The HERPETOLOGICAL BULLETIN

Number 76 – Summer 2001

Dangerous Wild Animals Act (1976) review (2001) • Encounters with reptiles and amphibians during 1939-1945 • The herpetofauna of La Suerte Biological Field Station, Costa Rica • Escape reaction of *Sphenomorphus sabanus* • Nest temperatures of *Physignathus leusuerii* • Melanism in Lataste's Viper • Predation on a skink by *Physignathus lesueurii* • Occurrence of Common Frogs in ground water springs • Recent records of neotony in Smooth Newts

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The **Herpetological Bulletin** (formerly the British Herpetological Society 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).

ISSN 1473-0928

Printed by Metloc Printers Limited, Old Station Road, Loughton, Essex.

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All submissions and correspondence arising from the Bulletin should be sent to the Editor, Peter Stafford, c/o Dept. of Botany, The Natural History Museum, Cromwell Road, London, SW7 5BD. *E-mail: pjs@nhm.ac.uk*

Front cover illustration
Eyelash Palm Pitviper, *Bothriechis schlegelii*. Costa Rica. See article on page 10. Photograph © Peter Stafford.

FROM KAMPALA TO KIVU: A SHORT REPORT ON OUR RECENT VISIT TO EAST AND CENTRAL AFRICA

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OUR latest visit (September 2000) to Africa – Uganda and Rwanda - enabled us to combine various activities with responsibilites at the Faculty of Veterinary Medicine, Makerere University, where we both have visiting teaching positions in the recently formed Department of Wildlife and Animal Resources Management (WARM).

We made Makerere University our base and this proved ideal for one of our early commitments - attendance at part of the 10th Pan-African Ornithological Congress (PAOC). The PAOC, which was held in English and French, attracted delegates from many parts of Africa as well as from countries further afield. We met many old friends and John presented a poster on 'Parasites and Pathogens, the Need for Interdisciplinary Research on African Avifauna'. Perhaps appropriately, the poster was amongst those from the Congo and Madagascar – a chance to practise our French as well as our Swahili!

Our work with the University included organising a research day at Uganda's only crocodile farm. In addition to supervising some routine veterinary duties there, we initiated a study of parasites, with particular emphasis on searching for a species of schistosome (fluke) that has been reported from crocodiles in Australia but not, so far, from *Crocodylus niloticus* in Africa. Two recent graduates from the Faculty, Innocent Rwego and Lawrence Mugisha, accompanied us on the trip and they are following up the research. Amongst equipment used for the work and now donated to WARM was a dissecting microscope, a gift from a veterinary colleague in Britain which was presented to us by Derek Lyon at the Spring Meeting of the British Veterinary Zoological Society (BVZS). Some of the books kindly given by Martin Lawton for use in Africa are now installed at Makerere University; those concerning reptiles were particularly appreciated.

Our interest in crocodiles took us also to Murchison Falls Conservation Area where *C. niloticus* breeds in large numbers and where eggs have been regularly collected for incubation and hatching. Murchison is a magnificent Park that boasts many species of game animals as well as a rich variety of birds, reptiles, fish and invertebrates. WARM is currently carrying out studies on large cats and other predators in Murchison and may participate in a census of Nile Crocodiles.

We exchanged our four-wheel drive University vehicle for a hire car and took the long route west to Rwanda. As last year, our primary goal was to visit Gisenyi, on the edge of Lake Kivu, in order to spend time with our friend, Mrs. Rosamund Carr. Roz was the confidante of Dian Fossey and the friend of many who have worked with the Mountain Gorillas. Despite being in her 88th year, she still runs an orphanage for Rwandan children. It was good to see youngsters from different tribal backgrounds, many of whom suffered terribly during or following the genocide of 1994, living and learning together. We combined our drive to Gisenyi with time in Ruhengeri where we were welcomed by staff from the Dian Fossey Gorilla Fund and the Mountain Gorilla Veterinary Project. The latter now has a well-equipped laboratory, similar to ours which was situated at Kinigi at the foot of the volcano Sabinyo but was destroyed in 1994. We also talked to staff at

ORTPN (Rwanda National Parks Office) in Kigali and, amongst other things, this provided Margaret with up-to-date news about the country's conservation legislation. Rwanda and Rwandans seemed to us to be less tense, more relaxed and welcoming, than in the past but the country still faces many challenges, not least because of continued conflict in neighbouring Congo.

Demonstrating use of field equipment at Ugandan crocodile farm. Photograph by Margaret Cooper.

We were able to fit in a number of other activities, not least of all a meeting with Dr. John Ogwal-Okot (CVA Councillor) to discuss Commonwealth veterinary matters, and a visit to the VSO Programme Office with a view to fostering links with them in the future. On the animal side, we were joined on our journey from Murchsion by a delightful young Oribi (an indigenous Ugandan antelope) that had been confiscated and was bound for the Ugandan Wildlife Education Centre at Entebbe. Despite fragile legs and needing to be hand-fed regularly, it travelled remarkably well. We also visited a silk farm in the bush - fortunately the family were all Swahili speakers - where we were able to pursue our interests in mini-livestock - no silkworms at present but plenty of free-range fowls, ducks, and pigeons, and an apparently successful rabbit-breeding enterprise.

We stayed in Entebbe both on arrival and prior to our departure from Uganda. These self-imposed periods of isolation were intended to help us catch up with pressing writing commitments in a tranquil environment away from the bustle of Kampala and the stimulating demands of the University. Margaret took the opportunity to visit Ngamba Island, which serves as a sanctuary for chimpanzees. This was an interesting experience not only on account of her professional interest in the practical and legal implications of confiscated animals, but because we were both present when Uganda's original island Chimpanzee Sanctuary, on Lake Edward (Queen Elizabeth National Park), was opened in 1995.

We were sorry to leave our hideaway in Entebbe, with its view of Lake Victoria and the constant cry of Fish Eagles, but we look forward to our next visit to Uganda in April when we are to lecture on WARM's Diploma and new MSc course. The regeneration of Uganda and the optimism of so many of its people are cheering to witness and we enjoy playing our small part in its bid to become once again the 'Pearl of Africa'.

We are grateful to friends and colleagues at WARM, elsewhere at Makerere University, at UWA (Kampala and Murchison Falls), at UWEC (Entebbe) and in various parts of Rwanda for their welcome and help on this visit.

Prof. J. E. Cooper is principal investigator of a part-BHS funded project aimed at the improved husbandry of farmed Nile Crocodiles (Crocodylus niloticus) in Uganda (see Bulletin No. 67/68 (1999), pp.1-12).

LEGISLATION

DANGEROUS WILD ANIMALS ACT (1976) REVIEW (2001): SUBMISSION ON BEHALF OF THE BRITISH HERPETOLOGICAL SOCIETY

Dr. SIMON TOWNSON

Chairman, BHS Captive Breeding Committee

DURING December 2000, agents of the Department of the Environment, Transport and Regions (DETR) asked the BHS to submit views and recommendations for the review (2001) of the Dangerous Wild Animals Act (1976). The following article is a slightly amended version of the BHS submission, made in January 2001. The outcome of the review will be conveyed to members in a later issue of the Herpetological Bulletin.

The BHS has been involved with the Dangerous Wild Animals Act (DWA) and the listing of species since the legislation was originally being formulated (pre-1976) and during the 1984 review. This Society has maintained a substantially consistent view over the past 25 years on both the administrative aspects of the legislation and the listing of species. The difficult issues surrounding the DWA were thoroughly re-examined at a recent meeting of the BHS Captive Breeding Committee, and later by the BHS Council and at the 2001 Annual General Meeting.

While the Society has supported the principal of legislation for the control, licensing and safe-keeping of potentially dangerous animals from the very beginning, we consider the legislation to be seriously flawed, both with regard to the administration/implementation of the Act and the arbitrary and unscientific listing of species. The Act was clearly intended to control the keeping of overtly dangerous animals, principally with regard to public safety (not that of the keeper). Mr. Peter Thomas and Mr. Peter Temple-Morris were sponsors of the Bill. Hansard records (14.05.76.), quote Mr. Thomas 'The Bill is concerned with public safety and its basic philosophy is that an animal must be so obviously dangerous that one must do something to prevent its being kept by a private individual, except in exceptional circumstances', and in another excerpt, animals (listed) must be ...'recognised universally as dangerous'.

I have served both on the original expert advisory committee to the Government and at the 1984 review, and have been dismayed by the over-representation of groups attempting (and to some extent, succeeding), to mis-use the Act. This has been done by listing as many species as possible as 'dangerous', in order to restrict or ban the keeping and trade in so-called 'exotic' animals. This problem was particularly evident at the 1984 review, where the RSPCA and their legal representatives produced a large additional list of species for inclusion including tortoises, terrapins, some amphibians and other innocuous species, on spurious public health grounds. The BHS feels that it is essential that an objective, scientific and evidence-based system is used for the listing of species, and that final decisions concerning whether or not to list should not depend on some kind of horse-trading with powerful animal rights/welfare groups with a separate agenda.

One of the enduring difficulties has been the lack of a definition of the term 'dangerous'.

Although it is clear from Hansard that Parliament intended this to mean overtly dangerous animals, there is no attempt to define or discuss this in the Act. We believe there are two important considerations when assessing the level of danger that an animal may pose, one being 'potential' and the other being 'likelihood of attack/exercise of potential'. The Captive Breeding Committee agreed that the terminology used in the Animals Act (1971) is appropriate for the DWA ...'fully grown animal normally having such characteristics that they are likely, unless restrained, to cause severe damage'. The listing under the DWA of harmless species such as tamarins, squirrel monkeys, talapoin monkeys, aardvarks, small felids, capybara, mangrove snakes, vicuna and others has undoubtedly damaged the credibility of this legislation and contributed to a significant level of non-compliance. The BHS has no information on the level of compliance of its members, although we have been informed by other animal keeping groups that compliance may be as low as 5% of those to whom the Act applies.

ADMINISTRATION ISSUES

If this legislation is to stand any chance of working effectively, then the administrative aspects really must be sorted out and be seen to be working in a fair and uniform manner.

The responsibility for administration currently lies with local authorities where there have been major problems with interpretation of the legislation, costs and attitudes. Some authorities are charging fees of up to £1200 plus veterinary fees (the applicant will also have to pay for insurance), and some officials have a negative approach to licence applications. I know of at least one authority which does not approve of the keeping of 'exotic' animals and will make it as difficult as possible to obtain a licence, and another authority which will ask neighbours up and down the street if they object to the applicant keeping a listed animal; this procedure will invariably result in an objection. We do not believe that it was the intention of Parliament that local authorities should operate in this way, particularly with regard to fees; quoting from Hansard (16.07.76.), Mr. Peter Temple-Morris, 'Concern was expressed in another place that local authorities should be given guidance or at least an intimation that it was not the Bill's intention that fees should be used as a weapon to prevent people applying for licences or keeping the animals covered by them. This intimation .... is that it will be a fee which is sufficient to meet the direct and indirect costs that may arise as a result of the application'.

From the point of view of the prospective keeper, applying to a local authority for a licence may be a daunting prospect. An application may result in an unwelcome intrusion into the home by unsympathetic local government officials or their agents, the imposition of unreasonable conditions and/or insistence on unnecessary facilities by persons not sufficiently knowledgeable of the appropriate husbandry or safety requirements, and the imposition of possibly punitive costs. In practice, these factors may result in a *de facto* ban for some applicants who want to keep within the law, while others, presumably otherwise honest citizens, will be discouraged from applying and become criminalised, with their animals not controlled.

The BHS feels that there should be an expectation that a licence application will be granted (ie. a right to a licence) if the applicant meets a set of standard conditions, unless there are exceptional circumstances (for example, the applicant has convictions for animal cruelty, or nuisance behaviour, or other pertinent factors). Fees must be set or capped at a reasonable level. A fee of £75 was recommended as a maximum level (even this is relatively expensive when compared to the cost of other types of licences). If local authorities argue that the costs are greater than this, then they are probably spending too much time/bureaucracy on the application, since the actual practical inspection is carried out by vets and charged separately. Unless there are particular problems, the veterinary fees should be restricted to the costs of a standard home visit. I have witnessed the veterinary inspection of venomous snake facilities, and, as one might expect, there is very little for the vet to do except to observe that the facilities remain as agreed and briefly look (from the outside) at the animals within.

Overall, the BHS believes that the DWA would be better administered centrally and in a standard manner by the DETR, perhaps using experienced Wildlife Inspectors operating with a simple set of guidelines. This would obviate the need for veterinary inspections and, since this legislation is primarily concerned with public safety, there would be no need or role for the vet unless the animal became sick (it is illogical to argue that a 'dangerous' animal requires regular veterinary inspection by law and that a non-dangerous animal does not).

SCHEDULE OF SPECIES

The Captive Breeding Committee was unanimous and felt strongly that no further reptiles and no species of amphibian should be added to the DWA schedule; the Committee felt equally strongly that a number of species had been inappropriately listed.

In the absence of any definition of the word 'dangerous' in the DWA, for the sake of our discussions the Committee decided to compare the threat posed by certain reptiles to that of a medium sized (or larger) domestic dog as a 'standard' - this, we believe, poses a level of danger considerably lower than that intended by Parliament for the DWA (see Background and Introduction). On the whole, society quite happily accepts the very small risks of exposure to the domestic dog, which has the ability to run down its victims and the potential to cause serious injury or rare fatalities. This animal is usually taken into the public arena on a daily basis, in contrast to captive reptiles, which would not normally enter the public arena at all.

Species inappropriately listed on the DWA, that should be removed

Mangrove Snake ***(Boiga dendrophila)***. This species was discussed at the 1984 review. While certain other back-fanged snakes (Mole Viper, Twig Snake, Boomslang) were proposed by the BHS for inclusion under the DWA, we were opposed to the inclusion of the Mangrove Snake as there is no evidence that it is dangerous. It would appear that it was proposed by others simply because this species was in trade. Mangrove Snakes have been kept in large numbers in the UK, continental Europe and the USA for over 30 years. Although often irascible at first, resulting in harmless bites, this species usually settles well in captivity. As far as we are aware, there has not been a single serious envenomation due to this species and there is no justification for its inclusion under the DWA.

Dwarf Crocodile ***(Osteolaemus)*** **and Dwarf Caimans** ***(Palaeosuchus)***. The adult size of these species is only 1-1.5 m and they cannot pose a significant threat to the public, should they escape. These crocodiles are listed on Appendix I and II of CITES respectively, so that trade/availability of these animals is already strictly controlled. However, the additional inclusion under the DWA imposes a considerable unnecessary burden of cost, bureaucracy, insurance, transportation problems, etc. on the keeper. These are relatively clumsy animals, which, even if they escape from their enclosure, would be unlikely to escape from the house. Outside they will attempt to hide and rapidly cool to become torpid. If approached, a dwarf crocodile may hiss or attempt to move away, or may bite if interfered with. However, this bite would be less serious that that posed by our domestic dog 'standard', while the crocodile has no ability to run down/jump up and attack its victim in the manner of a dog.

The Committee agrees with all of the larger species of crocodiles remaining listed (although we feel that this should be on a size basis of over 1.5 m), however we strongly recommend the de-listing of the dwarf species.

BHS RESPONSE TO CONTENTIOUS PROPOSALS BY OTHER ORGANISATIONS

We have been made aware that certain animal rights groups have proposed that all reptiles and amphibians be included under the DWA. This is a ludicrous proposal and is obviously based on

their separate agenda, which is to prevent the keeping of and trade in these animals. Proposals on spurious grounds must be resisted at all costs.

Comments on particular groups:

Large lizards (non-venomous). Green Iguanas and various Monitor Lizards are widely kept and pose no threat to public safety. Arguably, the only potentially dangerous lizard is the Komodo Dragon (*Varanus komodoensis*) when in a wild situation, where its bacterially infectious bite can eventually weaken and bring down larger prey. The Komodo Dragon is listed on Appendix 1 of CITES and we are not aware of any specimens in private hands in the UK. However, an escaped captive animal would rapidly cool and seek shelter; it would be very unlikely that it would carry the oral bacterial fauna of a wild specimen, and extremely unlikely to attack humans.

Large constricting snakes. The larger constricting snakes were discussed in detail pre-1976 and in 1984, and on both occasions the expert committee concluded that although these animals might be unfamiliar and scary to some people, they were of no significant threat to public safety. The BHS agrees with this view and would strongly oppose the inclusion of these snakes under the DWA legislation. The fact that no one has ever been seriously injured or killed by a large boid in the UK provides good evidence of minimal risk. The big snakes are extremely popular captive animals, and although the Society does not have specific information about how many are kept in this country, it is thought to be in the tens of thousands (a recent Mintel survey estimates there are 1.6 million reptiles kept in the UK). Evidence from other countries is also reassuring - there are some millions of these snakes kept globally, the largest numbers in the USA, and both eastern and western Europe. As far as we can determine there has not been a single fatality to a member of the public from an escaped large constrictor at any time. We are aware of a very small number of unfortunate incidents involving the keeper, usually because of procedural errors at feeding time, in the USA.

An escaped snake will rapidly become lethargic and seek a place to hide. Snakes tend to have fixed behaviour patterns, such as defensive behaviour (biting), or feeding behaviour (biting and constricting). These snakes do not normally recognise humans as food, and if approached or interfered with, an escaped large constrictor may move away, hiss or bite, but not attempt to constrict. In fact we do not know of a single instance where this has happened. Boids have small needle-like gripping teeth and the jaws are rapidly released following a defensive bite, which is likely to be significantly less damaging than our standard domestic dog (capable of lethal bites). The snake also does not have the capability to chase and run-down its victim.

We are aware that at least one Environmental Health Officer would like to see large snakes listed, as a means of reducing numbers being kept, mainly because of the inconvenience which may be caused in the rare event of an escape; the RSPCA want them listed along with all other reptiles and amphibians. Any objective analysis of the evidence concerning the threat to public safety from these snakes can only come to the conclusion that the risks are minuscule, and significantly less than those posed by some domestic animals such as dogs, cats (suffocation of babies), and horses, or common farmed animals such as Jersey cows, rams, pigs and goats.

The Committee did discuss at some length, the likely outcome of including large snakes under the DWA. It was felt that the consequences would be serious and counterproductive, with a large number of snakes abandoned or destroyed, and with an equally large number going 'underground', with very few applications for licences forthcoming. Animal keepers (or anyone else) are not likely to respect or comply with laws if they are seen to be unreasonable in their content and/or unfair in their application.

Certain amphibians. In 1984, the RSPCA proposed that certain amphibians, including poison-arrow frogs, should be listed under the DWA, and we understand that some individuals and groups are now proposing that some species

be listed in the current review. We regard such proposals to be absurd and believe that no amphibians pose a threat to public safety. A small number of species may have highly toxic chemicals in their skin, thought to be a defence against being eaten by predators and against microbial infection through their soft and permeable skins. However, to be an effective threat against humans, these chemicals would have to be extracted and delivered to the tissues or blood-vessels of the victim (i.e. via a dart or needle). The frogs themselves have no such delivery system. If they escape from their damp tropical tank they will desiccate quickly in a normal room, and will survive only a short period outside. Eating these animals is not recommended and we do not regard this as a credible threat to public safety. In addition, there is now good evidence that the toxins found in the skins of these frogs are rapidly lost in captivity, and not present in captive-bred individuals. It is believed that these chemicals are probably not synthesised *de novo*, (Daly, 1998, *Journal of Natural Products* 61, 162-172), but are acquired from their natural arthropod diet, which in turn acquire them from certain forest plants.

RECOMMENDATIONS

1. Administrative aspects of the DWA must be overhauled and made to operate in a fair and uniform manner. We would prefer to see the legislation administered centrally by the DETR by Wildlife Inspectors, and taken out of the hands of the myriad of local authorities and vets. However, if local authorities continue to administer the DWA, then guidelines should be issued by Government to ensure that authorities are normally obliged to issue licences when conditions are met, at set (or capped) fees and in a minimally bureaucratic manner.

2. Mangrove Snakes (*Boiga dendrophila*), and Dwarf Crocodiles (*Osteolaemus*) and Dwarf Caimans (*Palaeosuchus*), should be removed from the schedule as they pose no significant threat to public safety.

3. We are strongly opposed to the addition of any further reptile species or any amphibian species to the DWA schedule. Experience of the past 40 years of large-scale reptile and amphibian keeping in the UK (including nearly 25 years of the DWA), provides strong evidence that there is no justification for further species to be listed.

4. We recommend the formation of a scientific working group in order to develop and agree upon an objective criteria based definition of the term 'dangerous'. This group should comprise of expert scientists, vets, animal keepers and administrators.

CONCLUSIONS

Thankfully, the DWA does seem to have controlled the disturbing trend in the 1970's to keep lions in the back garden. However, a combination of mal-administration and the mis-use of the Act to schedule relatively innocuous species, has seriously undermined its credibility and lead to a high level of non-compliance. This type of legislation is often difficult to enforce, and cannot work unless it has the general support of animal keepers and is seen to be objective, reasonable and fair. Our collective experience over the past 40 years of wide-scale reptile and amphibian keeping, where not a single member of the public has been seriously injured or killed by one of these animals, allows us to draw the important conclusion that the threat posed to public safety by captive reptiles and amphibians is immeasurably small. The BHS would like to see an improved and workable DWA with a high level of compliance, resulting in better control of genuinely dangerous animals. We very much hope that this review will provide the opportunity to make the necessary changes.

ARTICLES

ENCOUNTERS WITH REPTILES AND AMPHIBIANS IN SOUTHERN ENGLAND DURING THE WAR YEARS, 1939-1945

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I was born and brought up for my first seven years in the suburbs of North London, and an early interest in amphibians was encouraged by my then favourite uncle, who took me catching tadpoles and newts in the Totteridge ponds. In 1938, when I was a mature seven years old, and could tell Great Crested Newts from the 'littl'uns', and frogs from toads, my father joined the Air Ministry, and we made our first of several moves around the southern half of England, to Wroxham, in Norfolk.The house was a naturalist's paradise; instead of a fence at the end of what seemed a huge garden, there was the River Bure. There were also two ponds attached which teemed with fish; Perch, Roach, Bream, and Pike. Other residents were Water Voles, frogs, and the occasional toad on shore.

It was here that I had my first important herpetological find. One afternoon I lifted up an old wooden bucket under a garden tap, and discovered a huge blackish green frog with a long narrow head, and no eye mask markings. I knew it was not a Common Frog, and years later found an almost identical animal in a photograph illustrating the Marsh Frog (*Rana ridibunda*) in Malcolm Smith's definitive work on the British Herpetofauna. After Neville Chamberlain made his sober little speech about war being declared, my father moved into RAF Mess at Coltishall; the house we rented was requisitioned; our Italian friendly neighbour interned on the Isle of Man and my mother, who had a morbid phobia about the Wermacht invading via the Norfolk Broads, fled with my two sisters and myself to Combe Martin, in North Devon. Here, for the next few months, I started to find out about reptiles. The first species I encountered was the Slow-Worm. Walking home one afternoon from my new school, I found a very old, sluggish, tail-less male lying at the side of the footpath. I took him home and kept in a big shoe-box and fed him on slugs. However he remained extremely lethargic and, after a couple of months, died. Fired with enthusiasm about reptiles, I became so skilled at finding Slow-Worms that I tired of them and wanted to find something different, namely Common Lizards. For many days I searched in vain, despite looking for them in the kind of habitats described in my Observers' Book of British Animals. Somewhat discouraged, I abandoned reptiles for rock pools. One day, whilst rummaging around a little pool at the foot of the cliffs, I noticed some movement in a tuft of couch grass growing between the boulders just above. I stared into it, and much to my amazed delight, perceived the tiniest blackish-bronzed lizard run out onto the warm stones. It was only there for an instant before it disappeared, but the glimpse of its tiny bright eyes, and the miniaturised claws on its feet filled me with an excitement I still feel when confronted by baby lizards even to this day. From that time on lizards became my great interest. Initially, because of the rather poor illustrations in my book, I used to think that large female Common Lizards were Sand Lizards, but luckily a little museum in nearby Ilfracombe had pickled specimens of both species, and I soon recognised the difference between them. In the summer of 1940, my father was moved to Bomber Command at Naphill in Buckinghamshire, and we drove back

from Devon. We broke the journey in a village near Salisbury Plain, and that evening I was delighted to find a chalky escarpment teaming with the biggest Common Lizards I had ever seen. I caught seventeen of them and put them in a shoe box which I stored in my bedroom in the boarding house. The next morning a girl came into the room and drew the curtains. Much to her surprise (and mine!) she was showered with the lizards which had escaped in the night and sought refuge up the net curtains. We stayed in Buckinghamshire for a few months. The local common had both Slow-Worms and Common Lizards, and a nearby pond lots of Great Crested Newts. Then we moved to London in 1941, first to Muswell Hill and thence to a strange house near Hampstead Heath.

There was a little park on the edge of the heath which had ornamental ponds in it teeming with Great Crested Newts. I used to catch them by tying a worm on the end of a piece of thread. The newts would grab the worm and not let go, allowing themselves to be dragged to the shore. One day a keeper accused me of fishing, but I showed him that I had no hooks on my line and that I was 'only feeding them'. Another time I was so engrossed in my herpetological activities on the edge of a big pond that I ignored the air raid siren. Suddenly the Heath guns started to fire and shrapnel began to make fizzing splashes into the water. I ran all the way home and got punished for taking no notice of the alert. There was one very interesting pond on the Heath. It boasted some tall reeds and very shy and agile frogs with green stripes down their backs, narrow faces and no eye-masks which jumped into the pond with a loud splash at the slightest sound. I never managed to catch one, but I am sure that they were introduced Edible Frogs (*Rana esculenta*).

My grandfather was a resident of the Isle of Wight, and he was allowed to have us children for the summer holidays, to get us away from London. The island was a restricted zone and now innocent of holiday-makers. Also, all the gamekeepers had been called up, and the now deserted countryside was bursting at the seams with wildlife! I wanted above all to catch a Grass Snake. After the usual frustrating period of seeing nothing in lots of the apparently right places, one day I took a short cut across a meadow in the grounds of Afton Manor, where I was trespassing. Suddenly I saw a large Grass Snake curled in a classic oval coil. As soon as it saw me it made off. I ran after it with great speed and after a long chase, eventually caught it. It was a male about thirty two inches long. Later on that summer I saw two Grass Snakes that had been killed in a hay field. One, a huge female, was four feet eight inches long. I saw my first Adders that year on the Isle of Wight in a little deserted patch of sunny woodland, a basking male and female.

The last thing of real interest that I found before the end of the War was at a large pond on the edge of Moor Park Golf Course. It was a young albino Grass Snake about two feet long. In colour it was pale cream with the normally dark markings a very light grey. The eyes were a beautiful red colour. Soon after this find we moved to Scotland where I saw no reptiles until 1958.

THE HERPETOFAUNA OF LA SUERTE BIOLOGICAL FIELD STATION, CARIARI, COSTA RICA; AN UPDATED FIELD LIST WITH NOTES ON SPECIES RECORDED IN 1998

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COSTA RICA lies at 12° latitude and 80° longitude in Central America. The country covers 19,730 square miles and has both an Atlantic and Pacific coastline. The Pacific features two peninsulas, de Nicoya in the North and de Osa to the South. The north of the country borders Nicaragua and the South, Panama. The inland mountain ranges stretch from the northwest across the middle of the country and proceed centrally down to Panama. These ranges form the 'backbone' of the country and include both active and dormant volcanoes. The country is divided into provinces that are characterised by tropical forest and volcanic geology. Each division has a varied topography, flora and fauna (for a review of general ecology and conservation see Janzen, 1983 and Boza, 1993). Costa Rica receives between 4,500 and 5,000 mm of rainfall annually in heavily forested lowland areas. The average temperature for lowland areas is generally 77°F (25°C) and at elevations above 7,500 feet (2,300 m) they are lower, around 60°F (15°C).

The Cariari region is located in Limon province, northeast of San José. La Suerte Biological Field Station is 45 minutes drive from Cariari and close to the banks of the Rio La Suerte River. The field station was originally a ranch with surrounding pasture that blends into marshes, swamps, primary and secondary rainforest. In 1987 the Molina family purchased the farm and converted it into a research station. Over the years cattle numbers were reduced and pasture land closed off. Much of the surrounding land belonging to La Suerte has been returned to forest cover during the Molina's ownership. Today the station offers field orientated courses for university students to participate in a variety of tropical and ecological studies.

The following report is an account of the herpetofauna to be found at La Suerte and observations recorded during an educational course in Tropical Herpetology. The course took place from 22 June - 20 July 1998. Encounters with amphibians and reptiles were mostly observational using VES surveys (as described by Crump & Scott, 1994) on marked trails within the forest. Other encounters were during random leaf litter sampling, line transects, surveys for projects, or visits to other areas in the province. Many nocturnal species were recorded during night walks in swamp and forest areas. Some specimens were observed within and around buildings. Many species were identified within the confinement of the La Suerte laboratory using Savage & Villa (1986) and then released at the site of capture. Other papers/keys used for identification were those of Taylor (see references) and Gunther (1987). Many of the animals found during the visit were encountered more than once. Species that were unidentified are not included in this report.

The La Suerte forests are classified as lowland tropical rainforest (Holdridge, 1967). These forests harbour a diverse and interesting variety of indigenous animals including three monkey species, Agouties, Keel-billed Toucans, White-crowned Parrots, Strawberry Poison-dart Frogs, Eyelash Palm Pitvipers, and Green Iguanas. The dry season in northeastern Costa Rica extends from January to late April. Rainfall during our stay was frequent and consisted of short bursts, usually in the afternoon. Occasionally full sunshine would last all day and for three separate days it rained for more than 24 hours. Temperatures varied daily from 24 (±2°C) to 31

(±2°C) and humidity was fairly constant between 60-65% (max. 70% min. 40%).

SPECIES DESCRIPTIONS

REPTILIA

CROCODYLIA; **Alligatoridae**

Caiman crocodylus. Caiman (Linnaeus). The Caiman is distinguished from other Alligatoridae by the presence of a ridge between the eyelids. It also has a tubercle eyelid. The specimens seen were observed in the larger, more permanent swamp holes, although they are also common in pastures, pools, and some streams. Larger adults frequented permanent pools and may have had more dominant access to pool resources (Drews, 1990). Younger, smaller specimens observed in the permanent pools may have been nomadic. Juvenile Caimans were observed with adult specimens.

SERPENTES; **Colubridae**

Imantodes cenchoa, Blunt-headed Tree Snake (Linnaeus, 1758). All *Imantodes* species are characterised by an enlarged head and thin neck. They are an arboreal and nocturnal species that have very large bulging eyes. *Imantodes cenchoa* has dark dorsal body blotches and is distinguished from other *Imantodes* species by a row of enlarged vertebral scales.

Leptodiera annulata, Banded Cat-eyed Snake (Linnaeus, 1758). This Cat-eyed Snake has dark body blotches consisting of dark spots on a grey or brown background. Sometimes the blotches form a zig-zag mark down the centre of the back. A dark nape stripe is present.

Leptodiera septentrionalis, Cat-eyed Snake (Kennicott, 1859). Has a medium dark nape stripe which is connected to the first body blotch. The dorsal markings are not outlined by a lighter colour as with *L. annulata*.

Leptophis nebulosus, Oliver's Parrot Snake (Oliver, 1942). All the snakes in this genus are locally named 'Lora', meaning parrot snake. This species is coloured by a tan stripe on the back, green side stripe, and black stripe through the eye. The prefrontal scale is continuous with the loreal scale. *L. nebulosus* is an arboreal snake with round pupils and a thin elongate head.

Oxybelis aeneus, Mexican Vine Snake (Wagler, 1824). This vine snake is brown or grey in life and has a coal black lining to its mouth. It has a prominent snout and slender body. Most specimens are small in size and have exceptionally long tails. *0. aeneus* commonly gapes its mouth and hisses repeatedly when captured. The specimen encountered was found at a perch height of approximately 1.5 m at 12:00 hrs. This height was predictable as the time of day can provide a guide to the vertical movements of this species (Henderson & Nickerson, 1977). Perch height is at lowest during morning and to its highest at sunset. This shift in height is probably to change location for a more favourable ambush when a site occupied has failed to yield prey.

Viperidae

Bothrops asper, Terciopelo (Garman, 1883). Has a pronounced canthus rostralis, velvet skin, and a wedge or lance shaped head. Each scale protrudes like an island/keel. It's markings consist of black triangles pointing up with tanned triangles. This species is abundant on banana plantations, is packed with venom, and is a possible danger to locals. It is also the most important and dangerous to humans in Costa Rica (Rojas et al., 1997). One specimen was brought to us by farmers from a local plantation.

Bothriechis schlegelii, Eyelash Palm Pit Viper (Berthold, 1846). The individuals we encountered were mostly of the yellow 'oropel' morph. Just one individual of the green morph was found. It was green with reddish brown spots. The snake is characterised by protruding scales above the eye that appear like an eyelash. It exhibits vertical pupils, keeled scales, and a prehensile tail.

Porthidium nasutum, Rainforest Hog-nosed Pitviper (Bocourt, 1868). This venomous snake has a dorsal pattern of dark spots or blotches on a

pale cream brown background. It is recognised by a nose scale formed by a fleshy rostral scale and a large supraocular plate projecting over each eye. Its colour and pattern are variable. The specimens encountered were small and no larger than 30-40 cm.

Corytophanidae

Basiliscus plumifrons, Plumed or Green Basilisk (Cope, 1876). Has a double crest on the head, a high crest on the back, and a separate crest on the tail. It is bright green with black and white cross bands on it's back and nape of neck. Female specimens have a reduced crest and are generally smaller. When disturbed they run on their hind legs and even over water (Glasheen & McMahon, 1997). Most specimens were observed basking. They tend to prefer secondary scrub along water courses. Specimens found were usually on land although some individuals exploited island gravel bars in the midstream of the Rio La Suerte.

Basiliscus vittatus, Brown Basilisk (Wiegmann, 1828). Males have a single large crest on the head and no crest on the body or tail. Females have a reduced crest on the head. Both sexes are brown in body colour with yellow, paired dorsolateral stripes. Both sexes were commonly seen basking on south facing slopes and alongside pastures and roadsides. *Basiliscus vittatus* also runs on water.

Gekkonidae

Hemidactylus frenatus, Common House Gecko (Dumeril and Bibron, 1836). A medium sized, grey gecko with large toe-pads and a uniform colour. It has vertical pupils and elongate fleshy tubercles on the side of the tail. *Hemidactylus frenatus* is a nocturnal species although it is also found during the daytime and is mostly abundant on or in buildings where it is heard 'chirping'. It is an introduced species.

Lepidoblepharus xanthostigma, Costa Rican Scaly-eyed Gecko (Noble, 1916) - A tiny gecko with reduced toe-pads and a variable pattern of black, brown or grey. It has a narrow snout and a tail that is rounded in cross section. *Lepidoblepharus xanthostigma* is a terrestrial species found under logs and boards. This species is both diurnally and nocturnally active.

Sphaerodactylus homolepis, Caribbean Least Gecko (Cope, 1886). Males of this small diurnal species are brown with a bright yellow reticulated pattern on the head. Females are black and grey banded and the young brown and grey. The toes of this species have paired scales and small toe-pads. The pupils are round and the snout pointed. *Sphaerodactylus homolepis* is insectivorous and most commonly found around buildings.

Thecadactylus rapicaudus, Turniptail Gecko (Houttuyn, 1782). This large dark brown lizard (9 inches total length) is sometimes mottled in pattern, otherwise being uniform. It exhibits a vertical pupil and large toe-pads with retractable claws hidden in a sheath on the tip of its toes. A nocturnal species.

Iguanidae

Iguana iguana, Green Iguana (Linnaeus, 1758). The Iguanas were observed alongside the Rio La Suerte basking high in bankside trees. They are large green lizards (3.5 ft) with crests of spines along the back. They prefer riparian habitats. Specimens had noticeable black bands on the tail. Males had rusty orange head and shoulders with a green dewlap. Juveniles were bright green and often very hard to spot amongst foliage.

Polychrotidae

Norops biporcatus, Neotropical Green Anole (Wiegmann, 1834). A large green anole with black cross bands and a yellow ring around the eye. The dewlap is an orange colour with fading white and blue streaks. *Norops biporcatus* is an arboreal canopy species.

Norops capito, Big Headed Anole (Peters, 1863). A large, short-snouted anole with a highly

variable colour and pattern. It is generally a green to brown colour but is sometimes either plain or lichenous in pattern. It is a predator of deeper parts of the forest, preferring small perches and low trunks. Both sexes have reduced toe-pads.

Norops carpenteri, Carpenter Anole (Echelle, Echelle & Fitch, 1971). This species was not seen at La Suerte before 1996. It is small, greenish with a banded tail and red dewlap. It is a forest anole preferring low perches of <2 m. Only four specimens have been found at La Suerte.

Norops humilis, Humble Anole (Peters, 1863). This small, brown, short legged anole has a deep pocket in the axillary region that often contains small orange mites. The relationship between the mites and the lizards is unclear. Specimens have a dark triangle between the eyes. Males have a reddish/orange dewlap with a yellow border. Most specimens were observed on low perches of <1.5 m. The lizard was common deep in the forest. Young were also observed and tended to be dark brown.

Norops limifrons, Border Anole (Cope, 1862) - Easily the most frequently seen anole at La Suerte. It is gracile and long legged with a nondescript grey tan colour. The throat is cream and the tail banded. Males have a small white dewlap with a yellow spot in the centre. Their perch height varies from 1.5 - 2.5 m. They are common around forest edges.

Norops oxylophus, Sharp Crested Anole (Cope, 1875). This is a large semi-aquatic anole, brown above with a pronounced yellow/cream lateral stripe. The dewlap is dull orange with a yellow border. N. oxylophus prefers perches close to water into which it will escape to avoid predators.

Norops pentaprion, Lichen Anole (Cope, 1862). A small grey anole with a bark-like pattern. This species is uncommon at La Suerte. The dewlap of the male is a plum red colour with faint blue streaks. It is an arboreal, trunk-inhabiting anole, with a perch height of >2 m.

Scincidae

Sphenomorphus cherriei, Brown Forest Skink (Cope, 1893). A small, brown, short legged skink with black lateral stripes, yellow anterior markings and cycloid scales. It is shiny in appearance and has a serpentine locomotion if harassed. Caudal autotomy is common in this species so care must be taken if handling is necessary. They occur mostly in leaf litter.

Teiidae

Ameiva festiva, Middle American Ameiva (Lichtenstein & von Martens, 1856). Most teiids are active diurnal foragers. This is a moderately large forest species. The pattern in young specimens exhibits a bright blue tail with a grey/brown body and black dorsal lateral fields outlined by a broken yellow line. The young also have a pronounced yellow mid-dorsal stripe from snout to tail and orange flecking in the shoulder region. Mature adults have no blue in the tail or yellow stripes. Most adults were found actively foraging on the forest floor or basking in patches of sunlight.

Ameiva quadrilineata, Four Lined Ameiva (Hallowell, 1861). These teiids have dorso and ventrolateral stripes which are broken or occur anteriorly. These stripes may be absent in the largest of adults and youngest of juveniles. Adults usually have a continuous ventrolateral stripe running the entire length of the body which is kept throughout life. The larger adults tend to have a dark brown colour with light lateral spots.

Xantusiidae

Lepidophyma flavimaculatum, Yellow Spotted Night Lizard (Dumeril, 1851). These secretive lizards are found on the forest floor. They have granular scales on the body with brown, sometimes black, markings. Tubercles are present along with a rectangular belly plate, enlarged head scales, and no movable eyelid. Yellow spots are present on the body, hence the name; *flavimaculatum*. Interestingly, some of the individuals were found under domestic bathing sinks located outside of dormitories.

TESTUDINATA; **Kinosternidae**
Kinosternon leucostomum, White Lipped Mud Turtle (Dumeril & Bibron, 1851). This turtle has an elongate domed carapace that is hinged on the plastron. It exhibits a pale yellow beak and smooth scutes. A single specimen was found on land but many are common in pasture, pools, and swamps.

AMPHIBIA

ANURA; **Bufonidae**
Bufo marinus, Giant/Cane Toad (Linnaeus, 1758). This large toad (max. 145 mm M, 175 mm F) is found mostly in the surrounding pastures and close to buildings with lighted areas (attracted by insects). It is the largest anuran in Costa Rica and has distinct large parotid glands and prominent cranial crests.

Dendrobatidae
Dendrobates auratus, Black and Green Poison-dart Frog (Girard, 1855) - This is a large (30 - 39 mm) poison-dart frog that has an irregular pattern of black and pastel green. This pattern is highly variable and surrounds the whole body. Some males were observed with a tadpole on their back. Both Dendrobates spp. feed on ants and it is known that their alkaloid toxicity is influenced by this dietary preference (Barnett, 1994: Daly et al, 1994). Further work by Daly et al (1994) discovered that the alkaloid precoccinelline in D. auratus possibly originated from ingestion of small beetles and pyrrolizidine oximes from small millipedes.

Dendrobates pumilio, Strawberry Poison-dart frog (Schmidt, 1857). This was easily the most abundant frog at La Suerte. It has blue legs, a bright red body, and a smooth dorsum. Its hands and arms are small and are also blue. Females were observed carrying tadpoles on their backs, transporting them to bromeliads. After depositing the tadpole in the axil of a bromeliad she continues to feed the tadpole daily with infertile eggs laid at the tadpole pool. This kind of brood care can increase reproductive success in anurans (Townsend et al, 1984). Males are very territorial (Crump, 1972) and were observed fighting and creating a 'buzzing' call.

Hylidae
Agalychnis callidryas, Red-eyed Tree Frog (Cope, 1862). Sometimes known as the 'Gaudy Leaf Frog', this nocturnal anuran is common in swamp areas. It is easily recognised by its bright red eyes, green dorsum, orange feet, white belly, and yellow bars running through a blue lateral region.

Agalychnis saltator, Misfit Leaf Frog (Taylor, 1955). Differs from *A. callidryas* in having a tomato-red eye, yellow to green dorsum, blue lateral wash, dark green transverse bars and no yellow bars. It is not as common as *A. callidryas* at La Suerte. This species breeds after heavy rains.

Hyla ebraccata, Hourglass Treefrog (Cope, 1874). A small brown tree frog, common in swamp areas. It has a bright enameloid yellow pattern only visible by day and well-developed toe pads.

Hyla rufitella, Canal Zone Treefrog (Forquette, 1961). This species is green with blue coloration in the groin and red webbing in between the toes. There are two morphs. The green morph has stripes and the lichenous morph black and white dots on its back.

Scinax eleachroa, (Cope). This tree frog has distinct green bones, a translucent venter, and a yellowish green dorsum. It is sometimes found in buildings and breeds in temporary pools. Tadpoles observed in swamps had a white venter, stripes on the tail and a band through the eye.

Smilisca spp.
S. baudinii (Dumeril & Bibron). Bar patterns on lips, new species to La Suerte. The specimen caught was a massive 90 mm long.
S. phaeota (Cope). A large brown frog with tubercles on the forearms.

S. puma (Cope). This was another new species to La Suerte. It has parallel bands on its back that connect, a small bar between the eyes, and turns white during the day.

Leptodactylidae

Eleutherodactylus bransfordi, Bransford's Robber Frog (Cope, 1886). A small brown diurnal/nocturnal frog with ridges on its back. It is distinguished by its indistinct/reduced toe-pads and red flash colouration.

Eleutherodactylus diastema, Caretta Robber or Tink Frog (Cope, 1876). A minute (males are 19 mm maximum), arboreal, and very difficult to find frog. It has a short 'tink' call, pointed snout, and is tanned/light brown on its back. Some individuals have a pink line on their back and most have a white to yellow venter.

Eleutherodactylus fitzingeri, Fitzinger's Robber Frog (Schmidt, 1857). A larger *Eleutherodactylus* species with long legs, making it a good leaper. It has highly variable markings and is solid gold sometimes with a cream stripe along its back. Numerous small pale yellow spots are present on the body. It is both nocturnal and diurnal and prefers shrub layer habitat.

Eleutherodactylus mimus, Tilaran Robber Frog (Taylor, 1955). A large frog (30 mm M, 50 mm F) found in the leaf litter layer. Has a dark mask through the eye, grey sides and a brown back. The individual was found during a random leaf litter survey.

Eleutherodactylus noblei, Nobles Robber Frog (Barbour & Dunn, 1926). A smaller, masked eleutherodactyline species with a bright yellow venter and a distinct longitudinal glandular ridge. It is a ground dwelling species.

Leptodactylus melanonotus, Sabinal Frog (Hallowell, 1861). A small brown frog, ridges on its back and a narrow pointed snout. Can be located in grassy pools by a high pitched, repeated, 'peep' but is very difficult to find due to its burrowing activities.

Leptodactylus pentadactylus, Smoky Jungle or South American Bullfrog (Laurenti, 1768). A fairly large frog with a brown wood grain pattern, black and white lip area around the jaws, and red flash coloration on the back legs. It is a nocturnal species and can be spotted by torch-light with its distinctive red eye shine or heard by a loud 'whooping' call.

Note: Toe-pads are present in all *Eleutherodactylus* species found at La Suerte except *E. bransfordii*.

Ranidae

Rana vaillanti, Vaillant's Frog (Brocchi, 1977). This species has a green back dorsum, brown posterior, an angular snout and dorsal lateral folds. It is common in permanent water bodies and a widely distributed species in the wet tropical lowlands of Central America.

DISCUSSION

The herpetofauna of La Suerte has not previously been documented, but records of species found have been accumulated since the farm was converted to a field station. La Suerte is currently undergoing expansion and new land is being sought. The land surrounding La Suerte's current area is ecologically sound but its use is currently the subject of debate between parties with widely opposing interests.

The primary forest of La Suerte is joint leased with local farmers, and although no evidence was apparent, logging could nonetheless still occur. Logging activities undertaken in the past have not necessarily been agreed by both parties. Trees further off the main trails were noticeably marked for removal. Evidence in the literature suggests that minimal selective logging seems to have only modest effects on vertebrate animal diversity (Hartshorn & Whitmore, 1999). Although mobile animals migrate away from areas of active logging, they seem to return fairly

Agalychnis callidryas. La Suerte. Photograph by Paul Grant.

Eleutherodactylus biporcatus. Pitilla, Guanacaste Province, CR. Phototraph by Peter Stafford.

Smilisca baudini. Adult female from Pitilla, Guanacaste Province, CR. Photograph by Peter Stafford.

Caiman crocodylus. La Suerte. Photograph by Paul Grant.

Lepidophyma flavimaculatum. Volcán Santa Maria, CR. Photograph by Peter Stafford.

Bothriechis schlegelii. Yellow morph or 'oropel' La Suerte. Photograph by Paul Grant.

quickly once logging ceases and re-establish normal populations and guild structures within 3-8 years (Hartshorn & Whitmore, 1999). However, fragile amphibian communities with low or non-migratory habits would still potentially be affected. If selective logging began to occur more severely a thorough and detailed program to study its affects on amphibians would need to be implemented, perhaps beginning with comparisons of the varied habitats (primary, secondary, and pasture forest species). Heang et. al. (1996) used a 'before and after' comparison of species abundance to assess logging impacts, and further studies of this kind may provide better evidence on the effects of logging. Without a complete inventory of species present in the area, however, this may prove difficult. Perhaps when the number of new species records for the area begin a downward turn, this could then be implemented. Several recent studies of species richness have shown forest disturbance by selective logging and fragmentation to lower a range of vertebrate and invertebrate diversity within tropical forests (butterflies in southern Cameroon and Ecuadorian hummingbirds: (Hartshorn & Whitmore, 1999). This compromise of selective logging versus forest conservation and the search for an agreeable balance is a familiar occurrence in many tropical areas (Palmer, 2001) with illegal logging posing a threat to delicate habitats. Regular trail walking and monitoring at La Suerte could help prevent any unlawful logging.

The species observed during the visit do not constiture a definitive list. Some species that were usually found annually were not encountered. Perhaps this is because these particular species exist over a large area, at a low population density, or because of intense competition for food and living space, or even from constant attention by predators (Whitmore, 1990; Donnelly & Guyer, 1994). Successive years of these conditions may lead to local extinction of rare species, followed by later re-invasion from adjacent forests when better conditions return. New or existing species that are not recorded annually and species that arrive or mysteriously disappear may be indicating variation in local distribution. Fluctuating species distributions due to mild changes in annual weather patterns and ecological-reproductive factors can affect anurans (Duellman, 1982). Humidity can restrict anuran species to particular lowland forest types depending on their reproductive mode (Duellman, 1982). If selective logging posed a problem to this stable humidity by canopy removal then it too would be a factor altering the habitat and influencing local distribution change.

Local attitudes toward animals were not always encouraging. Some expressed superstitious fears of *Thecadactylus rapicaudus* being responsible for unpleasant bites whilst workers slept. Captured animals such as a damaged *Boa constrictor* were brought to the station by locals who had kept them as pets. One local also proudly displayed an adult (approx. 7 ft) *B. constrictor* skin pinned on his garage. Education and integration of the local population with work at La Suerte could relieve some misconceptions about the herpetofauna they live with. Many young people were curious of activities at and around the station and could be involved, benefiting both the interested individual and the station.

With the current focus of attention on global amphibian declines (Blaustein & Wake, 1995: Alford & Richards, 1999) especially in tropical regions (Pounds & Crump, 1994), solutions to help distinguish natural fluctuations over local population declines are needed. Studies such as those of Lips (1998) and Stafford (1998) are valuable for establishing species presence and absence and if continued annually are a useful way of long term monitoring of populations. La Suerte field station intends to continue the survey work involving students to create long-term information on all its biota in its range of forests.

ACKNOWLEDGEMENTS

Thanks to the Molina family for their kind hospitality, Dr. T. C. LaDuke (East Stroudsburg University) for help with field identification and for reviewing the article, Peter Stafford for suggestions, additional photographs and advice on the article, Paul Grant for photographs and field work, family and friends for support and encouragement. The University of London Jonathan Ziman Award provided funding for the educational course.

ADDENDUM: Since the completetion of this report, logging pressures have tragically increased heavily in the region of La Suerte and alteration of the environment has already occurred.

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Appendix 1.

THE AMPHIBIANS AND REPTILES OF FINCA LA SUERTE

AMPHIBIA
Anura

Bufonidae
*Bufo coniferus**
Bufo marinus

Dendrobatidae
Dendrobates auratus
Dendrobates pumilio
Phylobates lugubris #

Hylidae
*Agalychnis calcarifer**
Agalychnis callidryas
Agalychnis saltator
Hyla ebraccata
Hyla phlebodes
Hyla rufitella
Scinax boulengeri
Scinax eleaochroa
Smilisca baudinii #
Smilisca phaeota
Smilisca puma #
Smilisca sordida

Leptodactylidae
*Eleutherodactylus biporcatus**
Eleutherodactylus bransfordi
Eleutherodactylus cerasinus
Eleutherodactylus cruentus
Eleutherodactylus diastema

Eleutherodactylus fitzingeri
Eleutherodactylus mimus
Eleutherodactylus noblei
Leptodactylus melanonotus
Leptodactylus pentadactylus

Ranidae
Rana vallanti

Gymnophiona

Caeciliidae
Gymnopis multiplicata

Total Amphibia = 26 species

REPTILIA
Crocodylia

Alligatoridae
Caiman crocodylus

Crocodylidae
*Crocodylus acutus**

Testudinata

Kinosternidae
Kinosternon leucostomum

Emydidae
Rhinoclemmys annulata
Rhinoclemmys funerea
*Rhinoclemmys pulcherrima**

Serpentes

Boidae
Boa constrictor
*Corallus annulatus**

Colubridae
*Chironius grandisquamis**
Coniophanes fissidens
Enulius sclateri
Imantodes cenchoa
Imantodes inornatus
*Lampropeltis triangulum**
Leptodeira annulata
Leptodeira septentrionalis
*Leptophis depressirostris**
Leptophis nebulosus
Leptophis ahaetulla
*Mastigodryas melanolomus**
Ninia sebae
Ninia maculata
Oxybelis aeneus
*Oxybelis fulgidus**
Pseustes poecilonotus
Rhadinaea decorata
*Sibon annulata**
Sibon nebulata
Spilotes pullatus

Elapidae
*Micrurus alleni**
Micrurus nigrocinctus

Viperidae
Bothrops asper
Bothriechis schlegelii
Porthidium nasutum

Squamata

Anguidae
*Diploglossus monotropis**

Corytophanidae
Basiliscus plumifrons
Basiliscus vittatus
Corytophanes cristatus

Gekkonidae
Hemidactylus frenatus
Lepidoblepharus xanthostigma
Sphaerodactylus homolepis
Thecadactylus rapicaudus

Iguanidae
Iguana iguana

Polychrotidae
Norops biporcatus
Norops capito
*Norops carpenteri**
Norops humilis
Norops lemurinus
Norops limifrons
Norops oxylophus
Norops pentaprion

Scincidae
*Mabuya unimarginata**
Sphenomorphus cherriei

Teiidae
Ameiva festiva
Ameiva quadrilineata

Xantusiidae
Lepidophyma flavimaculatum

Total Reptilia = 56 species

* Indicates isolated report unconfirmed by faculty.
\# Indicates new species record (1998).

AN UNUSUAL ESCAPE REACTION OBSERVED IN *SPHENOMORPHUS SABANUS* (REPTILIA: SCINCIDAE) IN INDONESIA, WITH TAXONOMIC COMMENTS

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ABSTRACT. - In this paper we report on the taxonomy and a so far unobserved behavioural trait in the scincid lizard, *Sphenomorphus sabanus*. An individual of this species attempted to evade detection on a branch by hanging upside-down, suspended by its hind-limbs, thus mimicking a dry twig. Comparisons to similar strategies in other lizard species are made. *Sphenomorphus sabanus* is recorded for the first time from West Kalimantan (Indonesian Borneo).

THE second author conducted a one-year field survey in West Kalimantan (Kalbar) in 1996/1997, investigating populations and ecological parameters of three giant reptile species harvested for the commercial skin trade (Riquier, 1998; Auliya & Abel, 1999, 2000a, 2000b; Auliya & Erdelen, 1999). The major study site was the small river island Sibau Pulau [0°52'N; 112°55'E], adjacent to the village Putussibau at the Kapuas river.

In addition to the daily field work routine of checking traps set to capture the Water Monitor (*Varanus salvator*) and the Reticulated Python (*Python reticulatus*), the herpetofaunal community of the study site was intensively examined.

Study area. – The general study area is characterised as a river-fed swamp forest, including scattered remnant primary forest and secondary forest patches with a more dense undergrowth. Additionally, a diverse range of plants are cultivated by the local human population, e.g. fruits are managed in traditional systems. Many trap sites were set in dark microhabitats, partly with an almost 100% canopy cover. Due to regular and heavy rainfall the area was subject to frequent flooding. On these occasions it was easy to detect animals surviving on tree stems, stumps, logs or snags with various hiding holes.

Several observations were made of the very shy diurnal scincid *Sphenomorphus sabanus*. It was commonly seen in the study area, mostly escaping into tree holes. Basking was never observed and neither was terrestrial behaviour, in contrast to Inger & Lian (1996). All specimens were found at more or less low height (less than 3 m), usually around the base of trunks, where more shelter is provided (e.g. buttresses, stilt roots).

Taxonomy. – In order to identify the lizards, four specimens were collected, and data on colour pattern, morphometry and pholidosis were recorded (Table 1). All individuals can be attributed to *Sphenomorphus sabanus* Inger, 1958 (Figure 1). This species is characterised by its slender phenotype, 7 supraoculars (including the scale which touches both parietal and frontoparietal), 15-16 supraciliaries, 18-22 subdigitals under toe IV, and 38-42 midbody scales. The vertical oval ear opening bears no lobules. The prefrontals are broadly pentagonal, in contact with each other, and about two-thirds the width of the frontonasal. The frontal is longer than its distance from the tip of the snout, and is in contact with the first three supraoculars. The parietals meet behind the interparietal, and supranasals are absent. There are 7 upper labials, of which the fourth to the sixth are below the

eye. Six infralabials are present, as well as three pairs of chin shields. The colour in life is quite distinct, and the typical orange flush on the flanks of males is well expressed. Preserved specimens are greyish-brown dorsally with indistinct darker patches. A dorsolateral black streak or row of black spots, as well as a black cervical spot, is absent. All four specimens possess distinct barred labials, the darker ones always wider than the lighter ones. The temporal region is mottled black, and the ventral surface is always cream-coloured.

The specimens could be distinguished from sympatric *Sphenomorphus* spp. by the following combination of characters: from *S. hallieri, S. alfredi, S. shelfordi, S. stellatus, S. tenuiculus* and *S. buttikoferi* by more than 4 supraoculars; from *S. maculicollus* by 7 instead of 8 supraoculars, as well as more midbody scale-rows (38-42 compared with 36), from *S. kinabaluensis* and *S. murudensis* by more midbody scale-rows (38-42 against 32-35 respectively 30-32), from *S. multisquamatus* by a lower number of midbody scale rows (38-42 against 42-49). Furthermore, the specimens differ from *S. haasi* by the lack of a dark dorsum with scattered, small and whitish spots, and from *S. cyanolaemus* by lacking the dark dorsolateral band, which begins behind the eye in the latter species.

According to a provisional checklist of Borneo and Palawan reptiles (Iskandar, unpublished), at least 16 species of *Sphenomorphus* are recognised. Major herpetofaunal surveys are still largely confined to Sarawak and Sabah, Malaysian Borneo (Das, 1995), thus documented records in Kalimantan are scarce. One example is *Sphenomorphus hallieri*, which was recorded from Putussibau by de Rooij in 1915 (Bacon, 1967). *Sphenomorphus sabanus* is therefore recorded herein for the first time from West Kalimantan.

Behavioural observations. – One individual was captured for the purpose of obtaining additional photographs. At night the specimen was positioned on a branch of a small Guava tree (*Psidium guajava*). This tree did not have any wooden structures providing sufficient shelter. In the spotlight of a torch, the animal attempted to escape by running away along the branch. Instead of letting itself drop to the ground as is typical for other tree-dwelling species (discussed below), the lizard tried to escape, by hanging itself in a 'hanging-head-over'-position, remaining attached to the branch only with its hind-leg claws. In this position it resembled a small dry branch (Fig. 2). After remaining motionless for several moments, the lizard fled along the branch.

This peculiar behaviour was also observed by several residents in West Kalimantan, including one of the second author's highly trained field assistants. In order to check and confirm this, photographs of Bornean scincids, agamids and monitor lizards were presented to these forest villagers, and all persons consistently selected scincids.

So far, similar postures have only been observed in Malagasy Leaf-tailed Geckos,

ZFMK-Catalogue-Number	No. Supra oculars	Parietals in contact with Supraoculars	No. Midbody-scales	No. Scales under Toe IV	SVL	TL
65782	7	yes	39	22 / 21	5.3	9.3 (R)
65783	7	yes	40	- / -	5.0	-
65784	7	yes	39	19 / 20	5.5	-
65785	7	yes	41	21 / 21	5.5	7.5 (R)

Table 1. Morphology and pholidosis of *Sphenomorphus sabanus* from West Kalimantan. SVL: Snout-vent length; TL: Tail length; R: regenerated tail. Measurements in cm.

Uroplatus phantasticus / ebenaui group, where a 'hanging-head-over-behaviour' has been described (Böhme & Henkel, 1995). Males cling with their hind-legs to a twig in a hanging position with their head pointing downward. In this position they 'display' their leaf-mimicking tails. The body might also resemble some leaf structure, though it is not obvious, whether this can be considered as a startle behaviour, or a natural resting position, as this observation was also made during the night.

A further example was observed in a *Cyrtodactylus* sp. (Malkmus, 1988). The gecko displayed an akinesis also clinging with its hind-claws to the bark of a tree trunk, in a more or less 'hanging-back-over'-position. Malkmus (l.c.) suggests that this posture could mimic that of a looper (Geometridae).

Reports of this escape mode in reptiles are scarce. Instead, many reptiles show distinct defensive or anti-predator strategies, e.g. snakes that display red tails like *Cylindrophis* spp. or *Maticora* spp. (= aposematic colouration), snakes that feign death (*Heterodon spp., Hemachatus haemachatus, Natrix* spp.), or crypsis displayed in a perfect evolved manner e.g. geckos within the genus *Rhacodactylus* spp., or African Twig Snakes (*Thelotornis* spp.). Some even react with a reflexive bleeding, a chemical anti-predator mechanism, known in iguanids in North America (*Phrynosoma* spp.). Also well known is the acoustic defensive mode demonstrated in *Crotalus* spp. and *Echis* spp. Some lizards are even armoured with spines or horns, e.g. *Moloch horridus* and *Phrynosoma cornutum*. Intimidation display is exemplified by *Chlamydosaurus kingii*. Some more heavy-bodied reptiles even drop from the canopy and riverine vegetation into the water, in order to escape from predators, e.g. *Iguana iguana, Hydrosaurus* spp. (Porter, 1972; Stiling, 1996).

Escape by means of running away is generally practised among all animals. Some exclusively arboreal reptiles even developed a gliding flight supported by skin appendages on body and limbs. These distinct morphologies may also contribute to a successful escaping behaviour from potential predators. Examples within the Sauria are represented by *Draco* spp. (Agamidae), *Ptychozoon* spp., *Cosymbotes* spp., *Uroplatus fimbriatus* (all Gekkonidae), and the African lacertid, *Holaspis guentheri* (e.g. Tweedie, 1949; Schiøtz & Volsøe, 1959; Tiwari, 1961; Klingel, 1965; Herrmann, 1986; Kiew, 1987).

Other reptiles for which 'flight' has been observed, include the agamids *Bronchocoela cristatella*, and *Calotes* spp., *Anolis* spp. (Iguanidae), some *Dendrelaphis* spp. (Colubridae), and the well-known tree snakes (*Chrysopelea* spp.) (e.g. Shelford, 1906; Hediger, 1932; Reid, 1958; Herrmann, 1986). The latter examples lack morphological adaptations for gliding flight. Instead, all are capable of flattening their bodies considerably, in order to increase the carrying surface during the 'flight', or when 'falling' from arboreal structures. This 'flight' behaviour is exclusively related to arboreal taxa. Herrmann (l.c.) and Lazell (1987) observed that 'gliding' flights were also practised, when individuals of *Ptychozoon kuhli* and *Draco* sp. were pursued. 'Flight' as an active response to predators in snakes is described by Ford & Burghardt (1993).

Apart from this escape behaviour, Hediger (1932) observed on several occasions that *'Dasia' smaragdina (=Lamprolepis smaragdinus)* dropped down from trees (approximate 15-20 m in height), and, after landing on partly rocky substrate without injuries, immediately ascended into the next tree. Hediger (l.c.) provides no indication whether this behaviour was related to an antipredator behaviour, or the lizards fell accidentally. According to Herrmann (1986), all taxa within the genus *Dasia* are capable of flattening their bodies, when falling from tree crowns.

This paper reports on a so far unobserved anti-predator behavioural trait in scincid lizards. Nothing is known about its evolutionary origin. The additional examples of survival strategies mentioned above, either accidental (falling) or intentional (escape), could have led to the observed behaviour in *Sphenomorphus sabanus*.

Figure 1. *Sphenomorphus sabanus*, Putussibau, West Kalimantan. Photograph by

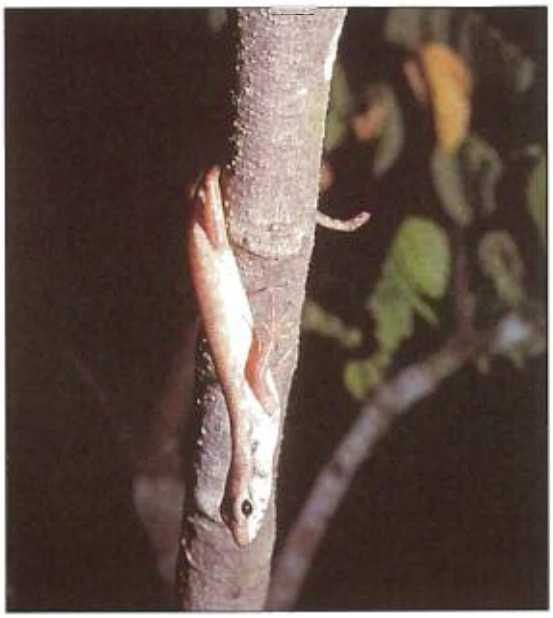

Figure 2. Escape reaction of *Sphenomorphus sabanus*. Photograph by

As many species in the genus *Sphenomorphus* are tree dwelling (pers. obs.), there are two possible explanations. First, as dropping to the ground is the commonly observed behaviour in many tree dwelling lizards, an escape strategy as described above could confuse flying predators such as birds who would not expect their prey remaining on the branch. Secondly, as also described in *Uroplatus*, it can be an effective escape strategy against other tree-dwelling predators, falling into a cryptic posture. Of course, more observations including experimental ones are required to substantiate and explain this extraordinary escape behaviour and its origin.

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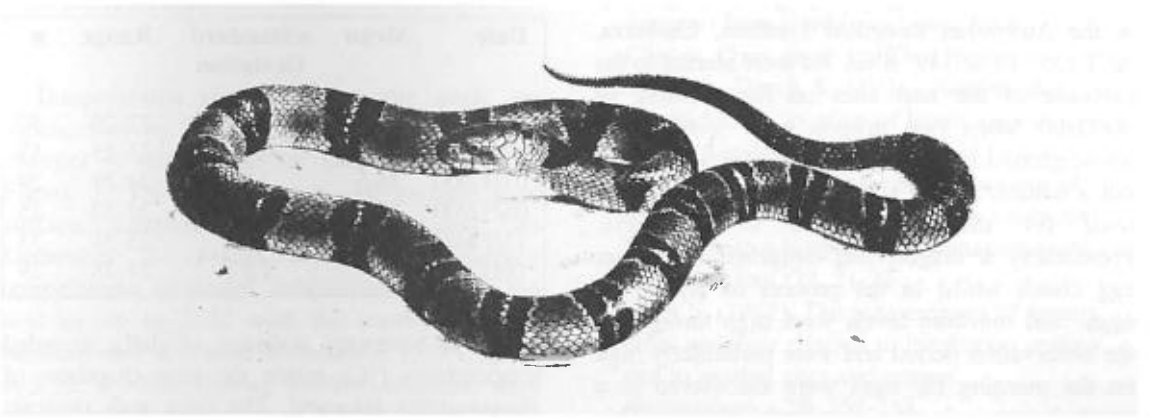

Annulated Water Cobra, *Boulengerina annulata*. Reproduced with permission of the Zoological Society of London from *Proceedings of the Zoological Society of London*, 1900.

NEST TEMPERATURES OF THE WATER DRAGON *PHYSIGNATHUS LESUEURII* IN SOUTHEAST AUSTRALIA

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ALTHOUGH the egg stage is a critical period in the life cycles of reptiles, details of the incubation conditions inside natural egg chambers are limited; information usually concerns species with environmental sex determination, mainly crocodilians and chelonians (e.g. Bull, 1982; Magnusson et. al. 1985; Moll, 1994). Conditions within lizard nests have also been reported, but much less frequently (e.g. Leiberman, 1979; Phelps, 2000). Part of the problem apparently involves the location of natural nests, since in comparison to many crocodiles and chelonians, lizards are often much smaller and their nesting behaviour less obvious (Perry & Dmi`el, 1994).

During November and December 2000 we had the opportunity to make observations on the temperatures inside the egg chambers of the Australian water dragon *Physignathus lesueurii* at the Australian Botanical Gardens, Canberra, ACT (35° 15'S; 149° 8'E). We were alerted to the presence of the nest sites on the morning of 30/11/00 when two dragon eggs were found above ground in an area of sandy soil, which was not a natural feature of the gardens having been used for the construction of pathways. Presumably a dragon had disturbed an earlier egg clutch whilst in the process of laying her eggs. Soil moisture levels were high throughout the observation period and were particularly high on the morning the eggs were discovered as a result heavy rain the previous evening. This depressed the loose soil at the nest entrances and showed up clearly against the surrounding impacted soil. Further investigation revealed at least eight nest sites.

The nests were situated on short embankments, at approximately 50° inclines, generally facing a direction of northwest with the egg tunnels at approximate right angles to the surface. All were situated in open areas and did not receive any shade until late in the day (around 1700 hrs). The top rows of eggs were buried 20 cm or so into the soil. To avoid undue disturbance of the egg clusters we did not make detailed counts of the eggs within each nest but numbers in excess of 15 - 20 eggs were present in at least two nest chambers. Over six days between 30/11/00 and 16/12/00, consisting of two overcast and four sunny days, temperatures inside the nests were recorded at approximately 15 minute intervals using an alcohol thermometer with the bulb placed immediately above the egg clutches.

Date	Mean	±Standard Deviation	Range	*n*
31/[1]1/00	24.3	1.04	22-25	30
07/[1]2/00	23.7	0.06	23-25	17
01/[1]2/00	26.6	1.91	24.29	29
06/[1]2/00	29.2	1.94	25-32	35
11/[1]2/00	25.7	2.81	23-31	33
16/[1]2/00	25.2	1.57	24-28	29

Table 1. Summary statistics of daily recorded temperatures (°C) inside the nest chambers of *Physignathus lesueurii*. The days with overcast weather were 31/11/00 and 7/12/00; the others generally had clear sunny skies. The number of daily measurements ***n*** on which the calculations are based are also given.

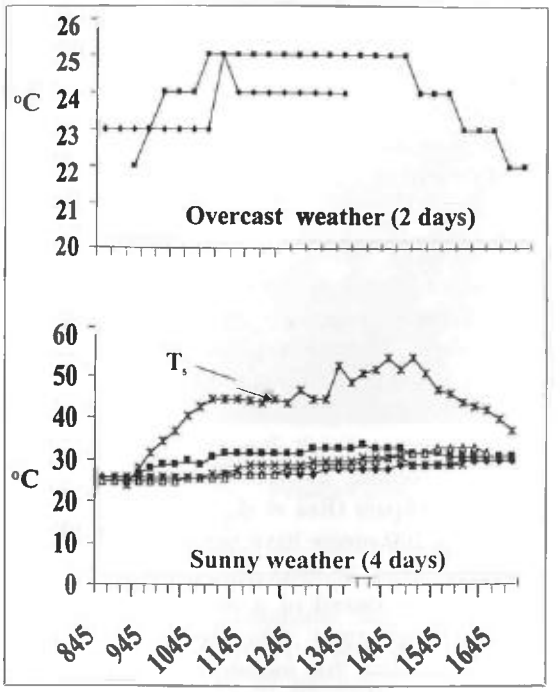

Figure 1. Daily changes in temperature inside the nests of *P. lesueurii* during overcast (top graph) and sunny weather. Corresponding changes in sand surface temperature (T_s) and nest temperatures (solid squares) on the warmest sunny day (6 December 2000) are shown for comparative purposes. Crosses, solid diamonds and open triangles show nest temperature records on sunny days when comparative sand surface temperatures were not recorded.

Temperatures recorded from the nests are summarised in Table 1 with the quarter-hourly changes in temperature for each day shown in Figure 1. The highest nest and outside sand surface temperatures were observed on December 6 (Fig.1) when sand surface temperatures exceeded temperatures inside the nest by up to 23°C with the mean difference between nest and sand temperature 13.4°C (S.D. = 5.32, n =32). During the two overcast days maximum nest temperatures did not exceed 25°C.

One interesting aspect revealed by these data was the relatively constant temperatures inside the nests, despite frequent high and variable external temperatures - it is of course important that reptile eggs do not overheat. The nest temperatures of *P. lesueurii* were in general lower than those recorded from similar sized tropical lizards (e.g. *Basiliscus basiliscus*, Lieberman, 1980; *Iguana iguana*, Rand, 1972; Drummond & Burghardt, 1983). As in the *P. lesueurii* nests some degree of variation in nest temperature in these species was also reported. It should be noted however, that in the present study no hatching period was observed, although when the nests were inspected on 28/12/00 the clutches were still apparently healthy.

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A RECORD OF MELANISM IN *VIPERA LATASTI*

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LATASTE'S viper (*Vipera latasti* Boscá, 1878) is a Mediterranean snake occurring in all of the Iberian peninsula, except in the extreme north, and in northwestern Africa (Morocco, Algeria and Tunisia). It is a small species with a snout-vent length usually not larger than 60 cm. Two subspecies are currently recognised: *Vipera l. latasti*, found in most of the Iberian peninsula and Portugal above Mondego River, and *Vipera l. gaditana*, found in the south and southeastern area of the Iberian peninsula and northern Africa (Bea & Braña, 1997; Gasc et al., 1997). The two subspecies are differentiated by the number of ventral scales, higher in the former subspecies (135-147) and lower in the latter (122-138) (Saint-Girons, 1977).

It is a viper with reduced polymorphism in the body colour and pattern. The background body colour is commonly grey, or grey-yellowish with yellow, light brown, orange or reddish spots according to the various populations (Bea & Braña, 1997; Barbadillo et al., 1999). The dorsal colour pattern is a dark stripe, with contrasted margins. The stripe can be either a zig-zag with sharp angles or a succession of inter-connected rhomboidal spots in the shape of rosary (Bea & Braña, 1997; Barbadillo et al., 1999). To our knowledge, melanism in this species has never been reported.

On 23 April 1997 a melanistic *Vipera latasti* (Figure 1) was found dead on a road in the Mata de Albergaria, Parque-Nacional da Peneda-Gerês, north of Portugal (UTM 29TNG7127). The specimen was at 680 m a.s.l. on a mountainside subjected to heavy rainfall (>3000 mm/yr.), and the surrounding habitat was a dense oak forest (*Quercus robur*) with heath (*Erica* sp.), brooms (*Cytisus* sp.) and brambles (*Rubus* sp.). The specimen was an adult male and its biometry is presented in Table 1.

In other European viper species melanism is quite frequent, especially in *Vipera berus* and *Vipera aspis*. In some populations of these two species, melanic individuals can represent more than 50% of the population (Naulleau, 1973). For *Vipera seoanei* it has been described for 38.8% of melanic individuals in the mountains of northern Spain (Bea et al., 1984). Since 1998, more than 100 vipers have been captured in this area, either live or dead on the roads, and this was the only record of a melanistic specimen. This presupposes a very low abundance of melanism and/or that melanism is quite rare in this species. Inquiries among local people inhabiting this mountain revealed that some are aware of the existence of these 'black vipers' but stated that they are very rare.

Snout-vent length	50.0 cm
Total body leength	59.0 cm
Head length	2.40 cm
Head width	1.24 cm
Head height	1.07 cm
Body weight	64.0 gr
Number of ventral scales	146
Number of pairs of sub-caudal scales	42
Number of loreal scales	9
Number of canthal scales	2
Number of apical scales	5
Number of peri-ocular scales	9
Number of intercanthal and interupperocular scales	30
Number of upper-labial scales	9
Number of lower-labial scales	10
Number of scale rows between the eye and the upper labials	2
Number of dorsal rows of keel scales	19
Entire dorsal head scales	2 parietals

Table 1. Biometric data for melanic specimen of *Vipera l. latasti.*

Plate 1. Melanic specimen of *Vipera latasti* from Parque-Nacional da Peneda-Gerês, Portugal. Photograph by I. Catalão.

Several theories regarding the evolutionary advantages of melanism have been suggested, and some data point to an advantage of melanic individuals of *Vipera berus* in faster heating rates, especially in mountain and cold regions (Andrén & Nilson, 1981), higher growth rates and body sizes (Madsen & Stille, 1988), higher fecundity in the females (Capula & Luiselli, 1994), and lower mortality rates after parturition (Luiselli, 1992). However, higher risk of predation (Andrén & Nilson, 1981) and considerable susceptibility to low food abundance (Madsen & Stille, 1988) has been reported as well. The evolutionary role of melanism in this species is yet to be determined, but it seems to be of less importance due to the extreme low frequency of occurrence.

ACKNOWLEDGEMENTS

This work was financially supported by a PhD grant from Fundação para a Ciência e Tecnologia (PRAXIS XXI/BD/16093/98) and by the Peneda-Gerês National Park (PNPG). Thanks are extended to José Ferreira and Francisco Neto for collecting the specimen.

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NATURAL HISTORY NOTES

Natural History Notes features shorter-style articles documenting original observations made of amphibians and reptiles mostly in the field. Articles should be concise and may consist of as little as two or three paragraphs, although ideally will be between 600 and 800 words. Preferred contributions should represent an observation made of a free-living animal with little human intrusion, and describe a specific aspect of natural history. Information based on a captive observation should be declared as such in the text and the precise geographical origin of the specimen stated. With few exceptions, an individual 'Note' should concern only one species, and authors are requested to choose a keyword or short phrase which best describes the nature of their observation (e.g., Diet, Reproduction). The use of photographs is encouraged but should replace words rather than embellish them. Contributions are accepted on the premise that they represent a previously unreported observation, and may be edited prior to acceptance. Standard format for this section is as follows:

SCIENTIFIC NAME (Common Name; the abbreviation NCN should be used where none is recognised): KEYWORD. TEXT; this should include date, time and locality (with full map co-ordinates if possible), precise details on the nature of the observation with some discussion of its significance, and references to pertinent literature. If the information relates to a preserved specimen, its catalogue number and place of deposition should also be given. REFERENCES. Then leave a line space and close with name and address details in full.

***RANA TEMPORARIA* (Common Frog): OCCURRENCE IN GROUND WATER SPRINGS.** In recent years I have been investigating ground water springs in Surrey and Hampshire, primarily for invertebrates, but have also regularly encountered Common Frogs, *Rana temporaria*.

The Chalk and Upper Greensand escarpments in north Hampshire have springs which range from seasonal seepages to permanent streams emerging from fissures in the underlying rock. All the springs investigated (over 30 to date) were surrounded by woodland. Searching at the point where the water emerged from the ground invariably produced at least one frog, regardless of the time of year. In March 2000 most of the frogs encountered were subadults at least a year old (in their second winter). The frogs were usually submerged with their heads pointing into the flow, so that water ran over the whole body. Many were completely underground, and up to 7 individuals were found in some springs, but 1 or 2 was more typical.

Adults and juvenile frogs were found in larger springs such as those in the deep hanger valley at Ashford Chace (GRSU 7326); here the frogs breed in the spring-fed stream and are amongst the earliest spawners in the district (early February being typical). Spawning at this site is usually completed a full fortnight before neighbouring surface ponds despite the valley being out of reach of the sun's rays in early spring.

The exceptionally wet conditions in 2000 meant that many new springs poured forth, and the usual springheads were often supplemented by seepages 2 or 3 m up slope. In December 2000 I checked 8 of these 'new' springs in Lower Greensand strata at Hammer Bottom on the Surrey/Hampshire border (GRSU 8732). All had at least one small frog in residence, which looked like they were wintering for the first time.

In Cumbria I regularly found adult frogs (in both summer and winter) in spring-fed troughs sunk into the ground for watering livestock. In the colder months they were hidden away in silt. It would be interesting to know if *R. temporaria* feeds on gammarids, in which case the springhead provides everything these frogs could want for, except a breeding site!

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***PHYSIGNATHUS LESUEURII* (Australian Water Dragon): PREDATION ON A SKINK (*LAMPROPHOLIS DELICATA*).** The Water Dragon *Physignathus lesueurii* is a common agamid lizard of the eastern seaboard and adjacent regions of Australia (Cogger, 2000). It is a large species which may reach a head-body length of 25 cm (Ehmann, 1992) and in common with many other Australian dragons is essentially a sit-and-wait predator. It is known to feed on insects, small vertebrates, fruits and berries (Wilson & Knowles, 1992; Cogger, 2000) and apparently under certain conditions, hatchlings of its own species (Ehmann, 1992). Few detailed observations of predatory behaviour of *P. lesueurii* have been made, however, particularly on reptilian prey. We report here on repeated predation by *P. lesueurii* on a skink *Lampropholis delicata* at the Australian Botanical Gardens, Canberra, ACT. The Grass Skink *L. delicata* reaches a head-body length of up to 3.7 cm and is known to forage in low vegetation, grass or leaf litter where it feeds on small invertebrates (Lunney et al., 1989; Ehmann, 1992). It is a common species in a whole series of habitats in the ACT including suburban gardens (Bennett, 1997).

The observations were made during a field study on the behaviour of *P. lesueurii* at the Australian Botanical Gardens during November and December 2000. There were eight observations of predation, all on adult skinks, the details of which are given in Table 1. Events 1 through to 6 occurred when individual *L. delicata* were moving across open clearings during overcast weather and 7 and 8 when the skinks were moving along the base of rocky outcrops. The skinks were moving in shaded areas and the dragons were perched on rocks at the time of the incidents. All the dragons involved were adult lizards (but not the largest males) with body masses probably approaching 0.5 kg and, as can be seen from Table 1, were apparently able to locate the skinks at distances up to 7 m. We additionally observed two unsuccessful attempts at predation on *L. delicata* by adult and sub adult dragons on 16 December and 11 December respectively. In both cases the skinks were moving in vegetation in shaded areas (shaded air temperatures = 31°C). The dragons travelled about 1.5 and 0.5 m before abandoning the chase when the skinks disappeared into vegetation.

The observations of successful predation reported here were confined to only three days of the field study. Other instances of predation were recorded daily throughout the study period but were confined to invertebrate prey - mainly flies,

N	Date	Time (hrs)	Weather	Shade temp.	Open area temp.	D.T.
1	29/11/00	12:55	overcast	22	29	2.0
2*	29/11/00	14:07	overcast	24	30	3.5
3*	29/11/00	14:14	hazy sunshine	24	30	2.5
4*	29/11/00	14:53	hazy sunshine	26	35	3.0
5	29/11/00	15:52	sunny	25	36	7.0
6	30/11/00	09:50	sunny	24	35	3.0
7	30/11/00	11:40	overcast	24	38	2.0
8	01/12/00	13:40	overcast	20	43	1.8

Table 1. Details of *P. lesueurii* predation on *L. delicata*. The approximate distances travelled in metres by the water dragons (D.T.) to capture the skinks are shown, together with local times. Shaded and open area (high) temperatures in °C are based on the temperatures of water-filled black painted copper cylinders employed during the study to measure environmental temperatures. The * denotes the same individual *P. lesueurii*.

ants and earthworms. These were preyed on by *P. lesueurii* of all size classes (alpha males, adults, sub adults and juveniles). It may be of further interest that despite the high population densities of *P. lesueurii* on the study site, we saw no instances of predation by large dragons on juvenile or sub adult individuals, perhaps a surprising finding given the frequent close proximity of all size classes in this environment.

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***TRITURUS VULGARIS* (Smooth Newt); RECENT RECORDS OF NEOTONY.** After many years of newt watching I was finally rewarded with my first encounter with a fully neotonous and albinistic adult Smooth Newt. It was found in a large garden pond at Bampton Grange (NY51), Cumbria, UK, in April 2000. Two similar individuals were caught in bottle traps set by John Read in a ditch near Whitehaven in West Cumbria, also in the Spring of 2000.

I have twice encountered partially neotonous adult Smooth Newts in 1998 at Chigwell in Essex, and between 1989 and 1991 in the fore-dunes near Birkdale, Merseyside. Both sites were small deep ponds and several adults with partially developed gills were found at each.

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THE HERPETOLOGICAL BULLETIN

Number 76, Summer 2001

BRITISH HERPETOLOGICAL SOCIETY

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