

# Exploration into the hidden world of Mozambique's sky island forests: new discoveries of reptiles and amphibians

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## Abstract

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## Key Words

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We carried out a survey of reptiles and amphibians within Afromontane forest and woodland slopes of three inselbergs in northern Mozambique (Mount Mabu, Mount Namuli, and Mount Ribáuè). A total of 56 species (22 amphibians and 34 reptiles) were recorded during the current survey. Our findings substantially increase the number of herpetofaunal species recorded from these mountains (Mount Ribáuè 59%, Mount Mabu 37%, and Mount Namuli 11% of the total species), including one new country record and several putative new species. An updated checklist of the herpetofauna of these mountains is presented.

## Introduction

Northern Mozambique (north of the Zambezi River and south of the Rovuma River) is biologically one of the most poorly known areas in Africa (see Tolley et al. 2016). This is a consequence of the limited infrastructure in the region as well as the protracted civil war (1977–1992), which made travel and exploration problematic. In recent years, several biodiversity surveys have been conducted in northern Mozambique (e.g. Branch et al. 2005a & b, Timberlake et al. 2007, Bayliss 2008, Spottiswoode et al. 2008, Timberlake et al. 2009 & 2012, Bayliss et al. 2010,

Pascal 2011, Portik et al. 2013a, Bayliss et al. 2014, Ohler and Frétey 2014, Farooq and Conradie 2015, Farooq et al. 2015). These expeditions resulted in the discovery of several new species of reptiles (Branch and Bayliss 2009, Branch and Tolley 2010, Portik et al. 2013b, Branch et al. 2014), crustaceans (Daniels and Bayliss 2012, Daniels et al. 2014), butterflies (Congdon et al. 2010, Congdon and Bayliss 2012), and bats (Monadjem et al. 2010, Taylor et al. 2012, Taylor et al. 2015).

The topography of northern Mozambique is characterised by isolated mountains ('inselbergs'), mainly in the west closer to Mt. Mulanje in Malawi, where the highest

peaks are found, but also by chains of smaller inselbergs extending eastwards towards the coast. These montane isolates form an important link between the better studied Eastern Arc Mountains (EAM) and the East African Coastal Forest (EACF). White (1983) classified the vegetation from Mts. Chipirone, Mabu, and Namuli as being associated with the East African Coastal Mosaic (EACM; type 16b). However, Timberlake et al. (2007, 2009, 2012) disregard White's classification and describe the vegetation from these mountains (especially at above 1600 m altitude) as more similar to the moist montane forests from the EAM. The presence of species from both, EAM and EACM, in Mts. Namuli (e.g. Timberlake et al. 2009) and Mabu (e.g. Timberlake et al. 2012) suggests that these mountains form a mosaic of biodiversity from two different ecoregions.

Findings from previous surveys suggest the Mozambican montane sky island forests contain high levels of biodiversity, particularly in terms of single site endemics (e.g. Ryan et al. 1999, Congdon et al. 2010, Portik et al. 2013b, Branch et al. 2014). In particular, high diversity is predicted in less vagile groups because these forests are isolated, and forest species are likely to have speciated *in situ* resulting in a suite of narrow endemics per mountain (Congdon et al. 2010, Branch et al. 2014, Bittencourt-Silva et al. 2016). The biological diversity of these poorly sampled montane forests is expected to be underestimated. This is particularly worrying as these, as yet undescribed, narrow endemics are at risk of extinction because of the substantial land use changes in the region. It is therefore critical that these poorly sampled forests receive attention towards documenting their biological diversity before they disappear.

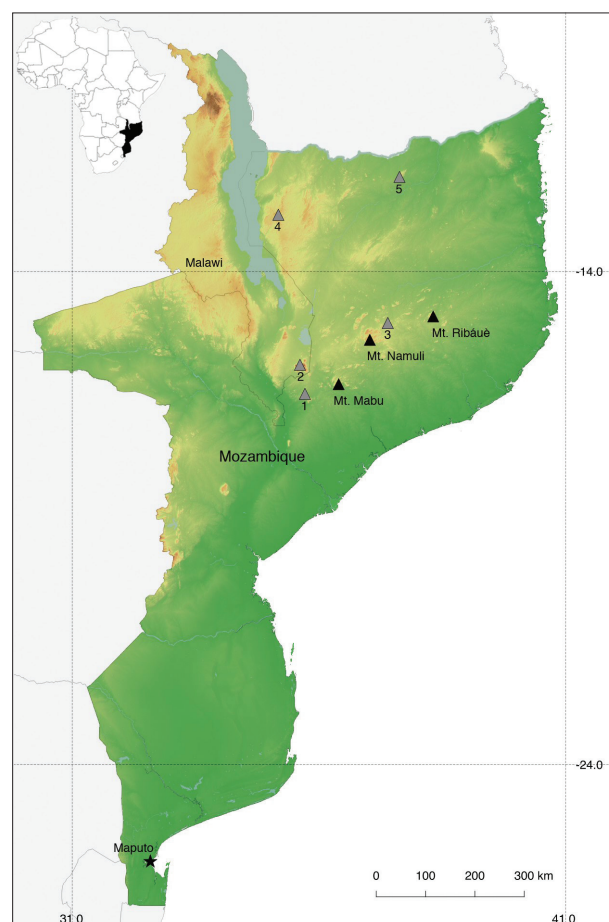
Through targeted fieldwork, we explored three poorly known montane isolates (Mts. Mabu, Namuli, and Ribáuè), to document their herpetofaunal diversity. We conducted intensive surveys on these mountains across several habitats and over an altitudinal gradient searching for amphibians and reptiles. Although some herpetological surveys have been done recently on Mt. Namuli (Timberlake et al. 2009, Portik et al. 2013a, Farooq and Conradie 2015) and Mt. Mabu (Timberlake et al. 2012, Bayliss et al. 2014), Mt. Ribáuè has not been explored for its herpetofauna since 1964 (Blake 1965). The Ribáuè massif consists of two adjacent inselbergs covered with dry miombo and separated by a narrow valley (ca. 3km) with miombo woodland. We only surveyed the eastern part of the massif known as Mt. M'pàluwé. We suspect that Blake (1965, p.37 & 38) previously surveyed the M'pàluwé section of Mt. Ribáuè and at that time only found seven species from the lower slopes and the forest was not visited. Poynton (1966) later reviewed the amphibians collected by Blake (1965) and recorded a total of ten amphibian species from M'pàluwé section of Mt. Ribáuè. Herein we present an annotated checklist of reptiles and amphibians from Mts. Mabu, Namuli, and M'pàluwé. Additionally, we provide a summary of all herpetological surveys carried out to date, on these sky island forests of northern Mozambique.

## Material and methods

### Study area

The study area comprises of two mountain blocks in the Zambezia province and one in the Nampula province in northern Mozambique (Fig. 1, Table 1). The landscape in this part of the country is scattered with inselbergs surrounded by miombo woodland forest. Some of these mountains are covered with dense moist forest (e.g. Mt. Chipirone and Mt. Mabu) whereas others are just exposed granitic rocks with isolated shrubs.

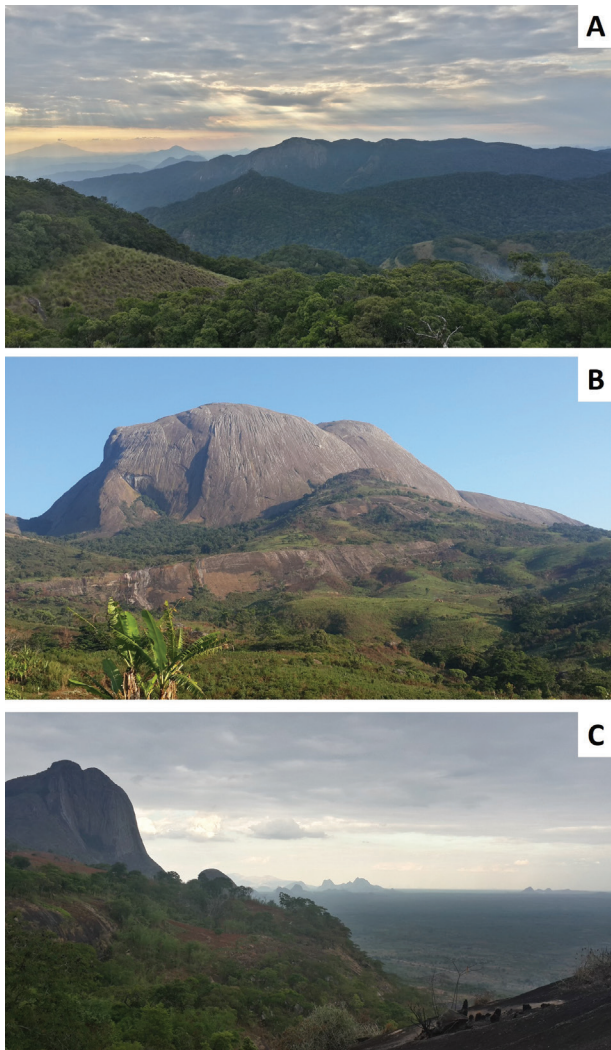
For both Mt. Mabu (Fig. 2A) and Mt. Namuli (Fig. 2B), the vegetation type at low and mid-elevation, i.e. below 800 m above sea level (asl), is dominated by cultivated areas and secondary forest, which gradually changes to denser and moister forests with the increase of elevation (>1000 m asl). On Mt. M'pàluwé (Fig. 2C), cultivated areas (called 'shamba' or 'machamba' locally in East Africa) dominate the lower part of the mountain, and at mid and high elevation the forest is drier – possibly due to progressive deforestation in the area as a result of the



**Figure 1.** Map of localities surveyed in northern Mozambique. Black triangles indicate the mountains sampled during this study and grey triangles show other areas previously sampled in northern Mozambique and southern Malawi. Numbers indicate the following localities: (1) Mt. Chipirone, (2) Mt. Mulanje, (3) Mt. Inago, (4) Serra Jeci, (5) Serra Mecula.

**Table 1.** Localities surveyed in northern Mozambique.

Mountain	Locality	Province	Latitude	Longitude	Elevation (m)
Mabu	River Camp	Zambezia	-16.281528	36.443778	429
	Forest Base Camp	Zambezia	-16.286222	36.400056	987
	Summit Camp	Zambezia	-16.296817	36.392433	1609
Namuli	Pese dome	Zambezia	-15.386420	37.033520	1892
	Ukalini dome	Zambezia	-15.369367	37.061417	1616
	Muretha Plateau	Zambezia	-15.387194	37.044611	1892
	Satellite Camp	Zambezia	-15.397972	37.019778	1633
M'pàluwé	Oasis Water Camp	Nampula	-14.915220	38.316450	588
	Miombo area	Nampula	-14.902583	38.323306	714
	Summit area	Nampula	-14.889306	38.316139	1366

**Figure 2.** Study area, northern Mozambique sky islands. **A** – Mount Mabu, **B** – Mount Namuli, **C** – Mount M'pàluwé to the left.

internal fragmentation of the forest due to slash and burn clearing. The summits are characterised by bare granitic rocks with isolated patches of montane heath vegetation. Temporary streams are found in all three mountains but no permanent stream was found in Mt. M'pàluwé.

In northern Mozambique, the average temperature in the warmest months (December–February) varies between 20–25 °C, and in the cooler months between 15–20 °C.

The wet season lasts from November–April when the average rainfall per month is 150–300 mm (McSweeney et al. 2010a & b). During our survey we experienced a total of 36 hours of non-stop heavy rain at Mt. Mabu from 17 to 18 November 2014. The remaining time of the survey was dry and warm with no further rain.

#### Data collection

We conducted herpetofaunal surveys in the study area, between 15 November and 4 December 2014, using a combination of visual encounter survey and standard drift fences with pitfalls (each trap array consisted of 3 × 10 m long and 50 cm high fences positioned in a Y-shape with four pitfall traps at the ends and middle, and two one-way funnels per fence – only employed at Mts. Mabu and Namuli). Diurnal searches were done by actively looking for specific microhabitats including underneath rocks and logs. Nocturnal surveys were carried out with the use of headlamps or flashlights. Specimens were captured by hand, hook stick, noosing or net (e.g. tadpoles), and euthanized, according to ethically approved methods (Conroy et al. 2009), after which they were fixed in 4% buffered formalin for 48 hours and transferred to 70% alcohol for long-term storage in the herpetological collections of the Port Elizabeth Museum (PEM), South Africa, Museo delle Scienze (MUSE), Italy, and Natural History Museum of Maputo, Mozambique. Prior to formalin fixing DNA samples were collected (thigh muscle or liver), and stored in 99% ethanol for future genetic analysis.

Specimens were identified using field guides (Broadley 1990, Branch 1998, Channing 2001, Marais 2004, Du Preez and Carruthers 2009) and morphological comparison to material in the Port Elizabeth Museum. A number of specimens collected were difficult to assign to currently recognised species. In some species, e.g. *Arthroleptis* spp., *Lygodactylus* spp., specimens presented a variety of characters shared with known species and the present assignment is provisional pending ongoing studies. In some cases, further genetic and morphometric analyses will be carried out to confirm species identifications and will be presented elsewhere. We follow Frost (2016) for taxonomy of amphibians, Uetz and Hošek (2016) for reptiles, and were further updated where appropriate. In



addition to our survey findings the following literature was consulted to compile historical records for the study area: Poynton (1996), Branch and Ryan (2001), Timberlake et al. (2009, 2012), Portik et al. (2013a), and Farooq and Conradie (2015). To compile species accounts, specimens were measured for body size: snout-urostyle length (SUL) for anurans and snout-vent length (SVL) and tail length (TL) for reptiles. Measurements were taken using a digital calliper to the nearest 0.1 mm.

## Results and discussion

A total of 27 amphibian species representing 10 families and 14 genera (Table 2), and 45 reptile species (19 snakes, 25 lizards, one tortoise) representing 12 families and 31 genera (Table 3) have been recorded from the three mountains. The current survey contributed numerous additional amphibian and reptile species to the checklist of northern Mozambique inselbergs (13 for Mt. Mabu, five for Mt. Namuli and 19 for Mt. M'páluwé).

During the current survey we recorded four species of reptiles endemic to Mozambique (*Nadzikambia baylissi*, *Rhampholeon maspictus*, *Rhampholeon tilburyi*, and *Lygodactylus regulus*), and four putative new species of *Nothophryne* (Bittencourt-Silva et al. 2016). We also documented one new country record, the snake *Duberria shirana* (see account below). *Acanthocercus atricollis* was omitted from the final checklist of Mt. Namuli. It was erroneously reported by Portik et al. (2013a) to be recorded from Mt. Namuli, although they only listed specimens collected from Serra Jeci, more than 300 km to the northwest of Mt. Namuli. This record was followed in error by Farooq and Conradie (2015). Portik et al. (2013a) also reported a few species from the low-lying Gurué village and surroundings (*Breviceps mossambicus*, *Sclerophrys gutturalis*, *S. pusilla*, *Lygodactylus capensis*, *Naja melanoleuca*, and *Boaedon capensis*) and included them in their checklist for the inselbergs. As the focus of this study is to record the herpetological diversity of the sky island forests we omitted the above records, including *Agama mossambica* (current study – see species account).

**Table 2.** Updated species lists for amphibians based on historical records as well as data from the current surveys. Parentheses in the totals given denote the number of new species recorded during the current surveys. Literature records are indicated with L and new records with N.

ORDER/Family	Species	Mount Mabu	Mount Namuli	Mount M'páluwé
<b>ANURA</b>				
<b>Arthroleptidae</b>	<i>Arthroleptis francei</i>	L,N	L,N	
	<i>Arthroleptis stenodactylus</i>	L,N	N	L,N
	<i>Arthroleptis xenodactyloides</i>	L,N	L	L,N
	<i>Leptopelis broadleyi</i>			L,N
	<i>Leptopelis flavomaculatus</i>	L,N	N	
<b>Brevicipitidae</b>	<i>Breviceps mossambicus</i>		L,N	N
<b>Bufonidae</b>	<i>Sclerophrys gutturalis</i>		L,N	
	<i>Sclerophrys pusilla</i>	L,N	L	N
<b>Hyperoliidae</b>	<i>Afraxalus brachycnemis</i>	L,N	L	N
	<i>Afraxalus fornasini</i>	N		
	<i>Hyperolius nasutus</i> complex		L	
	<i>Hyperolius marmoratus albofasciatus</i>		L,N	
	<i>Hyperolius spinigularis</i>		L	
<b>Phrynobatrachidae</b>	<i>Hyperolius substriatus</i>	L,N	L,N	
	<i>Phrynobatrachus natalensis</i>			L
	<i>Phrynobatrachus acridoides</i>			L,N
<b>Pipidae</b>	<i>Phrynobatrachus mababiensis</i>		L	L,N
	<i>Xenopus laevis</i>	N		
<b>Ptychadenidae</b>	<i>Ptychadena anchietae</i>			L,N
	<i>Ptychadena taenioscelis</i>			N
	<i>Ptychadena guibei</i>			L
	<i>Ptychadena cf. porossisima</i>		L,N	
<b>Pyxicephalidae</b>	<i>Amietia queckettii</i>	N	L,N	L,N
	<i>Nothophryne cf. broadleyi</i>		L,N	L,N
	<i>Strongylopus fuelleborni</i>	N	L,N	
<b>Rhacophoridae</b>	<i>Chiromantis xerampelina</i>			L
<b>GYMNOPHIONA</b>				
<b>Scolecophoridae</b>	<i>Scolecophorus kirkii</i>	N	L	
		<b>12 (5)</b>	<b>18 (2)</b>	<b>15 (4)</b>

**Table 3.** Updated species lists for reptiles based on historical records as well as data from the current surveys. Parentheses in the totals given denote the number of new species recorded during the current surveys. Literature records are indicated with L and new records with N.

ORDER/Family	Species	Mount Mabou	Mount Namuli	Mount M'pàluwé
<b>CHELONIA</b>				
<b>Testudinidae</b>	<i>Kinixys belliana</i>		L	
<b>SQUAMATA</b>				
<b>Agamidae</b>	<i>Agama kirkii</i>		L,N	N
	<i>Agama mossambica</i>	L	L	
<b>Chamaeleonidae</b>	<i>Chamaeleo dilepis</i>		L,N	
	<i>Nadzikambia baylissi</i>	L,N	N	
	<i>Rhampholeon tilburyi</i>		L,N	
	<i>Rhampholeon maspictus</i>	L,N		
	<i>Rhampholeon</i> sp.			N
	<i>Trioceros melleri</i>	L		
<b>Cordylidae</b>	<i>Platysaurus maculatus</i>			L,N
<b>Gekkonidae</b>	<i>Chondrodactylus turneri</i>			N
	<i>Hemidactylus mabouia</i>	N	L	
	<i>Hemidactylus platycephalus</i>	L		N
	<i>Lygodactylus grotei</i>	N		
	<i>Lygodactylus regulus</i>		L,N	
	<i>Lygodactylus</i> cf. <i>rex</i>	N		
	<i>Lygodactylus</i> sp.			N
<b>Lacertidae</b>	<i>Holaspis laevis</i>	N		
<b>Scincidae</b>	<i>Melanoseps</i> cf. <i>ater</i>	L,N	L	
	<i>Mochlus afer</i>	L		
	<i>Panaspis wahlbergi</i>		L	
	<i>Trachylepis boulengeri</i>			N
	<i>Trachylepis maculilabris</i>	N		
	<i>Trachylepis margaritifera</i>	L	L	N
	<i>Trachylepis striata</i>		L,N	
	<i>Trachylepis varia</i>	L,N	L,N	N
<b>Colubridae</b>	<i>Dispholidus typus</i>		N	L,N
	<i>Dipsadoboa</i> cf. <i>shrevei shrevei</i>	L,N		N
	<i>Philothamnus angolensis</i>		L,N	
	<i>Philothamnus</i> cf. <i>carinatus</i>	L		
	<i>Philothamnus hoplogaster</i>	N		N
	<i>Thelotornis mossambicanus</i>	N	L	N
<b>Elapidae</b>	<i>Naja melanoleuca</i>	L,N	L	
	<i>Naja mossambica</i>			N
<b>Lamprophiidae</b>	<i>Boaedon capensis</i>		L	N
	<i>Duberria shirana</i>		N	
	<i>Gonionotophis capensis</i>	N		
	<i>Lycophidion acutirostre</i>		L	
	<i>Psammophis orientalis</i>			N
	<i>Psammophylax variabilis</i>		L,N	
<b>Natricidae</b>	<i>Natriciteres sylvatica</i>	L	L	
<b>Viperidae</b>	<i>Atheris mabuensis</i>	L	L	
	<i>Bitis arietans</i>		L	N
	<i>Bitis gabonica</i>	L	L	
	<i>Causus defilippi</i>			L
		<b>23 (8)</b>	<b>27 (3)</b>	<b>17 (15)</b>

## Selected species accounts

### Amphibia

#### Anura

#### Arthroleptidae

##### *Arthroleptis francei* Loveridge, 1953

**Material.** Mt. Mabu (PEM A11180, male, 25.5 mm SUL; PEM A11181, male, 21.4 mm SUL; PEM A11182, male, 22.9 mm SUL; PEM A11183, male, 19.0 mm SUL; PEM A11192, female, 34.5 mm SUL; PEM A11193, female, 24.6 mm SUL; PEM A11194, male, 20.6 mm SUL; PEM A11195, juvenile, 12.1 mm SUL; PEM A11196, juvenile, 14.7 mm SUL; PEM A11197, juvenile, 17.3 mm SUL; PEM A11198, male, 23.16 mm SUL; PEM A11199, female, 34.7 mm SUL; PEM A11200, male, 24.7 mm SUL; PEM A11201, female, 21.5 mm SUL; PEM A11202, male, 21.4 mm SUL; PEM A11204, male, 25.7 mm SUL; PEM A11205, juvenile, 18.5 mm SUL; PEM A11206, female, 23.2 mm SUL; PEM A11207, male, 23.6 mm SUL; PEM A11208, male, 22.8 mm SUL; PEM A11209, female, 31.3 mm SUL; PEM A11268, female, 31.0 mm SUL; PEM A11292, female, 36.2 mm SUL; PEM A11294, juvenile, 15.1 mm SUL; PEM A11403, female, 31.8 mm SUL), Mt. Namuli (PEM A11296, juvenile, 13.0 mm SUL; PEM A11297, juvenile, 16.6 mm SUL; PEM A11298, female, 32.6 mm SUL; PEM A11299, male, 20.4 mm SUL; PEM A11303, female, 32.0 mm SUL; PEM A11304, male, 24.8 mm SUL; PEM A11305, juvenile, 17.4 mm SUL; PEM A11306, juvenile, 17.8 mm SUL; PEM A11307, female, 35.4 mm SUL; PEM A11308, juvenile, 18.4 mm SUL; PEM A11341, juvenile, 15.0 mm SUL; PEM A11398, male, 24.0 mm SUL; PEM A11404, female, 35.5 mm SUL). **Comments:** Specimens were collected from moist leaf litter in closed-canopy forest (Fig. 3A). Some individuals were found sitting on low vegetation (<1 m). All mature males exhibit extended third finger and dark throat.

##### *Arthroleptis stenodactylus* Pfeffer, 1893

**Material.** Mt. Mabu (PEM A11203, male, 25.5 mm SUL; PEM A11249, male, 31.6 mm SUL; PEM A11266, female, 30.4 mm SUL; PEM A11267, male, 23.4 mm SUL; PEM A11277, male, 22.1 mm SUL; PEM A11293, male, 23.0 mm SUL), Mt. M'pàluwé (PEM female, 26.1 mm SUL). **Comments:** Found in both dry transitional miombo woodland and montane forest (Fig. 3C). This species is very similar to *A. francei*, which seems to be more abundant in these forests. One feature that helps to separate these two species is the hind limbs, being shorter in *A. stenodactylus*.

##### *Arthroleptis xenodactyloides* Hewitt, 1933

**Material.** Mt. Mabu (PEM A11210, female, 16.3 mm SUL; PEM A11211, male, 16.1 mm SUL; PEM

A11212, male, 16.8 mm SUL; PEM A11213, female, 18.3 mm SUL; PEM A11214, male, 15.3 mm SUL; PEM A11215, male, 12.1 mm SUL; PEM A11216, female, 15.2 mm SUL; PEM A11217, male, 13.9 mm SUL; PEM A11218, male, 13.2 mm SUL; PEM A11219, male, 13.1 mm SUL; PEM A11220, male, 15.4 mm SUL; PEM A11221, female, 17.4 mm SUL; PEM A11222, female, 17.1 mm SUL; PEM A11223, male, 15.8 mm SUL; PEM A11224, male, 12.9 mm SUL; PEM A11225, male, 14.2 mm SUL; PEM A11226, male, 15.9 mm SUL; PEM A11227, male, 13.5 mm SUL; PEM A11228, male, 17.7 mm SUL; PEM A11229, female, 15.0 mm SUL; PEM A11230, female, 16.7 mm SUL; PEM A11231, female, 17.4 mm SUL; PEM A11232, female, 16.3 mm SUL; PEM A11233, female, 15.2 mm SUL; PEM A11234, female, 17.6 mm SUL; PEM A11269, male, 15.6 mm SUL; PEM A11270, female, 18.8 mm SUL; PEM A11271, female, 22.1 mm SUL; PEM A11272, female, 19.9 mm SUL; PEM A11273, male, 17.4 mm SUL; PEM A11274, male, 18.3 mm SUL; PEM A11275, female, 19.0 mm SUL; PEM A11276, female, 16.8 mm SUL; PEM A11278, female, 17.5 mm SUL; PEM A11279, female, 17.6 mm SUL; PEM A11280, male, 14.8 mm SUL; PEM A11295, male, 15.4 mm SUL; PEM A11401, male, 17.8 mm SUL; PEM A11402, female, 17.2 mm SUL), Mt. M'pàluwé (PEM A11377, male, 15.0 mm SUL; PEM A11378, male, 15.5 mm SUL; PEM A11379, female, 17.6 mm SUL; PEM A11380, female, 19.3 mm SUL; PEM A11386, female, 17.8 mm SUL; PEM A11387, female, 17.5 mm SUL; PEM A11388, female, 16.3 mm SUL; PEM A11389, male, 15.2 mm SUL). **Comments:** In Mt. Mabu it was common on the forest floor, and at Mt. M'pàluwé it was found in moist leaf litter at lower elevations (Fig. 3B). Mature males exhibit extended third finger and dark throat.

##### *Leptopelis broadleyi* Poynton, 1985

**Material.** Mt. M'pàluwé (PEM A11367, male, 30.9 mm SUL). **Comments:** Sub-adult male specimen was collected from mid-elevation slopes while calling from low vegetation. This species is part of the *L. argenteus* group. Some authors regard this as a valid species (Poynton and Broadley 1987, Schiøtz 1999, Channing and Howell 2006, Pickersgill 2007, Du Preez and Carruthers 2009, Mercurio 2011, Ohler and Frétey 2014), while Frost (2016) considers it as a junior synonym of *L. argenteus* based on similar calls. Herein we consider *L. broadleyi* as a valid species pending further investigation.

##### *Leptopelis flavomaculatus* (Günther, 1864)

**Material.** Mt. Mabu (PEM A11240, male, 50.3 mm SUL; PEM A11241, male, 38.1 mm SUL; PEM A11242, female, 72.0 mm SUL; PEM A11243, male, 48.1 mm

SUL; PEM A11244, male, 39.2 mm SUL; PEM A11245, female, 71.0 mm SUL; PEM A11246, female, 35.1 mm SUL; PEM A11247, male, 41.0 mm SUL; PEM A11290, male, 42.8 mm SUL), Mt. Namuli (PEM A11309, female, 65.2 mm SUL). **Comments:** Common along streams at both Mt. Mabu and Mt. Namuli. In most cases, the males of this species are much smaller and have a uniform lime-green dorsum with yellow spots. All the males have well developed pectoral glands. Females are much larger with dull brown dorsum with scattered green spots or patterns.

### Brevicipitidae

#### *Breviceps mossambicus* Peters, 1882

**Material.** Mt. Namuli (PEM A11310, male, 25.4 mm SUL), Mt. M'pàluwé (PEM A11362, male, 23.0 mm SUL). **Comments:** Both specimens are males, based on the presence of a very dark throat and small size. The specimen from Mt. M'pàluwé was collected at night in a shamba at mid-elevation (ca. 1000 m).

### Bufonidae

#### *Sclerophrys gutturalis* (Power, 1927)

**Material.** Mt. Namuli (PEM A11348, female, 68.8 mm SUL). **Comments:** One adult female collected from Muretha Plateau at night. No red infusions on the thighs or side of the body were observed, but the well-elevated parotid glands exclude it from being *S. pusilla*.

#### *Sclerophrys pusilla* (Mertens, 1937)

**Material.** Mt. Mabu (PEM A11260, male 64.6 mm SUL; PEM A11261, male 55.3 mm SUL; PEM A11262, male 63.1 mm SUL; PEM A11263, male 60.3 mm SUL; PEM A11264, male 54.8 mm SUL; PEM A11265, male 63.1 mm SUL), Mt. M'pàluwé (PEM A11364, male 63.1 mm SUL; PEM A11365, male, 53.2 mm SUL, PEM A11384, male 64.9 mm SUL). **Comments:** Specimens were found calling along low-elevation streams at dusk.

### Hyperoliidae

#### *Afrixalus brachynemis* (Boulenger, 1896)

**Material.** Mt. Mabu (PEM A11250, male, 19.5 mm SUL), Mt. M'pàluwé (PEM A11392, female, 317.8 mm SUL; PEM A11393, female, 21.2 mm SUL). **Comments:** Adult male was collected during the day sitting on a leaf in an open area at lower slopes of Mt. Mabu. Two females were collected sheltering in sugarcane fronds at the base of Mt. M'pàluwé. Species identification was based on the absence of dorsal patterning and transverse tibial bands (Pickersgill 2007). Others also reported this species to be present in northern Mozambique (Branch 2004, Portik et al. 2013a, Ohler and Frétey 2014).

#### *Afrixalus fornasinii* (Bianconi, 1849)

**Material.** Mt. Mabu (PEM A11251, female, 36.5 mm SUL; PEM A11252, female, 38.3 mm SUL; PEM A11253, female, 31.7 mm SUL). **Comments:** Three females were collected along a low-elevation forest stream. One female (PEM A11252) was gravid (collected 15 November 2014).

#### *Hyperolius marmoratus albofasciatus* (Hoffman, 1944)

**Material.** Mt. Namuli (PEM A11311, male, 27.8 mm SUL; PEM A11312, female, 26.5 mm SUL; PEM A11313, female, 33.6 mm SUL; PEM A11349, juvenile, 15.8 mm SUL; PEM A11350, juvenile, 18.8 mm SUL; PEM A11354, male, 30.6 mm SUL; PEM A11355, male, 33.7 mm SUL; PEM A11356, male, 34.2 mm SUL; PEM A11360, juvenile, 26.2 mm SUL). **Comments:** Found to be abundant on the grassland of the Muretha Plateau at Mt. Namuli. Males were found calling from very low vegetation close to water level. Adult males and females exhibit the same dorsal pattern indicating no sexual dichromatism. The *H. marmoratus* group consists of many regional colour patterns and this population conforms to that of *H. marmoratus albofasciatus* (Schiotz 1999). We believe that the two juvenile *H. marmoratus* reported from Mt. Namuli by Portik et al. (2013a) belongs to the same species group.

#### *Hyperolius substriatus* Ahl, 1931

**Material.** Mt. Mabu (PEM A11235, female, 27.7 mm SUL; PEM A11236, female, 30.4 mm SUL; PEM A11237, female, 28.0 mm SUL; PEM A11238, female, 27.3 mm SUL; PEM A11239, female, 29.0 mm SUL; PEM A11281, female, 29.7 mm SUL; PEM A11282, female, 29.6 mm SUL; PEM A11283, female, 23.4 mm SUL; PEM A11284, female, 35.3 mm SUL; PEM A11285, female, 22.5 mm SUL; PEM A11286, female, 22.1 mm SUL; PEM A11287, female, 29.1 mm SUL; PEM A11288, female, 27.2 mm SUL; PEM A11289, female, 26.9 mm SUL), Mt. Namuli (PEM A11314, female, 27.3 mm SUL; PEM A11315, female, 27.4 mm SUL; PEM A11316, female, 23.4 mm SUL; PEM A11317, female, 32.4 mm SUL; PEM A11318, female, 32.4 mm SUL; PEM A11361, female, 24.8 mm SUL). **Comments:** Found in abundance at low, mid (ca. 920 m asl) and high elevations along forested streams at both Mts. Mabu and Namuli. All material showed typical adult coloration, similar to that reported by Portik et al. (2013a) from Mt. Namuli.

### Phrynobatrachidae

#### *Phrynobatrachus acridoides* (Cope, 1867)

**Material.** Mt. M'pàluwé (PEM A11366, male, 26.6 mm SUL; PEM A1375, male, 26.4 mm SUL). **Comments:** Found moving near stagnant pools at a low-elevation



(544 m asl) streams. Species identification was based on extensive webbing and swollen toe tips. Poynton (1966) records both *P. natalensis* and *P. acridoides* from Mt. M'pàluwé area. We only found the latter.

### *Phrynobatrachus mababiensis* FitzSimons, 1932

**Material.** Mt. M'pàluwé (PEM A11381, male, 14.6 mm SUL; PEM A11382, male, 13.5 mm SUL; PEM A11383, male, 12.7 mm SUL; PEM A11390, male, 14.0 mm SUL; PEM A11391, male, 14.8 mm SUL; PEM A11394, female, 14.5 mm SUL). **Comments:** Specimens were found in dry leaf litter at low elevation, and two individuals were collected in the same microhabitat as *Nothophryne* cf. *broadleyi* (in water seepage over rocks).

### Pipidae

#### *Xenopus laevis* (Daudin, 1802)

**Material.** Mt. Mabu (PEM A11291, female, 45.8 mm SUL). **Comments:** One specimen was collected from a low-elevation stream below an old hydroelectricity dam. Poynton and Broadley (1991) report no records of *X. laevis* for northern Mozambique, but do report it from southern Malawi. The Malawi population has been confirmed by molecular analyses to be *X. laevis* (Furman *et al.* 2015). On the other hand, *X. muelleri* is common in lowland Mozambique. Ohler and Frétey (2014) reported the first record of *X. petersii* for Mozambique. Based on a low number of plaques (17 plaques around the eye and 20 from eye to vent) their assignment of the specimen to *X. petersii* is doubtful and most likely represents *X. laevis* (which shows the same level of variation in plaque counts).

### Ptychadenidae

#### *Ptychadena anchietae* (Bocage, 1868)

**Material.** Mt. M'pàluwé (PEM A11376, male, 35.0 mm SUL). **Comments:** Was found on dry leaf litter at low elevation.

#### *Ptychadena* cf. *porosissima* (Steindachner, 1867)

**Material.** Mt. Namuli (PEM A11351, female, 31.8 mm SUL). **Comments:** Collected from grassland on Muretha Plateau. This specimen is tentatively identified as *Ptychadena* cf. *porosissima* using the key provided in Poynton and Broadley (1985). The specimen lacks the characteristic tibial white line.

#### *Ptychadena taenioscelis* Laurent, 1954

**Material.** Mt. M'pàluwé (PEM A11368, female, 31.7 mm SUL). **Comments:** Found on dry leaf litter at low

slopes of Mt. M'pàluwé. Identification was based on the key provided in Poynton and Broadley (1985).

### Pyxicephalidae

#### *Amietia delalandii* (Duméril & Bibron, 1841)

**Material.** Mt. Mabu (PEM A11188, male, 77.2 mm SUL; PEM A11189, juvenile, 27.3 mm SUL; PEM A11190, male 58.3 mm SUL; PEM A11191, female, 75.5 mm SUL; PEM A11254, male, 52.8 mm SUL; PEM A11255, juvenile, 29.3 mm SUL; PEM A11256, female, 63.3 mm SUL; PEM A11257, female, 73.3 mm SUL; PEM A11258, female, 74.7 mm SUL; PEM A11259, juvenile, 32.5 mm SUL), Mt. Namuli (PEM A11300, female, 83.7 mm SUL; PEM A11301, female, 44.0 mm SUL; PEM A11302, male, 74.6 mm SUL; PEM A11319, male, 86.4 mm SUL; PEM A11397, female, 50.3 mm SUL, PEM T692-3), Mt. M'pàluwé (PEM A11363, male, 57.0 mm SUL; PEM A11373; male, 32.0 mm SUL; PEM A11374, juvenile, 29.8 mm SUL; PEM A11395, juvenile, 29.3 mm SUL; PEM A11396, juvenile, 26.4 mm SUL). **Comments:** Channing and Baptista (2013) revised southern African river frogs and restrict *A. angolensis* to Angola and assign southern populations of *A. angolensis* to either *A. quecketti* or *A. poyntoni*. Channing *et al.* (2016) re-instated *A. delalandii* as a senior synonym of *A. quecketti*. More recently, Larson *et al.* (2016) identified several well-supported cryptic lineages of river frogs previously assigned to *A. angolensis* in the Albertine Rift region, which refer that further cryptic diversity can be expected in East Africa. The phylogenetic affinities of our newly sampled population are unknown and additional work will be necessary to clarify its taxonomic status. Commonly found at both low and high elevation in forested streams (Fig. 3D).

#### *Nothophryne* cf. *broadleyi* Poynton, 1963

**Material.** Mt. Namuli (PEM A11320, male, 17.9 mm SUL; PEM A11321, female, 22.7 mm SUL; PEM A11322, male, 18.1 mm SUL; PEM A11322, PEM A11323, female, 23.4 mm SUL; PEM A11324, male, 18.0 mm SUL; PEM A11325, juvenile, 19.0 mm SUL; PEM A11326, male, 17.5 mm SUL; PEM A11327, male, 18.7 mm SUL; PEM A11328, female, 25.3 mm SUL; PEM A11329, male, 19.5 mm SUL; PEM A11330, female, 20.7 mm SUL; PEM A11331, male, 18.2 mm SUL; PEM A11332, juvenile, 17.1 mm SUL; PEM A11333, male, 17.4 mm SUL; PEM A11334, male, 18.2 mm SUL; PEM A11335, male, 17.5 mm SUL; PEM A11336, juvenile, 13.9 mm SUL; PEM A11337, juvenile, 13.3 mm SUL; PEM A11338, juvenile, 15.7 mm SUL; PEM A11339, female, 25.9 mm SUL; PEM A11340, male, 17.5 mm SUL; PEM A11342, male, 18.1 mm SUL; PEM A11343, female, 22.0 mm SUL; PEM A11344, male, 18.4 mm SUL; PEM A11345, male, 18.0 mm SUL; PEM A11346, male,



17.7 mm SUL; PEM A11347, male, 17.4 mm SUL), Mt. M'pàluwé (PEM A11369, female, 21.7 mm SUL; PEM A11370, female, 23.8 mm SUL; PEM A11371, male, 19.2 mm SUL; PEM A11372, male, 18.1 mm SUL). **Comments:** Specimens were collected both during the day and at night from rocky outcrops in water seepages (Fig. 3E, 3F). Historically, *Nothophryne* has only been reported from two localities: Mt. Mulanje, Malawi (type locality) and Mt. M'pàluwé in Mozambique (Poynton 1962 & 1966, Blake 1965), both higher than 1200 m asl. Timberlake et al. (2009) were the first to report this species from Mt. Namuli. Some calls similar to *Nothophryne* were heard from the summit of Mt. Mabu, but no frog was visually located to confirm the species occurrence in this mountain. Genetic analyses suggest a cryptic diversity in this genus (Bittencourt-Silva et al. 2016) and additional work is underway to update its taxonomy. Based on its small distribution this nominotypical species is listed as Endangered (Mazibuko and Poynton 2004). Referring to that the undescribed species will receive similar red list status.

#### *Strongylopus* cf. *fuelleborni* (Nieden, 1911)

**Material.** Mt. Mabu (PEM A11184, male, 35.5 mm SUL; PEM A1185, male, 36.3 mm SUL; PEM A11186, male, 35.3 mm SUL; PEM A11857, male, 37.3 mm SUL, PEM T691), Mt. Namuli (PEM 11352, juvenile, 27.9 mm SUL; PEM A11353, female, 49.8 mm SUL; PEM A11357, female, 49.1 mm SUL; PEM A11358, female, 49.9 mm SUL; PEM A11359, female, 43.6 mm SUL). **Comments:** Part of the *Strongylopus faciatus* group that has seen two newly described species in recent years (Channing and Davenport 2002, Clarke and Poynton 2005). Mercurio (2011) assign *Strongylopus* from Mt. Mulanje to *S. merumontanus*. While Poynton (2004) don't list them from southern Malawi and rather refer to them as *S. fuelleborni*. The phylogenetic affinities of our newly sampled population are unknown and additional work will be necessary to clarify its taxonomic status. For now, we assign them to *S. fuelleborni*. Adult specimens and tadpoles were found along a high-elevation stream in a patch of Afromontane forest at Mt. Mabu (Fig. 3G). Specimens from Mt. Namuli were collected along marshy areas in montane grassland.

#### Gymnophiona Scolecomorphidae

#### *Scolecomorphus* cf. *kirkii* Boulenger, 1883

**Material.** Mt. Mabu (PEM A11248). **Comments:** A single specimen was found under a log in the closed canopy forest of Mt. Mabu after 36 hours of heavy rain (Fig. 3H). The specimen (probably a young female) measures 210 mm total length, 6.3 mm body width and has 142 pri-

mary annuli. The olive-brown dorsal colouration of the preserved specimen is dorsally restricted and the venter is light yellowish (pinkish in life), agreeing with the description of Nussbaum (1985). This new record represents the southernmost distribution of *Scolecomorphus kirkii*, and for all African caecilians. Branch (2004) reported the first ever caecilian record for Mozambique from dry transitional miombo vegetation at the edge of Serra Mecula, while Farooq and Conradie (2015) recorded a second record from Mt. Namuli.

#### Reptilia Squamata Agamidae

#### *Agama kirkii* Boulenger, 1885

**Material.** Mt. Namuli (PEM R21169, male, 93.0 mm SVL; PEM R21171, female, 81.5 mm SVL), Mt. M'pàluwé (PEM R21159, female, 77.2 mm SVL; PEM R21211, male, 106.9 mm SVL). **Comments:** Collected at the lower slopes on the rocky outcrops of both Mt. Namuli and Mt. M'pàluwé. Both males brightly coloured, while females are dull in overall colouration.

#### *Agama mossambica* Peters, 1854

**Material.** Mt. Namuli (PEM R21114, female, 95.7 mm SVL). **Comments:** One specimen collected in Gurùè town. This record was omitted from our final checklist of the inselbergs, as it was collected from the low lying town (see Results and Discussion).

#### Chamaeleonidae

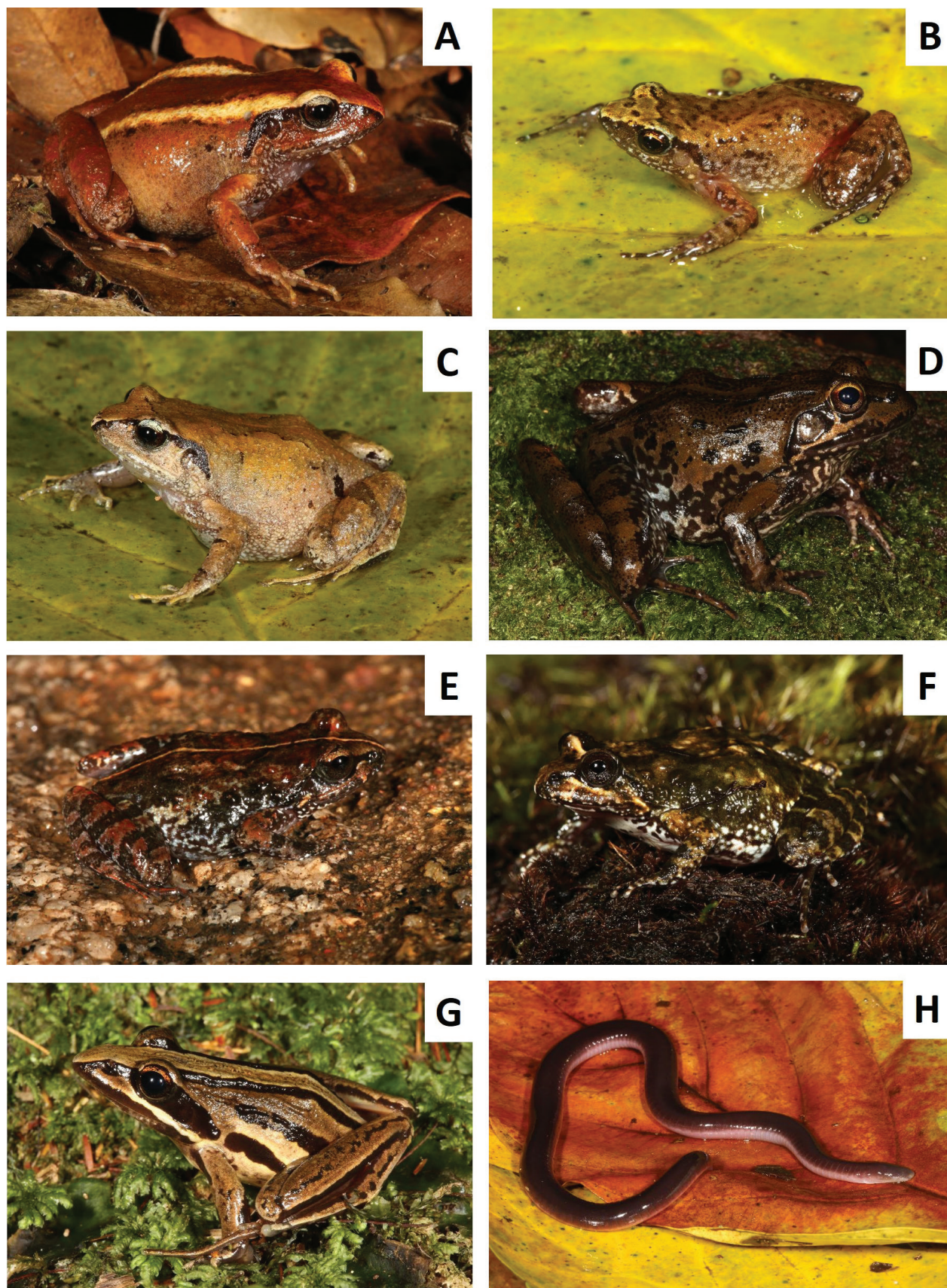
#### *Chamaeleo dilepis* Leach, 1819

**Material.** Mt. Namuli (PEM R21170, female, 104.7 mm SVL). **Comments:** One specimen donated by a local, presumably obtained from near the village just below the Muretha Plateau.

#### *Nadzikambia baylissi* Branch & Tolley, 2010

**Material.** Mt. Mabu (PEM R21128, male, 73.7 mm SVL; PEM R21129, female, 64.8 mm SVL; PEM R21130, female, 66.4 mm SVL; PEM R21131, male, 68.3 mm SVL; PEM R21132, female, 57.9 mm SVL), Mt. Namuli (PEM R21164; female, 79.9 mm SVL; PEM R21165, male, 71.4 mm SVL; PEM R21166, female, 75.5 mm SVL; PEM R21167, female, 79.3 mm SVL; PEM R21188, female, 74.3 mm SVL; PEM R21189, female, 72.0 mm SVL; PEM R21190, female, 80.1 mm SVL). **Comments:** Collected from canopy forest, in Afromontane forest above 600 m asl. Historically, *Nadzikambia* was considered a





**Figure 3.** A selection of amphibians from northern Mozambique inselbergs. **A** – *Arthroleptis francei* (Mt. Namuli, PEM A11303), **B** – *Arthroleptis xenodactyloides* (Mt. Mabu), **C** – *Arthroleptis stenodactylus* (Mt. Mabu), **D** – *Amietia delalandii* (Mt. Namuli, PEM A11319), **E** – *Nothophryne* cf. *broadleyi* (Mt. M'páluwé, PEM A11370), **F** – *Nothophryne* cf. *broadleyi* (Mt. Namuli), **G** – *Strongylopus* cf. *fuelleborni* (Mt. Mabu, PEM A11184), **H** – *Scolecomorphus* cf. *kirkii* (Mt. Mabu, PEM A11248).



monotypic genus endemic to Mt. Mulanje (Broadley 1965a), but recently Branch and Tolley (2010) described a second species from Mt. Mabu. We here report the first record for Mt. Namuli (Fig. 4A).

#### *Rhampholeon tilburyi* Branch, Bayliss & Tolley, 2014

**Material.** Mt. Namuli (PEM R21155, female, 58.7 mm SVL; PEM R21156, female, 53.2 mm SVL; PEM R21157, male, 62.2 mm SVL; PEM R21158, male, 65.4 mm SVL; PEM R21160, male, 62.7 mm SVL; PEM R21161, male, 61.4 mm SVL; PEM R21162, male, 66.5 mm SVL; PEM R21163, female, 69.7 mm SVL; PEM R21174, female, 61.1 mm SVL; PEM R21175; PEM R21176, female, 57.6 mm SVL; PEM R21177, juvenile, 26.6 mm SVL; PEM R21178, female, 52.3 mm SVL; PEM R21191, female, 60.6 mm SVL; PEM R21192, male, 45.4 mm SVL; PEM R21193, juvenile male, 28.2 mm SVL; PEM R21194, female, 58.2 mm SVL). **Comments:** This newly described species of pygmy chameleon was collected from Mt. Namuli at both the Ukalini forest and the forest patches on the Muretha Plateau (Fig. 4B). Considerable morphological differences, e.g. well-developed dorsal crenulations, continues and well developed temporal ridge, and reduced rostral and supraocular processes, were observed between the two sub-populations of Mt. Namuli.

#### *Rhampholeon maspictus* Branch, Bayliss & Tolley, 2014

**Material.** Mt. Mabu (PEM R21117, male, 53.8 mm SVL; PEM R21118, male, 62.4 mm SVL; PEM R21119, juvenile male, 31.7 mm SVL; PEM R21120, juvenile female, 30.6 mm SVL; PEM R21121, juvenile female, 35.8 mm SVL; PEM R21133, juvenile female, 36.7 mm SVL; PEM R21134, juvenile male, 41.9 mm S; PEM R21135, female, 39.0 mm SVL; PEM R21136, female, 60.5 mm SVL; PEM R21136, female, 60.5 mm SVL; PEM R21137, male, 64.5 mm SVL; PEM R21138, male, 65.8 mm SVL; PEM R21139, female, 47.0 mm SVL; PEM R21140, juvenile female, 36.5 mm SVL; PEM R2141, juvenile male, 42.0 mm SVL). **Comments:** Specimens were found in Afromontane forest above 1900 m asl. This species is restricted to Mt. Mabu.

#### *Rhampholeon* sp.

**Material.** Mt. M'pàluwé (PEM R21202, female, 45.8 mm SVL; PEM R21203, female, 57.3 mm SVL; PEM R21204, female, 44.1 mm SVL; PEM R21205, female, 65.1 mm SVL; PEM R21206, female, 56.2 mm SVL; PEM R21207, female, 40.7 mm SVL; PEM R21208, male, 34.0 mm SVL; PEM R21209, female, 61.9 mm SVL; PEM R21210, male, 37.5 mm SVL). **Comments:** This is the first record of a pygmy chameleon from Mt. Ribuáué insulates forests (Fig. 4C). Based on the isolation

of all the northern Mozambique inselbergs and high genetic differences reported by Branch et al. (2014), it is highly plausible that this new population represents an undescribed species. Most similar to *R. tilburyi* in external morphology.

#### Cordylidae

##### *Platysaurus maculatus* (Broadley, 1965)

**Material.** Mt. M'pàluwé (PEM R21220, subadult female, 62.7 mm SVL; PEM R21221, male, 79.5 mm SVL; PEM R21222, female, 62.9 mm SVL; PEM R21223, male, 81.7 mm SVL; PEM R21224, male, 75.8 mm SVL). **Comments:** Collected from the lower slopes of Mt. M'pàluwé where they were found in abundance running on rocky slopes. Previously, collected from Mt. M'pàluwé [=Ribuáué] by Blake (1965), which formed part of the type series of this species (Broadley 1965b). This species is now regarded as widespread in northern Mozambique (Broadley 1965b, Branch et al. 2005) and southern Tanzania (Broadley 1995).

#### Gekkonidae

##### *Chondrodactylus turneri* (Gray, 1864)

**Material.** Mt. M'pàluwé (PEM R21199, juvenile, 35.3 mm SVL; PEM R21200, juvenile, 39.5 mm SVL; PEM R21213, juvenile, 47.7 mm SVL). **Comments:** Collected at night on rock surface at lower slopes.

##### *Hemidactylus mabouia* (Moreau De Jonnés, 1818)

**Material.** Mt. Mabu (PEM R21124, female, 62.5 mm SVL; PEM R21143, male, 48.5 mm SVL; PEM R21144, male, 51.9 mm SVL), Mt. M'pàluwé (PEM R21215, female, 51.6 mm SVL; PEM R21216, male, 59.4 mm SVL). **Comments:** Collected at Mt. Mabu from rock surface and under tree bark in low to mid-elevation. At Mt. M'pàluwé specimens were collected in sympatry with *H. platycephalus* on derelict buildings of the Oasis Water Camp.

##### *Hemidactylus platycephalus* Peters, 1854

**Material.** Mt. M'pàluwé (PEM R21217, female, 81.4 mm SVL; PEM R21218, male, 72.9 mm SVL). **Comments:** Collected from derelict buildings and mango trees around the Oasis Water Camp.

##### *Lygodactylus grotei* Sternfeld, 1911

**Material.** Mt. Mabu (PEM R21125, female, 30.7 mm SVL). **Comments:** Collected at the base of a tree in dry miombo woodland.

***Lygodactylus regulus* Portik, Travers, Bauer & Branch, 2013**

**Material.** Mt. Namuli (PEM R21168, female, 33.8 mm SVL). **Comments:** Recently described gecko related to the larger *L. rex* from Mt. Mulanje (see Portik et al. 2013b). Only known from three specimens collected from Mt. Namuli. Our specimen was collected from a fallen tree in a shamba.

***Lygodactylus cf. rex* Broadley, 1963**

**Material.** Mt. Mabu (PEM R21147, male, 48.1 mm SVL; PEM R21148, male, 42.1 mm SVL). **Comments:** Specimens were collected from tree trunks in transitional miombo at lower slopes (Fig. 4D). These large geckos are morphologically similar to *L. rex* from Mt. Mulanje in that they share the large size of typical *L. rex* (up to 55 SVL: Portik et al. 2013b), the mental scale is very shallow with lateral slits, and the conspicuous ocellus (spot) above the shoulder. Given the high level of genetic diversity in montane species of this genus (Portik et al. 2013b, Travers et al. 2014) this could either represent an extension of its distribution or a new species. For that reason, we tentatively assign it to *L. rex*.

***Lygodactylus* sp.**

**Material.** Mt. M'pàluwé (PEM R21196, female, 41.0 mm SVL). **Comments:** One individual collected from a tree trunk in a newly cleared shamba at the top of Mt. M'pàluwé at night. Specimen from Mt. M'pàluwé differs from *L. cf. rex* from Mt. Mabu, and *L. regulus* from Mt. Namuli in that they lack the conspicuous ocellus above the shoulder. It closely resembles *L. angularis* in general throat markings and that the mental is entire and not split with shallow lateral slits as in the *L. rex* group.

**Lacertidae*****Holaspis laevis* Werner, 1895**

**Material.** Mt. Mabu (PEM R21145, male, 48.8 mm SVL; PEM R21146, male, 48.0 mm SVL). **Comments:** Found on tree trunks in transitional miombo woodland at lower slopes (Fig. 4E). This secretive species is only known from Amatongas, in central Mozambique (Cotts 1934) and numerous unpublished records from other localities in Mozambique: Marrumeu area (Branch pers. obs. in Branch 2000), Moebase (Branch pers. obs. in Branch 2000), Cavalo near Gorongosa Mountain (Broadley pers. obs. in Branch 2000), Dondo Inhamitanga Forests (Broadley pers. obs. in Branch 2000), Quiterajo (Conradie pers. obs.), Italthai (Verburgt pers. obs.), and Palma (Verburgt pers. obs.). It has also been recorded from southern Malawi from the Ruo River Gorge (Branch and Cunningham 2006).

**Scincidae*****Melanoseps cf. ater* (Günther, 1873)**

**Material.** Mt. Mabu (PEM R21126, 93 mm SVL, 28.6 mm TL; PEM R21127, 121 SVL, 39.9 mm TL). **Comments:** Broadley et al. (2006) assigned the northern Mozambique specimens to *M. loveridgei*, while specimens from southern Malawi are referred to as *M. ater*. We used the key from Broadley et al. (2006) to identify the specimens based on number mid-body scale rows (24). Timberlake et al. (2012) were the first to report this species from Mt. Mabu and this was only the second record for this genus in Mozambique. Farooq and Conradie (2015) recorded *M. cf. loveridgei* from Mt. Namuli. This identification was tentative, as material got lost in a motor vehicle accident and could not be examined. Based on the close proximity to Mt. Mabu the Mt. Namuli record should be regarded as *M. cf. ater*.

***Trachylepis boulengeri* (Sternfeld, 1911)**

**Material.** Mt. M'pàluwé (PEM R21225, male, 75.4 mm SVL). **Comments:** Only one specimen was collected in dry bamboo leaves from the eastern slopes of Mt. M'pàluwé. This species is known from only a handful of records from northern Mozambique, e.g. Niassa (Branch et al. 2005), and Marrupula (Blake 1965, Broadley 1974).

***Trachylepis maculilabris* (Gray, 1845)**

**Material.** Mt. Mabu (PEM R21150, female, 88.6 mm SVL). **Comments:** One adult female was collected from a transition woodland. Branch et al. (2005) were the first to record this species from northern Mozambique and indicate, based on material used from coastal northern Mozambique (Carranza et al. 2001) towards the presence of a cryptic species in the north of Mozambique. Our record is the first for Mt. Mabu and fills a large gap between the northern (Lipumbulo floodplain) and the Zambezi Valley records. Records from north of the Zambezi remains scattered to only a handful of records, e.g. Lipumbulo floodplain, Moebase, and Moma (Branch et al. 2005).

***Trachylepis margaritifera* (Peters, 1854)**

**Material.** Mt. M'pàluwé (PEM R21226, female, 97.1 mm SVL; PEM R21227, female, 101.7 mm SVL). **Comments:** Two adult females were collected from the Oasis Water Camp running among outbuildings and on rocky slopes. Broadley and Bauer (1998) recorded this species from a handful of records from the northern Mozambique, presumably based on records collected by Blake (1965). Our record from Mt. M'pàluwé just fills in the gap between Blake's (1965) Morrumbala and Nampula



records. Portik et al. (2013a) also recorded this species from Lichinga further north and Branch et al. (2005) recorded them from Niassa Game Reserve.

### *Trachylepis striata* (Peters, 1844)

**Material.** Mt. Namuli (PEM R21172, male, 71.1 mm SVL; PEM R21173, male, 67.7 mm SVL). **Comments:** Specimen was collected from the lower slopes of Mt. Namuli running on granite rocky outcrops. Common and widespread species in southern Africa, but only recorded from Niassa (Branch et al. 2005), Namuli and Lichinga (Portik et al. 2013a), Mossuril and Mozambique Island (Blake 1965) in northern Mozambique.

### *Trachylepis varia* (Peters, 1867)

**Material.** Mt. Mabu (PEM R21151, male, 58.6 mm SVL), Mt. Namuli (PEM R21179, female, 52.7 mm SVL; PEM R21180, female, 51.1 mm SVL; PEM R21181, female, 59.4 mm SVL; PEM R21182, female, 60.7 mm SVL; PEM R21183, male, 49.3 mm SVL; PEM R21185, male, 53.8 mm SVL), Mt. M'páluwé (PEM R21198, male, 57.6 mm SVL). **Comments:** Specimens from Mts. Mabu and M'páluwé represent the plain tan brown dorsum coloration with dark-edged white lateral line and uniform beige ventrum, while the montane grassland population of the Murteha Plateau of Mt. Namuli have the dorsum greenish with five finely striped white lines, and ventrally a bluish darker colouration. Broadley (2000) also refers to the fact that montane populations differs in size, scalation, and colour. Further taxonomical work is needed to resolve the status of these montane populations.

## Colubridae

### *Dispholidus typus* (Smith, 1828)

**Material.** Mt. M'páluwé (PEM R21214, a juvenile female, 518 mm SVL + 20 mm TL). **Comments:** Juvenile dislodged by a Southern Shrike (*Lanius* sp.) from the branches of a mango tree at the Oasis Water Camp. This specimen can be assigned to the northern race *D. typus viridis* (Smith, 1828).

### *Dipsadoboa cf. shrevei shrevei* (Loveridge, 1932)

**Material.** Mt. Mabu (PEM R21115, juvenile 312 mm SVL + 91 mm TL; PEM R21116, juvenile, 271 mm SVL + 77 mm SVL; PEM R21122, male, 802 mm SVL + 255 mm TL; PEM R21123, male, 681 mm SVL + 243 mm TL), Mt. M'páluwé (PEM R21195, juvenile, 381 mm SVL + 106 mm SVL). **Comments:** Specimens collected from forest floor or in low growing trees along streams (Fig. 4F). Except for Mt. M'páluwé specimen, which was

collected from low growing scrubs in the forest, far from any water. Based on the identification key provided by Spawls et al. (2002) the Mozambique species keys out as *D. shrevei shrevei*, from which it differs on ventral and subcaudal counts. First collected in 2008 (Timberlake et al. 2012, Bayliss et al. 2014) from Mt. Mabu.

### *Philothamnus angolensis* Bocage, 1882

**Material.** Mt. Namuli (PEM R21187, female, 641 mm SVL + 254 mm TL). **Comments:** One specimen collected from mid-elevation forested stream, swimming across the stream at the base of the two Namuli granite domes when disturbed.

### *Philothamnus hoplogaster* (Günther, 1863)

**Material.** Mt. Mabu (PEM R21154, female, 390 mm SVL 165 mm TL), Mt. M'páluwé (PEM R21219, male, 406 mm SVL + 188 TL). **Comments:** Specimen collected from Mt. Mabu has 10 black spots anterior on the dorsum, while the Mt. M'páluwé specimen has uniform lime-green colouration. The Mt. Mabu specimen was collected from an overhanging tree along a well vegetated low-elevation stream at night, while the Mt. M'páluwé was collected around a water tank at the Oasis Water Camp.

### *Thelotornis mossambicanus* (Bocage, 1895)

**Material.** Mt. Mabu (PEM R21142, juvenile, 312 SVL+163 mm TL; PEM R21149, male, 650 mm SVL + 400 mm TL), M'páluwé (PEM R21228, female, 706 mm SVL + 419 mm TL). **Comments:** At Mt. Mabu one specimen was collected from closed-canopy forest while the other was collected in transitional miombo woodland. A male and female specimen donated by a local presumably obtained from near Ribáuè town. The juvenile collected from closed-canopy forest had a juvenile *Rhampholeon maspictus* in its stomach.

## Elapidae

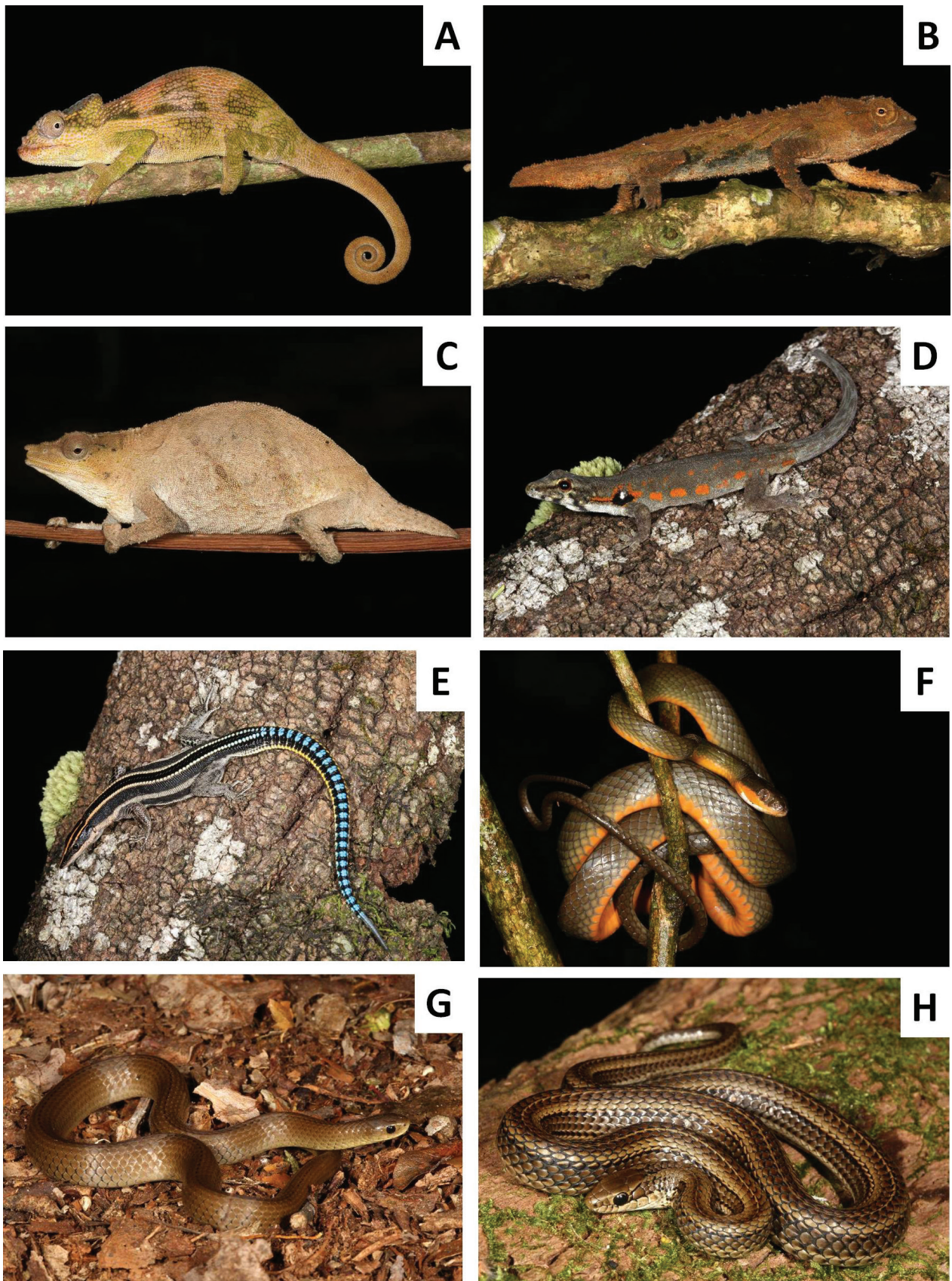
### *Naja mossambica* Peters, 1854

**Material.** Mt. M'páluwé (PEM R21201, female, 715 mm SVL + 146 mm TL). **Comments:** Collected at night on the lower slopes near the shambas.

## Lamprophiidae

### *Boaedon capensis* Duméril & Bibron, 1854

**Material.** Mt. M'páluwé (PEM R21229, male 147 SVL + 98 mm TL). **Comments:** A female specimen donated by a local, presumably obtained from near Ribáuè town.



**Figure 4.** A selection of reptiles from northern Mozambique inselbergs. **A** – *Nadzikambia baylissi* (Mt. Namuli, PEM R21165), **B** – *Rhampholeon tilburyi* (Mt. Namuli, PEM R21157), **C** – *Rhampholeon* sp. (Mt. M'páluwé, PEM R21209), **D** – *Lygodactylus* cf. *rex* (Mt. Mabu, PEM R21147), **E** – *Holaspis laevis* (Mt. Mabu, PEM R21146), **F** – *Dipsadoboa* cf. *shrevei shrevei* (Mt. Mabu, PEM R21123), **G** – *Duberria shirana* (Mt. Namuli, PEM R21184), **H**– *Psammophylax variabilis* (Mt. Namuli, PEM R21186).



We follow Portik et al. (2013a) and refer to this specimen as *capensis*, rather than *fuliginosus*, based on general colouration.

### ***Duberria shirana* (Boulenger, 1894)**

**Material.** Mt. Namuli (PEM R21184, male, 193 mm SVL + 49 mm TL). **Comments:** Collected in a funnel trap situated in montane grassland of the Muretha Plateau (Fig. 4G). This represents the first known record of this species for the whole of Mozambique.

### ***Gonionotophis capensis* (Smith, 1847)**

**Material.** Mt. Mabu (PEM R21152, male, 965 mm SVL + 160 mm TL; PEM R21153, female, 993 mm SVL + 143 mm TL). **Comments:** Two specimens were collected on the same night (15 November 2014) from the same locality near a stream at the base of Mt. Mabu. It is possible that the male was following the female, as they were collected minutes apart.

### ***Psammophis orientalis* Broadley, 1977**

**Material.** Mt. M'pàluwé (PEM R21197, female, 475 mm SVL + 243 mm TL). **Comments:** One specimen collected at night, one meter from the ground in a low growing shrub in transitional miombo.

### ***Psammophylax variabilis* Günther, 1893**

**Material.** Mt. Namuli (PEM R21186, female, 329 mm SVL + 77 mm TL). **Comments:** Collected in montane grassland on the Muretha Plateau (Fig. 4H). This represents only the third record of this species for the whole of Mozambique (Timberlake et al. 2009; Farooq and Conradie 2015).

## **Viperidae**

### ***Bitis arietans* Merren, 1820**

**Material.** Mt. M'pàluwé (PEM R21212, female, 573 mm SVL + 51 mm TL). **Comments:** One specimen collected at night on the path near the shambas.

## **Conclusions**

We have found eight putative new species through field identification, added additional species known from northern inselbergs (13 species to Mt. Mabu, five species to Mt. Namuli, and 19 species to Mt. M'pàluwé), and one new

country record. Additional analyses are necessary, including barcoding and phylogenetic analyses, to determine whether these mountains are exceptionally high in species richness. We now know there are at least 30–40 species of reptiles and amphibians on each of these sky islands, many of which are montane endemics. Although the state of knowledge is growing for Mt. Mabu and Mt. Namuli and can be considered to be relatively well sampled, it is clear that Mt. Ribáuè isolates requires more work given the brevity of our survey. In addition, several other sky islands in the area have received little or no attention in terms of the herpetofaunal survey (e.g. Mt. Inago and Mt. Chipirone).

The present collection is essentially a preliminary assessment of amphibian and reptile diversity in the region and does not account for seasonal variation in activity of herpetofauna. Future surveys that are more comprehensive in space and over time should considerably increase our understanding of the regional diversity, endemism, and richness of these inselbergs. Although the state of biodiversity knowledge has grown for Mts. Mabu and Namuli, there is an urgent need for a clear understanding of the nature of threats, and mitigation measures that will directly improve protection of habitat. At Mt. Ribáuè additional surveys are imperative, given the comparatively limited exploration on that mountain coupled with the apparent high rate of forest clearing. Overall, the sky islands of Mozambique clearly require additional surveys to quantify species richness and endemism for a broad range of taxonomic groups. Ultimately, a better understanding of the threats to biodiversity will allow for prioritisation of conservation interventions.

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