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RESEARCH COMMUNICATION

Synonymy of *M. flaviviridis* and *M. ammaiae* under *M. wightiana* based on morphological evidence

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Abstract

A recent taxonomic study within the genus *Miliusa* has revealed that *Miliusa flaviviridis* N V Page, Poti and K Ravik and *Miliusa ammaiae* Karuppusamy and P S S Richard, both described from the same type locality- Naraikadu Estate, Kalakkad, Tamil Nadu exhibit close morphological resemblance to *Miliusa wightiana* Hook. f and Thomson. Upon re-examination of live specimens and herbarium materials, including type specimens, it was determined that *M. flaviviridis* and *M. ammaiae* are conspecific with *M. wightiana*. Notably, the original descriptions of *M. flaviviridis* and *M. ammaiae* did not provide comprehensive comparisons with *M. wightiana*. Based on the morphological evidence, we propose that *M. flaviviridis* and *M. ammaiae* be treated as taxonomic synonyms of *M. wightiana*. Photographs illustrating key morphological and taxonomic characters are provided to support the proposed synonymy.

Keywords: Annonaceae; conspecific; holotype; KMTR; *Miliusa*; synonym

Introduction

Miliusa Lesch. Ex. A. DC is a genus in the family Annonaceae, comprising approximately 60 species distributed across the Austro-Asiatic region (1, 2). Members of the genus range from small treelets to tall trees, reaching up to ~40 m and inhabit both evergreen and dry habitats (1). In India, *Miliusa* is represented by 26 species and 2 varieties. Based on molecular phylogenetic evidence, *Miliusa* is consistently placed within the subfamily Malmeoidea, tribe Miliuseae (3). A recent phylogenomic study of Annonaceae at the genus level has further refined its placement within the subtribe Phaeanthinae (4). Interestingly, *M. ammaiae* and *M. flaviviridis* were reported and described from the same type locality (5, 6). *M. wightiana*, rediscovered from its type locality in the Courtallum Hills after 154 years, was previously considered to be restricted to the Tirunelveli Hills, specifically Courtallum, Mancholai and Papanasam (7). However, our recent field explorations reveal that *M. wightiana* is more widely distributed and extends across the entire Kalakkad-Mundanthurai Tiger Reserve (KMTR).

A taxonomic revision of the genus in India led to the collection of *M. ammaiae* and *M. flaviviridis* from the same locality Naraikkad estate, KMTR, Tirunelveli district, Tamil Nadu. A detailed re-examination of morphological characters from both live and herbarium specimens indicated that *M. flaviviridis* and *M. ammaiae* are conspecific with *M. wightiana*, exhibiting no significant morphological differences. In the absence of distinct morphological features supporting their recognition as separate species, we propose that *M. ammaiae* and *M. flaviviridis* be synonymised under *M. wightiana*. Photographs of diagnostic morphological and taxonomic characters, including the holotype of *M. wightiana*, are provided to support the proposed synonymy (Fig. 1, 2).

Materials and methods

Live specimens of *M. wightiana*, *M. ammaiae* and *M. flaviviridis* were collected and studied through field investigations, including visits to type localities, in Papanasam, Mancholai, Courtallam and Kalakkad, Tamil Nadu. A critical examination of herbarium specimens, including type specimens, was performed from the following herbaria: MH (Madras Herbarium), Sri Ganesan Herbarium (The Madurai College), Tropical Botanic Garden and Research Institute, Thiruvananthapuram (TBGT), Calicut University Herbarium (CALI) and Foundation for Revitalisation of Local Health Traditions (FRLH). Additionally, high-resolution digital images of herbarium specimens from the Royal Botanic Gardens, Kew (K), available through JSTOR Global plants and respective herbarium websites were analysed. A comprehensive literature review was also undertaken to support the taxonomic assessment.

Results

Taxonomic treatment

M. wightiana Hook. f. and Thomson

Fl. Ind. 149. 1855; Fl. Brit. India 1:87. 1872; Fl. Pres. Madras 1:21.1915; Fl. Tamil Nadu series 1: Analysis 1983; Fl. Courtallum 1: 23. 1986; Fl. India 1: 222. 1993 (Fig. 1, 2).

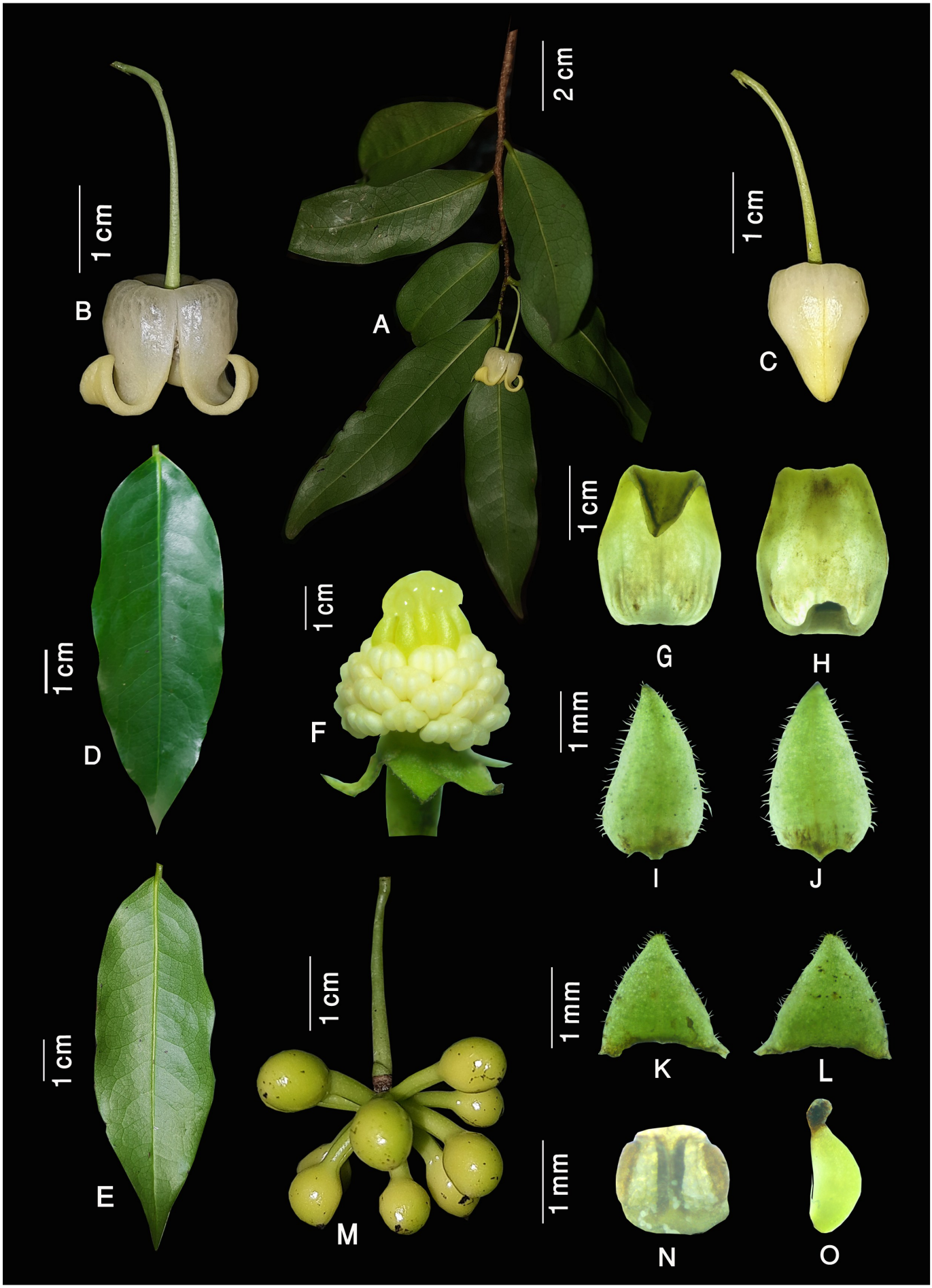

Fig. 1. *Miliusa wightiana*. **A.** Twig with flower; **B.** Flower; **C.** Bud; **D.** Leaf adaxial surface; **E.** Leaf abaxial surface; F. Receptacle; **G.-H.** Inner petal; **I.-J.** Outer petal; **K. - L.** Sepal; **M.** Fruit; **N.** Anther; **O.** Carpel.

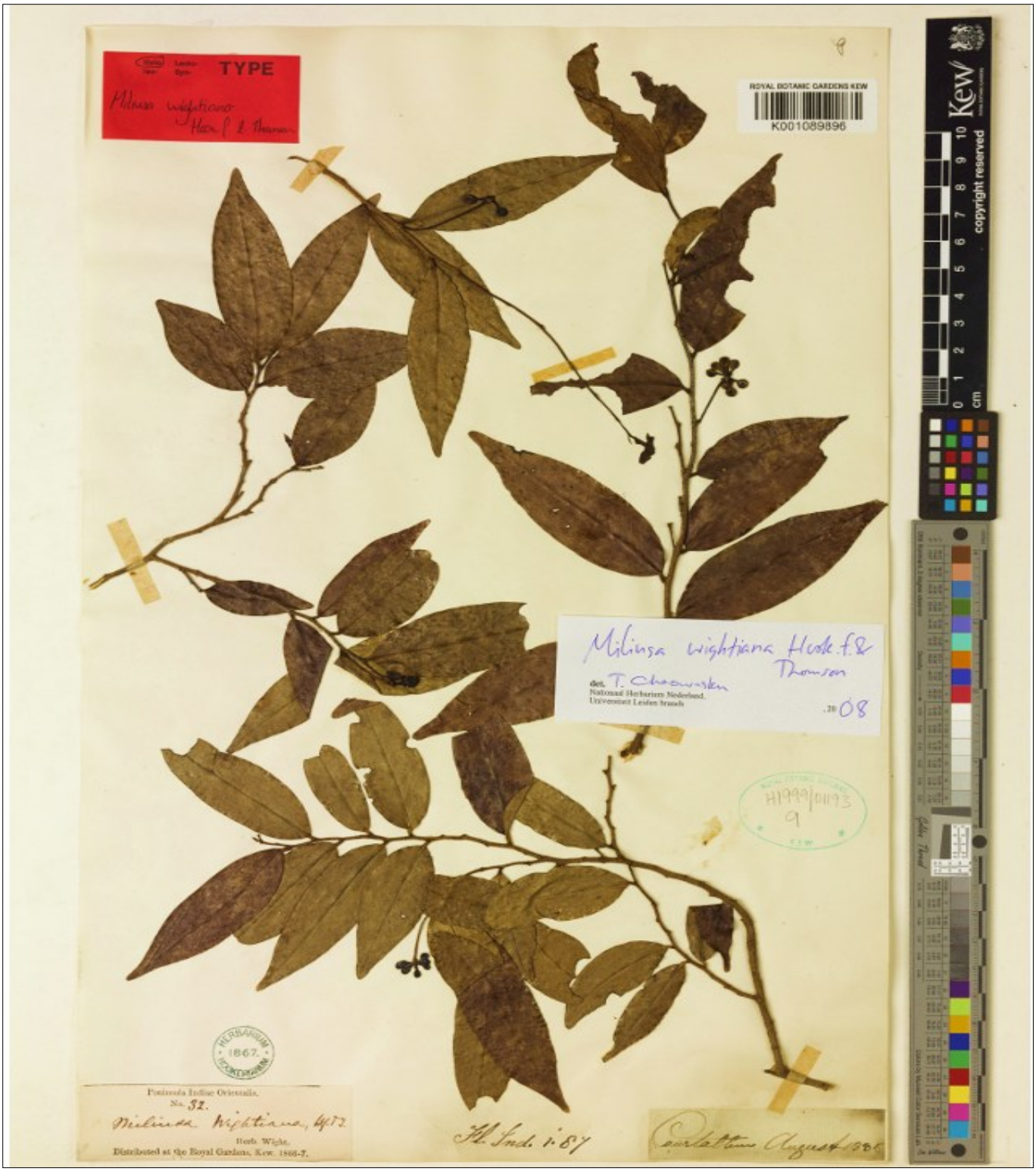

Fig. 2. Holotype of *M. wightiana* Hook. f. and Thomson (K001089896). Image reproduced with permission of © The Board of Trustees of the Royal Botanic Gardens, Kew. http://specimens.kew.org/herbarium/K001089896.

Synonyms

Miliusa flaviviridis N. V. Page, M. Poti and K. Ravik.

Type:-INDIA. Tamil Nadu: Tirunelveli district, Kalakad Mundanthurai Tiger reserve, Thirukurungudi range, Naraikadu, 900-1200 m, 22 February 2014, Page 104 (holotype: Foundation for Revitalisation of Local Health Traditions (FRLH!); isotypes: J C Bose Herbarium (JCB!), Madras Herbarium (MH!).

Miliusa ammaiae Karupp. and P. S. S. Rich.

Type: India, Tamil Nadu, Tirunelveli district, Kalakadu Mundanthurai Tiger Reserve, Naraikadu Estate, Karuppusamy and Selva Singh Richard 1210 (Holotype Madras Herbarium (MH!); Isotypes Sri Ganesan Herbarium, The Madura College, Madurai; MH; Royal Botanic Gardens, Kew!).

Diagnosis

Vegetative characters

Shrubs or small trees; bark grey; branchlets terete, glabrous. Leaves alternate, simple, lanceolate, glabrous, glossy, base acute, apex acuminate; midrib slightly prominent above, impressed; nerves 8-15 pairs; petiole 2 mm long, glabrous.

Floral characters

Flowers bisexual, solitary, axillary, greenish-yellow; bracts 3; pedicels ca. 3 cm long, glabrous. Sepals 3, triangular, glabrous, margin ciliate. Petal 6 (3 + 3), outer petal 3, ovate, glabrous, apex acute; inner petal 3, broadly ovate, apex acute, base conspicuously saccate, greenish-yellow, apex reflexed. Stamens ca. 30, anthers dithecous, connective apiculate. Carpel ca. 10, oblong, stigma ovoid; ovules 2.

Fruit

Monocarps 8-10, globose, obtuse at apex, glabrous; stipe ca. 7 mm long; seed 1-2, ovoid, endosperm ruminate.

Distribution and ecology

M. wightiana is distributed across the moist evergreen forests of KMTR, the southern Western Ghats. They mainly thrive in moist soil, particularly along the margins of streams at an elevation above 750 m. Its population appeared to be highly restricted and represented by only a limited number of individuals. The conservation status of the species has not been assessed under the IUCN criteria.

Phenology

Flowering and fruiting from January to May.

Discussions

Critical examination of live and herbarium specimens of *M. wightiana*, *M. flaviviridis* and *M. ammaiae* revealed valuable taxonomic insights about their close morphological resemblance. According to the taxonomic description of *M. flaviviridis*, the author compared *M. flaviviridis* with *M. wightiana*. However, the comparison with *M. wightiana* appears to have been based on a misinterpretation of its diagnostic characters. *M. wightiana* was described as possessing pink flowers, oblong fruit and long pedicel, which were inconsistent with the type and verified specimens of *M. wightiana* (6). Additionally, the taxonomic characters of *M. ammaiae* were not compared with *M. wightiana*, leading to an incomplete assessment of its diagnostic features (5). Furthermore, it is noteworthy that the taxonomic descriptions of both *M. flaviviridis* and *M. ammaiae* were consistent with the diagnostic characters of *M. wightiana*. Previous works described *M. wightiana* based on a collection by Robert Wight from Courtallam, Tamil Nadu (8). After 154 years, *M. wightiana* was rediscovered from its type locality and was reported to be endemic to Courtallum, Mancholai and Papanasam hills of Tirunelveli District, Tamil Nadu (7). However, our study revealed that the distribution range of *M. wightiana* could potentially be extended to the moist tropical evergreen forests of the Kalakkad range of Kalakkad-Mundanthurai Tiger Reserve (KMTR) at an elevation of 750-1300 m. Based on the evidence from the detailed examination of morphological characters and literature survey, we conclude that *M. flaviviridis* and *M. ammaiae* are fully identical with *M. wightiana*, and should be merged.

Conclusion

M. wightiana was originally described by Hook. f. and Thomson, based on a collection by Robert Wight from Courtallum, Tamil Nadu. Subsequently, *M. flaviviridis* and *M. ammaiae* was described essentially from the same locality, Naraikadu Estate, KMTR (5, 6). Upon re-examination of live specimens and herbarium materials, including type specimens, our study confirmed that *M. flaviviridis* and *M. ammaiae* are conspecific with *M. wightiana*. Notably, the original descriptions of *M. flaviviridis* and *M. ammaiae* did not provide comprehensive comparisons with *M. wightiana*. Based on the morphological evidence, we propose that *M. flaviviridis* and *M. ammaiae* be treated as taxonomic synonyms of *M. wightiana*. This synonymy clarifies the taxonomy of the genus in the region and aids future biodiversity and conservation studies.

Acknowledgements

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Authors' contributions

SKH carried out all taxonomic studies and drafted the manuscript. GR has authenticated the specimens as well as critically reviewed the manuscript. Both authors read and approved the final manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interest to declare.

Ethical issues: None

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