

Revised treatment of Mozambican *Memecylon* (Melastomataceae—Olisbeoideae), with descriptions of four new species in *M.* section *Buxifolia*

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Abstract

Memecylon sect. *Buxifolia* R.D. Stone (Melastomataceae, Olisbeoideae) is a group of forest shrubs and small understory trees distributed from tropical East Africa (Kenya and Tanzania) to eastern South Africa and with a disjunct occurrence in Madagascar. Previous authors had recognized three species of this section as occurring in Mozambique, i.e., *M. natalense* Markgr., *M. torrei* A. Fern. & R. Fern. and *M. insulare* A. Fern. & R. Fern. Here we describe four new species of *M.* sect. *Buxifolia* from Mozambique and adjacent parts of Malawi and Tanzania: *Memecylon incisilobum* R.D. Stone & I.G. Mona, *M. nubigenum* R.D. Stone & I.G. Mona, *M. rovumense* R.D. Stone & I.G. Mona and *M. aenigmaticum* R.D. Stone. In accordance with previous molecular results, *M. incisilobum* and *M. nubigenum* are semi-cryptic species that had been confused with *M. natalense* (considered here to be a South African endemic). *Memecylon rovumense* and *M. aenigmaticum* had also been confused with *M. natalense*, but their conspicuously verrucose-wrinkled fruits indicate a closer affinity with *M. torrei*. We assess the conservation status of each new species according to the IUCN Categories and Criteria, and provide an identification key to the seven species of *Memecylon* currently recognized in the flora of Mozambique.

Introduction

Memecylon Linnaeus (1753: 349) is a paleotropical genus of forest shrubs and small trees with 350+ species (Renner *et al.* 2007 onwards). In accordance with recent morphological and molecular findings (Jacques-Félix 1978, Bremer 1982, Stone 2006, 2014, Stone and Andreasen 2010), it is now circumscribed to exclude the monospecific western and central African genus *Spathandra* Guill. & Perr. in Guillemin *et al.* (1833: 313), the paleotropical *Lijndenia* Zoll. & Moritz in Moritz (1846: 10) and the African-Madagascan *Warneckea* Gilg (1904: 100).

The treatment of *Memecylon* sensu lato for the *Flora de Moçambique* (Fernandes & Fernandes 1980: 3) included six species, of which three have distinctly trinervate to multinervate leaves and are properly placed in *Warneckea*, as *W. sansibarica* (Taub.) Jacques-Félix (1978: 234), *W. sessilicarpa* (A. Fern. & R. Fern.) Jacques-Félix (1978: 234) and *W. sousae* (A. Fern. & R. Fern.) A.E. van Wyk in Coates Palgrave (2002: 19, 844). A revised key to the Mozambican species of *Warneckea* is given in Stone & Tenza (2017). The remaining three species have apparently uninervate leaves and belong to *Memecylon* sensu stricto: *M. natalense* Markgr. in Mildbraed (1934: 1078), *M. torrei* A. Fernandes & R. Fernandes (1972: 63) and *M. insulare* A. Fernandes & R. Fernandes (1972: 65). These three species were recently placed in *M.* sect. *Buxifolia* R.D. Stone (2014: 557).

Memecylon sect. *Buxifolia* is a monophyletic group with an overall range from East Africa (Kenya and Tanzania) southwards to the eastern part of South Africa and disjunctly in western and northern Madagascar (Stone 2014). It is diagnosed by the combination of branchlets with successive nodes alternating between normal leaves and reduced, often inflorescence-bearing bracts, white petals with corolla rounded to apiculate in bud, and anther connectives bearing a dorsal oil-gland. Amongst the other sections of East African *Memecylon*, an anther gland is found only in the Tanzanian *M.* sect. *Magnifoliata* R.D. Stone (2014: 553), which differs in its cauliflorous habit and ellipsoid to obovoid fruits, and in *M.* sect. *Obtusifolia* Engler (1921: 769), characterized by its unusually thick bark, yellowish green leaves and subdeltate-acuminate petals. Section *Obtusifolia* currently holds just one species, *M. flavovirens* Baker (in Baker *et al.* 1897: 268), widely distributed in seasonally dry “miombo” woodlands from Angola through Zambia, Katanga (D. R. Congo), Burundi and Malawi to southwestern Tanzania. In addition, *M. flavovirens* has been collected recently in the Niassa Province of northwestern Mozambique (Burrows 11154 & 11171, BNRH).

Until now the circumscription of *M. sect. Buxifolia* has included ten species (Stone 2014). In South Africa there are two species, *M. bachmannii* Engler (1921: 768) and *M. natalense*, according to recent treatments (Coates Palgrave 2002, Germishuizen *et al.* 2006, Boon 2010). *Memecylon bachmannii* occurs near the coast in Pondoland (Eastern Cape) and southern KwaZulu-Natal, while *M. natalense* inhabits somewhat drier forests of the same region and has a wider but sporadic distribution northwards to Mpumalanga and Limpopo. The range of *M. natalense* has also been reported to extend to northern Mozambique and southern Malawi (Fernandes & Fernandes 1978, 1980).

Evolutionary relationships in southern African *Memecylon* were recently investigated with population-level sampling and comparative sequencing of the nuclear rDNA ITS and 5' ETS regions (Stone *et al.* 2017). That study has clearly shown that *M. natalense* as previously circumscribed is not a monophyletic group and includes some geographically outlying populations warranting recognition as distinct taxa. A comprehensive morphological study and revision of the "*Memecylon natalense* species-complex" is currently underway (Mona & Stone 2016). In the meantime, we describe here four new species of *M. sect. Buxifolia* to make their names available for a forthcoming book on the *Trees and Shrubs of Mozambique* (Burrows *et al.*, in press). For each species, the extent of occurrence (EOO) and area of occupancy (AOO) were estimated using GeoCAT (Bachman *et al.* 2011), and the conservation status has been provisionally assessed according to the IUCN Red List Categories and Criteria (IUCN 2012). We also compare geographic distribution and morphology between *M. natalense* and the six presently recognized species of *M. sect. Buxifolia* in Mozambique, and provide an identification key to the seven currently recognized species of Mozambican *Memecylon*.

Taxonomy

Memecylon incisilobum R.D. Stone & I.G. Mona, *sp. nov.* (Figs. 1, 2)

Type :—MOZAMBIQUE. Prov. Gaza: forest surrounding M-cel tower 11 km from Bilene on road to Macia, elevation 60 m, 25°11'31"S, 33°12'33"E, 28 October 2015, Burrows *et al.* 14765 (holotype BNRH!, isotypes CAS, K, LMA, MO, NH, NU!, PRE).

Evergreen understory tree up to 7 m tall; bark brownish gray, longitudinally fissured; young branchlets slender, quadrangular to narrowly quadrangular-alate; older branchlets terete, whitish gray, longitudinally fissured; nodes thickened; internodes between normal leafy nodes (2–) 3–5 (–6) cm long. Leaves subcoriaceous, dark green and glossy above, somewhat paler below; petioles 2.5–3 mm long; blades elliptic, (4.5–) 5–7 (–8.5) × (1.8–) 2.5–3.5 (–4.5) cm, cuneate at base (margins curved slightly inwards) and confluent with the petiole, ± broadly and obtusely acuminate at apex, the acumen (3–) 4.5–8.5 (–11) mm long (sometimes indistinct or with apex acute); midnerve clearly visible, impressed on the upper surface, ± prominent on the lower (especially toward the leaf base); one pair of lateral nerves faintly visible on both surfaces, curvilinear and 1.5–4 mm from the margin in the basal half of the blade; transverse veins *ca.* 5 pairs, faintly visible, oblique relative to the midnerve, prominent on both upper and lower surfaces in dried material. Cymes 1–9-flowered, solitary (rarely geminate) at the defoliated nodes of older branchlets, less often in the leaf axils and at the bracteate nodes alternating with those bearing fully developed leaves, occasionally borne terminally; peduncles (3–) 5–10 (–13) mm long; secondary axes slender, 1–5 in number, mostly 3.5–7 mm long; additional axes when present mostly 3–5.5 mm long; bracts rapidly deciduous. Flowers borne individually at the ends of the inflorescence axes, on pedicels 1–2 (–3) mm long; hypantho-calyx green, broadly cupuliform, 2–2.5 mm high × 5 mm wide, margin shallowly sinuate; lobes broadly rounded, each with scarious margin regularly incised ± to the base, together forming a ring of 8 whitish, deltoid-acute teeth *ca.* 1 mm high; corolla in bud sharply apiculate (apiculum *ca.* 1 mm high); petals white, broadly ovate to rhombiform, 4 × 3 mm, truncate at base above the short claw *ca.* 0.5 mm long, midnerve impressed on the adaxial surface, prominent on the abaxial surface forming a keel that extends at the apex into a sharp acumen *ca.* 1 mm long; staminal filaments 4 mm long; anthers dolabriform, 1.25–1.5 × 0.75–1 mm, the connective with thecae positioned at the anterior end, strongly incurved by the dorsal oil-gland; style *ca.* 7 mm long; epigynous chamber with membranous partitions forming a V-shaped structure beneath each petal and with a low, non-membranous ridge radiating from the base of the style towards each episepalous stamen. Fruits baccate, 1-seeded, green before maturity, subglobose, 5–7 mm in diameter, crowned by the persistent calyx 1.5–2 mm high, thickened and collar-like with the lobes curved inwards partially concealing the epigynous chamber; scarious teeth on calyx margin not persistent or only partially so.

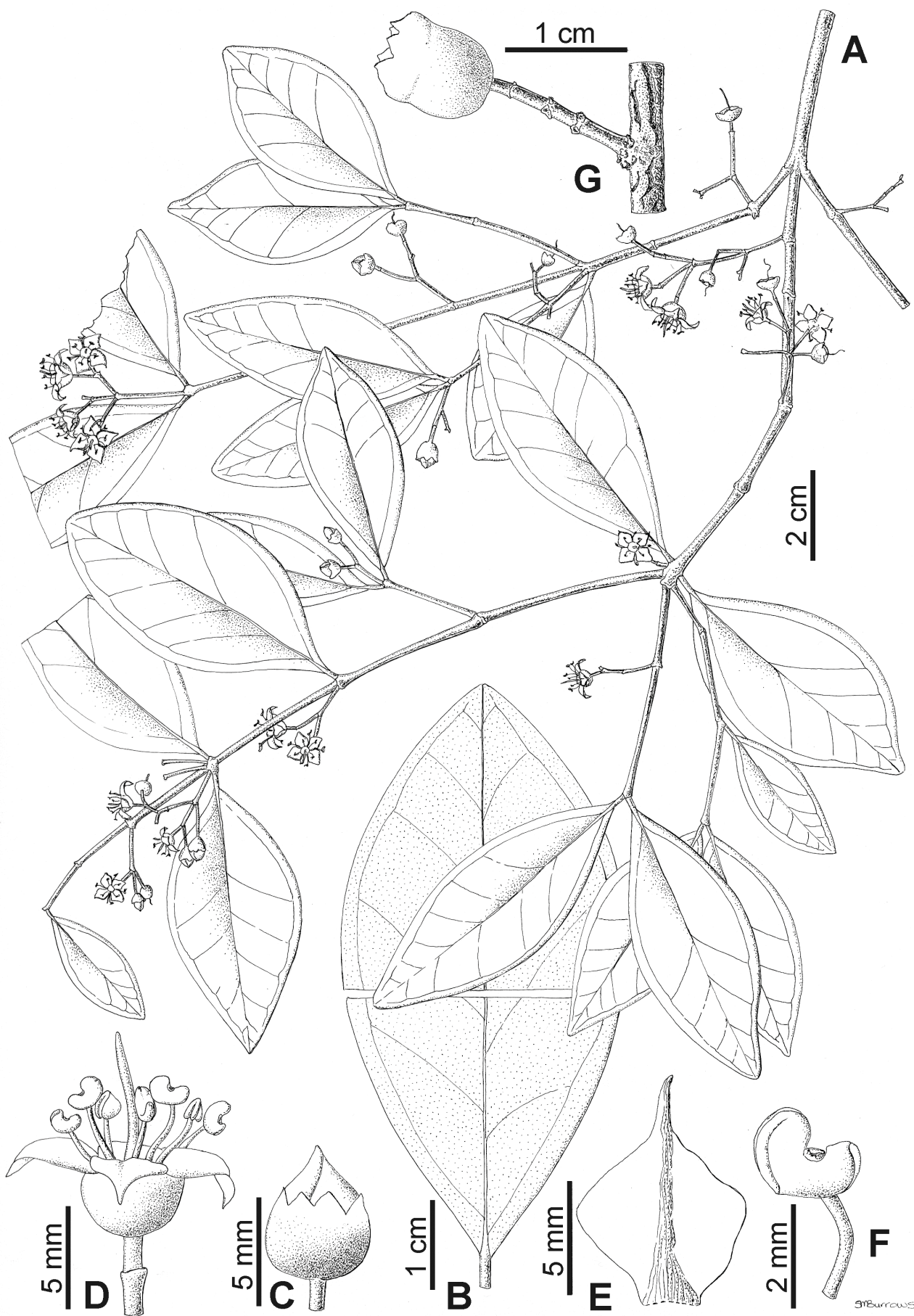


FIGURE 1. *Memecylon incisilobum*. **A.** Flowering branch. **B.** Leaf. **C.** Floral bud. **D.** Open flower. **E.** Petal. **F.** Stamen. **G.** Fruit. (A–F from Burrows 14765, BNRH; G from Matimele & Tokura 2208, BNRH). Drawing by Sandie Burrows.

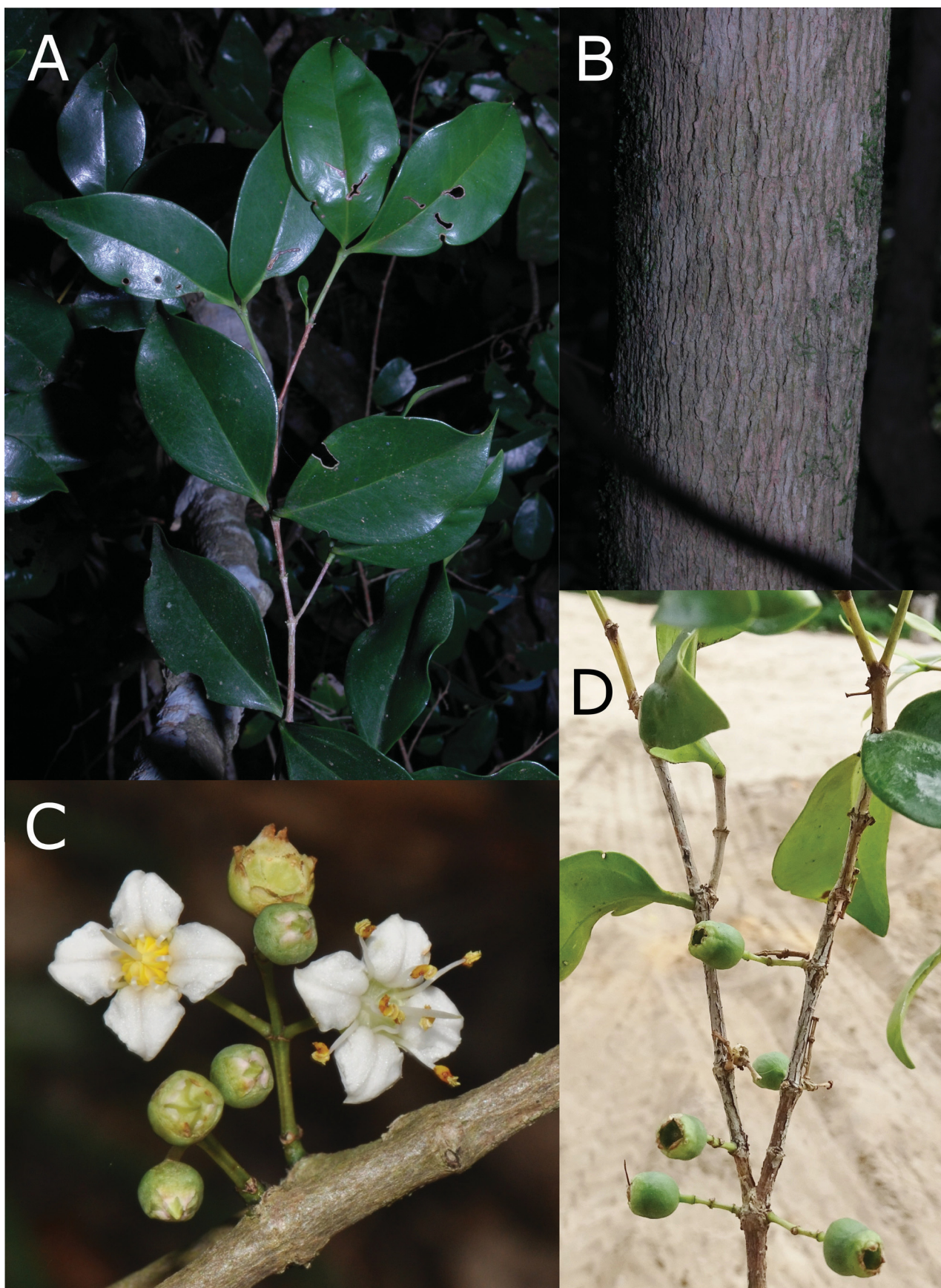


FIGURE 2. *Memecylon incisilobum*. **A.** Leafy branchlet; **B.** Trunk showing character of the bark. **C.** Flower. **D.** Fruiting branchlet. Photographs in A–C by John Burrows; in D by Hermenegildo Matimele.

Additional specimens examined (paratypes):—MOZAMBIQUE. Prov. Gaza: M-cel tower, ± 10 km from Bilene on road to Macia, elevation 70 m, 24 July 2005, *Burrows 9050* (BNRH!); next to M-cel tower 10 km from Bilene on road to Macia, elevation 67 m, 25°11'31"S, 33°12'36"E, 11 December 2009, *Burrows et al. 11512* (BNRH!, NU!); M-cel tower forest, ca. 11 km from Bilene beach to Macia, 25°11'31"S, 33°12'31"E, elevation 61 m, 17 March 2016, *Matimele & Tokura 2208* (BNRH, LMA?, NU!).

Distribution and habitat:—Known only from the type locality in Gaza Province, southern Mozambique, about 10 km inland from Praia do Bilene (Fig. 3). Small remnant of tall coastal forest occupying the slopes of a low sand hill (ancient dune) at 60–70 m elevation. In March 2016 there were 42 individuals of *M. incisilobum* counted (according to the collection-label of *Matimele & Tokura 2208*).

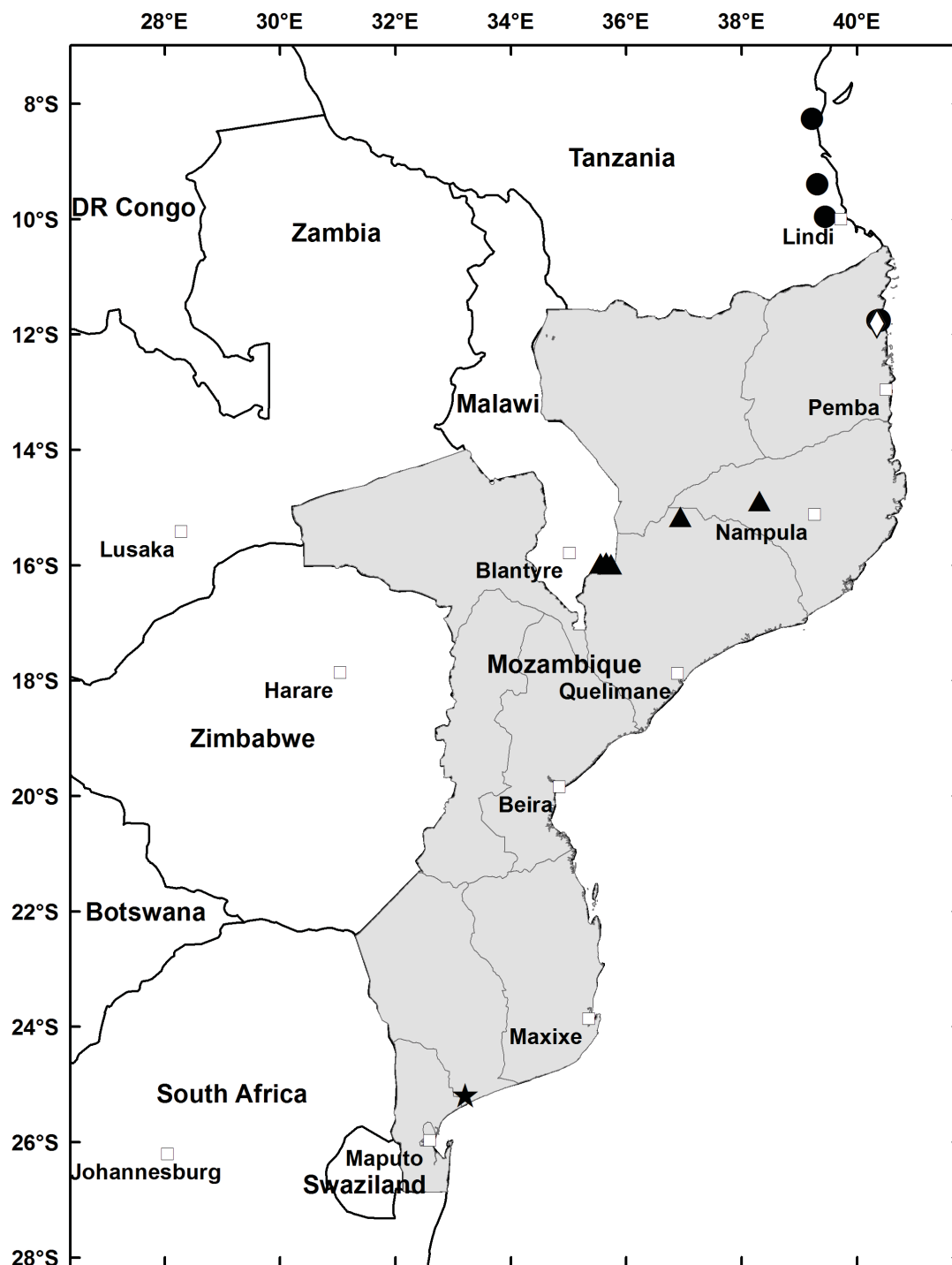


FIGURE 3. Distribution of species of *Memecylon* section *Buxifolia* in Mozambique and adjacent parts of Malawi and Tanzania: *M. incisilobum* (black star); *M. nubigenum* (black triangles); *M. rovumense* (black circles); *M. aenigmaticum* (open diamond). Political boundaries are indicated by solid lines, and selected cities by open squares.

Phenology:—Flowers in late October. Immature fruits in mid-March.

Conservation status:—*Memecylon incisilobum* is known from a single location and has an extent of occurrence (EOO) and area of occupancy (AOO) of 0.005 km² or less, according to Matimele (2016) who has further noted that the species is threatened by forest clearing for subsistence agriculture, wood-cutting for charcoal production, and runaway fires. For these reasons, Matimele (2016) has assessed *Memecylon incisilobum* (as *Memecylon* sp. nov.) as Critically Endangered [CR A3cd; B1ab(i, ii, iii, v)+2b(iii); C2a(ii)] following the IUCN Red List Categories and Criteria (IUCN 2012).

Etymology:—The epithet *incisilobum* is an adjective referring to the incised calyx-lobes, this being one of the main features distinguishing this species from *M. natalense*.

Discussion:—*Memecylon incisilobum* is closely related to another new species, still undescribed, that is known from a single locality in the Kosi Bay Nature Reserve, northeastern KwaZulu-Natal, South Africa. The two populations are separated by an airline distance of ca. 200 km, yet their nrDNA spacer sequences, obtained from the samples Burrows *et al.* 11512 (BNRH) and Styles 3539 (NH), have 100% identity with respect to each other, seemingly an indication of recent divergence. Molecular phylogenetic analyses suggest that the Gaza and Kosi Bay populations are more closely related to the Mt Mulanje population in southern Malawi (described below as *M. nubigenum* R.D. Stone & I.G. Mona, sp. nov.) than they are to typical *M. natalense* sampled further to the south in KwaZulu-Natal (Stone 2014, Stone *et al.* 2017). In the present study, we have found that the Gaza and Kosi Bay populations share the features of calyx-lobes with scarious margin and anther connectives yellow in color, which clearly sets them apart from *M. natalense* in which the calyx-lobes remain subcoriaceous throughout and green (sometimes suffused with dark purple) and the anther connectives are white.

Morphologically, *M. incisilobum* is clearly distinguished from the Kosi Bay *Memecylon* by its cymes solitary or rarely geminate (vs cymes solitary or in fascicles of 2–3); longer inflorescence axes (peduncles mostly 5–10 mm not 3–5 mm, secondary axes mostly 3.5–7 mm not 2–3 mm); more numerous flowers (up to 9 flowers per cyme vs flowers mostly 1–3, rarely 4 or 5 per cyme); hypantho-calyx differently shaped (broadly cupuliform vs obconic to cupulopatellate); calyx-lobes with scarious margin ca. 1 mm high and regularly incised $\pm$ to the base (vs scarious margin ca. 0.5 mm high and irregularly erose-denticulate or occasionally with one lobe shallowly incised); corolla in bud sharply apiculate with apiculum ca. 1 mm high (vs rounded-apiculate); shorter styles (ca. 7 mm vs 8–10 mm); and fruits with calycinal crown thickened and collar-like with lobes curved inwards (vs calycinal crown not thickened and collar-like, lobes erect). There also seems to be a difference in their respective flowering times (late October for *M. incisilobum*, early December for the Kosi Bay *Memecylon*).

Memecylon incisilobum differs from *M. natalense* by its elliptic leaf-blades with transverse veins prominent on both surfaces in dried material (vs blades ovate with transverse veins $\pm$ obscure especially on the lower surface); cymes borne mostly at the defoliated nodes of older branchlets (vs cymes mostly axillary and at the bracteate nodes alternating with those bearing fully developed leaves), on peduncles mostly 5–10 (–13) mm long and up to 9-flowered (vs peduncles mostly 0.5–5 mm long and 1–4-flowered); hypantho-calyx broadly cupuliform with calyx-lobes scarious and regularly incised $\pm$ to the base (vs hypantho-calyx obconic, the margin slightly and obtusely 4-lobed); corolla in bud sharply apiculate (vs rounded); anther connectives yellow (vs white); and fruits with calycinal crown thickened and collar-like with lobes curved inwards (vs calycinal crown not thickened and collar-like, lobes spreading) (Table 1).

In comparison to *M. insulare* it has a larger stature (a tree to 7 m vs a shrub to 2 m); larger leaves (mostly 5–7 $\times$ 2.5–3.5 cm vs 1.5–4.5 $\times$ 0.5–2.7 cm) that are $\pm$ broadly and obtusely acuminate at apex (vs leaf apices obtuse to rounded) and have transverse veins faintly visible on both surfaces (vs transverse veins obscure); and somewhat larger flowers (hypantho-calyx 2–2.5 $\times$ 5 mm vs 2 $\times$ 3.5 mm, petals 4 $\times$ 3 mm vs 3.5 $\times$ 2.5 mm). However, *M. incisilobum* and *M. insulare* are rather similar in their inflorescence dimensions (1–9-flowered vs up to 12-flowered), the acutely apiculate shape of the corolla in bud, and in having petals keeled on the back (Table 1).

TABLE 1. Comparison of geographic distribution and morphology between *Memecylon natalense* and the six presently recognized species of *M.* section *Buxifolia* in Mozambique.

	<i>M. natalense</i>	<i>M. torrei</i>	<i>M. insulare</i>	<i>M. incisilobum</i>	<i>M. nubigenum</i>	<i>M. rovimense</i>	<i>M. aenigmaticum</i>
Distribution	South African endemic (in KwaZulu-Natal, Eastern Cape, Mpumalanga & Limpopo)	coastal forests of N Mozambique (Nampula & Cabo Delgado provinces)	Magaruque Island near Vilanculos (Inhambane Province)	coastal forest remnant near Praia do Bilene, S Mozambique (Gaza Province)	N Mozambique (Nampula & Zambézia provinces) & S Malawi (Mt. Mulanje) at 1000–1800 m elevation	N Mozambique, Namacubi coastal dry forest near Quiterajo (Cabo Delgado Province); also in S Tanzania (Lindi Region)	N Mozambique, Namparamnera coastal dry forest near Quiterajo (Cabo Delgado Province)
Habit	small tree mostly 2–4 m (rarely to 15 m)	shrub or small tree 1.5–3 m	shrub to 2 m	tree to 7 m	tree 4–7 (–17) m	shrub or tree to 6 m	shrub to 3 m
Texture of leaves	thinly coriaceous	coriaceous	coriaceous	subcoriaceous	subcoriaceous	coriaceous	thickly coriaceous
Leaf blades	ovate, 3–6 × 1.5–3 cm	elliptic to obovate, 4–7 × 2–4 cm	elliptic to obovate, 1.5–4.5 × 0.5–2.7 cm	elliptic, mostly 5–7 × 2.5–3.5 cm	ovate to ± elliptic, mostly 3.5–5 × 1.8–2.5 cm	elliptic to ± ovate or obovate, mostly 3.3–5.5 × 1.7–3.3 cm	obovate, 1.75–3 × 1–1.75 cm
Leaf apex	acutely acuminate	obtuse to rounded	obtuse to rounded	± broadly and obtusely acuminate	± obtusely acuminate	± broadly obtuse-acuminate or rounded and obtuse	rounded to obtuse
Transverse veins	± obscure, especially on the lower surface	inconspicuous	obscure	ca. 5 pairs, faintly visible, prominent on both surfaces in dried material	4–5 pairs, obscure or ± faintly visible on upper surface	3–5 pairs, faintly visible	± obscure
Lower leaf surface	pale green	vivid yellowish green	yellowish green	pale green	pale green	pale green	pale green
Inflorescence position	mostly axillary and at the intervening “aphyllous” nodes	mostly axillary and at the intervening “aphyllous” nodes	mostly axillary and at the intervening “aphyllous” nodes	mostly at the defoliated nodes of older branchlets	at the defoliated nodes of older branchlets, in the leaf axils and at “aphyllous” nodes	mostly at the defoliated nodes of older branchlets	at the defoliated nodes of older branchlets, in the leaf axils and at “aphyllous” nodes
Peduncles	mostly 0.5–5 mm	ca. 2 mm	up to 6 mm	mostly 5–10 (–13)	1–7 (–11) mm	1.5–2 mm	ca. 2 mm
No. of flowers per inflorescence	1–4	1–3	up to 12	1–9	1–3	1–3 (–4)	[no data]
Hypantho-calyx	obconical, ca. 2.5 × 3.75 mm	campanulate, 3 × 4 mm	obconical, ca. 2 × 3.5 mm	cupuliform, 2–2.5 × 5 mm	obconical, ca. 2.5 × 3.75 mm	[no data]	[no data]
Calyx-lobes	broadly rounded to triangular, 0.5–1 × 1.75–2 mm, green or suffused with dark purple	broadly triangular, 1 × 2.5 mm	broadly rounded to subtriangular, ca. 0.5 × 2 mm	broadly rounded, ca. 1 mm high, scarious, regularly incised ± to the base	broadly rounded, ca. 0.5 × 2 mm	[no data]	[no data]
Corolla in bud	rounded to subacute	rounded-apiculate	acutely apiculate	sharply apiculate	apiculate, subacute at apex	rounded-apiculate	[no data]

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TABLE 1. (Continued)

	<i>M. natalense</i>	<i>M. torrei</i>	<i>M. insulare</i>	<i>M. incisilobum</i>	<i>M. nubigenum</i>	<i>M. royumense</i>	<i>M. aenigmaticum</i>
Petals	rhomboid to rounded, 5 × 4 mm, apex subacute	irregularly rhombic, 2.5 × 3.25 mm (in bud)	triangular, 3.5 × 2.5 mm, keeled on back	broadly ovate to rhombiform, 4 × 3 mm, keeled on back, acuminate at apex	subrhombic, 5 × 4 mm, apex acute	[no data]	[no data]
Fruit	to 10 mm in diam., ± ellipsoid or tending to be somewhat longer than wide, smooth	18 × 14 mm, ovoid, warty-roughened	[no data]	5–7 mm in diam., subglobose,	7–8 mm in diam., subglobose	18 × 14 mm, broadly pyriform, conspicuously verrucose-wrinkled	9–10.5 × 7–8 mm, ellipsoid to obovoid, verrucose-wrinkled
Persistent calycinal crown	ca. 1 mm high, lobes erect to spreading	ca. 1 mm high, lobes erect	[no data]	1.5–2 mm high, thickened and collar-like with lobes curved inwards	ca. 1 mm high, ± constricted at base, margin spreading	crown lacking but lobes persistent, broadly deltate, ca. 1 mm long, curved inwards	crown very short (ca. 0.3 mm high), margin sinuate to ± truncate

Memecylon nubigenum R.D. Stone & I.G. Moná, *sp. nov.* (Fig. 4)

Type:—MOZAMBIQUE. Prov. Nampula: Ribáuè, serra Mepáluè, elevation ca. 1600 m, 09 December 1967, *Torre & Correia 16431* (holotype LISC!, isotypes COI, K!, LMU!, PRE!, SRGH).

Evergreen understory tree 4–7 (–17) m tall. Youngest branchlets brown to dark brown, strongly quadrangular and ± narrowly alate; older branchlets eventually becoming terete, grayish brown to grayish white, ± longitudinally fissured; nodes thickened; internodes (1–) 1.8–3.2 (–4.5) cm long. Leaves subcoriaceous, dark green on the upper surface, paler beneath; petioles 1–3 (–4) mm long; blades ovate, varying to ± elliptic, (2.5–) 3.5–5 (–6) × (1.2–) 1.8–2.5 (–3.2) cm, cuneate to rounded at base, ± broadly acuminate at apex, the acumen up to 8 mm long, obtuse varying to rather acute or sometimes indistinct, margins narrowly and shallowly revolute; midnerve clearly visible, impressed on the upper surface, prominent on the lower (especially toward the leaf base); intramarginal nerves faintly visible on the upper surface; transverse veins 4–5 pairs, oriented at an oblique angle relative to the midnerve, obscure or ± faintly visible on the upper surface in dried material. Cymes ca. 1.5 cm long, 1–3-flowered, solitary to geminate or in fascicles of 2, borne at the defoliated nodes of older branchlets, in the leaf axils and at the bracteate nodes alternating with those bearing fully developed leaves; peduncles 1–7 (–11) mm long; secondary axes 1–6 mm long; bracts rapidly deciduous. Flowers borne individually at the ends of the inflorescence axes, on pedicels 1–3.5 mm long; hypantho-calyx ca. 2.5 mm high × 3.75 mm wide, obconic; lobes broadly rounded, ca. 0.5 × 2 mm, green and subcoriaceous with a very narrow scarious margin; corolla in bud distinctly apiculate, subacute at apex; petals white, subrhombic, 5 × 4 mm, acute at the apex; staminal filaments ca. 6 mm long; anthers ca. 2.5 mm long, connective strongly incurved by the dorsal oil-gland; ovules 2–8; style 10 mm long. Fruits baccate, 1-seeded, green becoming black at maturity, subglobose, 7–8 mm high × 7–8 mm in diameter, crowned by the persistent calyx ca. 1 mm high; epigynous chamber lacking radial partitions, marked only by the scars of the deciduous petals, anthers and style.

Additional specimens examined (paratypes):—MALAWI. **Southern Region:** Mlanje District, Ruo Gorge, elevation ± 1000 m, 01 September 1970, *Müller 1474* (COI, K!, SRGH); Mlanje District, Ruo Gorge 2.5 km above Hydro Electric Station [S side of Mlanje Mt.], elevation 1250 m, 07 May 1980, *Blackmore et al. 1512* (K!, MAL); Mlanje Mt. District, Lichenya Forest (Mim-Mim path), elevation 1820 m, 29 September 1983, *Dowsett-Lemaire 1026* (BR!); Mlanje Mt. District, Great Ruo Gorge, elevation 1250 m, 23 June 1984, *Dowsett-Lemaire 1159* (BR!); Mt. Mlanje, Pamba Gorge at Savani stream crossing, elevation 1250 m, 30 September 1986, *Chapman 8098* (K!, MO!, PRE!); Mt. Mlanje, Chisongeli Forest (West), elevation 1500 m, 15 September 1988, *Chapman 9292* (K!, MO!, PRE!, WAG!); Mlanje District, Lujeri Power Station, above Lujeri Dam, along Ruo River, elevation 1137 m, 15°57'16.15"S, 35°11'16.83"E, 13 July 2007, *Nothale & Patel 171* (K!). **MOZAMBIQUE. Prov. Zambézia:** Gurue, encosta da serra do Gurue via fábrica Junqueiro a Oeste dos Picos Namúli, próx. do rio Malema, elevation ca. 1700 m, 06 November 1967, *Torre & Correia 15956* (COI, EA, K!, LISC, SRGH).



FIGURE 4. *Memecylon nubigenum*. Image of the holotype (Torre & Correia 16431, LISC). Source: Herbario, Instituto de Investigação Científica Tropical, Museu Nacional de História Natural e da Ciência, Universidade de Lisboa, Portugal.

Distribution and habitat:—Known from two granitic inselbergs in northern Mozambique, i.e., the Namúli massif (Zambézia Province) and Monte Mepáluè (Nampula Province), in cloud forest at 1600–1700 m elevation (Fig. 3). The collecting localities of Torre and Correia in November 1967 were on the eastern side of the Namúli massif, on slopes and in riverine forests of Mt Namúli (Timberlake *et al.* 2009: 24).

Also known from the Mulanje massif, a granitic inselberg in southern Malawi, at elevations of 1000–1800 m, in forests classified as either “mid-altitude” or “submontane” (Dowsett-Lemaire 1988, 1989). At Mulanje, most collections of *M. nubigenum* are from the Ruo Gorge at the southern end of the massif, with other forested localities represented by single collections (Lichenya Plateau, Chisongeli, Pamba Gorge).

Phenology:—Flowers in December. Fruiting collections in May–July, also in September and November.

Conservation status:—*Memecylon nubigenum* is known from six locations including two in northern Mozambique and four in southern Malawi (Mulanje massif). It has an EOO of *ca.* 5,900 km² and an AOO of 24 km² (assuming a 4 km² grid cell size).

In Mozambique, the type locality in Nampula Province is formally protected in the Mepáluè [M’páluè] Forest Reserve which has a reported area of 42.5 km² (Faye 2005). At the base of the mountain, the village of Ribáuè lies in a densely populated valley. Natural vegetation on the lower slopes has already been converted to subsistence agriculture, but human intrusion at the higher elevations (above 1100 m) is impeded by steep slopes and lack of road access (Müller *et al.* 2005). The second Mozambican location, in the Namúli massif near Guruè (Zambézia Province), is not formally protected but has been recommended for such status (Timberlake *et al.* 2009). Much of the natural vegetation below 1500 m elevation has already been transformed, but *ca.* 10 km² was covered by montane forest at elevations of 1600–1900 m (determined from 2005 Landsat imagery). Major threats in forested habitats above 1400 m include potato cultivation, frequent wildfires, and logging.

The locations in Malawi are protected in the Mulanje Mountain Forest Reserve, first gazetted in 1927 but with later boundary adjustments due to on-going human encroachment on the lower slopes. The massif is surrounded by villages of the Mulanje and Phalombe districts, tea estates, and small-scale cultivation. According to Dowsett-Lemaire (1988), forest cover (estimated from aerial photographs) was 15 km² at middle elevations (900–1500 m) and 46 km² on the upper slopes and plateaux (1500–2300 m). Continuing threats include clearing of forest for subsistence agriculture and charcoal production, wildfires, extraction of the commercially valuable Mulanje cypress (*Widdringtonia whytei* Rendle), and spread of the naturalized Mexican weeping pine (*Pinus patula* Schiede ex Schltdl. & Cham.). Deforestation has been most severe on the southern and southeastern slopes of the massif, in or near areas where *M. nubigenum* has been collected in the past, i.e., Chisongeli and near the entrance to the Ruo Gorge (Dowsett-Lemaire 1988). This trend of environmental deterioration and unsustainable resource exploitation led to the establishment of the non-governmental Mulanje Mountain Conservation Trust around 1994. This organization has attracted substantial funding from the World Bank (2001–2008) and more recently the Norwegian government (Wisborg & Jumbe 2010).

Memecylon nubigenum is thus provisionally assessed as Vulnerable [VU B1ab(iii)+B2ab(iii); D2] according to the IUCN Red List Categories and Criteria (IUCN 2012).

Etymology:—The epithet *nubigenum* is a compound derived from the Latin noun *nubis* meaning “cloud” and the verb *gignere* meaning “to be born.” It functions as an adjective and means “born of or originating from the clouds.” It is a reference to the habitat in mountains of northern Mozambique and southern Malawi.

Discussion:—The *Memecylon* populations from mountains of northern Mozambique and southern Malawi (Mt Mulanje), described herein as *M. nubigenum*, were earlier identified as *M. natalense* (Fernandes & Fernandes 1972, 1978, 1980) but are evidently not very closely related to that species (Stone *et al.* 2017), clearly indicating the need to recognise them as a distinct taxon. *Memecylon nubigenum* also differs morphologically from South African *M. natalense* sensu stricto in the shape of the leaf apex (mostly obtuse in *M. nubigenum* vs acute in *M. natalense*), the shape of the corolla in bud (distinctly apiculate vs rounded to subacute), and the shape of the fruits (strictly globose vs ± ellipsoid or tending to be somewhat longer than wide) (Table 1).

The new species was previously illustrated by Fernandes & Fernandes (1972: *tab.* 2, as *M. natalense*).

Memecylon rovimense R.D. Stone & I.G. Mona, *sp. nov.* (Fig. 5)

Type:—TANZANIA. Lindi Region: Lindi District, Chitoo Forest Reserve, elevation 240–420 m, 9°58’S, 39°27’E, 18 June 1995, Clarke 56 (holotype K!).

Evergreen shrub or understory tree up to 6 m tall; young branchlets quadrangular (subquadrangular below the “aphyllous” nodes); nodes thickened; internodes between normal leafy nodes (1–) 2.5–6.5 (–11) cm long; bracts of the

“aphyllous” (i.e., inflorescence-bearing) nodes lanceolate, *ca.* 3 mm long, rapidly deciduous. Leaves coriaceous, on petioles 1–3 (–4) mm long; blades elliptic to $\pm$ ovate or obovate, (2.5–) 3.5–5.5 (–7) $\times$ (1.3–) 1.8–3.3 (–4) cm, cuneate at base, $\pm$ broadly and obtusely acuminate at apex, the acumen (1–) 2–4 (–5.5) mm long or sometimes indistinct with the leaf apex then rounded and obtuse; midnerve clearly visible, impressed on the upper surface, $\pm$ prominent on the lower (especially toward the leaf base); intramarginal nerves faintly visible; transverse veins 3–5 pairs, oriented at an oblique angle relative to the midnerve, faintly visible in dried material. Cymes 1–3 (–4)-flowered, solitary to geminate or in fascicles of 2 (–3), borne at the defoliated nodes of older branchlets, less often in the leaf axils and at the bracteate nodes alternating with those bearing fully developed leaves; peduncles 1.5–2 mm long; secondary axes $\pm$ absent, the flowers thus directly subumbellate; bracts *ca.* 2 mm long, $\pm$ lanceolate, narrowed to the base, rapidly deciduous. Flowers in bud on very short pedicels, corolla rounded-apiculate; fully developed and open flowers not seen. Fruits baccate, 1-seeded, green before maturity, broadly pyriform, 18 $\times$ 14 mm, conspicuously verrucose-wrinkled, lacking a calycinal crown but with lobes persistent, broadly deltate and *ca.* 1 mm long, curved inwards partially concealing the epigynous chamber.

Additional specimens examined (paratypes):—**MOZAMBIQUE:** Prov. Cabo Delgado: Namacubi (Banana) Forest west of Quiterajo, elevation 90 m, 11°45'55"S, 40°23'45"E, 25 November 2008, *Burrows 10766* (BNRH!, K!); Quiterajo, elevation 110 m, 11°45'48.24"S, 40°21'47.16"E, 24 November 2009, *Luke 13891* (EA!, K!, LMA, P); Namacubi Forest near Quiterajo, elevation 90 m, 11°45'23"S, 40°24'00"E, 08 September 2014, *Timberlake & Massingue s.n.* (NU!). **TANZANIA. Lindi Region:** Chitoa Forest, elevation 415 m, 05 December 2001, *Mbago et al. 2266* (DSM, K!); Kilwa District, *ca.* 1 km W of Miteja soccer pitch, elevation 50 m, 08°16'14"S, 39°13'36"E, 03 August 2003, *Kayombo et al. 4431* (CAS!, MO); Ngarama North Forest Reserve, elevation 420 m, 09°24'S, 39°19'E, 26 November 2003, *Luke & Kibure 9741* (CAS!, EA!, MO).

Distribution and habitat:—Known from three locations in southern Tanzania (Lindi Region) and one location in northern Mozambique (Namacubi Forest near Quiterajo, Cabo Delgado Province) (Fig. 3). Coastal dry forest at elevations of 50–420 m.

Phenology:—Floral buds in late November; fruits in June.

Conservation status:—*Memecylon royumense* is known from four locations including three in southeastern Tanzania (Lindi Region) and one in northern Mozambique (Cabo Delgado Province). It has an EOO of *ca.* 8,400 km² and an AOO of *ca.* 24 km² (assuming a 4 km² grid-cell size).

The coastal forests of East Africa are small and highly fragmented, most of them being less than 50 km² in size (Burgess *et al.* 2000). They are thought to be remnants of a more extensive forest cover that existed prior to the spread of dry climate in this region beginning *ca.* 16 Myr ago (Jacobs 2004); however, recent disturbance by human activities (especially increased fire frequency) has also contributed to the reduction and fragmentation of these forests (Burgess *et al.* 1998).

In Tanzania, *M. royumense* currently receives an uncertain level of protection, in spite of the fact that two of the three known locations lie within gazetted forest reserves. This is because the management budgets and staffing levels are extremely low (Burgess *et al.* 2012). The Chitoa Forest Reserve, which includes the type locality, is *ca.* 45 km west of the coastal town of Lindi. It is a small reserve (7.7 km²) with only 1.8 km² designated as “protective” forest and the remaining 5.9 km² as “production” forest intended for sustainable use (Clarke 1995, Burgess *et al.* 2012). In total, the Chitoa Plateau and nearby Litipo Forest Reserve contain an estimated 8 km² of mixed dry forest (Prins & Clarke 2007). The Chitoa Forest Reserve is located 3 km away from the nearest villages and is only accessible by footpath; this suggests that threats to the forest may be limited, although Clarke (1995) noted some wood cutting of poles by local people and the possibility of uncontrolled bushfires. About 65 km further to the north, the Ngarama North Forest Reserve is larger (*ca.* 45 km²) with 15 km² designated as “protective” forest and the remainder as “production” (Burgess *et al.* 2012). The reserve is situated on the Ruwawa Plateau largely covered by “scrub forest” over coral rag limestone, but with 13 km² of mixed dry forest and legume-dominated dry forest (Prins & Clarke 2007). Threats are minimal because of low human population density in the area, although some timber poaching has been seen (Prins & Clarke 2007). The remaining coastal forests of the Lindi Region (SE Tanzania) are also threatened by recent improvements in road infrastructure, which are opening up previously remote and relatively inaccessible areas for logging and charcoal production (Prins & Clarke 2007, Burgess *et al.* 2012).

In Mozambique, the only known location of *M. royumense* is not in a protected area. Ongoing threats in the Namacubi Forest include continued clearing for subsistence agriculture, cutting of poles, uncontrolled fires, and possible road construction for oil-and-gas development which would increase access to and clearing of the forest (Timberlake *et al.* 2011, Cheek & Darbyshire 2014).

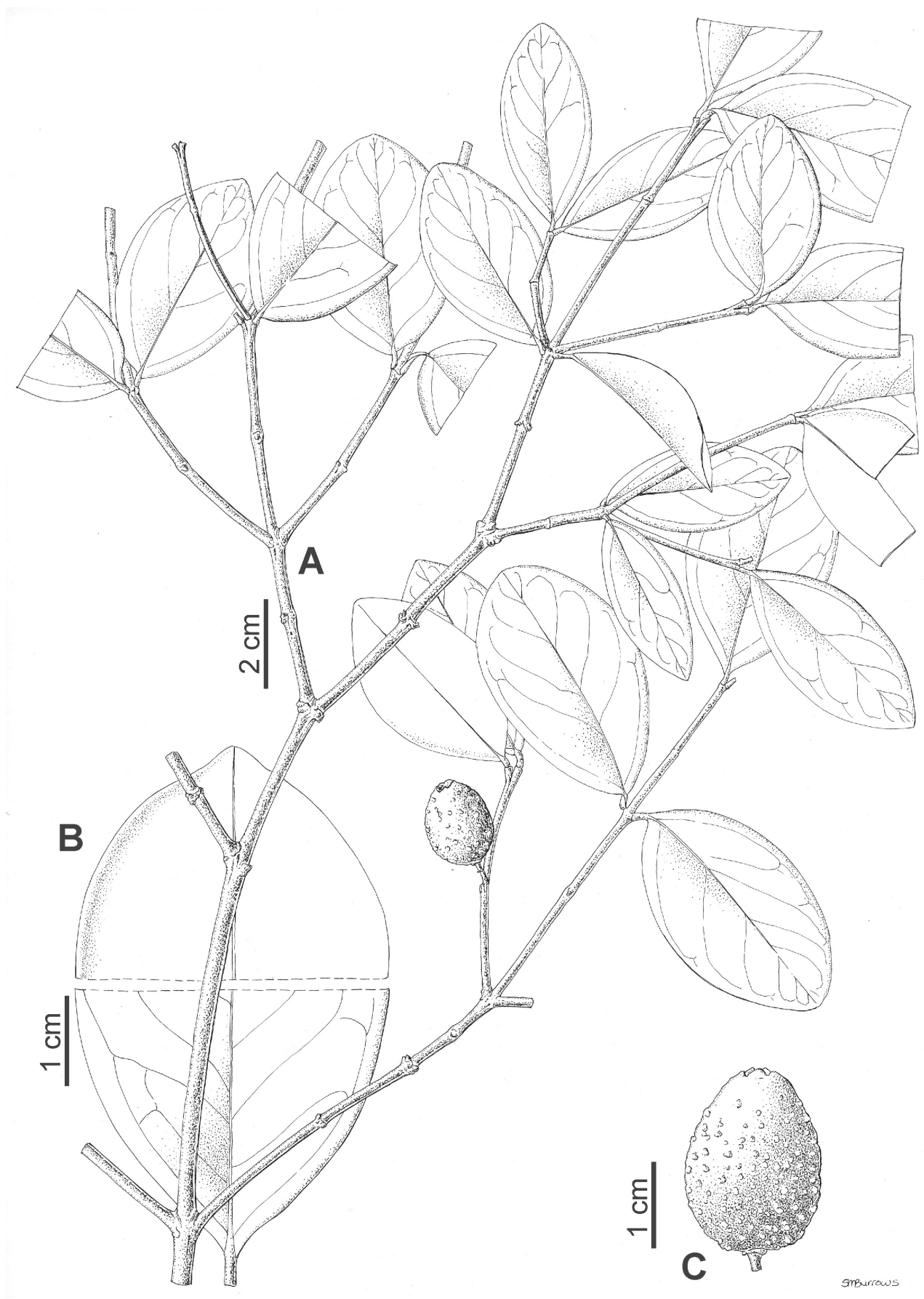


FIGURE 5. *Memecylon royumense*. A. Fruiting branch. B. Leaf. C. Fruit. (A–C from Clarke 56, K). Drawing by Sandie Burrows.

Memecylon rovimense is thus provisionally assessed as Endangered [EN B1ab(iii)+B2ab(iii)] according to the IUCN Red List Categories and Criteria (IUCN 2012).

Etymology:—The epithet *rovumense* is an adjective used to indicate geographical origin, i.e., to emphasize that the new species is an endemic of the Rovuma region of northern Mozambique and southeastern Tanzania. The region itself gets its name from the Rovuma River which forms the border between these two countries.

Discussion:—*Memecylon rovimense* has been previously confused with *M. natalense*, but DNA evidence suggests it may have originated through hybridization between a lineage close to the Kenyan *M. fragrans* A. Fernandes & R. Fernandes (1960: 87) and another, as-yet unidentified Mozambican lineage close to *M. torrei* (Stone *et al.* 2017). Its fruits are quite distinctive in being relatively large, yellow-green and warty-roughened on the exterior, appearing much like miniature avocados, seen in the collection *Clarke 56* (K).

It differs from South African *M. natalense* by its more thickly coriaceous leaves that are rounded and obtuse to $\pm$ broadly obtuse-acuminate at the apex (vs thinly coriaceous with acumen acute), by its cymes borne mostly at the defoliated nodes of older branchlets (vs cymes mostly axillary and at the bracteate nodes alternating with those bearing fully developed leaves), and by its larger, broadly pyriform and conspicuously verrucose-wrinkled fruits lacking a persistent calycinal crown (vs fruits up to 10 mm in diameter, ellipsoid to subglobose with smooth exterior and calycinal crown conspicuous) (Table 1).

In comparison to the Kenyan *M. fragrans* it has broader, differently shaped leaves (mostly $3.3\text{--}5.5 \times 1.7\text{--}3.3$ cm and $\pm$ elliptic vs $2\text{--}5.5 \times 1.0\text{--}2.4$ cm and $\pm$ ovate), and the cymes are borne mostly at the defoliated nodes of older branchlets (vs cymes mostly axillary and at the bracteate nodes alternating with those bearing fully developed leaves). The fruits of *M. fragrans* are also smaller and differently shaped (ovate to elliptic, $8\text{--}9.5 \times 6\text{--}7$ mm with exterior only slightly roughened and calycinal crown conspicuous).

In comparison to the Mozambican *M. torrei* it has somewhat smaller leaves (mostly $3.3\text{--}5.5 \times 1.7\text{--}3.3$ cm vs $4\text{--}7 \times 2\text{--}4$ cm), and the lower leaf surface is pale green (vs vivid yellowish green) (Table 1). The fruits of *M. torrei* are similarly large (*ca.* 18×14 mm) and also with exterior warty-roughened, seen in the collection *Goyder et al. 6107* (P).

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

Type:—MOZAMBIQUE. Cabo Delgado: Macomia district, Quiterajo, Namparamnera forest, elevation 136 m, $11^{\circ}49'02.9''\text{S}$, $40^{\circ}20'31.7''\text{E}$, 29 November 2008, *Timberlake et al. 5574* (holotype K!, isotypes LMA, P!).

Evergreen shrub to 3 m high; young branchlets whitish grey, quadrangular, soon becoming terete with age; nodes thickened; internodes between normal leafy nodes $1\text{--}3.5$ ($\text{--}6.5$) cm long. Leaves thickly coriaceous, on petioles $1\text{--}2$ mm long; blades obovate, $1.75\text{--}3 \times 1\text{--}1.75$ cm, cuneate at base, rounded to obtuse at apex; only the midnerve clearly visible, impressed on the upper surface, $\pm$ prominent on the lower (especially toward the leaf base); intramarginal nerves and transverse veins $\pm$ obscure. Flowering cymes and flowers not seen. Fruits baccate, 1-seeded, solitary at the defoliated nodes of older branchlets, in the leaf axils and at the bracteate nodes alternating with those bearing fully developed leaves, borne on a very short, stout axis (length *ca.* 2 mm), pale green before maturity, elliptic to obovoid in outline, $9\text{--}10.5 \times 7\text{--}8$ mm, conspicuously verrucose-wrinkled; calycinal crown very short (*ca.* 0.3 mm high), margin sinuate to $\pm$ truncate.

Distribution and habitat:—Known only from the type collection made in Cabo Delgado Province, northern Mozambique (Fig. 3). Coastal dry forest at 136 m elevation.

Phenology:—Flowers unknown; fruits in November.

Conservation status:—*Memecylon aenigmaticum* is known from a single location with an area of occupancy (AOO) of 4 km² (assuming a 4 km² grid cell size). Coastal forests in Cabo Delgado are virtually unprotected, and those in the Quiterajo vicinity are threatened by clearing for subsistence agriculture, logging of large timber trees and cutting of poles, and uncontrolled fires (Timberlake 2009, Timberlake *et al.* 2011). *Memecylon aenigmaticum* is thus provisionally assessed as Critically Endangered [CR B2ab(iii)] according to the IUCN Red List Categories and Criteria (IUCN 2012).

Etymology:—The epithet *aenigmaticum* is an adjective based on the Greek noun *ainigma* meaning mysterious or difficult to interpret or understand. It is in reference to the fact that this new species has been previously confused with both *M. natalense* and *M. rovimense* (q.v.).

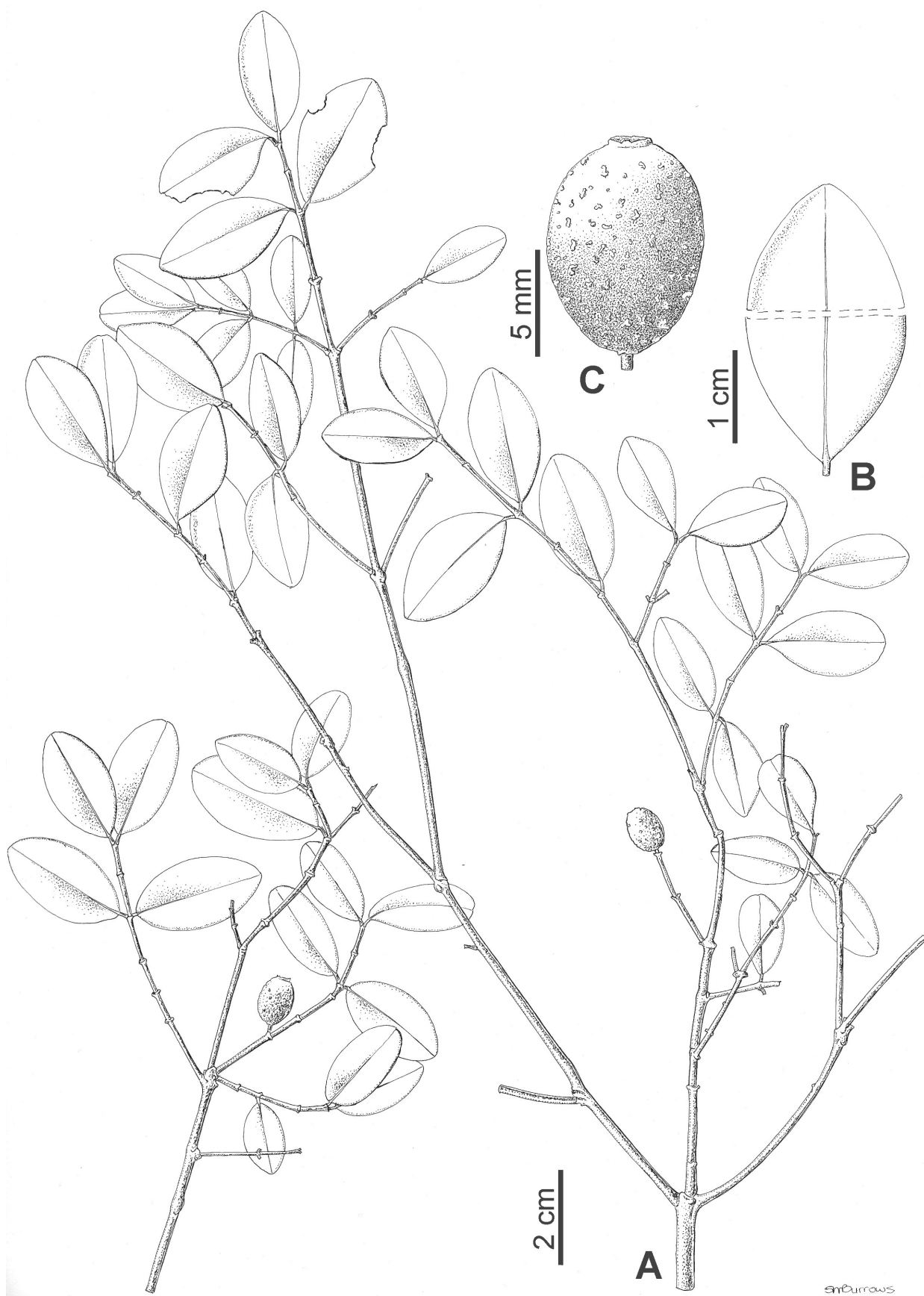


FIGURE 6. *Memecylon aenigmaticum*. A. Fruiting branch. B. Leaf. C. Fruit. (A–C from Timberlake *et al.* 5574, K). Drawing by Sandie Burrows.

Discussion:—*Memecylon aenigmaticum* has been confused with the South African *M. natalense* but differs by its more thickly coriaceous leaves that are obovate in outline and rounded to obtuse at the apex (vs leaves thinly coriaceous, ovate in outline with apex acutely acuminate); by its cymes borne mostly at the defoliated nodes of older branchlets (vs cymes mostly axillary and at the bracteate nodes alternating with those bearing fully developed leaves); and by its ellipsoid to obovoid, verrucose-wrinkled fruits lacking a persistent calycinal crown (vs fruits ellipsoid to subglobose with smooth exterior and calycinal crown conspicuous) (Table 1).

This new species appears closely related to *M. rovimense*, but differs by its much smaller leaves ($1.75\text{--}3 \times 1\text{--}1.75$ cm vs $3.3\text{--}5.5 \times 1.7\text{--}3.3$ cm) and smaller, differently shaped fruits (ellipsoid to obovoid and $9\text{--}10.5 \times 7\text{--}8$ mm vs ovoid to broadly pyriform, 18×14 mm) (Table 1).

Key to the species of *Memecylon* in Mozambique

1. Bark thick, deeply longitudinally fissured; branchlets with all nodes bearing normal leaves; leaf apices rounded to truncate or emarginate; petals subdeltate-acuminate with apex sharply acute; anther connectives purple; fruits ovoid-ellipsoid, $12\text{--}14 \times 6\text{--}8$ mm. In Mozambique confined to “miombo” woodland in NW Niassa Province (*M. sect. Obtusifolia*).....*M. flavovirens*
- . Bark thin, finely longitudinally fissured; branchlets with successive nodes alternating between normal leaves and reduced, often-inflorescence-bearing bracts; leaf apices rounded to obtuse or $\pm$ acuminate; petals subrhomboid with apex rounded to subacute (acuminate in *M. incisilobum*); anther connectives whitish or yellow; fruits $\pm$ globose in some species, ovoid to ellipsoid or obovoid in others, $8\text{--}18 \times 7\text{--}14$ mm (*M. sect. Buxifolia*).....2
2. Leaf apices obtuse to rounded or $\pm$ broadly and obtusely acuminate, the acumens when present mostly 2–4 mm long.....3
- . Leaf apices $\pm$ distinctly acuminate, the acumens 3–8.5 (–11) mm long.....6
3. Leaf-blades $1.5\text{--}4.5 \times 0.5\text{--}2.7$ cm; cymes up to 12-flowered, on peduncles up to 6 mm long. Known only from Magaruque Island near Vilanculos (Inhambane Province).....*M. insulare*
- . Leaf dimensions as above or larger, $1.75\text{--}7 \times 1\text{--}4$ cm; cymes 1–3-flowered, on peduncles ca. 2 mm long.....4
4. Leaf-blades $4\text{--}7 \times 2\text{--}4$ cm; lower leaf surface vivid yellowish green; fruits ovoid, 18×14 mm. Coastal forests of N Mozambique (Nampula & Cabo Delgado provinces).....*M. torrei*
- . Leaf-blades smaller, $1.75\text{--}5.5 \times 1\text{--}3.3$ cm; lower leaf surface pale green; fruits as above or smaller, $9\text{--}18 \times 7\text{--}14$ mm.....5
5. Leaf-blades mostly $3.5\text{--}5.5 \times 1.8\text{--}3.3$ cm; fruits ovoid to broadly pyriform, 18×14 mm. In Mozambique known only from the Namacubi coastal dry forest near Quiterajo (Cabo Delgado Province).....*M. rovimense*
- . Leaf-blades $1.75\text{--}3 \times 1\text{--}1.75$ cm; fruits elliptic to obovoid, $9\text{--}10.5 \times 7\text{--}8$ mm. Known only from the Namparamnera coastal dry forest near Quiterajo (Cabo Delgado Province).....*M. aenigmaticum*
6. Leaf-blades elliptic, mostly $5\text{--}7 \times 2.5\text{--}3.5$ cm; cymes borne mostly at the defoliated nodes of older branchlets, on peduncles mostly 5–10 (–13) mm long, up to 9-flowered; hypantho-calyx broadly cupuliform and with calyx-lobes scarious and regularly incised $\pm$ to the base; corolla in bud sharply apiculate; fruits with calycinal crown thickened and collar-like with lobes curved inwards. Coastal forest remnant in S Mozambique (Gaza Province).....*M. incisilobum*
- . Leaf-blades ovate, dimensions $\pm$ smaller (mostly $3\text{--}6 \times 1.5\text{--}3.2$ cm); cymes mostly axillary and at the bracteate nodes alternating with those bearing fully developed leaves, on peduncles 1–7 mm long and usually 3-flowered; hypantho-calyx obconic, the margin slightly and obtusely 4-lobed; corolla in bud subacute; fruits with calycinal crown not thickened and collar-like, lobes spreading. Mountains of N Mozambique (Nampula & Zambézia provinces) at 1600–1700 m elevation.....*M. nubigenum*

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