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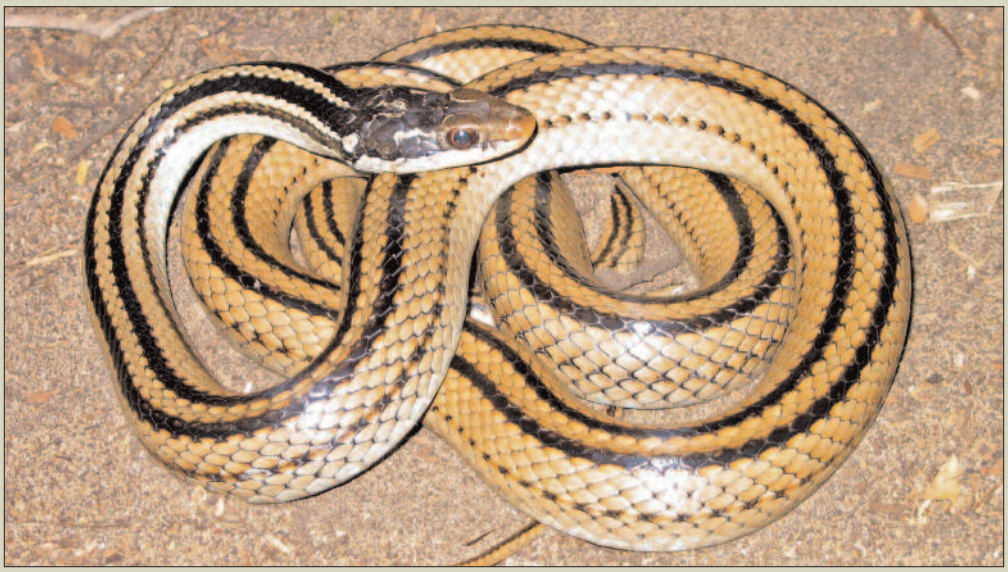

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THE HERPETOLOGICAL BULLETIN

The **Herpetological Bulletin** is produced quarterly and publishes, in English, a range of articles concerned with herpetology. These include full-length papers of mostly a semi-technical nature, book reviews, letters from readers, society news, and other items of general herpetological interest. Emphasis is placed on natural history, conservation, captive breeding and husbandry, veterinary and behavioural aspects. Articles reporting the results of experimental research, descriptions of new taxa, or taxonomic revisions should be submitted to The Herpetological Journal (see inside back cover for Editor's address).

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Front cover illustrations. Top: *Furcifer oustaleti*; below *Dromicodryas quadrilineatus.* Photographs © Neil C. D'Cruze. See article on page 17.

EDITORIAL

Monica Green, retiring BHS Membership Secretary: a tribute

The 2006 AGM marked the end of an era in the history of the BHS, as we paid tribute to Mrs. Monica Green, BHS Secretary for an incredible 54 years. Monica took up the position in 1952, at the age of 27. Little could she have known that this was a task that would take over her life for so many years to come!

Monica has seen the highs and lows of BHS history; Presidents and Chairmen have come and gone while she remained strong, steadfast and dedicated to her role. For some of those long years Monica also simultaneously held the office of Treasurer.

If further testament was needed, some may find it surprising that reptiles and amphibians in general are not Monica's main interest. "I love my tortoises but I'm not so interested in lizards and snakes" she once told me. 'I'm really more interested in gardening'. This fact alone serves as an indication of the commitment that Monica has so selflessly given so much of her free time to the Society. For 54 years Monica has been steadfast in her role. There can be no doubt that the British Herpetological Society owes her a debt of gratitude.

In recognition of her achievements and commitment to the Society, Monica was presented with a suitably inscribed memorial bird-bath, made from green Lakeland slate and specially commissioned by the BHS from a stonemason in the Lake District. This was Monica's choice and will stand proudly in her church garden (after it has spent sometime being admired by passers-by in her own front garden!). An encyclopaedia of Roses was also presented.

Her dedication is an inspiration to me in attempting to follow in her footsteps. I know how personally responsible she felt and I know how difficult the decision was for her to relinquish this responsibility. But at the age of 81, Monica is surely entitled to a long-overdue break from BHS duties, although as an Honorary Life Member I have no doubt she will keep a watchful eye on our activities! *Trevor Rose*

It is impossible to exaggerate Monica's contribution to the BHS. For decades she was the mainstay of the Society, and its current healthy state is in large part due to her unwavering efforts and devotion over such a long period. I well remember the crisis, some 25 years ago now, when she temporarily left her post as Secretary and Treasurer following the death of her husband. The BHS came close to collapse at that time, but fortunately for us she sailed back to the rescue. I am particularly grateful for her support during my stint as Chairman in the early 1990s. Indeed, I find it hard to imagine the Society without her. She has all my good wishes for a long and healthy life, and I look forward to seeing her at future meetings. *Trevor Beebee*

The short time that I was President of the Society coincided with major problems over the employment of our then Education Officer. This was when I had most to do with Monica: we were in telephone contact almost daily for a period of several months. She was a tower of strength and shrewd, sound advice. I don't want to open old wounds, but it was common knowledge that the police were involved with these problems. Monica bore the brunt of their visits. I am sure that at first they didn't quite know what to make of the eccentric (to them) and rather severe (to them) lady whose love was the odd one (to them) of reptiles and amphibians. But they thawed - tribute to a multitalented lady whom I admire very much. My good wishes, Monica! *Roger Avery*

I knew Monica by name for many years before joining the Society and meeting her - which I did after returning to England from the Sudan in 1971. (I had always been fascinated by amphibians and reptiles, but it was not until my appointment to the University of Khartoum in 1960 that sufficient material became available to undertake my type of research on them). By that time, Harold Fox had taken over from my friend Angus Bellairs as Editor, British Journal of Herpetology, while Deryk Frazer – another friend from the '50's, was still President. Thirty-five years seems a very long while ago, yet Monica had already been BHS Secretary for nearly 20 years! There can be few people to have served

any scientific society for even half as long as Monica has, and I feel honoured to add my personal appreciation to those of her many other friends. *John Cloudsley-Thompson*

Monica is a long standing important member of the conservation committee and has always supported the aims of the committee whole heartedly in her own way though some members may not realise to what extent as she has never blown her own trumpet. She has always been very active locally with the physical side of conservation although again some members may not have been aware of this as it did not involve the rare species but very important in N.London for the so called more common species. There is no way that the conservation committee would have been able to achieve as much as it has without Monica's continued support. *Dave Bird*

My initial contact with Monica Green was in 1959, when I was 15 years old and attended my first meeting of the BHS in London. 'Mrs Green', as I referred to her in those early days, was the person I encountered as I entered the lecture-room. She was kind and welcoming and made a young schoolboy (I was shy in those days!) feel at ease.

Subsequently as a member of the BHS, I met her regularly. She knew that I hoped to train as a veterinary surgeon and encouraged me in this, emphasising always how much needed to be learnt about diseases of reptiles and amphibians and suggesting that I should make myself known to Dr Edward Elkan (see below). Monica was always a wonderful source of information about the Society, its members and its history. She was an important link with Major Maxwell Knight (radio-naturalist and the inspiration for 'M' in the James Bond books), whom she remembered as one of the founders of the BHS. Maxwell Knight became my mentor and our son is named after him. Later, when I had graduated, had my first stint in Africa and returned for a while to Britain, Monica was an integral part of various ventures, mainly relating to herpetological medicine, that I organised - in particular, the commemorative meetings and lectures in honour of Dr Elkan.

Surprisingly, perhaps the most enduring memory I shall have of Monica will be of meeting her on so many occasions when she called in at the London Zoo to collect BHS correspondence. This unassuming lady, who seemed to know everybody and to have so many friends in the world of natural history, always seemed to me to epitomise the friendliness and shared interests of those who made the BHS what it is today. Monica Green was synonymous with the Society and its literature will never be quite the same because it does not include her name as an office-holder.

'Mrs Green', thank you very much for all you have done for the Society and for herpetology and for your personal support over the 47 years since we first met. *John Cooper*

As well as her role as Secretary it is a little known fact that Monica performed numerous other tasks that were equally important to the running of the BHS – as our newly appointed replacement, Trevor Rose, does now. Over many years, for example, she took it upon herself to be the person responsible for packaging and distributing issues of the *Bulletin* (and at one time also the *Journal*) – many hundreds

of them every few months – a surely tedious job which involved at least a couple of day's work and repeated trips to the Post Office. Monica also graciously provided space in her home for the storage of an ever-increasing number of back issues, and on at least one occasion it seemed the number of boxes accumulating in the hall of her house threatened to block up the doorway. Many thanks Monica, we owe you an enormous debt of gratitude. *Peter Stafford*

The Herpetological Journal - on-line

The British Herpetological Society is preparing an online subscription for Institutions, Overseas and Full UK members, to be launched fully for 2007. From January 2007, the *Herpetological Journal* will be available as an online publication through our provider, Ingenta. Initially, only the *Herpetological Journal* will be available online; the *Herpetological Bulletin* will remain in hardcopy and be delivered via surface mail. It is planned to include the *Bulletin* in the online subscription by 2008/9. In brief, the advantages to members will be faster access to publications as they are released, access to all available back-copies, and cheaper subscription. Papers will of course be available as downloads, providing all the benefits that electronic access to documents brings, such as keyword searching, filing, etc. The Society will benefit from greater exposure of its content, including abstracts of all papers to non-members, and reduced printing and posting costs. In order for subscribing BHS members to test and check access to the services provided by Ingenta, all issues of the *Herpetological Journal* published during 2006 will be available online. Volume 15, No. 4 and Volume 16, No. 1 are available now. All BHS members (full inland, overseas and institutions) are invited to try this service to ensure error-free access. Please note you will need your membership number to gain access to online publications.

The normal postal subscription will remain in place for members wishing to continue to receive hardcopy publications. However, subscription rates are set to rise in 2007 to cover the ever-increasing postal and printing charges. The new pricing structure will be advertised in the coming months in preparation for 2007.

To view BHS *Herpetological Journal* content online, go to www.ingenta.com, and follow the instructions for registration. Your password is your membership number, and this field is case-sensitive. Institutional members please note a covering letter has been sent with this issue of the *Herpetological Bulletin* containing notification of your subscriber (membership) number.

Trevor Rose, BHS Secretary

OBITUARY

Leigh George Gillett

29th October 1958 – 6th October 2005

Leigh Gillett, a well-known naturalist and long term supporter of the BHS, sadly lost his battle with cancer on 6th October 2005. He remained an active Council member until shortly before his death, and in many ways typified the naturalist-herpetologist that laid the foundations upon which the present-day Society is based. Leigh served a fairly typical herpetological apprenticeship. As a schoolboy, he spent much of his time ferreting around in ponds and ditches for assorted creatures, which were carried home triumphantly in jam jars and sandwich boxes. After gaining scholarships to Kent College and then Magdalen College, Oxford, Leigh gained a degree in mathematics and realised his long-standing ambition to become a school teacher. Given his passion for the natural world and outstanding intellect, he was often asked why he didn't take zoology at Oxford. His answer was always the same. This would have meant that he

take A-level zoology at school, which – at the time – required all pupils to dissect a frog: something he refused to do. Although in later life he worked closely with many scientists, to Leigh amphibian and reptiles were animals to be revered and enjoyed, not exploited for the benefit of science or humankind.

Leigh indulged his passion for wildlife by converting his home and garden into a haven for reptiles and amphibians. In addition to several spacious outdoor vivaria and greenhouses containing many species personally collected by Leigh on his numerous overseas field trips, his garden also contained wild slow-worms, viviparous lizards, grass snakes, common frogs and all three newt species. Peer in through the living room window and the eyes would feast on a North American desert habitat – complete with indigenous herpetofauna – rather than a three-piece suite and TV.

However, Leigh's interest in the natural world flowed well beyond reptiles and amphibians. He was probably the best all-round field naturalist I have ever met, and possessed an encyclopaedic knowledge of the distribution and habitats of all sorts of animals and plants. When I moved to the University of Kent in 1990, Leigh was invaluable in providing information about local sites that could be usefully harnessed for ecology and conservation teaching and research. Indeed, he became a valued friend and colleague not just to me personally, but to a whole generation of students and researchers who have pursued herpetological research projects over the past 15 years.

Leigh was elected to the first of several terms on BHS Council in 1991. With his broad-based herpetological interests, sharp mind and easy-going personality, Leigh was seen as someone who truly had the Society's values and philosophy close to his heart. His wise counsel and balanced views were always worth listening to. He took a particular interest in the Society's publications, and frequently highlighted to me the grammatical shortcomings of many of the papers published in the *Herpetological Journal*. This led to his

appointment as Associate Editor with responsibilities for proof-reading and correction of English, a post that he filled with great dedication and efficiency until his failing health made him unable to continue. There are many herpetologists throughout the world – some of them eminent scientists – who owe a debt of gratitude to Leigh for improving the quality of their written work. Leigh also valued the social side of the Society, and after meetings he was instrumental in encouraging members to continue herpetological discussions over a beer and a curry.

Because he pursued herpetology for pleasure, Leigh was not a prolific publisher of his own herpetological work. Nevertheless, he was widely respected both in Britain and overseas, and a frequent delegate at scientific meetings. He would be pleased to know that the majority of his personal herpetological library has been deposited with the BHS for the long-term benefit of people with similar interests. His legacy will therefore live on, although herpetological natural history will be a much poorer place without him.

Richard A. Griffiths
The Durrell Institute of Conservation and Ecology.

Captive husbandry of the Dwarf plated lizard, *Cordylosaurus subtessellatus* (Smith, 1844), with indications for ecological and behavioural characteristics

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ABSTRACT — A captive study, combined with observations in the wild, revealed preliminary ecological and behavioural information on *Cordylosaurus subtessellatus*. Captive specimens switched between a unimodal and bimodal activity pattern, depending on the season (i.e., unimodal in winter and spring, and bimodal in summer and autumn). Specimens in the wild showed a bimodal activity pattern in spring. In all seasons, daily activity time was limited to a few hours or less, and captive lizards remained inactive following days of feeding, perhaps to avoid predation. When lizards were inactive, or disturbed by the observer, they hid in shallow dry sand. Initially, captive specimens were intolerant towards one another, but this behaviour phased out within a year. Captive specimens fed on a variety of live and dead medium-sized arthropods, but these were only caught when they had moved close to the lizards. Lizards produced a late summer and spring clutch consisting of two eggs, but these did not produce hatchlings. Mating took place several weeks after oviposition.

THE Dwarf plated lizard (*Cordylosaurus subtessellatus*) is the smallest member of the sub-Saharan African Gerrhosauridae, with a reported maximum snout-vent length of 57.1 mm (Bauer *et al*., 1999). The smooth body with relatively small limbs superficially resembles that of a skink. It has a dark-brown to black ground colour, with two cream to yellow dorsolateral lines, running from the snout to the tail. On the tail, the lines gradually change to an electric blue colouration (Fig. 1; Branch, 1998). The limbs may have a reddish tint, and the belly is off-white. A characteristic that distinguishes the species from all other Gerrhosauridae is the presence of transparent discs on the lower eyelids (Branch, 1998).

Cordylosaurus subtessellatus has a large distribution range, extending from the Western Cape of South Africa north to southern Angola, and from the Atlantic coast as far inland as Windhoek in Namibia (Branch, 1998). Most of the area experiences summer rainfall (October to March), but the southern coastal parts receive most rain in winter. Rainfall in the entire area is limited to 10–500 mm per year (Müller, 1983; Branch, 1998). Within the large distribution range, the species may occur somewhat isolated since it is associated with rocky habitat (Fig. 2; Branch, 1998; Bauer & Branch, 2001) . In suitable habitat, it may be common (Bauer & Branch, 2001), and its conservation status in Namibia is listed as 'secure' (Griffin, 2003). Despite its apparent commonness, published observations are scarce. Reports are limited to notes on their size and distribution, with only a few words on ecology and behaviour (Branch & Bauer, 1995; Cooper *et al*., 1997; Branch, 1998; Bauer *et al*., 1999; Bauer & Branch, 2001; Loehr, 2004). This is surprising, as the bright blue tail of this diurnal species makes it easy to spot, identify, and study.

Of all Gerrhosauridae, *Gerrhosaurus* spp. are probably the most frequently kept in captivity. They are hardy species, but captive breeding is not widespread (Kirkpatrick, 1993; Slavens, 1999). Published results of captive husbandry of *C. subtessellatus* appear to be absent, except one remark by an anonymous author on the internet in 2003 referring to K. Adolphs stating that *C. subtessellatus* brought from Namibia in 1987 survived only a few months in captivity. Without

details on the history of the lizards (e.g., period between capture and release in captivity, means of transportation) and husbandry methods (e.g., medical evaluation and treatment, facilities, group composition), it is difficult to interpret the negative findings. In general, captive husbandry can be a valuable tool to gather ecological information on a species, facilitating the development of *in situ* studies or wildlife conservation plans (e.g., see Loehr, in press). In addition, husbandry methods are much better now than they were in 1987, with successful breeding of lizards that used to be difficult to keep alive (e.g., *Uromastyx* spp., *Chamaeleon calyptratus*, *Sauromalus obesus*) as a result.

In order to increase the available information on the ecology and behaviour of *C. subtessellatus*, I combined a captive study with observations in the wild. Focused topics were (1) behaviour, (2) diet, and (3) reproduction.

MATERIALS AND METHODS

Observation in the wild

While conducting an ecological study on the Namaqualand specked tortoise, *Homopus signatus signatus*, records were made of sympatrically occurring *C. subtessellatus*. Three to four persons methodologically inspected the approximately 4 ha Succulent Karoo research area (Loehr, 2002, 2004) in spring, from 2nd September to 2nd October 2004. Searching continued from 08:00-17:00 hrs, with a one hour break between 11:00-15:00 hrs. For each specimen encountered, we recorded date and time of the day. In addition, we estimated the total size of each specimen.

Springbok Weather Station, located circa 2.5 km north of the research area, provided daily maximum ambient temperatures for the period 1990-2004. I compared 2004 values with 1990-2004 averages by means of a paired *t*-test (SigmaStat 2.03, SPSS Inc., Chicago, U.S.A.). Detailed temperature recordings from the research area are present in Loehr (2003).

Captive study

At the end of January 2004 (summer), I captured and exported one male and one female for a captive study. The couple was released in a 90 x 35 x 40 cm (l x w x h) indoor enclosure (enclosure 1) in the Netherlands, circa four days after collecting them in the field. This enclosure consisted of glass, and artificial rocks (PUR foam, tile glue, and paint) were present to form crevices. The soil layer consisted of a 4 cm deep layer of dry sand (grain 0.5-2 mm). Some artificial plants, cork bark and wood provided additional retreats. The enclosure was heated by two 25 W spotlights, from 1st May 2004 switched via a Habistat dimming thermostat (Living Earth Electronics, UK), adjusted to a maximum temperature of 30°C in one of the coolest retreats. As a result, the spotlights usually switched off between 11:00-17:00 hrs when the room temperature was high (June - August). In winter, I switched off the spotlights entirely for two weeks (29th March 2004 until 12th April 2004), to provide a cooler period. Initially, an 18 W TLD 840 bulb provided illumination, but a 36 W PLL 840 bulb replaced this on 8th May 2004.

On 18th November 2004, the specimens moved to a larger indoor enclosure, measuring 150 x 60 x 40 cm (l x w x h) (enclosure 2; Fig. 3). Decoration was similar. The two 25 W spotlights were connected via a dimming thermostat (adjusted to 30°C) on 4th April 2005. I switched off the spotlights between 15th January 2005 and 29th January 2005. A 54 W T5 840 bulb provided illumination.

Adjusting the lizards from southern to northern hemisphere climatic conditions was accommodated by skipping the remainder of the southern hemisphere summer, and compressing the first autumn, winter, and spring in the period January - May 2004 (Fig. 4). After that, heating and lighting switched via an astrotimer (Suevia Astra Nova, Germany), automatically adjusting the daily photoperiod to 35 degrees latitude North (Fig. 4). Ambient maximum temperatures were close to 32°C in summer (corresponding with a retreat temperature around 30°C), gradually decreasing to 25°C in winter when I switched off the spotlights.

Thermochron iButtons (Dallas Semiconductors, Maxim Integrated Products, Inc., Sunnyvale, U.S.A.) recorded retreat and spotlight temperatures (frequency 15 minutes) in enclosure 1 between 12th June 2004 and 17th July 2004. In

enclosure 2, a PC-datalogger (Hygrotec Messtechnik, Titisee-Neustadt, Germany) recorded retreat and spotlight temperatures every 10 minutes.

Immediately upon arrival, a number of different food items offered provoked the lizards to commence feeding. After two months, feeding regime consisted of once weekly feedings on 10-15 crickets (5-10 mm), dusted with Calcicare 40+ (Witte Molen, Meeuwen, Netherlands) and calcium lactate, mixed in a ratio of 1:1. Occasional feedings with other food items provided some variation. Initially, I inspected the faeces of the lizards microscopically for parasites (e.g., protozoa, nematodes, cestodes), and treated the specimens with fenbendazole (Panacur, 22 % granulate; Hoechst AG, Frankfurt am Main, Germany) at circa 50 mg/kg body weight, repeated after 14 days. A buffalo worm (*Alphitobius diaperinus*) offered by means of forceps hid the drug.

Further husbandry included spraying enclosure 1 twice weekly in spring, summer and autumn, and three times weekly in winter. Enclosure 2 had an automatic spraying installation, switched on three times weekly (app. 420 ml per spraying). In both enclosures, spraying never left the soil layer uniformly moist. Most of the soil remained dry, to allow the lizards to hide in the sand. I observed the specimens in the weekends, and in the afternoons and evenings of weekdays, and noted qualitative recordings in a spreadsheet.

Food item	**Accepted**
Buffalo worms - larvae (*Alphitobius diaperinus*)	Yes
Buffalo beetles (*Alphitobius diaperinus*)	Occasionally
Crickets - live (*Gryllus domestica*)	Yes, 2-7 mm
Crickets - dead (*Gryllus domestica*)	Occasionally
Fruit flies (*Drosophila melanogaster*)	No
Flies - larvae (*Musca domestica*)	No
Flies (*Musca domestica*)	No
Grasshoppers (*Chorthippus* sp.)	Yes, <17 mm
Woolice (*Oniscus asellus*)	Occasionally
Wax moths - live larvae (*Galleria mellonella*)	Yes, <8 mm
Wax moths - dead larvae (*Galleria mellonella*)	Yes, <8 mm
Wax moths (*Galleria mellonella*)	No

Table 1. Food items provided to *Cordylosaurus subtessellatus.*

RESULTS AND DISCUSSION

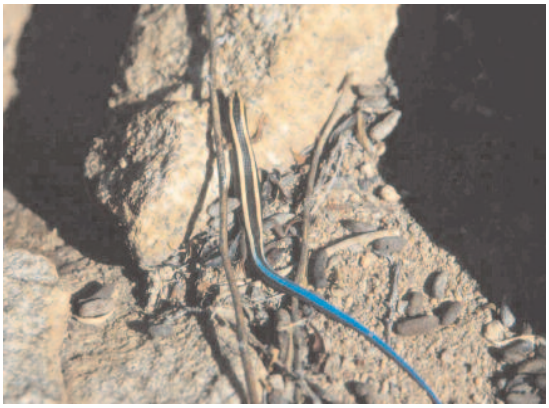
Observations in the wild

Cordylosaurus subtessellatus activity occurred between 08:25-16:45 hrs, with the majority of observations recorded in the morning and afternoon (Fig. 5). Even compensated for our one hour break between 11:00-15:00 hrs, most observations were made in the morning and afternoon. This indicates a bimodal activity pattern, as reported by Loehr (2004), working at the same location in summer. Daily maximum temperatures were not higher than the long-term average (respectively 21.8 and 21.1 °C, paired *t*-test $t_{30} = 0.727$, $P = 0.47$), thus the bimodal pattern may be usual for September. Start and end of activity were later, respectively earlier than in February (Loehr, 2004), and this is probably the result of different photoperiod.

We observed specimens in many size classes (total length circa 50-140 mm), but did not take accurate size measurements. One juvenile (total length circa 90 mm) hid in shallow sand (1-2 cm, soil temperature 19.2°C at 10:25 hrs), under a small flat rock (circa 25 x 15 x 2 cm). This site was positioned on a large rock slab. The next two days we rechecked the hiding place, and found what appeared to be the same specimen (temperatures 23°C at 11:50 hrs, and 21.4°C at 09:35 hrs). After this period, it disappeared, perhaps because of disturbance by the observers.

Captive study: diet

The faeces of the captive couple contained numerous nematode eggs. After treatment with fenbendazole, no further eggs or other parasites were observed. The lizards readily started feeding on buffalo worms (*Alphitobius diaperinus*), and other arthropods (Table 1). Within a week, they accepted food items offered by means of forceps. It was striking that they accepted relatively large grasshoppers (*Chorthippus* sp.), but refused similar sized fly larvae or flies (*Musca domestica*).



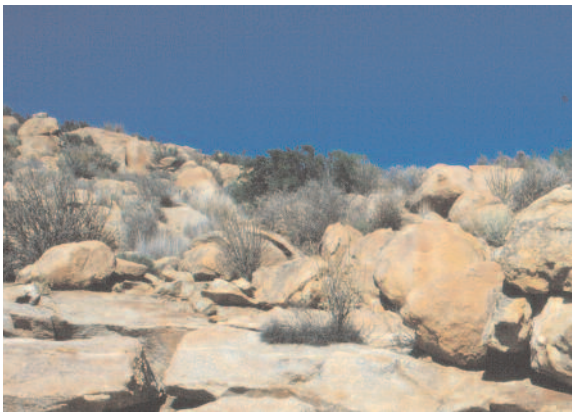


Figure 1 (top left). *Cordylosaurus subtessellatus* in the wild, demonstrating appearance and colouration. All photographs by author.

Figure 2 (top right). Natural habitat of *Cordylosaurus subtessellatus*, near Springbok, South Africa.

Figure 3 (centre left). Enclosure 2, in which a pair of *Cordylosaurus subtessellatus* has been housed since 18th November 2005.

Figure 6 (below). Male and female *Cordylosaurus subtessellatus*, following mating.

Wax moths (*Galleria mellonella*) were probably too large. Lizards usually did not hunt food items that were further than circa 10 cm away, although *C. subtessellatus* proved to be extremely skilful chasing fast insects (e.g., crickets) in their direct vicinity. They also accepted several dead prey items (Table 1), as do other Gerrhosauridae.

Cordylosaurus subtessellatus has a small head and pointed snout, suggesting small prey items. However, they refused *Drosophila* and very small crickets (2 mm). In addition, prey items accepted were medium-sized, but still large in comparison to the size of the head and body of *C. subtessellatus*. Crickets, that formed the main food source, tended to hide rapidly after releasing them in the enclosure. The lizards used their pointed snout to check narrow crevices and loose bark, eating any crickets encountered. There appear to be no published reports of natural food items for *C. subtessellatus*.

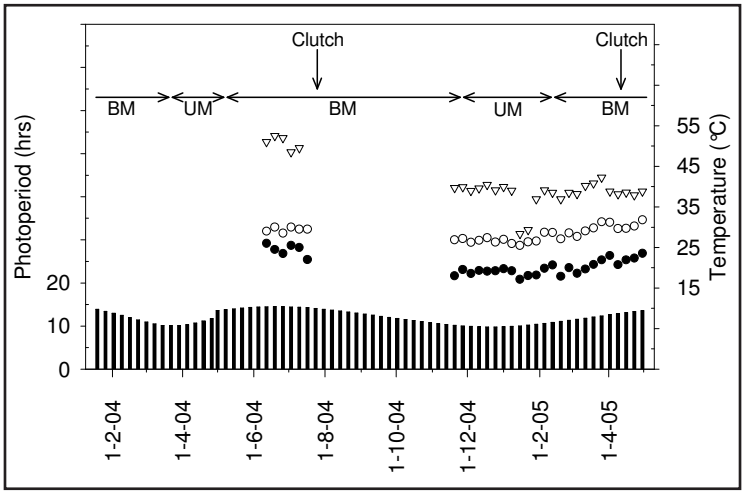


Figure 4. Photoperiod (bars), daily minimum (closed circles) and maximum (open circles) retreat temperatures, and daily maximum spotlight temperatures (open triangles) in two enclosures that housed *Cordylosaurus subtessellatus*. BM indicates periods when the lizards had a bimodal activity cycle, and UM when their activity cycle was unimodal. Two clutches were produced, on 25th July 2004 and 12th April 2005.

Captive study: behaviour

Like *C. subtessellatus* in the wild (Loehr, 2004), captive lizards exhibited a bimodal activity pattern in summer (Fig. 4), with most activity occurring in the morning and afternoon. However, in winter they switched to a unimodal pattern, that they continued in early spring (Fig. 4). During this period, most activity occurred around noon. Daily activity time was typically circa 1-3 hours, regardless of the season. Activity episodes started with basking, first at some distance from the spotlights, and later in the direct beam. In enclosure 1, they continued the latter for a short period, compared to enclosure 2. This was probably the result of the shorter distance to the spotlight in enclosure 1, leading to higher temperatures (Fig. 4). In enclosure 1, they often continued basking outside of the beam. In both enclosures, lizards preferred basking under cover (e.g., twigs, artificial plants) rather than at exposed sites.

Inactive lizards, captive or wild (Loehr, 2004; this study), hid in dry portions of the sandy soil. This behaviour may explain the remark from Bauer & Branch (2001), referring to microhabitats of the species consisting of rocky areas with sand or soil-filled interstices. The small body size, smooth scales, small limbs, and transparent discs on the eyelids in *C. subtessellatus* probably facilitate moving through the soil.

In winter, activity reduced to basking (estimated 90-95 % of activity time), whereas in summer lizards actively traversed their enclosure after basking (estimated 50 % of activity time), inspecting decoration materials for prey. They interrupted this activity repeatedly by brief (1-5 minutes) periods of basking. Cooper *et al*. (1997) predicted *C. subtessellatus* to be an active forager, based on a small sample size. Qualitative observations in the current study support this. I usually released prey items in the enclosure during activity episodes. Once the lizards had ingested a number of prey, they ceased all activity and retreated. Also the first day after feeding days usually lacked activity.

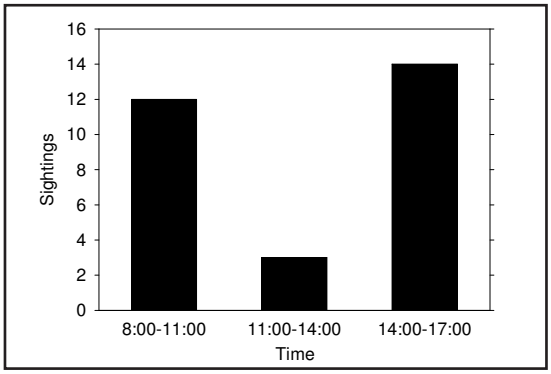


Figure 5. *Cordylosaurus subtessellatus* observations in the wild in September - October 2004.

Winter activity (i.e., basking) continued when I had switched off the spotlights. This might be the result of the ambient temperature remaining suitable for activity due to the fluorescent lighting and the room temperature, but the species may also remain active in winter in the wild. Loehr (2003) reported winter soil temperatures around 25°C.

Initially, encounters between the two specimens resulted in excitement, quick movements of the posterior 2-3 cm of the tail, and chasing each other, until one would move into a retreat. Within approximately one year, this behaviour phased out (except occasional tail movements), ultimately resulting in basking on top of each other.

In summer, dimming thermostats usually switched off the spotlights around noon, potentially affecting the activity cycle of the lizards. However, it appears that it was not the sole cause of the bimodal activity pattern, as specimens followed the same pattern on cool summer days when thermostats did not switched off the spotlights, and continued activity while the spotlights had switched off on other days. It is an intriguing question why wild and captive *C. subtessellatus* had such limited activity periods, while environmental conditions appeared to allow activity, and sympatrically occurring lizards in the wild were active throughout the day (Loehr, 2004). The colouration and active foraging behaviour of *C. subtessellatus* may expose lizards to high predation pressure, necessitating reduction of its activity time.

Captive study: reproduction

Observation of mating activity was limited to one instance, on 2nd May 2005 at 14:45 hrs. Male and female had just completed mating, and the male was biting the female in the left flank, behind the forelimb (Fig. 6). Previously, the flank scutes of the female showed slight damage on 14th August 2004, possibly indicating another mating. Two clutches consisting of two eggs were produced 20 days before these dates, respectively on 25th July 2004 (12.0 x 5.0 mm, and 11.6 x 5.5 mm), and 12th April 2005 (eggs not measured).

The female produced both clutches on top of the soil close to the spotlights, and they were dehydrated when found. Nesting sites offered included closed and open plastic boxes in different sizes, filled with *Sphagnum*, peat, or sand/peat mixture, covered with cork bark, rock, or plastic. The female inspected nesting sites, but additional experimenting will be required to determine its requirements.

Branch & Bauer (1995) reported enlarged follicles and eggs in wild *C. subtessellatus* in spring and early summer, respectively on 18th September 1993 and 2nd November 1992. Egg size reported (12.4 x 4.9 mm) is close to that found in this study. The captive female produced its first clutch in late summer (Fig. 4), but adjusting climatic conditions to northern hemisphere may have interfered. The second clutch was produced in spring (Fig. 4).

Prior to oviposition, female behaviour changed in several ways. Several weeks before oviposition, basking episodes became longer, and the last few days basking took place throughout the day. While specimens normally disappeared during sprayings, the female maintained activity and drunk one week before oviposition, and at the same time refused food items offered, perhaps as a result of intestinal compaction or displacement by the relatively large eggs.

Conclusions regarding husbandry of *Cordylosaurus subtessellatus*

Cordylosaurus subtessellatus can survive in captivity. Additional experimenting will be required to breed the species in captivity. Considering the fact that no published reports on

captive husbandry of *C. subtessellatus* appear to exist, the results presented here are promising. Crucial for successful husbandry might be diagnosing and treating any possible parasites in wild-caught specimens, as these may quickly exhaust a small species such as *C. subtessellatus*. The species is not likely to be a suitable species for the average terrarium keeper, as their activity episodes are extremely limited.

ACKNOWLEDGEMENTS

I would like to thank Northern Cape Nature Conservation for issuing permits (NNO 1/10/2 145/2003, and NNO 1/10/3 7/2004) to initiate the captive study on *C. subtessellatus*. Patrik Abramsson, Mats Blohm, Lin Lagerström, and Peter van Putten are thanked for their assistance in the field. Furthermore I am grateful to South African Weather Services for providing temperature data.

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On the meridional distribution of *Alytes maurus* Pasteur and Bons, 1962 (Amphibia, Discoglossidae)

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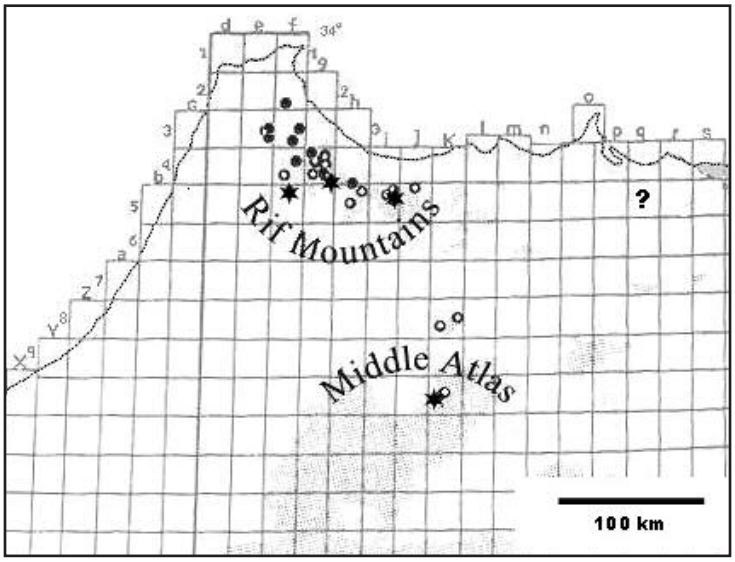
THE Moroccan midwife toad *Alytes maurus* Pasteur & Bons, 1962 was finally separated from the European midwife toad *Alytes obstetricans* after 41 years, and elevated to full specific rank when it was found to be closely related to the Betican *Alytes dickhilleni* and Majorcan midwife toad *Alytes muletensis* (Donaire & Bogaerts, 2003). These authors suggested the need to study the relationships between the two disjunct distributional ranges in the Rif and Middle Atlas regions within Morocco, and because the species is rare and much localized, they stressed the need to undertake more field research to determine its global distribution. (Map 1).

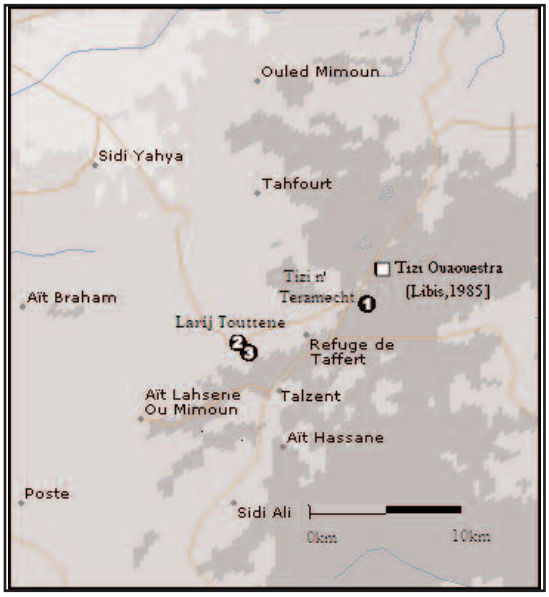
Due to its reduced distributional range (about 30 localities known in an extent of occurrence less than 5000 km^2) in the wettest areas of the Rif and Middle Atlas of Morocco, *Alytes maurus* has been classified as a Near Threatened species (IUCN, 2004). Furthermore, Mateo *et al*. (2003) feared a radical reduction in the density of the populations of the species exposed to human activity in the Rif Mountains.

The Middle Atlas distribution of the species is scarcely known as it is based only on one observation from the 1980s (Libis, 1985) and two from the 1990s (Mellado & Mateo, 1992; Bons & Geniez, 1996). No tangible proof of its existence has ever been shown in the form of photographs or specimens.

Under the scope of the DAPTF SEED GRANT 2004 project: 'Environmental characteristics and population census of three endemic amphibians of Morocco (North Africa): Implications for conservation', a field expedition to the Rif and Middle Atlas regions was undertaken from 31st October until 7th November 2004. During the rainy night of 4th November, on a track running from Taffert to Merhaoua in the Middle Atlas region, the first author had the opportunity to find, photograph, measure and collect toe clips (deposited at the MNCN Madrid tissue bank for a future genetic



Map 1. Updated global distribution of *Alytes maurus* Pasteur & Bons, 1962; hollow circles based on Bons & Geniez, 1996, solid circles by Donaire & Bogaerts, 2003 and star symbol unedited data from the project 'Environmental characteristics and population census of three endemic amphibians of Morocco'.



Map 2. Meridional distribution of *Alytes maurus* at the Djebel Bou Iblane SIBE natural park. Square = former southern most location (Libis, 1985); other symbols = new records presented in this note.

analysis) of three specimens of *Alytes maurus* from three different sites (one male, one female and one juvenile; Fig.1). Locality 1 at Tizi n'Teramecht (N33° 40' 11.7" W 4° 7' 29.7", altitude 2142 m), locality 2 and 3 at Larij Touttene (N33° 38' 37.2" W 4° 12' 50.5", altitude 2017 m; N33 38' 26" W 4 12' 35.2", altitude 1688 m respectively).

These three new sites confirm and validate the 20 year-old record by Libis (1985) of *Alytes* at Tizi Ouaouestra (N33° 41' W4° 6', altitude 2050 m) which is very close to locality 1 (about 2 km away), and slightly expands its distribution since Larij Touttene (localities 2 & 3) lies about 10 km. from Tizi Ouaouestra to the southwest, proving its wider distribution in the area of Djebel Bou Iblane (see Map 2). The two Larij Touttene sites are about 500 m from each other and they represent the new southernmost known record of the species' distribution.

At first glance, both locations, Tizi n'Teramecht and Larij Touttene, have different habitats corresponding to two bioclimatic zones; the first is a rocky criomediterranean zone devoid of forest with only bushy thorny vegetation present and patches of snow (as described in Libis, 1985); Larij Touttene is a forested oromediterranean zone of

Figure 1. Examples of *Alytes maurus* found at Djebel Bou Iblane. Top left: male from location 2; top right: female from loc. 1; bottom centre: juvenile from loc. 3.

Pinus and *Quercus* trees below the Cedar line. These two locations are found within the protected SIBE priority 1 (site of bio-ecological interest) Jebel Bou Iblane where neither deforestation nor human impact seem to threaten the species. However, outside the protected area the pressure of domestic animals, deforestation and soil erosion is alarmingly encroaching upon this population.

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Observations of predaceous diving beetles (Insecta, Coleoptera, Dytiscidae) attacking Terecay, *Podocnemis unifilis*, (Reptilia, Testudines, Pelomedusidae) in Ecuador

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ABSTRACT — Cases of adults of *Megadytes* (*Megadytes*) sp. and of *M*. (*Trifurcitus*) *robustus* (Insecta, Coleoptera, Dytiscidae) attacking young of *Podocnemis unifilis* in headstarting pools in the Ecuadorian Amazon are recorded. The possible causes of this behaviour are briefly discussed. *Megadytes* (*Trifurcitus*) *robustus* is new to Ecuador.

THE Dytiscidae (Insecta, Coleoptera) is a fairly large family of beetles distributed over most of the world. Both adults and larvae are carnivorous, feeding on small aquatic invertebrates (e.g. molluscs, crustaceans, insects), while the larger species feed also on amphibians (chiefly tadpoles) and small fish. The adults are also scavengers, feeding on dead or injured animals (cf. Larson *et al*., 2000). Some large Dytiscidae species have a fundamental role in the demographic control of amphibian populations (e.g. Ideker, 1979; Formanowicz, 1986; Holomuzki, 1986). Moreover, one case of predation upon a reptile has been reported: a neonate of *Thamnophis elegans* (Reptilia, Serpentes, Colubridae) killed by a larva of *Dytiscus* sp. (Drummond & Wolfe, 1981).

Two of the authors observed in the Ecuadorian Amazon many adults of the tribe Cybistrini (Dytiscinae) attacking young of *Podocnemis unifilis* (Reptilia, Testudines, Pelomedusidae). Such behaviour has never been recorded, and is the subject of this note.

The observations were made in January 1999 at the 'Reserva de produccion faunistica de Cuyabeno' (Sucumbios province) in four artificial pools in three villages (one in Playas, two in Zabalo and one in Zancudo) along the Aguarico River banks. The young turtles were reared for their first year of life in these pools, and were later released along the rivers (headstarting) with the aim of reducing the high natural mortality of neonate turtles (cf. Caputo *et al*., 2005; Townsend *et al*., 2005). The pools were specially dug

prismatic hollows (from 12 to 20 m^2) lined with PVC and filled with motor pumped water from the Aguarico River. Three pools (the two at Zabalo and the one at Zancudo) were badly managed (scarce food, dirty water, competition for the basking site, excessive vegetation and mud, overcrowding, presence of young caimans), so in these pools the accretion of *P. unifilis* after one year was lower than that observed in the well-managed one (Playas). Moreover many of the turtles in the badly managed pools showed health problems (dwarf disease, posterior legs paralysed, etc.) (Bertolani & Caputo, unpubl. data).

The three badly managed pools were infested by large adults of Dytiscidae. Four specimens were collected (Zacundo, UTM 0452750 9937724, 6th January 1999), belonging to two species: *Megadytes* (*Trifurcitus*) *robustus* (Aubé, 1838) and *Megadytes* (*Megadytes*) sp. The first species was represented by two males and its identification was confirmed by examinaton of the genitalia (cf. Tremouilles & Bachmañn, 1980; Tremouilles, 1989). Given that *Megadytes* (*Megadytes*) sp. was represented by two females, it was not possible to identify it with certainty. *Megadytes* (*Trifurcitus*) *robustus* is new to Ecuador, having been previously recorded in Argentina, Brazil, Paraguay and Uruguay (cf. Tremouilles & Bachmañn, 1980; Tremouilles, 1989).

The Cuyabeno natives named these beetles 'bichos que chupan la tarta' (beetles that suck the turtle), considering them to be hematophage animals. For this reason they were eliminated by the people responsible for the pools, albeit somewhat haphazardly.

Dytiscidae, including those collected, were observed attached to turtles' inner thighs, close to the conjunction of the carapace and plastron. Their grip was so tight that even removing the turtle from the water, did not loosen it. All the turtles thus observed (from 4.4 to 4.7 cm in plastron length) were moribund (probably due to poor environmental conditions) and died shortly afterwards, despite the removal of the insect. Dytiscidae were never observed eating dead turtles, though this may be due to the fact that corpses were removed from the pools as soon as they were seen. Both dytiscid species belong to the tribe Cybistrini, which includes some of the largest members of the family. No literature data are available on the feeding behaviour of the collected species, but it is known that other congeneric species (Tucker, 1940; Motta & Uieda, 2004) and those of the close genus *Cybister* Curtis, 1827 are predators of small vertebrates (e.g. Goidanich, 1943; Ideker, 1979; Johnson *et al*., 2003) or scavengers (Johnson & Jakinovich, 1970). Our observations suggest that also *Megadytes* (*Trifurcitus*) *robustus* and *Megadytes* (*Megadytes*) sp. are predaceous of small vertebrates. The observed attacks on turtles are very probably attributable to the abundance of prey and to their bad health; similar situations have been observed also in fish-breeding (cf. Larson *et al*., 1990; Balke *et al.*, 2004).

We suppose that similar behaviour occurs also in nature. This would take place during the dry season when some turtles, due to falling water levels, are confined to isolated muddy, low-oxygen pools (Vogt & Soini, in press). In a such situation availability of food may be reduced, exposing the young turtles to risk of Dytiscidae attack.

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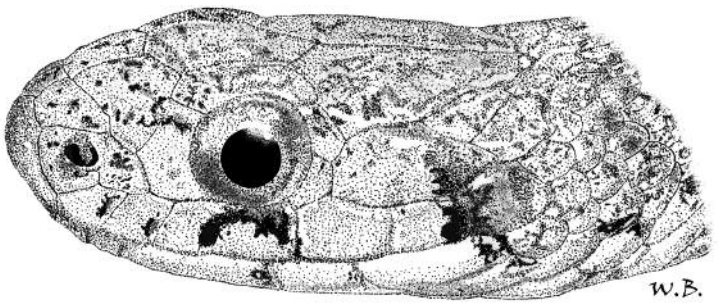

Storeria dekayi. Lake County, Illinois, U.S.A. Pen and ink illustration by Will Brown.
www//blueridgebiological.com

A rapid assessment of the amphibians and reptiles of an unprotected area of dry deciduous forest in north Madagascar

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ABSTRACT — 24 species of amphibians and reptiles (1 crocodilian, 10 lizards, 9 snakes and 4 anurans) are recorded from an unprotected area of dry deciduous forest located west of the Montagne D'Ambre massif in northern Madagascar. Although the survey area is currently under threat from increasing anthropogenic activity (especially agricultural clearance and charcoal production which still require careful and continuous monitoring), the results of this rapid assessment conclude that this area does not contain any species that are in serious danger from a current conservation perspective. 22 species (91.7% of the total species) currently receive protection within Montagne D'Ambre National Park, Ankarana Special Reserve or Lokobe Strict Nature Reserve. Of the 2 remaining species (8.3% of the total species) that are not protected by these important biological refuges, one (*Hoplobatrachus tigerinus*) is not endemic to Madagascar and the second (*Madascincus intermedius*) is not endemic to the Region of Antsiranana. Both species appear to possess relatively widespread distributions across a range of different habitat types. This paper contributes to the current understanding of Malagasy patterns of biodiversity by documenting the composition, geographical and ecological distribution of the herpetofauna of an unprotected and hitherto unstudied site. It supports the theory that prior to human invasion continuous lowland corridors of dry or transitional forest linked the lower slopes of the five major massifs found in the north of the country.

THE amphibians and reptiles of Madagascar are extremely diverse and display a level of endemism surpassed only by that of the Caribbean and Meso-America (Myers *et. al.,* 2000). Although the amount of information regarding Malagasy herpetofauna has increased dramatically over the past decade (Goodman & Benstead, 2003) further detailed surveys focusing on Malagasy amphibians and reptiles are still required. In particular the current information regarding non-protected areas and secondary habitats is extremely scarce (Andreone *et. al.,* 2003) and must be targeted in order to ensure that informative conservation decisions are made. This paper is the second in a series of research articles (D'Cruze & Sabel, 2005) that contributes to the existing literature by highlighting the findings of a rapid biodiversity survey conducted in the north of Madagascar.

The herpetofauna in the extreme north of Madagascar is currently conserved by a network of protected areas consisting of Montagne D'Ambre National Park, Ankarana Special Reserve and Analamera Special Reserve on the mainland and Lokobe Strict Nature Reserve located on Nosy Be (an island off north-west Madagascar). Of these four biological refuges, only the rainforest found within Lokobe and Montagne D'Ambre and the dry deciduous forest of Ankarana have been subject to in-depth biodiversity surveys that have resulted in published species lists (Andreone *et. al.*, 2003; Raxworthy & Nussbaum, 1994; Hawkins *et. al.,* 1990).

The intention of this study was to survey a previously undocumented area of low altitude dry deciduous forest located outside of these protected areas. Firstly, this survey would serve to identify any species that do not currently receive protection within these biological refuges and provide researchers with the opportunity to assess the current conservation threats that they might face. Secondly it was hoped that the information gathered would contribute to the existing literature regarding Malagasy patterns of biodiversity by documenting the composition, geographical and

Geckolepis maculata. Photograph © N.C. D'Cruze.

Blaesodactylus boivini. Photograph © N.C. D'Cruze.

ecological distribution of any species encountered. Crucially this information can then be used in the assessment of future conservation priorities.

MATERIALS AND METHODS

Fieldwork was carried out by Frontier researchers over a period of approximately two weeks at the end of the dry season from the 26th October-6th November 2005. Unfortunately the area could not be surveyed during the wet season [when Malagasy herpetofauna is typically at its most active (Glaw & Vences, 1994)] as access to this area by road is made impossible as a result of the incredible amount of rainfall that occurs during this period. Photographic records (held by the first author) were compared with specimens housed at the University of Antananrivo and were also verified by Dr. A.P. Raselimanana. Frontier-Madagascar is an arm of the Society for Environmental Exploration, a UK based non-governmental organisation carrying out scientific and socio-economic survey work with a view to making informed conservation decisions. The main techniques used to survey the amphibians and reptiles were pitfall trapping and active searches. Three pitfall lines were utilised in an area of dry deciduous forest with traps placed into the ground at 10 m intervals with drift fences along a transect line measuring 100 m in length. Both diurnal and nocturnal active searches lasting approximately three hours in length were carried throughout the duration of the survey.

Investigators searched under stones, amongst dead wood, and on tree trunks both day and night in order to gauge the diversity of the full complement of species.

Description of the survey area

The survey period concentrated on an area of land surrounding the village of Manondro with researchers operating from a base camp situated on the edge of a fast flowing stream at 12Ɣ27.56'S 49Ɣ01.29'E. Located within the commune of Andranofanjava, Manondro village is situated approximately 30 km southwest of Diego-Suarez, the administrative capital of the Antsiranana region in north Madagascar. The extent of this area is bounded by the Mozambique Channel to the west and the Montagne D'Ambre Massif to the east. Ankarana Special Reserve can be found approximately 50 km to the south east.

Climate — The study site is part of the Western Ecoregion defined by Cornet (1974) and is characterized by a reliable wet season that runs from November to March during which the majority of rainfall occurs. This period is followed by a distinct dry season that can last up to seven months during which rainfall is highly infrequent. The presence of flowing rivers and small lakes at the height of the dry season indicates that the mean annual precipitation of this location is most likely higher than the 980 mm received by Antsiranana, but not as high as the 2378 mm received by Montagne D'Ambre (Nicoll & Langrand, 1989).

Vegetation Types — The area immediately surrounding the study site at Manondro is a mosaic of dry deciduous forest, riparian vegetation and anthropogenically disturbed habitat. The areas of dry deciduous forest are typified by a dense assemblage of vegetation which results in a relatively pronounced layer of leaf litter. Within these areas smaller pockets of seasonal semi-evergreen vegetation (maximum canopy height of 35 m) and substantial areas filled by stands of bamboo are present which supports the hypothesis that this forest is semi-humid in nature as a result of the high annual precipitation that it receives. Due to the transitional nature of these areas and the difficulty of differentiating between them, this type of vegetation has been designated simply as dry deciduous forest. Found near to the permanent rivers and lakes, the areas of riparian vegetation are more verdant in appearance than the areas of dry deciduous forest and are typified by a variety of broadleaf trees and a much thinner layer of leaf litter. Lastly, the area is also characterised by the presence of several villages and cultivated land that constitute the commune of Andranofanjava. As a result substantial areas of both dry deciduous forest and riparian vegetation have been altered creating a third distinct habitat.

Microhabitats — Many microhabitats exist for the species found at this location. The vegetation offers a wide variety of arboreal niches that can be utilized by a large number of different species, such as those belonging to the genus *Furcifer* and *Ithycyphus*. The accompanying shrub layer also provides shelter for terrestrial species such as *Paroedura stumpffi*. A layer of leaf litter is present in the gallery forest in which fossorial species such as *Madascincus intermedius* occur and the surrounding rivers and small lakes provides a large body of water in which *Crocodylus niloticus* can be found.

RESULTS

Composition — A total of 24 different species were encountered during this study (see Table 1 for complete list including pitfall trap captures) and it is now known that the reptile fauna of this area consists of at least 1 species of crocodilian (4.2%), 10 species of lizard (41.7%), 9 snakes (37.5%) and 4 anurans (16.7%).

Primary habitat — With regards to primary habitat, 12 species (50%) were found to occur only in dry deciduous forest and 3 species (12.5%) were found solely in riparian areas (Table 1). 2 species (8.3%) were found to occur solely in anthropogenically disturbed areas. No species were encountered in both riparian areas and dry deciduous forest, 1 (4.2%) in both riparian forest and anthropogenically disturbed areas, 4 (16.7%) in both dry deciduous forest and anthropogenically disturbed areas and 2 (8.3%) in all three of the primary habitats.

Ecological distribution — In terms of vertical positioning within the primary habitat, 12 species (50%) were usually found only in terrestrial situations, 9 (37.5%) were typically found only in arboreal situations, and 1 (4.2%) were found in both (Table 1). Only 1 species the crocodilian *Crocodylus niloticus* was only observed in aquatic situations (4.2%).

Relative abundance — The 24 species recorded from the area are classified using a system similar to that used by Wilson & McCranie (2004) and can be summarized as follows: Abundant (large numbers encountered on a regular basis), common (encountered on a regular basis), infrequent (unpredictable, few individuals seen), or rare (rarely seen). These classifications are based on

Ithycyphus miniatus. Photograph © N.C. D'Cruze.






Top left: *Boophis tephraeomystax*. **Top right**: *Ptychadena mascareniensis*. **Centre left**: *Paroedura stumpffi*. **Centre right**: *Trachylepis elegans*. **Lower left**: *Phelsuma madagascariensis*. **Lower right**: *Alluaudina bellyi*. All photographs © N. C. D'Cruze.

Top: *Acrantophis madagascariensis.* **Centre left**: *Leioheterodon madagascariensis.* **Centre right**: *Madagascarophis colubrinus* (colour variant). **Lower left**: *Madagascarophis colubrinus.* **Lower right**: *Liophidium torquatum*. All photographs © N. C. D'Cruze.

Species	Primary Habitat	Ecological Distribution	Relative Abundance	Literature		
				Montagne D'Ambre National Park	Ankarana Special Reserve	Lokobe Strict Nature Reserve
REPTILIA						
Crocodylidae						
Crocodylus niloticus	RIP	A	I		+	
Chamaeleonidae						
Furcifer oustaleti	A, RIP	AB	C		+	
Gekkonidae						
Blaesodactylus boivini	DDF	AB	I		+	
Geckolepis maculata	A, DDF	AB	C	+		+
Paroedura stumpffi	DDF	AB, T	I	+	+	+
Phelsuma abbotti chekei	A, DDF	AB	C		+	+
Phelsuma madagascariensis grandis	A, DDF, RIP	AB	C	+	+	+
Lygodactylus cf. *heterurus*	DDF	AB	I		+	+
Scincidae						
Madascincus intermedius	DDF	T	R			
Trachylepis elegans	A	T	A	+	+	
Trachylepis tavaratra	DDF	T	I	+	+	
Boidae						
*Acrantophis madagascariensis**	RIP	T	R	+		
Colubridae						
Alluaudina bellyi	DDF	T	R	+		+
Dromicodryas quadrilineatus	A, DDF, RIP	T	C			+
Ithycyphus miniatus	RIP	AB	I			+
Leioheterodon madagascariensis	A, DDF	T	C	+	+	+
Liophidium torquatum	DDF	T	I	+	+	+
Stenophis gramuliceps	DDF	AB	R			+
Madagascarophis colubrinus	DDF	T	C			+
Mimophis mahfalensis	A	T	C		+	
AMPHIBIA						
Mantellidae						
Boophis tephraeomystax	DDF	AB	I			+
Mantidactylus cf. *pseudoasper*	DDF	T	I	+		+
Ranidae						
Hoplobatrachus tigerinus	DDF	A	R			
Ptychadena mascareniensis	A, DDF	T	A	+		+

Table 1. Distribution of the amphibian and reptile species found during this survey. Abbreviations include: Primary Habitat- A = anthropogenically disturbed areas, DDF = dry deciduous forest, RIP = riparian areas; Ecological Distribution- A = aquatic, AB = arboreal, T = terrestrial; Relative Abundance- A = abundant, C = common, I = infrequent, R = rare; Literature- + = previously documented. Occurrence in Montagne D'Ambre is given according to Raxworthy & Nussbaum (1994), occurrence in Ankarana according to Hawkins *et al*. (1990), occurrence in Lokobe according to Andreone *et al*. (2003). *Listed as Vulnerable in the 2005 IUCN Red List of Threatened Species.

Mimophis mahfalensis. Photograph © N.C. D'Cruze.

data collected using both active searching and pitfall traps. 2 species (8.3%) were abundant, 8 (33.3%) were common, 9 (37.5%) were infrequent and 5 (20.8%) were rare (Table 1).

Pitfall trap results — The pitfall trap lines are characterized in Table 2. A total of 5 vertebrates were captured over 264 trap days, giving an overall vertebrate capture rate of just 1.9% per trap day. The number of individuals of each species caught by the trap lines is summarized in Table 3. The pitfalls caught 4 species of lizard but failed to produce any snake or anuran captures. These results are relatively poor in comparison with other similar studies (e.g. Raxworthy & Nussbaum, 1994) and are probably due to reduced activity during the dry season. *Geckolepis maculata* was the most abundant species caught in the pitfall traps. This is interesting as this species was only observed in arboreal situations during active searches.

Literature summary — 15 of these 24 encountered species (62.5%) receive protection within Lokobe Strict Nature Reserve and 5 species (20.8 %) have

Line	Forest Type	Microhabitat	Latitude	Longitude	Altitude (masl)	Start date	Finish date	Days	Trap days	Capture rate %
1	Dry deciduous forest	Ridge	12°28.02'S	49°00.44'E	190	28.10.05	06.11.05	8	88	1.1
2	Dry deciduous forest	Slope	12°27.98'S	49°00.31'E	203	28.10.05	06.11.05	8	88	1.1
3	Dry deciduous forest	Valley	12°27.96'S	49°00.23'E	209	28.10.05	06.11.05	8	88	3.4

Table 2. Pitfall lines used to capture amphibians and reptiles (capture rate % is number of vertebrate individuals caught per trap day).

been previously recorded from Montagne D'Ambre National Park (Table 1). They can not be considered strictly rainforest species as they are also found in the three primary habitats detailed in this survey. An additional 6 species (25%) are currently protected in the dry deciduous forest of the nearby Ankarana Special Reserve and 12 species (50%) have been recorded from two or more of these protected areas. Therefore according to the current literature the 2 remaining species (8.3%) are not protected within the network of refuges in the north of Madagascar. However importantly, the anuran *Hoplobatrachus tigerinus* is not endemic to Madagascar and the skink *Madascincus intermedius* is not endemic to the region of Antsiranana. Both species possess relatively wide distributions across Madagascar throughout a range of different habitats and therefore appear to be in no immediate danger from extinction.

Significance of the survey

Patterns of biodiversity in northern Madagascar - The disruptive anthropogenic activity that followed human invasion approximately 2000 years ago is believed to be largely responsible for the current distribution of amphibians and reptiles in Madagascar (Vallan, 2003). It has been suggested that prior to human invasion continuous lowland corridors of dry or transitional forest linked the lower slopes of the five major massifs of Analamera, Ankarana, Daraina, Montagne D'Ambre and Montagne des Français located in the north. The current distribution of the skink *Trachylepis tavaratra* at all of these locations has been used as evidence to support this claim (Ramanamanjato *et. al.*, 1999). The results of this survey also support this theory as 25% of the species found in this lowland area of semi humid dry deciduous forest are found in both Montagne D'Ambre and Ankarana Special Reserve. These former corridors help to explain how these species were able to cross the distance (approx. 50 km) between these sites. We strongly suspect that further detailed surveys focussed on the remaining 3 massifs (for which detailed species lists do not currently exist) will result in patterns of distribution similar to that of *Trachylepis tavaratra* for a significant number of other robust species and will add further weight to this theory.

Species	Number of individuals captured		
	Pitfall line number		
	1	2	3
REPTILIA			
Gekkonidae			
Geckolepis maculata	1	1	
Paroedura stumpffi			1
Scincidae			
Madascincus intermedius			1
Trachylepis tavaratra			1
	TOTAL	**TOTAL**	**TOTAL**
	1	1	3
% Capture rate	1.1	1.1	3.4

Table 3. Pitfall trap capture of amphibians and reptiles.

The subject of various Malagasy proverbs and taboos, local staff member Onjaniaina Cecilia Paulariot demonstrates that chameleons (these examples are *Furcifer oustaleti*) are fascinating organisms that require our protection. Photograph © Janine E. Robinson.

Current threats to conservation — The data collected in this study contributes to the current understanding regarding patterns of biodiversity of Malagasy herpetofauna by documenting the fauna of a specific site located outside the network of protected areas found in the north of Madagascar. In addition to Manondro village, this study area is characterized by the presence of several other villages that constitute the commune of Andranofanjava and thus is subject to numerous human-caused environmental problems. The major threats to the integrity of the reptile fauna of this area appear to be agricultural clearance, charcoal production and zebu grazing (during which sites are either selectively logged or cleared of all trees) which have resulted in the degradation of large areas of forest.

Despite the fact that this area currently receives no formal protection its herpetofauna remains relatively diverse as a total of 24 species were encountered during this survey. We conclude that these species are in no immediate danger from a conservation perspective as 22 species are currently protected in Montagne D'Ambre National Park, Ankarana Special Reserve and Lokobe Strict Nature Reserve. The 2 remaining species that are not protected by these biological refuges are also not under serious threat as the existing literature suggests that they are either non-endemic or widespread species found across a range of different habitats. However, we suggest that the area still requires careful and continuous monitoring as 7 species (*Blaesodactylus boivini, Paroedura stumpffi*, *Phelsuma madagascariensis grandis*, *Lygodactylus* cf. *heterurus, Trachylepis tavaratra, Acrantophis madagascariensis* and *Alluaudina bellyi*) have restricted ranges in the north of Madagascar and 1 species (*Acrantophis madagascariensis*) is listed as vulnerable on the 2005 IUCN Red List of Threatened Species.

Future action

The reptile and amphibian rich fauna found in the north of Madagascar is already recognized as one of the more speciose regions of the biodiversity hotspot that is Madagascar (Goodman &

Benstead, 2003). Although a series of effective nature reserves currently exist in this region the majority of these protected areas have not been subject to surveys resulting in published species lists for over a decade or indeed at all. In addition several unprotected sites such as Montagne des Français and Daraina have been identified as threatened areas of high biodiversity that also require some form of protection (ANGAP, 2003; Glaw *et. al*. 2005). We recommend that further biodiversity surveys focused on the composition, geographical and ecological distribution of the species found at these localities should be conducted to ensure that informed and effective conservation making decisions are made.

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Ophiophagy and cannibalism in *Vipera latastei* Boscá, 1878 (Reptilia, Viperidae)

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THE normal or occasional diet of many snake species includes other snakes. Species such as the King Cobra (*Ophiophagus hannah*) from south-eastern Asia or the Mussurana (*Clelia clelia*) from the Amazon rainforest are reported to be largely ophiophagic (Gasc, 1994). Some North American crotalids, members of the genera *Crotalus* and *Sistrurus*, primarily prey on endotherms; however newborns of both genera may prey on other snakes (Mushinsky, 1987). In Europe, there are no truly ophiophagic snakes, but some species such as the Montpellier snake (*Malpolon monspessulanus*), the Western whip snake (*Coluber viridiflavus*) or the European smooth snake (*Coronella austriaca*) also attack and prey on other snakes, including vipers (Bellairs, 1975; Gasc, 1994). About 20 species of snakes are reported to be cannibalistic (Polis & Myers, 1985).

With the exception of species adapted to eat other snakes, ophiophagy is considered an aberrant behaviour released by an inappropriate stimulus (Fox, 1975). Although this phenomenon has been observed in the wild, it typically occurs under captive conditions. For instance, it occurs in boids, when two specimens share a terrarium and select the same prey. One of them, usually the smaller, can be swallowed after the prey by the larger snake (Gasc, 1994). It also occurs after long periods of fasting, when a snake is stimulated by a prey situated within its striking range, regardless of whether or not the prey is another snake or a conspecific (Bruno & Maugeri, 1990).

In this note, ophiophagy and cannibalism is reported in wild and in captive conditions for Lataste's Viper (*Vipera latastei* Boscá, 1878). *Vipera latastei* is a small viviparous Mediterranean snake, distributed throughout most of the Iberian Peninsula, except for a narrow strip in the north, and in North Africa from Morocco to Tunisia (Pleguezuelos & Santos, 2002). It is an ambush predator with a similar diet pattern to the rest of European vipers, with the exception of *V. ursinii* (Bea & Braña, 1988; Bea *et al*., 1992; Brito, 2004). Its diet before sexual maturation consists mostly of ectothermic prey such as reptiles of the family Lacertidae, and endothermic prey such as small mammals of the Soricidae and Rodentia groups after sexual maturation (Saint-Girons, 1980; Bea *et al*., 1992; Brito, 2004). Less frequently, it also feeds on invertebrates of the Mollusca, Myriapoda and Coleoptera groups (Bea & Braña, 1988; Brito, 2004), and other vertebrates such as amphibians, birds and mustelid mammals (López Jurado & Caballero, 1981; Bea & Braña, 1988; Brito, 2004). To our knowledge (Valverde, 1967; López Jurado & Caballero, 1981; Bea & Braña, 1988; Bea *et al*., 1992; Brito, 2004), snakes have never been reported in the diet of *V. latastei*.

Two observations of ophiophagy in *Vipera latastei* from Sedano valley (latitude 42º43'13''N and longitude 3º45'03''W), north-western Burgos, north of Spain, are detailed. The first observation occurred in September 2004 when several pregnant females were kept in glass terrariums (54 x 30 x 30 cm) during the last 20 days of gestation for reproductive experiments. On 1st September an adult male of 400 mm snout-vent length (SVL) was introduced in a terrarium with a pregnant 525 mm SVL female. After a 5-day period without observing interactions between the two specimens, the male disappeared and five newborns were found in the terrarium. The palpation of the female allowed the clear identification of the male inside the stomach of the female. After the male was eaten, the female gave birth to two newborns more. The pregnant female weighted 180 g, the total weight of the offspring (including embryonic tissues) was 74 g, the male weighted 66 g and the post-partum female with the male in the stomach weighted 171 g. The second observation was made on 27th April 2005 during a field survey. A juvenile of *V. latastei* with an SVL of 167 mm was captured and a few minutes latter disgorged a juvenile 168 mm SVL *Coronella austriaca*.

Although both observations increase the current knowledge about the foraging ecology of *V. latastei*, the nature of such observations is radically different. The first observation was made under captive conditions and could be the result of an aberrant behaviour due to the conditions of captivity. Only *V. ammodytes* is reported to be cannibalistic in the field (Beskov & Dushkov, 1981; Mario Schweiger, pers. comm.). Whereas studies in semi-wild conditions (large open terrariums) confirm the lack of intraspecific intolerance when two specimens are placed in contact (Bellairs, 1975), in captive conditions (small closed terrariums) snake keepers have to be careful when placing vipers together as they should eliminate smells by washing the terrariums (Mario Schweiger, pers. comm.). Although social behaviour and intraspecific chemical recognition were studied in many snake species (Ford & Burghardt, 1993), including European vipers (Andrén, 1976, 1982), nothing is known about territory marking by smell and interspecific recognition by smell under captive conditions. In the field, both sexes of *V. latastei* can only be found together during the hibernation and mating seasons. During the rest of the annual cycle, vipers are solitary animals, with pregnant females and males selecting different habitat types during the gestation period (authors, pers. obs.). This habitat segregation could avoid the occurrence of cannibalistic behaviours. Pregnant females of *V. latastei* usually do not feed during the final stages of gestation due to physical constraints in the abdominal cavity caused by the developing offspring (Bea *et al*., 1992). Thus, post-partum females are largely emaciated and finding food is a crucial step for survival (Madsen & Shine, 1992). The presence of the smaller male in a small terrarium at the moment after parturition might have released an inappropriate stimulus, leading to predation by the female.

The second observation was made under natural conditions and should reflect local variation in the diet composition of this viper. In the Sedano valley, *C. austriaca* is very abundant and it shares similar habitats to *V. latastei*, and thus could be a potential prey species for this viper. *Vipera latastei* occurs in a wide range of environments, from sea level to mountain areas, in sub-humid, humid and semi-arid Mediterranean climates (Pleguezuelos & Santos, 2002) and should exhibit local variation in diet composition according to prey availability.

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Additions to the herpetofauna of Parque Nacional El Cusuco, Honduras

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ABSTRACT — We report 50 species of amphibians and reptiles (5 salamanders, 12 anurans, 12 lizards, and 21 snakes) from Parque Nacional El Cusuco, a cloud forest preserve in northwestern Honduras, an increase of 20 species from the previously reported total. Four of the newly recorded species are new to science. An update on the conservation status of the herpetofauna of the park is provided.

RESUMEN — Nosostros reportamos 50 especies de anfibios y reptiles (5 salamandras, 12 anuros, 12 lagartillas, y 21 culebras) del Parque Nacional El Cusuco, una reserva del bosque nublado en Honduras del noroccidental, un aumento de 20 especies del previamente informado total. Cuatro de las especies nuevamente recordadas son nuevas para ciencia. Un actualiza del estado de conservación del herpetofauna está proveida.

A long series of studies has amply demonstrated the biological significance of the herpetofauna of Honduras (e.g., McCranie & Wilson, 2002; Wilson & McCranie, 2004a), a country located within the Mesoamerican biodiversity 'hotspot' (Conservation International, 2005). It is fortunate, therefore, that the government of Honduras has established a sizable system of biotic reserves that, while not providing total protection for the herpetofauna, does present significant potential for its protection (Wilson *et al*., 2001; McCranie & Wilson, 2002).

One of the best-developed biotic reserves in Honduras is Parque Nacional El Cusuco, located in the Sierra de Omoa of northwestern Honduras. According to its original demarcation in 1987, the park has an area of about 234 km^2, of which approximately 7.7 km^2 above 1800 m elevation was considered the nuclear zone (Wilson & McCranie, 2004b). Since that original delineation, the nuclear zone has been expanded to 75.9 km^2 (COHDEFOR, 2005), and now includes the majority, if not all, of the cloud forest remaining in the Sierra de Omoa. This development has been enhanced since the Operation Wallacea Honduran Forest Research Project has been headquartered in this park. Operation Wallacea "is a series of biological and social science expedition projects designed to underpin the achievement of specific wildlife conservation aims" (Operation Wallacea Research Programme, 2005). The program has been in operation in Honduras since 2003. Its purpose is to conduct research that will 'provide hard data on the effectiveness of conservation management programmes' (Operation Wallacea Research Programme, 2005).

Beginning in 2004, we developed and implemented a series of herpetofaunal inventory and monitoring projects at a number of sites in and around Parque Nacional El Cusuco, within the framework and support structure of Operation Wallacea. The primary goals of the herpetology

teams were to complete an inventory of species composition in the park, assess the conservation status of these species, and to inform the development of management strategy for their continuing protection within the park.

Wilson & McCranie (2004b) recently discussed the herpetofauna of Parque Nacional El Cusuco and provided the point from which the survey work described in the preceding paragraph was based. They reported a herpetofauna consisting of 30 species, including four salamanders, nine anurans, six lizards, and 11 snakes. Recent work in this national park has led to the discovery of a significant number of additions to the herpetofaunal inventory, which are enumerated below.

MATERIAL AND METHODS

Herpetofaunal sampling was accomplished using diurnal and nocturnal opportunistic searching, drift fence arrays with pitfall traps checked daily or twice daily, and leaf litterbags and dipnetting for tadpole collection. Specimens were preserved in 10% formalin solution and transferred within a week to 70% ethanol. Species identifications in the field were made using keys and descriptive information in McCranie & Wilson (2002) and Köhler (2003), and were later verified using additional sources and comparative material. Specimens were deposited in the collections of the Florida Museum of Natural History (UF), Gainesville, Florida, and the National Museum of Natural History (USNM), Washington, D.C. Fieldwork was carried out by JHT, SMH, and TLP from 24th June to 10th September of 2004, by JHT from 26th February to 5th March 2005, and by JHT, LDW, BLT, DCF, and TLP from 23rd June to 19th August of 2005. Generic taxonomy used in this paper follows Crawford & Smith (2005), Faivovich *et al*. (2005), Frost *et al*. (2006), and Poe (2004).

Description of Field Sites

In connection with the Operation Wallacea Honduran Forest Research Project, several field camps were established, which were utilized by the authors for herpetofaunal collecting. All of the localities visited were in Depto. Cortés, except for La Fortuna and La Fortuna Camp, which are in Depto. Santa Barbara. Field camps and other localities mentioned in this paper are characterized below.

Centro de Visitantes (15º29.6'N, 88º12.9'W) — Also referred to as Base Camp by Operation Wallacea, the Centro de Visitantes for Parque Nacional El Cusuco is situated at 1550 m alongside the Río Cusuco in the southeastern sector of the park. This camp also encompasses a set of trails that fan out into the forest from this center. These trails include Sendero Las Minas, Sendero El Danto, Sendero El Quetzal, and Sendero El Pizote. Collections were made from 1450 m to 1800 m elevation.

Cascada de Quetzal (15º29.8'N, 88º12.3'W) — A tall (>25 m) waterfall in the Río Cusuco to the southeast of the Centro de Visitantes. Collections were made around the pool at the base of the waterfall, as well as along the trail between the waterfall and the road from 1430 m to 1490 m elevation.

Bosque Enano (15°30.5'N, 88°13.9'W) — The highest portions of Cerro Cusuco and Cerro Jilinco host the bosque enano, or elfin forest, ecosystem. This unique habitat is typified by having growth-stunted trees covered with a thick layer of epiphytic bromeliads, mosses, and fungi. Collections were made from 1990 m to 2242 m elevation.

Cantiles (15°30.8'N, 88°14.5'W) — This camp is located at 1780 m elevation in primary broadleaf forest WNW of Cerro Cusuco. The camp is near a stream, Quebrada de Cantiles, which drains northward into the Río Cuyamelito and into the Caribbean. Collections were made from 1780 m to 1990 m elevation along trails and the stream.

Finca of Makrín Ramírez (15°29.7'N, 88°13.3'W) — A small farm cut from cloud forest at 1580 m elevation near the Centro de Visitantes upstream along the Río Cusuco.

Guanales (15º28.9'N, 88º13.3'W) — This camp is located at 1220 m elevation in broadleaf secondary and primary forest in a steep canyon. The river adjacent to the camp flows southwesterly into the Río Naco. Collections were made from 1220 m to 1450 m elevation on steep trails leading up the slopes on both sides of the river.

La Fortuna (15º29.3'N, 88º15.4'W) — The village of La Fortuna lies within the southern portion of the park, across the Río Naco valley from the canyon where Guanales Camp is located. The town sits along a ridge from about 1330 m to 1400 m in elevation. Two nights were spent in the village in June and July 2005 while transiting in and out of the La Fortuna campsite.

La Fortuna Camp (15º29.9'N, 88º17.2'W) — This campsite is ca. 4 airline km west of La Fortuna at the edge of a remote agricultural clearing and primary forest, above a tributary of Quebrada La Ruidosa at 1300 m elevation. Quebrada La Ruidosa flows westward into Guatemala, where it eventually drains into the Río Motagua. Collections were made from 1250 m to 1350 m. This campsite was only visited by JHT and TLP from 30th June 2005 to 6th July 2005.

RESULTS

As noted above, Wilson & McCranie (2004b) reported 30 species of amphibians and reptiles from Parque Nacional El Cusuco. We herein report an additional 20 species from the park based on our work and other published reports, providing a current total of 50 species (Tables 1 & 2). These 50 species include five salamanders (10%) and 12 anurans (24%) for a total of 17 amphibians (Table 1), and 12 lizards (24%) and 21 snakes (42%) for a total of 33 reptiles (Table 2). Four of the newly reported species (*Oedipina* sp., *Hyla* sp., *Rhadinaea* sp., and *Geophis nephodrymus*) represent previously undescribed taxa (McCranie, submitted; McCranie & Castañeda, in press, submitted; Townsend & Wilson, 2006). Including these new species, a total of 352 species of amphibians and reptiles are now known in occur in Honduras, of which six are marine in distribution (McCranie, 2004a, b; McCranie & Castañeda, 2004; McCranie & Wilson, 2002; McCranie *et al*., 2002, 2003a,b, 2005; Townsend *et al*., 2005a,b; Wilson & McCranie, 2002; Wilson *et al*., 2003). The number of species now known from Parque Nacional El Cusuco represents 14.5% of the 346 species recorded from mainland and insular habitats in Honduras.

Class Amphibia
Order Caudata
Family Plethodontidae
Oedipina sp. (Fig. 1)
Localities: Cantiles.
Remarks: A single specimen representing an undescribed species was found under debris near the campsite. This species is being described by McCranie (Submitted).

Order Anura
Family Hylidae
'*Hyla*' sp. (Figs. 2 and 3)
Localities: Bosque Enano.
Remarks: A single specimen representing an undescribed species of hylid frog was discovered as it jumped from a bromeliad in elfin forest. This species is being described by McCranie & Castañeda (submitted).

Smilisca baudinii (Duméril & Bibron)
Localities: La Fortuna Village.
Remarks: Three different males were heard calling during two nights spent in the village, at around 1350 m elevation.

Family Leptodactylidae
Craugastor charadra (Campbell & Savage)
Localities: Guanales.
Remarks: This species is an uncommonly encountered inhabitant of the riparian area around the river next to Guanales camp.

Class Reptilia
Order Squamata
Family Anguidae
Celestus montanus Schmidt (Fig. 4)
Localities: Cantiles, Guanales.
Remarks: In addition to the juvenile specimen from Guanales reported on by Townsend *et al*. (2005c), UF 144903 was collected on 19th July 2005 near Cantiles Camp. Relevant data for UF 144903 is: snout-vent length about 72 mm, tail length about 118 mm, three prefrontals, two rows of internasals, the nasal contacts the rostral, the frontal is 1.7 times as long as its width at the widest point, the interparietal is clearly smaller then the parietals, three loreals, 11/11 supralabials, supralabials 7–9 directly under the orbit, 7/8

Species	Wilson and McCranie (2004b)	2004 and 2005 records				
		Centro de Visitantes	Bosque Enano	Guanales	La Fortuna	Cantiles
Plethodontidae: 5						
Bolitoglossa conanti	X	X		X	X	X
Bolitoglossa diaphora	X	X				X
Bolitoglossa dunni	X	X				
Cryptotriton nasalis	X		X	X		
Oedipina sp.						X
Bufonidae: 1						
Cranopsis valliceps	X					
Hylidae: 7						
Bromeliohyla bromeliacia	X	X		X		
Duellmanohyla soralia	X	X		X	X	
"Hyla" sp.			X			
Plectrohyla dasypus	X	X			X	X
Plectrohyla exquisita	X	X		X		
Ptychohyla hypomykter	X	X		X	X	
Smilisca baudinii					X	
Leptodactylidae: 3						
Craugastor charadra				X		
Craugastor milesi	X					
Craugastor rostralis	X	X		X	X	
Ranidae: 1						
Lithobates maculatus	X					
TOTAL	**13**	**9**	**2**	**8**	**6**	**4**

Table 1. Amphibians of Parque Nacional El Cusuco, Honduras, with a comparison of species collected at different survey sites during 2004 and 2005 (for site descriptions see text).

infralabials, 66 scales along the dorsal midline, 23 subdigital lamellae on the fourth toe.

FAMILY PHRYNOSOMATIDAE

Sceloporus variabilis Wiegmann

Localities: Centro de Visitantes.

Remarks: A single adult male was found basking on a rock pile in a cleared area in front of the Visitor's Center.

FAMILY POLYCHROTIDAE

Anolis capito (Peters)

Localities: Guanales.

Remarks: A single specimen was found near camp on a fallen log at 1300 m.

Anolis ocelloscapularis (Köhler, McCranie, & Wilson)

Localities: Guanales, La Fortuna Camp.

Remarks: This species was reported from Guanales by Townsend *et al.* (2005d), and was commonly encountered around La Fortuna Camp in an edge area where primary forest meets an agricultural clearing.

Anolis petersii (Bocourt)

Localities: Guanales, La Fortuna Camp.

Remarks: In addition to the specimen reported from La Fortuna Camp by Townsend & Plenderleith (2005), a subadult was collected at Guanales at 1410 m elevation.

FAMILY SCINCIDAE

Sphenomorphus incertus (Stuart)

Localities: Near the Centro de Visitantes, on a trail leading to the finca of Makrín Ramírez; Sendero Las Minas.

Remarks: One specimen was collected as it ran across a trail in disturbed cloud forest at 1550 h at 1570 m (Townsend, 2005), and another was found in a pitfall trap at 1580 m.

Figure 1. *Oedipina* sp. Photograph © B. L. Talley.

Figure 2. *Hyla* sp. Photograph © B. L. Talley.

Figure 3. *Hyla* sp., on same species of bromeliad from which it was collected. Photograph © Dan Pupius.

Figure 4. *Celestus montanus*. Photograph © B. L. Talley.

Figure 5. *Geophis nephodrymus*. Patternless variant. Photograph © B. L. Talley.

Figure 6. *Geophis nephodrymus*. Blotched variant. Photograph © B. L. Talley.

Figure 7. *Atropoides mexicanus*. Photograph © B. L. Talley.

FAMILY COLUBRIDAE

Adelphicos quadrivigatum Jan
Localities: Guanales; Parque Nacional El Cusuco on road from Buenos Aires to the Centro de Visitantes.
Remarks: One specimen was found dead on road and another alive on road. An adult female was collected at Guanales at 1300 m elevation.

Geophis nephodrymus Townsend & Wilson (Figs. 5 and 6)
Localities: Cantiles; Finca of Makrín Ramírez; Sendero El Danto; Sendero El Quetzal; Sendero Las Minas.
Remarks: This species was described by Townsend & Wilson (2006) based on a single specimen collected in a pitfall trap near the Centro de Visitantes in 2004. Townsend (2006) described considerable morphological variation in this species based on an additional material collected during 2004 and 2005.

Lampropeltis triangulum (Lacépède)
Localities: Sendero Las Minas.
Remarks: One adult was collected as it crossed a trail between Guanales Camp and Centro de Visitantes on 16th August 2005 at 1450 m elevation.

Omoadiphas aurula Köhler, Wilson, & McCranie
Localities: Trail to Cerro Cusuco.
Remarks: A single male specimen (UF 144905) was found on trail to landslide at ca. 1900 m. The relevant data on UF 144905 are as follows: male (hemipenes not everted); ventrals 163; cloacal scute divided; subcaudals 35; 17 dorsal scale rows; 7/7 supralabials, third and fourth entering orbit; 8/8 infralabials, first pair in medial contact, first four touching anterior chinshields, fourth largest; loreal single, elongate; no preocular; two postoculars, lower smaller; anterior temporal absent, single posterior temporal; total length 282 mm; tail length 35 mm; tail length/total length ration 0.124. The color pattern in preservative after one year is as follows: dorsum medium chocolate brown with dark brown stripe on entire middorsal row and another on adjacent halves of third and fourth rows; head dark brown dorsally and laterally, with cream spotting on supralabials; venter cream, save for small dark brown spots on infralabials. The specimen is also in significant agreement with the remainder of the features indicated by Köhler *et al*. (2001) in the holotype.

Pseustes poecilonotus (Günther)
Localities: Guanales.
Remarks: An adult male was collected at 1420 m as it moved through moderately disturbed broadleaf forest.

Rhadinaea montecristi Mertens
Localities: Cantiles.
Remarks: A single adult male collected as it crawled through Cantiles, representing a notable northern range extension for this species (Wilson *et al*., 2006).

Rhadinaea sp.
Localities: Centro de Visitantes.
Remarks: This species was recently described from the park (McCranie & Castañeda, In press).

Scaphiodontophis annulatus (Duméril, Bibron, & Duméril)
Localities: Centro de Visitantes.
Remarks: An adult female was collected during the day near the visitor's center building at 1550 m.

FAMILY VIPERIDAE

Atropoides mexicanus (Duméril, Bibron, & Duméril) (Fig. 7)
Localities: Guanales.
Remarks: One adult female was found in a hollow log during the daytime in 2004. In 2005, an adult male was found coiled at the base of a sapling alongside a trail at 1310 m during the daytime. A juvenile and was found during the day at 1320 m near a stream.

Species	Wilson and McCranie (2004b)	2004 and 2005 records				
		Centro de Visitantes	Bosque Enano	Guanales	La Fortuna	Cantiles
Anguidae: 2						
Celestus montanus				X		X
Mesaspis moreletii	X		X			X
Phrynosomatidae: 2						
Sceloporus malachiticus	X	X	X		X	X
Sceloporus variabilis		X				
Polychrotidae: 6						
Anolis amplisquamosus	X		X			X
Anolis capito				X		
Anolis cusuco	X	X			X	
Anolis johnmeyeri	X	X	X	X		X
Anolis ocelloscapularis				X	X	
Anolis petersii				X	X	
Scincidae: 2						
Sphenomorphus cherriei	X					
Sphenomorphus incertus		X			X	
Colubridae: 16						
Adelphicos quadrivirgatum		X		X		
Drymarchon melanurus	X					
Drymobius chloroticus	X	X		X		
Geophis nephodrymus		X				X
Imantodes cenchoa	X	X				
Lampropeltis triangulum				X		
Leptophis ahaetulla	X			X		
Mastigodryas dorsalis	X			X		
Ninia espinali	X					
Omoadiphas aurula		X				
Pseustes poecilonotus				X		
Rhadinaea montecristi						X
Rhadinaea sp.*						
Scaphiodontophis annulatus		X				
Stenorhina degenhardtii	X					
Tantilla schistosa	X	X		X		
Elapidae: 1						
Micrurus diastema	X			X	X	
Viperidae: 4						
Atropoides mexicanus				X		
Bothriechis marchi	X	X		X		X
Bothrops asper				X		
Cerrophidion godmani	X	X	X			X
TOTAL	**17**	**16**	**5**	**16**	**6**	**9**

Table 2. Reptiles of Parque Nacional El Cusuco, Honduras, with a comparison of species collected at different survey sites during 2004 and 2005 (for site descriptions see text).*Being described by McCranie and Castañeda (In press).

Bothrops asper (Garman)
Localities: Guanales.
Remarks: Three female specimens were recorded in 2005 in the vicinity of Guanales, one at 1450 m elevation, a record high elevation for this species in Central America (Talley *et al*., 2005).

CONSERVATION STATUS OF DECLINING AND RECENTLY-REPORTED SPECIES

There were six members of Parque Nacional El Cusuco's herpetofauna that were regarded by Wilson & McCranie (2004b) as species of conservation significance. Of these six, one species (*Craugastor milesi*) was considered to be extinct, a situation that had also been discussed by McCranie & Wilson (2002) and Wilson & McCranie (2004a). Despite deliberate and considerable efforts by our team to locate this frog over the course of more than 21 weeks in 2004 and 2005, no *C. milesi* were observed, further supporting the conclusion that this species is extinct, or at the very least extirpated around its type locality.

Three amphibian species previously known from the park were described as having declining populations (Wilson & McCranie, 2004b): *Duellmanohyla soralia*, *Craugastor rostralis*, and *Lithobates maculatus*. We recorded *Duellmanohyla soralia* from the Río Cusuco in the vicinity of the Centro de Visitantes, from along the trail to Cascada de Quetzal, at the pool under Cascada de Quetzal, and in and around a tributary of Quebrada La Ruidosa below La Fortuna Camp. This species was very abundant at the latter locality when La Fortuna Camp was visited in late June and early July 2005, with as many as nine individuals observed in a single night in the vegetation along a 20 m stretch of stream and numerous individuals were recorded from the forested hillsides above the stream. The stream also had hundreds of *D. soralia* tadpoles present. Unfortunately, a large area along the stream discussed above had been cleared recently by *campesinos* from the nearby village of Nueva Esperanza, and there are a number of other clearings and shade coffee plantations on the hillsides above the stream. The future survival of the *D. soralia* population around La Fortuna Camp is clearly endangered by human activities, despite the supposedly protected location of the site within the boundaries of Parque Nacional El Cusuco. Due to these concerns and despite the local abundance of *D. soralia* in at least some sites within the park, we support the continued recognition that this species has declining populations.

Craugastor rostralis, was recorded by our team in the following localities: Centro de Visitantes, Guanales, and La Fortuna Camp. While the species is not regularly encountered around the Centro de Visitantes, the species is an abundant inhabitant of leaf litter on hillsides at both the lower elevation localities. Populations of *C. rostralis* at lower elevations within Parque Nacional El Cusuco appear healthy, and this species is apparently able to persist in disturbed habitats such as shade-grown coffee farms around La Fortuna Camp.

Lithobates maculatus, was not encountered by our team during 2004 or 2005, although it was collected below the park near the village of Buenos Aires at around 1250 m elevation. The possibility exists that *L. maculatus* is extirpated within the boundaries of Parque Nacional El Cusuco. Two snakes were regarded as having declining populations by Wilson & McCranie (2004b): the colubrid *Drymobius chloroticus* and the viper *Bothriechis marchi*. We encountered both of these species within the park in 2004 and 2005, but only rarely.

Of the four stream-breeding frog species collected in the 2005 season (*Duellmanohyla soralia*, *Plectrohyla dasypus*, *Plectrohyla exquisita*, and *Ptychohyla hypomykter*), only one species (*P. hypomykter*) had tadpoles that exhibited mouthpart malformations similar to those described by Wilson & McCranie (2004b). All *P. hypomykter* tadpoles collected within park limits in 2003 had normal mouthparts, with stable adult population (Wilson & McCranie 2004b). As was reported by Wilson & McCranie (2004b), the current adult population of *P. hypomykter* in the Río Cusuco appears stable. However, mouthpart malformations among tadpoles varied from minor to extreme, including incomplete tooth rows and poorly keratinized jaw sheaths. Tadpoles with malformed mouthparts were collected to examine extensiveness of malformations. McCranie & Wilson (2002) documented *P. hypomykter* tadpoles with malformed mouthparts found between 1050–1460 m elevation, from areas between central Olancho and southern Ocotepeque.

Of the 20 species added to the herpetofauna of the park, only *Celestus montanus* and *Anolis ocelloscapularis* were considered to have declining populations by Wilson & McCranie (2004a). Only two specimens of *C. montanus* have been collected in the park, but due to the secretive nature of members of this genus we do not necessarily see this as an indication of population health. Data from La Fortuna Camp and Guanales indicate that *A. ocelloscapularis* has stable populations at both of those sites.

During the entire course of our fieldwork during 2004 and 2005, there were six species reported by Wilson & McCranie (2004b) that we did not record inside the park: *Cranopsis valliceps*, *Craugastor milesi*, *Lithobates maculatus*, *Sphenomorphus cherriei*, *Drymarchon melanurus*, and *Ninia espinali*. The status of two of these species is discussed above (*C. milesi* and *L. maculatus*), and another (*C. valliceps*) is a widespread species at lower elevations and is most abundant in disturbed areas, so it is not necessarily unexpected that the species would not be encountered in the more pristine areas of the park. *Sphenomorphus cherriei* was not recorded, but its congener *S. incertus* was collected at a number of sites throughout the park. Both *D. melanurus* and *N. espinali* lack sufficient baseline population data to judge whether their absence during our surveys is of any conservation significance.

Anolis amplisquamosus, which was reported to have a stable population by Wilson & McCranie (2004a & b) and was originally described based on a series of 26 specimens collected around the Centro de Visitantes (McCranie *et al*., 1992), was not encountered until the final week of fieldwork on 14th August 2005. At that time, a single adult male was collected at night as it slept on a fern at Bosque Enano. This was the only time this species was collected during over 21 weeks of fieldwork. Without any explanation, a species that was abundant in previous years has apparently experienced a dramatic population decline, made even more alarming by the fact that the entire documented range of *A. amplisquamosus* lies within the boundaries of Parque Nacional El Cusuco. If this is the case, it is a disturbing development and only further indicates the need for both an extensive and intensive monitoring program at Parque Nacional El Cusuco to determine what steps need to be taken in order to better protect its endemic herpetofauna.

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APPENDIX

Referred specimens

Craugastor charadra.- UF 145411.
Celestus montanus.- UF 142324, 144903.
Anolis capito. - UF 144745.
Anolis ocelloscapularis.- UF 144266.
Anolis petersii.- UF 144333, 144744.
Sceloporus variabilis.- UF 144110.
Sphenomorphus incertus.- UF 144061, 144731-32.
Adelphicos quadrivigatum.- UF 144668-69, 144692.
Geophis nephodrymus.- UF 142577, UF 143022-25, USNM 561824-25.
Lampropeltis triangulum.- UF 144912.
Omoadiphas aurula.- UF 144905.
Pseustes poecilonotus.-UF 144661.
Rhadinaea montecristi.- UF 144648.
Scaphiodontophis annulatus.-UF 144683.
Atropoides mexicanus.- UF 144678, 144757.
Bothrops asper.-UF 144698-99.

Amphibians and Reptiles Status and Conservation in Florida

Walter E. Meshaka, Jr. and
Kimberly J. Babbitt (Eds.)

Hardcover: 334 pages
Krieger Publishing Company, 2005
ISBN 1-57524-251-6
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Amphibians and reptiles are prominent in Florida. It is a state where both temperate and tropical species can be found, where reptiles such as the Alligator and Gopher tortoise structure habitats and ecological communities and where amphibians and reptiles are of financial significance in trade. However, it is also a state that has experienced a dramatic growth in human population – 0.5 to 15 million over the last century – and is predicted to do so in the future. The impacts of human population growth on natural habitats are made more dramatic due to the rapidity with which they have occurred. This publication aims to assess human-mediated impacts on Florida's herpetofauna.

The book's chapters are a mixture of broad-ranging overviews and some quite specific research papers (in one case seemingly of a work in progress). However, collectively they present a fascinating account of the overwhelming problems facing Florida's herpetofauna. For example, although populations of Diamondback terrapins in Florida Bay and the Keys have made some recovery after a decline in commercial harvest - they still face threats from loss of nesting beaches to development, an increase in predation from human-associated racoons, pollution and being trapped in crab pots.

Predictably, for most species, habitat loss and fragmentation are the killer blows. Ray and Patricia Ashton gloomily predict that habitat loss could be so severe as to leave a landscape 'similar to that of…Britain'!

Although exotic species are extremely successful in Florida, consideration of their impacts on native species is disappointingly thin.

This book is nicely produced, although it would have benefited from a closer proof read. It presents a fascinating subject area, not only for those with an interest in Florida's herpetofauna, but also for its contrasts and similarities with herpetofaunal conservation issues closer to home.

John Baker

The Herpetological Conservation Trust

Venomous Snakes of the World

By Mark O'Shea

Hardcover: 160 pages
New Holland Publishers, October 2005
ISBN: 1843309726
List Price: £24.99

Venomous Snakes of the World is a magnificent contribution to herpetological and toxinological literature. Containing 160 pages and almost 200 colour pictures for species included, this book is a thorough overview of this intriguing group of venomous snakes. Mark O'Shea is qualified to produce a book of this scope. Sections include Introduction, Americas, Eurasia, Africa, Tropical Asia, Australasia and Oceans. This includes material on anatomy, venom evolution and bioactivity, sea snake adaptations, conservation and venomous lizards. The real strength of the book, and what gives it unique value, is the material dealing with lesser known snakes, including the nuances of venomous colubrids. Most readers will be unfamiliar with this information and therefore it is a tremendous opportunity for them to learn more about this special area of evolution.

The only addition I would like to have seen would have been a brief section on first-aid treatment, particularly the application of pressure-immobilisation bandages for elapid envenomations.

I cannot recommend this book strongly enough.

Bryan Grieg Fry

Australian Venom Research Unit, University of Melbourne.

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