SOME OBSERVATIONS ON DIURNAL ACTIVITY PATTERNS, HABITAT, AND NATURAL HISTORY OF MABUYA AFFINIS (SCINCIDAE) IN THE NIGER DELTA, NIGERIA

GODFREY C. AKANI[1] AND LUCA LUISELLI[2]
[1]*Department of Biological Sciences, Rivers State University of Science and Technology, P.M.B. 5080, Port Harcourt, Rivers State, Nigeria*
[2]*Environmental Studies Centre Demetra and F.I.Z.V., via dei Cochi 48/B, I-00133 Rome, Italy*
(E-mails: lucamlu@tin.it, or lucalui@iol.it) [author for correspondence]

ABSTRACT

Some observations on the activity patterns, habitat, and reproductive phenology of the skink *Mabuya affinis* are presented in this paper. The study was conducted, between April and May 2000, in a locality of the eastern Niger Delta, south-eastern Nigeria. Skinks were diurnal, and exhibited a bi-peaked activity pattern, with a first and small peak around 9-10.00 am, and a second high peak by 2.00 pm. Lizard activity intensity was positively influenced by increases of both air and substratum temperatures, and negatively by increases in relative humidity. *Mabuya affinis* fed mainly upon insects (termites and ants), and was typically linked to altered habitats in the forest-plantation mosaic of the Niger Delta. Oviposition is likely to occur during the dry season, and egg hatching at the end of the dry season.

THE skink *Mabuya affinis* is one of the most widely distributed reptiles of the Niger Delta Basin (Akani, Luiselli & Politano, 1999). In terms of abundance, and together with the congener *Mabuya maculilabris*, it is next to the Rainbow Lizard *(Agama agama)* which is the most abundant, particularly in suburban habitats (Butler, 1986; Reid, 1986; Akani et al., 1999). Specimens of *Mabuya affinis* are commonly found on the forest floor, and in and around human settlements. According to Reid (1986), it is a typical species of modified vegetation, rarely recorded far into primary forest. Despite their abundance in the field and wide distribution, however, ecological studies on this scincid are scarce, particularly in Nigeria where we can avail ourselves of only a few comments reported by Dunger (1972, 1973), Butler (1986), Reid (1986), and Akani et al. (1999).

As a part of a larger ecological project on forest reptiles of Nigeria (e.g. see Luiselli, Akani & Capizzi, 1998, 1999; Luiselli, Angelici & Akani, 2000), we conducted a short-term study devoted to the daily activity patterns and habitat preferences of *Mabuya affinis* at a site of the Niger Delta. The present note reports the results of this investigation.

STUDY AREA

The study was conducted between the towns of Rumuosi and Rumuigbo in the suburbs of Port Harcourt - the capital city of Rivers state, Nigeria (Figure 1). Situated within the costal plain, on the eastern flank of the Niger Delta, the area is characterized by secondary forest vegetation adjoined by a series of cultivated and abandoned farmlands, plus some derived grassland due to over cropping. The climate is essentially tropical with approximately six months of dry season (November - April) and six months of rain season (May - October). Rainfall is high, and records over

Fig. 1 Map of south--eastern Nigeria, showing the location of the study area.

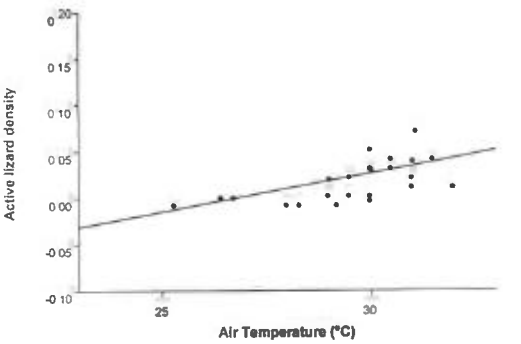


Fig. 2. Relationships between air temperature and density of above-ground active *Mabuya affinis* (number of specimens x m^{-1} at the study area). For statistical details, see text.

1250 mm annually. The major occupations of the people here are farming, hunting and fishing. Others are palm wine tapping, processing of oil palm fruit from the palm Elaeis guineensis, which is quite abundant here to a density of not less than 20 individuals per hectare.

MATERIALS AND METHODS

The skink activity pattern in this study was based on the number of skinks counted along a 200 meter long transect every 30 minutes from 0600 - 1800hrs for 10 days, between April and May, 2000. The study transect was walked along only one direction at each sampling, to avoid multiple counts of the same lizard specimens. At each sampling time, air, and soil temperature as well as relative humidity measurement were made (using a mercury. in glass thermometer and whirling hygrometer respectively) to investigate whether or not any correlations exist between skink abundance and time of day, and these ecological factors. All sighted individuals were observed by means of a pair of powerful binoculars to identify the food items they caught during their normal activities, and behaviours elicited at different periods of the day. We considered active all the lizard specimens found above-ground, i.e. including both the individuals sitting and moving in sun and those sitting and moving in shadow. Hidden specimens were considered not active (Anibaldi, Luiselli & Angelici, 1998). The basking duration was determined by using a stopwatch.

To determine habitat preference of *Mabuya affinis* at the study area, seven major skink habitats were identified: Cassava Peel Dump (CPD), Timber Piles (TP), Oil Palm Fruit heap (OPFH), Garbage Dump (GD), Dilapidated building (DB), Ground and Reed (GR), and Shrub/Tree (ST). At intervals of two days, these habitats were visited and skinks found within a 20 meters radius counted at the peak activity period. The numerical abundance obtained in this second experiment was used as a measure of this species' habitat preference.

Statistical analyses, with all tests being two-tailed and alpha set at 5%, were performed with Prism 3.0 (GraphPad) PC package.

RESULTS AND DISCUSSION

Raw data showing the activity patterns of *Mabuya affinis* in relation to air and soil temperature, and relative humidity, for 10 different days at the study area, are presented in Table 1. Using the density of above-ground active lizards sighted while walking along the transect (number of specimens x m^{-1}) as a measure of activity intensity, it resulted that above-ground lizard density increased significantly with increases of both air

TIME (HOURS)	SOIL T (°C)	AIR T (°C)	% HUMIDITY	NO OF SKINKS	MAJOR ACTIVITY TYPES
0600	25.6 ± 0.7 (25-27)	25.3 ± 0.6 (24.5-26)	92 ± 1.8 (86.94)	0	Hiding
0630	26.3 ± 0.9 (24.5-27)	26.4 ± 1.0 (25-26)	90 ± 2.1	0	Hiding
0700	26.3 ± 0.8 (25.5-27)	26.7 ± 0.8 (25-28)	91 ± 2.5 (84-96)	0	Hiding
0800	29.0 ± 0.9 (26.5-30)	28 ± 1.3 (26-29)	89 ± 2.8 (82-92)	0	Hiding
0830	30 ± 1.5 (26.5-30)	29.5 ± 1.8 (27.0-30)	85 ± 1.6 (80-92)	2 (0 - 4)	Basking Running
0900	30 ± 0.7 (26-31)	29 ± 1.5 (26-30)	83 ± 2.2 (76-87)	2 (0 - 3)	Basking Running
0930	30.5 ± 1.8 (26.5-31)	29.5 ± 1.8 (26-31)	81 ± 3.6 (76-89)	6 (2 - 10)	Basking Running
1000	31 ± 0.4 (27.0-32.5)	29.0 ± 0.6 (27-31.5)	78 ± 2.4 (72-86)	4 (2 - 8)	Basking Running / Eating
1030	31.5 ± 0.6 (28.0-32.1)	30.0 ± 1.4 (27-31.5)	78 ± 2.7 (72-83)	12 (3 - 16)	Basking Running / Eating
1100	31.0 ± 1.3 (29.0-32.0)	30.5 ± 0.9 (27.8-31.5)	75 ± 3.5 (68-82)	8 (2 - 16)	Basking Running / Eating
1130	32.1 ± 1.2 (30.0-31.8)	31.0 ± 0.9 (30.0-32.0)	75 ± 2.8 (65-80)	4 (2 - 7)	Basking Running / Eating
1200	32.5 ± 0.8 (29-33.5)	30 ± 0.8 (28-31.8)	58 ± 3.6 (56-60)	6 (2 - 12)	Basking Running / Eating
1230	33.0 ± 1.1 (30.0-34.5)	30.5 ± 0.8 (29-31.5)	56 ± 2.9 (51-63)	10 (2 - 14)	Basking Running / Eating
1300	32 ± 0.9 (30-34.0)	31.0 ± 1.5 (29.5-31.8)	58 ± 3.1 (54-60)	8 (5 - 11)	Basking Running / Eating
1330	33 ± 0.5 (30-34)	30 ± 1.3 (29.8-32.0)	56 ± 0.7 (53-62)	8 (3 - 10)	Basking Running / Eating
1400	33.6 ± 1.4 (30.6-34.5)	31.1 ± 0.9 (29.5-32.7)	48 ± 2.8 (44-52)	16 (5 - 19)	Running Resting
1430	33.2 ± 0.8 (30.0-34.0)	31.5 ± 1.3 (30.0-32.4)	54 ± 3.2 (50-64)	10 (5 - 14)	Running Resting
1500	33.0 ± 1.2 (30.5-33.8)	32.0 ± 0.6 (30.5-33.8)	56 ± 2.7 (53-64)	4 (2 - 6)	Running Resting
1530	32.6 ± 1.5 (30.0-33.5)	31 ± 1.1 (30.0-33.4)	54 ± 1.9 (50-60)	6 (2 - 9)	Running Resting
1600	32 ± 1.8 (30.5-33.0)	31 ± 1.5 (30.4-32.2)	62 ± 3.1 (56-67)	4 (1 - 6)	Resting
1630	31 ± 1.5 (30.2-32.8)	30 ± 0.8 (29.0-31.2)	62 ± 2.5 (52-67)	2 (1 - 4)	Resting
1700	31.2 ± 0.6 (30.0-31.8)	30 ± 0.9 (29.7-31.2)	64 ± 1.8 (60-69)	1 (0 - 3)	Resting Hiding
1730	31.2 ± 0.8 (30.5-31.6)	29.2 ± 1.4 (29.0-30.0)	72 ± 2.8 (68-84)	0	Hiding
1800	30 ± 1.4 (29.7-30.9)	28.3 ± 1.9 (27.8-29.5)	78 ± 3.5 (68-88)	0	Hiding

Table 1: Raw data showing the above-ground activity periods of *Mabuya affinis* in relation to air temperature, soil temperature, and relative humidity for 10 different days around Port Harcourt city in south-eastern Nigeria. Means are followed by ± one Standard Deviation, and ranges are in parenthesis.

DATE	CPD	TP	OPFH	GD	DB	GR	ST
13/4/2000	6	6	4	4	8	3	1
15/4/2000	5	4	2	4	14	2	0
17/4/2000	5	3	2	6	6	1	1
19/4/2000	9	3	6	8	10	0	1
21/4/2000	7	4	1	5	13	4	2
23/4/2000	10	2	3	8	9	1	0
25/4/2000	4	6	2	8	11	0	0
27/4/2000	2	6	4	6	14	3	1
29/4/2000	4	4	3	4	5	3	0
01/5/2000	2	1	3	8	8	1	3
03/5/2000	8	3	6	2	8	2	1
05/5/2000	5	3	1	6	3	1	1
07/5/2000	5	2	1	5	7	2	0
09/5/2000	7	1	2	2	12	4	0
11/5/2000	4	5	1	7	5	0	0
13/5/2000	8	2	4	10	13	2	1
15/5/2000	11	3	2	3	10	2	0
17/5/2000	4	1	3	3	8	3	2
19/5/2000	4	4	3	5	7	1	1
21/5/2000	2	2	5	2	7	3	1
Total	**112**	**65**	**58**	**106**	**178**	**39**	**16**
Mean	6	3	3	5	9	2	1
Std dev.	2.6	1.6	1.5	2.3	3.2	1.2	0.8

Table 2: Numbers of *Mabuya affinis* specimens sighted in the various habitats surveyed at the study area. Habitats are: Cassava Peel Dump (CPD), Timber Piles (TP) Oil Palm Fruit Heap (OPFH), Garbage Dump (GD) Dilapidated Building (DB); Ground and Reed (GR); and Shrub/ Tree (ST). Observations were made during activity peak periods (0930 - 1430 hrs) between April and May, 2000.

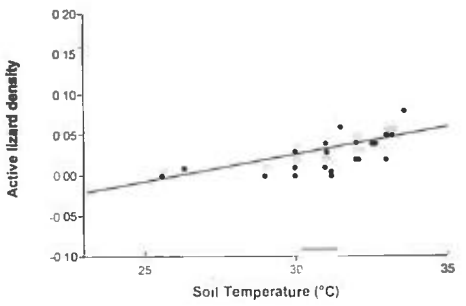


Fig. 3. Relationships between soil temperature and density of above-ground *Mabuya affinis* (number of specimens x m^{-1}) at the study area. For statistical details, see text.

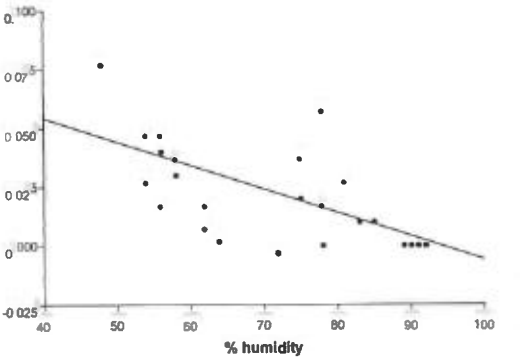


Fig. 4. Relationships between relative humidity and density of above-ground active *Mabuya affinis* (number of specimens x m^{-1}) at the study area. For statistical details, see text.

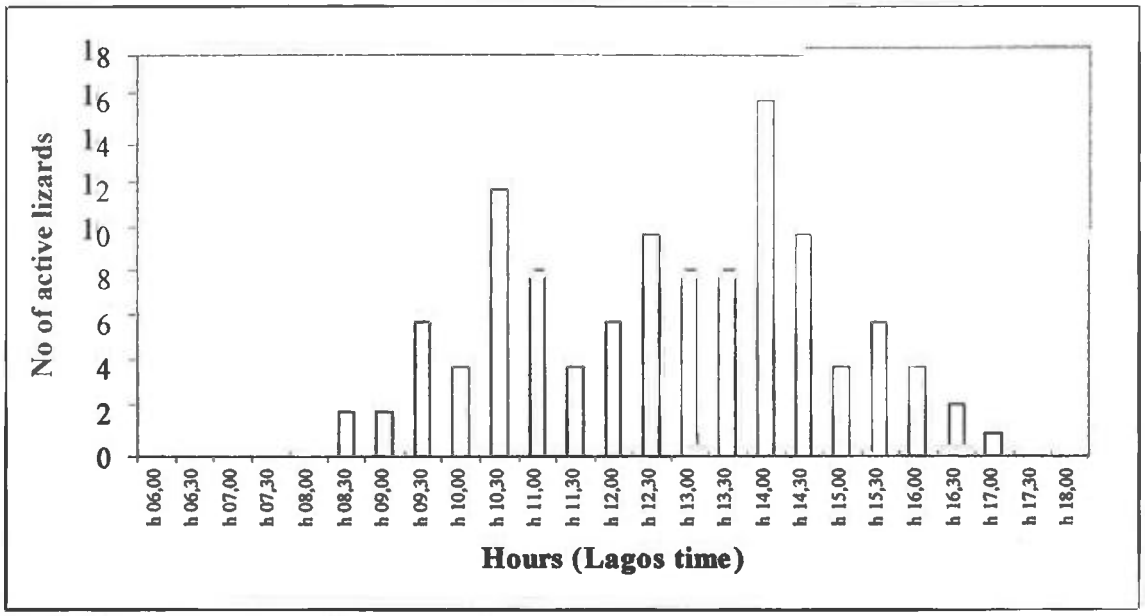


Fig. 5. Daily activity pattern of *Mabuya affinis* at the study area.

temperature (r^2 = 0.396, n = 24, ANOVA F = 14.42, df = 1,22, P = 0.001; Figure 2) and soil temperature (r^2 = 0.462, n = 24, ANOVA F = 18.93, df = 1,22, P = 0.0003; Figure 3). However, it is obvious that air and soil temperatures are positively correlated (P < 0.000001), and that, when they run against daytime (hr), they show similar trends, although soil temperature profile is slightly above that of air. Skink density was negatively influenced by increases in relative humidity (r^2 = 0.406, n = 24, ANOVA F = 15.02, df = 1,22, P = 0.0008; Figure 4).

Plot of daytime against skink numerical abundance (Figure 5) shows that these lizards had two activity peaks: a first and small one around 9 - 10.00 am, while the highest come up later by 2.00 pm. The skinks tend to withdraw by mid day probably due to too much heat.

Basking and feeding occurred more by morning hours (Table 1), when the lizards were also particularly fast in escaping and running performances. Basking duration was approximately 2 - 10 minutes. Skinks were observed on several times while feeding, on insects particularly (termites, ants, grasshoppers, diptera, etc). Numbers of skinks recorded in the various habitats at the study area are presented in table 2. The totals of table 2 show that habitat preference follows the order: DB > CPD > GD > TP > OPFH > GR > ST. Given the relatively preliminary nature of these data, it seems unlikely to present statistical details on this matter.

In summary, our data show that these small lizards are diurnal with a bi-peaked activity pattern, strongly influenced by external factors (soil and air temperatures, and relative humidity), and with a clear tendency to inhabit highly disturbed sites in the forest-plantation mosaic of south-eastern Nigeria. In these habitats, it seems that oviposition occurs during dry season, and egg hatching at the end of dry season. Seven females containing eggs were captured between November and December at Calabar (Cross River State), and newborns were commonly observed in March and April in both Port Harcourt and Calabar. Similar observations were done by Butler (1986), who recorded clutches of eggs in November and December at Ibadan (south-western Nigeria), and egg hatching in late January. Nevertheless, this author suggested

that it is likely that *Mabuya affinis* reproduces throughout the year, as he noticed an abundance of juveniles in early July at Ibadan. Our current data could not support nor reject Butler's opinion.

ACKNOWLEDGEMENTS

We thank F.M. Angelici, D. Capizzi, and M. Capula for helpful comments on a previous draft of this manuscript, and F.I.Z.V. and Demetra for granting the study project. Zena Tooze is particularly thanked for much helpful cooperation, and Joe Butler for having sent to us some crucial literature cited.

REFERENCES

Akani, G.C., Luiselli, L. & Politano, E. (1999). Ecological and conservation considerations on the reptile fauna of the eastern Niger Delta (Nigeria). *Herpetozoa* **11**, 141-153.

Anibaldi, C., Luiselli, L. & Angelici, F.M. (1998). Notes on the ecology of a suburban population of Rainbow lizards in coastal Kenya. *African Journal of Ecology* **36**, 199-206.

Butler, J.A. (1986). Notes on collections and observations of lizards in Nigeria. *The Nigerian Field* **51**, 85-94.

Dunger, G.T. (1972). The lizards and snakes of Nigeria. Part 6. The skinks of Nigeria (Dibamidae and Scincidae). *The Nigerian Field* **37**, 99-120.

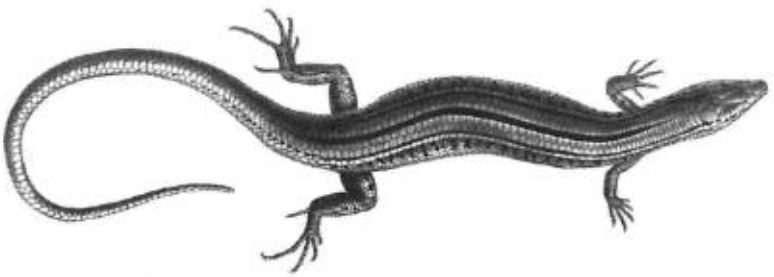
Dunger, G.T. (1973). The lizards and snakes of Nigeria. Part 7. The skinks of Nigeria (continued and completed). *The Nigerian Field* **38**, 54-80.

Luiselli, L., Akani, G.C. & Capizzi, D. (1998). Food resource partitioning of a community of snakes in a swamp rainforest of south-eastern Nigeria. *Journal of Zoology, London* **246**, 125-133.

Luiselli, L., Akani, G.C. & Capizzi, D. (1999). Is there any interspecific competition between dwarf crocodiles (*Osteolaemus tetraspis*) and Nile monitors (*Varanus niloticus ornatus*) in the swamps of Central Africa? A study from south-eastern Nigeria. *Journal of Zoology London* **247**, 127-131.

Luiselli, L., Angelici, F.M. & Akani, G.C. (2000). Food habits of *Python sebae* in suburban and natural habitats. *African Journal of Ecology* **39**, in press.

Reid, J. (1986). A list with notes of lizards of the Calabar area of Southeastern Nigeria. In *Studies in Herpetology*, pp. 699-704. Roček, Z. (Ed.). Prague: Charles University.



Lygosoma dorsale (= *Ctenotus spaldingi*), from a lithographed plate in 'Catalogue of the Lizards in the British Museum' by G.A. Boulenger (1887). Reproduction courtesy of The Natural History Museum, London.