THAI FOR. BULL. (BOT.), SPECIAL ISSUE: 205–211. 2009.

Taxonomic notes on two *Cissus* (Vitaceae) species in Thailand

ANNA TRIAS-BLASI[1], JOHN A. N. PARNELL[1] & KONGKANDA CHAYAMARIT[2]

ABSTRACT. The taxonomic status of two *Cissus* species is reassessed. The Thai endemic *Cissus craibii* Gagnep. is divided into two subspecies (the type subspecies and another based on *C. dissecta* Craib) and lectotypes are designated. New synonyms and lectotypes for *Cissus modeccoides* Planch. are designated. Descriptions for all three taxa are given.

KEY WORDS: *Cissus*, Vitaceae, Thailand.

INTRODUCTION

The genus *Cissus* L. (Vitaceae) comprises ca 350 species distributed in all tropical areas with a few species reaching temperate climates (Wen, 2007). Several phylogenetic studies (Rossetto *et al*., 2002; Soejima & Wen, 2006; Wen *et al*., 2007) have shown the polyphyletic nature of *Cissus*. This was confirmed by Rossetto *et al.* (2007), who showed the distinct origin of two clades separate from *Cissus* sensu stricto. Preliminary estimates indicate that 25–30 *Cissus* species occur in Thailand. *Cissus* is a genus with high intra-specific variability and opaque inter-specific boundaries. For this reason past researchers have published contradicting accounts with confusing synonomy and unclear referencing (Roxburgh, 1820; Planchon, 1887; Craib, 1911, 1926; Gagnepain, 1911, 1912, 1950; Suessenguth, 1953). During the preparation of the revision of the Vitaceae for the Flora of Thailand, two *Cissus* species presented confusing synonomy and taxonomic status which required clarification. All cited specimens have been seen by the first author unless otherwise stated.

TAXONOMIC ACCOUNT

1. Cissus craibii Gagnep. in Craib, Bull. Misc. Inform. Kew 1915: 426. 1915; Craib, Fl. Siam. 1: 306. 1926; Gagnep. in H. Lecomte, Suppl. Fl. Indo-Chine 1: 891. 1950. Type: Thailand: Foot of Mae Ping rapids, Ban Samoeng, *Kerr* 2181 (lectotype, **P!**, designated here; isolectotypes **BM!, E!, K!**).

KEY TO SUBSPECIES OF ***C. CRAIBII***

1. Leaves palmatifid with broad lobes 2–6 cm wide; stem indumentum pilose with hairs 0.3–0.5 mm long; ovary disc glabrous **a.** subsp. **craibii**
1. Leaves almost palmatisect with narrow lobes 0.5–1.75 cm wide; stem indumentum setulose with hairs 0.1–0.2 mm long; ovary disc with some hairs **b.** subsp. **dissecta**

[1] Herbarium, Department of Botany, School of Natural Sciences, Trinity College Dublin, University of Dublin, Dublin 2, Ireland.
[2] Queen Sirikit Botanic Garden, The Botanical Garden Organization, P.O. Box 7, Mae Rim, Chiang Mai 50180, Thailand.

1a. subsp. **craibii**

Herbaceous climber. *Stems* erect, cylindrical, 4–5 mm diameter, ridged, densely pilose with slightly bent hairs 0.3–0.5 mm long, branched; tendril absent; stipules 2, at base of petiole, 2–2.5 by ca 2 mm, base auriculate, apex acute, with an umbonate projection at the base, pilose with hairs 0.1–0.2 mm long. *Leaves* simple, palmatifid, alternate; petiole to 13–14 cm, densely pilose (as stem); leaf blade 3–5(–7) lobate, to 14 by 15 cm, outer lateral lobes ca 3.5 by 2 cm, suboblong, apex rounded with minute tip, inner lateral lobes ca 8 by 3.5 cm, unequally lanceolate, outermost side with rounded with rounded lobes, apex acute, central lobe ca 11 by 6 cm, ovate to subtrilobate, apex acuminate, base auriculate, margin denticulate with minute teeth; adaxial side sparsely pilose particularly on the margins and the midrib, with hairs as described for the stem; abaxial side pilose on main veins, 3–5 main veins protruding and 2–4 pairs of secondary veins. *Inflorescence* ramified, leaf opposed, dichasium compound, 2–3 cm long, densely pilose (as stem); peduncle to 1–1.25 cm long, secondary peduncle 0.7–1 cm long, tertiary peduncle 0.3–0.5 cm, densely pilose (as stem), pedicel to 2 mm long, pilose with hairs 0.05–0.1 mm long. *Buds* ovoid to oblongoid, 2.5 by 2 mm, apex rounded. *Calyx* fused, sinuate, with inconspicuous lobes, 1 by 1.2 mm, densely pilose (as pedicel). *Corolla* greenish, petals 4, ovate, 1.8–2 by 1–1.2 mm, dorsal side pilose (as pedicel), apex on the inside cucullate. *Stamens* 4; filaments filiform, 1 mm long, broader at base; anthers ovate-eliptic, medifixed, 0.5 mm long; pollen numerous, yellowish. *Ovary* adnate with the disk, 0.5 by 1 mm, glabrous. *Style* cylindrical broadening at the base, 0.7 by 0.2–0.3 mm; stigma inconspicuous, 0.05–0.1 mm at the apex. *Fruit* unavailable.

Thailand.— NORTHERN: Chiang Mai [Foot of the Mae Ping rapids, Ban Samoeng, *Kerr* 2181 (**BM, E, K, P**)].

Distribution.— Endemic to Thailand.

Ecology.— In bamboo jungle. Altitude to 150 m. Flowers in Oct.

1b. subsp. **dissecta** (Craib) Trias-Blasi & J. Parn. ***stat. nov.*** Type: Thailand, Ratchaburi [Ratburi], *Kerr* 9008 (lectotype **BM!**, designated here; isolectotype **ABD!, BK!, K!**).— *Cissus dissecta* Craib, Bull. Misc. Inform. Kew 1926: 356. 1926; Craib, Fl. Siam. 1: 306. 1926. Type: as above.— *C. craibii* var. *dissecta* Gagnep. in H. Lecomte, Suppl. Fl. Indo-Chine 1: 891. 1950. Type: as above.

Stem densely setulose with bent hairs 0.1–0.2 mm long facing upwards. *Leaves* simple, palmatifid to palmatisect, petiole 5–7 cm long, setulose; leaf blade (3–)5–7 lobate, to 10 by 10 cm, outermost lateral lobes 5–6 by 0.5–0.8 cm, inner lateral lobes 8–9 by 0.7–1 cm, deeply lobate on the outer side, slightly lobate in the inner side, central lobe, 8 by 1.5 cm, lobate on both sides, apex acute; adaxial side sparsely setulose particularly on venation, hair length as on stem; abaxial side densely setulose, denser on midrib. *Inflorescence* setulose-papillose with hairs <0.1 mm long. *Buds* 1.5–2 by 1.2–1.5 mm. *Calyx* 0.3–0.5 by 0.7–1 mm, densely setulose-papillose (as pedicel). *Corolla* yellow, 1–1.25 by 0.5–0.75 cm, dorsal side densely setulose-papillose (as pedicel). *Stamens* filament 0.7–0.9 by 0.1 mm; anthers 0.4–0.5 by 0.4–0.5 mm. *Ovary* with 4 lobes facing

slightly downwards, 0.3–0.5 by 0.7–1 mm, sparsely pilose at the base of the style. *Style* cylindrical broadening at the base, 0.4–0.5 by 0.2–0.3 mm. *Fruit* unavailable.

Thailand.— SOUTHWESTERN: Uthai Thani [Ban Rai, *Sangkhachand* 981 (**C, E, K, L, P**)]; Ratchaburi [Ratburi, *Kerr* 9008 (**ABD, BK, BM, K**); Kanburi, *Marcan* 932 (**ABD, BM, K**)].

Distribution.— Endemic to Thailand.

Ecology.— In mixed deciduous forest. Altitude ranging from 0 to 70 m. Flowers in July.

Notes.— This taxon has a setulose indumentum with short hairs bending down from their middle towards the stem with the tip nearly rounded. These hairs are arranged mostly upwards in the direction of the upper part of the plant. The hairs covering the inflorescence are considerably shorter than the ones on the vegetative organs, often becoming straighter, and appearing more papillae-like.

General Species Notes.— In the first description of this species Craib (1915) indicated that *Cissus craibii* has similarities with *C. modeccoidi* Planch. [accepted name *Cissus modeccoides* Planch.]. Upon examination of the available specimens the first author observed that they can be easily differentiated mainly because *C. craibii* lacks the hairy indumentum present in *Cissus modeccoides*.

Later, Craib (1926) indicated that *C. craibii* and *Cissus dissecta* Craib share morphological similarities. In 1950, Gagnepain placed *C. dissecta* as a variety of *C. craibii.*

According to the first author's observations, *C. craibii* and *C. dissecta* share morphological characters such as the presence of an umbonate protuberance at the base of the stipules, palmate leaves and a hispid indumentum among other characters. However, there are also some obvious differences, *C. craibii* is different from *C. dissecta* in that it has: 1. palmatifid leaves with broad lobes 2–6 cm wide as opposed to almost palmatisect leaves with narrow lobes 0.5–1.75 cm wide; 2. hairs generally longer (0.3 – 0.5 mm) and denser as opposed to sparser hairs of 0.1 mm long; 3. ovary disc glabrous as opposed to a disc with some hairs. In addition, the specimens examined appear to have a disjunct distribution, with specimens of *C. craibii* only occuring in Northern Thailand (particularly in Chiang Mai province), and specimens of *C. dissecta* only in the South-West (Surat Thani and Ratchaburi provinces). If the specimen labels are accurate there is another clear difference between these two taxa, while *C. craibii* has been found flowering in October while *C. dissecta* does so in July. However it could be the case that the species have a long flowering period, therefore more specimens are required to clarify this matter.

Though the number of specimens available is quite low for both taxa the first author feels that the morphological differences and disjunct distribution are sufficient to separate them into two subspecies. However, further specimen collection in the present locations and a search for them in the intermediate locations such as Tak, Lamphun and Kanchanaburi provinces would provide a better understanding of these taxa. Finally, lectotypes have been designated for both subspecies here by selecting the best specimen representatives for each taxon.

2. Cissus modeccoides Planch. in A.DC, Monogr. Phan. 5(2): 503. 1887; Gagnep., Notul. Syst. (Paris) 1(11): 356. 1911; in H.Lecomte, Fl. Indo-Chine. 1: 971 (1912). Type: Cochinchine [Vietnam], frontiere meridionale, 1865, *Pierre* 4442 (lectotype, **P!**, designated here, barcode P00536130; isolectotype **P!**, barcode P00536129).— *C. kerrii* Craib in Kerr, Bull. Misc. Inform. Kew 1911: 31. 1911, **synon. nov**. Type: Thailand, Chiang Mai [Chiengmai], *Kerr* 1238 (lectotype, **BM!**, designated here; isolectotypes, **E!, P!, TCD!**).— *C. modeccoides* Planch. var *subintegra* Gagnep., Notul. Syst. (Paris) 1(11): 356. 1911; in H.Lecomte, Fl. Indo-Chine 1: 971. 1912. Type: Tonkin: vers Ninh-binh no 82, *Bon* 4229 (lectotype **P!**, designated here).— *C. modeccoides* Planch. var *kerrii* Craib, Fl. Siam. 1: 307. 1926. **synon. nov**. Type: as for *C. kerrii* Craib.— *C. triloba* **sensu** Merrill **non** Loureiro, Trans. Amer. Philos. Soc. 24: 254. 1935.

Herbaceous climber. *Stems* erect, cylindrical, ridged, glabrous, branched, 3–6 mm diameter; tendril heteromorphic, in lower older parts of the stem robust and simple, 10–16 cm long, 1 m diameter, in terminal younger positions slender and bifurcated, 5–6 cm long, 0.3–0.5 mm diameter, born on the stem normally leaf opposed, glabrous, sometimes only the simple type found; stipules 2, at base of petiole, 4–5 by 2–2.5 mm, papyraceous, apex mostly rounded. *Leaves* simple, alternate, heteromorphic; petiole to 6–7 cm by 1 mm, glabrous; upper leaves blade almost entire, lanceolate to ovate (subcordate), to 6–7 by 3–6 cm, base slightly cuneate to attenuate, margin denticulate with small pointed teeth to 0.5 mm long, apex acute to acuminate; lower leaves blade trilobate (sometimes 5-lobate), palmatifid to palmatisect, to 6–10 by 3–11 cm, lateral lobes 2–3 by 1.5 cm, central lobe 6–8 by 2–3 cm, base cuneate to auriculate, margin denticulate with small pointed teeth to 0.5 mm long, apex acuminate to mucronate; both sides glabrous, with 3 (sometimes 5) main veins protruding and 2–4 pairs of secondary veins. *Inflorescence* ramified, leaf opposed, dichasium compound, to 3–5 cm long, glabrous; peduncle 1–3.5 cm long, secondary peduncle 0.5–2.5 cm long, tertiary peduncle 0.2–0.5 cm, glabrous, pedicel to 2–10 mm long, glabrous. *Buds* ovoid to oblongoid, 2–3 by 1.5–2 mm, apex rounded. *Calyx* fused, sinuate, cupuliform, 0.5–1 by 2–2.5 mm, glabrous. *Corolla* petals 4, ovate, 1.5–2.5 by 0.75–1.5 mm, glabrous, apex on the inside cucullate. *Stamens* 4; filaments filiform, slightly broader at the base, 0.7–1.3 by 0.1–0.2 mm long; anthers orbicular, medifixed, to 0.5–0.75 by 0.5 mm; pollen numerous, yellowish. *Ovary* adnate with the disk, crenulated, thin ridge surrounding the disk showing 4 vaguely visible lobes, 0.5–0.75 by 1.25–1.5 mm, glabrous. *Style* cylindrical, broadening at the base, 0.4–1 by 0.2–0.3 mm; stigma inconspicuous. *Fruit* berry, globose with a minute tip, 5 by 6 mm, glabrous, base attenuate, stalk glabrous. *Seeds* 1, globose with a pointed base, 5 by 4 mm (pointed base alone 0.5 by 1 mm), rather smooth with a groove along the perimeter.

Thailand.— NORTHERN: Chiang Mai [Doi Sutep, *Kerr s.n.* (**BM**); *Kerr* 328 (**ABD, BM, E, P, TCD**)]. SOUTH-WESTERN: Ratchaburi [Ban Pa In, *Marcan* 1428 (**ABD, BM**)]. CENTRAL: Saraburi [Sahm Lahn forest, *Maxwell* 74-707 (**AAU, L**)]. Krung Thep Maha Nakhon (Bangkok) [Bangkok, *Kerr s.n.* (**BM**); Bangkok, *Kerr* 3746 (**BM, K**)]. SOUTH-EASTERN: Prachin Buri [Aran Pratet, *Put* 3148 (**BK, BM, K**)]. Rayong [c. 10 miles. E. Rayong HW # 3, *Maxwell s.n.* (**AAU, L**)].

Distribution.— Thailand, Cambodia, Vietnam, China.

Ecology.— In roadside thickets, rocky-bamboo forest, scrub jungle. Found at

altitudes ranging from 0 to 350 m. Flowering period between June and Aug.; fruiting between Aug. and Sept.

Notes.— The species *Cissus modeccoides* was first described in 1887 by Planchon; later Craib in Kerr (1911) described *Cissus kerrii*. These two species share a very similar morphology. In 1911, Gagnepain published a brief revision where he mentioned *C. modeccoides* again as a species and added the variety *C. modeccoides* var. subintegra; in 1912 in another publication, he indicated that, in fact, this variety was a synonym of *C. kerrii*. He also indicated that the separation was based upon examination of the types, from which he observed that *C. kerrii* had much shorter leaf lobes. He also admitted the presence of specimens with intermediate characters.

Having examined both type specimens and other specimens available the first author can confirm that in fact the lobes of *C. modeccoides* are generally longer and perhaps thinner (sometimes appearing palmatisect with 5 lobes) than those of *C. kerrii*. In addition, the first *C. kerrii* description indicates the presence of hairs on the disc above the ovary; the first author did not observe any hairs on the disc of the type specimens for either *C. kerrii* or *C. modeccoides*. Additionally, both descriptions indicate simple tendrils; in the type for *C. kerrii*, the first author observed bifurcate tendrils on the young parts of the stem while the older ones were simple; *C. modeccoides* always has simple tendrils. Another difference observed is the length in the inflorescence, shorter in *C. modeccoides*. Overall the two type specimens present a few character differences but the first author believes that this could be due to variability within the species due to ecological factors. In fact, all Thai specimens available labelled as *C. kerrii* were collected in the Northern region, while the ones labelled as *C. modeccoides* were collected in the Central and South-Eastern regions. This apparent disjunct distribution together with slight morphological differences could lead to the conclusion that these are in fact subspecies. The first author believes that a broader specimen sampling of the species and a search for them in intermediate locations together with a molecular marker analysis of these samples would be required to further assess their taxonomic status. However, with the present material available the first author feels that these slight morphological differences are not sufficient to separate them into species or subspecies.

In 1935 Merrill published an article where he commented on Loureiro's Flora Conchinchinensis (1790). Among his observations there was a "comb. nov." for a *Cissus* species. He indicated that a species previously placed within the Lamiaceae, namely *Callicarpa triloba* Lour. and *Cissus modeccoides* were basionyms for his newly proposed species *Cissus triloba* (Lour.) Merr. No specimens were examined by Merrill, who therefore based his decision solely on the descriptions available. Loureiro (1790) indeed described *Callicarpa triloba* in a brief manner; he did not include any reference to the specimens examined. Among the characters given Loureiro indicated that this species has fruits with 4 seeds, a bifurcate tendril and a calyx with 4 visible lobes. The type specimen for *C. modeccoides* examined here only had immature fruits with 1 seed, a simple tendril and a slightly sinuate calyx with no visible lobes. Based on these character differences the first author believes that *Callicarpa triloba* cannot be a synonym of *Cissus modeccoides*. In fact, if the observations regarding the seed number are accurate, *Callicarpa triloba* cannot be a *Cissus* at all, since *Cissus* only has 1 or 2 seeds, never 4. Therefore Merrill

(1935) could have never been sure (and certainly had no proof) that *Callicarpa triloba* and *Cissus modeccoides* were the same species and thus *Cissus modeccoides* Planch. should be the prevailing name.

Planchon only indicated that he had examined one specimen to construct the first description of *C. modeccoides*; this can be considered as holotype according to Article 37 in ICBN (McNeill *et al.*, 2006). In addition, this specimen was collected by Pierre and since all his type specimens are believed to be held in P (Stafleu, 1983), the first author is confident that the specimen examined is the holotype and not an isotype. Regarding the typification of the synonym *C. kerrii* the first author decided to select as the lectotype the duplicate specimen held in BM since it is the best specimen available. Regarding the lectotypification of the synonym *Cissus modeccoides* Planch. var *subintegra* Gagnep., that particular specimen was selected because it is held in P and all of Gagnepain's types are held there (Stafleu, 1976) and also because it was the first specimen mentioned in the first description of the variety.

Morphologically it resembles *Cissus craibii* because of the leaf shape, however they clearly have a distinct indumentum and tendril. While *C. modeccoides* is completely glabrous and has a heteromorphic tendril, *C. craibii* is hairy and lacks a tendril.

Another species associated with both *C. craibii* and *C. modeccoides*, because of its lobate leaf morphology, is *Cissus marcanii* Craib. However, *C. marcanii* is different from *C. craibii* because it has a bifurcate tendril, its leaf blade is cordate to slightly lobate and the indumentum hairs are erect. In addition, *C. marcanii* is different from *C. modeccoides* because it has a hairy indumentum, its tendrils are always bifurcate and the leaf blade is never palmatisect.

ACKNOWLEDGEMENTS

Thanks to the staff and students in TCD and especially to Atchara Teerawatananon. Thanks to the reviewers of this paper. Thanks for funding to Trinity College Postgraduate Award, Trinity College Postgraduate Travel Fund, *SYNTHESYS* (European Union-funded Integrated Infrastructure Initiative grant), Davis Expedition Fund, IAPT Research Grants Program in Plant Systematics, William Dickson Travelling Fund and Trinity College Botany Department.

REFERENCES

Craib, W.G. (1911). Contributions to the Flora of Siam. II. List of Siamese plants with descriptions of new species. Bulletin of Miscellaneous Information Kew 1911: 7–60.

_____. (1915). XLV. Contributions to the Flora of Siam. Additamentum VIII. Bulletin of Miscellaneous Information Kew 1915: 419–433.

_____. (1926). XLI. Contributions to the Flora of Siam. Additamentum XIX. Bulletin of Miscellaneous Information Kew 1926 337–362.

Gagnepain, F. (1911). Un genre meconnu: classification des *Cissus* et *Cayratia*. Notulae Systematicae (Paris) 1(11): 339–363.

Gagnepain, F. (1912). Ampélidacées. In: Lecomte, H. Flore Générale de l'Indo-Chine. 1: 944–1001. Paris, Masson et Cie.

_____. (1950). Ampélidacées. In: Lecomte, H. Supplément de la Flore Générale de l'Indo-Chine 1: 855–915. Paris, Masson et Cie.

Kerr, A.F.G. (1911). Contributions to the Flora of Siam. Bulletin of Miscellaneous Information Kew 1911: 1–80.

Loureiro, J. (1790). Flora Cochinchinensis. 1. Lisbon: Ulyssipone.

McNeill, J., Barrie, F.R., Burdet, H.M., Demoulin, V., Hawksworth, D.L., Marhold, K., Nicolson, D.H., Prado, J., Silva, P.C., Skog, J.E., Wiersema, J.H. & Turland, N.J. (2006). International code of botanical nomenclature (Vienna Code): adopted by the Seventeenth International Botanical Congress, Vienna, Austria, July 2005 (Regnum Vegetabile 146). Liechtenstein: A. R. G. Gantner Verlag, Ruggell.

Merrill, E.D. (1935). A commentary on Loureiro's "Flora Conchinchinenesis". Transactions of the American Philosophical Society. New Series 24(2): 1–445.

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

Rossetto, M., Jackes, B., Scott, K.D. & Henry, R.J. (2002). Is the genus *Cissus* (Vitaceae) monophyletic: evidence from plastid and nuclear ribosomal DNA. Systematic Botany 27: 522–533.

Rossetto, M., Crayn, D.M., Jackes, B.R. & Porter, C. (2007). An updated estimate of intergeneric phylogenetic relationships in the Australian Vitaceae. Canadian Journal of Botany 85: 722–730.

Roxburgh, W. (1820). *Cissus*. In: Flora Indica. 1: 423–432. Serampore: Mission Press.

Stafleu, F.A. & Cowan, R.S. (1976). Taxonomic literature. Volume 1: A-G: a selective guide to botanical publications and collections with dates, commentaries and types. Utrecht: Bohn, Scheltema & Holkema.

_____. (1983). Taxonomic literature. Volume 4: P-Sak: a selective guide to botanical publications and collections with dates, commentaries and types. Utrecht: Bohn, Scheltema & Holkema.

Soejima, A. & Wen, J. (2006). Phylogenetic analysis of the grape family (Vitaceae) based on three chloroplasts markers. American Journal of Botany 93: 178–187.

Suessenguth, K. (1953). Vitaceae. In: Engler, A. & Prantl, K., Die natürlichen Pflanzenfamilien 20d: 174–333. Berlin, Duncker & Humbolt.

Wen, J. (2007). Vitaceae. In: Kubitzki, K. The families and genera of vascular plants. Vol.9 : Flowering plants. Eudicots: Berberidopsidales, Buxales, Crossosomatales, Fabales p.p., Geraniales, Gunnerales, Myrtales p.p., Proteales, Saxifragales, Vitales, Zygophyllales, Clusiaceae Alliance, Passifloraceae Alliance, Dilleniaceae, Huaceae, Picramniaceae, Sabiaceae 9: 467–479, Springer Verlag, Berlin.

Wen, J., Nie, Z.-L., Soejima, A. & Meng, Y. (2007). Phylogeny of Vitaceae based on the nuclear *GAI*1 gene sequences. Canadian Journal of Botany 85: 731–745.