calcicola* Kochaiph. & Trias-Blasi sp. nov. and *T. jaichagunii* C.L.Li ex Kochaiph. & Trias-Blasi sp. nov. are described and illustrated. *Tetrastigma calcicola* sp. nov. is a slender climber restricted to the open areas on limestone mountains at high elevation in the northern part of Thailand. The other species, *T. jaichagunii* sp. nov., is similar to *T. harmandii* Planch., but differs from it by having more densely verrucose young branches, broader leaflets, 4-lobed thick discs, bigger globose berries and oblongoid seeds. This species occurs along streams or in forest margins in evergreen forest and it is widely distributed in several parts of Thailand.

Keywords. *Tetrastigma*, taxonomy, Thailand, revision, Vitaceae.

Kochaiphat P., Trias-Blasi A. & Pornpongrungrueng P. 2016. Two new species of *Tetrastigma* (Miq.) Planch. (Vitaceae) from Thailand. *European Journal of Taxonomy* 201: 1–12. http://dx.doi.org/10.5852/ejt.2016.201

Introduction

Tetrastigma Planch. (Vitaceae) is a genus comprising approximately 95 species, distributed in tropical and subtropical Asia with a few of them reaching Australia (Planchon 1887; Latiff 1983; Chen *et al.* 2011; Trias-Blasi *et al.* 2012; Wen 2007). It can be easily distinguished from other genera of Vitaceae by its polygamo-dioecy, 4-merous flowers, 4-lobed or 4-parted stigma, and absent or very short styles. Twenty-six species have been recorded in Thailand (Kochaiphat *et al*. 2014), of which five are endemic.

During preparation of the revision of *Tetrastigma* for the Flora of Thailand account, the first author came across several specimens collected from Doi Tung and Tham Luang Khun Nam Nang Non Forest Park (Chiang Rai province) with a unique combination of characters that did not match any previously described species.

In addition, a number of specimens representing a distinct taxon were found. Some were annotated as *Tetrastigma jaichagunii* by the late Prof. C.L. Li, however, no formal description had been published

for this name. Therefore, this species is described here as new species and the name *T. jaichagunii* is applied.

Material and methods

This study is based on the investigation of the herbarium specimens from relevant major herbaria as well as field collections and observations in Thailand. Herbarium specimens from the following herbaria were examined: AAU, ABD, BCU, BK, BKF, BM, C, CMU, CMUB, E, K, KKU, L, P, PSU, QBG and TCD. The herbarium abbreviations follow Thiers (continuously updated). Voucher specimens collected from field surveys were made following the method of Bridson & Forman (1989) and were deposited at KKU, BKF and QBG. The vegetative parts were measured in a dry state. Reproductive parts were rehydrated by boiling in water. Measurements were made under light microscope. The morphological terminology generally follows Beentje (2010), Wen (2007) and Jackes (1989); and for berry and seed terminology follows Latiff (1983) and Chen & Manchester (2011).

Taxonomy

Class Equisitopsida C.Agardh (Agardh *et al.* 1825)
Subclass Magnoliidae Novák ex Takht. (Takhtajan 1967)
Superorder Rosanae Takht. (Takhtajan 1967)
Order Vitales Juss. ex Bercht. & J.Presl (Berchtold & Presl 1820)
Family Vitaceae Juss. (Jussieu 1789) nom. cons.
Genus *Tetrastigma* (Miq.) Planch. (Planchon 1887)

Two *Tetrastigma* from Thailand, *T. calcicola* sp. nov. and *T. jaichagunii* sp. nov., are described herein as new species. Accordingly, the key to *Tetrastigma* in Thailand (Kochaiphat *et al*. 2014) has been revised from couplet 16 as follows.

Key to the species of *Tetrastigma* in Thailand

1. Tendrils 5–7 palmately branched; leaves palmately 3-foliolate ..... ***T. triphyllum*** (Gagnep.) W.T.Wang
– Tendrils simple or bifurcate; leaves simple, palmately 3–5(–7)-foliolate or pedately 5–7(–9)-foliolate 2

2. Inflorescences on old stems (cauliflorous plants), more than 5 inflorescences per nodes ..... ***T. cauliflorum*** Merr.
– Inflorescences on young branches, 1–3 inflorescences per nodes 3

3. Young branches with 4–5 sharp ridges ..... ***T. quadrangulum*** Gagnep. & Craib
– Young branches round or nearly round 4

4. Leaves palmately 3–5(–7)-foliolate or mixed with simple leaves or all leaves simple 5
– Leaves pedately 5–7(–9)-foliolate rarely mixed with 3-foliolate 16

5. Stems verrucose or with corky protuberances 6
– Stems smooth, pubescent or with flaky cork 8

6. Stems with corky protuberances; leaves ovate to elliptic; stigma distinctly 4-lobed 7
– Stems verrucose; leaves lanceolate; stigma peltate ..... ***T. harmandii*** Planch.

7. Leaves fleshly; stigma cruciform; berries ellipsoid when dry ..... ***T. cruciatum*** Craib & Gagnep.
– Leaves coriaceous or papyraceous; stigma pointed lobes; berries pyriform when dry ..... ***T. assimile*** (Kurz) C.L.Li ex Kochaiph. & Trias-Blasi

8. Shrubs, creeping, erect or decumbent 9
– Lianas 10

9. Leaves simple or mixed with palmately 3(–5)-foliolate; pedicel 0.4–0.6 cm long ..... ***T. bambusetorum*** Craib
– Leaves palmately 3-foliolate; pedicel 0.8–1.2 cm long ..... ***T. apiculatum*** Gagnep.

10. Leaflets glabrous 11
– Leaflets pubescent or hirsute at least along the midrib on lower leaf surface 15

11. Female flower disc conspicuous, thick and adnate to lower part of ovary 12
– Female flower disc inconspicuous 14

12. Terminal leaflets broadly elliptic to rhombic; berries pyriform when dry ..... ***T. pedunculare*** (Wall. ex M.A.Lawson) Planch.
– Terminal leaflets elliptic, ovate or lanceolate; berries ellipsoid when dry 13

13. Leaves coriaceous or subcoriaceous ..... ***T. erubescens*** Planch.
– Leaves papyraceous ..... ***T. dubium*** (M.A.Lawson) Planch.

14. Leaflets broadly ovate or broadly elliptic, apex caudate ..... ***T. campylocarpum*** (Kurz) Planch.
– Leaflets lanceolate, apex attenuate ..... ***T. planicaule*** (Hook.f.) Gagnep.

15. Ovary brownish hirsute; leaves palmately 5-foliolate ..... ***T. obovatum*** (M.A.Lawson) Gagnep.
– Ovary glabrous; leaves palmately 3-foliolate ..... ***T. dubium*** (M.A.Lawson) Planch.

16. Leaves 5-foliolate, rarely mixed with 7-foliolate 17
– Leaves 7(–9)-foliolate, rarely mixed with 5-foliolate 29

17. Branches glabrous; leaflets glabrous on both surfaces 18
– Branches more or less pubescent; leaflets pubescent at least along the midvein on lower leaf surface 26

18. Secondary branches of peduncle 2 ..... ***T. baenzigeri*** C.L.Li
– Secondary branches of peduncle more than 2 19

19. Berries pyriform or triangular when dry 20
– Berries globose, ovoid or ellipsoid when dry 21

20. Terminal leaflets ovate–lanceolate, 3–4 × 6–9 cm; berries pyriform when dry ... ***T. pyriforme*** Gagnep.
– Terminal leaflets obovate or elliptic, 4–5.5 × 9–12 cm; berries triangular when dry ..... ***T. rumicispermum*** (M.A.Lawson) Planch.

21. Inflorescences compound umbel on pseudo-terminal branch or axile, umbelliform, loose; tendrils bifurcate ..... ***T. serrulatum*** (Roxb.) Planch.
– Inflorescences compound umbel on axile, globose, compact; tendrils unbranched 22

22. Female flower disc inconspicuous ..... ***T. pachyphyllum*** (Hemsl.) Chun
– Female flower disc conspicuous, thick and adnate to lower part of ovary 23

23. Stigma peltate, rounded or slightly 4-lobed 24
– Stigma cruciform, 4-lobed, obtuse, acute or pointed apex 25

24. Berries 1.8–3.0 × 1.5–2.5 cm; seed oblongoid; female flower disc 4-angled ..... ***T. jaichagunii*** C.L.Li ex Kochaiph. & Trias-Blasi sp. nov.
– Berries 0.8–1.2 × 0.8–1.2 cm; seed ellipsoid; female flower disc rounded ..... ***T. harmandii*** Planch.

25. Stigmas 4 acute or pointed lobes, style tubular 0.5–0.8 mm long ... ***T. dubium*** (M.A.Lawson) Planch.
– Stigmas 4 obtuse lobes, style absent ..... ***T. calcicola*** Kochaiph. & Trias-Blasi sp. nov.

26. Leaflets broadly elliptic or ovate 27
– Leaflets narrowly elliptic or lanceolate ..... ***T. dubium*** (M.A.Lawson) Planch.

27. Leaflets pubescent along nerve or at least along the midrib on the lower surface 28
– Leaflets pubescent on both surfaces ..... ***T. macrocorymbum*** Gagnep. ex J.Wen

28. Berries up to 1.5 cm in diameter ..... ***T. pilosum*** C.L.Li
– Berries more than 2 cm in diameter ..... ***T. siamense*** Gagnep. & Craib

29. Berries 2–2.5 cm in diameter ..... ***T. teaniatum*** C.L.Li
– Berries 0.8–1.5 cm in diameter 30

30. Outer petals densely papillose ..... ***T. leucostaphylum*** (Dennst.) Alston ex Mabb.
– Outer petals glabrous 31

31. Secondary vein almost 90° with midrib; old branches verrucose, light brown; stigma 4 pointed lobes ..... ***T. delavayi*** Gagnep.
– Secondary vein angle nearly 45° with midrib; old branches flaky, grey; stigma 4 rounded lobes or nearly globose, not lobed ..... ***T. godefroyanum*** Planch.

Tetrastigma calcicola Kochaiph. & Trias-Blasi sp. nov.
Table 1, Figs 1–2
urn:lsid:ipni.org:names:77155114-1

Diagnosis

Tetrastigma calcicola sp. nov. is most closely aligned to *T. pachyphyllum* (Hemsl.) Chun, but differs in having a 4-lobed disc adnate to the lower part of the ovary, and small berries with a smooth surface (Table 1).

Etymology

The specific epithet refers to the habitat of this species, which is only found on limestone mountains.

Type materials

Holotype

THAILAND: Chiang Rai, Tham Luang Khun Nam Nang Non Forest Park, 21 Mar. 2011, *M. Norsaengsri & N. Tathana 7810*, ♀ fl. (holo-: QBG!).

Paratype

THAILAND: Chiang Rai, Tham Luang Khun, Nam Nang Non Forest Park, 10 Jul. 2012, *M. Norsaengsri & N. Tathana 9736*, ♀ fr. (QBG).

Table 1. Main morphological differences between *T. calcicola* Kochaiph. & Trias-Blasi sp. nov. and *T. pachyphyllum* (Hemsl.) Chun.

Characters	***T. calcicola*** Kochaiph. & Trias-Blasi sp. nov.	***T. pachyphyllum*** (Hemsl.) Chun
Female flowers		
Pedicels length	0.5–1.0 mm	2.0–3.0 mm
Petals size	1.5–1.8 × 0.8 mm	2.5–3.0 × 1.2–1.7 mm
Disc	4-lobed adnate to lower part of ovary	inconspicuous
Berries		
Shape	globose to ellipsoid	globose
Size	0.8–1.0 × 0.7–0.8 cm	1.4–1.7 × 1.4–1.8 cm
Surface	smooth	coarse
Seeds		
Size	0.7–0.8 × 0.4–0.5 cm	0.9 × 0.5–0.7 cm
Endosperm shape in cross-section	⋒	⋒

Description

Slender climber. Stems terete, young branches terete, verrucose; mature stems corky; tendrils simple; stipules 2, deltate, *c.* 0.2 × 0.2 cm long, scale-like with age. Leaves compound, 3-foliolate or pedately 5-foliolate; petiole 0.8–5.0 cm long, glabrous, base slightly pulvinate; leaflets coriaceous; terminal leaflet petiolule 0.2–2.0 cm long, glabrous, terminal leaflet blade elliptic, obovate to oblanceolate, 2.0–8.0 × 1.0–3.5 cm, base cuneate, margins serrate with minute protruding vein tip, apex acute to acuminate, petiolules of lateral leaflet complex 0.1–1.0 cm long, glabrous, lateral leaflet petiolules, sessile to 0.6 cm long, glabrous, lateral leaflet blade elliptic, obovate to oblanceolate, 1.0–5.5 × 0.5–2.8 cm, base cuneate or asymmetrical, margins and apex as for terminal leaflet; veins conspicuous on lower sides, midrib protruding on both surfaces, glabrous, 1 main basal vein, 4–7 pairs of lateral veins. Inflorescences axillary on young stem, 1–2 per node, compound umbel, male plant not seen; female plant 1.0–2.5 cm in diameter, compact, globose; peduncles 0.3–1.0 cm, rarely puberulous. Female flowers' bud ovoid, 1.0–1.5 mm long; pedicels 0.5–1.0 mm long, papillose; calyx disciform, margins entire, papillose; petals ovate, 1.5–1.8 × 0.8 mm, apex slightly corniculate, outer surface densely papillose, margins entire; disc 4-lobed adnate to lower part of ovary; staminode clavate, *c.* 1.2 mm long; ovary conical, *c.* 0.8 × 0.8 mm; style sessile; stigma cruciform, 4-lobed, lobes obtuse, ciliate. Berries globose to ellipsoid, 0.8–1.0 × 0.7–0.8 cm, surface smooth, yellow or white when ripe, 1–3-seeded. Seeds ellipsoid, 0.7–0.8 × 0.4–0.5 cm, testa transversely rugulose on both sides, adaxial surface with a Y shaped furrow, abaxial surface with an oblong chalaza, endosperm '⋒' shaped in cross-section.

Distribution

Known only from Thailand (Fig. 2).

Ecology and phenology

In open area on limestone mountain, dry evergreen forest, altitude 1,300–1,450 m; flowering: February–March; fruiting: July–October.

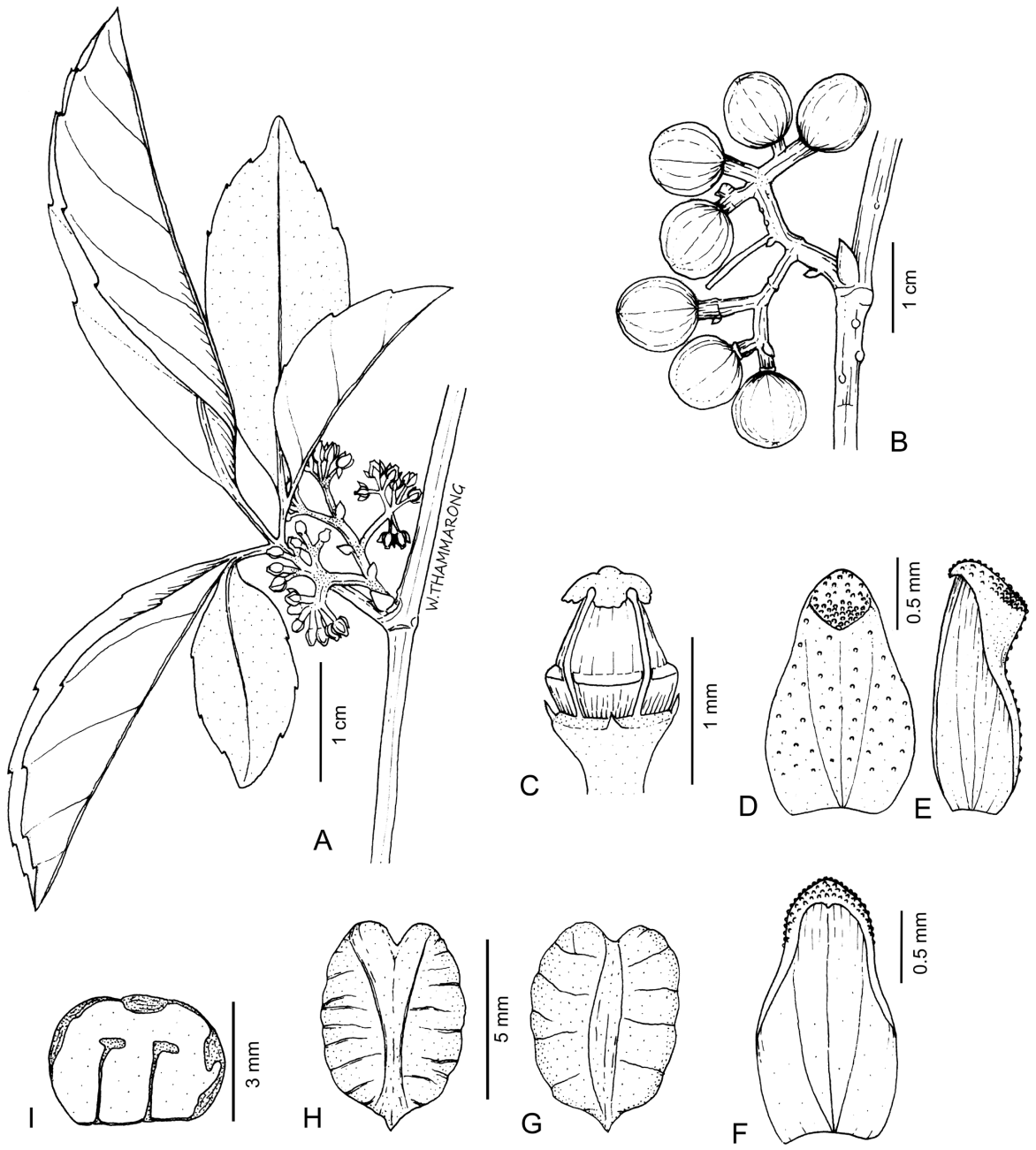

Fig. 1. *Tetrastigma calcicola* Kochaiph. & Trias-Blasi sp. nov. **A**. Branch and female inflorescence. **B**. Infructescence. **C**. Ovary. **D**. Corolla, dorsal view. **E**. Corolla, lateral view. **F**. Corolla, ventral view. **G**. Seed, dorsal view. **H**. Seed, ventral view. **I**. Seed, transversal section. Drawn by Woranart Thammarong. A, C–F from *M. Norsaengsri & N. Tathana 7810*; B from *R. Pooma 1186*; G–I from *M. Norsaengsri & N. Tathana 9736*.

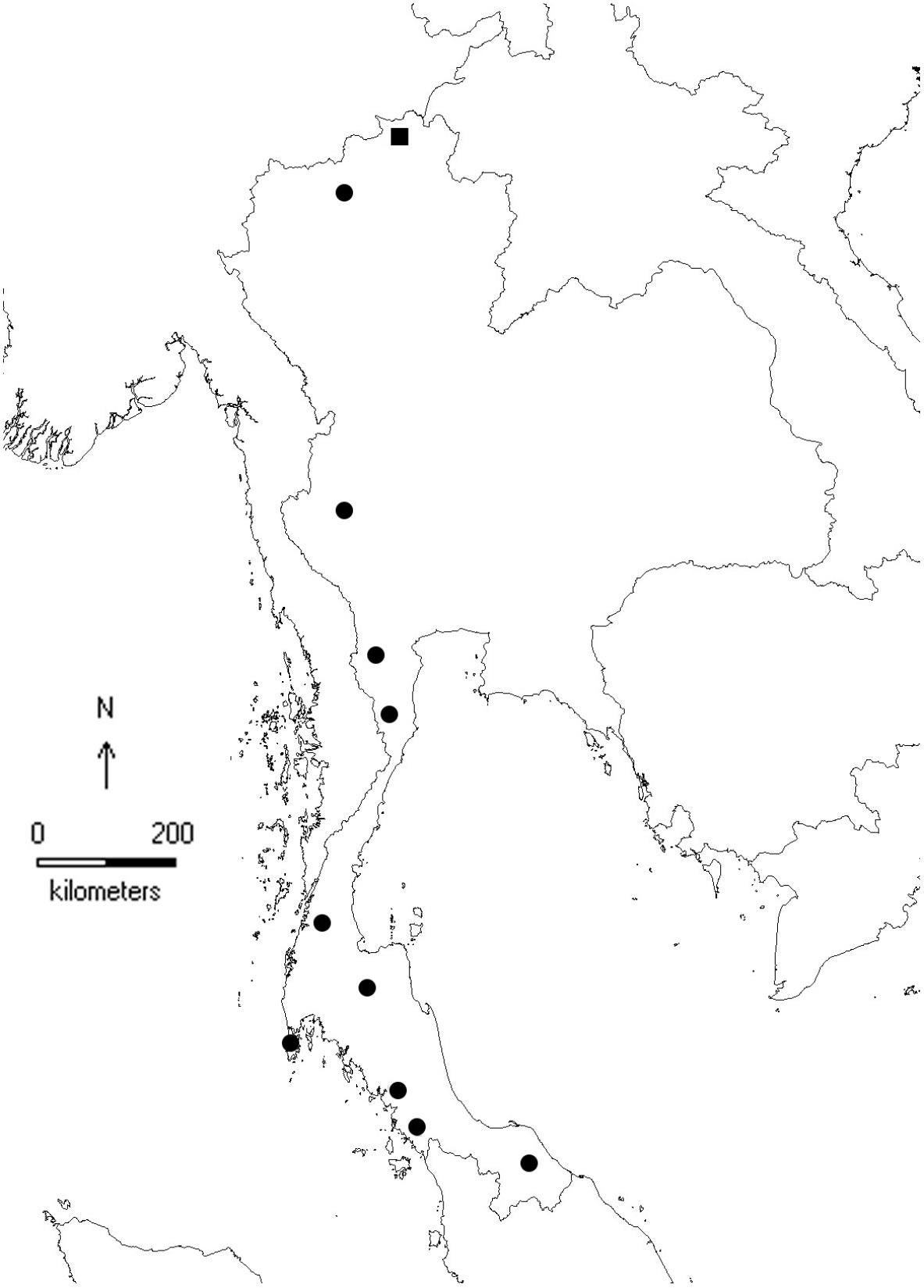

Fig. 2. Distribution of *Tetrastigma calcicola* Kochaiph. & Trias-Blasi sp. nov. (■) and *T. jaichagunii* C.L.Li ex Kochaiph. & Trias-Blasi sp. nov. (●).

Additional specimens examined

THAILAND. **Chiang Rai**:Doi Tung, 22 Oct. 1995, *R. Pooma 1186*, ♀ fr. (BKF, CMUB); ibid., 18 Feb. 2005, *J.F. Maxwell 05-147*, ♀ fl. (CMUB).

Conservation status

We suggest to treat this species as Data Deficient (DD) according to IUCN (2012), as this species is only known from a few herbarium specimens and only two localities have been recorded: Doi Tung and Tham Luang Khun Nam Nang Non Forest Park in Chiang Rai Province. Although the species seems to occur only in limestone mountains at high elevation, the number of populations and their sizes are not known so far.

Tetrastigma jaichagunii C.L.Li ex Kochaiph. & Trias-Blasi sp. nov.
Table 2, Figs 2–3
urn:lsid:ipni.org:names:77155116-1

Diagnosis

This species is similar to *T. harmandii* Planch., but differs from it by having more densely verrucose young branches, broader leaflets, 4-lobed thick discs, bigger globose berries and oblongoid seeds (Table 2). Some specimens were misidentified as *T. hookeri* Planch., an Indian species, but *T. hookeri* has narrow leaves and an inconspicuous disc in female flowers.

Etymology

We think that Prof. C.L. Li selected the specific epithet 'Jaichagunii' in honour of Mr Manit Jaichagun, from the CITES Scientific Authority in Thailand.

Type materials

Holotype

THAILAND. Trang, Khao Chong, 12 Mar. 1974, *K. Larsen & S.S. Larsen 33238*, ♀ fl. (holo-: AAU!, iso-: BKF!, L!, P!).

Paratypes

THAILAND. Phetchaburi, Kaeng Krachan National Park, 3 Aug. 1995, *K. Larsen, S.S. Larsen, C. Tange, R. Moran & P. Puudjaa 45370*, ♀ fr. (AAU); Satun, Ta Le Bun, 26 Nov. 1985, *J.F. Maxwell 85-1060*, ♀ fr. (L).

Description

Large climber. Stems flattened with age, young branches terete, verrucose; mature stems corky; tendrils simple; stipules 2, deltate, *c.* 0.4 × 0.3 cm, reduced to scale-like with age. Leaves compound, 3-foliolate or pedately 5(–7)-foliolate; petioles 4.0–19.0 cm long, verrucose, base pulvinate; leaflets papyraceous to subcoriaceous; terminal leaflet petiolule, 1–5.0 cm long, glabrous, terminal leaflet blade lanceolate, elliptic, to oblanceolate, 11.5–33.0 × 3.5–12.0 cm, base obtuse to cuneate, margins coarsely serrate with *c.* 0.5 protruding vein tip, apex acuminate to caudate, petiolules of lateral leaflet complex 1.0–3.5 cm long, glabrous, lateral leaflet petiolules, sessile–2.5 cm long, glabrous, lateral leaflet blade lanceolate, elliptic to broadly elliptic, oblong, 8.5–30 × 2.5–11.5 cm, base obtuse to cuneate or asymmetrical, margins and apex as terminal leaflet; veins conspicuous on lower sides, midrib protruding on both surfaces, glabrous, 1 main basal vein, 6–13 pairs of lateral veins. Inflorescences axillary on young stem, single, compound umbel; 2–3 cm in diameter, compact, umbelliform; peduncles 0.5–1.0 cm, puberulent, male plant not seen. Male flowers not seen. Female flowers' bud ovoid, 2.0–3.0 mm long; pedicels 2.0–3.0 mm long, papillose; calyx disciform to cupuliform, margins undulate, ciliate; petals ovate to oblong, 2.2–3.0 ×

Table 2. Main morphological differences between *T. jaichagunii* C.L.Li ex Kochaiph. & Trias-Blasi sp. nov. and *T. harmandii* Planch.

Characters	***T. jaichagunii*** C.L.Li ex Kochaiph. & Trias-Blasi sp. nov.	***T. harmandii*** Planch.
Female flowers		
Petals shape	ovate to oblong	ovate
Disc	thick, 4-angled	thick, rounded
Berries		
Size	1.8–3.0 × 1.5–2.5 cm	0.8–1.2 × 0.8–1.2 cm
Seeds		
Shape	oblongoid	ellipsoid
Size	1.2–1.4 × 1.0–1.2 cm	0.7–0.8 × 0.6–0.7 cm
Endosperm shape in cross-section		

1.5–1.8 mm, apex hooded, outer surface densely papillose, margins entire; disc thick, 4-angled, adnate to ovary; staminode clavate–trullate, 0.5–1.0 mm long; ovary conical, 1.0–1.2 × 1.0–1.5 mm; style cylindrical, *c.* 0.5 mm long; stigma peltate, round or slightly 4-lobed, ciliate. Berries globose, 1.8–3.0 × 1.5–2.5 cm, surface smooth, green when young, yellow when ripe, 1–4-seeded. Seeds oblongoid, 1.2–1.4 × 1.0–1.2 cm, testa transversely rugose on both sides, adaxial surface with an oblong furrow, abaxial surface with a linear chalaza, apex bilobed, apical notch 1.0–3.0 mm, endosperm '  ' shaped in cross-section.

Distribution

Known only from Thailand (Fig. 2).

Ecology and Phenology

Along streams or in forest margins in evergreen forest; altitude 0–1,500 m; flowering: January–April; fruiting: June–January.

Additional specimens examined

THAILAND. NORTHERN: **Chiang Mai**: Chiang Mai, along the road, 40 km to Pai, 17 Sep. 1995, *K. Larsen, S.S. Larsen, C. Tange & D. Sookchaloem 46583*, ♀ fl. (AAU); Chiang Dao, 26 Dec. 1940, *H.B.G. Garrett 1214*, ♀ fr. (TCD, L, P); Doi Chiang Dao, 13 Jul. 1950, *H.B.G. Garrett 1336* (P, L, K); ibid., 18 Dec. 1951, *H.B.G. Garrett 1374* (P, L, K); ibid., 22 Jan. 1989, *J.F. Maxwell 89-0081*, ♀ fr. (L); Hang Dong, Mae Khanin, 7 Mar. 1999, *S. Watthana & W. Pongamornkul Wat. 240*, ♀ fl. (QBG); Mae Tang, 19 Nov. 1990, *J.F. Maxwell 90-1259*, ♀ fr. (CMU); Mae Tang, Pa Pae, 17 Sep. 1995, *BGO. Staff. 4507* (QBG); SOUTH-WESTERN: **Kanchanaburi**: Between Kriti and Mueang Cha, 9 Jul. 1973, *R. Geesink & C. Phengklai 6220*, ♀ fr. (AAU, BKF, E, L, P); Thung Yai Naresuan, 11 Aug. 1992, *J.F. Maxwell 93-869*, ♀ fr. (CMUB); Thong Pha Phum, Thung Yai Naresuan, 10 Jun. 2002, *M. Van De Bult 565*, ♀ fr. (BKF, CMUB); **Phetchaburi**: Kaeng Krachan National Park, 26 Aug. 1995*, J.A.N. Parnell, J. Pendry & T. Boonthavikoon 95-450*, ♀ fr. (K); ibid., 25 Jun. 2000, *M.F. Newman, T. Boonthavikoon, C. Hemrat & D.J. Middleton 1040*, ♀ fr. (AAU, BKF, L, P); ibid., 9 Aug. 2002, *D.J. Middleton, S. Suddee, S.J. Davies & C. Hemrat 888*, ♀ fr. (BKF, CMUB); **Prachuap Khiri Khan**: Kaeng Krachan National Park, Pa La-u Waterfalls, 14 Aug. 2002, *D.J. Middleton, S. Suddee, S.J. Davies & C. Hemrat 1060*, ♀

fr. (BKF, CMUB); PENINSULAR: **Ranong**: Klong Naka National Park, 24 Nov. 1974, *R. Geesink, P. Hiepko & C. Charoenpol 7519*, ♀ fr. (BKF, K); ibid., 7 Jan. 1990, *S. Hoover 5048*, ♀ fr. (E); ibid., 8 Jan. 1990, *S. Hoover 5481*, ♀ fr. (E); ibid., 13 Jan. 1990, *S. Hoover 6329*, ♀ fr. (E); Khao Po Ta Luang Kaeo, 31 Jan. 1929, *A.F.G. Kerr 16912*, ♀ fl. (L, P); No locality, 22 Jan. 1929, *A.F.G. Kerr 16805A* (BK, K); Kapoe, 15 Jul. 1979, *C. Niyomdham et al. 320*, ♀ fr. (AAU, BKF, K, L, P); Khao Po Ta Luang Kaeo, 11 Dec. 1979, *T. Shimizu, H. Toyokuni, H. Koyama, T. Yahara & C. Niyomdham T-26922* (AAU, BKF, L); **Surat Thani**: Klong Phanom National Park, 21 Mar. 2005, *S. Gardner, P. Sidisunthorn & P. Tippayasri ST1875*, ♂ fl. (QBG); **Phangnga**: Khao Po Ta Luang Kaeo, 2 Feb. 1929, *A.F.G. Kerr*

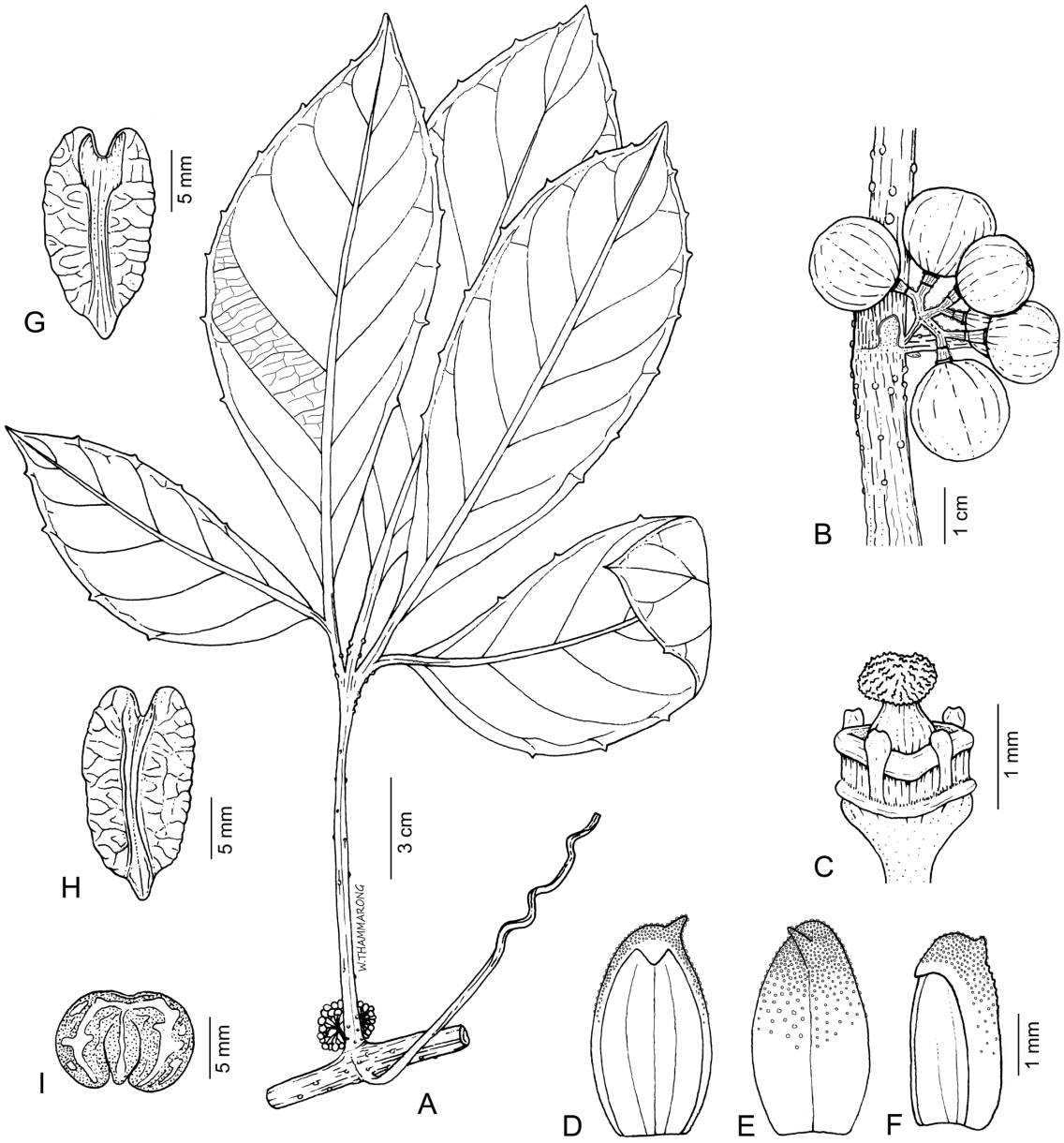

Fig. 3. *Tetrastigma jaichagunii* C.L.Li ex Kochaiph. & Trias-Blasi sp. nov. **A**. Branch and female inflorescence. **B**. Infructescence. **C**. Ovary. **D**. Corolla, ventral view. **E**. Corolla, dorsal view. **F**. Corolla, lateral view. **G**. Seed, ventral view. **H**. Seed, dorsal view. **I**. Seed, transversal section. Drawn by Woranart Thammarong. A, C–F from *K. Larsen & S.S. Larsen 33238*; B from *K. Larsen et al. 4537*; G–I from *J.F. Maxwell 85-1060*.

16990, ♀ fl. (BK, BM, K, L); **Phuket**: Kathu, 12 Mar. 1929, *A.F.G. Kerr 17463* (BK, K); **Nakhon si thammarat**: Ka Rom Waterfalls, 14 Apr. 1985, *J.F. Maxwell 85-0396*, ♀ fl. (BKF, L); ibid., 30 Oct. 1993, *K. Larsen, S.S. Larsen, C.T. Norgaard, K. Pharsen, P. Puudjaa & W. Ueachirakan 44163*, ♀ fr. (AAU); Tha Sala, 2 Mar. 1986, *J.F. Maxwell 86-0111*, ♀ fl. (BKF, L); Thung Song, 19 Jul. 1929, *Rabil 93*, ♀ fr. (BK, L); **Phatthalung**: Khao Pu Khao Ya National Park, 16 Nov. 1990, *K. Larsen, S.S. Larsen, W. Nanakorn, W. Ueachirakan & P. Sirirugsa 41534*, ♀ fl. (AAU, K); **Trang**: Khao Chong, 13 Jun. 1974, *R. Geesink, T. Hattink & C. Charoenpol 7181*, ♀ fr. (BKF, K); ibid., 10 Jul. 2000, *D.J. Middleton, T. Boonthavikoon, S.J. Davies, C. Hemrat & M.F. Newman 373*, ♀ fr. (AAU, BKF); Pa Liang, 24 Apr. 1931, *M.C. Laksanakarn 791*, ♀ fl. (L, K); Sai Rung Waterfalls, 15 Mar. 2006, *S. Gardner & V. Chamchaumroon ST2480*, ♀ fl. (QBG); **Satun**: Ko Ta Ru Tao, 19 Jan. 1918, *A.F.G. Kerr 14188*, ♀ fl. (BM, K); Klong Ton, 11 Mar. 1928, *A.F.G. Kerr 14469*, ♀ fl. (L, K); **Yala**: Bang Lang National Park, 12 Feb. 2004, *D.J. Middleton, M. Phuphat, R. Pooma & K. Williams 3011*, ♂ fl. (BKF, E); no locality, 25 Mar. 1998, *C. Niyomdham 5331*, ♀ fl. (BKF, K).

Conservation status

This species has rather large populations and is widely distributed in several parts of the country. Therefore, it is considered Least Concern (LC).

Discussion

Tetrastigma calcicola sp. nov. and *T. jaichagunii* sp. nov. are distinct from the other previously described species. The major characters for recognising the species are female flowers and fruits. *Tetrastigma calcicola* sp. nov. differs from its closest relative, *T. pachyphyllum*, by its 4-lobed disc that is adnate to the lower part of the ovary, and small berries with a smooth surface. *Tetrastigma jaichagunii* sp. nov. can be separated from *T. harmandii* by its more densely verrucose young branches, broader leaflets, 4-lobed thick discs, bigger globose berries and oblongoid seeds.

Currently, these two new species are known only from Thailand. *Tetrastigma calcicola* sp. nov. is restricted to limestone mountains at high elevation in the northern part of Thailand, while *T. jaichagunii* sp. nov. has a wider range of distribution. The latter species has only been recorded from evergreen forest in several parts of Thailand in large populations. However, it seems possible that it might be found in neighbouring countries such as Myanmar or Laos if a more extensive field survey is carried out in the future.

Acknowledgements

This work was supported by the Graduate School, Khon Kaen University and Science Achievement Scholarship of Thailand (SAST). The first author would like to thank Prof. Dr. John A.N. Parnell and other staff at TDC for their kind help and also grateful to the staff of AAU, ABD, BCU, BK, BKF, BM, C, CMU, CMUB, E, K, KKU, L, P, PSU, QBG and TCD for their help and for the loan of/or access to specimens. Thanks to Mr. Woranart Thammarong for the illustrations.

References

Agardh C.A., Holmberg L.P. & Lundstrom P.M. 1825. *Classes Plantarum*. Literis Berlingianis, Lundae [Lund]. http://dx.doi.org/10.5962/bhl.title.7657

Beentje H. 2010. *The Kew Plant Glossary*. Kew Publishing, Kew, UK.

Berchtold B.V. von & Presl J.S. 1820. *O přirozenosti rostlin, aneb rostlinár, obsahugjcj: gedanj on živobytj rostlinném pro sebe a z ohledu giných živoků, podlé stawu nyněgssjbo znánj; k rozssjřenj*

přirodnictwj; w potaženj na užitećnost w rolnictwj, hospodářstwj, řemestech, uměnj i obchodu a w wztahowánj obzwlásstnjm na lekařstwj. Enders, Prague.

Bridson D. & Forman L. 1989. *The Herbarium Handbook*. Royal Botanic Gardens, Kew, London.

Chen P., Chen L. & Wen J. 2011. The first phylogenetic analysis of *Tetrastigma* (Miq.) Planch, the host of Rafflesiaceae. *Taxon* 60 (2): 499–512.

Chen I. & Manchester S.R. 2011. Seed morphology of Vitaceae. *International Journal of Plant Science* 172 (1): 1–35. http://dx.doi.org/10.1086/657283

IUCN 2012. *IUCN Red List Categories and Criteria: Version 3.1. Second edition*. IUCN, Gland, Switzerland and Cambridge, UK.

Jackes B.R. 1989. Revision of the Australian Vitaceae, 5. *Tetrastigma* (Miq.) Planchon. *Austrobaileya* 3 (1): 149–158.

Jussieu A.L. de 1789. *Genera plantarum, secundum ordines naturales disposita, juxta methodum in horto regio Parisiensi exaratam*. Herissant & Barrois, Paris. http://dx.doi.org/10.5962/bhl.title.7762

Kochaipat K., Trias-Blasi A. & Pornpongrungrueng P. 2014. A new combination and new records of *Tetrastigma* (Vitaceae) from Thailand. *Phytotaxa* 183 (4): 272–278. http://dx.doi.org/10.11646/phytotaxa.183.4.6

Latiff A. 1983. Studies in Malesian Vitaceae VII. The genus *Tetrastigma* in the Malay Peninsula. *Gardens' Bulletin Singapore* 36 (2): 213–228.

Planchon J.E. 1887. Monographie des Ampélidées vrais. *In:* de Candolle A.F.P.P. & de Candolle C. (eds) *Monographiae Phanaerogamarum*. Vol. 5, part 2: 305–654. G. Masson, Paris.

Takhtajan A.L. 1967. *Sistema i filogeniia tsvetkovykh rastenii (Systema et Phylogenia Magnoliophytorum)*. Soviet Science Press, Leningrad & Nauka, Moscow.

Thiers B. Continuously updated. *Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium* [online]. Available from http://sweetgum.nybg.org/ih/ [accessed 9 Oct. 2015].

Trias-Blasi A., Parnell J.A.N. & Hodkinson T. 2012. Multi-gene region phylogenetic analysis of the grape family (Vitaceae). *Systematic Botany* 37 (4): 941–950. http://dx.doi.org/10.1600/036364412X656437

Wen J. 2007. Vitaceae. *In*: Kubitzki K. (ed.) *The Families and Genera of Vascular Plants.* Vol. 9: 467–479. Springer-Verlag, Berlin.

Manuscript received: 14 October 2015
Manuscript accepted: 8 January 2016
Published on: 30 May 2016
Topic editor: Koen Martens
Desk editor: Natacha Beau

Printed versions of all papers are also deposited in the libraries of the institutes that are members of the *EJT* consortium: Muséum national d'Histoire naturelle, Paris, France; Botanic Garden Meise, Belgium; Royal Museum for Central Africa, Tervuren, Belgium; Natural History Museum, London, United Kingdom; Royal Belgian Institute of Natural Sciences, Brussels, Belgium; Natural History Museum of Denmark, Copenhagen, Denmark.