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REGULAR PAPER

Further new species and records from the coastal dry forests and woodlands of the Rovuma Centre of Endemism

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Background and aims – The coastal dry forests and woodlands of Cabo Delgado Province (Mozambique), part of the proposed Rovuma Centre of Endemism that is shared with coastal southern Tanzania, are known to support high numbers of endemic and highly range-restricted species. Here we investigate the taxonomic status of three taxa that were discovered and highlighted as potential novelties during botanical surveys of northeast Cabo Delgado in 2003–2012.
Methods – This study was based on standard practices of herbarium taxonomy and morphological analyses. The conservation (extinction risk) assessments are based on application of the Categories and Criteria of the IUCN Red List.
Key results – Three new species are described, all of which are currently thought to be endemic to Cabo Delgado Province and recorded from the area around the coastal town of Palma and/or inland along the lower Rovuma River Escarpment. *Casearia celastroides* I.Darbysh. & J.E.Burrows (Salicaceae), the smallest African member of its genus, is assessed as globally Endangered. *Convolvulus goyderi* J.R.I.Wood (Convolvulaceae), which, in contrast, has the largest flowers in its genus in tropical Africa, is known only from the type collection and is assessed as Data Deficient (DD) but could potentially be threatened. *Vitex franceseana* I.Darbysh. & Goyder (Lamiaceae) is also assessed as globally Endangered. *Crossopetalum mossambicense* I.Darbysh., a species previously thought to be endemic to Cabo Delgado, is reported for the first time in neighbouring southeast Tanzania. A review of new species discoveries from Mozambique since 2010 reveals that 26 species (one third of the newly published species) are derived from the forests and woodlands of the Rovuma Centre of Endemism, which is a critical area for plant conservation in Mozambique.

Keywords – Cabo Delgado; coastal dry forest; endemic; IUCN Red List; Mozambique; Rovuma; Tanzania; taxonomy.

INTRODUCTION

Tropical dry forests are of high conservation concern globally as they typically combine high rates of endemism and species turnover with high and increasing levels of threat (Miles et al. 2006). The coastal dry forests and thickets along the Indian Ocean coastline of Eastern Africa are no exception (Burgess & Clarke 2000; Timberlake et al. 2011). Indeed, these habitats and the species they support are central to the Coastal Forests of Eastern Africa Biodiversity Hotspot, which extends from southern Somalia to southern Mozambique (Conservation International 2005). Although originally

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included in a single phytogeographical unit by White (1983) – his Zanzibar-Inhambane Regional Mosaic – subsequent studies have proposed several centres of plant endemism along these coastal lowlands (e.g., Clarke 1998, 2001; Burrows & Timberlake 2011; Darbyshire et al. 2019a).

The coastal forests and woodlands of Cabo Delgado Province in northeast Mozambique form a part of the proposed Rovuma Centre of Endemism [CoE] (Burrows & Timberlake 2011; Darbyshire et al. 2019a) which is shared with southeast Tanzania. This takes its name from the Rovuma River which forms much of the border between the two countries. The Mozambican portion of the Rovuma CoE had not been botanised thoroughly prior to the 21st century, but a series of botanical expeditions focussing on the dry forests of northeast Cabo Delgado in 2003–2009 helped to shed much light on this region. Of over 3,000 collections made during these expeditions, 738 plant taxa were documented, with 68 new country records for Mozambique noted, including scarce Rovuma CoE endemics such as *Drypetes sclerophylla* Mildbr. (Putranjivaceae) and *Pavetta lindina* Bremek. (Rubiaceae). In addition, 36 taxa were identified as either entirely new to science or known previously from insufficient material to have been formally described (Timberlake et al. 2011). Fieldwork in preparation for the *Trees and Shrubs of Mozambique* (Burrows et al. 2018a) has resulted in further additions to the woody flora of this region, including additional rare Rovuma CoE endemics such as *Grewia filipes* Burret (Malvaceae: Grewioideae).

The unique biodiversity of this region is, however, under severe threat. Timberlake et al. (2011) estimated that the extent of "dense vegetation cover" in the coastal lowlands of Cabo Delgado has declined from c. 6,087 km^2 historically to only 1,182 km^2 today, a loss of c. 80%. The first wave of deforestation is likely to have occurred in the Portuguese colonial period when there was extensive timber exploitation. Following a period of depopulation during the war for independence and the post-independence civil war (1960s–1991), the area has recently experienced rapid repopulation, aided by improved transport links and by the construction of cutlines within the forested areas during oil prospecting in the late 2000s. This immigration has been further encouraged by planned offshore liquefied natural gas (LNG) extraction. The increasing human populations are resulting in widespread forest and woodland clearance for subsistence agriculture and settlement accompanied by uncontrolled burning and logging (Timberlake et al. 2010, 2011; Darbyshire et al. 2016). Two large LNG operations are underway – the Exxon Mobil-led Rovuma LNG and Total-led Mozambique LNG projects – which will result in major onshore infrastructure and transport networks between Palma and Mocimboa da Praia. A violent Islamic insurgency in this region since 2017 has disrupted some of these activities, causing significant temporary population displacement and halted immigration, but this unrest is also potentially hindering the ability of environmental groups to access and provide proper scrutiny of the ongoing and planned developments.

With threats so high to this region, it is essential that its unique biodiversity is highlighted in order to promote the conservation and sustainable management of the remaining natural habitats. In this paper we contribute to this effort by formally describing three of the species first postulated as new to science by Timberlake et al. (2011): *Casearia celastroides* I.Darbysh. & J.E.Burrows (Salicaceae), *Convolvulus goyderi* J.R.I.Wood (Convolvulaceae), and *Vitex franceseana* I.Darbysh. & Goyder (Lamiaceae). In addition, *Crossopetalum mossambicense* I.Darbysh., previously thought to be endemic to this area of northeast Mozambique, is here reported in the coastal thickets of southeast Tanzania for the first time. Finally, we report on progress in describing the endemic flora of the Rovuma CoE in Mozambique since 2010 and on the status of the important sites in which these species occur.

MATERIAL AND METHODS

The findings of this paper are based on morphological studies of herbarium material, primarily using specimens held at the K and BNRH herbaria, with additional study of material at LMA where available (herbarium abbreviations following Thiers continuously updated), and with reference to online images of relevant specimens held at other herbaria, accessed primarily via JSTOR (https://plants.jstor.org/). Field photographs of the species in question were also consulted where available. Measurements were made on dry material except for flowers which were first rehydrated using Aerosol OT 5% solution. At least one duplicate of all cited specimens has been seen by one or more of the authors. Data on distribution, habitat and ecology, and phenology were taken from herbarium specimen labels and from field observations made by D.J. Goyder and J.E. Burrows. Specimen georeference data were imported into SimpleMappr (Shorthouse 2010) to produce distribution maps.

The conservation (extinction risk) assessments are based on application of the Categories and Criteria of the IUCN Red List (IUCN 2012; IUCN Standards and Petitions Committee 2019). The online tool GeoCAT (http://geocat.kew.org/, Bachman et al. 2011) was used to calculate the area of occupancy (AOO) and extent of occurrence (EOO) of each taxon.

Electronic images of the type specimens housed at K will be made available freely at https://apps.kew.org/herbcat/navigator.do shortly after publication of this work.

RESULTS

1. *Casearia* (Salicaceae)

Casearia Jacq. (Salicaceae; formerly Flacourtiaceae or Samydaceae) is a large genus of trees and shrubs comprising c. 160 species distributed across the tropics and subtropics, with centres of diversity in the Neotropics and in Malesia (Sleumer 1954; Breteler 2008). It was last revised continent-wide in Africa, including Madagascar and the Mascarenes, by Sleumer (1971) who reduced the number of species from 34 to 12. Only two species were noted in Mozambique prior to the discovery of the new species described below: *C. battiscombei* R.E.Fr. from montane moist forest and *C. gladiiformis* Mast. from coastal and lowland woodland and dry forest (Wild 1960; Wild & Vidigal 1973; Burrows et al. 2018a; Hyde et al. 2020). Sleumer (1971) noted that species delimitation in *Casearia* is very difficult in Africa and that

the species he maintained are separated mainly by rather few vegetative characters. More recently, Breteler (2008, 2018) provided a synoptic revision of *Casearia* in West and Central Africa. He made several taxonomic changes to Sleumer's revision and added two new species, but was again reliant on vegetative characters (indumentum, branchlets hollow versus solid, number and arrangement of lateral veins on the leaves) to help distinguish most species, with few fertile characters used. Breteler (2008) further noted that the flowers of *Casearia* offer almost no diagnostic characters for separation of the African species, a feature that has also been observed by Sleumer (1954) for the many species of Malesia. Below we describe a new species of *Casearia* from Mozambique that is remarkable for its small, slender growth habit.

Casearia celastroides I.Darbysh. & J.E.Burrows, **sp. nov.**

Casearia ?sp. nov. *sensu* Timberlake et al. (2011: 131).

Casearia sp. A *sensu* Burrows et al. (2018a: 630).

Figs 1A–H, 2A–E, 3

Diagnosis – Resembling *Casearia gladiiformis* but differing in being a single stemmed slender shrub 0.3–1.3 m tall (versus a tree or robust shrub (2–)3–10(–20) m tall); in the leaves being distichous but spreading and not pseudopinnate (versus leaves markedly distichous and often drooping, the lateral branches appearing pseudopinnate); and in the leaves being elliptic, ovate-elliptic or only somewhat oblong, with length:width ratio 1.9–2.6:1 and with a ± conspicuous crenate-serrate margin at maturity (versus leaves oblong-elliptic to oblong-lanceolate, length:width ratio 2.2–4.1:1, usually over 2.5:1, and with margin usually entire at maturity [but see note regarding some South African populations]).

Type – Mozambique: Cabo Delgado Province, c. 25 km from Palma on track to Pundanhar, 10°49.533′S, 40°17.25′E, 96 m elev., 6 Sep. 2009, fl., *J.E. Burrows, S.M. Burrows, H.A. Matimele & A.C. Banze 11378* (holotype: BNRH [BNRH001984]; isotypes: K [K001341781, K001341782], LMA).

Description – Single- or few-stemmed shrub 30–130 cm tall, slender; stems 4-angular and green when young, sparsely patent-puberulous; later terete with ± pale brown-grey bark, sometimes lenticellate, glabrescent. Stipules narrowly triangular-lanceolate, 0.7–1.4 × 0.4–0.8 mm, brown or straw-coloured, shortly hairy particularly along the margin where hairs ascending, later caducous. Leaves distichous; petioles 4–9 mm long, channelled above, sparsely patent-puberulous or glabrous; blade chartaceous, often partially eaten at maturity, elliptic, ovate-elliptic to somewhat oblong, 5.8–12.5 × 2.5–6.7 cm, length:width ratio 1.9–2.6:1, base cuneate or somewhat attenuate, often oblique in at least some leaves, margin conspicuously to shallowly crenate-serrate, apex attenuate or acuminate with an obtuse or rounded tip and mucronulate; surfaces glabrous, pellucid striations rather numerous when young but soon becoming inconspicuous or invisible except towards the margin; midrib prominent and yellow-orange beneath, lateral veins 5–8 pairs, these and the reticulate tertiary venation slightly raised particularly beneath. Inflorescences axillary glomerules of 2–7 flowers but only 1–3 flowers mature at a given time; bracts imbricate, reddish-brown, ovate-triangular, ± 1 × 1 mm, puberulous; pedicels 2.3–2.7 mm long in flower, extending up to 4 mm long in fruit, articulated at or near the base, puberulous or subglabrous. Sepals 5, green, (ovate-) elliptic, ± 3 × 1.5 mm, apex obtuse or rounded, margins membranous and involute, external surface sparsely puberulous particularly towards the base, 3 parallel veins visible internally. Disc ± 2.3 mm in diameter excluding lobes, concave, sparsely puberulous. Stamens 8 (in the single dissected flower); filaments 0.5–0.7 mm long, glabrous above the base where puberulous; anthers with oblong thecae, 0.9–1.2 mm long, with few short patent hairs; staminodes 0.6–0.7 mm long, conspicuously pale-pilose. Ovary oblong-ovoid, ± 1.6 × 1 mm, sparsely puberulous towards apex, hairs ascending; stigma subsessile, capitate, shallowly 3-lobed. Fruit bright yellow when mature, glossy, ellipsoid or somewhat obovoid, 11.5–19 × 9.5–14 mm, length:width ratio 1.15–1.4:1, shallowly trilobed in cross section, apex abruptly rounded or slightly concave; sepals, disk and androecium persisting at base of fruit; aril bright red. Seeds pale cream-brown, ellipsoid but somewhat angular with apical point, 4–4.7 × 3 mm, surfaces smooth.

Distribution – Restricted to the coastal lowlands of Cabo Delgado Province in northeastern Mozambique, close to the Tanzania border. It may possibly also occur in southeast Tanzania on the northern side of the Rovuma River. Fig. 3.

Other specimens examined – **Mozambique**: Cabo Delgado Province, Palma District: campsite at dambo S of Nhica do Rovuma village, 10°45.317′S, 40°12.967′E, 130 m elev., 5 Dec. 2008, fr., *J.E. Burrows & S.M. Burrows 10967* (BNRH, K, LMA); Nhica do Rovuma area, 32 km WSW of Palma, 10°49.847′S, 40°11.653′E, 133 m elev., 7 Dec. 2008, fr., *J. Timberlake et al. 5665* (K, LMA, LMU, P); Nhica do Rovuma area, 10°50.48′S, 40°12.737′E, 10 Dec. 2008, *T. Müller 4142* (K, LMA, LMU, P); 1.8 km along track to Nhica do Rovuma, from the Palma–Pundanhar road, 10°49.833′S, 40°11.667′E, 127 m elev., 6 Dec. 2008, fr., *J.E. Burrows & S.M. Burrows 11008* (BNRH, K, LMA); Nhica do Rovuma Camp pt. 430, 10°45.576′S, 40°13.164′E, 110 m elev., 13 Nov. 2009, fr., *Q. Luke 13768* (EA, K, LMA); c. 3 km on the Olumbe road, from the Palma–Mocimboa da Praia road, 11°00.030′S, 40°22.031′E, 85 m elev., 5 Jan. 2012, fr., *J.E. Burrows & S.M. Burrows 12551* (BNRH, K, LMA).

Habitat, ecology, and phenology – Recorded from riverine woodland and forest of *Berlinia orientalis* Brenan and in *Brachystegia-Uapaca-Parinari* woodland and woodland-thicket mosaics on sandy soils, at elevations of 95–135 m a.s.l. The single flowering collection was made in September, at the end of the dry season. Fruiting occurs from November to January during and after the early rainy season.

Conservation status – This species is restricted to the woodlands and dry forests of the lower Rovuma River Escarpment west and south of Palma. It has an extent of occurrence (EOO) of only 145 km^2 based on current knowledge and is known from three threat-defined locations. It is likely to extend further inland along the Rovuma towards Nangade and potentially north of Palma, but maximum EOO is unlikely to exceed 2,000 km^2. Area of occupancy (AOO), using a standard 2 × 2 km grid cell size, is calculated as 20 km^2. Whilst this is likely to be an under-estimate of true AOO due to incomplete botanical survey within its range, we are confi-

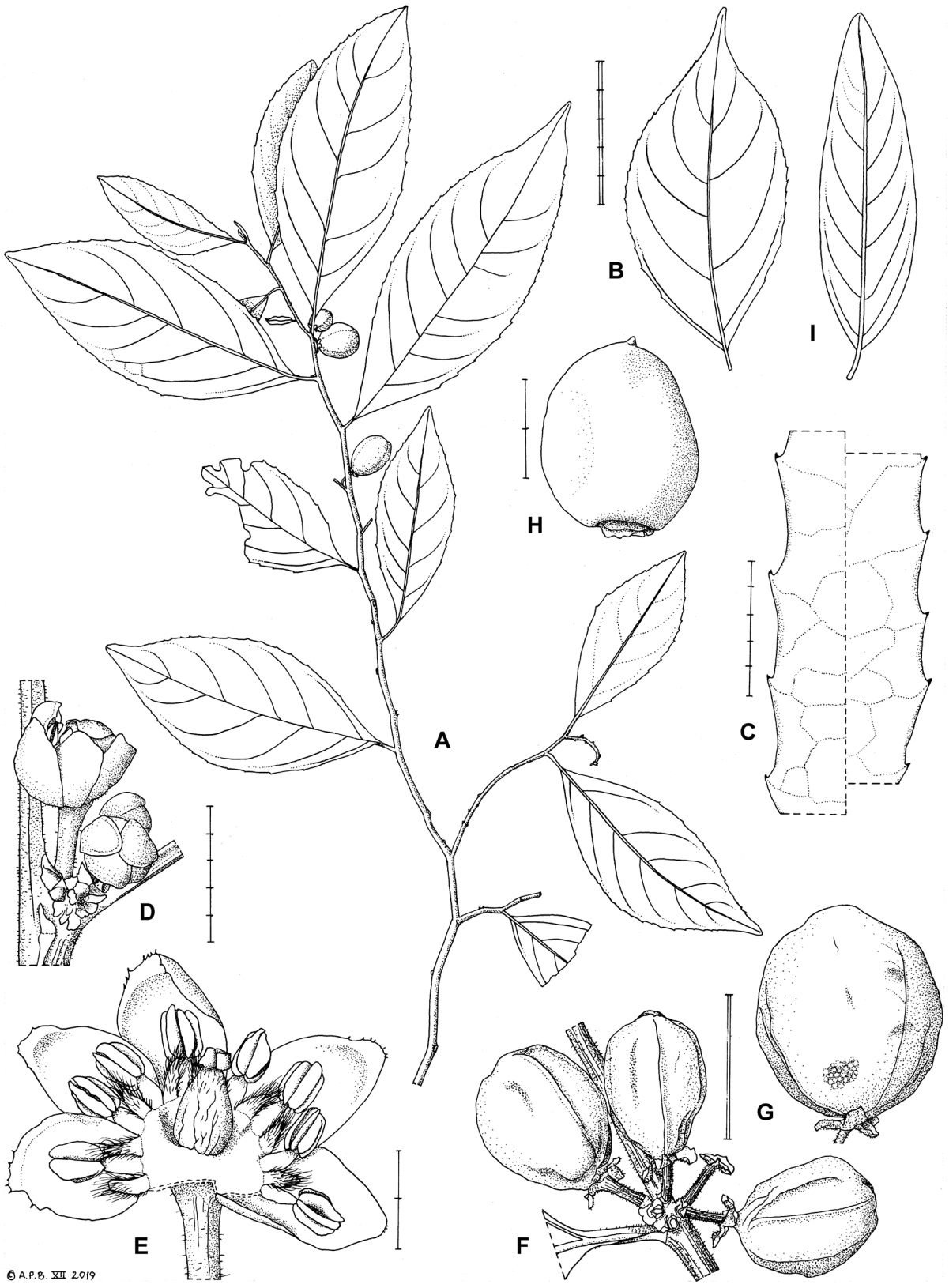

Figure 1 – **A**–**H**. *Casearia celastroides*. **A**. Habit, fruiting branch. **B**. Mature leaf, adaxial surface. **C**. Adaxial margins of distal portion of leaf showing variation in density of serrations. **D**. Inflorescence. **E**. Floral dissection. **F**. Infructescence. **G**. Mature fruit. **H**. Seed. **I**. *C. gladiiformis*, mature leaf for comparison. A, F, G from *Timberlake et al. 5665* (K). B–E from *Burrows et al. 11378* (K). H from *Luke et al. 13768* (K). I from *Mogg 28343* (K) ex Inhaca Island, Mozambique. Scale bars: graduated single bar = 2 mm and 5 mm; double bar = 1 cm; graduated double bar = 5 cm. Drawn by Andrew Brown.

dent that AOO is considerably less than the threshold of 500 km^2 for Endangered under criterion B2 given that extant suitable habitat is highly restricted. On one collection, this species was recorded from degraded *Brachystegia* woodland, but it appears to be mainly associated with undisturbed areas. It has been noted as locally scattered to frequent (*J.E. Burrows & S.M. Burrows 12551*). Whilst significant areas of intact woody vegetation remain along the Rovuma escarpment, the increasing human activities noted in the Introduction are likely to threaten this species. Of the known locations, the site south of Palma is likely to have been degraded due to proximity to the Palma–Mocimboa road, and the Palma to Nangade road is also being increasingly impacted by subsistence agriculture with much clearance of woody habitat. With a continuing decline in extent and quality of habitat, this species is assessed as Endangered - EN B1ab(iii)+2ab(iii).

Etymology – The species epithet "*celastroides*" denotes the fact that this species superficially resembles a member of the Celastraceae family and was provisionally identified as such in the field.

Figure 2 – Field photographs of *Casearia* (by J.E. Burrows). **A**–**E**. *C. celastroides*. **A**. Growth habit, fruiting. **B**. Leaves and flower buds. **C**. Flowers. **D**–**E**. Fruiting branches, including dehiscing fruit with arillate seeds. **F**–**I**. *C. gladiiformis*. **F**. Growth habit. **G**. Typical branch architecture. **H**. Fruiting branch. **I**. Variant with serrate leaves, Umtamvuna, South Africa.

Table 1 – **Diagnostic characters for separation of *Casearia celastroides* from *C. gladiiformis*.**
A variant of *C. gladiiformis* (possibly a distinct taxon) from South Africa is separated out as it differs in several vegetative characters from *C. gladiiformis* s. str. *Ugandan and West Kenyan specimens previously named as *C. gladiiformis* are excluded here as they are much larger trees with larger, more coriaceous leaves.

Character	*Casearia celastroides*	*Casearia gladiiformis* s. str.*	*Casearia gladiiformis* (South African variant = *Moll 3366*)
Growth habit and height	slender, single-stemmed shrub (possibly a geoxylic suffrutex), 0.3–1.3 m	robust shrub or tree, 2–12 m, most often in the range 3–10 m	tree, 7–20 m
Branch architecture	leaves distichous but not appearing pseudopinnate	leaves strongly distichous, often drooping and pseudopinnate on lateral branches	as for *C. gladiiformis* s. str., but leaves are smaller and less drooping and so less markedly pseudopinnate
Leaf texture	chartaceous	subcoriaceous or thickly chartaceous	chartaceous
Leaf shape	elliptic, ovate-elliptic or somewhat oblong	oblong-elliptic or oblong-lanceolate	oblong-elliptic or oblong-lanceolate
Leaf length:width ratio	1.9–2.6:1	2.2–3.9:1, usually over 2.5:1	2.2–4.1:1, usually over 2.5:1
Leaf margin (mature leaves)	conspicuously to shallowly crenate-serrate	entire or minutely and inconspicuously toothed	conspicuously to shallowly crenate-serrate

Notes – *Casearia celastroides* is the smallest known species of *Casearia* in Africa; it is the only one that is a slender, single- or few-stemmed shrub. Burrows et al. (2018a) hypothesise that it may be a geoxylic suffrutex but the underground parts of this species have not yet been seen to confirm this. There are certainly a significant number of geoxylic suffrutices growing within this species' habitat and distribution.

There is little doubt that this new species is allied to *C. gladiiformis* (fig. 2F–I), which it apparently replaces in the coastal woodlands and forests of the lower Rovuma River Escarpment. The nearest known population of *C. gladiiformis* is on the edge of the Mueda Plateau c. 95 km to the west up-river along the Rovuma. As with most other *Casearia* species in Africa, the differences between these two species are mainly vegetative. However, they are easily separated in the field (J.E. Burrows, pers. obs.; Q. Luke, pers. comm.). As well as differing in habit, *C. gladiiformis* being a robust shrub or more often a small to medium-sized tree (fig. 2F), they also differ in growth architecture. In *C. gladiiformis* the leaves are markedly distichous, often drooping and are pseudopinnate along lateral branches (fig. 2G, H). In *C. celastroides* the leaves are distichous but not pseudopinnate or drooping (fig. 2A, B, D). The leaves of *C. celastroides* are typically elliptic and have a ± conspicuous crenate-serrate margin at maturity (fig. 2B, E), whilst those of *C. gladiiformis* over most of its range are oblong-lanceolate or oblong-elliptic and have a ± entire margin at maturity, and are also thicker in texture (fig. 2H). The fruits of *C. gladiiformis* can be more elongate than in *C. celastroides*, up to 26 mm long and sometimes with a pointed apex, but fruit shape does seem to vary considerably in *C. gladiiformis*. The two species are compared in table 1.

Figure 3 – Distribution map for *Casearia celastroides*.

Although fairly uniform over most of its range, some populations assigned to *Casearia gladiiformis* are more variable. Of relevance to our new species is a variant from South Africa (fig. 2I) with thinner chartaceous leaves that are often small, typically 5–10 cm long, have a ± conspicuously serrate margin and can have a more pronounced acuminate apex (e.g., *Moll 3366*, *Strey 8870*, both K). These populations are also notable for being medium to large trees, 6–20 m tall, often in the forest canopy layer rather than being a midstratum or understory component. This variant was separated out by Sleumer (1971) but without formal taxonomic status. However, Killick (1976), in the *Flora of Southern Africa* treatment of Flacourtiaceae, included all South African specimens under *C. gladiiformis* and only commented briefly on the variation seen in vegetative characters. The leaves of Sleumer's variant are more similar to *C. celastroides* than typical *C. gladiiformis* but are still proportionately narrower and have finer and more numerous serrations. The growth habit of these populations is also very different from *C. celastroides*. This form is treated separately in table 1 and may warrant separate taxonomic status following further investigation.

Breteler (2008) noted that although the calyx is always 5-merous in African *Casearia*, the number of stamens and of the alternating staminodes is often not in accordance and is variable; in the single dissected flower observed for *C. celastroides*, eight stamens and alternating staminodes were observed but it is quite possible that this number varies.

Table 2 – **Diagnostic characters for separation of *Convolvulus goyderi* from *C. randii* and *C. kilimandschari.***

Character	*Convolvulus goyderi*	*Convolvulus randii*	*Convolvulus kilimandschari*
Habit	creeping perennial, rooting at the nodes with stems to at least 60 cm long	erect or (rarely) scrambling perennial to 80 cm high	twining perennial reaching 2 m
Leaf shape	ovate-suborbicular	oblong-obovate	ovate-deltoid
Leaf apex	rounded	acute to apiculate	acute
Leaf margin	undulate to dentate	entire to obscurely crenate	entire to obscurely crenate
Abaxial surface of leaf	prominently veined, silvery-villous	prominently veined, silvery-sericeous	not prominently veined, glabrous to pubescent
Petiole	20–30 mm long	0.5–3 mm	7–35 mm
Inflorescence	solitary, axillary flowers	solitary, axillary flowers	pedunculate, many-flowered heads
Corolla	3.5–4 cm long	1.6–2 cm long	2.5–3(–4) cm long
Distribution and elevation range	NE Mozambique 134 m	Zimbabwe 1270–1700 m	Ethiopia, Kenya, Uganda, Tanzania 1800–3700 m
Habitat	Sand at the margin of a pan transitional to dry forest	Grassland on serpentine deposits	Montane forest

2. *Convolvulus* (Convolvulaceae)

Convolvulus L. is a genus of around 190 species, widely distributed in temperate regions of all continents, including Australia. It is most diverse in the Irano-Turanian floristic region, but endemic species are found in most places with a Mediterranean climate, including South Africa and California, as well as on The Canary Islands and Socotra. It is poorly represented in most tropical regions, although the Horn of Africa region could be considered a partial exception (Wood et al. 2015). Mozambique fits this distribution pattern and only three species are certainly known at the present time (Gonçalves 1987, 1992; Hyde et al. 2020). The discovery of a new species is, therefore, unexpected and of considerable interest.

Convolvulus goyderi J.R.I.Wood, **sp. nov.**

Ipomoea ?sp. nov. *sensu* Timberlake et al. (2011: 131).

Figs 4, 5

Diagnosis – Most similar to *Convolvulus randii* Rendle, particularly in the distinctive leaf indumentum, but prostrate and rooting at the nodes (not erect), appressed villous (rather than sericeous), the leaves ovate-suborbicular, rounded at apex (not oblong-obovate, acute), dentate (not crenate), the petioles 2–3 cm long (not 0.5–3 mm) and the corolla much larger, 3.5–4 cm long (not 1.6–2 cm).

Type – Mozambique: Cabo Delgado Province, Palma–Pundanhar road, c. 4.5 km W of junction with road to Nhica do Rovuma, 10°51.272′S, 40°09.605′E, 134 m elev., 8 Nov. 2009, fl., *D.J. Goyder, T. Alves & A. Massingue 6026b* (holotype: K [K000787952]; isotypes: LMA, P).

Description – Prostrate perennial, the stems rooting at the nodes, stout, up to at least 60 cm in length, when young densely pubescent with white hairs, when old brown, somewhat woody, thinly appressed pubescent. Leaves petiolate, lamina 2.5–5 × 2–4 cm, diminishing in size towards the stem tips, broadly ovate to suborbicular, apex rounded, base shallowly cordate to subtruncate and briefly narrowed onto the petiole, margin deeply undulate to dentate, adaxially dark green, densely villous with white hairs, abaxially silvery, densely villous-canescent, the veins somewhat prominent; petioles 2–3 cm long, villous with white hairs. Flowers solitary, axillary, borne on short leafy shoots; peduncles 4 mm long, pilose; bracteoles 6 × 1 mm, linear, adaxially white-silvery villous, abaxially pilose; pedicels 2–3 mm long, densely silvery-pilose. Sepals slightly unequal, the outer 11–12 × 3–4 mm, the inner about 1 mm narrower, ovate, acuminate with a cuneate base, densely white-canescent. Corolla 3.5–4 cm long, campanulate to shortly funnel-shaped, the throat pinkish-purple, the limb paler and whitish, sparsely pilose on the exterior, somewhat glabrescent, the limb c. 3.5 diam., shallowly lobed with the midpetaline bands ending in a tooth. Stamens included, filaments 6–7 mm long, glabrous, anthers 3 × 0.75 mm. Ovary ovoid, 1.5 mm high, glabrous, style 9 mm long, thinly pilose, stigmas 1.25 mm long. Capsule and seeds unknown.

Distribution – Only known from the type collection from near Palma in northern Mozambique. Fig. 5.

Habitat, ecology, and phenology – At the type locality, it was found growing at low altitudes in an open habitat on sand at the margin of a pan transitional to dry forest. D.J. Goyder noted it to be locally common. The single flowering collection was made in November, during the early rainy season.

Conservation status – Very little is known about the total distribution and frequency of this species and for the time being it is best treated as Data Deficient (DD) according to IUCN guidelines. However, if no further populations are discovered after extensive search, it would be best classified as Critically Endangered (CR) because of its extremely restricted distribution and the threat posed by the growing hu-

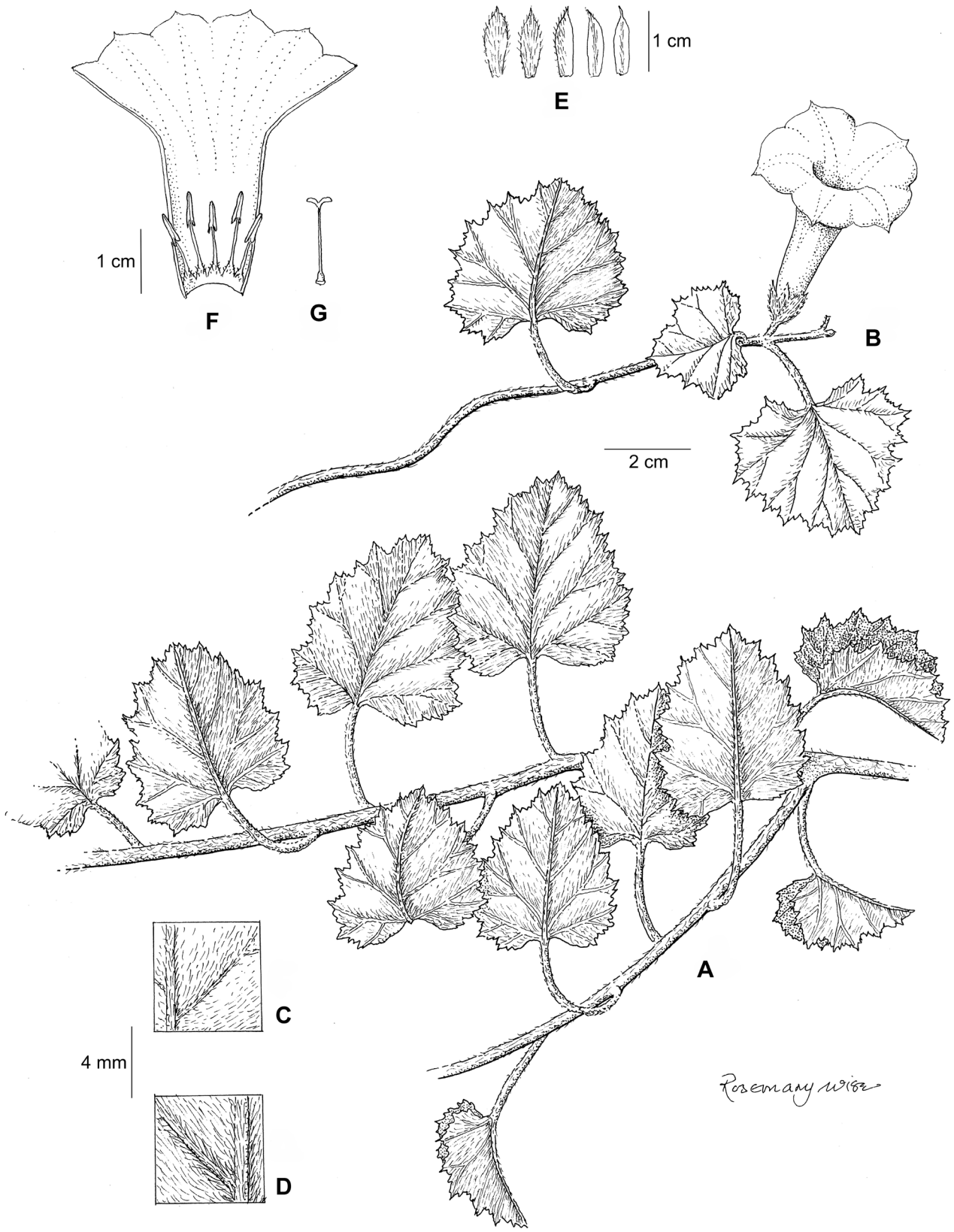

Figure 4 – *Convolvulus goyderi*. **A**. Creeping habit. **B**. Habit with flower. **C**. Adaxial leaf surface. **D**. Abaxial leaf surface. **E**. Sepals, outermost on left to innermost on right. **F**. Corolla opened out to show stamens. **G**. Ovary and style. Drawn by Rosemary Wise from *Goyder et al. 6026b* (K).

man population along the Palma–Pundanhar road. The pans are probably less threatened than the dry forest itself but this species is only currently known from a single population and was not observed elsewhere in the region by the collectors.

Etymology – This species is named for David Goyder, long-time friend and colleague of the author and specialist in the African flora and the family Apocynaceae. In the latter role he accompanied the author on four memorable expeditions to Bolivia resulting in several papers and the discovery of many new species, for example Goyder (2004).

Note – The very large corolla of this species is unusual in *Convolvulus* and only matched in sub-Saharan African species in rare forms of the Afromontane species, *C. kilimandschari* Engl. The creeping stems rooting at the nodes are another unusual feature. See table 2 for a comparison with *C. kilimandschari* and *C. randii*.

3. *Vitex* (Lamiaceae)

Vitex L. (Lamiaceae: Viticoideae) is a genus of over 200 species of trees, shrubs, and lianas, distributed mainly in the tropics but with some temperate species (Sales 2005). In the most recent regional treatment of the genus for southern tropical Africa, Sales (2001, 2005) recorded 12 species occurring in Mozambique. Burrows et al. (2018a) later added two more species for the country: (a) *Vitex carvalhoi* Gürke, which they separated out from *V. mossambicensis* Gürke in the northeast coastal region based on recent collections that demonstrate that two distinct species are involved, and (b) *Vitex* sp. A, a possible new species from the north of Mozambique and southern Tanzania which has previously been treated as a form of *V. mombassae* Vatke. The latter taxon requires further investigation, including collection of flowering material (J.E. Burrows, pers. obs.). Here, we describe a distinctive yellow-fruited species of *Vitex* from the Cabo Delgado coast which was previously confused with *V. buchananii* Baker ex Gürke.

Vitex franceseana I.Darbysh. & Goyder, **sp. nov.**

Vitex ?sp. nov. aff. *buchananii sensu* Timberlake et al. (2011: 131).

Vitex buchananii sensu Burrows et al. (2018a: 860), *pro parte*, non Baker ex Gürke.

Figs 6–8

Figure 5 – Distribution map for *Convolvulus goyderi*.

Diagnosis – *Vitex franceseana* is most likely to be confused with *V. buchananii* but differs in having a racemoid thyrse without well-developed lateral branches (versus a panicle with well-developed racemoid lateral branches); fruits with a smooth glossy surface with only few scattered sessile yellow glands (versus surface encrusted with abundant yellow glands); larger corollas 8–10 mm long with a pale reddish-mauve to lilac lower lip (versus corolla 4–6.5 mm long, white, cream, greenish-yellow or yellow); and a larger and more deeply lobed calyx, 3.2–5 mm long in flower, the lobe apices often rounded or obtuse (versus calyx 1.5–2.7 mm long in flower, lobes very shallow and denticulate).

Type – Mozambique: Cabo Delgado Province, Palma area, 1 km E of Muangaza, S of Palma, 10°55.408′S, 40°23.58′E, 65 m elev., 5 Dec. 2008, fl., *D.J. Goyder, A. Banze, P. Clarke, F. Crawford & C. de Sousa 5085* (holotype: K [K000738952]; isotypes: LMA, LMU).

Description – Slender erect shrub 1.5–3 m tall or small tree up to 6 m tall; young stems sharply quadrangular, hollow, reddish- or purplish-brown, at first puberulous to pubescent with ± patent pale-buff hairs and with numerous sessile yellow glands, becoming sparse on mature stems. Leaves present when flowering and fruiting but sometimes immature (plant deciduous?); petiole 3.6–13 cm, indumentum as that of young stems but hairs can be longer; blade chartaceous, 5-foliolate, the median leaflet the largest, the basal pairs of leaflets sometimes considerably smaller, leaflets subsessile or median leaflet on petiolule 3–7 mm long; median leaflet obovate, 6.7–12.4 × 2.6–5 cm, base long-cuneate, margin entire or rarely with one or two obscure teeth, apex markedly acuminate for 0.6–1.5 cm, lateral veins (5–)7–9 per side, not or barely impressed above, more conspicuous beneath; all leaflets antrorse-pubescent on veins of lower surface and margin, more sparsely so above where can be evenly distributed across the surface or largely restricted to the midrib and margin, both surfaces with numerous sessile yellow (-orange) glands. Inflorescences terminal on main and short lateral branches, slender racemoid thyrses 3.5–9 × 1.5–2 cm, each inflorescence node with opposite dichasial cymes usually 3-flowered but sometimes with additional lateral flower buds developing; primary peduncle to 18 mm long, peduncles of lateral cymes 2–3 mm long; bracts early-caducous, (linear-) lanceolate, 3–5 × 0.6–0.7 mm, pubescent, particularly along margin, and with numerous sessile glands; bracteoles as bracts but more linear, 1.3–3.5 mm long, margins involute; pedicels 0.7–2.5 mm long, pedicels of lateral flowers in 3-flowered cyme longer than those of central flower, indumentum as on young stems. Calyx 3.2–5 mm long in flower, 5–6.5 mm long in fruit; tube campanulate, 10-veined; lobes 1.3–2.1 mm long with apices rounded, obtuse or acute, external surface with dense yellow sessile glands and with ± sparse antrorse hairs mainly along main veins. Corolla 8–10 mm long (tube to upper lip), pale yellow-green with pale reddish-mauve or lilac lower lip particularly the median lobe; external surface with numerous yellow glands, apices of lobes also with pale multicellular eglandular hairs, minutely papillose within tube and pubescent in throat, densely pale-pubescent around insertion of stamens; tube broadly cylindrical, 5.8–6.5 × 3 mm; upper lip erect, 2–3 mm long, deeply 2-lobed, lobes ovate-elliptic, ± 2 mm wide; lower lip

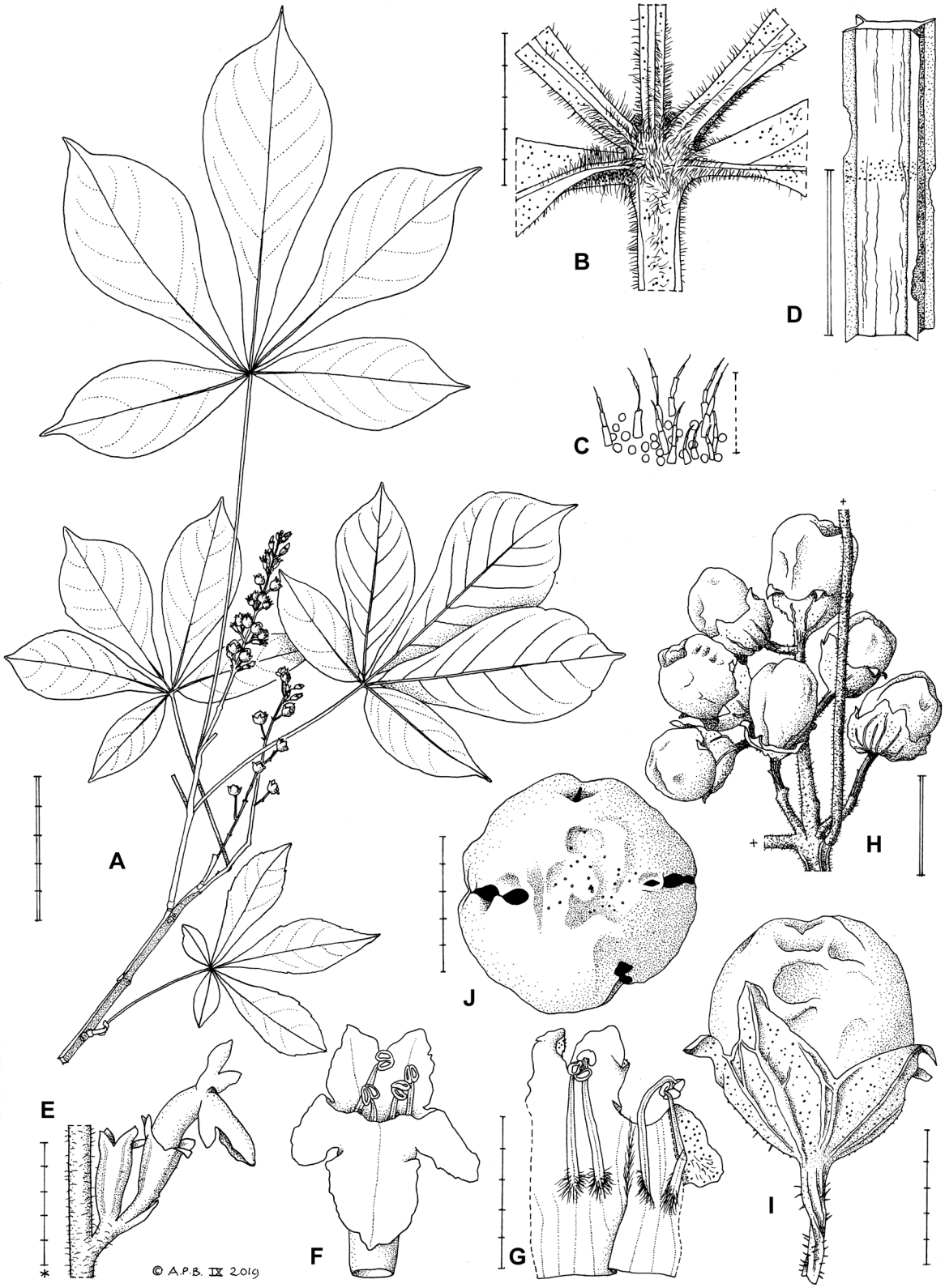

Figure 6 – *Vitex franceseana*. **A**. Habit, flowering branch. **B**. Adaxial surface of leaf at insertion of leaflets. **C**. Detail of indumentum and glands at base of leaflet. **D**. Section of mature stem showing wings. **E**. Flower *in situ*. **F**. Flower, face view. **G**. Dissected corolla with androecium, lobes of lower lip naturally folded behind tube. **H**. Infructescence. **I**. Mature fruit with persistent calyx. **J**. Mature fruit, apical view showing sparse apical glands. A–C from *Crawford 360* (K). D, F, G from *Goyder et al. 5085* (K). E from field photograph by J.E. Burrows. H–J from *Burrows et al. 11307* (K). Scale bars: dashed bar = 500 µm; graduated single bar = 5 mm (approximate in E); double bar = 1 cm; graduated double bar = 5 cm. Drawn by Andrew Brown.

strongly deflexed, 4.5–6 mm long, lobes divergent, median lobe 3.5–3.7 × 3.5 mm, lateral lobes 2.3–2.5 × 2–2.5 mm. Stamens inserted midway along corolla tube, anterior pair inserted slightly higher than lateral pair; filaments 4–4.5 mm long, pubescent towards base; anthers 0.6–0.8 mm long. Pistil with style ± 6 mm long; stigma with lobed margin and central depression. Fruit a globose to somewhat ellipsoid drupe, 9–10.5 × 7.5–9 mm, glossy and yellow when ripe, surface smooth and without glands except for a few scattered towards the apex.

Distribution – Known only from the coastal lowlands of northeast Cabo Delgado Province in Mozambique. It may also occur in southeast Tanzania on the northern side of the Rovuma River. Fig. 8.

Other specimens examined – **Mozambique**: Cabo Delgado Province, Palma District: road from campsite at the dambo to Nhica do Rovuma village, 10°45.517′S, 40°12.567′E, 130 m elev., 5 Dec. 2008, fl., *J.E. Burrows & S.M. Burrows 10976* (BNRH, K, LMA); N of Palma, on road to Nhica do Rovuma village, 10°45.305′S, 40°12.967′E, c. 90 m elev., 7 Dec. 2008, fl., *F. Crawford FC360* (K, LMA, LMU, P); Palma District, 10°40.398′S, 40°25.25′E, 67 m elev., 7 Dec. 2008, imm. fr., *H.A. Matimele 67* (K, LMA, LMU, P); between Pundanhar and Nangade, 10°58.867′S, 39°45.233′E, 178 m elev., 23 Mar. 2009, fr., *J.E. Burrows & S.M. Burrows 11307* (BNRH, K, LMA).

Habitat, ecology, and phenology – Occurs in coastal dry forest patches with e.g. *Berlinia orientalis* and in deciduous thicket / woodland mosaics, on sandy soils at 0–180 m elevation. It can sometimes persist in degraded or disturbed patches of forest or secondary regrowth but is more frequent in undisturbed habitats. Based on the few collections made to date, it flowers in December during the early rainy season, with mature fruits in March late in the rainy season.

Conservation status – This species is known from four locations from west and south of Palma, with an extent of occurrence (EOO) of 1,015 km^2. Area of occupancy (AOO), using a standard 2 × 2 km grid cell size, is calculated as 16 km^2. Whilst this is likely to be an under-estimate of true AOO due to incomplete botanical survey within its range, we are confident that AOO is considerably less than the threshold of 500 km^2 for Endangered under criterion B2 given the limited extant suitable habitat. While it can persist in degraded patches of forest or in secondary regrowth, this species is considered to be threatened by increasing clearance of woody habitat for subsistence agriculture and settlement (see Introduction), particularly in the locations close to major roads between Palma and Nangade and Palma and Mocim-

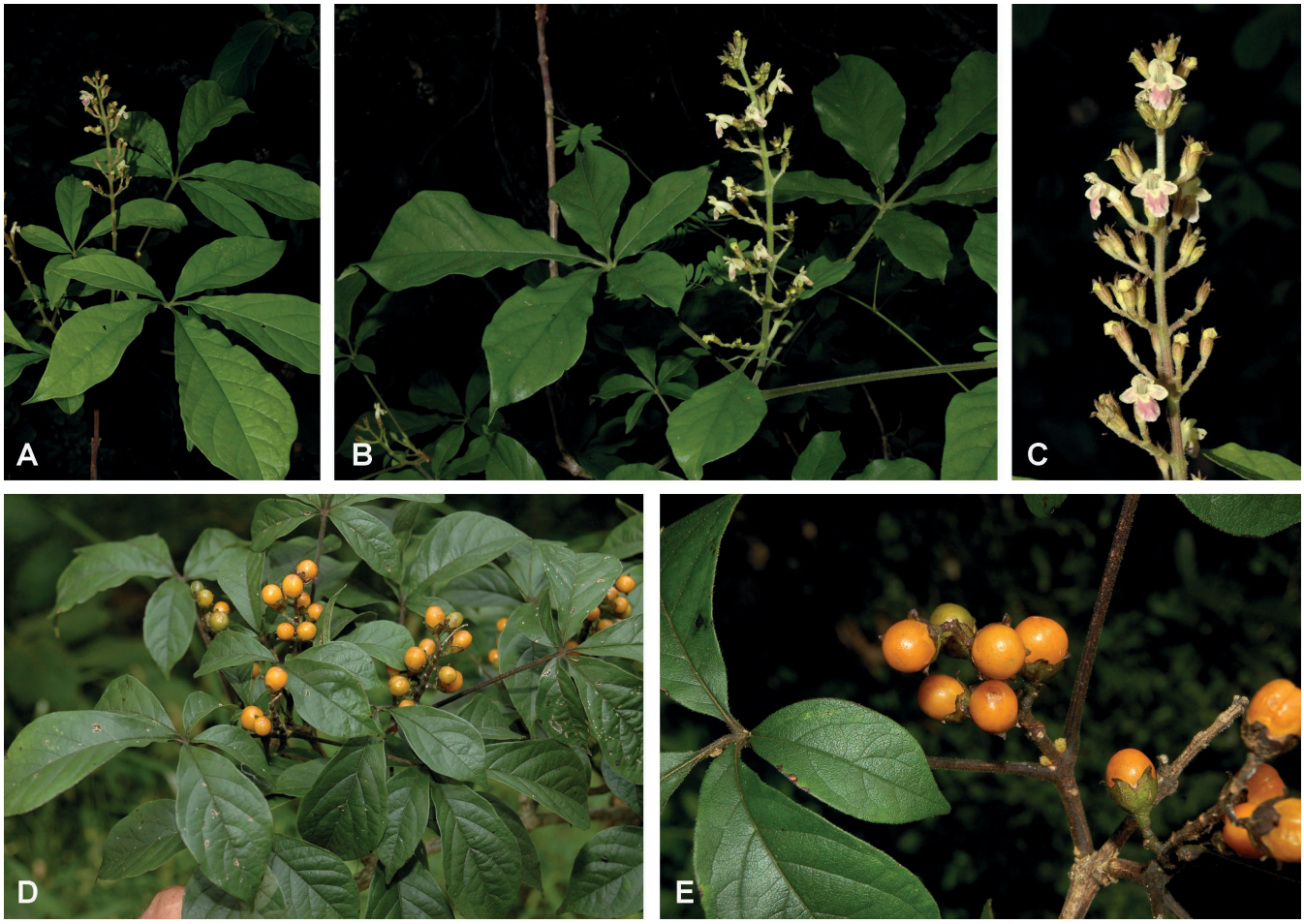

Figure 7 – Field photographs of *Vitex franceseana* (by J.E. Burrows). **A**–**B**. Habit, flowering branches. **C**. Inflorescence. **D**. Habit, fruiting. **E**. Infructescences.

Table 3 – **Diagnostic characters for separation of *Vitex franceseana* from *V. buchananii* and *V. strickeri*.**
*Sales (2005) records the corolla of *V. buchananii* as sometimes being mauve but we have not seen this recorded on any specimen.

Character	*Vitex franceseana*	*Vitex buchananii*	*Vitex strickeri*
Number of leaflets per leaf	5	(3–)5	3
Inflorescence form	racemoid thyrse	panicle of thyrses, racemoid lateral branches well developed particularly in flower	racemoid or more open thyrse but without racemoid lateral branches
Calyx indumentum (flowering)	dense yellow sessile glands and ± sparse antrorse hairs mainly along main veins	numerous yellow sessile glands and dense short pale antrorse hairs	numerous yellow to orange sessile glands and with short antrorse hairs ± mainly along veins
Calyx length (flowering)	3.2–5 mm	1.5–2.7 mm	1.5–3 mm
Calyx lobing	lobes well-developed, apices rounded, obtuse or acute	lobes shallow, denticulate	lobes shallow and rounded to denticulate, or more developed, sometimes forming a 2-lipped calyx
Corolla colour	pale yellow-green with pale reddish-mauve or lilac lower lip particularly the median lobe	white, cream, greenish-yellow or yellow*	white, greenish-yellow or yellow, lower lip can be tinged pale pink
Corolla length (base of tube to tip of upper lip)	8–10 mm	4–6.5 mm	2.7–4.5 mm
Corolla external indumentum (distal portion of tube and limb)	numerous yellow glands; eglandular hairs restricted to lobe apices	numerous mixed yellow glands and short eglandular hairs	numerous (rarely few) mixed yellow glands and short eglandular hairs, or eglandular hairs restricted to limb
Drupe shape and size	globose to somewhat ellipsoid, 9–10.5 × 7.5–9 mm	globose, 5–8 mm in diameter	globose to globose-ellipsoid, 4.5–8.5 mm in diameter
Drupe surface and colour	smooth and without glands except for a few scattered towards apex; yellow	encrusted with very dense yellow glands throughout, sometimes sparser in apical portion; yellow or orange-yellow	smooth and without or with sparse and scattered glands; buff-brown
Distribution and elevation range	NE Mozambique 0–180 m	D.R. Congo, Tanzania, Malawi, Mozambique, Zambia, Zimbabwe (10–)250–1800 m	Kenya, Tanzania 0–1700 m

boa da Praia. With an ongoing decline in extent and quality of habitat, *Vitex franceseana* is assessed as Endangered - EN B1ab(iii)+2ab(iii).

Etymology – The species epithet honours Frances Chase (née Crawford), currently Curator of the National Herbarium of Namibia (WIND) at the National Botanical Research Institute in Windhoek. Frances was formerly a member of the Drylands: Africa team at RBG Kew during which time she participated in the botanical expeditions in Cabo Delgado Province and made many important collections including one of the paratypes of this species.

Figure 8 – Distribution map for *Vitex franceseana*.

Notes – This species belongs within *Vitex* subg. *Vitex* sect. *Vitex* (previously named sect. *Terminales* Briq.) due to the combination of a drupaceous fruit and terminal inflorescence (Pieper 1928; Sales 2005). It has previously been confused with *V. buchananii*, which is widespread in drier forest types and moist woodland in E and SE tropical Africa, mainly away from the coastal lowlands (Verdcourt 1992; Sales 2001, 2005). These species share leaves with (usually) 5 leaflets, a terminal inflorescence with the flowers arranged in a racemoid thyrse along each inflorescence axis, small pale flowers and small globose to ellipsoid yellow drupes with a thin papery coating. However, they are easily separated by the characters listed in the diagnosis and in table 3; the non-branched racemoid thyrse, larger flowers and sparsity of glands on the drupes are particularly diagnostic for *V. franceseana*. A further species in sect. *Vitex*, *V. strickeri* Vatke & Hildebr. from lowland Kenya and Tanzania, shares with *V. franceseana* a similar inflorescence form and fruits that lack or have only sparse glands on the papery coating. However, *V. strickeri* is easily separated from *V. franceseana* by having leaves with only 3 leaflets and in having considerably small-

er flowers and buff-brown coloured drupes (Verdcourt 1992); *V. strickeri* is also included within table 3.

Burrows et al. (2018a) included this species within their account of *Vitex buchananii*; the top-left (flowering) and bottom (fruiting) photographs on p. 860 of that work are referable to *V. franceseana*.

4. *Crossopetalum* (Celastraceae)

Crossopetalum P.Browne is a genus of 36 species, mainly represented in the New World tropics but with three species recently reported in tropical Africa (Darbyshire et al. 2016). *Crossopetalum mossambicense* I.Darbysh. was described from near Palma in Cabo Delgado, where it was thought to be endemic. However, a brief stint of fieldwork in January 2020 in the fragments of remaining coastal forest and thicket of Mtwara Region revealed several notable records including the first observation in Tanzania of *Crossopetalum mossambicense* I.Darbysh. (I. Darbyshire, pers. obs.). This new Tanzanian record is documented below.

Crossopetalum mossambicense I.Darbysh. (Darbyshire et al. 2016: 857).

Distribution – Previously known only from northeast Cabo Delgado Province in Mozambique; newly recorded here in Mtwara Region of Tanzania.

Additional specimen examined – **Tanzania**: Mtwara Region, Naliendele Forest Reserve, 10°25.3878′S, 40°8.1168′E, 151 m elev., 13 Jan. 2020, fl., *H.O. Suleiman et al. 5527* (DSM, K, NHT).

DISCUSSION

Mozambique is amongst the countries with the highest rates of new species discovery in continental Africa (Darbyshire et al. 2019a). The coastal dry forests and woodlands of the Rovuma Centre of Endemism are particularly productive in this respect. Of the 78 species newly described since 2010 that occur in Mozambique, 26 (⅓) are restricted to, or have a large portion of their range within, the Rovuma CoE (data compiled from IPNI 2020, Darbyshire et al. 2019a, and the current work). In table 4, we report on progress on description of the 36 new or undescribed taxa listed by Timberlake et al. (2011) from the Cabo Delgado portion of the Rovuma CoE. Of these, three had already been described prior to that publication, in 2009–2010. A further 11 have been described since and three more are in preparation, whilst six of these are now confirmed or suspected to be referable to existing species. The remaining undescribed species are either awaiting additional material (e.g., *Tarenna* sp. 53 of Degreef 2006), or are within taxonomically challenging groups that require wider revision before new taxa can be formalised (e.g., *Deinbollia* ?sp. nov.). Further field studies in Cabo Delgado are required to fully delimit these species and assess their conservation status, but this is largely impossible at present because of the security concerns in northeast Mozambique (see Introduction).

Table 4 also lists 20 additional species that have been described (nine) or proposed (11) from the Rovuma CoE in Mozambique post-2010 that were not included in the discoveries of Timberlake et al. (2011). Amongst these are three new woody Melastomataceae (Stone & Tenza 2017; Stone et al. 2017) several woody species that were described in the *Trees and Shrubs of Mozambique* (Burrows et al. 2018a), and the remarkable discovery of *Eriolaena rulkensii* Dorr in and around the vicinity of Pemba Bay, this being the first record of this striking, predominantly Asian genus in continental Africa (Dorr & Wurdack 2018).

New species discovery is likely to continue in the Rovuma CoE. In particular, the herbaceous flora is currently under-represented, in part due to the focus on woody plants during some of the recent expeditions and in part because the timing of those expeditions has not, to date, coincided with peak flowering and fruiting times for most herbs. Even the more thoroughly botanised Tanzanian portion of the Rovuma CoE continues to yield new discoveries, as exemplified by the recent discovery of *Crossopetalum mossambicense* noted in the current Results.

The Namacubi and Namparamnera forests near Quiterajo, the lower Rovuma River Escarpment, the environs of Palma, and parts of the Quirimbas National Park in Cabo Delgado Province are amongst the sites with the highest number of endemic and near-endemic taxa in Mozambique (Darbyshire et al. 2019a). As with *Casearia celastroides* and *Vitex franceseana* above, many of these Rovuma CoE endemics are threatened with extinction, largely due to the range of threats that their habitats face (see, for example, Burrows et al. 2018b; Darbyshire et al. 2019b). However, of these sites only the Quirimbas Park featured among the initial selection of Important Plant Areas in Mozambique in 2004 (Smith 2005). This demonstrates just how poorly known this region was in botanical terms prior to the plant surveys over the past two decades. With high numbers of endemic and threatened species, and critical coastal dry forest habitat now identified, all these sites are sure to feature in the new assessment of Tropical Important Plant Areas that is currently underway in Mozambique, to be completed in 2021 (Darbyshire et al. 2019a; https://www.kew.org/science/our-science/projects/tropical-important-plant-areas-mozambique). Through this initiative, we aim to promote the conservation and sustainable management of these critical sites for plant diversity and so safeguard their future. Without such targeted conservation efforts, the survival of these sites and their unique biodiversity looks highly uncertain.

ACKNOWLEDGEMENTS

We thank the Instituto de Investigação Agrária de Moçambique (IIAM) for organising the plant collecting permits and Pro-Natura International and the Muséum national d'Histoire naturelle in Paris for providing the funding and support for the expeditions on which many of the cited specimens were collected. The collectors of the cited specimens are also thanked. Fieldwork by the first author in southern Tanzania in January 2020, during which *Crossopetlaum mossambicense* was recorded, was supported by the Bentham-Moxon Trust (grant BMT4-2018). We thank Andrew Brown and Rosemary Wise for preparing the detailed line drawings.

Table 4 – Review of taxa from the Rovuma Centre of Endemism (CoE) in Cabo Delgado Province, Mozambique, proposed as new to science by Timberlake et al. (2011); and additional new taxa proposed or published from the Mozambican portion of the Rovuma CoE after Timberlake et al. (2011).

Family	Taxon name in Timberlake et al. (2011)	Now described?	Published or provisional name	Publication	Notes
Taxa treated in table 2 of Timberlake et al. (2011)					
Annonaceae	*Xylopia* sp. A of *Flora of Tropical East Africa*	Y	*Xylopia lukei* D.M.Johnson & Goyder	Johnson et al. (2017)	
Annonaceae	*Xylopia* sp. nov.	Y	*Xylopia tenuipetala* D.M.Johnson & Goyder	Johnson et al. (2017)	
Araceae	*Stylochaeton* sp., uncertain status	Y	*Stylochaeton tortispathus* Bogner & Haigh	Haigh & Boyce (2012)	
Asparagaceae	*Asparagus ?*sp. nov.	in prep.	*Asparagus* sp. nov.	Burrows & Burrows (in prep.)	currently under description by S.M. Burrows (BNRH); voucher: *J.E. Burrows & S.M. Burrows 10838*
Asteraceae	*Vernonia* ?sp. nov. 2	N			voucher: *F. Crawford FC622*; further material needed
Asteraceae	*Vernonia* ?sp. nov. aff. *inhacensis* G.V.Pope	N			vouchers: *F. Crawford FC364*; *D.J. Goyder et al. 6027*; further material needed
Celastraceae	*Pleurostylia* ?sp. nov. aff. *serrulata* Loes.	Y	*Crossopetalum mossambicense* I.Darbysh.	Darbyshire et al. (2016)	
Convolvulaceae	*Ipomoea* ?sp. nov.	Y	*Convolvulus goyderi* J.R.I.Wood	this publication	
Euphorbiaceae	*Euphorbia* ?sp. nov. aff. *ambroseae* L.C.Leach	N			close to *E. ambroseae* var. *spinosa* L.C.Leach but possibly distinct; vouchers: *D.J. Goyder et al. 5071*; *D.J. Goyder & Q. Luke 6141*
Fabaceae	*Acacia latispina* J.E. & S.M. Burrows	Y	*Acacia latispina* J.E.Burrows & S.M.Burrows	Burrows & Burrows (2009)	already published prior to Timberlake et al. (2011); treated by some authors as *Vachellia latispina* (J.E.Burrows & S.M.Burrows) Kyal. & Boatwr.
Fabaceae	*Baphia* ?sp. nov.	see note			mis-identification of *Ellipanthus madagascariensis* (G.Schellenb.) Capuron ex Keraudren (Connaraceae)
Fabaceae	*Erythrina ?*sp. nov.	N			vouchers: *G.P. Clarke 140*; *F. Crawford FC723*; fertile material needed
Lamiaceae	*Vitex* ?sp. nov. aff. *buchananii* Gürke	Y	*Vitex franceseana* I.Darbysh. & Goyder	this publication	
Lamiaceae	*Vitex* cf. *mossambicensis* Gürke	see note	*Vitex carvalhoi* Gürke	Burrows et al. (2018a)	species resurrected by Burrows et al. (2018a); previously treated as a synonym of *V. mossambicense* Gürke (e.g., Sales 2001, 2005)
Malvaceae	*Cola* sp. nov. 1 aff. *clavata* Mast.	see note			both of the listed species of *Cola* are sterile; one or both may refer to *C. discoglypremnophylla* Brenan & A.P.D.Jones but fertile material is required for confirmation (M. Cheek, pers. comm.).
Malvaceae	*Cola* ?sp. nov. 2 aff. *clavata* Mast.	see note			see note above

Table 4 (continued) – Review of taxa from the Rovuma Centre of Endemism (CoE) in Cabo Delgado Province, Mozambique, proposed as new to science by Timberlake et al. (2011); and additional new taxa proposed or published from the Mozambican portion of the Rovuma CoE after Timberlake et al. (2011).

Family	Taxon name in Timberlake et al. (2011)	Now described?	Published or provisional name	Publication	Notes
Taxa treated in table 2 of Timberlake et al. (2011)					
Melastomataceae	*Warneckea* sp. nov.	Y	*Warneckea cordiformis* R.D.Stone	Stone (2013)	
Meliaceae	*Trichilia* ?sp. nov.	N			voucher: *Q. Luke 13748*; taxon requires further study
Ochnaceae	*Ochna* ?sp. nov.	Y	*Ochna dolicharthros* F.M.Crawford & I.Darbysh.	Crawford & Darbyshire (2015)	
Rubiaceae	?*Chassalia* cf. *umbraticola* Vatke	Y	*Chassalia colorata* J.E.Burrows	Burrows et al. (2018a)	also now known from Tanzania (O. Lachenaud, pers. comm.; I. Darbyshire, pers. obs.)
Rubiaceae	*Didymosalpinx callianthus* J.E. & S.M.Burrows	Y	*Didymosalpinx callianthus* J.E.Burrows & S.M.Burrows	Burrows & Burrows (2010)	already published prior to Timberlake et al. (2011)
Rubiaceae	*Oxyanthus biflorus* J.E. & S.M.Burrows	Y	*Oxyanthus biflorus* J.E.Burrows & S.M.Burrows	Burrows & Burrows (2010)	already published prior to Timberlake et al. (2011)
Rubiaceae	*Oxyanthus* sp. A of *Flora Zambesiaca*	Y	*Oxyanthus strigosus* Bridson & J.E.Burrows	Burrows et al. (2018a)	
Rubiaceae	*Polysphaeria* ?sp. nov.	see note			treated as *Polysphaeria multiflora* Hiern subsp. A in Darbyshire et al. (2019c)
Rubiaceae	*Psilanthus* sp. nov., cf. sp. A of *Flora of Tropical East Africa*	in prep.	*Coffea* sp. nov.		currently under description as *Coffea* sp. nov. by A.P. Davis (K); voucher: *T. Müller 4093* (missing at K and LMA)
Rubiaceae	*Pyrostria* ?sp. nov. = *Luke 9724*	N			voucher: *Q. Luke 13740*; fertile material needed
Rubiaceae	*Pyrostria* sp. B of *Flora Zambesiaca*	see note			misidentification; the specimen in question (*F. Crawford FC698*) does not match sp. B of *Flora Zambesiaca*; it is closer to *P. bibracteata* (Baker) Cavaco but possibly distinct
Rubiaceae	*Pyrostria* sp. D of *Flora of Tropical East Africa*	in prep.	*Pyrostria* sp. nov.		currently under description as part of a revision of continental African *Pyrostria* by K. Matheka (EA) et al.; vouchers: *G.P. Clarke 122*; *D.J. Goyder et al. 6033*; *Q. Luke 13761*; *Q. Luke et al. 10148*; *T. Müller 4160*; *J.R. Timberlake et al. 5651*
Rubiaceae	*Rytigynia* cf. *umbellulata* (Hiern) Robyns = *de Koning et al. 9759* of *Flora Zambesiaca*	N			treated as *Rytigynia* sp. M by Burrows et al. (2018a); voucher: *J.E. & S.M. Burrows 10864*; taxon requires further study; see also note on *J. de Koning et al. 9759* in Bridson (1998: 287).
Rubiaceae	*Tarenna* sp. 53 of Degreef 2006	N			listed as *Tarenna* sp. 53 in Burrows et al. (2018a); flowering material is needed for description; voucher: *Q. Luke 13883*; see also Degreef (2006)

Table 4 (continued) – Review of taxa from the Rovuma Centre of Endemism (CoE) in Cabo Delgado Province, Mozambique, proposed as new to science by Timberlake et al. (2011); and additional new taxa proposed or published from the Mozambican portion of the Rovuma CoE after Timberlake et al. (2011).

Family	Taxon name in Timberlake et al. (2011)	Now described?	Published or provisional name	Publication	Notes
Taxa treated in Table 2 of Timberlake et al. (2011)					
Rubiaceae	*Tricalysia* sp. A of *Flora Zambesiaca*	N			listed as *Empogona* sp. A in Burrows et al. (2018a) but without a distribution point in Cabo Delgado; vouchers: *G.P. Clarke 131*; *F. Crawford FC269* & *FC673*; *Q. Luke 13819*
Rubiaceae	*Tricalysia* sp. B of *Flora Zambesiaca*	N			listed as *Empogona* sp. B in Burrows et al. (2018a) with a note that it is closely allied to *E. ngalaensis* (Robbr.) Tosh & Robbr. from Malawi and Tanzania, further research is needed; vouchers: *J.E. Burrows & S.M. Burrows 10812*; *H. Matimele 8*
Rutaceae	*Vepris* sp. nov.	N			flowering material is needed for clarification of this species; voucher: *J.E. Burrows & S.M. Burrows 10799*
Rutaceae	*Zanthoxylum lepreurii* Guill. & Perr., subsp. nov.?	see note			probably not distinct from *Z. lepreurii* s. str.
Salicaceae	*Casearia* ?sp. nov.	Y	*Casearia celastroides* I.Darbysh. & J.E.Burrows	this publication	
Sapindaceae	*Deinbolllia* ?sp. nov.	N			treated as *Deinbollia* sp. A in Burrows et al. (2018a), *Deinbollia* is in need of revision in Africa; vouchers: *F. Crawford FC283* & *FC665*; *Q. Luke et al. 10131*; *T. Müller 4089* & *4152*
Additional taxa described or proposed since Timberlake et al. (2011)					
Annonaceae	N/A	Y	*Uvaria rovumae* Deroin & Lötter	Burrows et al. (2018a)	
Combretaceae	N/A	N	*Combretum* sp. A	Burrows et al. (2018a)	an additional undescribed species from near the mouth of the Rovuma River
Fabaceae	N/A	Y	*Acacia quiterajoensis* Timberlake & Lötter	Burrows et al. (2018a)	
Fabaceae	N/A	N	*Dalbergia* sp. A	Burrows et al. (2018a)	an additional undescribed species from the Rovuma valley
Fabaceae	N/A	N	*Dalbergia* sp. B	Burrows et al. (2018a)	previously treated as a form of *D. armata* E.Mey. from Maputaland but Burrows et al. (2018a) note clear differences
Malvaceae	N/A	Y	*Eriolaena rulkensii* Dorr	Dorr & Wurdack (2018)	treated as *Helmiopsiella* sp. A in Burrows et al. (2018a)
Malvaceae	N/A	N	*Grewia* sp. A	Burrows et al. (2018a)	an undescribed species also known from southern Tanzania
Melastomataceae	N/A	Y	*Memecylon aenigmaticum* R.D.Stone	Stone et al. (2017)	
Melastomataceae	N/A	Y	*Memecylon rovumense* R.D.Stone & I.G.Mona	Stone et al. (2017)	

Table 4 (continued) – Review of taxa from the Rovuma Centre of Endemism (CoE) in Cabo Delgado Province, Mozambique, proposed as new to science by Timberlake et al. (2011); and additional new taxa proposed or published from the Mozambican portion of the Rovuma CoE after Timberlake et al. (2011).

Family	Taxon name in Timberlake et al. (2011)	Now described?	Published or provisional name	Publication	Notes
Additional taxa described or proposed since Timberlake et al. (2011)					
Melastomataceae	N/A	Y	*Warneckea albiflora* R.D.Stone & N.P.Tenza	Stone & Tenza (2017)	
Myrtaceae	N/A	Y	*Syzygium niassense* Byng & J.E.Burrows	Byng & Burrows (2018)	treated as *Syzygium* sp. A in Burrows et al. (2018a); this species is not restricted to the Rovuma CoE, it is widespread in northern Mozambique.
Rubiaceae	N/A	N	*Ixora* sp. A	Burrows et al. (2018a)	an additional undescribed species from the Palma area
Rubiaceae	N/A	N	*Lagynias* (=*Vangueria*) sp. A	Burrows et al. (2018a)	an undescribed species known only from near Nangade
Rubiaceae	N/A	Y	*Pavetta dianeae* J.E.Burrows	Burrows et al. (2018a)	treated as both *Pavetta* sp. D & *P.* sp. F of Flora Zambesiaca (Bridson & Verdcourt 2003)
Rubiaceae	N/A	N	*Psychotria* sp. C	Burrows et al. (2018a)	known with certainty only from Palma district but may also occur in Niassa Game Reserve
Rubiaceae	N/A	N	*Psydrax* sp. A	Burrows et al. (2018a)	known only from Vamizi Island
Rubiaceae	N/A	in prep.	*Pyrostria* sp. nov.		currently under description as part of a revision of continental African *Pyrostria* by K. Matheka (EA) et al.; vouchers: *Q. Luke 13778*; *H. Matimele 149*; *J.R. Timberlake et al. 5610 & 5776*
Rubiaceae	N/A	N	*Tricalysia* sp. E	Burrows et al. (2018a)	treated under *T. schliebenii* Robbr. by Bridson & Verdcourt (2003) but Burrows et al. (2018a) note that two taxa are separable in Cabo Delgado
Rubiaceae	N/A	Y	*Vangueria domatiosa* J.E.Burrows	Burrows et al. (2018a)	
Rutaceae	N/A	N	*Zanthoxylum* sp. A	Burrows et al. (2018a)	a potential new species, recorded as relatively common in the coastal thicket of Cabo Delgado by Burrows et al. (2018a)

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