

Three New Species of *Wrightia* (Apocynaceae: Apocynoideae) from Thailand

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Abstract

Three new species of *Wrightia* from Thailand are described: *Wrightia karaketii* D.J.Middleton, *Wrightia tokiae* D.J.Middleton and *Wrightia poomae* D.J.Middleton.

Introduction

The genus *Wrightia* R.Br. is reasonably well known due to a revision of the entire genus by Ngan (1965), coupled with more recent regional revisions for China (Li *et al.*, 1996), Thailand (Middleton, 1999), Malesia (Middleton, 2007a), Peninsular Malaysia (Middleton, 2010), and Cambodia, Laos and Vietnam (Middleton, in press). This literature has meant that undescribed species have been relatively easy to discern and several have been published in recent years (Middleton and Santisuk, 2001; Middleton 2005a, 2007b). The pattern that has emerged is of a number of widespread species, mostly not growing on limestone, along with several local endemic species, mostly on limestone. Many of the more recent discoveries are these limestone endemics as collecting efforts in a number of countries, particularly in Thailand, have intensified. A similar pattern of widespread non-limestone species and fairly narrowly endemic limestone species can be seen in *Alstonia* R.Br. (Sidiyasa, 1998; Middleton, 2005b). Recent collecting in northern Thailand has brought to light three undescribed species of *Wrightia*, two of them from limestone, the other from dry evergreen forest.

Ngan suggested that *Wrightia* could be divided into four sections. Livshultz *et al.* (2007) sampled six species of the genus in their molecular phylogeny of Apocynaceae subfamily Apocynoideae. The two species of *Wrightia* sect. *Scleranthera* (Pichon) Ngan which were sampled, namely *W. dubia* (Sims) Spreng. and *W. coccinea* (Roxb. ex Hornem.) Sims, are nested within *Wrightia* sect. *Wrightia*. *Wrightia sirikitiae* D.J.Middleton & Santisuk, which was not included in Ngan's system (Ngan, 1965), but would key out to *Wrightia* sect. *Wallida* A.DC., is also nested within *Wrightia* sect. *Wrightia*. No species from *Wrightia* sect. *Balfouria* (R.Br.) Ngan were included. This

section, confined to Africa and Australia, was defined on the basis of the corona lobes being coherent, only attached to the corolla at the very base and forming a ring around the stamens. Of the three new species described here, *Wrightia tokiae* would key out in *Wrightia* sect. *Balfouria* in Ngan (1965), but, given the findings of Livshultz *et al.* (2007), the sectional arrangement should be abandoned until further research is done.

Conservation assessments have been applied to each taxon using the IUCN guidelines (IUCN, 2001; IUCN Standards and Petitions Working Group, 2008).

Wrightia karaketii D.J.Middleton, *sp. nov.*

Corolla rotata. Corona annulum continuum ad corollam praeter fimbrias marginales adnata. Ovaria apocarpa. Fructus bini. – **Typus:** Thailand, Chiang Mai, Chiang Dao, Ban Arunothai, Kio Phawok, 13 May 2007, Pooma, Karaket, Pattharahirantricin & Sirimongkol 6732 (holotype, BKF; isotype, E). **Figs. 1-3.**

Tree 5-10 m tall, 15 cm dbh; bark pale brown, lenticellate; twigs puberulent when young with short hooked hairs, soon glabrescent. **Leaves** opposite; petiole 9-10 mm long, densely puberulent with short hooked hairs; blade elliptic, 9-21 × 5.6-11.8 cm, 1.2-1.9 times as long as wide, apex emarginate-apiculate to rounded-apiculate or shortly acuminate, base cuneate, mid green above, slightly paler beneath, densely puberulent beneath, sparsely so above but more densely so on venation, venation weakly brochidodromous, 15-19 pairs of secondary veins, these occasionally forking, tertiary venation alternate percurrent. **Inflorescence** a short terminal cyme, few-flowered, puberulent; peduncle 8-23 mm long; pedicels *ca* 4.5 mm long. **Sepals** ovate, 3.7-5.5 × 2.5-2.8 mm, apex obtuse, puberulent outside, greenish, with two broad colleters per sepal at base inside, these bifid at the apex. **Corolla** bright red, greenish at base outside, rotate; tube *ca* 2 mm long, minutely puberulent outside; lobes overlapping to the left in bud, obovate, 17-20 × 12-15 mm, apex rounded, papillose inside and outside, minutely puberulent at base outside. Corona bright red, a continuous ring likely to be composed of antepetalous and alternipetalous lobes, adnate to the corolla thereby joining the bases of the corolla lobes together, 4-5 mm long opposite the corolla lobes, slightly shorter between the corolla lobes where it is 2.2-3.2 mm long, glabrous, margin shortly fimbriate, the fimbriae free from the corolla, fimbriae 1.2-1.5 mm long. **Stamens** 5, attached in a ring to the style head, inserted at the mouth of the corolla; filaments *ca* 1.5 mm long, puberulent; anthers yellow, narrowly triangular, base sagittate, *ca* 6.5 × 2 mm, shortly puberulent dorsally. **Gynoecium** of two apocarpous ovaries united into a common style; ovaries *ca* 2.5 mm high, glabrous; style + style head *ca* 6 mm long. **Fruit** of paired



Figure 1. Distribution of *Wrightia karaketii* D.J.Middleton (●), *Wrightia tokiae* D.J.Middleton (▲) and *Wrightia poomae* D.J.Middleton (■).



Figure 2. *Wrightia karaketii* D.J.Middleton - flower (×1.5). Photo of *Pooma et al.* 6732 by Rachun Pooma.

follicles, these pendulous and slightly diverging or occasionally twisting around each other but still free, often rejoining at the tips, 29.5-40 cm long, 7-9 mm wide, brown, densely cream lenticellate, glabrous. **Seeds** linear, *ca* 17.5 x 2.2 mm, coma pointing towards base of fruit, *ca* 31 mm long.

Additional collection studied: THAILAND. Chiang Mai, Chiang Dao District, Kio Phawok border checkpoint, 750 m altitude, 21 Sep 2008, *Middleton, Karaket, Triboun, Kawatkul & Meeboonya 4541* (BK, BKF, E, K).

Distribution: Only known from Kio Phawok in Thailand, very close to the border so is also likely to occur in Burma.

Habitat: On karst limestone rocks in mixed deciduous forest at 750 m altitude.

IUCN conservation assessment: DD. Under IUCN guidelines, as this species is only known from the type locality and there is no information on possible threats, the category of Data Deficient should be given (IUCN Standards and Petitions Working Group, 2008).

Etymology: This species is named after Mr Preecha Karaket, one of the collectors of both known specimens and an excellent photographer.

Notes: This species is highly distinctive with its corona in a ring almost entirely adnate to the corolla and its apocarpous ovaries which give rise to paired fruits. Its affinities are probably with *Wrightia lanceolata* Kerr and *W. siamensis* D.J.Middleton. It differs from both species in its larger leaves, the shorter corolla tube, the slightly longer corolla lobes and the more fimbriate corona.

Wrightia tokiae D.J.Middleton, *sp. nov.*

Corolla rotata. Corona annulum continuum e corolla ad basin exceptum libera. Ovaria apocarpa. Fructus bini. – **Typus:** Thailand, Tak, Maesot, Phawo spirit house on the Tak-Maesot road, 700 m altitude, 24 May 2008, *Pooma, Karaket, Pattharahirantricin & Saengrit 6906* (holotype, BKF; isotypes, A, AAU, BKF, E, K, L, SING). **Figs. 1, 4, 5.**

Tree 15 m tall; bark pale brown, with fine lenticels; twigs densely short puberulent with short hooked hairs, eventually glabrescent. **Leaves** opposite; petiole 4-6 mm long, puberulent; blade ovate to elliptic, 5.3-21 x 3.4-8 cm, 1.4-2.6 times as long as wide, apex acuminate, base rounded to



Figure 3. *Wrightia karaketii* D.J.Middleton - fruit ($\times 0.25$). Photo of *Middleton et al.* 4541 by Preecha Karaket.



Figure 4. *Wrightia tokiae* D.J.Middleton - flower ($\times 0.15$). Photo of *Pooma et al.* 6906 by Preecha Karaket.

acute, densely puberulent beneath, papillose above, sparsely puberulent on midrib, venation brochidodromous, 13-18 pairs of secondary veins, tertiary venation alternate percurrent. **Inflorescence** a terminal cyme, few-flowered, densely puberulent; peduncle 6-10.5 mm long; pedicels 3-5 mm long; flowers slightly fragrant. **Sepals** pale green, ovate, $3.5-4.2 \times 2.4-4.8$ mm, apex obtuse to rounded, puberulent; colleter absent. **Corolla** yellowish green inside, paler outside, fallen corolla reddish, rotate; tube 2.5 mm long, minutely papillose outside; lobes overlapping to the left in bud, elliptic, *ca* 13 x 11 mm, apex rounded, margins reflexed, papillose inside, minutely so outside. Corona yellow, a continuous cup-like ring, slightly narrower at the top than in the middle, adnate to corolla only at very base, *ca* 5 mm long, glabrous inside, minutely papillose outside, margin dentate. **Stamens** 5, attached in a ring to the style head, inserted at the mouth of the corolla; filaments 1 mm long, puberulent; anthers yellow, narrowly triangular, base sagittate, *ca* 7 x 1.8 mm, shortly puberulent dorsally. **Gynoecium** of two apocarpous ovaries united into a common style; ovaries *ca* 1.5 mm high, glabrous; style + style head *ca* 5.5 mm long. **Fruit** of two closely associated but not fused parallel follicles joined at the apex, *ca* 13.5 cm long, each follicle *ca* 1.3 cm wide, dark brown, pale brown lenticellate except on inner surfaces. **Seed** not seen.

Additional collection studied: THAILAND. Tak, Maesot, behind Phawo spirit house, 24 August 2008, *Karaket* 3 (BKF, E).

Distribution: Only known from the type locality.

Habitat: In dry evergreen forest on limestone hills.

IUCN conservation assessment: DD. Under IUCN guidelines, as this species is only known from the type locality and there is no information on possible threats, the category of Data Deficient should be given (IUCN Standards and Petitions Working Group, 2008).

Etymology: This species is named after Ms Nannapat Pattharahirantricin, more commonly known as Tok, one of the collectors of the type.

Note: This species would appear to fall into *Wrightia* sect. *Balfouria* in the sectional system proposed by Ngan (1965). This section is otherwise only known from Africa and Australia. However, as noted above, the sectional arrangement in the genus is in need of revision. In flower it is perhaps most similar to *Wrightia coccinea*, but that species does not have its corona in a ring and the ovaries are syncarpous. There does not appear to be any sepaline colletes in *Wrightia tokiae*, which, although similar in



Figure 5. *Wrightia tokiae* D.J.Middleton - fruit ($\times 0.6$). Photo of *Karaket* 3 by Preecha Karaket.



Figure 6. *Wrightia poomae* D.J.Middleton - flower ($\times 1.5$). Photo of *Pooma* 6973 by Preecha Karaket.

Wrightia poomae, is highly unusual in the genus. The fruit of this species appears to be syncarpous as in *Wrightia coccinea*, but the follicles, although very closely associated (see Fig. 5) are not fused together.

Wrightia poomae D.J.Middleton, *sp. nov.*

Corolla rotata. Corona e lobis antepetalis alternipetalis et alternantibus glabris composita. Ovaria apocarpa. Fructus ignoti. – **Typus:** Thailand, Tak, Umphang, roadside from Huai Nam Khao Forest Protection Unit to summit of Mae Chan Tha Forest Protection Unit, 700 m altitude, *Pooma, Karaket, Pattharahirantricin & Saengrit* 6973 (holotype BKF; isotype A, AAU, BKF, E, K, L, SING). **Figs. 1, 6.**

Tree ca 4 m tall; bark greyish-green; twigs sparsely puberulent when young, soon glabrescent. **Leaves** opposite; petiole 2-5 mm long, sparsely puberulent; blade ovate to elliptic, $2.3-12 \times 1.5-5.6$ cm, 1.8-2.1 times as long as wide, apex acuminate to subcaudate, base obtuse to acute, dull green above, pale green beneath, minutely papillose and very sparsely puberulent on venation above and beneath, venation weakly brochidodromous, 8-12 pairs of secondary veins, tertiary venation alternate percurrent. **Inflorescence** a terminal cyme, few-flowered, sparsely puberulent; peduncle 4-10 mm long; pedicels 2.5-7 mm long; flowers fragrant. **Sepals** pale green, ovate, $4.2-4.5 \times 5.8-6.4$ mm, apex rounded, sparsely puberulent, ciliate; colleter absent. **Corolla** pale yellowish-orange, turning pale red with age, rotate; tube ca 2.7 mm long, minutely papillose outside; lobes overlapping to the left in bud, elliptic, ca 19×13 mm, apex truncate, margins somewhat reflexed, minutely papillose inside, barely so outside. Corona pale orange, of three distinct parts: antepetalous, alternipetalous and alternating lobes, the antepetalous and alternipetalous lobes glabrous inside, minutely papillose outside, the alternating lobes glabrous; antepetalous lobes ca 6.5 mm long, ca 1/3 width of and adnate to corolla lobes for approximately half their length, fimbriate to 1/3 of their length; alternipetalous lobes in same plane as antepetalous, adnate to antepetalous lobes at base, ca 5 mm long, bifid; alternating lobes between the antepetalous and alternipetalous at the very base (but somewhat irregular in number up to 10), simple, ca 1.7 mm long. **Stamens** 5, attached in a ring to the style head, inserted at the mouth of the corolla; filaments ca 1.5 mm long, puberulent; anthers yellow, narrowly triangular, base sagittate, ca 9×2.5 mm, shortly puberulent dorsally. **Gynoecium** of two apocarpous ovaries united into a common style; ovaries ca 2.2 mm high, glabrous; style + style head ca 7 mm long. **Fruit** and **seed** not known.

Distribution: Only known from the type collection.

Habitat: In dry evergreen forest at 700 m altitude.

IUCN conservation assessment: DD. Under IUCN guidelines, as this species is only known from the type locality and there is no information on possible threats, the category of Data Deficient should be given (IUCN Standards and Petitions Working Group, 2008).

Etymology: This species is named after Dr Rachun Pooma, one of the collectors of the type.

Note: This species appears superficially similar to *Wrightia pubescens* R.Br., which is common in Thailand, but that species normally has only two whorls of corona lobes, the corona is pubescent inside and the ovaries are syncarpous. It is most similar to *Wrightia kwantungensis* Tsiang from China and northern Vietnam, which also has three whorls of corona, but that species has smaller sepals with an acute apex and colleters at the base inside, and a much longer corolla tube. There does not appear to be any sepaline colleters in *Wrightia poomae*, which, although similar in *Wrightia tokiae*, is highly unusual in the genus.

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