

Observations on the Nile monitor lizard (*Varanus niloticus*, L.) in Queen Elizabeth National Park, Uganda

E. L. EDROMA and W. SSALI *Uganda Institute of Ecology, Box 22, Lake Katwe, Uganda*

Summary

The daily activity, feeding habits and intra- and interspecific relationships of the monitor lizard *Varanus niloticus* (L.) were studied from 07.00 to 17.00 h. The lizards basked in the mornings (07.00–09.30) and afternoons (14.30–15.10). They are scavengers and predators.

Résumé

L'activité journalière, les habitudes alimentaires et les relations inter- et intraspécifiques du varan du Nil, *Varanus niloticus* L. ont été étudiées de 7 à 17 heures. Les varans prennent le soleil le matin (7.00–10.30) et l'après-midi (14.30–15.10). Ils sont charognards et prédateurs.

Introduction

The Nile monitor lizard *Varanus niloticus* (L.) is one of some thirty species in the genus *Varanus* occurring in Africa, India, Malaysia and Australia. The species, sometimes known as the Nile monitor, is widespread in Uganda and is the largest widely distributed lizard in Queen Elizabeth National park reaching 2 m (Pitman, 1971). Though reported as a fierce and active predator, the Nile monitor in the Park is shy and immediately runs into hiding at the slightest sign of a person. Though common, there is no record of any study on the species in Uganda and elsewhere except that of Cowley (1930) in South Africa. This deficiency prompted observations on the general ecology of *V. niloticus* in the park, emphasizing the general daily activity pattern and feeding habits.

The observations were made during 25 February–30 June 1980 in four sites within one square kilometre of Mweya Peninsula (built up part of area A in Kenyi, 1979). The compound and its surroundings (1.8 ha) of the Chief Research Officer's house with two garbage collecting places, the launch landing (0.8 ha) below the Mweya Safari Lodge, the premises of the Uganda Institute of Ecology (0.9 ha), and the area (0.8 ha) surrounding the Mweya Safari Lodge, formed the study area. All these places were open mosaic *Sporobolus* grassland with hedges of *Apocynacea* species.

The monitor lizards and their burrows in the study area were counted and the reptiles were watched from the time they emerged from the burrows until they retired in the evening. Notes were taken for the time of emergence, size or length

of the animal (large, over 1.5 m; medium, 1.0–1.5 m; small, less than 1.0 m), weather conditions and what the animal did (movements, locomotion, basking, feeding, resting, fighting, mating, etc.). Certain aspects, such as home range, required ability to recognize the animals individually.

Results and Discussion

Habitat

A total of 47 *V. niloticus* were recorded of which 35 were successfully traced to their burrows (Table 1). Holes or crevices served as burrows. None of them was constructed by the monitor lizard; the animals were opportunists and occupied them as shown in the American lizards (Smith, 1946). The activities of the reptiles were centred around the burrows within a radius of 300 m.

Table 1. Burrow locations for 35 Nile monitor lizards in Mweya Peninsula

Holes formerly occupied by other animals e.g. snakes, rats, warthogs, etc.	9
Drain pipes	8
Holes in termite mounds	6
House ceilings	5
Spaces in heaps of stones and gravel	4
Old launches	3
Total	35

V. niloticus detected its environment by the use of the eye and the tongue. Bellairs (1969) reported most diurnal reptiles to respond much more readily to moving than to stationary objects. While our observations were consistent with this report, the nature of the moving objects seemed to matter. Monitor lizards ignored moving vehicles, buffaloes and hippopotamus but they escaped when a person passed by. Being an olfactory and a tactile organ (Bellairs, 1969), the tongue of the lizard frequently darted out to sense the environment and food.

Encounters (Table 2) between monitor lizards and people, buffalo, hippopotamus, pied kingfisher, Egyptian geese, banded mongoose, spurwing plovers, great white egret, weaverbird and marabou stork were observed. The majority (70%) of the encounters with people resulted in the monitor lizard escaping into bushes, burrows or plunging into water. Only 15% of the encounters with people did not cause the lizards to escape into hiding. These were in an area where the burrows were close to houses and the animals had become accustomed to people. In the remaining 15% of the encounters, the monitor lizards became aggressive to people and in one of these a small boy was thrashed by the tail of *V. niloticus*. Rose (1950) mentioned similar aggression in South Africa.

Pied kingfisher (*Ceryle rudis*), spurwing plover (*Hiploptenus spinosus*) and a weaverbird (*Ploceus* sp.) provoked the reptile. The birds flew some 2 m above the ground and then suddenly dived aiming at the reptile. Once started, the birds continued provoking the reptile in this manner until the latter ran away.

Table 2. Reactions between monitor lizards meeting with other animals

Other animals	Number of	Reaction
People	100	70% monitor lizard escaped 15% monitor lizard aggressed and 15% monitor lizard showed no reaction
Buffalo	2	No reaction
Hippopotamus	1	No reaction
Pied Kingfisher	5	No reaction
Egyptian geese	5	No reaction
Banded mongoose	6	Indifferent to each other
Great grey mongoose	1	Monitor lizard ran away
Spurwing plover	2	Birds aggressive towards reptile
Great white egret	2	Monitor lizard chased egret in one case and no reaction in other
Weaverbird	1	Bird aggressive towards reptile
Marabou Stork	1	The monitor lizard chased away the bird
Cats	3	No reaction
Total	129	

Table 3. Emergence from burrows related to different sizes of Nile monitor lizards (Figures in brackets show % frequency of emergences)

Time	Lizard length			Total
	Small	Medium	Large	
		(Below 1.0 m)	(1.0–1.5 m)	(over 1.5 m)
0700–0730	1 (4.3)	1 (4.2)	0 (0)	2 (8.3)
0730–0800	4 (16.7)	3 (12.5)	0 (0)	7 (29.2)
0800–0830	2 (8.3)	3 (12.5)	3 (12.5)	8 (33.3)
0830–0900	0 (0)	4 (16.7)	3 (12.5)	7 (29.2)
Total	7 (29.2)	11 (45.8)	6 (25.0)	24 (100.0)

Basking

Most monitor lizards left their burrows after 08.00 h for basking. The time of emergence varied depending on the size of the animal, the location of the burrow and the atmospheric temperature. The smaller monitor lizards possessed a larger surface area to volume ratio, thus they warmed faster and emerged earlier than the bigger animals (Table 3). As bulk impedes the rate of change in the body temperature of ectothermic vertebrates (Bogert, 1949, 1959) the smaller monitors, therefore sensed the rise in air temperature faster than the larger ones. Eighteen of the 24 lizards with a burrow entrance directly facing the sun emerged before 08.30 h, followed by those (six) with a burrow entrance in the shade. Generally, the earlier the sun appeared or the hotter the morning, the sooner the reptiles came out of their burrows.

There were two basking periods, one from 07.30 h and lasting between 40 and 70 min depending on the size of the animal and the intensity of solar radiation, and the afternoon one, occurring after 14.30 h and usually lasting not more than 40 min, after which the animal fed and retired to its burrow. Basking was such that the animal orientated its body continually so that maximum surface area was exposed to the sun. The smaller the animal the shorter the time for basking. Similar behaviour was observed in the smaller lizard *Anolis limifrons* (Bellinger *et al.*, 1970) and in *Amphiboturus* lizards (Bradshaw & Main, 1968). Out of 43 instances, preference was given to stones (11), concrete surfaces (9), sand (8), bare ground with pieces of metal (8), and short grass (2) as surfaces against which the reptile basked.

Practically all the activities were preceded by basking. The broad flattened body appeared also to promote rapid heat absorption. Objects like stones, concrete surfaces, sand and bare ground, which heated faster than the air were preferred on warm or hot days. On cooler days the monitor lizards chose grass and tree surfaces for basking. This was probably because of the insulating nature plant materials offered against the colder ground below.

Feeding habits

Writing about American lizards, Smith (1946) states that most of them are insectivorous, some omnivorous, few are herbivorous and that some prey on lizards of their own or other species. The feeding habits of *V. niloticus* in Queen Elizabeth National Park agree with most of these characteristics.

Table 4 lists the food frequently ingested by the Nile monitor in 109 observation days. The first six items show the reptile's habit as a scavenger while the rest as a predator. It more frequently scavenged than preyed probably because preying was done in thickets and other hide-outs and the observations were

Table 4. Food ingested by Monitor lizards in 109 observation days

Food item	Number of days
Fresh intestines of fish	34
Cooked remains of fish	23
Bones other than of fish	11
Remains of lion kills	8
Chicken bones	7
Cooked banana remains	6
Caterpillars	5
Earthworms	5
Insects (unidentified)	4
Rats	3
Agamid lizard	1
Cockroaches	1
Leafhopper	1
Total	109

difficult to make. The scavenging habits seem to indicate that the reptile is a voracious animal. Seven times it unsuccessfully tried to swallow a piece of bone and meat too big for its mouth. In two other cases the animal succeeded after breaking the bones against hard objects and tearing the meat from the bones with its teeth. If a larger lizard met a smaller one feeding, the latter ran away carrying with it the food between its jaws, or if the food was too big to carry, the food was left behind. On seven occasions a larger monitor lizard chased a smaller one holding a fish between its jaws. In five of these, the chase ended in the smaller dropping the fish for the larger animal to devour while in the other case the larger lizard gave up the chase. In one incident where the piece of food was too big to swallow or break into small pieces, it was carried and hidden in the burrow.

As a predator, the lizard hunted by stalking or by actively chasing the prey. Two monitor lizards caught one rat each and a third preyed on an agamid lizard. On different days the reptile ran, caught and swallowed seventeen caterpillars, five cockroaches and four leaf hoppers. Twice it chased a skink and a rat but failed to catch them.

Although eggs and birds were reported as food for the monitor lizards, there was no evidence to support this in the present study. However a monitor lizard once harassed a chicken and four times it climbed trees where bird nests were, probably looking for eggs and chicks. Eleven times in 3 months monitor lizards were seen digging with their snouts and front limbs through sand and loose soil, probably hunting for reptilian eggs.

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