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## A new species of *Atheris* (Serpentes: Viperidae) from northern Mozambique

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### Abstract

A new species of forest viper (*Atheris* Serpentes: Viperidae) is described from Mount Mabu and Mount Namuli, northern Mozambique. This is the most southerly record of the genus, and the first record from Mozambique. Features of scalation, colour, body form and behaviour distinguish the new species from all other African *Atheris*, particularly its small size (maximum total length 384mm), retention of juvenile colouration in adults, and relatively low ventral, subcaudal and labial scale counts. It appears to be a dwarf, possibly paedomorphic, species that feeds among leaf litter on small frogs and geckos. The discovery of the new species in isolated populations in mid-altitude forest remnants on Mount Mabu and Mount Namuli, emphasizes the high conservation importance of the region.

**Keywords:** Viperidae, *Atheris*, new species, Mount Mabu, Mount Namuli, Mozambique

### Introduction

Due to the loss of infrastructure and social upheaval caused by the protracted civil war, much of northern Mozambique has been inaccessible to field research for many years. As a result, much of the country's biodiversity, particularly the herpetofauna, remains one of the most poorly documented in Africa (Branch *et al.*, 2005). The herpetofauna of the southern provinces of Mozambique (i.e. those south of the Zambezi River) have traditionally been incorporated into monographic reviews of southern African focus (e.g. Branch, 1998; Broadley, 1990). However, provinces north of the Zambezi River, including those of Zambezia, Nampula, Niassa and Cabo Delgado, remain difficult to access and many regions lack even preliminary herpetofaunal surveys. Even as late as 1990 only a single locality for any amphibian collection was known from Mozambique north of latitude 14°, an area of over 150 000 km<sup>2</sup>. (Poynton and Broadley, 1991).

Central and northern Mozambique contains a series of montane inselbergs that have rarely been studied, and their biogeographic affinities to the Afromontane archipelago of Eastern and southern Africa remain unknown. Branch *et al.* (2005a) recorded the highest reptile and amphibian diversity in Mozambique on Serra Mecula in the Niassa Game Reserve, extreme northern Mozambique. This included a new species of girdled lizard (Branch *et al.*, 2005b), and they noted the presence of many elements shared with both Tanzanian components of the Afromontane archipelago, as well as with the south, particularly Mount Mulanje in southern Malawi (Branch *et al.*, 2005a). The lack of formal surveys highlighting the biological richness in these montane isolates, and the burgeoning human population and its attendant habitat threats, indicate that unique biodiversity may be lost before its presence is even scientifically known.

To meet this challenge the Royal Botanic Gardens Kew Darwin Initiative (Award 15/036) instituted a project 'Monitoring and Managing Biodiversity Loss in South-East Africa's Montane Ecosystems' working together with the Mozambique Agricultural Research Institute (IIAM). As part of this project, formal

biodiversity surveys of the Northern Mozambique montane isolates that rise above 1500m a.s.l. (Mounts Chipirone, Mabu, Namuli, and Inago; Fig. 1) were initiated. working together with the Mozambique Agricultural Research Institute (IIAM).

Mount Mabu (16°17'56"S, 36°23'44"E) is an inselberg rising to 1710 m, situated in the Zambezia Province of northern Mozambique, close to the border with Malawi (Fig. 1). It lies 90 km to the south-east of the much larger massif of Mount Mulanje (3002 m) in adjacent Malawi. The granite dome of the main peak of Mount Mabu, and a few other granitic formations, rise above an undulating forest of between 60–70 km<sup>2</sup>. Most of the forest lies at medium altitudes, mainly between 1000–1400 m, with smaller patches reaching approximately 1650 m. The foothills are clothed in dense transitional woodland and riparian forest to at least 300 m, except where replaced by cultivation for tea and eucalyptus plantations (Dowsett-Lemaire and Dowsett, 2008).

The herpetofauna of Mount Mulanje in adjacent Malawi is relatively well-known (Stevens, 1974; Broadley, 2001; Branch and Cunningham, 2006), and includes 32 amphibians (3 endemic and 3 near-endemic species), and 55 reptiles (6 endemics, including an endemic chameleon genus, *Nadzikambia*, Tilbury *et al.*, 2006). The discovery on Mount Namuli of two lizards (the gecko *Lygodactylus rex* and leaf chameleon *Rhampholeon platyceps*), previously considered endemic to Mount Mulanje (Branch and Ryan, 2001), highlighted the possible biogeographic affinities between these neighbouring massifs, particularly when subsequent molecular analysis of additional material confirmed that the Mount Namuli *Rhampholeon* represented a new species (Branch *et al.*, in prep).

Although herpetofauna was not specifically targeted during the Darwin Initiative surveys, reptiles and amphibians were collected opportunistically by J. Bayliss and companions and forwarded to Port Elizabeth Museum for identification. During the second reconnaissance visit to Mount Mabu (23–26 January 2006) a very young forest viper was found by J. Bayliss in leaf litter on the floor of closed-canopy wet forest on Mount Mabu at approximately 1000m. On examination in Port Elizabeth the specimen was identified as a member of the genus *Atheris*, which had never previously been recorded from Mozambique and which, moreover, represented a substantial southern range extension for the genus.

Although it was obvious that it probably represented a new species, its small size (<150 mm TL) precluded confident identification. Although the description of two of the most recently discovered species of *Atheris* (*Atheris broadleyi* – Lawson, 1999; *A. hirsuta* - Ernst and Rödel, 2001) have been based on single specimens, these were both adult males. Where possible it is desirable to describe a new species on the basis of a series of specimens in order to document intra-specific variation, and possible features of sexual dimorphism.

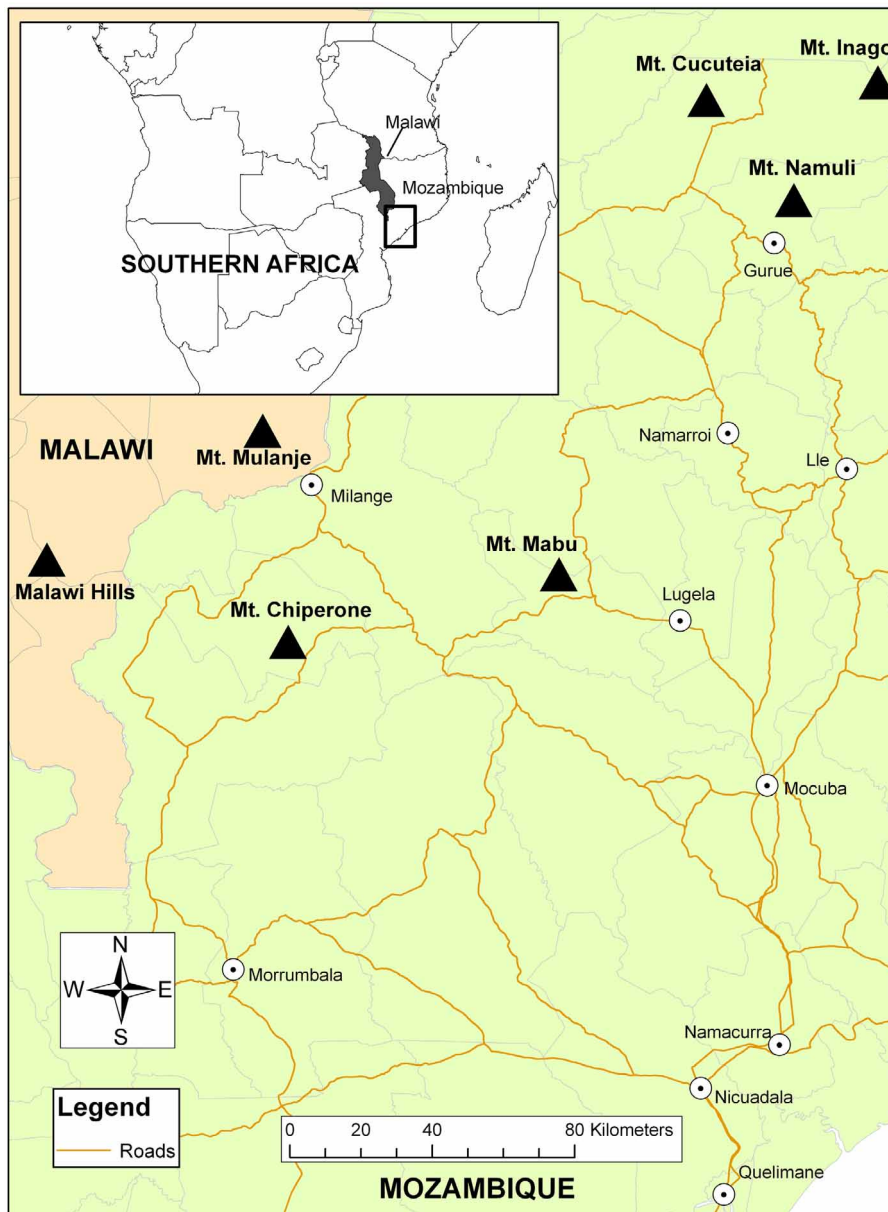
During the formal biodiversity of Mount Mabu (October 2008) additional *Atheris* from Mount Mabu, along with an additional specimen from Mount Namuli (November 2008), were discovered. Specimens were deposited in to the Bayworld (Port Elizabeth Museum; acronym PEM) herpetological collection. Analysis of the additional material confirmed the uniqueness of this small forest viper, and we take this opportunity to describe it below. Other herpetological novelties from these montane isolates are in the process of description (e.g. Branch *et al.*, 2009), and it is evident that additional herpetological discoveries in the surrounding forest, montane grasslands and summit rock outcrops of Mount Mabu and Mount Namuli are likely. They are the goal of targeted herpetofaunal surveys that are currently being planned.

## Methods

Ventral and subcaudal scales were counted using standard techniques (Dowling, 1951). Scale rows were recorded anteriorly (ASR, one length behind the neck), at midbody (MSR), and posteriorly (PSR, one head length in front of the head cloaca). Inter-rials were defined as the number of scales occurring in diagonal series from the angle of the mouth to the preventrals. Supra- and infralabials were counted for both sides (and recorded as the mean of both sides), and care was taken to count small scales sometimes hidden in the rictal

region. Suprarostrals were defined as only scales in contact with the upper edge of the rostral, excluding the bordering nasals; this differs from Broadley's (1998) definition which included small scales derived from the horizontal subdivision of the suprarostrals even when they were not in contact with the rostral. Snout-vent length (SVL) and tail length were recorded to the nearest millimetre. Sex was determined by dissection of the tail region to confirm the presence of the hemipenes in males. Reproductive status of the snakes was determined by visual inspection of the gonads. Males were considered mature if they had enlarged, turgid testes and/or white, thickened efferent ducts (indicating the presence of sperm). Females were classed as mature if they had thick muscular oviducts, vitellogenic ovarian follicles, and/or oviductal eggs.

Comparative scale counts and characters states for other *Atheris* species were based on those in Broadley (1998), supplemented with recent revisions (e.g. Lawson and Ustach, 2000; Lawson *et al.*, 2001) and new species descriptions (*A. broadleyi* Lawson, 1999; *A. hirsuta*, Ernst and Rödel, 2002). Comparative material is listed in these publications.



**FIGURE 1.** Map of Central Mozambique with the location of montane isolates (Mount Chiperone, Mount Mabu and Mount Namuli) in relation to Mount Mulanje and the Malawi Hills in southern Malawi.

***Atheris mabuensis* n. sp.**

(Figs. 2–7)

**Type Material:** *Holotype*: adult male, PEM R17901. *Type locality*: main forest camp, Mount Mabu (16°17'12"S, 36°24'14"E, 1000m a.s.l.); collected by local hunter, 20 October 2008; fixed in buffered formalin and stored in 70% EtOH. *Paratypes*: 3 specimens: adult female, PEM R17902, collected by Tom Timberlake, same locality and date as holotype; juvenile, PEM R17903, collected by Julian Bayliss, same locality and date as holotype; subadult male, PEM R17904, collected on path at 13h00 in leaf litter in Khara Forest (lower end on Manho Forest, Mount Namuli, Zambezia Province, Mozambique (15°24'39.9"S, 37°02'16.5"E, 1550m a.s.l.), Colin Congdon, 26 November 2008. The two Mount Mabu specimens were retained for one month in captivity before dying; on death they were placed in 90% EtOH, after small incisions were made in the ventrum; both were subsequently transferred to 70% EtOH for storage. The Mount Namuli specimen was kept alive for 2 months, and then euthanased, fixed in buffered formalin and subsequently stored in 70% EtOH; a small ventral incision was made to collect fresh liver tissue for genetic studies.

**Additional Material:** PEM R17910 (still maintained in captivity; shed skins and digital images), adult male, same locality as holotype, collected 25 January 2006, J. Bayliss.

**Synonymy:** *Atheris* sp. Dobiey and Vogel, 2007, p 110.

Numerous other images of the species under the same name have appeared in the world media following a press release from Kew highlighting the biodiversity discoveries during the Mount Mabu expedition (e.g. Marshall, 2009).

**Diagnosis:** *Atheris mabuensis* is distinguished from all other members of the genus by a combination of characters: (1) its small size, maximum length 384mm (all other *Atheris* exceed 580mm TL, with the exception of - *A. katangensis*, TL 397mm; *A. barbouri*, TL 369 mm (Barbour and Howell, 1998); and the unique type of *A. acuminata*, TL 440mm); (2) the lack of 'horns' (enlarged supraocular scales are present in *A. ceratophora*); (3) the lack of lanceolate or acuminate scales on top of the head (present in *A. hispida* and *A. acuminata*); (4) having weakly keeled gular scales (smooth only in *A. nitschei*; gulars moderately keeled in the eastern species, *A. rungweensis*, *A. desaixi*, *A. ceratophora* and *A. katangensis*, and strongly keeled in the remaining central and western species); (5) lacking interoculabials (*sensu* Broadley, 1998, i.e. the supralabials are in contact with circumorbitals; 1 or 2 in *A. desaixi* and *A. rungweensis*); (6) having 19–21 transverse head scales (*sensu* Broadley, 1998, i.e. number of scales across head between posterior supralabials; these are reduced in highly arboreal species, e.g. *A. squamigera*, 15–22, *A. hispida*, 12; and *A. acuminata*, 10); (7) having 21–23 MSR (most species have 27+ MSR rows; reduced in highly arboreal species such as *A. squamigera*, 15–25, *A. hispida*, 15–19, and *A. acuminata*, 14); (8) lateral body scales not serrated (strongly serrated in *A. ceratophora*, *A. desaixi*, *A. nitschei*, and *A. rungweensis*, and weakly serrated in *A. katangensis*); (9) having 8–9 supralabials (six in *A. acuminata*, 10–12 in *A. desaixi*); (10) having low ventral counts 128–137 (this is the lowest in the genus; usually over 140 in both sexes in *A. nitschei*, *A. rungweensis*, *A. desaixi*, *A. chlorechis*, *A. hispida*, and *A. subocularis*, and in the only known males of *A. acuminata* (160) and *A. hirsuta* (160)); (11) having low subcaudal counts - 39–47 (always higher than 45 in *A. rungweensis*, *A. ceratophora*, *A. chlorechis*, *A. squamigera* and *A. hispida*; and 54 and 58 in the only known males of *A. acuminata* and *A. hirsuta*, respectively); and (12) having a prehensile tail (non-prehensile in *A. barbouri*), and higher subcaudal (*A. barbouri* 15–21) and labial (*A. barbouri*, supralabials 5–6, infralabials 4–5) counts.

**Remarks:** Within the Atherini the Mount Mabu snake is referred to the genus *Atheris* Cope on the basis of the following diagnostic features: no enlarged supraocular shield (present in *Proatheris* Broadley, 1966), tail prehensile and subcaudals single (tail non-prehensile and subcaudals paired in *Montatheris* Broadley, 1996).

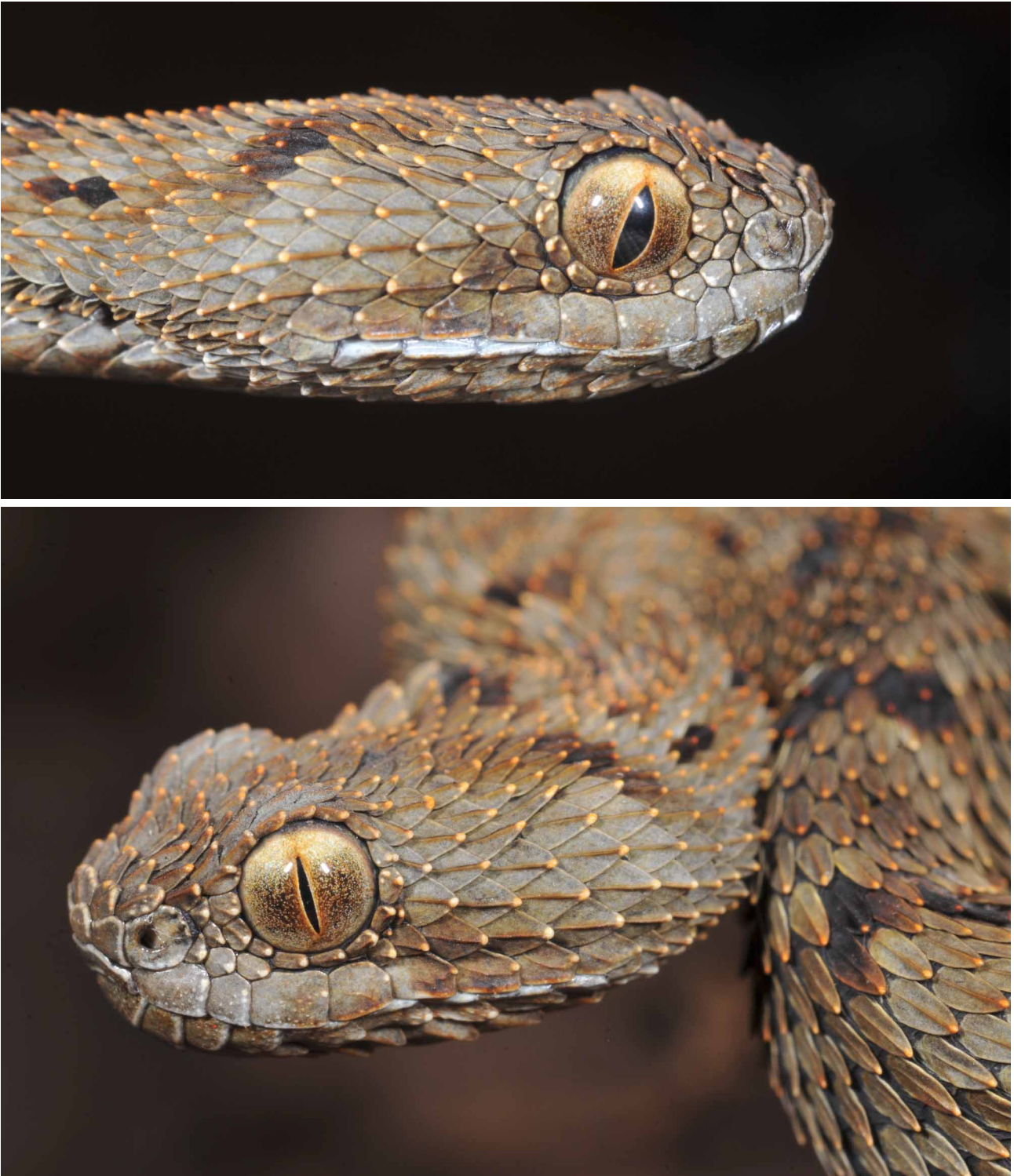
**Description:** Holotype PEM R17901; adult male preserved in formalin and transferred to 70% EtOH; body bent into 'U'-shape, and with a small incision in the belly (V48-52).

**Meristics:** snout-vent length (SVL) 256mm, tail 47mm (TL 303 mm); tail into SVL 5.45 times; rostral width 2.9mm, rostral height 0.8mm; eye diameter (vertical) 3.2mm; snout to eye 3.3mm.



*Habitus*: Body relatively slender and subtriangular in cross-section, with a thin, prehensile tail (SVL/Tail approximately 5–6 times; 4.92–6.16, mean 5.56, n = 5); head triangular, with a very distinct neck, bluntly rounded snout and swollen supraorbital region that does not bear elongate scales; eyes relatively large, laterally placed, and with a horizontal diameter approximately equal to the snout length.

*Scalation*: Crown of head covered in small scales, that are larger over the temporal region and somewhat irregular in outline between the eyes; they bear a prominent keel that is extended into a rounded, pale knob; the rostral is flattened, subtriangular, about 2.4–3.4 times broader than high, contacting first supralabials and



**FIGURE 2.** Right (top) and left (bottom) lateral views of the head of *Atheris mabuensis* n. sp. (Holotype PEM R17901, Mount Mabu) before fixation. Note swollen gold keel tips on the head and body scales.

three large, unkeeled suprarostrals, of which the middle is the smallest and about 1.25 times wider than high; right and left suprarostrals slightly higher than wide; nasal wider than high, with raised, embossed posterior edge, particularly on the left; nostril circular and approximately in the centre of the nasal; internasals 5, all strongly keeled; interrials 21; interorbitals 6–7, keeled, central scales more irregular in shape; circumoculars 15–15, all keeled and terminating in blunt knobs; suboculars absent; circumoculars separated from nasals by a single row of feebly knobbed scales; a row of three irregular scales, bordering supralabials between nasal and lower circumoculars; supralabials 8–8, 3 largest, and 6–8 feebly-keeled; infralabials 9–9, posteriormost feebly keeled and first in contact at the midline behind the mental, and separating the latter from 3 pairs of chin shields, the first largest; mental triangular, approximately twice as wide as deep; gulars bordering chin shields feebly-keeled, but prominently-keeled towards the rictus; 2 prementals, first largest; 132 ventrals; 47 undivided subcaudals (including spine); anal entire; dorsal scales about 1.5 times as long as wide, becoming shorter posteriorly, and 20 rows anteriorly, 25–26 rows at midbody, 17 rows posteriorly; keel on dorsal scales increasing in height from base, terminating in a rounded, pale knob that is more conspicuous on scales of the forebody; paraventrals larger than other dorsals, with a feeble, asymmetric keel; additional scales occur irregularly in rows 2–5 on the forebody, but do not form continuous duplicated scale rows.



**FIGURE 3.** Dorsal (left) and ventral (right) views of the head of *Atheris mabuensis* n. sp. (Holotype PEM R17901, Mount Mabu) before fixation. Note the poorly-defined dark V-patch on crown of head

*Hemipenis:* Both hemipenes have only partially everted, despite the rector muscles having been cut through a small lateral incision in subcaudals 13–17; the basal portion of the hemipenis reveals a typically divided organ with a number of basal spines on the lateral surfaces, and indications of a distal calyculate zone (this needs confirmation on fully everted hemipenes).

*Colouration:* Eye dirty bronze, darker in centre and with bright yellow edge around iris; crown greyish brown with each scale tipped with yellow; head pattern vague, comprising a broken inverted ‘V’-shape represented by two small dark patches over the jaw muscles; side of head dark greyish in front of eye, becoming darker towards angle of jaw; dorsum pale brown with a pale, vague and irregular dorsal chain



pattern, with faint paler edges and centre paler than body background colour; a dark edge to the chain pattern is represented only by a lateral series of subtriangular dark brown blotches that may lie adjacent to each other on either side of body, or become staggered; a series of small (sometimes only 1–2 scales), faded brown blotches occur along the flanks and align with the widest region of the dorsal ‘chain’ pattern; all scales on crown, body and upper surface of tail tipped in pale yellow to light orange, that is more prominent on the head and forebody; throat, belly and basal 2/3<sup>rd</sup> of underside of tail blue-grey, uniformly and heavily stippled with fine dark spots; underneath of tail becoming yellowish on distal third.

**Variation:** Details and meristics for the type series are summarized in Table 1. The most significant differences in colouration include: body colouration in the solitary subadult from Mount Namuli (PEM R17904) is slightly duller (bluish) with the scales on the head and forebody lacking the conspicuous yellow tips of specimens from Mount Mabu. Whether this is typical of this isolated population awaits the collection of additional material. Pale, narrow eye stripes radiating from the orbit to the lip (see Fig. 6 [top] and Fig. 7) are found in all snakes, except the holotype, although in some (e.g. PEM R17903-4) only the rear stripe is well developed. The head pattern forms a well-developed inverted ‘V’-shape (see Fig. 7, PEM R17910) in three snakes, but is reduced to two isolated dark blotches at the back of the head in the holotype, and is almost completely absent in the subadult from Mount Namuli. There is little ontogenetic colour change (based on PEM R17910); when first captured (Fig. 6, top) the juvenile snake (<150 mm TL) had darker brown body colouration that after three years in captivity has lightened slightly (Fig. 6, bottom), although the extent and intensity of yellow on the tail remains unchanged.

**Size:** Largest female (PEM R17902) 328 + 56 = 384 mm; largest male (PEM R7910) 305 + 62 = 367 mm. The series is too small to determine whether females grow larger than males.

**Etymology:** Named after the type locality, Mount Mabu, Zambezia Province, northern Mozambique.

**Suggested common name:** Mount Mabu Forest Viper

**Distribution:** Known only from the type locality, Mount Mabu, and adjacent Mount Namuli, both montane isolates in northern Mozambique.



**FIGURE 4.** *Atheris mabuensis* n. sp. (Holotype PEM R17901, Mount Mabu) in life showing habitus and general colouration. Note: Retention of yellow tail tip in adult.



**TABLE 1.** Measurements and scalation for *Atheris mabuensis*. \* includes terminal spine ; \*\* (right/left).

	Holotype PEM R17901	Paratype PEM R17904	Paratype PEM R17903	Captive PEM R17910	Paratype PEM R17904
Sex	Male	Female	Juvenile	Male	Male
Locality	Mount Mabu	Mount Mabu	Mount Mabu	Mount Mabu	Mount Namuli
Measurements					
SVL + Tail = TL	256 + 47 = 303 mm	328 + 56 = 384 mm	154 + 25 = 179 mm	305 + 62 = 367 mm	194 + 36 = 233 mm
SVL/Tail	5.45	5.86	6.16	4.92	5.39
Eye Diameter	3.2	3.6	2.3	na	2.6
Snout	3.3	4.8	2.5	na	3.2
Rostral (width & height)	2.9 & 0.8	2.7 & 1.2	1.9 & 0.8	na	2.6 & 1.0
Scalation					
Ventrals	132	135	137	135	128
Subcaudals *	47	40	39	43	41
ASR	20	20	20	21	21
MSR	25/26	23	23/24	23	22
PSR	17	17	18	18	17
Circumoculars (CO)	15/15	15/16	16/16	16/15	16/14
**					
Suprarostrals	3	3	3	4	3
Supralabials	8/8	8/8	7/8	9/8	8/8
Infralabials	8/9	9/10	10/8	10/10	9/9
Crown Scales between CO	7	7	7	8	6
Maximum number of crown scales	21	22	22	21	19

**Habitat:** All specimens were collected among leaf litter on the forest floor in evergreen mid-altitude wet forest, from approximately 1000 m a.s.l. on Mount Mabu (Fig. 8) and at 1550 m a.s.l. on Mount Namuli. The presence of the species at a higher altitude on Mount Namuli may be due to the loss of mid-altitude forest habitat on the lower slopes as a result of subsistence farming. A similar displacement of forest birds to higher montane forests on Mount Namuli has been proposed by Dowsett-Lemaire (in Jackson *et al.*, 2009). The habitat comprises closed-canopy forest (Fig. 9), except for small gaps caused by tree-falls and along stream gullies. Tall trees (up to 40–45 m height) emerge from the canopy, with *Strombosia scheffleri* dominant and others including *Newtonia* sp., *Chrysophyllum gorungosanum*, *Maranthes goetzeniana*, *Ficus thonningii*, *Blighia unijugata*, and *Funtumia africana*. Smaller trees in the understorey include *Allophylus* sp., *Canthium* sp., *Oxyanthus speciosus*, *Rawsonia lucida*, *Tabernaemontana ventricosa*, *Vepris stolzii*, and small saplings of *Cola greenwayi*, *Drypetes* sp. and *Maranthes* sp. Canopy lianas are dominated by *Millettia lasiantha* (Dowsett-Lemaire and Dowsett, unpubl. report 2008).

**Natural History:** The original specimen (PEM R17910) was maintained in captivity for over 37 months. The other specimens were kept for shorter periods (2–4 months). During this period they readily accepted small geckos (*Lygodactylus capensis* and *Hemidactylus mabouia*) as well as small amphibians (*Hyperolius* sp., *Strongylopus* sp., and *Phrynobatrachus* sp.). While in captivity they were observed to use the bright yellow tail as a caudal lure to entice prey into striking distance. In a terrarium with leaf litter and small branches they either coiled partially concealed among large leaves on the floor, or in dead twigs or leaf clumps up to 20cm above the floor. The only adult female (PEM R17902) has thick muscular oviducts and small vitellogenic ovarian follicles indicating sexual maturity at only 384mm TL.



**FIGURE 5.** Midbody, right lateral view of *Atheris mabuensis* n. sp. (Holotype PEM R17901 Mount Mabu): note oblique orientation of lateral scale rows 1–5, and the progressive asymmetry in the shape and lack of serrated keels on these scales.

The species was locally common within the large tract of wet forest (>1000m) on Mount Mabu, and it was only observed within leaf litter on the forest floor (Fig. 6 top). Local hunters when interviewed confirmed this habitat preference, and also noted that the species remained small, growing to not much more than 35 cm in length. This observation was supported by the growth of the first specimen, which measured approximately 150 mm TL when first captured, and grew to only 367 mm TL after over three years in captivity despite regular feeding. Local hunters also noted that bites from the species were painful but not lethal. Caution is still advised because serious envenomation has followed bites from *A. chlorechis* (Rödel, 1999; Top *et al.*, 2006) and *A. squamigera* (Mebs *et al.*, 1998), and even a death from the latter (Lanoie and Branch, 1991).

## Discussion

Within Africa the family Viperidae is represented by two well-defined lineages, usually placed in separate subfamilies; the night adders (Causinae) that possess enlarged colubrid-like head scales and lay eggs; and the Viperinae, which are viviparous and have fragmented head shields. The latter has undergone a number of radiations within the continent, including at least 13 species of forest vipers (*Atheris*) in the rainforests of central and eastern Africa, with two representatives (*A. chlorechis* and *A. hirsuta*) in the Upper Guinea Forest of West Africa (Spawls and Branch, 1995; Ernst and Rödel, 2002).

The genus *Atheris* Cope has never been fully revised, although Broadley (1998) collated and discussed character variation and species boundaries when describing *A. acuminata* from Uganda. At this time Broadley also validated *A. rungweensis* as a full species, which was previously treated as a southern race of *A. nitschei*. Although several subsequent papers have described additional species (*A. broadleyi*, Lawson, 1999; *A. hirsuta* Ernst and Rödel, 2002), or have revalidated (*A. suborbitalis*, Lawson and Ustach, 2000) or discussed others (*A. ansiolepis*; Lawson, Noonan and Ustach, 2001), Broadley's (1998) study remains the most comprehensive





**FIGURE 6.** *Atheris mabuensis* n. sp. (PEM R17910): Top - small juvenile (<150mm TL) photographed in situ on capture (25 January 2006, Julian Bayliss); note drab colouration imparting camouflage in habitat among leaf litter on forest floor. Bottom - same specimen (photographed 19 Nov 2008, after 34 months in captivity); note retention of juvenile colouration, particularly yellow tail tip, and development of gold tips to the keels on the head and forebody scales.



overview of the genus. The southern limit of the genus in the east is reached by *A. rungweensis*, recorded from northern Malawi (Misuku Forest; Loveridge, 1953) and adjacent Zambia (Broadley, 1998). In the west, *A. squamigera* has been recorded from northern Angola (Laurent, 1964), with a southern record provisionally assigned to the species photographed from Cangandala-Calandula (Pedro vas Pinto, pers. comm. January 2009).



**FIGURE 7.** Right lateral view of head and forebody *Atheris mabuensis* n. sp. (PEM R17904, Mount Namuli): note reduction of gold tipped scales on head and body.

On morphological grounds, Broadley (1996) recognized a Tribe Atherini including *Atheris* and *Adenorhinus* Marx and Rabb 1965, as well as two new monotypic genera, *Proatheris superciliaris* (Peters, 1854) and *Montatheris hindii* (Boulenger, 1910). A number of Atherini have been included in recent molecular phylogenies of the Viperidae. Lenk *et al.* (2001) showed that *Adenorhinus barbouri* is nested within *Atheris*, and we therefore return it to that genus, although others (e.g. Dobiey and Vogel, 2007) continue to recognize it as a monotypic genus. With its terrestrial behaviour, unusual squat habitus, and a specialized diet of soft-bodied invertebrates (Rasmussen and Howell, 1998), *Atheris barbouri* Loveridge 1930 is an anomaly within the genus.

The preliminary molecular phylogenies of Lenk *et al.* (2001) and Lawson *et al.* (2001) reveal clustering of western (*A. squamigera*, *A. hispida*, and *A. subocularis*) and eastern species (*A. desaixi*, *A. nitschei*, *A. rungweensis*, *A. ceratophora*, and *A. barbouri*). With the exception of the heavy-bodied *A. chlorechis*, the western species are characterized by very slender bodies and increasingly acuminate scalation, and none show even semi-terrestrial habits. Although *A. mabuensis* retains a prehensile tail and triangular head, its reduced scalation (i.e. the low number of dorsal scale rows, ventrals and subcaudals) and terrestrial habits are divergent from the other eastern species of *Atheris* and intermediate between them and *A. barbouri*. Both species also have subdued, predominately brown body colouration that matches that of forest leaf litter. Whether these two taxa are basal within the Atherini and therefore exhibit the ancestral habit, or whether they represent a progressive secondary reversion to such a habit will only be revealed by fuller studies.





**FIGURE 8.** General view of closed-canopy, mid-altitude forest habitat on Mount Mabue, northern Mozambique. The central valley includes the main camp from whose surroundings the type series of *Atheris mabuensis* were collected (photograph J. Bayliss).



**FIGURE 9.** Closed-canopy forest habitat around the main camp, Mount Mabu, northern Mozambique. The type series of *Atheris mabuensis* was collected in leaf litter on the forest floor (photograph J. Bayliss).



Exceptional media interest in the Mount Mabu area has followed the release of the provisional results of the Darwin Initiative survey in the region (October 2008). The interesting biodiversity discovered, including new plants, butterflies and reptiles, and the obvious conservation importance of the largely intact forest has resulted in numerous media reports (e.g. Marshall, 2009), including the publication of images of the new *Atheris* and other herpetological discoveries, e.g. a leaf chameleon (*Rhampholeon* sp., Branch, Tolley and Bayliss, in prep.). Concern has already been expressed at the loss of low and mid-altitude forests on Mount Namuli for some bird species of conservation concern, e.g. Cholo Alethe (Timberlake *et al.*, 2009). Presently no protected areas are proclaimed on Mount Mabu or Mount Namuli even though they contain large tracts of relatively intact lowland evergreen forest. It is hoped that the description of this new forest viper, and that of other new species from the region, will serve as a vehicle for the conservation of this threatened habitat.

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