

A new species of *Miliusa* (Annonaceae) from the Western Ghats of Karnataka, India

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Within Magnoliales, Annonaceae is the most species-rich family (Chatrou *et al.* 2012). *Miliusa* Leschenault ex De Candolle (1832: 213) is placed in tribe Miliusae, subfamily Malmeoideae, according to the recent infrafamilial classification (Chatrou *et al.* 2012). Chaowasku *et al.* (2014) provided insights into the evolutionary relationships of tribe Miliusae, and Chaowasku & Keßler (2013) reconstructed the phylogeny of *Miliusa* with four well-supported clades. *Miliusa* is distributed across the Austro-Malesian region with most species exhibiting a restricted distribution to certain areas (Mols & Kessler 2003). Species known from India exhibit a high degree of endemism (Kundu 2006).

Hooker & Thomson (1855), Hooker (1872), King (1893) and Gamble (1915) included the genus in their respective taxonomic studies of the flora of British India. Mitra (1993) enumerated 14 species of this genus from India (of which almost half are endemic) showing a disjunct distribution across the country with most species being restricted to northeast India, the Andaman Islands or the Western Ghats. Only two species [*Miliusa tomentosa* (Roxburgh: 1795: 31. t. 35.) Sinclair (1955: 378) and *M. velutina* (Dunal) Hooker & Thomson (1855: 151)] show a wider distribution in India (Mitra 1993). With the addition of recently described taxa [*M. codonantha* Chaowasku (2013: 101), *M. gokhalei* Ratheesh *et al.* (in Narayanan *et al.* 2012: 26), *M. tirunelvelica* Murugan *et al.* (2004: 102), *M. velutina* var. *deviyarina* Rajendran *et al.* (2003: 220), *M. wayanadica* Sujanapal *et al.* in Narayanan *et al.* (2010: 64)], the total number of species in India has increased to 19 species and one variety (Turner 2015). In their recently updated work, Nayar *et al.* (2014) mention 11 species of *Miliusa* from the Western Ghats biodiversity hotspot in India.

During regular explorations around Kudremukh national park, some interesting specimens superficially resembling *Miliusa wightiana* Hooker & Thomson (1855: 149) were encountered and subsequently collected. A critical examination and comparison of the specimens along with a thorough literature review revealed that the specimens are distinct with respect to multiple morphological characters from the known species of *Miliusa* from the Indian subcontinent and the species is therefore described anew. A complete taxonomic description along with an illustration and additional ecological notes are provided here.

Miliusa malnadense Page & Nerlekar, *sp. nov.*, Figs. 1 & 2

This species can be distinguished by the presence of pubescent young branches, coppery red young leaves, inner petals glabrous outside, apices and margins densely puberulous inside and purple coloured, carpels elongated, curved and pubescent throughout its length, ovoid-oblong stigma and globose monocarps.

Type:—INDIA. Karnataka: Chikmagalur district, Kudremukh National Park, 13.131633 N 75.280404 E, 1450 m, 18 November 2013, (with flowers), Page 102 (holotype MH!, isotype JCB!, FRLH!).

Small evergreen trees, 3–5 m; bark grayish brown, branches terete, lenticelled and pubescent when young. Leaves simple, alternate, 5.0–11.5 × 1.5–3.5 cm, oblong to lanceolate, bases slightly unequal, cuneate or rounded, apices acute to acuminate, petioles 2–3 mm, pubescent in young leaves, glabrous when mature; young leaves coppery red; margins entire, ciliate at least in young leaves; midrib and nerves rusty tomentose on the abaxial surface and sparsely so on the adaxial surface; 8–9 pairs of secondary nerves, prominent beneath and faintly looping. Flowers axillary and solitary, bisexual; pedicels 2.5–3.0 cm, glabrous; bracts 3, minute, triangular, ca. 0.5 mm, 2 basal and one just above them, ovate-lanceolate, densely tomentose; sepals 3, each 1.0 mm, triangular, acute, ciliate, reflexed; petals 6 (3+3), outer 3 reduced, sepaloid, ovate, 1.0 mm, alternate to sepals; inner 3 elliptic-lanceolate, acute, purple with faint maroon streaks inside, c. 2.0 × 1.5 cm, tightly appressed at base, veins 7, glabrous outside, apices and margins densely puberulous, basal saccate portion glabrous inside, recurved along

margins; torus ovoid; stamens numerous, paired, in ca. 5 whorls, ca. 1×1 mm, intermixed with numerous ca. 0.5 mm long hairs that are present on the torus; staminodes absent; connectives, not extending at apex, obtuse at top; anthers extrose; carpels up to 10, elongated, curved, pubescent throughout the outer ovary wall, ca. 2 mm, with 1–2 ovules; styles short or absent; stigmas ovoid to oblong, slightly tilted, with viscous exudates. Fruiting pedicel terete, 3 cm; monocarps 6–10, each up to 10 mm across, globose, glabrous, mucronate; stipes 8–10 mm long; seeds one or two (ripe fruits not found).

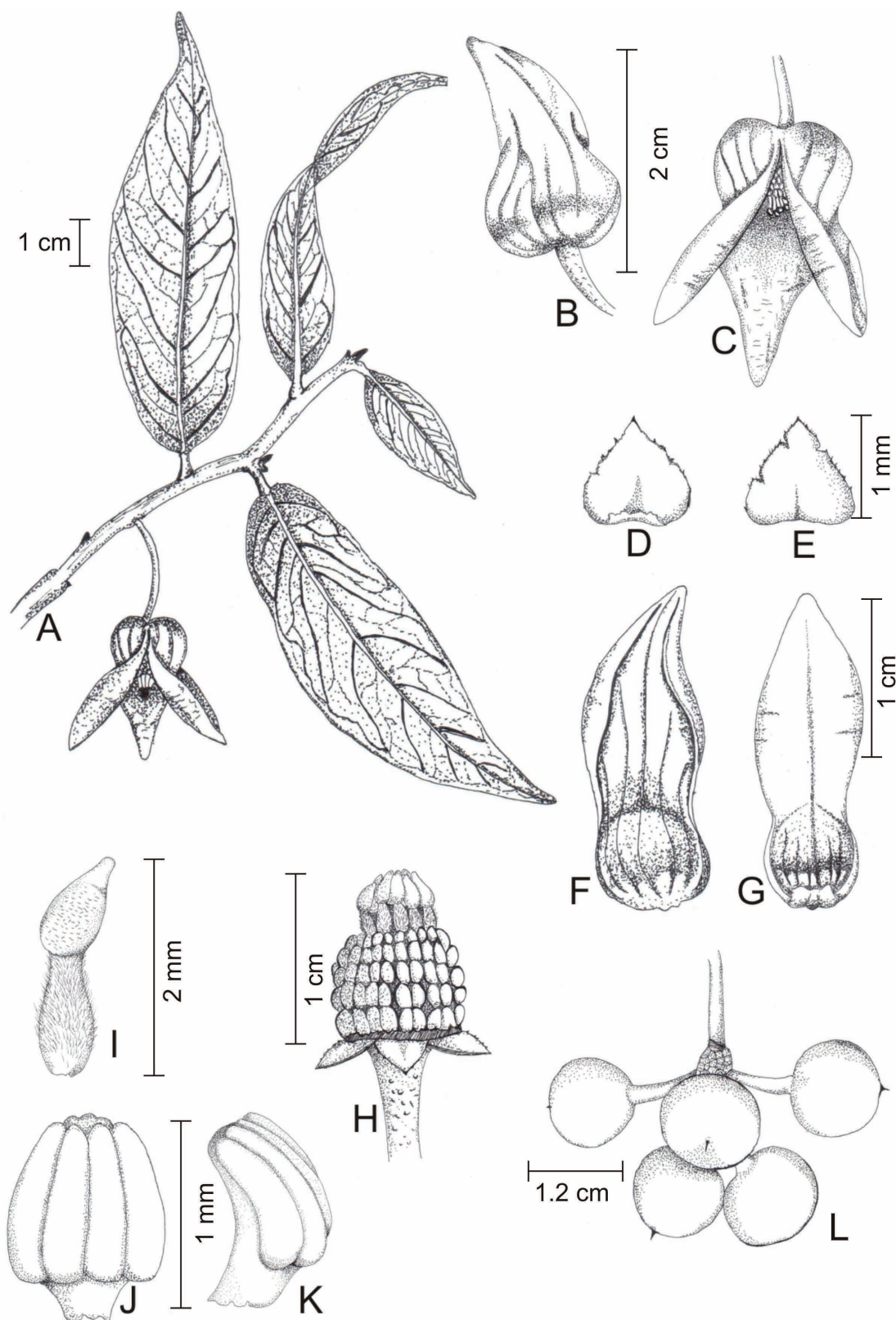


FIGURE 1. *Miliusa malnadense*. A. Flowering twig. B. Flower bud. C. Mature flower. D. Sepal. E. Outer petal. F. Inner petal, ventral view. G. Inner petal, dorsal view. H. Flower with petals removed. I. Carpel. J. Stamen frontal view. K. Stamen lateral view. L. Monocarps. Illustration by Ravi Jambhekar.

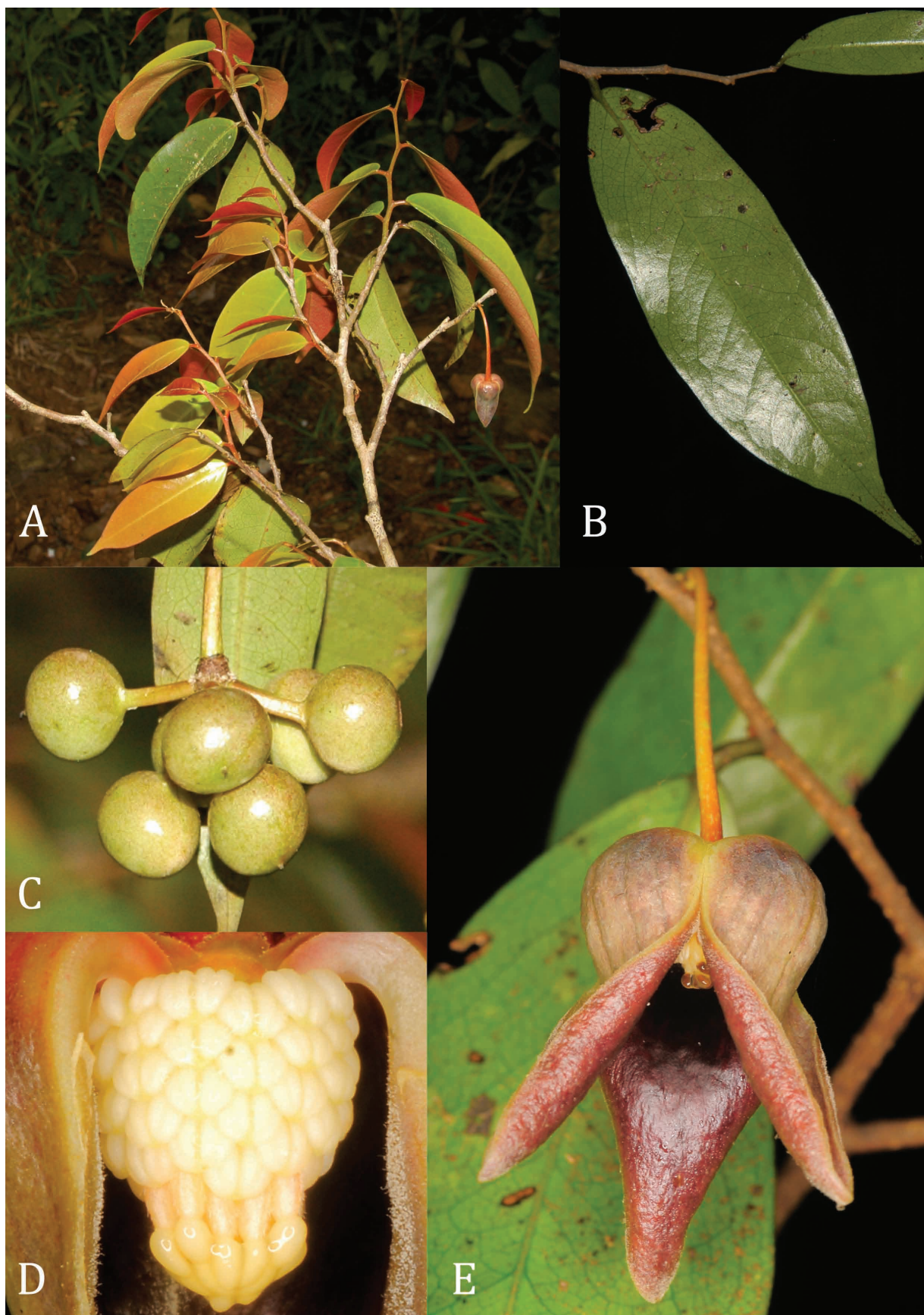


FIGURE 2. *Miliusa malnadense*. A. Twig showing new foliage and bud. B. Leaf. C. Monocarps. D. Lateral section of mature flower. E. Mature flower. Photographs by Navendu Page.

Phenology:—Flowering and fruiting seen from November to May.

Etymology:—The specific epithet “*malnadense*” refers to the Kartanaka part of the Western Ghats from Shimoga to Kodagu which is the currently known distribution range of this species.

Distribution and associated species:—*Miliusa malnadense* is so far known only from the Kudremukh national park in the Western Ghats mountain range which is one of the global biodiversity hotspots (Myers *et al.* 2000). *Miliusa malnadense* is probably restricted to forests at elevations above 1000 m in the Shola-Grassland ecosystem that harbor significant proportion of endemic taxa (Robin & Nandini 2012). Associated species observed in the type locality were species of the genus *Ochlandra* Thwaites, *Lasianthus* Jack, *Cinnamomum* Schaeffer, *Myristica dactyloides* Gaertner, *Euonymus indicus* B.Heyne ex Wall. and *Schefflera micrantha* (C.B.Clarke) Gamble. Conservation status—Data Deficient.

Interrelationships and critical notes:—*Miliusa malnadense* resembles *M. tirunelvelica* and *M. wightiana* in having long glabrous pedicels, the shape of the corolla and the ciliate sepals and outer petals. It differs from both taxa in characters listed in Table 1. We speculate that *M. malnadense* belongs to the *M. campanulata* Pierre (1881: 41) group based on the tightly appressed nature of the inner petals (Chaowasku & Keßler 2013). *Miliusa tirunelvelica* and *M. wightiana* are not known to occur at the type locality of the new species.

TABLE 1. Distinguishing characters of *M. malnadense* and other closely related species

characters	<i>M. malnadense</i>	<i>M. wightiana</i>	<i>M. tirunelvelica</i>
branches	pubescent, at least in the younger stages	glabrous, striate	pilose
leaf shape, size and colour	oblong to lanceolate, 5.0–11.5 × 1.5–3.5 cm, coppery red when young	narrowly oblong to lanceolate, 4.5–9.5 × 1.5–5.0 cm, green when young	elliptic to lanceolate, 4.0–9.0 × 1.0–2.5 cm, green when young
leaf margin	ciliate	glabrous	ciliate
petiole	pubescent, turning glabrous with age	glabrous	brown pilose
pedicel	2.5–3.0 cm, glabrous	1.5–2.5 cm, glabrous	1.5–4.0 cm, sparsely pilose
sepal and outer petal	ciliate	ciliate	sparsely pubescent
inner petal	glabrous outside, apices and margins densely puberulous inside, purple with maroon streaks inside	puberulous outside, pink or greenish	sparsely pubescent outside, glabrous inside. Pink with white tinge
anthers	0.5–1.0 mm long	1.0 mm long	1.5 mm long
carpels	elongated, curved, pubescent throughout length of outer ovary wall	oblong, glabrous	oblong/falcate, pubescent only at base
stigma	ovoid-oblong	oblong	obconical
monocarps	globose, apex mucronate, up to 1 cm across	pisiform, oblong, 1 cm across, apex apiculate or mucronate	oblong, 1.0–1.5 × 0.8–1.0 cm, apex obtuse

Although Mitra (1993) described the carpel of *M. wightiana* as ‘pubescent with straight hairs’, authentic sources like Hooker & Thomson 1855 (protologue), Hooker (1872), Gamble (1915) and King (1893) in addition to personal field observations confirms that the carpel is glabrous in this species. It is possible that the specimens collected as *M. wightiana* from the Shimoga district of the same state [(KFP 6838 (JCB!))] may be *M. malnadense*, but due to inadequate evidence from the herbarium sheet, we cannot strongly ascertain its identity.

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