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.* & Moritzi in Moritzi in 1846: 10) and the African-Madagascan *Warneckea* Gilg (1904: 100).


*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. *Magnirollata* R.D. Stone (2014: 553), which differs in its cauliflorous habit and ellipsoid to obovoid fruits, and in *M.* sect. *Obusifolia* Engler (1921: 769), characterized by its unusually thick bark, yellowish green leaves and subdeltate-acuminate petals. Section *Obusifolia* 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 towards 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 dolabridiform, 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 epispermal 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.
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 cupulo-patellate); calyx-lobes with scarious margin ca. 1 mm high and regularly incised ± 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 ± 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 ± 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 × 2.5–3.5 cm vs 1.5–4.5 × 0.5–2.7 cm) that are ± 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 × 5 mm vs 2 × 3.5 mm, petals 4 × 3 mm vs 3.5 × 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.

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

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### TABLE 1. (Continued)

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

**Memecylon nubigenum** R.D. Stone & I.G. Mona, *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; tracts 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); Mulanje 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); Mulanje Mt. District, Lichenya Forest (Mim-Mim path), elevation 1820 m, 29 September 1983, Dowsett-Lemaire 1026 (BR!); Mulanje Mt. District, Great Ruo Gorge, elevation 1250 m, 23 June 1984, Dowsett-Lemaire 1159 (BR!); Mt. Mulanje, Pamba Gorge at Savani stream crossing, elevation 1250 m, 30 September 1986, Chapman 8098 (K!, MO!, PRE!); Mt. Mulanje, Chisongeli Forest (West), elevation 1500 m, 15 September 1988, Chapman 9292 (K!, MO!, PRE!, WAG!); Mulanje 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. Zambezia: Guruè, encosta da serra do Guruè via fábrica Junqueiro a Oeste dos Picos Namúli, próx. do rio Malema, elevation ca. 1700 m, 06 November 1967, Torre & Correia 13956 (COI, EA, K!, LISC, SRGH).
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, Chisorongeli, 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’pálüè] 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 (Miiller 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., Chisorongeli 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 rovumense* R.D. Stone & I.G. Mona, *sp. nov.* (Fig. 5)

Type:—TANZANIA. Lindi Region: Lindi District, Chitoa 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
In Tanzania, the only known location of *Memecylon* 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).

In Mozambique, 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. rovumense* 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).
Memecylon rovumense 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 rovumense 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 ± 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 3.3–5.5 × 1.7–3.3 cm and ± elliptic vs 2.5–5.5 × 1.0–2.4 cm and ± 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, 8–9.5 × 6–7 mm with exterior only slightly roughened and calycinal crown conspicuous).

In comparison to the Mozambican M. torrei it has somewhat smaller leaves (mostly 3.3–5.5 × 1.7–3.3 cm vs 4–7 × 2–4 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°49′02.9″S, 40°20′31.7″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 1–3.5 (–6.5) cm long. Leaves thickly coriaceous, on petioles 1–2 mm long; blades obovate, 1.75–3 × 1–1.75 cm, cuneate at base, rounded to obtuse at apex; only the midnerve clearly visible, impressed on the upper surface, ± prominent on the lower (especially toward the leaf base); intramarginal nerves and transverse veins ± 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, 9–10.5 × 7–8 mm, conspicuously verrucose-wrinkled; calycinal crown very short (ca. 0.3 mm high), margin sinuate to ± 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 aínigma 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. rovumense (q.v.).
Discussion:—Memecylon aenigmaticum has been confined 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. rovumense, but differs by its much smaller leaves (1.75–3 × 1–1.75 cm vs 3.3–5.5 × 1.7–3.3 cm) and smaller, differently shaped fruits (ellipsoid to obovoid and 9–10.5 × 7–8 mm vs ovoid to broadly pyriform, 18 × 14 mm) (Table 1).

Key to the species of Memecylon in Mozambique

1. Leaf-blades 1.75–3 × 1–1.75 cm; fruits elliptic to obovoid, 9–10.5 × 7–8 mm. Known only from the Namparamnera coastal dry forest near Quiterajo (Cabo Delgado Province)........................................................................................................1
2. Leaf-blades 4–7 × 2–4 cm; lower leaf surface vivid yellowish green; fruits ovoid, 18 × 14 mm. Coastal forests of N Mozambique (M. flavovirens)........................................................................2
3. Leaf-blades 1.5–4.5 × 0.5–2.7 cm; cymes 1–2-flowered, on peduncles up to 9–10.5 mm long. Known only from Magaraque Island near Vilanculos (Inhambane Province)........................................3
4. Leaf-blades 1.75–7 × 1–4 cm; cymes 1–3-flowered, on peduncles ca. 2 mm long. .................................................4
5. Leaf-blades mostly 3.5–5.5 × 1.8–3.3 cm; fruits ovoid to broadly pyriform, 18 × 14 mm. In Mozambique known only from the Namacubi coastal dry forest near Quiterajo (Cabo Delgado Province) ..................................................5
6. Leaf-blades 1.75–3 × 1–1.75 cm; fruits elliptic to obovoid, 9–10.5 × 7–8 mm. Known only from the Namparamnera coastal dry forest near Quiterajo (Cabo Delgado Province) ..................................................6
7. Leaf-blades ovate, dimensions ± smaller (mostly 3–6 × 1.5–3.2 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; hypanto-calyx obovate, 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 .................................7

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References


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https://doi.org/10.5962/bhl.title.595


https://doi.org/10.1098/rstb.2004.1533


https://doi.org/10.5962/bhl.title.669

https://doi.org/10.1016/j.sajb.2016.02.116

https://doi.org/10.1007/s10531-006-9047-4

https://doi.org/10.12705/633.10

https://doi.org/10.11646/phytotaxa.311.2.4


REVISED TREATMENT OF MOZAMBIAN MEMECYLON

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