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Miliusa codonantha (*Annonaceae*), a new species from the Indian eastern Himalaya, with a new combination, *M. dioeca*

Abstract

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A new species from the Indian eastern Himalaya, *Miliusa codonantha*, is described and illustrated. It chiefly differs from *M. macrocarpa*, its most morphologically similar species, in having smaller flowers and considerably fewer stamens and carpels per flower. In addition, a new combination is made for another species of *Miliusa* also occurring on the Indian subcontinent: *M. dioeca* (basionym: *Uvaria dioeca*). The two species as well as *M. macrocarpa* are placed in the previously recognized *M. campanulata* group. The names *U. dioeca* and its heterotypic synonym *M. wallichiana* are lectotypified.

Additional key words: India, *Malmeoideae*, *Miliuseae*, nomenclature, systematics, taxonomy

Introduction

The genus *Miliusa* Lesch. ex A. DC. (*Annonaceae*) consists of c. 50 species distributed throughout the Asian paleotropics (including New Guinea and Australia) and belongs to the tribe *Miliuseae* Hook. f. & Thomson of the subfamily *Malmeoideae* Chatrou & al. (Chatrou & al. 2012; Chaowasku & Keßler in press). It is circumscribed by (1) "sepaloid" outer petals, i.e. outer petals that are similar in size (and often shape) to the sepals, whereas the inner petals are much larger; (2) a densely hairy torus; (3) loosely arranged stamens lacking a conspicuous connective dilation over the thecae ("miliusoid" stamens sensu Mols & Keßler 2003a); and (4) 4-parted lamelliform ruminations of the endosperm (Chaowasku & Keßler 2006, and in press). Four infrageneric morphological groups have been proposed for *Miliusa* (Chaowasku & Keßler 2006, and in press), and were the basis for a detailed palynological study of the genus (Chaowasku & al. 2008). Molecular phylogenetic analyses have revealed the genus *Hubera* Chaowasku to be sister to *Miliusa*, but no synapomorphies uniting the two genera have been identified yet; they only share some features that are common in *Annonaceae*, e.g. reticulate tertiary venation of the leaves (Chaowasku & al. 2012).

During the course of studying *Miliusa* species occurring on the Indian subcontinent, I found one collection that deviates from the previously known species occurring in the same and neighbouring regions (e.g. Cambodia and Vietnam: Chaowasku & Keßler in prep.; Thailand: Chaowasku & Keßler in press). Thorough comparisons with these species necessitate the recognition of the mentioned collection as a new species, which is herein described as *M. codonantha*. In addition to the description of the new species, a new combination of *Miliusa* is made for *Uvaria dioeca* Roxb. The need for the transfer was clearly stated by Turner (2011).

Material and methods

Specimens of the new species and of *Miliusa macrocarpa* Hoof. f. & Thomson (for comparisons, see Appendix) studied were from AAH, ABD, BM, BO, E, G, K, MEL,

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Fig. 1. Holotype of *Miliusa codonantha – Cave* (E 00092548).

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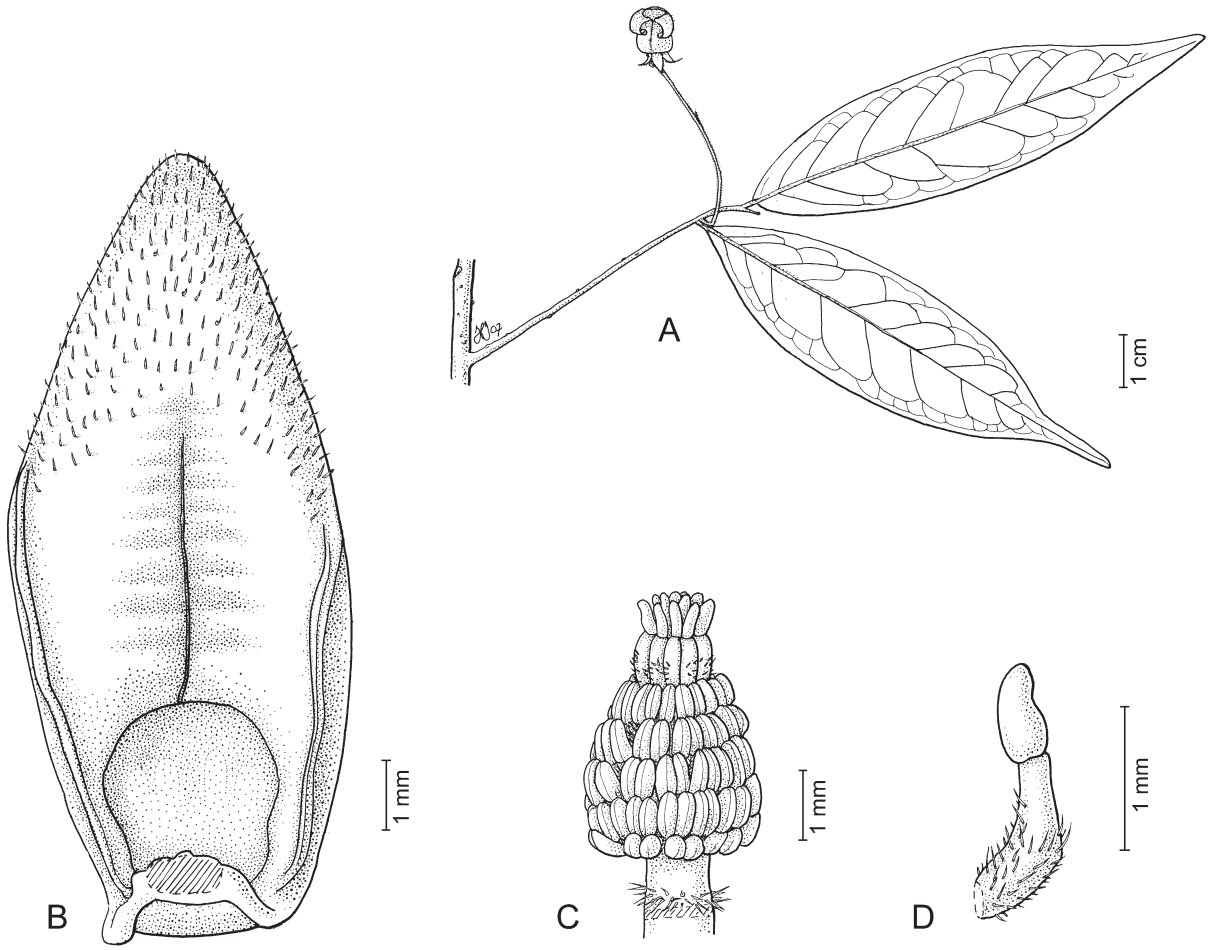


Fig. 2. *Miliusa codonantha* – A: habit; B: inner (adaxial) side of an inner petal; C: flower with sepals and petals removed; D: carpel. – A from the isotype; B–D from the holotype.

and NY herbaria. The indumentum terminology used follows Hewson (1988). The terms "velvety" and "puberulous" are equivalent to densely hairy/with dense hairs and sparsely hairy/with sparse hairs, respectively. When only a single measurement/observation was made, "c." (circa) was added.

Results and Discussion

1. Description of new species

Miliusa codonantha Chaowasku, **sp. nov.**
Holotype: [India, West Bengal State, Darjeeling], Eastern Himalaya, Lal, 4000 ft., 15 May 1919 [in flower], *Cave* (E 00092548; isotype: AAH) – Fig. 1–3.

Description — Treelets (?); y*oung twigs* (appressed-) puberulous-velvety, lenticels often observed. *Petioles* 2–3 mm long, slightly grooved on upper surface, appressed-puberulous. *Leaf blade* (narrowly) elliptic(-oblong), 4.5–14 × 1.5–3.8 cm, lower surface almost glabrous to appressed-puberulous, upper surface glabrous, base cuneate to obtuse, sometimes slightly unequal, apex (caudate-)acuminate; *midrib* raised and almost glabrous to appressed-puberulous on lower surface, slightly sunken and puberulous on upper surface; *secondary veins* 10–12 pairs per leaf, angle with midrib 40°–52°. *Flowers* solitary, axillary, bisexual; *pedicel* 3–3.5 cm long, almost glabrous to (appressed-)puberulous, more densely so near base, sometimes verruculose-rugulose at apex; *bracts* 2 or 3(or 4), caducous, (narrowly) triangular when observed, usually instead only a tuft of hairs and scars observed. *Sepals* (narrowly) triangular, 8–9.8 × 3.1–3.5 mm, outside appressed-puberulous, inside curly-velvety, margin puberulous. *Outer petals* (narrowly) triangular-ovate, 7–8.5 × 2.9–3 mm, indumentum same as on sepals; *inner petals* tightly appressed from base to c. ⅔ of their length at anthesis, elliptic-ovate, c. 14.9 × 6.2 mm, outside glabrous to appressed-puberulous on apical half, inside puberulous on apical half, with ± triangular and slightly coarsely warty discoloration observed around middle and lower parts (in sicco), base not saccate to slightly saccate, margin puberulous, apex considerably recurved upward at anthesis, broadly acute. *Torus* cylindrical. *Stamens* c. 53 per flower, c. 1.2 mm long. *Carpels* 11–14 per flower, 1.5–2.2 mm long; *stigmas* ellipsoid-

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cylindrical; *ovaries* (appressed-)puberulous; *ovule(s)* 1 or 2 per ovary, (sub-)lateral. *Fruits* unknown.

Etymology — The epithet refers to the bell-like appearance of the flowers.

Distribution, habitat and phenology — Eastern Himalaya [India, West Bengal State, Darjeeling (H. Noltie pers. comm.)]. Altitude: c. 1200 m. Flowering: May.

Notes — This species is known only from the type specimens. It is morphologically close to *Miliusa macrocarpa*. The new species differs mainly in having smaller flowers (sepals 8–9.8 × 3.1–3.5 mm, outer petals 7–8.5 × 2.9–3 mm, inner petals c. 14.9 × 6.2 mm vs. sepals c. 12.5 × 8.7 mm, outer petals 12–12.5 × 6.1–7 mm, inner petals 18–20 × 10.5 mm in *M. macrocarpa*), and considerably fewer stamens (c. 53 vs. 86–100 in *M. macrocarpa*) and carpels per flower (11–14 vs. 47–50 in *M. macrocarpa*). *Miliusa codonantha* might be sympatric to *M. macrocarpa*, which occurs in Bhutan (Sarpang District), India (Arunachal Pradesh, Sikkim and West Bengal States), and Nepal (Eastern Region), although *M. macrocarpa* was mostly collected from higher elevations.

The two species, *Miliusa codonantha* and *M. macrocarpa*, belong to the *M. campanulata* Pierre group sensu Chaowasku & Keßler (in press), which is primarily characterized by the inner petals being usually tightly appressed from the base to ± the midpoint at anthesis. The tight cohering of the inner petals of *M. codonantha* at anthesis, however, extends beyond the midpoint to c. ⅔ of the inner petal length from the base (Fig. 2A, 3), resembling that of the recently described *M. umpangensis* Chaowasku & Kessler endemic to Thailand (also a member of the *M. campanulata* group; see Chaowasku & Keßler in press). Both *M. codonantha* (Fig. 2A, 3) and *M. umpangensis* also possess inner petals with a considerably recurved apex at anthesis. Nonetheless, the adaxial side of the considerably recurved inner petal apex of *M. umpangensis* exhibits ± warty glandular structures, whereas that of *M. codonantha* shows no glandular structures. Further, *M. umpangensis* possesses much smaller sepals (c. 1.5 × 1.1 mm) and outer petals (c. 1.7 × 1.2 mm), and smaller number of stamens per flower (c. 20) than *M. codonantha* (sepals 8.0–9.8 × 3.1–3.5 mm, outer petals 7–8.5 × 2.9–3 mm, stamens c. 53 per flower).

The habit of *Miliusa codonantha* is unknown, but it is expected to be "treelets" because all other species in the *M. campanulata* group are usually treelets (e.g. Mols & Keßler 2003b, *M. longipes* King; Chaowasku & Keßler in press).



Fig. 3. *Miliusa codonantha* – enlarged flower, from the isotype. – Scale bar = c. 8 mm.

2. New combination

Miliusa dioeca (Roxb.) Chaowasku & Kessler, **comb. nov.** ≡ *Uvaria dioeca* Roxb., Fl. Ind., ed. 1832, 2: 659. 1832 ≡ *Phaeanthus dioecus* (Roxb.) Kurz in Flora 53: 274. 1870 ["*dioicus*"] ≡ *Hyalostemma roxburghianum* Wall., Numer. List: No. 6434. 1832, nom. illeg. superfl. ≡ *Miliusa roxburghiana* Hook. f. & Thomson, Fl. Ind. 1: 150. 1855, nom. illeg. superfl. – **Lectotype (designated here):** [unknown location and date, in fruit], *Roxburgh* (BM 000595529).

= *Miliusa wallichiana* Hook. f. & Thomson, Fl. Ind. 1: 149. 1855. – **Lectotype (designated here):** [India], Khasia, [unknown date, in flower], *Hooker & Thomson* (K [not seen]; isolectotypes: AAH, BM 000595468, BM 000595472, BR, C [2 specimens], E 00092551, G [2 specimens], L 0048498, M 0024328, MEL 2066160, MEL 2066161, MEL 2066163, NY 00026120, P 00160884, U 0015807).

Notes — This combination is made following the study of Turner (2011), who concluded that the name *Uvaria dioeca* Roxb. has priority over *Guatteria globosa* A. DC. The identity of *Miliusa globosa* (A. DC.) Panigrahi & S. C. Mishra is somewhat problematic. I have seen the types (holotype: Wallich Numer. List No. 6448 [Myanmar, Tavoy, in fruit] G; isotype: K [photograph]) and am certain that it is a *Miliusa* species ± morphologically similar to *M. dioeca*, especially in its leaves and fruits. However, flowers are needed before concluding that it is conspecific with *M. dioeca*, as claimed by several authors (e.g. Hooker & Thomson 1855, 1872; Panigrahi & Mishra 1984).

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Hooker & Thomson (1855) described *Miliusa wallichiana* Hook. f. & Thomson and later synonymized it with *M. dioeca* (Hooker & Thomson 1872, under *M. roxburghiana*). *Miliusa dioeca* is dioecious (but sometimes androdioecious?) (Roxburgh 1832, Hooker & Thomson 1855, under *M. roxburghiana*, androdioecious? ["polygamo-dioicis"] in *M. wallichiana*). The occurrence of (andro)dioecy in *Miliusa* is rare; besides *M. dioeca*, it has been observed in *M. thorelii* Finet & Gagnep. (Chaowasku & Keßler in press). Like *M. thorelii*, *M. dioeca* also belongs to the *M. campanulata* group because its inner petals are tightly appressed from the base to ± the midpoint at anthesis (Roxburgh 1832).

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Appendix

Specimens of *Miliusa macrocarpa* studied

[*Anonymous*] *89* (ABD)
Cave (E 00092559)
Clarke 13638 (BM)
Clarke 27920 (BM, E, G, K)
Cowan (E 00092560)
Gamble 969a (K)
Gamble 9856 (K)
Grierson & Long 4095 (AAH, E, K)
Haines 1091 (E)
Herb. Beddome 99 (BM)
Herb. of the late East India company 383 (AAH, K)
King 2441 (MEL)
Kingdon Ward 18511 (NY)
Kurz (BO 1351133)
Ribu 728 (MEL)
Simons 189 (K)
Stainton 5695 (BM)
Williams & Stainton 8348 (BM, K)

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