Status of names of *Mitrasacme* species occurring outside Australia

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Abstract

Species of *Mitrasacme* occurring in Australia were revised for the *Flora of Australia* project in 1996, but the genus has never been revised as a whole. A checklist of the names of *Mitrasacme* species that occur outside Australia is presented here, together with their taxonomic status, known distribution and notes on their morphological affinities. *Mitrasacme inornata* Dunlop is formally placed into synonymy under *M. albomarginata* Leenh., and *M. erophila* subsp. *grandiflora* J.Parn. & O.Griffin is formally placed into synonymy under *M. nidulifera* Dunlop. Lectotypes are designated for *M. elata* R.Br., *M. pusilla* Dalzell and *M. setosa* Hance. Neotypes are designated for *M. crystallina* Griff and *M. indica* Wight. The status of *Mitrasacme saxatilis* Backer ex Cammerl. is uncertain; it is doubtful this species should be placed in *Mitrasacme*.

Introduction

*Mitrasacme* Labill. (Loganieae, Loganiaceae) is most species-rich in Australia, but has a geographic range that extends north through Malesia to Asia and east to New Caledonia. Of the approximately 55 species currently recognised in *Mitrasacme*, 50 species occur in Australia (c. 43 endemic) (Dunlop 1996, Barrett and Barrett 2015, Gibson and Leeuwen 2015), with at least four putative new Australian species awaiting formal recognition. Dunlop (1996) provided the first revision of Australian species of *Mitrasacme* since Bentham and Mueller (1869), but did not review species not occurring in Australia. Asian and Malesian species have been revised in various regional floras (Leenhouts 1962b [Malesia], Backer and Bakhuizen van den Brink 1965 [Jawa, Indonesia], Tirel-Roudet 1972 [Cambodia, Laos, Vietnam], Conn 1995 [Papua New Guinea], Li and Leeuwenberg 1996 [China], Griffin and Parnell 1997 [Thailand]), but *Mitrasacme* has never been revised as a whole, and the account by Dunlop (1996) remains the most comprehensive treatment.

Of those species of *Mitrasacme* occurring in Australia, three species, *M. erophila* Leenh., *M. indica* Wight and *M. pygmaea* R.Br., are also widespread in Malesia and Asia, with *M. pygmaea* also occurring in New Caledonia. *Mitrasacme albomarginata* Leenh., *M. elata* R.Br. and *M. nudicaulis* Reinw. ex Blume are recorded from Australia and New Guinea, with *M. elata* also found on Kepulauan Aru (Aru Islands, Indonesia), and *M. nudicaulis* also from Nusa Tenggara, Indonesia (Lesser Sunda Islands) and Timor Leste. The remaining non-endemic Australian species also occur in Southeast Asia, with species of *Mitrasacme* not recorded in Australia occurring in Southeast Asia and New Guinea. It is uncertain whether the geographic ranges of two Australian species, *M. retroloba* Dunlop and *M. prolifera* R.Br. (Dunlop 1996), extend outside Australia.
They are not dealt with separately here, but see notes on *M. erophila* for information on *M. retroloba*, and notes on *M. indica* for information on *M. prolifera*. Additionally, the full geographic range of *M. micrantha* Domin outside Australia is not known (see notes under that species). *Mitrasacme* was previously regarded as occurring in New Zealand, but all taxa have now been transferred to *Schizacme* Dunlop (Gibbons et al. 2014) or to *Veronica* L. (Plantaginaceae) (Kirk 1896, Garnock-Jones et al. 2007).

Here, we present a checklist of the currently accepted species names of *Mitrasacme* occurring outside Australia, together with their known distribution and notes on their morphological affinities. Two new synonymies are presented and the status of previously published synonymies for all accepted names in *Mitrasacme* has been confirmed from photographic images of type material and/or descriptions given in the protologue, except in the few instances where descriptions and available images were insufficient to place the taxon.

**Nomenclature**

**Currently accepted species of *Mitrasacme* occurring outside Australia**


**Type:** Indonesia: Papua: Digul: Koerik bivouac near Merauke, 7 Sep 1954, *van Royen 4847* (holo: L, photograph!).

**Distribution:** The holotype of *Mitrasacme albomarginata* is the only extra-Australian collection of this species. In Australia *M. albomarginata* is known (as *M. inornata*) from few collections; in Queensland from near Weipa, Cape York Peninsula, and in the Northern Territory from Arnhem land, Groote Eylandt (Gulf of Carpentaria), the Tiwi Islands, Coburg Peninsula and near Darwin (AVH 2015). The Indonesian Papua collection is not geographically distant from Australian collections, with this near-coastal species encircling the Gulf of Carpentaria.

**Notes:** Dunlop’s (1996) description of *M. inornata* makes no mention of the white margins of the leaves and calyx lobes described by Leenhouts (1962b), but in Australian material the leaf margin appears to be thickened to slightly hyaline. Dunlop (1996) gives the pedicel length in Australian material as up to 17 mm long, compared with 5–10 mm long given in the protologue of *M. albomarginata* (Leenhouts 1962b). The two descriptions are otherwise in agreement. Our examination of images of the holotype of *M. albomarginata* indicates pedicels are up to 15.5 mm long. The phylogenetic affinities of *M. albomarginata* are with the Australian endemic species *M. alsinoides* R.Br. and *M. secedens* Dunlop (Gibbons et al. in prep), with morphology also resembling *M. indica* and *M. bogoriensis* Leenh.


**Type:** Indonesia: Java: Jawa Barat: Batavia Residency, along the river Tji Handjawr [Cihanjawar River], E of Bogor, 29 Dec 1912, *Backer 6218* (holo: BO n.v.; iso: L, photograph!).

**Distribution:** *Mitrasacme bogoriensis* was described from three collections near Bogor (Leenhouts 1962b). The current conservation status and geographic distribution of this species are uncertain.

**Notes:** The minutely reticulate seed testa, campanulate calyx, and frondose botryoidal inflorescences of *M. bogoriensis* are similar to *M. alsinoides* and *M. indica*, but further study is required to definitively determine the affinities of this species.


**Mitrasacme elata** R.Br. var *elata*

Lectotype (here designated): Australia: Northern Territory: Gulf of Carpentaria: North Island, Sir Edward Pellew Group, 20 Dec 1802, R. Brown s.n. (BM1040457, photograph!); isolecotype: (BM001040458, photograph!). Possible syntypes: Australia: 'North Coast', without date, R. Brown s.n. (MELE68565, K000883356, photographs!); Australia: unknown location, without date, R. Brown s.n. (K000883355, photograph!); Australia: 'Carpentaria', 1803, R. Brown s.n. (P639994, photograph!).

Distribution: Mitrasacme elata is found in Australia (Northern Territory), Indonesia [Kepulauan Aru (Aru Islands)], and Papua New Guinea (Leenhouts 1962a, Dunlop 1996).

Notes: The specimen chosen as lectotype is annotated in Brown's hand with 'Exacum junceum Carpentaria Island h, No.9, Dec' 20 desc [description] – 21 1802' with a later Brown label 'Mitrasacme elata prodr 453 desc s. r Dec' 1802'. This appears to be the specimen on which the description was based. Island h refers to North Island, Sir Edward Pellew Group (Stearn 1960). The isolecotype is material mounted on a blue sheet for public display at BM. Although Stearn (1960) suggests such material is suitable for lectotypification it does not, in this case, represent better material than the specimen chosen. Other Brown specimens listed as possible syntypes are from another location 'North Coast' or a later date '1803'.

For Mitrasacme elata var. brevicalyx Leenh., see M. nudicaulis Reinw. ex Blume.


Type: India: Meghalaya: Mt. Khasia, 400ft, without date, J.D.Hooker & Thomson, s.n. (holo: L5156, photograph!; iso: BM1014339, L5157, P63986–P63989, photographs!).

Distribution: Widely distributed in India, Cambodia, Vietnam, Thailand (Griffin and Parnell 1997), Indonesia (Jawa, Nusa Tenggara), Timor Leste (Leenhouts 1962b) and possibly Australia (as M. retroloba in Dunlop 1996, see Notes).

Notes: It is likely the name M. erophila is applicable to at least some Australian material currently recognised under M. retroloba Dunlop. A recent molecular study (Gibbons et al. in prep) indicates that Australian material attributed to M. retroloba might be better recognised as more than one species, but further study is required to determine the taxonomic limits of both species. Dunlop (1996) noted that the geographic range of M. retroloba extends to Southeast Asia, but the geographic range of the two species, and possible misapplication of names, requires clarification. Available images of type material of M. erophila seen by us do not carry Dunlop's annotations.


Mitrasacme alsinoides auct. non R.Br., Clarke CB, in Hooker JD, Flora of British India 4: 80 (1883); Dop P, Flore générale de l’Indo-chine 4: 157 (1912).


Type citation: "The exact station whence the specimen represented was obtained is uncertain, but I have specimens from various localities, Jaulnah, Arcot, Caimbatore, &c.”

Neotype (here designated): India: Arcot: in moist shady places, Jan 1826, unknown collector, [Herb. Wight s.n.] K001132432; possible isoneotype: India: Arcot, without date, unknown collector s.n. (E179283, photograph!); possible syntypes: India, without date, unknown collector [Herb. R. Wight s.n.], (K000450679; photograph!); India, Nagapitam [Nagapetum, now Nagapattinam], 23 Feb 1829, Wight s.n. (E179284, photograph!); India, Nagapitam, without date, Wight s.n. (E179285, photograph!).

Note: Leenhouts (1962b) and Tirel-Roudet (1972) both cite syntypes of M. indica they have seen at Kew, with Leenhouts adding that he did not designate a lectotype. Since it is not possible to identify the specimen that was used to circumscribe this species, the Kew collection from Arcot has been chosen as a neotype because the author examined plants from this region of India (refer protologue).
Mitrasacme crystallina Griff. Notulae ad plantas asiaticas 6(4): 87 (1854). Illustration: Icones plantarum asiaticarum t. 383, Fig. 2 (1854).


**Neotype (here designated):** India: Assam: Banks of the [illegible, Bopartus?], close to the water’s edge, 27 Sep 1835, herb. W. Griffith 3733, K000883396, lower right, photograph!)

**Note:** Since the collection from near Jamalpore, cited in the protologue, has not been located, the herb. W. Griffiths 3733 is here designated as neotype because it is part of the Griffith’s herbarium and the morphological features of these specimens agree with the protologue.


**Type citation:** ‘Crescit in prov. Malwan; fl. Aug. et Sept.’

**Lectotype (here designated):** unknown location, without date, Dalzell (K000883391, photograph! – upper four specimens of sheet). **Possible syntypes:** India: Bombay, without date, Dalzell (K000883394, photograph!); unknown location, without date, unknown collector, (K000883392, photograph!).

**Note:** The above specimen is chosen as lectotype because it is labelled by Dalzell as ‘Mitrasacme pusilla n. sp.’


**Type citation:** ‘In old rice paddies and open wet grass lands, Caloocan to Masambong, fl. Oct.–Jan.; known only from the vicinity of Manila.’

**Probable Type:** Philippines: Vicinity of Manila, Luzon, Nov 1910, Merrill 705 (FR, M, U, US, photographs!)

**Distribution:** Mitrasacme indica is widespread in India, China and Southeast Asia, with one record as far north as Khasansky District, Primorsky Krai, Russia (Leenhouts 1962a, Kozhevnikov and Kozhevnikova 2000); possibly also in northern Australia (see notes below). Further study is needed to determine whether collections from Papua New Guinea are attributable to M. indica or to M. prolifera R.Br. (see notes). Mitrasacme indica is a known weed of rice paddies (Biological diversity clearing house mechanism 2015), and so its wide geographic distribution might be explained, in part, by anthropogenic spread.

**Notes:** Dunlop (1996) placed M. indica in synonymy with M. prolifera R.Br. However, the name M. indica is widely accepted outside Australia. Dunlop’s (1996) description of M. prolifera, and material at DNA determined by him as M. prolifera, appear to agree with Wight’s description and illustration of M. indica, as well as with photographic images of the types. Brown’s name has priority, although it is not certain whether Dunlop correctly applied the name, M. prolifera R.Br. At Kew there are two Brown type collections of M. prolifera: Australia: Queensland, Shoalwater Bay, 30 Aug 1802, R. Brown, s.n. (BM802677; upper right collection on sheet only, photograph!) and BM802679 (photograph!), the duplicate specimen mounted on a blue sheet for public display by Brown. The former sheet also carries a Banks and Solander collection from Endeavor River, Queensland, designated by Bentham (1869) as the type of M. prolifera var. major Benth. Dunlop (1996) notes this collection could not be located, and so it appears Dunlop did not see this sheet, although he might have seen the duplicate (BM802679).

Brown’s (1810, p. 453) description notes “corolla tubo globoso limbum superante”, suggestive of the strongly urceolate corolla of the morphologically similar Australian species, M. nummularia S.Moore. The corolla of Australian material determined by Dunlop to be M. prolifera is campanulate. Dunlop (1996) gives the southern limit of M. nummularia in Queensland as Cairns. However, M. nummularia (as currently applied in Australia) is also known from the type locality of M. prolifera, Shoalwater Bay, Queensland. Mitrasacme nummularia is a morphologically variable taxon which recent molecular work (Gibbons et al. in prep) suggests might be better recognised as multiple species. Further morphological, and perhaps molecular, study is needed to resolve the complex. Our initial observations suggest that the name M. prolifera might be attributable to material within the M. nummularia complex collected by us in Cape York Peninsula.

Further examination of type material of M. prolifera is necessary, with seed testa and stem ornamentation useful characters that are not mentioned in Brown’s (1810) description and that cannot be seen from images. Until the question is resolved, we continue to accept the name M. indica.

**Type:** Australia: Queensland; Cook: Chillagoe, Feb 1910, *K. Domin s.n.* (holo: PR, n.v.).

**Distribution:** In Australia, *M. micrantha* occurs predominantly in the Northern Territory and Queensland (Dunlop 1996); a recent collection (*R.L. Barrett 8082, M.D. Barrett & B. Anderson, PERTH*) extends the known geographic range in Australia to the Kimberley region, Western Australia. Also known from the Philippines, and likely more widespread in Malesia (see notes).

**Notes:** Leenhouts (1962a) placed *M. micrantha* in synonymy with *M. pygmaea* var. *malaccensis* (Wight) Hara, but Dunlop (1996) maintains *M. micrantha* as a distinct species. A recent molecular phylogeny (Gibbons et al. in prep) supports Dunlop’s conclusions. Although Dunlop (1996) does not list the extra-Australian distribution of this species, two collections from the Philippines are held in Australian herbaria and have been determined by Dunlop and confirmed by us as *M. micrantha*. It is likely *M. micrantha* is more widespread in Malesia, currently included in *M. pygmaea* var. *malaccensis* sensu Leenhouts (1962a), but the full distribution is not known.


**Type:** Timor, without date, unknown collector (holo: L5158, photograph!).

**Distribution:** This species is recorded from Indonesia (Jawa, Madura, Nusa Tenggara, Sulawesi), Timor Leste and Papua New Guinea (Leenhouts 1962b).

**Notes:** The affinities of *M. neglecta* are with the Australian species *M. nummularia* (syn. *M. commutata* Leenh.) (Leenhouts 1962b). Dunlop (1996) notes that *M. neglecta* has been misapplied to *M. nummularia* in Australia.


**Type:** Australia: Northern Territory; Darwin and Gulf: Mount Boulder, 24 Feb 1989, *Dunlop 7988 & Leach* (holo: DNA!; iso: BRI, CANB, MEL, PERTH).


**Type:** Thailand: Chang Mai, Omkoi, c. 35 km from pine improvement centre to Omkoi, 28 Dec 1978, *Niyomdharn, Saangtho & Sangkhachand 168* (holo: L, photograph!; iso: AAU).

**Distribution:** In Thailand known only from the type collection for *M. erophila* subsp. *grandiflora*; also in northern Australia (Dunlop 1996).

**Notes:** The ciliate, horseshoe-shaped anthers, reticulate seed testa and cupular scales on the adaxial leaf surface are diagnostic for *M. erophila*. Although Dunlop (1996) gives the height of *M. nidulifera* as to 12 cm, compared with 20 cm given in the protologue of *M. erophila* subsp. *grandiflora* (Parnell 1995), the holotype of *M. nidulifera* is >20 cm high. Known in Thailand only from one collection, it is possible that this is a transitory waif, rather than an established, population.


**Type:** ‘in insula Solor’ [Indonesia: Nusa Tenggara: Kepulauan Solor], anno 1821, *Reinwardt 1269* (holo: L, photograph!).


**Type:** Timor, without date, *Spanoghe, s.n*. (lecto: K000883360, photograph!; islecto: MEL, photograph!).


**Lectotype:** (designated Dunlop 1996): Australia: Northern Territory: Darwin and Gulf: Depot Creek, Victoria River, without date, *F.Mueller s.n.* (lecto: K000883360, photograph!; islecto: MEL, photograph!).
Distribution: *Mitrasacme nudicaulis* is known from Indonesia (Nusa Tenggara), Timor Leste, New Guinea and Australia (Leenhouts 1962a, Dunlop 1996).

Notes: Leenhouts (1962) based *Mitrasacme elata* var. *brevicalyx* on *M. trinervis* Span., placing *M. nudicaulis* in synonymy with *M. elata* var. *brevicalyx* in the same publication. Dunlop (1996) describes two varieties in *M. nudicaulis*, with only *M. nudicaulis* var. *nudicaulis* known outside Australia, and notes that a small-flowered variant is known. Most if not all collections of *M. nudicaulis* var. *nudicaulis* from New Guinea appear to be this small-flowered variant (Leenhouts 1962a, Dunlop 1996).

The name *M. nudicaulis* was misapplied to *M. pygmaea* R.Br. by Bentham (1853) (Leenhouts 1962b).


Type: Australia, Queensland, Port Clinton, 22 Aug 1802, *R. Brown* s.n. (BM, photographs!).

Note: Digital images of collections of *M. pygmaea* held at BM are not available online but we have film photographs of one of Brown’s sheets. These photographs do not carry a specimen database number. Brown typically made duplicates of his collections; we refrain from designating a lectotype until other original material can be examined.


Note: Leenhouts (1962b) cites as holotype a specimen at K: Nepal, Aug 1821, *E. Gardner* in herb. *Wallich* 4348. The specimen (K001038781) bears an annotation by Dunlop that it was collected a year after the name was published and, therefore, cannot be the holotype.


Type: Meyen (B, presumed lost).


Type: China: Hong Kong, 13 Mar 1895, *E.M.Bodinier* 1060 (E284736, photograph!).


Type: Malaysia, without date, *Griffith* s.n. (K000450680, photograph!).

Distribution: *Mitrasacme pygmaea* is a widespread species, occurring in China, Taiwan, Japan, Korea, Southeast Asia, Papua New Guinea, northeast Australia and New Caledonia (Leenhouts 1962a, Dunlop 1996, Li and Leeuwenberg 1996).

Notes: Across its geographic range, the vegetative form of *M. pygmaea* varies from scapose or scapiform to many-branched subshrub, the variation probably being related to altitude, latitude and life history. Various infraspecific names have been erected to accommodate this variation; they are not dealt with here, but see references above.


Distribution: Cambodia (Tirel-Roudet 1972).

Notes: The specimen from BM is chosen as lectotype because type collections by Hance are generally housed there (Stafleu and Cowan 1979), and the specimen is the best of the original material.
In its branching habit, dense indumentum, acute calyx lobes and bilobed, clavate stigmas, this species is similar to the endemic Australian species *M. floribunda* Dunlop, *M. gentianea* F.Muell. and *M. multicaulis* R.Br. However, the description in Tirel-Roudet (1972) states the seeds are minutely verrucose; seeds of the other three species are smooth and shiny. The general growth habit and few-flowered inflorescences are similar to *M. multicaulis*, but the globular capsule resembles that of *M. floribunda*.

**Species excluded from Mitrasacme**

1a. *Mitrasacme cheesemani*ii Buchanan, *Transactions and Proceedings of the New Zealand Institute* 14: 348, pl. 29, Fig. 2 (1881 [1882]).


**Note:** When *M. cheesemani*ii Buchanan was transferred to *Veronica*, the specific epithet *cheesemani*ii could not be used, because *Veronica cheesemani*ii Benth., Hooker’s *Icones Plantarum* 14:48, t. 1366, Fig. A (1881) refers to a different taxon.

2a. *Mitrasacme hooker*i Buchanan, *Transactions and Proceedings of the New Zealand Institute* 14: 348, pl. 29, Fig. 1 (1881 [1882]).


= *Schizacme novae-zelandi*ae (Hook.f.) K.L.Gibbons, *Telopea* 17: 372 & 374, Fig. 7 (2014).

6a. *Mitrasacme petriei* Buchanan, *Transactions and Proceedings of the New Zealand Institute* 14: 349, pl. 30, Fig. 1 (1881 [1882]).


**Name of uncertain status**


Notes: The rigid, pungent-tipped leaves of this species are atypical of Mitrasacme, and, in the illustration in the protologue, one leaf of an (opposite) pair appears to overlap the other, whereas in Mitrasacme and closely related genera the leaf-bases are joined by an interfoliar sheath (a modification of the interpetiolar stipules typical of Loganiaceae). Further examination of type material is needed, but we are doubtful that this species is attributable to Mitrasacme.

References
Brown R (1810) Prodromus florae Novae Hollandiae. (Johnson & Co.: London)
Gibbons KL, Conn BJ & Henwood MJ (in prep) Understanding morphological diversity despite homoplasy and nested evolution: molecular phylogeny of Mitrasacme (Loganiaceae, Loganiaceae)

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