THE MADAGASCAN FROG PLETHODANTHOXYLA INGUINALIS EATS SCORPIONS
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The Madagascan microchirylid frog Plethodontohyla inguinalis Boulenger, 1882 is recorded for the first time as a predator of the scorpion Groujopus madagascariensis. Other instances of predation by amphibians 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 McCormack & Polis (1990). These authors established that approximately 150 taxa, mainly composed of vertebrates, prey on scorpions. They gave the frequencies of predation of scorpions represented in each group of vertebrates. These include birds (37%), lizards (34%), mammals (18%), frogs and toads (8%) and snakes (5%). Of predators listed by Polis et al. (1981), only seven species of anuran amphibians were cited. (These are: Bioe corunates, B. compacta, B. terrestris americanus and Scaphiopus couchii in the U.S.A.; B. melanoceps 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 & Coetzer (1995a) identified a new amphibian predator of scorpions, the large terrestrial South American frog Leptodactylus pseudactis (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 baccati Lourenco, since the four cases observed all involved this species. In this note we identify a new amphibian predator of scorpions, the terrestrial Madagascar frog Plethodontohyla inguinalis Boulenger, 1882. This is the first record of preying on scorpions in the family Microhydridae 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 Niagrakely, eastern Madagascar (Fig. 1). Its stomach contained two scorpions as well as fragments of leaves, almost certainly from the forest floor, a few unidentified berries and a stick insect. The scorpions were forwarded to W.R.L., who identified them as Groujopus madagascariensis (Geoffroy), one of the species most common in Madagascar. The specimens 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 maturing 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 & Coetzer, 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 nigra (Brind et al., 1980-81), in the area of the "Reserve naturelle intégrale de l'Ankarafantsika" (Fig. 1). However, young tortoises in the reserve have
been killed by scorpion stings (Razanaminirainiarivo in litt, 1995). The agent responsible for these incidents was identified as *Graphosoma horridum* Kraepelin, a species very similar in size to *Graphosoma 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. sipho*.

With the alarming decline of amphibian populations worldwide (Barriga, 1990; Phillips, 1989; Wake et al., 1990), 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


### NOTES ON HAWKBILL TURTLE NESTING ON GOLDEN SEAS BEACH, ORACABESSA, JAMAICA

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In July 1993, I visited Jamaica for three weeks. My intention was to visit the Hope Zoo in Kingston, Caribou 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 music 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 development like Flandersfield, plantations like the Prospect Estate and grand houses like Harmony Hill and it is on the left at a sandy bend in the road opposite a petrol station. A few minutes walk along the road, over the Rio Nana, 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 Pitt Marta. 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 bustling and apparent, if not actual, crime 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 brought in for educational purposes. 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 confided to give them a head start before release back into the wild (Rhiema 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 1960s) (Vogel & Kerr, 1992). The zoo also had a fine collection of the Jamaican Blue or Yellow snake (*Drymarchon subflavus*), but did not have facilities for breeding the snake. The animals are in the excellent care of senior curator Rhiema Kerr, who was very helpful in providing answers to my many questions. Rhiema 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