



Hoya thuathienhuensis and *Hoya graveolens* (Apocynaceae, Asclepiadoideae), a new species and a new record for the Flora of Vietnam

M. Rodda¹, Thê Bách Trân², N. Simonsson Juhonewe³, Lý Ngọc Sâm^{4,5}

Key words

evergreen forest
Hue Green Corridor
Marsdenieae
Thailand
Vietnam

Abstract A new species from the Annamite mountain range of central Vietnam, *Hoya thuathienhuensis*, is here described and illustrated. Its flowers bear similarity with *Hoya lockii*, a taxon recently described from the same area with which it shares the reflexed corolla and the thin coriaceous laves. *Hoya lockii* is an epiphytic shrub, whereas *H. thuathienhuensis* is a strong climbing liana. We also report the noteworthy extension into southern Vietnam of *Hoya graveolens*, a taxon previously considered to be endemic of Thailand.

Published on 1 February 2013

INTRODUCTION

Vietnam has at least 22 *Hoya* R.Br. species (Phạm 1993, Trần et al. 2011a, b, Rodda 2012, Phạm & Averyanov 2012). Eight of these can also be found in neighbouring China (He et al. 2009, Li et al. 1995, Rodda 2012) and six in Lao PDR (Newman et al. 2007, Rodda 2012).

Field investigations carried out in 2010 in central Vietnam resulted in the discovery of a further new taxon whose white reflexed corollas and thin coriaceous leaves superficially resemble those of the co-occurring *Hoya lockii* V.T. Phạm & Aver. (Phạm & Averyanov 2012) but its growth habit is unique among Vietnamese *Hoya* being a strong climbing terrestrial liana. In the present paper the new species, *Hoya thuathienhuensis* T.B. Tran, Rodda & Simonsson, is described and illustrated and its morphological affinities with other *Hoya* species are discussed. Additionally, *Hoya graveolens* Kerr, a taxon in need of lectotypification, is recorded for the first time for the flora of Vietnam.

Hoya graveolens was so far thought to be endemic to Thailand. Herbarium records indicate that apart from a single specimen collected in Nakorn Ratchasima Province (*Maxwell 76-313*) the species appears to be limited to coastal areas in the proximity of Sriracha, the type locality.

Floristic investigations in the karst hills of Kiên Giang Province in southern Vietnam in 2007, 2008 and 2009 by one of the co-authors resulted in the collection of three specimens later identified as *H. graveolens*, thus extending its distribution area eastward more than 500 km. The study of herbarium materials and the observation of the species *in situ* in Vietnam allowed us

to prepare an extended description of the taxon and highlighted the need to select a lectotype.

TAXONOMY

Hoya thuathienhuensis T.B. Tran, Rodda & Simonsson, *sp. nov.* — Fig. 1

Species insignis, a specibus nobis notae bene distincta. Ad *Hoyam lockii* similis ob corollam reflexam et folia lanceolata coriacea; differt ob coronae lobos rotundatos non compressos. — Typus: *M. Rodda LT10-056* (holo HN; iso K, SING), cultivated in Turin, Italy, 9 March 2011, from specimen originally collected in Vietnam, Thừa Thiên-Huế, A Roang, 800 m asl, strong twiner in open secondary forest c. 20 m high.

Etymology. *Hoya thuathienhuensis* is named after the only Vietnamese Province where it has been so far collected, Thừa Thiên-Huế Province in central Vietnam.

Vigorous terrestrial climber with white latex. *Leafy stems* cylindrical, green, up to 5 mm diam, hirsute; older stems leafless, lignified, c. 10 m long, bark peeling, dark brown or grey, glabrous. Internodes (4.5–)15–25 cm, adventitious roots present only if stems in contact with substrate. *Leaves* with petiole adaxially channelled, green, 9–13 by 1.5–2.3 mm, sparsely pilose; lamina coriaceous, oval to elliptic, adaxially dark green with sparse whitish spots, lighter abaxially, 3–6 by 10–15 cm, glabrous, apex cuspidate, base shortly attenuate, penninerved, main vein depressed on adaxial surface, evident on abaxial surface, secondary veins 6–10 pairs evident when dry, held at 60–80°, anastomosing near leaf margins. *Inflorescence* positively geotropic, pseudo-umbelliform, convex, 5–8 cm diam, up to 40-flowered; peduncle extra-axillary, dark green, perennial, presenting scars of previous flowerings, 8–15 cm long, c. 2 mm diam, hirsute when young; pedicels terete, reddish green, 2–3 cm long, c. 0.8 mm diam, glabrous. *Calyx* reddish green, 3–4 mm diam, lobes broadly ovate c. 1.5 by 1 mm with ciliate margins, apex acute, with 1–2 basal colleters at the lobe sinus. *Buds* globose, slightly 5-angled, ivory white. *Corolla* reflexed, white, 14–16 mm diam (20–25 mm when flattened), lobes ovate-lanceolate, 9–11 mm long, free lobe c. 8 by 4–4.5 mm, margins reflexed, apex apiculate, corolla lobes overall glabrous but densely hirsute underneath the corona only. *Corona* stami-

¹ Herbarium, Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569; corresponding author e-mail: rodda.michele@gmail.com.

² Department of Botany, Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam.

³ P.O. Box 1 – 524, Ukarumpa, Eastern Highlands Province 444, Papua New Guinea.

⁴ Department of Biological Resources, Institute of Tropical Biology, Vietnam Academy of Science and Technology, 85 Tran Quoc Toan road, District 3, Hochiminh City, Vietnam.

⁵ Muséum National d'Histoire Naturelle, Département de Systématique et Évolution, case postale 39, 57 rue Cuvier, F-75231 Paris Cedex 05, France.



Fig. 1 *Hoya thuatienhuensis* T.B.Tran, Rodda & Simonsson. a. Sterile branch; b. inflorescence; c. flower, lateral; d. flower, longitudinal median section; e. flower, from above; f. corona, underside; g. pedicel, side and frontal view; h. pollinarium (all: holotype). — Scale bars: a = 5 cm; c–g = 5 mm; b = 1 cm; h = 0.5 mm. — Photos by M. Rodda.

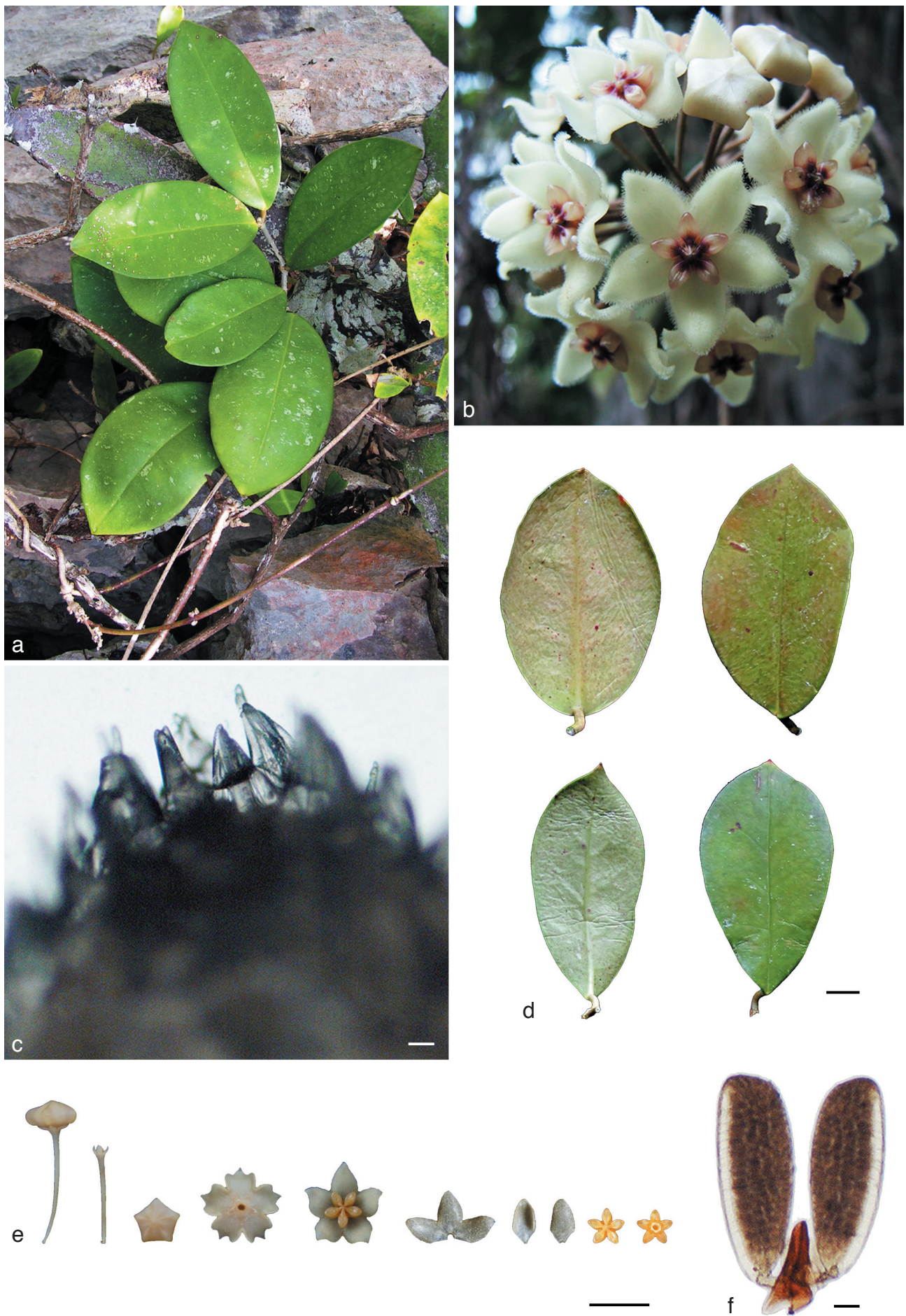


Fig. 2 *Hoya graveolens* Kerr. a. Leafy shoot; b. inflorescence; c. hairs at the base of colla lobes; d. leaves; e. dissected flowers; f. pollinarium (all: Lý 521, HN, P, SING, VNM). Scale bars: c, f = 100 μ m; d = 2 cm; e = 1 cm. — Photos by Lý Ngọc Sâm.

nal, dull yellow, 8–10 mm diam, 4.5–5.5 mm high, filament tube pubescent; lobes from above ovate-round, laterally oblong, c. 4 by 3.5–4 mm; inner process acute, converging, outer process apex round, inner process exceeding anthers by 0.5–1 mm. *Pollinaria* (all measurements approximate) 750 by 500 μm with two oblong pollinia, 550 by 200 μm , apex and base obliquely truncate, retinaculum 90 by 120 μm , caudicles broad, basally connected to the retinaculum c. 200 μm long. *Ovary* bicarpellate, each carpel bottle-shaped, light green with pink tips, c. 2 by 0.7 mm, glabrous, apex acute. *Fruits* and *seeds* not seen.

Distribution — Thừa Thiên-Huế province in Vietnam.

Habitat & Ecology — *Hoya thuathienhuensis* has been observed in secondary evergreen lower montane forest up to 20 m high, in proximity to primary forests. It is a strong climbing liana, rooted in the humus-rich forest floor.

Conservation status — The only locality where *H. thuathienhuensis* has been recorded is within the proposed conservation area of the Hue Green Corridor (Averyanov et al. 2006) thus supporting the long term preservation of the species *in situ*. Nonetheless, *H. thuathienhuensis* is to be considered Data Deficient (DD) according to IUCN Red List criteria (IUCN Standards and Petitions Subcommittee 2011) because it is known from only one collection and thus remains in need of further investigation with respect to future conservation efforts.

Notes — When *H. thuathienhuensis* was first observed in the field it was not in flower. From its vegetative structures, a strong terrestrial climber with coriaceous glabrous leaves, we first thought it may not belong to the genus. What made us initially think that *H. thuathienhuensis* may indeed belong to the genus are its extra-axillary, positively geotropic peduncles, bearing scars of previous flowerings thus diagnostic of the genus (Omlor 1996). After flowering in cultivation it became clear that the taxon belongs to *Hoya* and bears superficial similarities with co-occurring *H. lockii*, the only other *Hoya* species observed in the Hue Green Corridor apart from *Hoya carnososa* R.Br. so far. It can be easily separated from *H. lockii* because of the growth habit: *H. thuathienhuensis* is a strong climbing liana while *H. lockii* is an epiphytic shrub. Further, the corolla lobes are similarly reflexed and densely hirsute underneath the corona in both species but in *H. lockii* they are also slightly pubescent elsewhere and ciliate while in *H. thuathienhuensis* they are glabrous and brilliant; the corona lobes are ovate-round with a short acute inner process depressed among the prominent outer processes (Fig. 1) while in *H. lockii* the corona lobes are laterally compressed and present a prominent inner process bearing a caudate, erect or slightly converging or diverging appendage with a linear, slightly recurved apex, extending 2–4 mm above the apex of the outer process.

The general habit of the plant, a strong terrestrial climbing liana, as said, is rare in *Hoya* and usually typical of species belonging to *Hoya* sect. *Eriostemma*. Species in this section are characterised by mainly terrestrial, non-epiphytic habit, inflorescences on short-lived or deciduous peduncles and large and fleshy corollas with proportionally small coronas (Wanntorp et al. 2011). No species of *Hoya* sect. *Eriostemma* are known to occur in Vietnam. *Pollinaria* in species belonging to sect. *Eriostemma* consist of club-shaped pollinia lacking pellucid margins, attached to the retinaculum by twisted and winged caudicles (Wanntorp et al. 2011). With its perennial peduncles, smaller flowers and oblong pollinia with a clearly distinguished pellucid margin attached to the retinaculum by short broad caudicles (Fig. 1h), *H. thuathienhuensis* does not belong to sect. *Eriostemma*. Its sectional placement is uncertain and on the basis of pollinaria shape, it falls in a phylogenetically unsupported group of species bearing narrow elongate pollinia longer on one side, pellucid margin along the entire dorsal edge, a narrowly rhomboid retinaculum apically pointed and unwinged

caudicles (Wanntorp 2007) whose sectional placement will need to be re-evaluated following recent molecular evidence (Wanntorp et al. 2011).

Hoya graveolens Kerr — Fig. 2

Hoya graveolens Kerr (1939) 461. — Typus: Kerr 4245, Thailand, Sriracha, 15 May 1920 (lecto BM, designated here; iso K, P).

Hoya graveolens was described from a specimen collected in Sriracha, Thailand by Kerr in 1920. Kerr selected as type his collection Kerr 4245 but did not indicate in which herbarium it was deposited thus a lectotype has to be selected. We found duplicates in BM, K and P and we hereby select the BM specimen as lectotype since it is a complete specimen with leafy stems and flowers. It is also the only specimen belonging to Kerr's own herbarium (labelled: Herb. A.F.G. Kerr – Bequeathed 1942) and bears pencilled drawings and measurements of the flowers likely by Kerr's hand.

Terrestrial or lithophytic decumbent climber with white latex. *Leafy stem* slender, cylindrical, green, c. 5 m long, 2–7 mm diam, glabrous, older stems leafless, rust-brown with brown spots, with swollen nodes, glabrous. *Internodes* 2–16 cm with inactive adventitious roots below old nodes, located at or up to 2 mm below the nodes. *Leaves* petiolate; petiole curved or slightly twisted, light green (5–)7–12 by 1.5–3.5 mm, glabrous; lamina fleshy, coriaceous when dry, obovate-elliptic, dark green adaxially with many small whitish spots, light green abaxially, sometimes bearing purple spots, 5.4–7.8 by 3–5.7 cm, glabrous, apex shortly acuminate or cuspidate, base cuneate or rounded, penninerved, main vein depressed on adaxial surface, evident on abaxial surface, secondary veins indistinct on fresh leaves, evident when dry, 3(–5) pairs, at 45–60°. *Inflorescence* positively geotropic, pseudo-umbelliform, globose, c. 5 cm diam, up to 20-flowered; peduncle extra-axillary, green to purple-brown with few brown spots, perennial, presenting scars of previous flowerings, (17–)30–38(–55) mm long, c. 2 mm diam in the central portion, up to 3.5 mm at the apex, glabrous; pedicels terete, green or purple-brown, 1.3–2 cm long, c. 0.6 mm diam, sparsely hirsute. *Calyx* purplish green to light purplish, 3.4–4.1 mm diam, lobes triangular-ovate 1.7–2 by 0.8–1 mm, apex acute with a membranaceous margin, sparsely hairy inside, outer glabrous. *Buds* slightly 5-angled, creamy-white. *Corolla* rotate, concave, white adaxially and purplish white abaxially, 1.5–1.6 cm diam, lobes rhomboid-ovate, membranous, 8–8.3 mm long with free part 5–5.5 by 5–6 mm, margin reflexed, apex pointed and recurved, pilose throughout, hair length near corona 375–450 μm , near apex 300–375 μm . *Corona* staminal, translucent purplish white, turning purple at base, 5.5–5.7 mm diam, 2.5–3 mm high, glabrous; lobes ovate, held horizontally, 2.5–3 by 1.3–1.5 mm, inner process acute, outer process round, inner process exceeding anthers 1–1.4 mm. *Pollinarium* (all measurements approximate) 980 by 700 μm , pollinium oblong, 830 by 300 μm , apex obliquely truncate, base acute-round, retinaculum 370 by 180 μm , caudicle 100 μm long with appendages. *Ovary* bi-carpellate, each carpel ovate, light greenish, 1.2–1.5 by 0.5–0.7 mm, glabrous. *Follicles* fusiform, yellow dotted dark red-black c. 8 cm by 7 mm; *seeds* flattened, c. 5.5 by 1 mm, comose.

Distribution — So far only observed on three small karst hills along the coast in Kiên Giang Province, southern Vietnam.

Habitat & Ecology — Terrestrial or lithophyte, decumbent or weakly climbing, found in shaded areas at 0–110 m asl. The prevailing climate in this area is monsoon subequatorial climate with an annual rainfall of 2100 mm and average temperature of 27.4 °C (Nguyễn et al. 2000). This species has been observed flowering in Vietnam from April to May, in accordance with the flowering period observed in Thailand (March to May).

IUCN assessment — In Vietnam, *H. graveolens* has been observed only on the isolated karst hills of Kiên Giang Province in a total area of less than 3 km². This area is being destroyed by human impacts such as fuel wood cutting, small scale agriculture, and exploited for cement production, making the species likely to become threatened in the future. Based on the IUCN Red List criteria (IUCN Standards and Petitions Subcommittee 2011), we assign a provisional conservation status of Near Threatened (NT).

Specimens examined. THAILAND, *Collins 136B* (K, P), Chonburi Province, Sriracha, Apr. 1913; *Kerr 4138* (K), 29 Mar. 1920; *Kerr 4130A* (K), 18 May 1920; *Maxwell 76-313* (L), Nakorn Ratchasima Province, Sikiew District, Khao Phrik, 8 May 1976; *Maxwell 93-387* (L), Chonburi Province, Si Chang Island, 7 May 1993. — VIETNAM, *Lý 521* (HN, P, SING, VNM), Kiên Giang Province, Kiên Lương District, Bình An commune, 50 m asl, N10°08'23", E104°38'27", 9 Apr. 2009; *Lý et al. 61* (VNM), Kiên Giang Province, Hang Tiền Karst Hill, 45 m asl, N10°11'04", E104°35'41", 04 May 2007; *Lý et al. 125* (VNM), Mo So (Bai Voi) Karst Hill, 47 m asl, N10°13'21", E104°36'54", 16 Apr. 2008; *Lý et al. 185* (VNM), Bà Tài Karst Hill, 99 m asl, N10°10'17", E104°36'07", 12 Apr. 2008.

Acknowledgements This study is part of an on-going research project on the systematics of *Hoya*. Financial support has been received from the National Parks Board Singapore and Synthesys programme, grants no GB-TAF-5657, NL-TAF-676 and DE-TAF-675 to M.R., Vietnam National Foundation for Science and Technology Development (NAFOSTED) grant no. 106.11.41.09 and the project "Bioprospecting on Biological Materials of Vietnam" to T.T.B., the MacArthur Foundation funded project 06-86493, Prof. Lê Công Kiệt and Mr. Trương Quang Tâm to L.N.S, and Helge Ax:son Johnsons Stiftelse for N.S.J. We would like to thank the curators of the following herbaria: A, B, BM, BRUN, E, FI, HBG, HN, K, KEP, L, LAE, P, SAN, SAR, SNP, SING, TO and VNM for help with material and for providing high quality images of herbarium specimens, and two anonymous reviewers for their valuable comments on the manuscript.

REFERENCES

- Averyanov LV, Phan KL, Nguyễn TV, Trần MD, Dũng NT, Thành DV, Hùng LT, Nguyễn TH, Phạm VT, Averyanova AL, Regalado J. 2006. An assessment of the Flora of the Green Corridor Forest Landscape, Thừa Thiên-Huế Province, Vietnam. Report No 1: Part Two. Green Corridor Project, WWF Greater Mekong & Vietnam Country Programme and FPD Thừa Thiên-Huế Province, Vietnam. Downloadable from: http://www.huegreencorridor.org/toolkit/English/documents/GCP/GCP_Report1_BotanicalPart1_EN.pdf.
- He SH, Zhuang XY, Li PT, Lin JY, Li M. 2009. *Hoya baishaensis* (Apocynaceae), a new species from Hainan, China. *Annales Botanici Fennici* 46: 155–158.
- IUCN Standards and Petitions Subcommittee. 2011. Guidelines for using the IUCN red list categories and criteria. Version 9.0. Prepared by the Standards and Petitions Subcommittee. Downloadable from <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.
- Kerr AFG. 1939. XLV—Contributions to the Flora of Siam. Addimentum LII. Bulletin of Miscellaneous Information, Royal Gardens, Kew: 456–465.
- Li PT, Gilbert MG, Stevens WD. 1995. Asclepiadaceae. *Flora of China* 16: 228–236. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis.
- Newman M, Ketphanh S, Svengsuka B, Thomas V, Lamxay P, Armstrong K. 2007. A checklist of the vascular plants of Lao PDR. Royal Botanic Garden, Edinburgh.
- Nguyễn KV, Nguyễn TH, Phan KL, Nguyễn TH. 2000. Bioclimatic diagrams of Vietnam. Vietnam National University Publishing House, Hanoi, Vietnam.
- Omlor R. 1996. Notes on Marsdenieae (Asclepiadaceae) — a new, unusual species of *Hoya* from Northern Borneo. *Novon* 6: 288–294.
- Phạm HH. 1993. *Cây cỏ Việt Nam, An illustrated Flora of Vietnam*, Mekong Printing, Montreal.
- Phạm VT, Averyanov LV. 2012. New species from Vietnam — *Hoya lockii* (Apocynaceae, Asclepiadoideae). *Taiwania* 57, 1: 49–54.
- Rodda M. 2012. Taxonomy of *Hoya lyi*, *Hoya yuennanensis* and *Hoya mekongensis* (Apocynaceae — Asclepiadoideae). *Edinburgh Journal of Botany* 69, 1: 83–93.
- Trần TB, Rodda M, Kim JH. 2011a. *Hoya sapaensis* (Apocynaceae), a new species from Vietnam. *Annales Botanici Fennici* 48, 6: 511–514.
- Trần TB, Kim JH, Kim DK, Lee J, Bui TH, Simonsson Juhonewe N, Rodda M. 2011b. *Hoya ignorata* (Apocynaceae, Asclepiadoideae): an overlooked species widely distributed across South East Asia. *Novon* 21, 4: 508–514.
- Wanntorp L. 2007. Pollinaria of *Hoya* (Marsdenieae, Apocynaceae) — shedding light on molecular phylogenetics. *Taxon* 56, 2: 465–478.
- Wanntorp L, Gotthardt K, Muellner AN. 2011. Revisiting the wax plants (*Hoya*, Marsdenieae, Apocynaceae) phylogenetic tree using the chloroplast markers *matK* gene and *psbA-trnH* intergenic spacer. *Taxon* 60, 1: 4–14.