

THE MADAGASCAN FROG *PLETHODANTOHYLA INGUINALIS* EATS SCORPIONS

WILSON R. LOURENCO*, FRANK GLAW**, JOHN L. CLOUDLSEY-
THOMPSON*** & MIGUEL VENCES**

*Laboratoire de Zoologie (Arthropodes), M.N.H.N., 61 rue de Buffon 65005 Paris,
France

**Zoologisches Forschungsinstitut und Museum Alexander Koenig, Adenauerallee 160
53113 Bonn, Germany

***Department of Biology, University College London, Gower Street, London WC1E
6BT, United Kingdom

The Madagascan microhylid frog *Plethodontohyla inguinalis* Boulenger, 1882 is recorded for the first time as a predator of the scorpion *Grosphus madagascariensis*. Other instances of predation by anurans on scorpions are cited, and it is suggested that large terrestrial amphibians may be effective agents in the control of scorpion populations worldwide.

INTRODUCTION

An exhaustive list of the predators of scorpions was prepared by Polis *et al.* (1981). Predation on scorpions was later analysed by McCormick & Polis (1990). These authors established that approximately 150 taxa, mainly composed of vertebrates, prey on scorpions. They gave the percentages of predators of scorpions represented in each group of vertebrates. These include birds (37%), lizards (34%), mammals (18%), frogs and toads (6%) and snakes (5%). Of predators listed by Polis *et al.* (1981), only seven species of anuran amphibians were cited. [These are: *Bufo cognatus*, *B. compactilis*, *B. terrestris americanus* and *Scaphiopus couchii* in the U.S.A.; *B. melanostictus* in Singapore; *B. regularis* and *B. adspersus* in South Africa.] *B. regularis* is actually widespread throughout most of Africa except for the North West, and could therefore be an important agent in the regulation of scorpion populations over a large area.

In a more recent paper, Lourenco & Cuellar (1995a) identified a new amphibian predator of scorpions, the large terrestrial South American frog *Leptodactylus pentadactylus* (family Leptodactylidae). This was the first record of this species preying on scorpions, and the first instance of predation by Anura reported from South America. Moreover, this species may feed extensively on scorpions and specifically on *Tityus bastosi* Lourenco, since the four cases observed all involved this species. In this note we identify a new amphibian predator of scorpions, the terrestrial Madagascan frog *Plethodontohyla inguinalis* Boulenger, 1882. This is the first record of preying on scorpions in the family Microhylidae and is also the first instance reported from Madagascar of anurans preying on scorpions.

The initial observation was made by F.G., who examined the stomach contents of a male *Plethodontohyla inguinalis* deposited in the Zoologisches Forschungsinstitut und Museum Koenig (ZFMK 14646). This specimen had been collected at Niagarakely, eastern Madagascar (Fig. 1). Its stomach contained two scorpions as well as fragments of leaves, almost certainly from the forest floor, a few unidentified beetles and a stick-

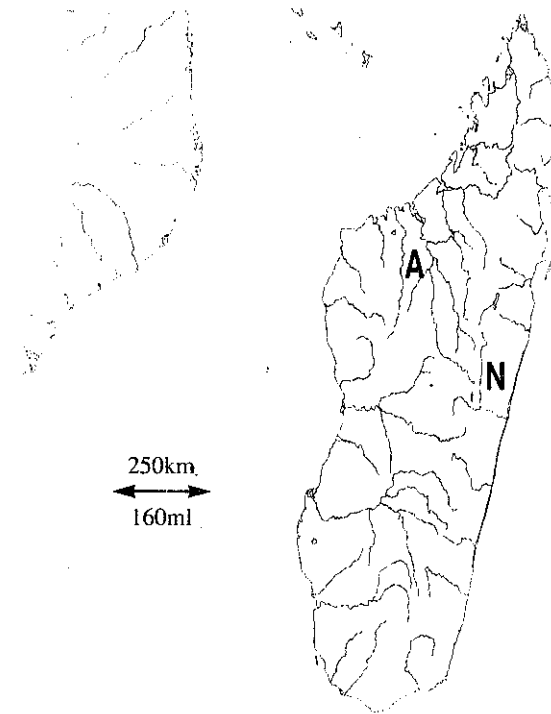


Fig 1.

Map of Madagascar, showing localities mentioned in the text

A: Réserve naturelle intégrale de l'Ankarafantsika

B: Niagarakely

insect. The scorpions were forwarded to W.R.L., who identified them as *Grosphus madagascariensis* (Gervais), one of the species most common in Madagascar. The specimen of *P. inguinalis* averaged about 100 mm in snout-vent length, while the two scorpions were both adults, one male and one female, ranging from 45 to 50 mm in length. It is possible that the scorpions were mating when captured by the frog.

This new record of predation on scorpions by frogs is of interest not only because it is the first case involving a Madagascan frog but, secondly because it shows that large terrestrial frogs may be active predators of scorpions and effective means of controlling their populations.

Several species of scorpions are extremely venomous and pose important health problems as a result of the fact that they live in close proximity to human beings in several regions of the world (Lourenco & Cuellar, 1995b; Lourenco *et al.*, 1996). This situation is not so common in Madagascar, but due to human activities in that country other problems arise. A biological programme of reproduction and reimplantation has been created by the Jersey Wildlife Trust for the endangered species of tortoise *Geochelone yniphora* (Jüvik *et al.*, 1980-81), in the area of the 'Réserve naturelle intégrale de l'Ankarafantsika' (Fig. 1). However, young tortoises in the reserve have

been killed by scorpion stings (Razanarimamila finarivo in litt, 1995). The agent responsible by these incidents was identified as *Grosphus bistriatus* Kraepelin, a species very similar in size to *Grosphus madagascariensis*. The presence of effective scorpion predators in the reserve might help to control the scorpion populations in the area, which are responsible for the deaths of *G. yniphora*.

With the alarming decline of amphibian populations worldwide (Barinaga, 1990; Phillips, 1990; Wake *et al.*, 1991), studies are needed to determine the precise extent to which frogs prey on scorpions, and to assess the status of frog populations in Madagascar. Scorpions may be losing some of their effective predators and the agents that control their populations worldwide.

REFERENCES

- Barinaga, M. (1990). Where have all frogies gone? *Science*, **247**: 1033-1034.
- Juvik, J.O., Andrianarivo, J. & Blanc, C.P. (1980-81). The ecology and status of *Geochelone yniphora*: A critically endangered tortoise in Northwestern Madagascar. *Biological Conservation*, **19**: 297-316.
- Lourenco, W.R. & Cuellar, O. (1995a). Neotropical frog *Leptodactylus pentadactylus* eats scorpions. *Alytes*, **12** (4): 191-192.
- Lourenco, W.R. & Cuellar, O. (1995b). Scorpions, scorpionism, life history strategies and parthenogenesis. *The Journal of Venomous Animals and Toxins*, **1** (2): 50-64.
- Lourenco, W.R., Cloudsley-Thompson, J.L., Cuellar, O., Von Eickstedt, V.R.D., Barraviera, B. & Knox, M.B. (1996). The evolution of scorpionism in Brazil in recent years. *The Journal of Venomous Animals and Toxins*, **2** (2): 121-134.
- McCormick, S.J. & Polis, G.A. (1990). Prey, predators, and parasites. In: G.A. Polis (ed.), *The Biology of Scorpions* pp. 294-320. Stanford: Stanford Univ Press.
- Phillips, K. (1990). Where have all the frogs and toads gone? *BioScience*, **40**: 422-424.
- Polis, G.A., Sissom, W.D. & McCormick, S.J. (1981). Predators of scorpions; field data and a review. *Journal of Arid Environments*, **4**: 309-326.
- Wake, D.B., Morowitz, H.J., Blaustein, A., Bradford, D., Bury, R.B., Caldwell, J., Corn, P.S., Dubois, A., Harte, J., Hayes, M., Inger, R., Nettmann, H.K., Rand, A.S., Smith, D., Tyler, M. & Vitt, L. (1991). Declining amphibians populations - a global phenomenon? Findings and recommendations. *Alytes*, **9**: 33-42.

British Herpetological Society Bulletin, No. 60, 1997

NOTES ON HAWKSBILL TURTLE NESTING ON GOLDEN SEAS BEACH, ORACABESSA, JAMAICA

A.D. DARBY

36, Newton Crescent, Dunblane, Perthshire FK15 0DZ

In July 1993, I visited Jamaica for three weeks. My intention was to visit the Hope Zoo in Kingston, Cinchona Gardens in the Blue Mountains and also see the Jamaican Iguana (*Cyclura collei*) in the Hellshire Hills.

Partly due to the exorbitant cost of vehicle hire and partly due to a stiff neck caused by a maniac driving into the back of my car, writing it off and rearranging my neck muscles, a week before departure, I only managed a short visit to Hope Zoo. Four wheel drive is necessary, as all roads, except the A1, which runs from Montego Bay to Ocho Rios, have potholes - some of them very deep.

Our base was *The Golden Seas Beach Hotel*, Oracabessa. To find the hotel, take the A3 from Ocho Rios East, past developments like Huddersfield, plantations like the Prospect Estate and great houses like Harmony Hall and it is on the left at a dusty bend in the road opposite a petrol station. A few minutes walk along the road, over the Rio Nueva, is Oracabessa town, where Ian Fleming's house *Goldeneye* can be found. Here he wrote many of his 007 books, naming the hero after his friend, the ornithologist James Bond. You can visit James Bond Beach, but *Goldeneye* can only be viewed by boat. Not far away, high on a hill, is *Firefly*, with its "Room with a view" overlooking Port Maria. Here Noel Coward spent many of the last 23 years of his life until he died there in 1973 (Zach, 1989). This place can be visited and is well worth the trek up the hill.

Once it became clear that I was not going to be able to gallivant all over the island, we decided to visit Kingston. A visit to Jamaica's capital is not for the faint-hearted, and the bustle and apparent, if not actual, chaos can be frightening. There are parts even regular visitors do not enter, so a map is essential. and it is not advisable to look lost. *even if you are!*

On my visit to the Hope Zoo, I was delighted to see a group of juvenile iguanas that were being reared for eventual release. The iguanas all had numbers painted on them and had been electronically tagged. They had originated from a wild nest found in the Hellshire Hills and had been confined to give them a head start before release back into the wild (Rhema Kerr, pers. comm; Vogel & Kerr, 1992). There are many hazards for young iguanas, and not the least of these are the under-fed dogs brought in by local charcoal burners [it was one of these dogs belonging to such a person which had inadvertently rediscovered the Jamaican Iguana after it was thought to have been wiped out in the 1940s] (Vogel & Kerr, 1992). The zoo also had a fine collection of the Jamaican Boa or Yellow snake (*Epicrates subflavus*), but did not have facilities for breeding the snake. The animals are in the excellent care of senior curator Rhema Kerr, who was very helpful in providing answers to my many questions. Rhema also suggested I keep an eye out for turtles on the Golden Seas Beach. You hear all sorts of stories about travelling abroad, and when you say you are going to Jamaica, some people react as if you have