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Head dimorphism in the African python, *Python natalensis* (Squamata: Pythonidae) from Tanzania

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ABSTRACT

Very little is known about intraspecific variation in the Southern African rock python which is also referred to as the Natal rock python or simply the African python, *Python natalensis* Smith, 1833 (family Pythonidae of the Order Squamata) mainly due to limited reachability of some members of the species such as the underground types and those inhabiting dense rocks. A recent study has revealed head dimorphism in the snake based on two samples from Bwiru rocky area near Lake Victoria shore in northern Mwanza City of Ilemela District, Tanzania. One morph (the "wedge-headed type") is the holotype, comprising short triangular head with U-shaped mouth. Another morph (the "shovel-headed type") is a paratype, comprising a long shovel-shaped head of burrowing design.

Key words: African python, *Python natalensis*, shovel-headed type, Southern African rock python, wedge-headed type.

INTRODUCTION

The Southern African rock python, *Python natalensis* Smith, 1833 which is sometimes referred to as the Natal rock python or simply African python belongs to the family Pythonidae of the Order Squamata (O'Shea, 2007; Alexander and Marais, 2008; Bartlett and Wagner, 2009; Beolens *et al.,* 2011; Boesveld, 2013). The body is blackish to brownish-grey in colour, with dark blotches that form a staircase-like pattern on the back; belly scales are of white color with black specks producing a salt-and-peppery pattern (Largen and Rasmussen, 1993; Alden *et al.,* 1996; Halliday and Adler, 2002; Razzetti and Msuya, 2002; Spawls *et al.,* 2002; Sandeep, 2004; Schmidt, 2006). The head is triangular and marked on top with a dark brown "spear-head" outlined in buffy yellow; teeth are many, sharp and backwardly curved; under the eye, there can be a small distinctive triangular marking referred to as the subocular mark (Mehrtens, 1987; McDiarmid, 1999; Bartlett *et al.,* 2001; Spawls *et al.,* 2002; Schmidt, 2006; O'Shea, 2007; Bartlett and Wagner, 2009; Beolens *et al.,* 2011; Boesveld, 2013).

Python natalensis is generally smaller in size (adults averaging 2.4 to 4.4 m in length) its northern relative namely the Northern African rock python also widely known as the African rock python or simply rock python, *Python sebae* Gmelin, 1789 found in Central and Western Africa and the Africa's largest snake and one of the six largest snake species in the world, in which adults may approach or exceed 6 m in length (Murphy and Henderson, 1997; Bartlett *et al.,* 2001; Luiselli *et al.,* 2001; Halliday, 2002; Luiselli and Akani, 2002; Spawls *et al.,* 2002; Henderson and Powell, 2007; Ott and Secor, 2007; Bartlett and Wagner, 2009; Beolens *et al.,* 2011; Boesveld, 2013). *P. natalensis* is also distinguished by its smaller scales on top of the head, darker coloura-tion markings on the back that are well separated blotches rather than an irregular stripe and a smaller or absent subocular mark (Starin and Burghardt 1992; Halliday and Adler, 2002; Spawls *et al.,* 2002; Schmidt, 2006; O'Shea, 2007; Boesveld, 2013).

The species occurs in Sub-Saharan Africa including Democratic Republic of the Congo, Burundi, Kenya, Tanzania, Angola, Zambia, Malawi, Zimbabwe, Mozambique, Namibia, Botswana, South Africa and Swaziland (Spawls and Branch, 1995; Branch, 1998; Halliday, 2002; Boesveld, 2013). It is found in a variety of habitats including forest, savanna, grassland, semi desert and rocky areas where it is particularly associated with the areas of permanent water hence usually found on the edges of swamps, lakes and rivers; it readily adapts to disturbed habitats, so is often found around human habitation especially cane fields (Spawls and Branch, 1995; Bartlett *et al.,* 2001; Razzetti and Msuya, 2002; Alexander and Marais, 2008). The species reproduces by egg-laying and unlike most snakes the female protects her nest and sometimes even her hatchlings; it is an invasive species, possessing a threat to indigenous wildlife and also to human safety; like all pythons, *P. natalensis* is a non-venomous snake which kills its prey by constriction and often eats animals up to the size of antelope (Luiselli *et al.,* 2001; Halliday and Adler, 2002; Spawls *et al.,* 2002; O'Shea, 2007; Bartlett and Wagner, 2009; Boesveld, 2013). However, very little is known about intraspecific variation of *P. natalensis* because of the existing difficulty to ascertain some members of the species such as those inhabiting the areas of dense rocks. The present work is reporting a substantial intraspecific variation in *P. natalensis* based on the head morphology, expanding information on the taxonomic status of the species.

MATERIALS AND METHODS

The study examined two specimens of *P. natalensis* from Bwiru Girls' Secondary School (Fig. 1) located in northern Mwanza City of Ilemela District, some 5 km north of the city centre or 4 km south of Mwanza Airport, Tanzania (2° 28' 0" South and 32° 53' 60" East). The school is bordered in both its southern and western directions by a series of rocks which are a well-known habitat for pythons which occasionally encroach into the school environment. Both snakes were accessed dead because of human stoning. The first specimen was killed and collected on 07th April 2017 as it aggressively encroached into a school dormitory, some 200 m eastward the lake shore. The second specimen was killed and collected on 22nd May 2017 near the parade ground, some 300 m eastward the lake shore. It was accompanied by an elder snake of about twofold larger body size, facilitating necessary protection hence assumed to be the mother. However, the elder snake successfully escaped the attacks by running back into the southward rocky habitat.

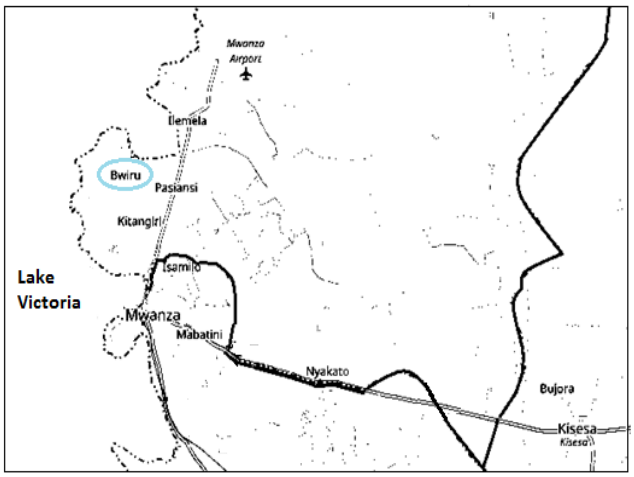


Figure 1: Line map of Mwanza City (modified from OpenStreetMap contributors, 2017) showing Bwiru area, the position of locality for *P. natalensis* specimens.

Both specimens were severely injured as a result of the stoning; they were measured of total length, photographed and then disposed of by burying them under the ground. Photographs were later examined of specimens at the Department of Life Sciences - Mkwawa University College of Education (a Constituent College of the University of Dar es Salaam) located in Iringa Municipality, some 500 km south-west of the Dar es Salaam City. Analysis of intraspecific variation was done based on the morphological profile of the head for each

specimen. Total length was compared from tip of mouth to tip of tail; head length was estimated from tip of snout to posterior edge of posteriormost supralabial; head height was estimated from sagittal level or central corner of mouth to top of head, after Gower and Winkler (2007).

RESULTS AND DISCUSSION

Referred materials (Fig. 1-4)

Two specimens (1 and 2); representing two type series (1 and 2) of unknown sex were examined; Mwanza City - Tanzania (2° 28' 0" South and 32° 53' 60" East).

Description

Shared characters: Both specimens are largely brown coloured pythons with many irregular black blotches bordering the back; body markings varying between brown and yellow, but are white on the underside; under the eye there is no subocular mark; teeth are many, sharp and backwardly curved. All these are key characters of *P. natalensis* (Razzetti and Msuya, 2002; Schmidt, 2006; Bartlett and Wagner, 2009; Boesveld, 2013)

Variation: Specimen 1 (representing Type Series 1) has total length of 1.8 m (as measured from snout to tail length), indicating to be a juvenile; the head is short and triangular (wedge-shaped) as the snout, with a U-shaped mouth; the head is marked on top with a dark brown "spear-head" outlined in buffy yellow, resembling the known holotype materials of the species (Mehrtens, 1987; Schmidt, 2006; Bartlett and Wagner, 2009; Boesveld, 2013). Specimen 2 (representing Type Series 2) has total length of 3.8 m (about twofold longer than Specimen 1) hence an adult (Luiselli *et al.,* 2001; Razzetti and Msuya, 2002; Bartlett and Wagner, 2009; Beolens *et al.,* 2011; Boesveld, 2013) with about twofold larger body size than Specimen 1; the head is long and shovel-shaped with a pear-shaped snout and a tapering mouth, which are of burrowing design and therefore a new feature in the species; the head markings are unknown as could not be clearly photographed.



Figure 2: *Python natalensis*. Photographs showing the short triangular-shaped head of holotype (left) and the long shovel-shaped head of paratype (right); note the injured neck of the paratype.



Figure 3. *Python natalensis.* Modified photographs of holotype (above) and paratype (below); note the triangular-shaped head of holotype and the shovel-shaped head of paratype.

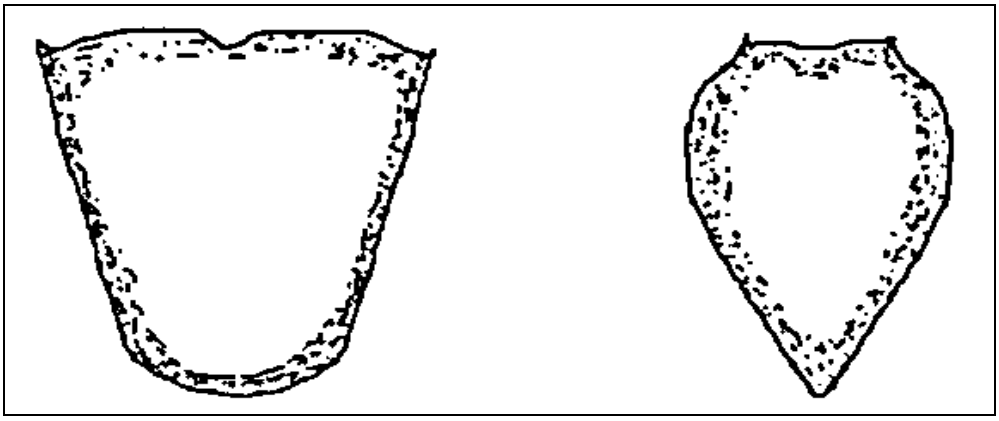


Figure 4. Dorsal view of *Python natalensis* showing its dimorphic heads. Drawings of holotype (left) and paratype (right).

Diagnosis:

Both of the referred materials fit clearly the morphe-metric homophyly of *P. natalensis* (Schmidt, 2006; Bartlett and Wagner, 2009; Boesveld, 2013), indicating to be belong to the species with notable intraspecific variations. Specimen 1 is generally compatible with the holotype in having a short triangular head with a U-shaped mouth, differing from Specimen 2 which is generally a paratype in having a longer shovel-shaped head comprising a pear-shaped snout with a tapering mouth, all never reported before. Members of *P. natalensis* are generally diagnosed by their largely brown or black coloured patterns with many irregular black blotches bordering the back, and a small or lack of subocular mark as opposed to *P. sebae* which is the closest sister species possessing an irregular stripe (rather than the blotches) and a large subocular mark (Mehrtens, 1987; Starin and Burghardt, 1992; Schmidt, 2006; Bartlett and Wagner, 2009; Boesveld, 2013).

The triangular head is a well-known character of *P. natalensis,* illustrating that Specimen 1 is a holotype; however, the character cannot be used to discriminate *P. natalensis* as it is also found in other pythons including *P. sebae* which is the sister species. In regard to the new discovery, the shovel-shaped head is a new feature in *P. natalensis,* indicating that Specimen 2 is a paratype of the species. The character provides important information on the taxonomic status of *P. natalensis*, and it discriminates the species from the rest. A rather

comparable shovel-shaped head is known in the African Burrowing Python commonly referred to as the Calabar python, *Calabaria reinhardtii* (Schlegel, 1851), which is a nonvenomous burrowing boa species endemic to west and central Africa (Beole-ns *et al.*, 2011; Pyron *et. al.*, 2013). The resem-blance suggests that the identified paratype of *P. natalensis* is most likely adapted for burrowing and thus the snake could be underground.

CONCLUSION

The sampled snakes have revealed that the African python, *P. natalensis* exhibits distinct head dimorphism, comprising a "wedge-headed type" which is a well-known holotypte occurring in Southern Africa living sympatrically with a "shovel-headed type" which is a burrowing paratype newly discovered in Tanzania.

Conflicts of Interest: The author stated that no conflicts of interest.

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