

species. Secondly, to collect baseline behavioural and morphological data. And finally, to highlight the lack of research into the extensive herpetofauna of the region.

The study took place at Kissesa, near Mwanza, which is located on the Southern shores of Lake Victoria. To the best of our knowledge, this is the first behavioural account of this species.

ANATOMICAL DESCRIPTION

A. mwanzae is sexually dimorphic, with the males being bigger than the females. Breeding males are usually between 25-35 cm in total length (Mean SVL = 102.90 mm +/- 16.43 SD; N = 32) whereas the females rarely exceed 30 cm (Mean SVL = 94.95 mm +/- 12.27 SD; N = 31). The reason for this sexual dimorphism is likely to be due to sexual selection for larger males, however niche divergence between the sexes cannot be discounted [see Yarnell & Jones, In Prep., and for a good example of the evolution of sexual dimorphism in an anolis lizard see Perry (1996)].

Agamids are fairly robust creatures and *A. mwanzae* is no exception. It has a short body, with a tail one and a half times as long as the body, with long limbs and toes. The toes have large claws in which to grab and climb vertical rock surfaces with. The fourth toe is longest. They have a triangular head with a pineal eye [a primitive light sensitive organ (Branch, 1994)], which is visible under the occipital scale, in the crown of the head. Head scales are small and irregular. The tympanums are larger than the eyes and not covered by scales. The large eyes have scaly eyelids and round pupils. Both the upper and lower jaws have 2 sets of between 10-18 triangular teeth, which get smaller as they near the snout. In adults 4 large fangs are present, 2 each in the upper and lower jaws, and in between, 2 smaller fangs on each jaw. Larger individuals have larger teeth and fangs. Both sexes have small frills and spines around the head and neck. There are between 60-90 mid-body scales, which are strongly keeled. A single row of 8-12 pre-anal pores are present in males. About 10% of the individuals observed had external, small red mite parasites, mostly located under the skin folds on the neck. The tail cannot be shed or regenerated and many are seen with stumpy tails, which were possibly lost in combat or to predators (Harris 1964).

Breeding males have bright reddish pink heads, necks and trunks with blue limbs and tails. Juvenile males and females are more cryptic in colour, being olive to dark purple/grey in colour often with a pale dorsal streak. Bellies are pale white, with throats having a purple network. Hatchlings are especially well camouflaged, ranging from speckled olive to granite grey.

NOTES ON THE BEHAVIOUR AND MORPHOLOGY OF *AGAMA MWANZAE* IN NORTHERN TANZANIA

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INTRODUCTION

The Mwanza agama (*Agama mwanzae*) is a large agama distributed throughout northwestern Tanzania from the Serengeti National Park, to the heavily human populated areas around Lake Victoria. *A. mwanzae* belongs to the family agamidae, which comprises about 300 species in 30-40 genera, which are distributed throughout most of the world, being replaced in the new world by the Iguanidae (Branch, 1994).

No scientific work has been carried out on *A. mwanzae* and the aim of our study was three fold. Firstly, to study the sexual dimorphism in this

Breeding males can also change to a more cryptic dark grey/purple, if chased out of territory or feel threatened or if they are cool. They are also darker first thing when basking presumably to increase the rate in which they warm up by having a bigger albedo. Furthermore, they are better camouflaged when cold and sluggish thereby making it harder for predators to spot them. Contrary to local beliefs, these colourful lizards are not poisonous.

BEHAVIOURAL ECOLOGY

The behavioural ecology of *A. mwanzae* is complex and interesting, especially regarding social interactions, which raised more questions than answers. The Mwanza agamids we observed lived exclusively on rock outcrops, sheltering in the spaces between large boulders or under the peeling skin of granite. Where human habitation has been built on or around the kopjes, the agamas find additional shelter in the spaces of the corrugated iron roofs and mud walls. Such shelters were shared by several agamas at anyone time and were consistently used by the same individuals. Indeed, at one crack we observed up to 20 juveniles and adults emerging from the same shelter every morning to bask in the sun. Therefore, *A. mwanzae* is a very gregarious and return to the same shelter every night. Living in large groups can give several benefits, such as; increased thermoregulation at night, and reduced predation risk. However, *A. mwanzae* is probably forced into a gregarious mode of life due to the limited number of crevasses which shelter provided. However, this hypothesis needs testing.

The fact that individuals return to the same shelter every night suggests they may be territorial. Further evidence for this comes from the cock lizard. Each group of lizards that shared a shelter had one male (the largest) that would develop conspicuous bright pink and blue colouration. Harris (1964) described the dominant male of Nigeria's *A. agama* as the cock lizard and we borrow his definition. Males in breeding colour were more often observed perched high up, scanning the surrounding area for possible rivals, displaying their bright colours and aggressive head bobbing actions. Any other male displaying the bright colours that was spotted by the resident cock male was first met with aggressive head bobbing movements, which can be interpreted as a warning, and if the warning was not headed the resident male would then advance and chase the intruder away. Therefore, the resident cock male defended an area from other cock lizards and we conclude that *A. mwanzae* is territorial.

Despite living in such close confines, very little aggressive behaviour was observed between individuals. Of the aggressive encounters observed, the

majority involved males. One reason why so few aggressive interactions were observed was because each individual in the group knew its place in a social hierarchy, and therefore avoided unnecessary aggressive encounters. This is backed up by the observation that the smaller of 2 rivals would yield rather than risk injury by fighting a larger more powerful rival. Further evidence for a hierarchy comes from the fact that only the largest male lizard in each group displayed bright colours, which possibly attracted females and warned rival males simultaneously. Other males were tolerated in the cock lizards territory as long as it maintained a cryptic colouration. Of the interactions in which 2 males clashed, the larger and more brightly coloured won. In contrast the females and juveniles of both sexes spent the majority of their time feeding and resting, preferring not to waste energy on costly antagonistic behaviours. Displaying in the males was the main difference between male and female behaviour.

In comparison to the cock lizards, females and juveniles spend the majority of their time foraging and resting. After emergence and basking, they would move to a boulder near by, where they would sit and watch for prey and predators. The boulders provide a suitable vantage point for both purposes. *A. mwanzae* is an opportunistic insectivore feeder, seizing any insect that comes its way. They can often be seen eating from a stream of ants, which make up the majority of their diet. They were also often seen making a short dash for other insects (usually about 30 cm – 1 m), that ranged from grasshoppers to flies, before dashing back to their rock to continue their watch and to devour their prey. One male was seen climbing up to a swarm of bees and grabbing one, before retreating to eat it. They were also observed supplementing their diet with succulents, herbs and flowers. One was also observed lapping at water. Harris (1964) noted that the Ground agama (*A. agama*) from Nigeria also took small snakes, scorpions, a small finch, and therefore took any reasonable sized animal they come across, which may also be the case for *A. mwanzae*, and further study would confirm this.

Only one predation event was observed. This involved a kingfisher taking a hatchling. This is probably their most vulnerable stage due to their small size. Other predators would include snakes, other birds and large conspecifics. However they are hard to catch due to their excellent vision and they are extremely quick once they have reached their optimum temperature. Harris (1964), documents cannibalism in the agamids (*Agama agama agama*) of Nigeria. Although we observed no cannibalism, we did notice that hatchlings or lizards under a total length of 10 cm never congregated with or shared the same retreats as juveniles and adults. This may support the idea that there is a risk of predation by their larger conspecifics. If a predator was observed they would make a dash for the nearest crevasse or crack they could get to by

sprinting directly to it – usually over open ground. A similar action was observed every evening as they headed back to their nightly shelter, where they would bask in the last of the sun's rays before retreating for the evening.

CONCLUSION

The behaviour of the Mwanza agama is just as colourful as a cock lizard in full breeding colour. They live in social groups of about 10 individuals, with a dominant cock lizard maintaining a territory. They are very common on the rock outcrops of the area and as this study has shown they are a very interesting animal in which to study. Insights into the evolution of sexual dimorphism, reptile mating and social systems, dominance hierarchies and mate selection could all be gained from further study of the Mwanza agama. Furthermore, by observing this lizard it became clear that in general, very little is known about the reptile fauna of the region, not only in terms of what can be found there, but also regarding the behaviour, morphology, and conservation status of many species of reptile and amphibian. Clearly, there is room for much more research to be carried out on the reptiles of North-western Tanzania both in terms of surveys and field studies.

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