Ten new species of Memecylon (Melastomataceae) from Madagascar

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Source: Candollea, 77(1) : 81-103

Published By: The Conservatory and Botanical Garden of the City of Geneva (CJBG)

URL: https://doi.org/10.15553/c2022v771a7

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Robert Douglas Stone

Abstract

STONE, R.D. (2022). Ten new species of Memecylon (Melastomataceae) from Madagascar. *Candollea* 77: 81–103. In English, English and French abstracts. DOI: http://dx.doi.org/10.15553/c2022v771a7

Memecylon L. (*Melastomataceae*, *Olisbeoideae*) is a widespread paleotropical genus of forest shrubs and small trees, and is one of the ten most species-rich genera of woody plants in Madagascar. All of the Malagasy species are endemic to the island, and most of them are known from just one or two sites. As part of ongoing work towards a comprehensive taxonomic revision, ten new Malagasy species are described and illustrated here: *M. arenicola* R.D. Stone, *M. conjugens* R.D. Stone, *M. draconopterum* R.D. Stone, *M. fissuricola* R.D. Stone, *M. insolitum* R.D. Stone, *M. linearifolium* R.D. Stone, *M. longipes* R.D. Stone, *M. majus* R.D. Stone, *M. ourantherum* R.D. Stone, and *M. ultramaficum* R.D. Stone. The conservation status of each species is provisionally assessed in accordance with the IUCN Red List Categories and Criteria.

Résumé

STONE, R.D. (2022). Dix nouvelles espèces de Memecylon (Melastomataceae) de Madagascar. *Candollea* 77: 81–103. En anglais, résumés anglais et français. DOI: http://dx.doi.org/10.15553/c2022v771a7

Memecylon L. (*Melastomataceae*, *Olisbeoideae*) est un genre forestier d'arbustes et de petits arbres à large distribution paléotropicale. À Madagascar, il est l'un des dix genres ligneux les plus riches en espèces. Toutes les espèces malgaches sont endémiques de l'île, et la plupart d'entre elles ne sont connues que dans un ou deux sites. Dans le cadre de travaux en cours pour une révision taxonomique complète, dix nouvelles espèces malgaches sont décrites et illustrées ici: *M. arenicola* R.D. Stone, *M. conjugens* R.D. Stone, *M. draconopterum* R.D. Stone, *M. fissuricola* R.D. Stone, *M. insolitum* R.D. Stone, *M. linearifolium* R.D. Stone, *M. longipes* R.D. Stone, *M. majus* R.D. Stone, *M. ourantherum* R.D. Stone et *M. ultramaficum* R.D. Stone. Pour chaque espèce, le statut de conservation est évalué selon les Catégories et Critères de la Liste Rouge de l'UICN.

Keywords

MELASTOMATACEAE – *Memecylon* – Madagascar – New species – Conservation – Taxonomy

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Submitted on July 26, 2021. Accepted on February 2, 2022. First published online on June 1, 2022.

ISSN: 0373-2967 – Online ISSN: 2235-3658 – *Candollea* 77(1): 81–103 (2022)

Introduction

The genus *Memecylon* L. (*Melastomataceae*, *Olisbeoideae*) comprises > 350 species of shrubs or small to medium-sized trees (Renner et al., 2022) and has a wide distribution in the Old-World tropics, mainly in the understory of evergreen humid forest. In accordance with morphological and molecular findings (Jacques-Félix, 1978; Bremer, 1982; Stone, 2006a, 2014; Stone & Andreasen, 2010), it is now circumscribed to exclude the monospecific western and central African genus *Spathandra* Guill. & Perr., the paleotropical *Lijndenia* Zoll. & Moritzi, and the African-Malagasy *Warneckea* Gilg. The members of *Memecylon* sensu stricto are characterized by a combination of very hard wood; leaves opposite, estipulate, and apparently 1-nerved (less often "subtrinerved" sensu Jacques-Félix et al., 1978; Jacques-Félix, 1983, 1985a); a general lack of indumentum; flowers small and 4-merous; anther-connectives enlarged and with a dorsal oil-gland (or with gland reduced or absent in some species or species-groups); and fruits baccate with 1-few large seeds and embryo foliaceous and convoluted.

In Madagascar, *Memecylon* is one of the three most important genera of *Melastomataceae* together with *Gravesia* Naudin and *Medinilla* Gaudich. (Almeda et al., in press). In the most recent revision, Jacques-Félix (1985a, 1985b) recognized 78 species of Malagasy *Memecylon* of which 33 were newly described. He also placed three previously recognized species in synonymy and transferred 11 species to *Lijndenia* or *Warneckea*. Many new collections have been made in recent years, and much of this material appears to represent species new to science (Stone, 2006b, 2012, 2020; Stone & Callmander, 2011). *Memecylon* clearly ranks among the ten largest woody genera on the island (cf. Schatz, 2001), and all of the Malagasy species are endemic with the majority being known from just one or two sites (Stone, 2012).

Work towards another comprehensive revision of Malagasy *Memecylon* is currently in progress, with approximately 1,000 collections (3,350 herbarium sheets) examined thus far (R.D. Stone, unpubl. data). The infrageneric classification is also in need of revision, in view of molecular analyses (Stone, 2014, unpubl. data; Amarasinghe et al., 2021) indicating that at least some of the seven sections previously recognized by Jacques-Félix (1985a, 1985b) are not monophyletic.

Here I describe a further ten new species of *Memecylon* from Madagascar, all of them belonging to the Malagasy clade (sensu Stone, 2014). Field work and collecting were done in January–February 2007 and 2008. Herbarium material was studied in BR, CAS, G, K, MO, NU, P, TAN, TEF and WAG. All specimens cited herein have been seen by me. For each species, the conservation status is provisionally assessed in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012), with the Extent of Occurrence [EOO] and Area of Occupancy [AOO] estimated using GeoCAT (2022). Specimen records can be accessed for each species via the *Catalogue of the Plants of Madagascar* (Madagascar Catalogue, 2022). A differential diagnosis is also provided for each species, together with a discussion of affinity. However, an identification key has not been provided, pending completion of the aforementioned taxonomic revision. With these ten additions, the total number of endemic species of *Memecylon* in Madagascar now stands at 106.

New Species

Memecylon arenicola R.D. Stone, **sp. nov.** (Fig. 1).

Holotypus: Madagascar. Reg. SAVA [Prov. Antsiranana]: Vohémar, Anjiabe, Analabe E of Lac Sahaka, 13°04'54"S 49°54'26"E, 6.II.2008, fr., *Stone et al. 2667* (CAS-1104135!; iso-: MO-6196936!, P [P05206876]!, TAN!).

Affine Memecyloni ambrensi Jacq.-Fél., sed ab eo foliis minoribus plerumque 4.5–6.5 × 2.5–3.5 cm (non usque ad 14 × 8 cm) et fructibus globosis (non ellipsoideis) differt.

Trees evergreen, c. 4 m high; young branchlets terete, c. 1.5–2 mm thick, surface smooth, ± rusty brown; older branchlets c. 3–4 mm thick, light brown, finely longitudinally fissured; nodes thickened; internodes (0.8–)1.3–3(–4.8) cm long. *Leaves* coriaceous, sessile, dull olive green on adaxial surface, pale brown on abaxial surface; blades elliptic, (3.5–)4.5–6.5(–7.5) × (2–)2.5–3.5(–4) cm, base rounded to subcordate, apex rounded to retuse, obtuse or shortly and obtusely acuminate; midnerve finely canaliculate adaxially, somewhat prominent abaxially especially towards base of blade; transverse veins scarcely visible, c. 6 pairs, oriented at an oblique angle relative to midnerve, weakly prominent on adaxial surface, obscure abaxially, confluent with equally weak intramarginal nerves; margins revolute. *Flowers* unknown. *Infructescences* solitary at defoliated nodes of upper branchlets; peduncles stout, (0–)1–2 mm long, sometimes extended by a short internode 1 mm long; bracts broadly triangular-cucullate, 0.75 mm long, early deciduous; fruiting pedicels 5.5–8 mm long, confluent with base of fruit. *Fruits* globose, c. 11 mm in diam.; persistent calycinal crown 1–1.5 mm high, 3 mm wide, margin sinuate-dentate; stylopodium prominent, ± filling the epigynous chamber.

Etymology. – The epithet *arenicola* is a compound derived from the Latin noun *arēna* meaning "sand" and the agent noun *-cola* meaning "inhabitor". It functions as an adjective and means "sand-dweller", in reference to the habitat in sandy soil.

Distribution and ecology. – Northeastern coast of Madagascar (SAVA region), near the village of Anjiabe and lac Sahaka c. 34 km N of Vohémar. Habitat in littoral forest on sand.

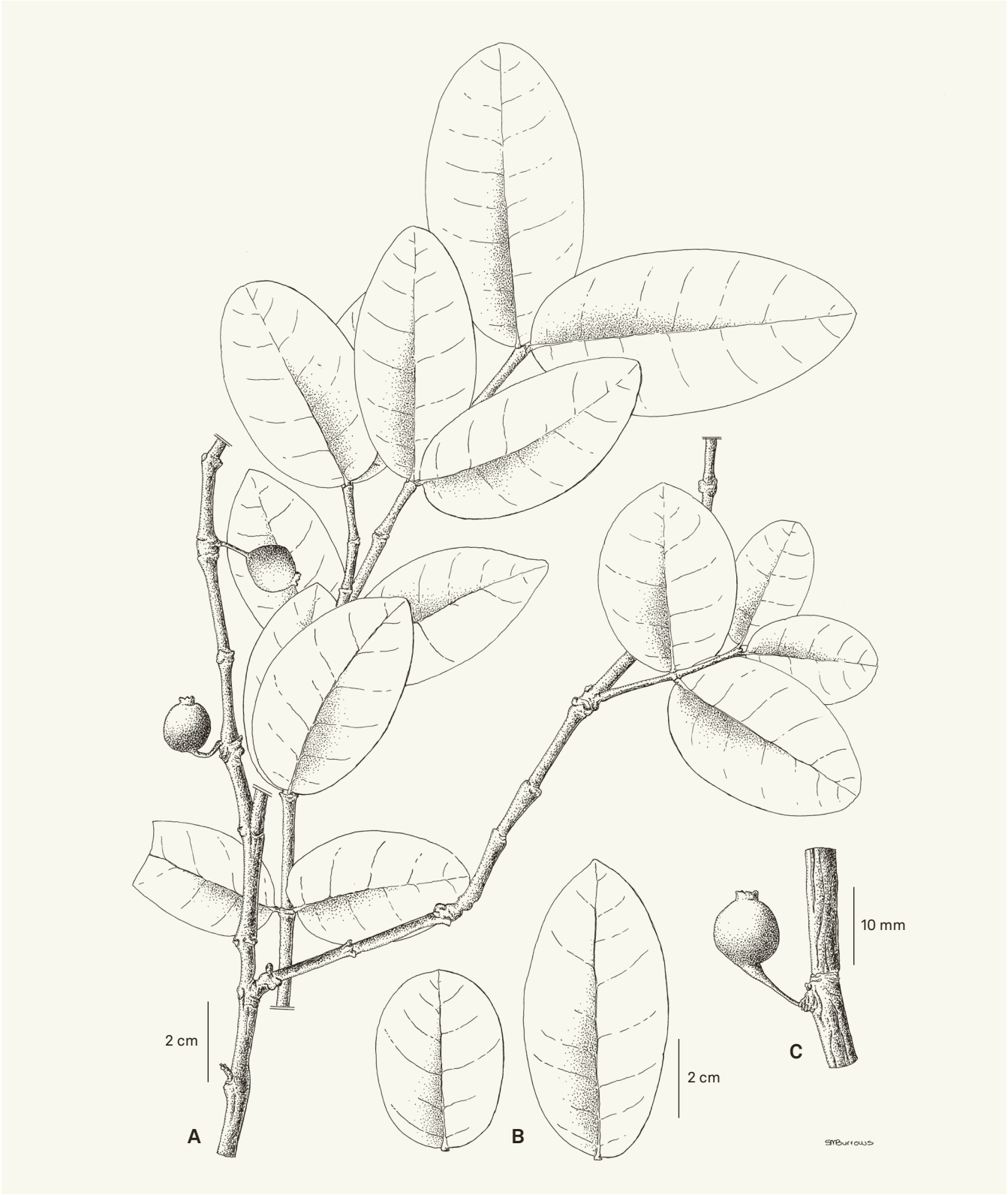

Fig. 1. – *Memecylon arenicola* R.D. Stone. **A.** Fruiting branch; **B.** Leaves; **C.** Fruit.
[**A:** *Stone et al. 2667*, CAS; **B, C:** *Razakamalala et al. 1236*, MO] [Drawing: S. Burrows]

Conservation status. – *Memecylon arenicola* is known from a single location with an estimated AOO of 4 km². As far as it is known, the entire population resides within the 3,000 ha Lake Sahaka-Analabe new protected area (NPA) and extension (BirdLife International, 2021), which is a part of the Paysage Harmonieux Protégé de Loky Manambato gazetted in 2015 and managed by the Association Fanamby (Goodman et al., 2021). Within Loky Manambato, the decline in area of littoral forest was zero (0%) between the years 1996 and 2006, and 135 ha (3.6%) between 2006 and 2016 (Goodman et al., 2021). The Lake Sahaka-Analabe littoral forest is nevertheless subjected to ongoing anthropogenic pressures including slash-and-burn agriculture, removal of hardwood timber, pasturage of "zébu" cattle, and grassland fires which can sometimes penetrate into the forest (Rakotondravony, 2006; BirdLife International, 2021; Goodman et al., 2021). *Memecylon arenicola* is thus provisionally assessed as "Critically Endangered" [CR B2ab(iii)] in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012).

Notes. – *Memecylon arenicola* is strongly supported as sister to *M. ambrense* Jacq.-Fél. in molecular analyses (R.D. Stone, unpubl. data). These two species are also morphologically close, except that the leaves of *M. arenicola* are much smaller (see differential diagnosis), and the shape of the fruit is different (globose vs. ellipsoid). Another littoral species from Ambondrobe south of Vohémar, *Memecylon longipes* R.D. Stone (see below), has small leaves like those of *M. arenicola* and ellipsoid fruits like those of *M. ambrense* (differing from both of these species in having a calycinal crown that is conspicuously 4-dentate).

Sterile collections from higher-elevation forests of the Daraina region resemble *Memecylon arenicola* but have somewhat larger leaves: *Nusbaumer & Ranirison 2345* (G), *Nusbaumer L17-586* (G) and *L22-150* (G). These populations need further study.

Additional specimens examined. – **Madagascar. Reg. SAVA [Prov. Antsiranana]:** Vohémar, Nosy Be, Anjiabe, forêt littorale d'Analabe près du lac Sahaka, 13°04'43"S 49°54'04"E, 13.V.2004, fr., *Razakamalala et al. 1236* (CAS, MO, TEF).

Memecylon conjugens R.D. Stone, **sp. nov.** (Fig. 2).

Holotypus: Madagascar. Reg. SAVA [Prov. Antsiranana]: N of Andapa, RNI Marojejy, 14°28'57"S 49°38'12"E, 1100–1600 m, I.1994, fl. buds, *Malcomber et al. 2687* (CAS-926817!; iso-: K!, MO-6262414!, NU!, P [P00516010]!).

Ob folia caudato-acuminata Memecyloni longicuspi Baker et M. peracuminato H. Perrier simile, sed a primo ramulis teretibus (non quadrangularibus et anguste alatis), hypanthocalyce majore 3 × 3.5–4 mm (non 1.5 × 2.5 mm), calycis margine sinuato-dentato (non truncato 4-denticulatoque), fructus corona calycina circa 1 mm longa (non subprominente); a secundo petiolis brevioribus 2–3 mm (non 3–5 mm) longis, cymularum bracteis deciduis (non persistentibus), floribus pedicellatis (non subsessilibus) pedicellis plerumque 2–3.5 mm longis et corolla in alabastro conico-apiculata (non conico-obtusa); ab ambobus cymulis longioribus 2(–3) cm, pedunculis 6–11 mm longis et fructibus multo majoribus 13–19 × 11–15 mm ellipsoideis vel late ovoideis differt.

Shrubs or small *trees* 4–8 m high, evergreen; ultimate branchlets slender, the youngest compressed, soon becoming terete with age; nodes ± thickened; internodes (1.4–)2–4(–5.3) cm long. *Leaves* subcoriaceous, petiolate, dark green and somewhat glossy above, paler and dull below, minutely roughened when dry; petioles 2–3 mm long; blades elliptic to narrowly elliptic or elliptic-ovate, (3–)4–5.5(–7) × (1.1–)1.8–2.4(–2.7) cm, base cuneate, apex caudate-acuminate, acumen (4–)7–12(–18) mm long, obtuse; midnerve finely canaliculate adaxially, conspicuous abaxially but not prominent or very slightly so towards the base of the blade; intramarginal nerves and transverse veins invisible. *Cymes* to c. 2(–3) cm long, 3–5(–6)-flowered, solitary or geminate in the leaf axils, sometimes terminally on the branchlets, and frequently also at the recently defoliated nodes; peduncles slender, compressed, (4–)6–11(–14) mm long; axis often extended by a slender internode (1–)3–6 mm long; bracts rapidly deciduous, not seen. *Flowers* white (at least in bud), on slender pedicels (1.5–)2–3.5(–4.5) mm long; hypanthocalyx obconic to campanulate, c. 3 × 3.5–4 mm, margin shallowly sinuate-dentate, lobes broadly rounded, scarious margined; corolla in bud conical-apiculate, c. 2 mm long; open flowers not seen; anthers in bud c. 2 mm long, thecae fronto-ventral, dorsal oil-gland narrowly elliptic, 0.7 mm long, posterior extremity of connective acute. *Fruits* purplish at maturity, broadly ovoid to ellipsoid, 13–19 × 11–15 mm; persistent calycinal crown c. 1 mm high, margin truncate.

Etymology. – The epithet *conjugens* is an adjective meaning "joined together", in reference to the fact that the flowering material from Marojejy and fruiting material from Anjanaharibe-Sud were at first considered to be separate species.

Distribution and ecology. – Northeastern Madagascar (SAVA region), known only from the Marojejy and Anjanaharibe massifs near the town of Andapa. Habitat in montane, humid forests at elevations of 1100–1350 m.

Conservation status. – *Memecylon conjugens* is known from three locations with an estimated EOO of 50 km² and an AOO of 12 km². All of the known locations are in protected areas including the Marojejy National Park (60,050 ha) and

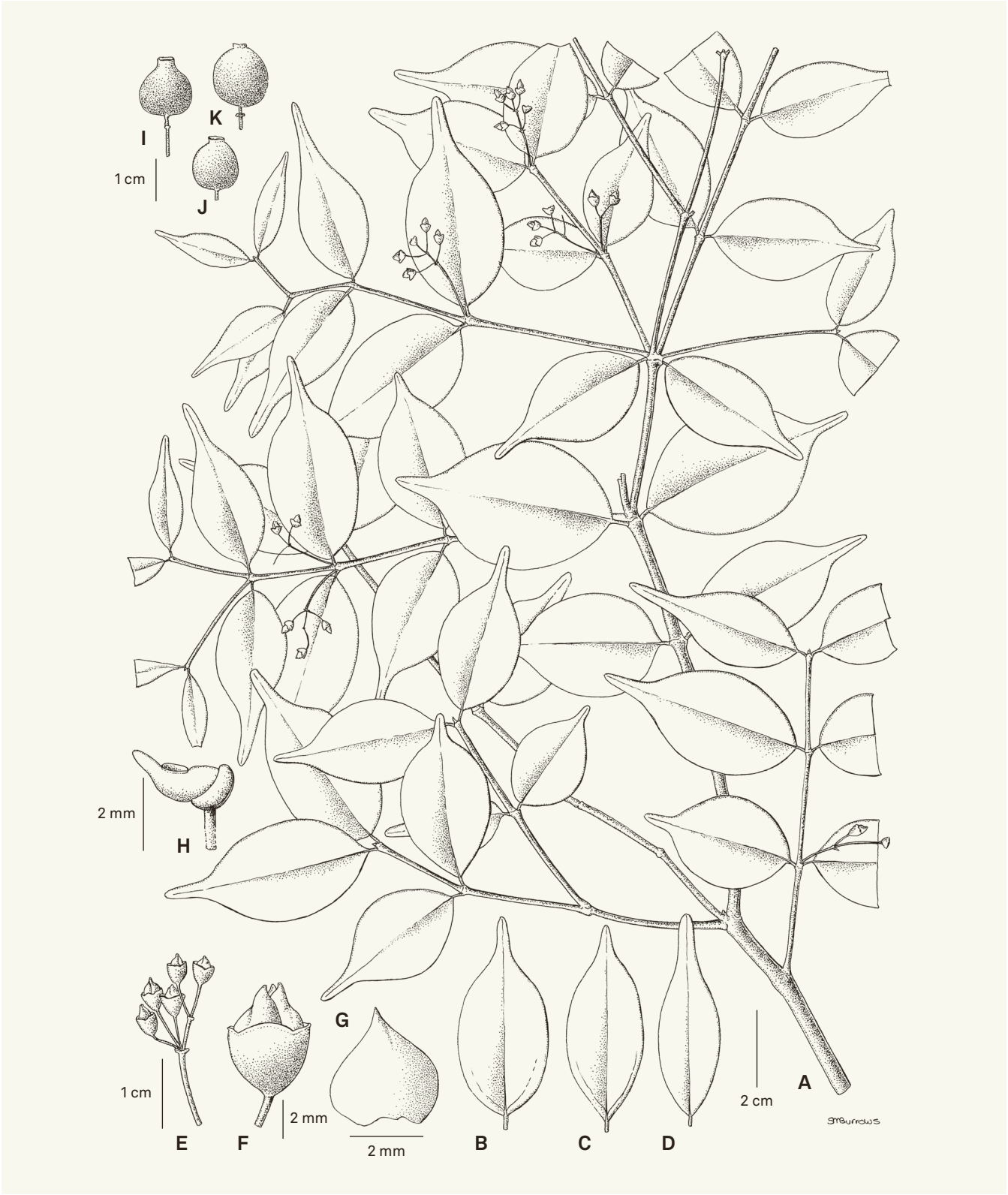

Fig. 2. – *Memecylon conjugens* R.D. Stone. **A.** Flowering branch; **B–D.** Leaves; **E.** Inflorescence; **F.** Floral bud; **G.** Petal; **H.** Stamen; **I–K.** Fruit. [**A, B, E–H:** *Malcomber et al. 2687*, CAS, NU, P; **C, D, I, J:** *Ravelonarivo et al. 319*, MO, P; **K:** *Ravelonarivo & Rabesonina 486*, NU] [Drawing: S. Burrows]

the Réserve Spéciale d'Anjanaharibe-Sud (26,903 ha), both of which are managed by Madagascar National Parks (Goodman et al., 2021). Marojejy has seen a relatively minor loss of 846 ha (1.7%) of moist evergreen forest between the years 1996 and 2016, and at Anjanaharibe-Sud the deforestation rate has been similarly low, 404 ha (1.6%) over the same time period (Goodman et al., 2021). Ongoing anthropogenic pressures include exploitation of hardwoods, collection of non-woody forest products, uncontrolled fires (Marojejy), slash-and-burn agriculture (Anjanaharibe-Sud), and small-scale mineral extraction (Anjanaharibe-Sud) (Goodman et al., 2021). Based on its limited AOO and the apparent threats, *M. conjugens* would meet the criterion B for listing as "Endangered" in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012), but it would be better assessed as "Near Threatened" [NT] contingent upon the continued effectiveness of habitat-specific conservation and management measures (IUCN, 2019).

Notes. – The presence of an anther-gland and the shallowly sinuate-dentate calyx margin of *Memecylon conjugens* indicate that it would be placed in *Memecylon* sect. *Memecylon* sensu Jacques-Félix (1985a, 1985b). However, the limits of this section are in need of revision since molecular results suggest the group is not monophyletic (Stone, 2014, unpubl. data; Amarasinghe et al., 2021), and the type species (*M. capitellatum* L.) is from Sri Lanka.

The leaves of the new species resemble those of *Memecylon longicuspe* Baker and *M. peracuminatum* H. Perrier in appearing 1-nerved with apex caudate-acuminate and acumen narrowly obtuse at the summit. However, this may not be an indication of its true affinity, and both *M. longicuspe* and *M. peracuminatum* are from east-central and southeastern Madagascar, while *M. conjugens* has a different and limited distribution in the northeast.

The fruits of *Memecylon conjugens* are variable, an unusual feature since other species of Malagasy *Memecylon* have a more-or-less consistent (often diagnostic) fruit size and shape. Among the additional specimens (paratypes) cited below, the fruits of *Ravelonarivo et al. 319* are broadly ovoid (conspicuously wider below the middle), as are those of the NU and P sheets of *Ravelonarivo & Rabesonina 486*. However, the fruits of the CAS and MO sheets of *Ravelonarivo & Rabesonina 486* are differently shaped, i.e. broadly ellipsoid or even obovoid (widest above the middle). The ovoid fruits of *M. conjugens* are similar to those of *M. pedunculatum* Jacq.-Fél., except that they are larger (11–15 vs. 8 mm in diam.), and the calycinal crown is prominent (vs. appressed to the summit of the ovary). Both of these species occur in the same region of northeastern Madagascar but are not closely related since *M. pedunculatum* lacks an anther-gland and has been placed in *Memecylon* sect. *Clavistamina* Jacq.-Fél. sensu Jacques-Félix (1985a).

Additional specimens examined. – **Madagascar. Reg. SAVA [Prov. Antsiranana]:** RS d'Anjanaharibe-Sud, env. du sommet, 14°40'55"S 49°28'20"E, 1336 m, 8.VII.1994, fr., *Ravelonarivo et al. 319* (CAS, G, MO, NU, P, TAN); ibid. loco, Camp nº 2, 14°44'42"S 49°27'42"E, 1185–1335 m, 3.XI.1994, fr., *Ravelonarivo & Rabesonina 486* (CAS, G, MO, NU, P, TAN).

Memecylon draconopterum R.D. Stone, **sp. nov.** (Fig. 3).

Holotypus: Madagascar. Reg. Atsinanana [Prov. Toamasina]: Betampona R.N.I., piste principale à 4 km via piste de Betakonana, 17°55'55"S 49°12'11"E, 500 m, XI–XII.1998, fl., *Rabenantoandro et al. 59* (MO-5167753!; iso-: P [P00516015]!).

Affine Memecyloni subsessili H. Perrier, sed ab eo foliis perfecte sessilibus (non breviter petiolatis petiolis 1–2 mm longis), laminis foliaribus brevioribus plerumque 5–9 × 1.5–3 cm ad basin cordatis amplexicaulibusque (non 7.5–19 × 2–3 cm ad basin cordatis non amplexicaulibus), cymis 1- ad 3- (non 3- ad 9-) floris, bracteis deciduis (non persistentibus), antheris 3 mm (non 2 mm) longis, antherae connectivo ad extremitatem fere subulatam (non breviter conicam) et septis interstaminalibus membranaceis (non vix evolutis) differt.

Shrubs 2 m high; branchlets terete (quadrangular on new growth but this is not continuing below the first internode); bark blackish brown on young branchlets, soon exfoliating in shreds or in shorter, rectangular patches; lower branchlets whitish; internodes mostly 1.5–3 cm long. *Leaves* subcoriaceous, quite sessile, slightly roughened on both surfaces when dry, fibrous when torn; blades lanceolate, 5–9(–10) × (1–)1.5–3 cm, base strongly cordate and amplexicaul, apex acuminate-acute; midnerve slightly grooved on the upper surface, somewhat prominent on the lower; transverse veins perpendicular to the midnerve, ± invisible. *Cymes* axillary and at defoliated nodes, 0.5–1 cm long, 1–3(–5)-flowered; peduncles (1.5–)2–3(–6) mm long; bracts caducous, not seen. *Flowers* terminating each secondary axis, subsessile (true pedicels nearly absent); hypantho-calyx obconic, 3 × 3 mm, lobes scarcely developed, rounded; petals violet, ovate, 2.5–3 × 1.5 mm, acuminate-acute; anthers 3 mm long, dolabriform, the anther sacs situated fronto-ventrally; extremity of connective long and narrow, almost subulate; gland punctiform; epigynous chamber with membranous partitions; style 4 mm long (before anthesis). *Fruits* unknown.

Etymology. – The epithet *draconopterum* is a compound formed from the Greek nouns *drákon* meaning "dragon" and *pterón* meaning "wing". It functions as an adjective and means "dragon-winged", in reference to the shape of the leaves.

Distribution and ecology. – East-central Madagascar (Atsinanana region), known only from the type collection from the Réserve Naturelle Intégrale de Betampona, c. 31 km

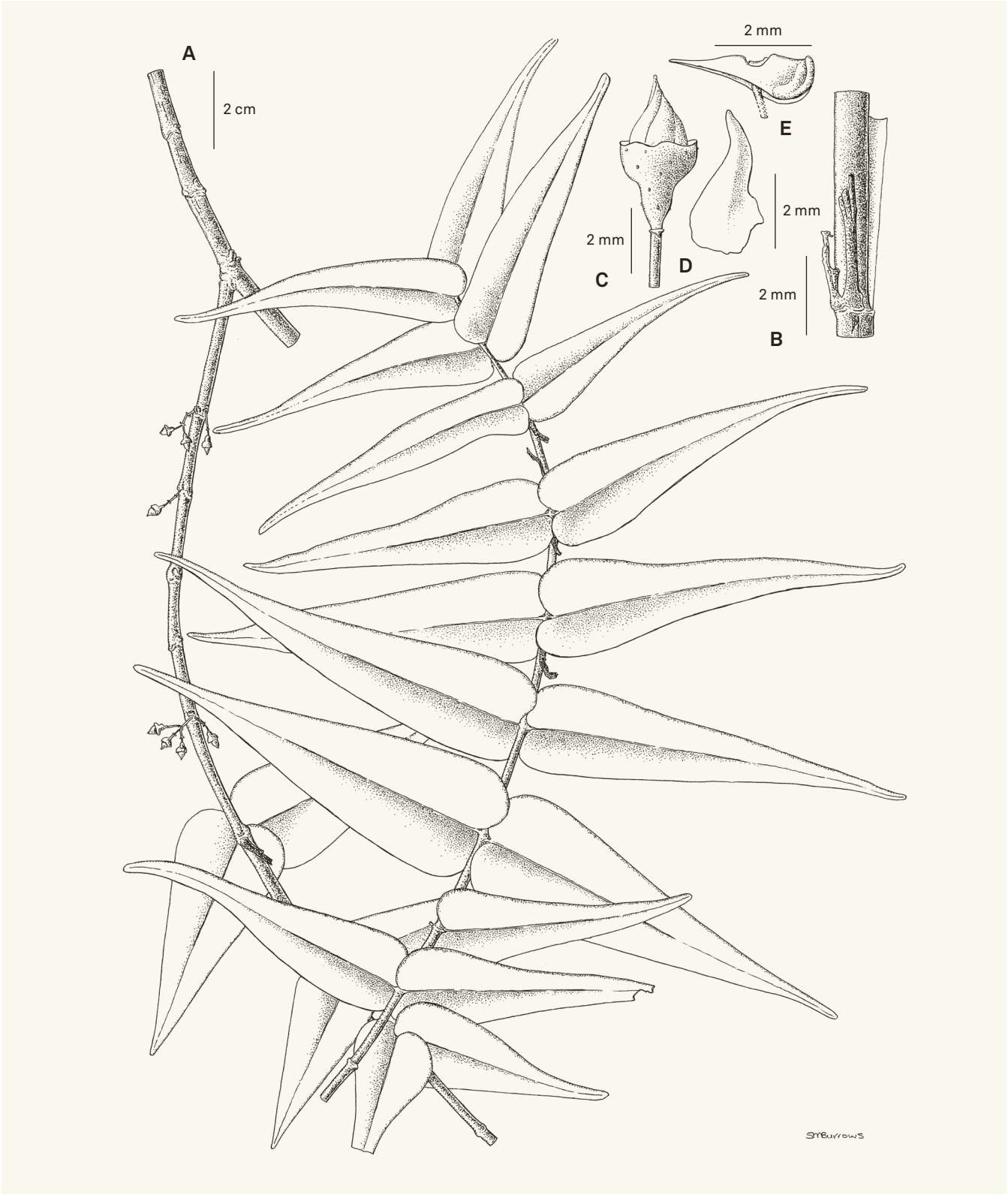

Fig. 3. – *Memecylon draconopterum* R.D. Stone. **A.** Flowering branch; **B.** Section of branchlet showing exfoliating character of bark; **C.** Floral bud; **D.** Petal; **E.** Stamen.
[**A–E:** *Rabenantoandro et al. 59*, MO, P] [Drawing: S. Burrows]

northwest of the coastal city of Toamasina. Habitat in remnant of lowland humid forest, elevation 500 m.

Conservation status. – *Memecylon draconopterum* is known from a single location (estimated AOO of 4 km²) within the Betampona strict nature reserve (2,248 ha) managed by Madagascar National Parks. This area was formerly connected with the Ankeniheny-Zahamena corridor to the west, but deforestation in the vicinity of Toamasina (Tamatave) has left it as an isolated remnant of lowland forest surrounded by anthropogenic vegetation (Goodman et al., 2021). Ongoing pressures include illegal cutting of trees for timber and construction, collection of non-timber forest products, and presence of invasive plant species (Goodman et al., 2021). Based on its limited AOO and the apparent threats, *M. draconopterum* would meet the criterion B for listing as "Critically Endangered" in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012), but it might be better assessed as "Near Threatened" [NT], contingent on the continued effectiveness of habitat-specific conservation and management measures (IUCN, 2019). The species is still poorly known, and we need better information on its local distribution and abundance.

Notes. – *Memecylon draconopterum* is closely related to *M. subsessile* H. Perrier, as evidenced by a suite of shared characters, such as the brownish-black, rapidly exfoliating bark of the younger branchlets, the narrow leaves that are cordate at base and acuminate-acute at the apex, and the presence of an anther-gland. Both of these species also inhabit the same region of east-central Madagascar. However, the new species is separated from *M. subsessile* by at least eight characters (see diagnosis, above), most notably by its shorter, completely sessile leaves with bases broadly cordate-amplexicaul (vs. cordate but distinctly short-petiolate and not clasping). The posterior extremity of the connective in *M. draconopterum* is remarkably long and narrow (vs. shortly conical-acute in. *M. subsessile*).

Memecylon fissuricola R.D. Stone, **sp. nov.** (Fig. 4, 5).

Holotypus: Madagascar. Reg. DIANA [Prov. Antsiranana]: RS Ankarana, piste vers le lac vert, 12°54'S 49°06'E, 180 m, 19.II.1994, fl., *Andrianarisata et al. 30* (P [P00516014]!; iso-: CAS-942152!, G [G00379393] image!, MO!).

Simile Memecyloni boinensi H. Perrier, sed ab eo laminis foliaribus basiliter angustatis (non rotundatis) in petiolum decurrentibus, petalis pallide violaceis (non albis) et fructibus plus minusve ellipsoideis (non globosis) differt.

Shrubs or small *trees* evergreen, 1–4 m high with bark light reddish-brown, finely longitudinally fissured; branchlets with bark smooth, whitish gray; young branchlets compressed and dorso-ventrally 2-grooved, soon becoming terete with age; nodes ± thickened; internodes (0.5–)1.3–2.8(–6) cm long. *Leaves* subcoriaceous, petiolate, bright green and somewhat glossy adaxially, paler and dull abaxially; petioles 1–2 mm long; blades elliptic to obovate, (1.7–)2.5–3.5(–4.4) × (0.8–)1.3–1.9 (–2.2) cm, base ± narrowed and confluent with petiole, apex rounded to retuse or vaguely obtuse-acuminate; midnerve finely impressed adaxially, conspicuous and ± prominent abaxially; intramarginal nerves and transverse veins invisible or nearly so in dried material, the latter oriented at an oblique angle relative to midnerve. *Cymes* up to c. 1.5(–2) cm long, (1–)3(–4)-flowered, solitary or geminate in leaf axils and terminally on branchlets, sometimes also on recently defoliated nodes; peduncles compressed, (1–)3–7(–10.5) mm long; secondary axes (1–)2–4(–5) mm long; bracts narrowly triangular-acute, c. 1 mm long, early deciduous. *Flowers* borne individually at ends of inflorescence axes, on short pedicels 0.3–0.7(–1) mm long; hypantho-calyx yellow, obconic to cupulo-patellate, 2.5 × 3 mm, margin shallowly sinuate-dentate, lobes broadly rounded, scarious margined; corolla in bud conical-apiculate, c. 2 mm long; petals pale violet, broadly ovate-triangular to suborbicular, 3 × 2–3 mm, base truncate above claw c. 0.5 × 0.5 mm, apex acute to apiculate; staminal filaments pale violet, c. 5 mm long; anthers pale yellow, 1.3 mm long, thecae fronto-ventral, dorsal oil-gland narrowly elliptic, posterior extremity of connective obtuse to subacute; style white, 8 mm long. *Fruits* yellowish (immature?), subglobose to ± ellipsoid, 9–12 × 9–10 mm; persistent calycinal crown 1 mm high.

Etymology. – The epithet *fissuricola* is a compound derived from the Latin noun *fissura* meaning "crevice" and the agent noun *-cola* meaning "inhabitor". It functions as an adjective and means "crevice-dweller", in reference to the habitat in shallow soil and crevices of calcareous rock.

Distribution and ecology. – Northern Madagascar (Diana region), evidently restricted to the Ankarana massif. Habitat in dry, semi-deciduous forests on the rocky, calcareous plateau, at elevations of 80–200 m.

Conservation status. – *Memecylon fissuricola* is known from approximately five locations with an estimated EOO of 25 km² and an AOO of 20 km². Its entire population evidently resides within the 18,225 ha Réserve Spéciale d'Ankarana gazetted in 1956 and managed by Madagascar National Parks (Goodman et al., 2021). Within the protected area there has been no measurable loss in hectarage of dry deciduous forest between the years 1996 and 2016, yet there are ongoing anthropogenic pressures including exploitation of wood products and wildfires which have increased in frequency since 2015 (Goodman et al., 2021). Based on its limited AOO and the

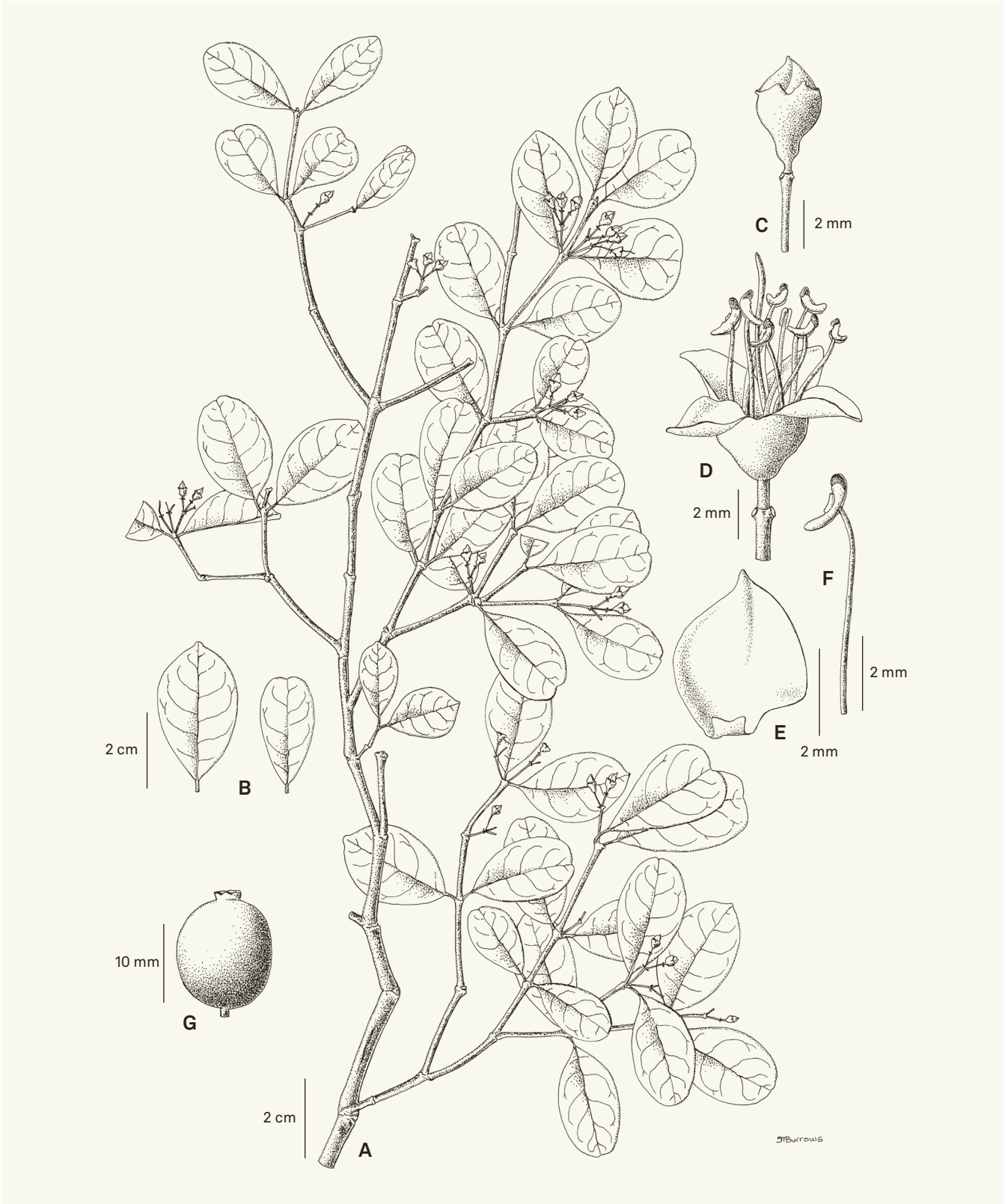

Fig. 4. – *Memecylon fissuricola* R.D. Stone. **A.** Flowering branch; **B.** Leaves; **C.** Floral bud; **D.** Open flower; **E.** Petal; **F.** Stamen; **G.** Fruit. [**A, C:** *Leeuwenberg et al. 14348*, P; **B:** *Stone et al. 2642*, CAS; **D–F:** *Andrianarisata et al. 30*, P; **G:** *Service Forestier 10503*, P] [Drawing: S. Burrows]

Fig. 5. – *Memecylon fissuricola* R.D. Stone. **A.** Trunk and lower branches growing from a crevice of calcareous rock; **B.** Crown of tree showing habit of tortuous branching; **C.** Flowering branchlet; **D.** Branchlet with young, developing fruits. [**A, D:** *Stone et al. 2639*; **B, C:** *Stone et al. 2642*] [Photos: **A, C, D:** C. Christian; **B:** R.D. Stone]

apparent threats, *M. fissuricola* would meet the criteria for listing as "Endangered" [EN B2ab(iii)] in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012), but it would also seem to qualify for "Near Threatened" [NT] status dependent upon the continued effectiveness of habitat-specific conservation and management measures (IUCN, 2019).

Notes. – *Memecylon fissuricola* has been confused with *M. boinense* H. Perrier, but molecular analyses indicate the resemblance is only superficial, i.e. the two species are not closest relatives (R.D. Stone, unpubl. data). The new species further differs from *M. boinense* in having leaf-blades basally angustate and decurrent to the petiole (vs. rounded), petals pale violet (vs. white), and fruits ± ellipsoid (vs. globose). The two species are also wholly allopatric, with *M. boinense* occurring further south and with its nearest known locality separated from *M. fissuricola* by a distance of c. 290 km.

Additional specimens examined. – **Madagascar. Reg. DIANA [Prov. Antsiranana]:** Massif de l'Ankarana, 5.XI.1990, ster., *Bardot Vaucoulon 237* (P); ibid. loco, 7.XI.1990, ster., *Bardot Vaucoulon 257* (P); ibid. loco, 17.XI.1990, fr., *Bardot Vaucoulon 300* (P); ibid. loco, 19.I.1991, fl., *Bardot Vaucoulon 402* (P); ibid. loco, road towards Lac Vert, 12°50'47"S 49°06'18"E, 82 m, 26.V.1999, fr., *De Block et al. 1025* (BR, MO); ibid. loco, near Campement des Anglais, 12°54'S 49°08'E, 150 m, 29.I.1994, fl., *Leeuwenberg et al. 14348* (CAS, K, MO, P, WAG); Ambilobe, Ankara SO, 27.VII.1954, fr., *Service Forestier 10503* (P); ibid. loco, on plateau directly above Grotte des Chauve Souris, 12°57'20"S 49°06'59"E, 200 m, 15.II.2007, fl. & imm. fr., *Stone et al. 2639* (CAS, MO, P, TAN); ibid. loco, Tourelles de Tsingy, 12°56'54"S 49°07'37"E, 17.II.2007, fl., *Stone 2642* (CAS, MO, P, TAN).

Memecylon insolitum R.D. Stone, **sp. nov.** (Fig. 6).

Holotypus: Madagascar. Reg. SAVA [Prov. Antsiranana]: Vohémar, Manakana, forêt d'Ambondrombe [Ambondrobe], 13°42'46"S 50°05'25"E, 18.V.2004, fl., *Rabehevitra et al. 1017* (CAS-1065489!; iso-: MO-4856438!, P [P04803913]!).

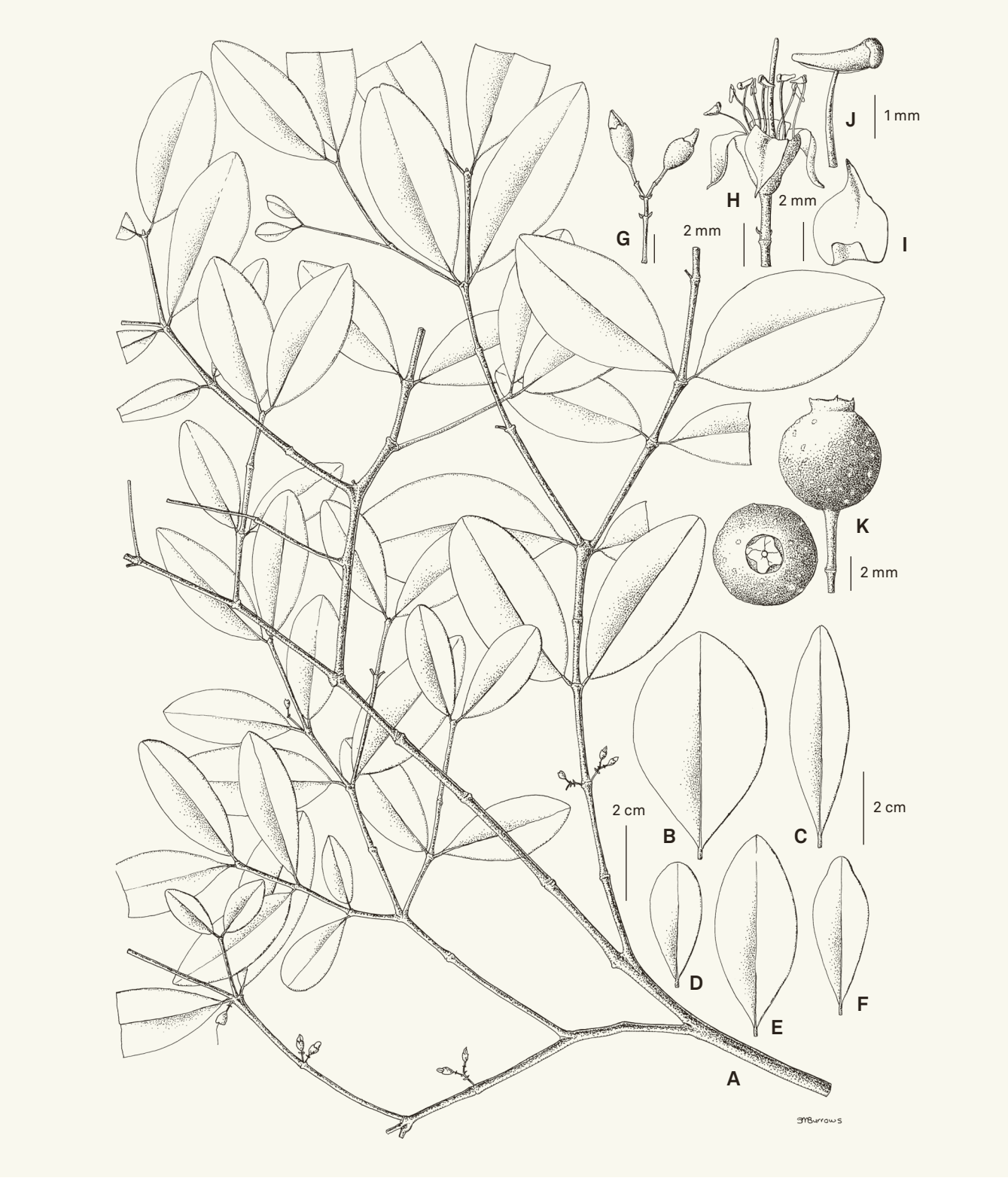

Fig. 6. – *Memecylon insolitum* R.D. Stone. **A.** Flowering branch; **B–F.** Leaves; **G.** Inflorescence with floral buds; **H.** Open flower; **I.** Petal; **J.** Stamen; **K.** Fruit.
[**A, G–J:** *Rabehevitra et al. 1017*, CAS; **B, E:** *Service Forestier 24864*, P; **C, D, F:** *Rabevohitra et al. 4210*, MO; **K:** *Rabenantoandro et al. 1017*, CAS]
[Drawing: S. Burrows]

Affine Memecyloni gracilipedicellato Jacq.-Fél., sed ab eo ramulis juvenilibus subquadrangularibus (non quadrangularibus crispato-alatisque), laminis foliaribus latioribus plerumque 4–5.5 × 1.8–2.6 cm (non 3.6–5.4 × 1.4–1.9 cm) ad apices obtusis rotundatis subretusisve (non obscure obtuseque acuminatis), connectivis antherarum glandulam dorsalem vestigialem ferentibus (non eglandulosis) et fructibus maturitate nigris (non rubris) differt.

Shrubs or small *trees* evergreen, 3–5 m high; youngest branchlets subquadrangular, soon becoming terete with age; internodes 1.5–3 cm long. *Leaves* thin, petiolate, distinctly discolored, minutely roughened on abaxial surface when dry (adaxial surface generally ± smooth), fibrous when torn; petioles slender, 2–4 mm long, often darkened; blades elliptic-obovate, 4–5.5 × 1.8–2.6(–3.3) cm, base attenuate, then decurrent with petiole, apex obtuse to rounded or even slightly retuse; midnerve channeled on adaxial surface, somewhat prominent abaxially; transverse and lateral veins faintly visible in dried material (especially on abaxial surface); the former oblique relative to midnerve, the latter following a curvilinear course c. 1 mm from slightly revolute margin. *Cymes* axillary and at the defoliated nodes below the leaves, c. 1 cm long, 1–5-flowered; peduncles slender, 3–3.5 mm long, becoming thickened and subligneous in fruit; primary and secondary inflorescence axes shorter, often unbranched; bracts and bracteoles minute, lanceolate-cucullate, ± persistent (especially uppermost pair). *Flowers* with very slender pedicels 1.5–3.5 mm long, thicker in fruit; hypantho-calyx campanulate, green with small white flecks externally, c. 2 × 2 mm, margin sinuate and 4-microdentate; petals white, ovate, 2 × 1.5 mm, auriculate towards base and then narrowed into a short claw, narrowly acute-acuminate at apex; anthers 1.5 mm long, dolabriform, borne on filaments 2 mm long; anther sacs situated fronto-ventrally; extremity of connective narrowly conic, ± acute; dorsal side of connective keeled, gland present but vestigial; style 5 mm long. *Fruits* globose, 6 mm in diam., reportedly black when mature, adorned with small whitish flecks; calycinal crown persistent, erect-spreading; epigynous chamber with radial partitions faint, cruciform.

Etymology. – The epithet *insolitum* is an adjective meaning "unusual", in reference to the presence of a vestigial anther-gland.

Distribution and ecology. – Northeastern Madagascar (SAVA region) to the south of the coastal city of Vohémar, all recent collections being made in the Ambondrobe forest. Habitat in littoral forest on sand.

Conservation status. – *Memecylon insolitum* is known from a single location with an estimated EOO of 0.1 km² and an AOO of 8 km². The Ambondrobe forest where it occurs has been recommended for protected-area status (Consiglio et al., 2006) but evidently remains unprotected. This species and its habitat are therefore threatened by ongoing deforestation which has already resulted in the loss of nearly 90 % of Madagascar's original area of eastern littoral forest (Consiglio et al., 2006). *Memecylon insolitum* is thus provisionally assessed as "Critically Endangered" [CR B2ab(iii)] in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012).

Notes. – Among the additional material (paratypes) of *Memecylon insolitum* cited below are two collections (*Service Forestier 24864* and *27483*) that were previously determined as *M. gracilipedicellatum* Jacq.-Fél. However, the protologue of *M. gracilipedicellatum* (Jacques-Félix, 1985a) was clearly based on disparate elements, including not only *M. gracilipedicellatum* s.str. but also the plants described here as *M. insolitum* and another, as-yet undescribed species. The present circumscription of *M. gracilipedicellatum* is limited to the type collection *Réserves Naturelles 8842* (holo- P, iso- TEF) from canton Marovato (SAVA region, Andapa district) plus other collections from the Analanjirofo and Atsinanana regions with young branchlets conspicuously winged, leaf-blades discolored and narrowly elliptic-oblong to ovate-lanceolate, anther-gland absent and fruits red when mature.

Memecylon insolitum is quite distinct from *M. gracilipedicellatum* s.str., not only morphologically but also geographically and ecologically. The presence of a vestigial anther-gland in *M. insolitum* is remarkable since this gland is absent in other members of *Memecylon* sect. *Pseudonaxiandra* H. Perrier sensu Jacques-Félix (1985a), with the notable exception of *M. paradoxum* Jacq.-Fél.

The following collections superficially resemble those of *Memecylon insolitum* but presently remain unplaced as to species: *Rahajasoa et al. 903* (CAS, MO, P) and *Rabenantoandro et al. 427* (CAS, MO, P, TEF).

Additional specimens examined. – **Madagascar. Reg. SAVA [Prov. Antsiranana]:** Fkt. Manakana, forêt littorale sur sables d'Ambondrombe [Ambondrobe], 13°43'06"S 50°05'52"E, 15.VII.2003, fr., *Rabehevitra et al. 363* (CAS, MO, P); ibid. loco, 13°42'58"S 50°05'37"E, 3 m, 24.X.2002, fr., *Rabenantoandro et al. 1017* (CAS, G, MO, P); ibid. loco, 13°43'14"S 50°05'59"E, 26.X.2002, fr., *Rabevohitra et al. 4209*, *4210* (CAS, MO, P, TEF); ibid. loco, 13°43'10"S 50°05'48"E, 2.III.2003, fr., *Rabevohitra et al. 4573* (CAS, MO, P, TEF); ibid. loco, 13°41'08"S 50°05'50"E, 13.III.2004, imm. fr., *Razakamalala et al. 1014* (CAS, G, MO, P); au S de Vohémar, 14.X.1966, fr., *Service Forestier 24864* (P, TEF); ibid. loco, III.1967, fl., *Service Forestier 27483* (P, TEF).

Memecylon linearifolium R.D. Stone, **sp. nov.** (Fig. 7).

Holotypus: Madagascar. Reg. DIANA [Prov. Antsiranana]: Ambilobe, Marivorahona, village le plus proche Betsimiranjana, 13°02'35"S 49°09'15"E, 40 m, 15.VII.2005, fr., *Rakotonandrasana et al. 928* (P [P05206870]!; iso-: NU!).

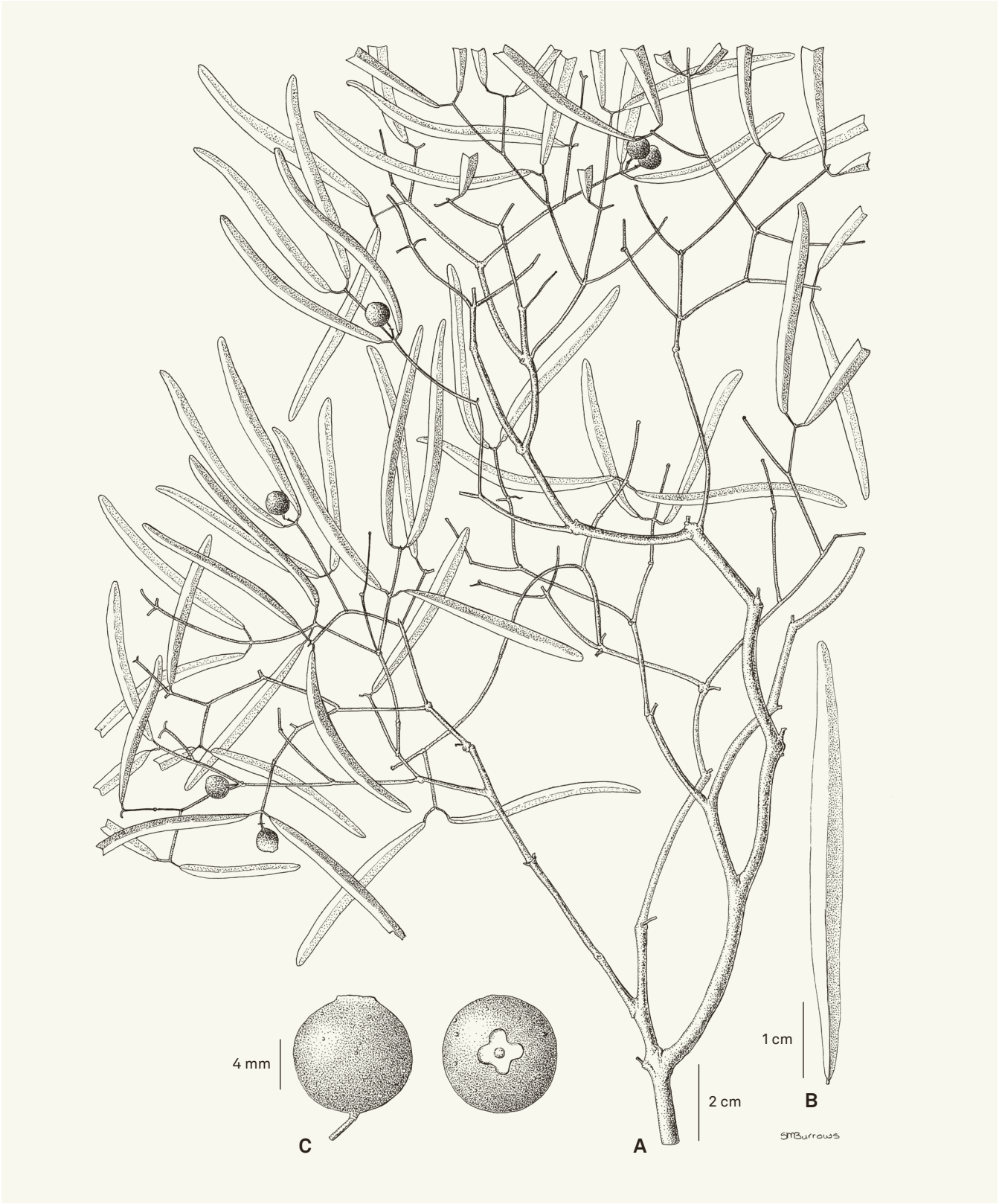

Fig. 7. – *Memecylon linearifolium* R.D. Stone. **A.** Fruiting branch; **B.** Leaf; **C.** Fruit.
[**A–C:** *Rakotonandrasana et al. 928*, NU] [Drawing: S. Burrows]

Ob florem ignotum affinitatis incertae, sed a congeneris madagascariensibus mihi cognitis combinatione foliorum linearium 4–5.5 cm × 2–3(–4) mm et fructuum globosorum 7–9 mm diametro bene distincta.

Evergreen large *shrubs* or *trees* 4–5 m high; bark of branches pale brownish grey; ultimate branchlets slender, wiry, terete to subquadrangular; nodes thickened; internodes 1–3 cm long. *Leaves* subcoriaceous, petiolate; petioles slender, 2 mm long; blades linear, ± plicately folded, 4–5.5 × 0.2–0.3(–0.4) cm, base attenuate and confluent with the petiole, apex obtuse; nervation obscure except for the midrib, which is visible abaxially and finely prominent towards the base of the blade. *Flowers* unknown. *Infructescences* solitary or geminate in the leaf axils and at the recently defoliated nodes; peduncles slender, 0.5–1.5 mm long, extended by a short internode 1–2 mm long; bracts deciduous, not seen. *Fruits* on pedicels 1–2 mm long, globose, 7–9 mm in diam.; calycinal crown appressed to the summit of the ovary.

Etymology. – The epithet *linearifolium* is a compound derived from the Latin adjective *linearis* meaning "linear" and the noun *folium* meaning "leaf". It functions as an adjective and means "linear-leaved".

Distribution and ecology. – Northern Madagascar (DIANA Region), at the western edge of the Andrafiamena mountain chain, northeast of Ambilobe. Habitat in dry sclerophyllous or semi-deciduous forest at elevations of 40–250 m.

Conservation status. – *Memecylon linearifolium* is known from two locations with an estimated AOO of 8 km^2. Both of these locations are inside the western limit of the Paysage Harmonieux Protégé d'Andrafiamena Andavakoera (73,710 ha) managed by the Association Fanamby (Goodman et al., 2021). Andrafiamena Andavakoera has sustained a major loss of 4,865 ha (28%) of total forest cover between the years 1996 and 2016, although the areas of dry deciduous forest were less affected (Goodman et al., 2021). Ongoing anthropogenic pressures include slash-and-burn agriculture (especially around mineral exploitation sites), destruction of forested habitat related to illegal gold mining and sapphire extraction, uncontrolled fires, exploitation of hardwoods, and collection of non-woody forest products (Goodman et al., 2021). Based on its limited AOO and the apparent threats, *M. linearifolium* would meet the criterion B for listing as "Critically Endangered" in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012), but it might be better assessed as "Near Threatened" [NT], contingent on the continued effectiveness of habitat-specific conservation and management measures (IUCN, 2019). The species is still poorly known, and we need better information on its local distribution, abundance, and microhabitat.

Notes. – The remarkably long, linear leaves of *Memecylon linearifolium* (greater than 15× longer than wide) will immediately distinguish this species from all others in the genus.

Additional specimens examined. – **Madagascar. Reg. DIANA [Prov. Antsiranana]:** à 5 km à l'E du hameau Betsimiranjana, au lieu dit Andohanantsohihy, partie Sud, 13°02'42"S 49°09'53"E, 249 m, 3.VII.2005, fr., *Leopold et al. 100* (CAS, MO, P).

Memecylon longipes R.D. Stone, **sp. nov.** (Fig. 8).

Holotypus: Madagascar. Reg. SAVA [Prov. Antsiranana]: Vohémar, Tsarabaria, Manakana, Ambondrombe, 13°42'46"S 50°05'25"E, 18.V.2004, fr., *Rabehevitra et al. 1033* (P [P05206873]!; iso-: CAS-1065645!, G [G00415905]!, MO-4777798!).

Affine Memecyloni ambrensi Jacq.-Fél. et M. arenicolae R.D. Stone, sed a primo internodiis brevibus plerumque 2.5–5 cm (non 5–8 cm) longis et foliis minoribus 5–10 cm × 3–6 cm (non usque ad 14 × 8 cm), ab ambobus fructuum pedicellis sursum dilatatis, fructu basi plusminusve truncata incrassataque et apice sub corona calycinali prominente constricto differt.

Evergreen *trees* 5–7 m high; young branchlets terete, c. 2 mm thick, surface smooth, chocolate brown; older branchlets c. 4 mm thick, lighter brown, finely longitudinally fissured; nodes thickened; internodes (1–)2.5–5(–6.2) cm long. Leaves coriaceous, sessile, dull green on the upper surface, dull green or brown on the lower; blades elliptic, 5–10 × 3–6 cm, base rounded to subcordate, apex rounded to obtuse or retuse; midnerve finely canaliculate adaxially, somewhat prominent abaxially especially towards the base of the blade; transverse veins scarcely visible, c. 8 pairs, oriented at an oblique angle relative to the midnerve, weakly prominent on both surfaces or ± obscure abaxially, confluent with the equally weak lateral nerves c. 2–3 mm from the margin. *Flowers* unknown. *Infructescences* solitary or fascicled in groups of 2–3 at the defoliated nodes of upper branchlets (rarely in the lower leaf axils); peduncles stout, 1–4 mm long, often extended by a short internode 1–1.5 mm long; bracts triangular-cucullate, 1–1.5 mm long, rapidly deciduous. Fruiting pedicels 7–9 mm long, slender towards the base, becoming dilated upwards and confluent with the base of the fruit. *Fruits* ellipsoid-urceolate, (10–)12–15(–17) × 8–11(–12) mm, base ± truncate beneath a ± conspicuous torus (thickened rim), apex constricted beneath the persistent calycinal crown c. 1.5 × 3 mm, calyx margin conspicuously sinuate-dentate; stylopodium prominent, ± filling the epigynous chamber.

Etymology. – The epithet *longipes* is a compound derived from the Latin adjective *longus* meaning "long" and the noun *pes* meaning "foot". It functions as an adjective and refers to the long and upwardly dilated fruiting pedicels of this species.

Fig. 8. – *Memecylon longipes* R.D. Stone. **A.** Fruiting branch; **B, C.** Leaves; **D.** Fruit.
[**A:** *Rabevohitra et al. 5152*, MO; **B–D:** *Rabehevitra et al. 1033*, CAS] [Drawing: S. Burrows]

Distribution and ecology. – Northeastern coast of Madagascar (SAVA region), near the village of Ambondrombe c. 37 km S of Vohémar. Habitat in littoral forest on sand.

Conservation status. – *Memecylon longipes* is known from two locations with an estimated AOO of 8 km². The coastal area and littoral forests to the south of Vohémar do not currently receive any formal protection, in spite of the fact that the Ambondrobe [Ambondrombe] forest where this species occurs was recommended for protected area status (Consiglio et al., 2006). Anthropogenic threats in this area are evidently not well documented. Based on its limited AOO, *M. longipes* is provisionally assessed as "Critically Endangered" [CR B1ab(iii)+B2ab(iii)] in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012).

Notes. – *Memecylon longipes* is closely related to *M. ambrense* Jacq.-Fél. and *M. arenicola* R.D. Stone, as evidenced by several shared characters including their thick, terete branchlets; sessile, elliptic to broadly elliptic leaves that are rounded to subcordate at base and ± rounded at the apex; and fruits with stylopodium prominent and ± filling the epigynous chamber. All three species are endemics of extreme northern Madagascar but are wholly allopatric, with *M. ambrense* restricted to the volcanic Montagne d'Ambre massif and both *M. longipes* and *M. arenicola* found only along the eastern coast and separated from each other by a distance of 44 km. The ellipsoid fruits of *M. longipes*, with their characteristically dilated pedicels, annular thickening above a ± truncate base, and conspicuously 4-dentate calycinal crown, are very different from the globose fruits of *M. arenicola*. The flowers of both species remain unknown.

Additional specimens examined. – **Madagascar. Reg. SAVA [Prov. Antsiranana]:** Vohémar, Tsarabaria, Manakana, à l'Est du village d'Ambondrombe, 13°41'48"S 50°05'18"E, 14.III.2004, fr., *Rabevohitra et al. 5152* (CAS, MO, P, TEF).

Memecylon majus R.D. Stone, **sp. nov.** (Fig. 9).

Holotypus: Madagascar. Reg. SAVA [Prov. Antsiranana]: Marojejy NP, just across stream from 2nd camp, 14°26'05"S 49°45'38"E, 750 m, 1.II.2008, fl., *Stone et al. 2656* (CAS-1104887!; iso-: G [G00379396]!, MO-6196939!, P [P05206814]!, TAN!).

Affine Memecyloni pedunculato Jacq.-Fél., sed ab eo laminis foliaribus majoribus plerumque 6–9 × 2.3–3.5 cm (non 4.3–6.1 × 1.3–2.4 cm) elliptico-acuminatis (non ovato-acuminatis) basaliter cuneatis (non rotundatis) et floribus majoribus hypantho-calyce 2.5 × 3.5–4 mm (non 2 × 3–3.5 mm), petalis 3 × 1.75 mm (non 2 × 1.25 mm) differt.

Shrubs or *trees* evergreen, 4–8 m high; young branchlets terete to subquadrangular, bark dark brownish-black soon exfoliating in elongate-rectangular strips to reveal whitish inner bark; older branchlets with nodes thickened; internodes (1.7–)2.5–5(–8) cm long. *Leaves* thinly coriaceous, petiolate, dark olive green on adaxial surface, drying brown abaxially (sometimes mottled with patches of lighter and darker brown); petioles 2–4 mm long; blades elliptic to narrowly elliptic, (3.4–)6–9(–11.6) × (1.4–)2.3–3.5(–4.5) cm, base cuneate, apex ± acuminate, acumen (3.5–)6.5–14(–20) mm long, obtuse; midnerve finely impressed on adaxial surface; transverse veins 6–11 pairs faintly prominent on both surfaces in dried material, departing at an acute angle then nearly perpendicular to slightly oblique relative to midnerve, confluent with similarly weak intramarginal nerves; margins slightly revolute. *Cymes* up to 1.5(–2) cm long, solitary or in fascicles of 2–3 at nodes below leaves, 1–2 times branched and (1–)3–5(–7)-flowered; peduncles (0.5–)1–5(–7.5) mm long, compressed; secondary axes (0.5–)2–4.5(–7) mm long, quadrangular; additional axes similar but shorter; bracts narrowly triangular, 1–1.5 mm long, acute, early deciduous; true pedicels short (flowers sessile or nearly so), rarely 1–2 mm long. *Flowers* borne individually at ends of inflorescence axes; hypantho-calyx white suffused with violet near margin, obconic to campanulate, 2.5 × 3.5–4 mm, margin with four V-shaped sinuses c. 0.5 mm deep, lobes rounded; corolla white in bud, narrowly conical-acute, 2.5 mm long; petals pale violet, ± triangular in outline, 3 × 1.75 mm, base ± auriculate above claw 0.5 mm long, apex acuminate-acute, margins scarious; staminal filaments white, 4.5–5 mm long; anthers pale yellow, c. 3 mm long, thecae positioned at anterior end, connective moderately incurved by dorsal oil-gland situated c. 0.5 mm behind thecae, posterior extremity narrowly conical-acute, extending 1.5 mm past gland; style white, c. 6 mm long. *Fruits* globose, 8–8.5 mm in diam., white when immature, turning red when ripe; calycinal crown appressed to summit of ovary.

Etymology. – The epithet *majus* is a neuter adjective meaning "greater", in reference to the larger leaves and flowers of this species in comparison to the closely related and sympatric *Memecylon pedunculatum* Jacq.-Fél.

Distribution and ecology. – Northeastern Madagascar (SAVA region), known only from the Marojejy and Anjanaharibe massifs near the town of Andapa. Habitat in humid forests at elevations of 750–1000(–1580) m.

Conservation status. – *Memecylon majus* is known from four locations with an estimated EOO of 85 km² and an AOO of 20 km². All of the known locations are in protected areas including the Marojejy National Park (60,050 ha, first gazetted in 1952) and the Réserve Spéciale d'Anjanaharibe-Sud (26,903 ha, first gazetted in 1958), both of which are managed by Madagascar National Parks (Goodman et al., 2021). Marojejy has

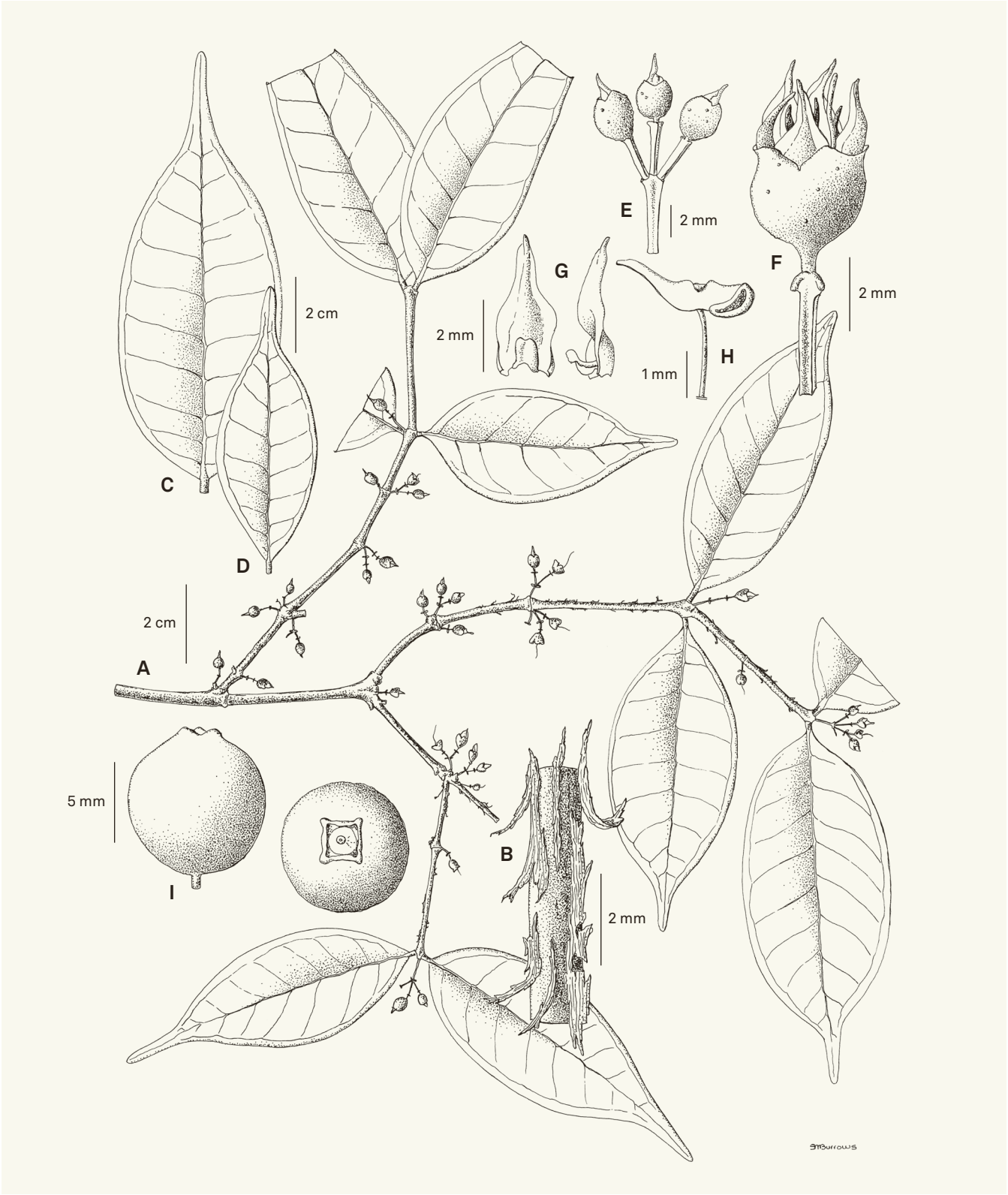

Fig. 9. – *Memecylon majus* R.D. Stone. **A.** Flowering branch; **B.** Section of branchlet showing exfoliating character of bark; **C, D.** Leaves; **E.** Inflorescence with floral buds; **F.** Flower at anthesis; **G.** Petal; **H.** Stamen; **I.** Fruit.
[**A, B, E–H:** *Stone et al. 2656*, CAS; **C:** *Stone et al. 2657*, CAS; **D:** *Stone et al. 2662*, CAS; **I:** *Razafimandimbison et al. 232*, CAS] [Drawing: S. Burrows]

seen a relatively minor loss of 846 ha (1.7%) of moist evergreen forest between the years 1996 and 2016, and at Anjanaharibe Sud the deforestation rate has been similarly low, 404 ha (1.6%) over the same time period (Goodman et al., 2021). Ongoing anthropogenic pressures include exploitation of hardwoods, collection of non-woody forest products, uncontrolled fires (Marojejy), slash-and-burn agriculture (Anjanaharibe Sud), and small-scale mineral extraction (Anjanaharibe Sud) (Goodman et al., 2021). Based on its limited AOO and the apparent threats, *M. majus* would meet the criterion B for listing as "Endangered" in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012), but it would be better assessed as "Near Threatened" [NT] contingent upon the continued effectiveness of habitat-specific conservation and management measures (IUCN, 2019).

Notes. – Molecular analyses (R.D. Stone, unpubl. data) indicate that *Memecylon majus* is the sister-species of *M. pedunculatum* in *Memecylon* sect. *Clavistamina* (sensu Jacques-Félix, 1985a). Also appearing in this species-group are *M. myricoides* Naudin and *M. xiphophyllum* R.D. Stone. However, *Memecylon* sect. *Clavistamina* as previously circumscribed is evidently not monophyletic, with the type species *M. longipetalum* H. Perrier and a different species-group including *M. eduliforme* Aug. DC., *M. clavistaminum* Jacq.-Fél., *M. laureolum* Jacq.-Fél., and *M. pterocladum* R.D. Stone appearing elsewhere within the Malagasy clade sensu Stone (2014).

Based on its morphology, *Memecylon majus* belongs to a group of montane species defined by the character of young branchlets with brownish-black bark soon exfoliating in narrow, longitudinal strips to reveal whitish inner bark, as well as the character of flowers and fruits short-pedicellate to ± sessile above the peduncle (Stone & Callmander, 2011). Also belonging to this species-group are *M. subsessile*, *M. pedunculatum*, *M. centrale* (Jacq.-Fél.) R.D. Stone, and the newly described *M. ourantherum* R.D. Stone (see below). The flowers of *M. centrale* have not been seen, but the other species all have flowers with an anther-gland present, in contrast with the protologue of *Memecylon* sect. *Clavistamina* described as being "without gland" (Jacques-Félix, 1985a).

Memecylon majus and *M. pedunculatum* both occur in the Marojejy massif and might be confused with each other, but *M. majus* differs by its larger, elliptic-acuminate leaves with base cuneate (not ovate-acuminate with base rounded) and larger flowers. The leaves of *M. majus* are also quite similar to those of the common and widespread species *M. louvelianum* H. Perrier, leading to possible confusion. However, *M. louvelianum* has smaller flowers, and its fruits have a distinctive character, i.e. with the top of the ovary prominent and projecting above the persistent calycinal crown (vs. calycinal crown appressed to the summit of the ovary in *M. majus*). Molecular analyses further indicate that the resemblance between *M. majus* and *M. louvelianum* is only superficial, i.e. the two species are not closest relatives (R.D. Stone, unpubl. data).

The following collections are clearly close to *Memecylon majus* but are from outside the type region and have generally smaller leaves, of about the same size as those of *M. pedunculatum* but elliptic in outline (not ovate) and with base cuneate (not rounded). They remain unplaced to species pending further study: *Antilahimena 2330* (K, MO, NU), *Antilahimena 2511* (K, MO, NU, P), *Birkinshaw et al. 1773* (G, MO, NU), *Service Forestier 35131* (TEF), *Vasey & Velo 31* (CAS, MO, P, WAG) and *69* (K, MO, P).

Additional specimens examined. – **Madagascar. Reg. SAVA [Prov. Antsiranana]:** R.N.I. Marojejy, on trail leading N into reserve from Tanambao, 14°32'S 49°42'E, 750 m, 15.V.1987, fr., *Nicoll 654* (K, MO, P, TAN); ibid. loco, aux env. du sommet d'Ambatosoratra, 14°32'S 49°42'E, 1583 m, VI.1994, fr., *Ravelonarivo et al. 219* (CAS, K); RS d'Anjanaharibe Sud, au S de campement à Mandritsarahely, 14°46'S 49°30'E, 985 m, 10.VII.1996, fr., *Razafimandimbison et al. 232* (BR, CAS, MO, P); Marojejy NP, along trail between 1st and 2nd camps, 14°26'05"S 49°45'38"E, 750 m, 1.II.2008, fl. & fr., *Stone et al. 2657* (CAS, G, MO, P, TAN), *2657A* (CAS, MO, P, TAN); ibid. loco, along trail between 2nd and 3rd camps, 14°26'08"S 49°45'26"E, 900 m, 2.II.2008, fl., *Stone et al. 2662* (CAS, K, MO, P, TAN); ibid. loco, *Takhtajania* trail, 14°45'15"S 49°29'10"E, 1006 m, 14.II.2006, fl., *Tosh et al. 360* (BR, CAS, MO, P, TAN).

Memecylon ourantherum R.D. Stone, **sp. nov.** (Fig. 10).

Holotypus: Madagascar. Reg. Analanjirofo [Prov. Toamasina]: PN Mananara-Nord, forêt d'Ibanda, PK 12 d'Antanambe, 12.II.1990, fl., *Raharimalala 266* (2-part specimen: P [P00516019, P00516020]!).

Affine Memecyloni majori R.D. Stone, sed ab eo laminis foliaribus iterum majoribus 10–13 × 4–5.5 cm (non 6–9 × 2.3–3.5 cm) basaliter rotundatis subcordatisve (non cuneatis) ad apicem acumine plerumque acuto 15–20 mm longo (non obtuso 6.5–14 mm) et floribus aliquantum majoribus corolla in alabastro 4 mm (non 2.5 mm) longa, petalis 4.5 mm (non 3 mm) longis, antheris 4 mm (non 3 mm) longis, antherae connectivo ultra glandem dorsalem 2.5 mm (non 1.5 mm) producto differt.

Shrubs evergreen, 2–6 m high; young branchlets terete, with dark brown to blackish bark peeling off in elongate-rectangular strips to reveal whitish inner bark; older branchlets c. 3 mm in diam. except for thickened nodes, remaining rather slender well below leaves; internodes 3.5–6.5(–7.3) cm long. Leaves coriaceous, petiolate, dark green and dull on adaxial surface, abaxial surface dull brown in dried material; petioles distinct but short and thick, 1–2.5 × 2 mm, flattened adaxially; blades elliptic to narrowly elliptic, 10–13 × 4–5.5 cm, base narrowly rounded to subcordate, apex ± caudate-acuminate, acumen (3–)15–20 mm long, acute (in some leaves short and obtuse); midnerve clearly visible, impressed on adaxial surface;

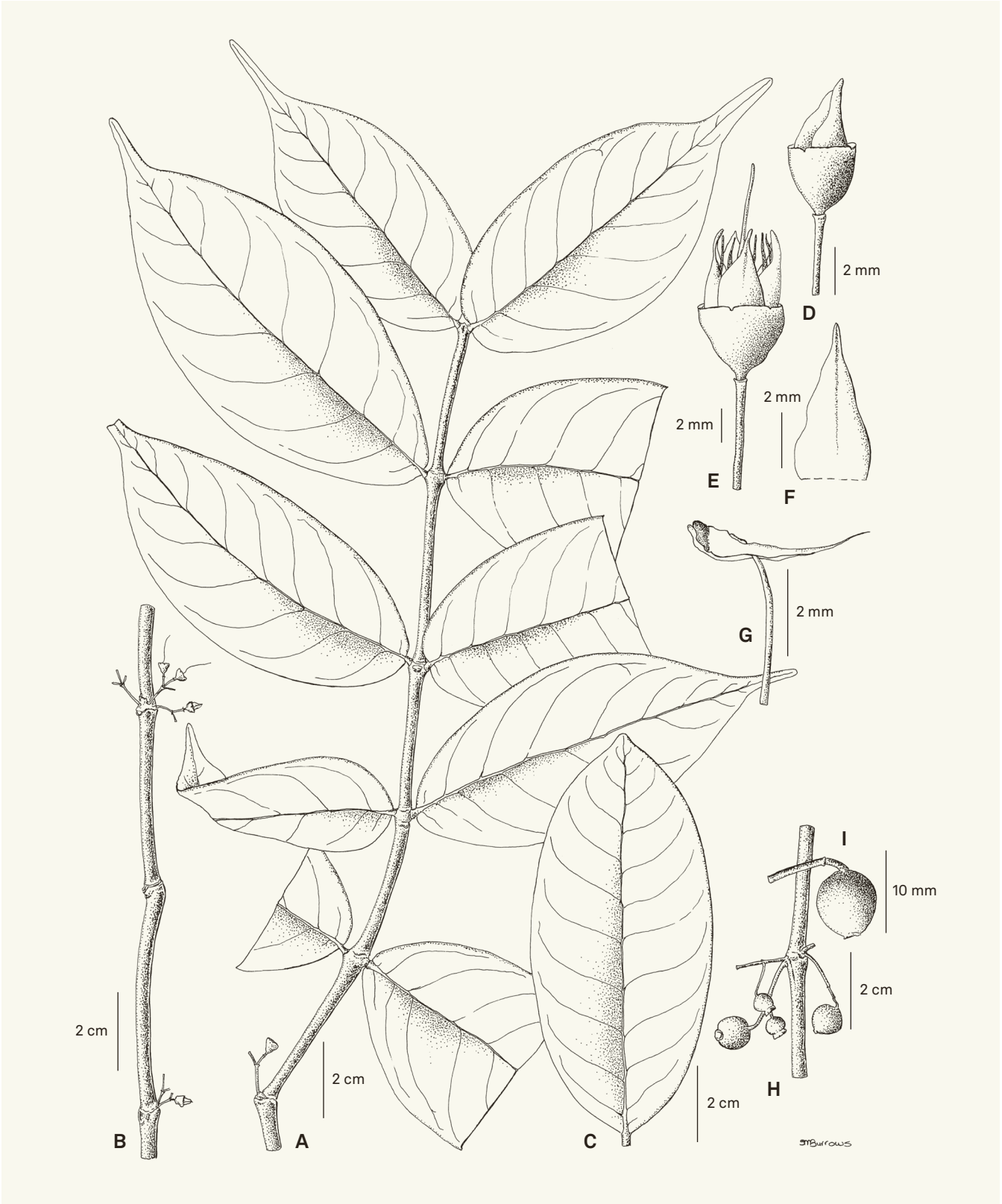

Fig. 10. – *Memecylon ourantherum* R.D. Stone. **A.** Leafy branch; **B.** Flowering branch; **C.** Leaf; **D.** Floral bud; **E.** Flower at anthesis; **F.** Petal; **G.** Stamen; **H.** Section of fruiting branch; **I.** Fruit. [**A, B, D–G:** *Raharimalala 266*, P; **C, H, I:** *Raharimalala 1089*, P] [Drawing: S. Burrows]

transverse veins c. 10 pairs faintly prominent on both surfaces in dried material, departing at an acute angle then oblique relative to midnerve, straight or sometimes forked, confluent with similarly weak intramarginal nerves. *Cymes* up to 2 cm long, 3–5-flowered, solitary or in fascicles of 2–3 at nodes below leaves, 1–2 times branched; peduncles 2–10 mm long, robust, compressed; secondary axes 3–5 mm long, quadrangular; additional axes similar but shorter; bracts narrowly triangular, c. 1 mm long, acute, early deciduous; true pedicels short, c. 0.5 mm long. *Flowers* borne individually at ends of inflorescence axes; hypantho-calyx obconic to campanulate, 3 × 4 mm, margin truncate but with four V-shaped sinuses c. 0.5 mm deep; corolla in bud narrowly conical-acute, 4 mm long; petals reportedly whitish, ovate-acuminate, 4.5 × 1.75 mm, acumen c. 2 mm long; staminal filaments c. 4.5 mm long; anthers c. 4 mm long, thecae positioned at anterior end, dorsal oil-gland c. 0.5 mm behind thecae, posterior extremity of connective caudate-acuminate, extending 2.5 mm past gland; style 10 mm long; epigynous chamber with 8 radial, membranous, interstaminal partitions, each partition also extending into a narrow ridge or crest c. 0.5 mm high adjacent to stylar scar. *Fruits* globose to ovoid-globose, 8 mm in diam.; calycinal crown appressed to summit of ovary.

Etymology. – The epithet *ourantherum* is a compound derived from the Greek noun *ourá* meaning "tail" and the noun *anthera* meaning "anther". It functions as an adjective and means "tailed-anther", in reference to the characteristic anthers of this species.

Distribution and ecology. – Northeastern Madagascar, known only from two collections made in the Ibanda forest c. 25 km to the west and inland from the coastal town of Mananara Avaratra. The soil is lateritic (i.e. ferralitic), according to the collector. Elevation c. 280 m.

Conservation status. – *Memecylon ourantherum* is known from a single location with an estimated AOO of 4 km^2. Based on the latitude and longitude coordinates provided by the collector, this locality is outside the boundary of the Mananara-Nord National Park and remains unprotected. Anthropogenic pressures, especially extensive slash-and-burn agriculture, are continuing even within the protected area and have contributed to deforestation around the park's periphery (Goodman et al., 2021). *Memecylon ourantherum* is thus provisionally assessed as "Critically Endangered" [CR B2ab(iii)] in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012). With additional field-work, this species may eventually be found to occur within the park boundary.

Notes. – *Memecylon ourantherum* belongs to a group of montane species including *M. subsessile*, *M. pedunculatum*, *M. centrale*, and the newly described *M. majus* (see above) defined by their branchlets with brownish-black bark soon exfoliating in narrow, longitudinal strips to reveal whitish inner bark, as well as the character of flowers and fruit short-pedicellate to ± sessile above the peduncle (Stone & Callmander, 2011). It is most similar to *M. majus*, differing from that species in having larger leaves 10–13 × 4–5.5 cm (vs. 6–9 × 2.3–3.5 cm) that are basally rounded to subcordate (vs. cuneate) and apically acute (the acumen ± acute and 15–20 mm long vs. obtuse and 6.5–14 mm), larger flowers with corolla in bud 4 mm long (vs. 2.5 mm), petals 4.5 mm long (vs. 3 mm), anthers 4 mm long (vs. 3 mm), and anther connectives extending beyond the dorsal gland by 2.5 mm (vs. 1.5 mm). The two species are also wholly allopatric, with *M. majus* occurring further north and with its nearest known locality separated from *M. ourantherum* by a distance of c. 150 km. The fruits of *M. ourantherum* are very much like those of *M. pedunculatum*.

In addition to the two sheets in P identified below as paratypes of *Memecylon ourantherum*, there is a third sheet [P00516201] labeled as *Raharimalala 1089* but with a different collecting date (20.VII.1990) and with material clearly belonging to *Memecylon* sect. *Pseudonaxiandra* sensu Jacques-Félix (1985a). It remains undetermined to species pending further study.

Additional specimens examined. – **Madagascar. Reg. Analanjirofo [Prov. Toamasina]:** PN Mananara-Nord, forêt d'Ibanda, 280 m, 27.II.1990, fr., *Raharimalala 1089* (P [P00516202, P05320686]).

Memecylon ultramaficum R.D. Stone, **sp. nov.** (Fig. 11).

Holotypus: Madagascar. Reg. Alaotra-Mangoro [Prov. Toamasina]: Ambatovy forest, up to Berano village, 18°50'13"S 48°19'19"E, 1130 m, 17.I.2005, fl., *Antilahimena & Andriambololona 3209* (CAS-1104896!; iso-: CAS-1164683!, P [P04802233]!).

Affine Memecyloni eduliformi Aug. DC., sed ab eo ramulis juvenilibus quadrangularibus et anguste alatis (non teretibus), petiolis brevioribus 1–2 mm (non 2–3 mm) longis, laminis foliaribus minoribus 1–3 × 0.5–2 cm (non 6–7 × 2.5–3 cm), floribus minoribus hypantho-calyce 1.5 × 1.75 mm (non 2 × 2 mm), petalis 2 × 0.8 mm (non 3 × 1.5 mm), filamentis 1.5 mm (non 3–3.5 mm) longis, stylo 4 mm (non 8 mm) longo et fructus corona calycina absente (non prominente) differt.

Evergreen *shrubs* or *trees* 3.5–8 m tall; bark greyish brown to whitish, finely longitudinally fissured; young branchlets quadrangular-alate; nodes somewhat thickened; internodes 0.5–2.5(–4.7) cm long. *Leaves* subcoriaceous, petiolate, bright green on the upper surface, paler green beneath (drying brown and with texture granular-rugose); petioles 1–2 mm long; blades elliptic to obovate or suborbicular, 1–3 × 0.5–2 cm, base cuneate and confluent with the petiole, apex obtuse, rounded,

Fig. 11. – *Memecylon ultramaficum* R.D. Stone. **A.** Flowering branch; **B–D.** Leaves; **E.** Floral bud; **F.** Open flower; **G.** Petal; **H.** Stamen; **I.** Immature fruit; **J.** Mature fruit.
[**A, B, D–H:** *Antilahimena & Andriambololona 3209*, CAS; **C, I, J:** *Ratovoson et al. 602*, CAS, MO] [Drawing: S. Burrows]

retuse or vaguely obtuse-acuminate; midnerve finely impressed on the upper surface, ± prominent on the lower especially towards the base of the blade; intramarginal nerves faintly impressed on the upper surface; transverse veins invisible; margins ± revolute. *Cymes* subumbellate, to 8 mm long, (1–) 3–4 (–6)-flowered, solitary or geminate in the leaf axils and at the recently defoliated nodes; peduncles 0.5–3 mm long, sometimes extended by a short internode 0.5–1 mm long; bracts narrowly triangular-acute, 1 mm long; bracteoles cucullate and dorsally carinate, 0.5 mm long. *Flowers* on pedicels 1–1.5 mm long; hypantho-calyx green, ± campanulate, slightly constricted around the top of the ovary, 1.5 × 1.75 mm, margin shallowly sinuate-denticulate; corolla in bud conical-acuminate, 1.5 mm long; petals white, reflexed at anthesis, ovate-triangular, 2 × 0.8 mm, base shortly clawed, apex acuminate, the acumen 0.5 mm long; stamens yellow, on slender filaments c. 1.5 mm long; anthers dolabriform, 1.25 mm long, thecae frontal, dilated laterally; connective acute, carinate-canaliculate on the dorsal side, gland absent; style c. 4 mm long. *Fruits* globose, c. 10 mm in diam., during development with a prominent calycinal crown, which lacks at maturity.

Etymology. – The epithet *ultramaficum* refers to the habitat of this species on ultramafic ferricrete substrate.

Distribution and ecology. – Eastern Madagascar (Alaotra-Mangoro region) near Ambatovy (c. 15 km northwest of Andasibe) and with an isolated station c. 84 km to the north and 29 km southeast of the city of Ambatondrazaka. Habitat in montane, humid forest and azonal, sclerophyllous scrublands on ultramafic, ferricrete substrate at 850–1150 m elevation.

Conservation status. – *Memecylon ultramaficum* has an estimated EOO of 207 km^2 and an AOO of 16 km^2. Of the four known locations, three are mapped either within the footprint of the Ambatovy-Analamay nickel mine or in the surrounding conservation zone. While better information is needed on this species' local distribution and abundance, it seems certain that development of the mine has led to a reduction in both its population size and available habitat. The off-site conservation area at Ankerana, about 70 km to the northeast of Ambatovy, is partially underlain by ultramafic substrates similar to those found at the mining site. However, the elevation at Ankerana is lower, and *M. ultramaficum* is not currently known to occur there. The northerly location near Ambatondrazaka is at the western edge of the Ankeniheny-Zahamena corridor, and the species should perhaps be searched for elsewhere in the intervening area, i.e. near the upper elevation limit of this protected corridor. Based on its limited EOO and AOO, *M. ultramaficum* is provisionally assessed as "Endangered" [EN B1ab(i, ii, iii, iv, v)+B2ab (i,ii,iii,iv,v)] in accordance with the IUCN Red List Categories and Criteria (IUCN, 2012).

Notes. – The anther characteristics of *Memecylon ultramaficum* (gland absent, thecae dilated laterally and appearing ± separate, connective dorsally keeled-canaliculate on the dorsal side) suggest a close relationship with *M. eduliforme*, which is one of the more common and widespread species of Malagasy *Memecylon*. In east-central Madagascar, most collections of *M. eduliforme* are from lower-elevation forests of the Analanjirofo and Atsinanana regions, but the type collection is from Analamazaotra (Alaotra-Mangoro region). The new species is clearly separated from *M. eduliforme* by at least eight characters (see diagnosis, above), most notably by its quadrangular-alate branchlets, much smaller leaves, smaller flowers, and mature fruits lacking a prominent calycinal crown.

Other *Memecylon* species that might be confused with *M. ultramaficum* include several with small, apically rounded to orbicular leaves. Of these, *M. ulopterum* DC. is superficially similar in having white flowers and anthers lacking a dorsal gland, but is distinguished by its conspicuously alate-crisped branchlets and delicate cymules hidden beneath the foliage. *Memecylon cotinifolioides* (H. Perrier) Jacq.-Fél. notably differs from *M. ultramaficum* in having cymules borne terminally on the branchlets in fascicles of 3–5 (vs. axillary and at recently defoliated nodes), petals pale violet, and anther-gland present. *Memecylon vaccinioides* Jacq.-Fél. differs by its pale green, somewhat larger leaves (3–4 × 2–2.5 cm vs. 1–3 × 0.5–2 cm) on longer petioles (3 vs. 1–2 mm), sessile, contracted, often terminal cymules, and smaller fruits (6 vs. c. 10 mm in diam.).

Another collection with fruits, *Antilahimena & Edmond 4953* (CAS, P, WAG), currently remains unplaced to species but might be referable to *Memecylon ultramaficum*. It is also from the environs of Ambatovy, but, according to the collectors, the locality is on substrate lacking a ferruginous crust.

Additional specimens examined. – **Madagascar. Reg. Alaotra-Mangoro [Prov. Toamasina]:** côte Est, 850 m, 28.XII.1944, fl., *Cours 2070* (P); Ambatondrazaka, 10 km à l'O de Didy, 18°03'56"S 48°32'13"E, 1080 m, 8.XI.2001, fr., *Ratovoson et al. 602* (CAS, MO, P); Mangoro, Moramanga, site d'Antsampanandrano, 18°48'12"S 48°21'56"E, 995 m, 3.VI.2007, fr., *Miandrimanana et al. 193* (P); Ambatovy, 18°50'53"S 48°18'26"E, 1091 m, 13.XII.2011, fl. buds, *Rasoazanany et al. 51* (MO, NU).

Acknowledgements

The curators of the following herbaria are thanked for providing loans or gifts of specimens or for providing access to specimen-images: BR, CAS, G, K, MO, NU, P, TAN, TEF, and WAG. Field-work in Madagascar in 2007–2008 was done in cooperation with the Ministère de l'Environnement, de l'Écologie et des Forêts, the Parc Zoologique et Botanique de Tsimbazaza, the Association Fanamby, and the California Academy of Sciences. The following persons (listed in alphabetical order by surname) are also gratefully acknowledged for their assistance and/or support of this work: Frank Almeda,

Laurent Gautier, Rokiman Letsara, Pete Phillipson, Heritiana Ranarivelo, Jérémie Razafitsalama, and Jan Wieringa. I am also grateful to Mrs. Sandie Burrows for her fine work on the line drawings, to Roy Gereau for editing the Latin, and to Martin Callmander and Joel Calvo at *Candollea*. The manuscript was improved thanks to comments received from Frank Almeda and another anonymous reviewer. This research was supported by UKZN and the California Academy of Sciences (John J. Rose Postdoctoral Fellowship, 2006–2008).

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