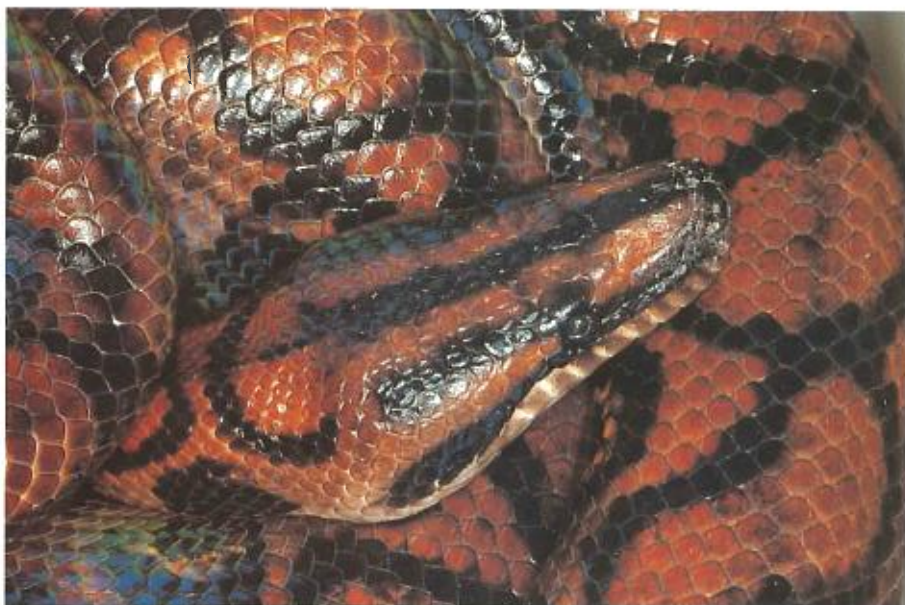


**THE BRITISH  
HERPETOLOGICAL SOCIETY  
BULLETIN**



**No. 23  
Spring 1988**

## BRITISH HERPETOLOGICAL SOCIETY

*c/o Zoological Society of London  
Regent's Park, London NW1 4RY*

*Correspondence, membership applications, subscription renewals and purchase orders for the British Journal of Herpetology should be sent to the above address.*

The British Herpetological Society was founded in 1947 with the broad aim of catering for all aspects of interest in reptiles and amphibians. Initiated by a small number of enthusiastic and well-known naturalists, including the first President and author of the standard textbook on British herpetofauna Dr. Malcolm Smith, the Society expanded rapidly and today enjoys national status with many international connections.

Activities of members range over a number of interrelated fields. In many cases the prime interest is in maintaining, breeding and observing various species in captivity and the Society acts as a forum for the interchange of experiences in this area. Others are concerned with the observation of animals in the wild state. There are active sub-committees which help to cater for these various tastes, notably the Captive Breeding Committee and the Conservation Committee. The former encourages the development of effective breeding techniques for captive specimens, thus providing animals for observation and study in vivaria, and for conservation purposes, while simultaneously reducing the need to take fresh stock from wild and possibly declining populations. The Conservation Committee is actively engaged in field study, conservation management and political lobbying with a view to improving the status and future prospects for our native British species. It is the accepted authority on reptile and amphibian conservation in the U.K. and has an advisory role to the Nature Conservancy Council (the statutory Government body). There are also professional scientists within the ranks of the Society engaged in increasing our understanding of all aspects of reptile and amphibian biology.

### Meetings

About ten meetings covering a broad sphere of interests are held each year.

### Subscriptions

Ordinary Members £15. Junior Members £5. (Junior Members do not receive the British Journal of Herpetology). Institution rates £25 (U.S. \$40).

All subscriptions become due on the first day of January each year.

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*The Society does not, as a body, hold itself responsible for statements made or opinions expressed in the Bulletin; nor does the Editorial necessarily express the official opinion of the Society.*

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The Bulletin is edited and produced by  
John Pickett and Simon Townson

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Contributions and correspondence arising from the Bulletin should be sent to:  
John Pickett, 84 Pyrles Lane, Loughton, Essex IG10 2NW

## LONDON MEETINGS 1988

Meetings are held in the Lecture Theatre of the Linnean Society of London, Burlington House, Piccadilly, London W1, and start at 7.00 pm, ending at 9.00 pm, unless indicated otherwise.

- APRIL 27th Dr David J. Bullock (Department of Zoology & Marine Biology, University of St Andrews, Scotland): *Herpetofauna of the northern Mauritian islands* (Indian Ocean).
- MAY 26th David Ball (Assistant Curator of Reptiles, Reptile House, Zoological Society of London): *Captive breeding of reptiles in the London Zoo.*
- JULY 6th *Amphibians and Reptiles worldwide: their care and breeding.* A discussion organised by the Captive Breeding Committee (Chairman: Mike Linley). Members are encouraged to bring live animals, preserved specimens, amphibian voice recordings and 35 mm colour slides for display and to illustrate discussions.
- AUGUST Field Meeting. *Tour of the B.H.S. reserve in Hertfordshire*, see page 6 for details and contact.
- SEPTEMBER *Care and breeding of amphibians and reptiles: an open meeting.* Contributions from members – live animals, slides etc. There will be facilities for the sale and exchange of members' private home-bred stock. Saturday date and venue to be arranged.
- OCTOBER 13th Paul Edgar (herpetologist, Operation Raleigh): *The herpetofauna of Seram, eastern Indonesia.*
- NOVEMBER 30th Mike Linley ('Survival', Anglia Television, London, and Chairman, Captive Breeding Committee) will show some herpetological films not previously screened by Anglia TV. Date to be confirmed.

## REPORT OF THE CHAIRMAN OF THE CONSERVATION COMMITTEE FOR THE YEAR 1987

By the Terms of Reference of the Committee, the Chairman may hold office for not more than five consecutive years. This period in my case ended on December 31st 1987 and I present my final Report for this term of office, with historical notes.

The earliest record I have of Conservation Committee meetings is for 11th July 1972, when M. Lambert took the Chair. Members present included T. Beebee, K. Corbett, V. Taylor and J. Webster of whom all except Vic Taylor are still serving with the Committee. The Minutes show the same preoccupation with pet-keeping vs. conservation as to some extent divides the BHS today. One wonders if these interests will ever be completely reconciled in ways that all will agree can mean no ill to our beloved herps. Mike Lambert remained Chairman until some time in 1977, when the post was assumed by Keith Corbett, who resigned on 4th December 1977. At that meeting Trevor Beebee became Chairman, holding office until my succession on January 1st, 1983. My first duty was to hold an emergency meeting, on January 16th 1983, to enable the Committee to decide whether it should lend BHS support to a proposed prestige Golf Course in the Formby area of Merseyside. The sponsors of the Course, which would markedly affect the habitats of both Natterjacks and the extremely rare Merseyside Sand lizard race, sought to use BHS support in their efforts to obtain planning permission. The Committee found itself deeply divided on this issue and after four hours of debate, narrowly voted against BHS endorsement. It was the peace-making initiative of Jon Webster that, later, more or less healed our split. The Golf Course Company, with Keith Corbett as its Adviser on behalf of BHS, later made concessions that largely calmed the Committee's conservation fears: however its proposal has been put into abeyance for other reasons.

During my term of office the general tide of opinion has run ever more strongly in favour of conservation so that, in contrast to the atmosphere prevailing for the founders of the Committee, it has been a time when our pleas for sympathy and help have been quickly heeded. The result is that the Committee is larger and richer than ever before and enjoys for the first time the services of a full-time Conservation Officer. In detail, we owe our financial good fortune chiefly to Mr. Vincent Weir and Leslie Gorrod (Vincent Weir Trust), Ted Hammond (NCC Grants) and Chris Tydeman (World Wildlife Fund-UK). In recent years WWF-UK has been able to support us through the H.J. Heinz "Guardians of the Countryside" project.

Attendance at the laborious and often uncomfortable autumn/winter tasks has been good and morale high, with a frequent feeling that by our own practical efforts we have increased the chances of survival and even increase of native herps, especially the rarer species. We have obtained a comprehensive, perhaps almost complete, understanding of the distribution of Sand lizards, Smooth snakes and Natterjack toads and have, under licence, established new populations of these animals, both through rescue from "doomed" sites and by captive breeding. We have helped with the NCC-sponsored Leicester Polytechnic Great crested newt survey and done something ourselves to assist this species, particularly in London and the Home Counties. In conserving the commoner herps, perhaps the greatest success has been the "Garden Ponds" leaflet, written by Trevor Beebe, distributed on request by the thousands, which must have led to many ponds in gardens holding frogs, toads and newts and from which amphibians using other ponds must also have benefited.

Through BHS membership of Wildlife Link (Link), the Committee has had a significant and increasing political effect in bringing the urgency of native herp conservation to the attention of the NCC and the voluntary organisations. This is especially important for the surviving Dorset and adjacent Hampshire heathlands, strongholds of the Smooth snake in the U.K. Indeed, NCC and Link have already had two meetings devoted entirely to these heaths: at these discussions BHS is the acknowledged herp voice for Link. The chief political difficulty is lack of legal means to protect SSSIs. The owners of these can and do neglect and allow damage on them, in some cases in the hope that destruction of the special scientific interest will turn an SSSI into a simple Site, ripe for profitable building or other "development". What is needed is a means to persuade SSSI owners, where necessary, to allow conservation measures: without these measures quite a number of vitally important dry heaths are surely soon going to be lost.

On 25th March, 1987 the NCC SW Region at Taunton held a one-day seminar entitled *Dorset Heathland Management and Reptiles*. I was asked to take the Chair and Keith Corbett to give two papers. He drove firmly home the known needs of Sand lizards in the U.K. especially their requirements for open sand on generally South-facing slopes. Lesley Hawkins (Dorset Naturalists Trust) spoke on plants, Stan Davis (RSPB) on birds and Ian Maclean (NCC) on invertebrates. Jim Kennard (NCC SW Region Chief Warden) told us about the management and protection of National Nature Reserves (NNRs), Jim White (NCC) spoke of policy at Slepe Farm, Wareham, and Malcolm Vincent of the legal framework for U.K. reptile conservation. There was lively and refreshingly heated discussion, especially about fire prevention, a more or less permanent bone of contention between BHS and NCC. The SW Regional Officer, Peter Nicholson (now translocated to NCC HQ at Peterborough) summed up the papers and gave his own opinions, which closely agreed with those expressed on behalf of BHS. NCC promised to publish the proceedings: so far this has not happened, apparently for the common reason in seminars that not all the contributions have been received in writing.

The NCC/Link meeting on *Herps and Heathland Conservation* took place at the Royal Entomological Society's Rooms in Kensington on 4th December 1987. BHS was represented by Keith Corbett, Bill Whitaker and myself. E.T. Idle (Assistant Director NCC S & W Region) chaired the meeting; Chris Tydeman led for Link. Much of the discussion was about protection of heathland SSSIs, as set out above. We were pleased to meet the new NCC SW Regional Officer, Mike Hudson, with whom we hope to co-operate as we did with Peter Nicholson. NCC ended by saying that future meetings must be widened, either to include heathland conservation for all species or the protection of herps generally.

On 19th October 1987, the NCC SE Region held a meeting at Lewes with BHS to discuss conservation of Sand lizards, Smooth snakes and Natterjacks in SE England. The atmosphere

at this discussion was relaxed and amiable, reflecting in part the lack of development pressure on the Hants/Surrey heaths as compared with those in Dorset. Most of the Home Counties heathland has either already been built on or is firmly in the hands of authorities who wish to preserve it. SE Regional NCC, which includes our member Brian Banks, is highly sympathetic to the work of your Committee. A point of contention, heathland management by controlled burning, has for the present at least, been resolved in favour of not allowing this where herps are present. NCC SE is prepared to sanction strictly controlled introductions of rare herps.

Throughout these important political discussions, our Conservation Officer, Keith Corbett, played a leading role in emphasising the requirements of the rare reptiles.

For Natterjacks, Brian Banks attended a liaison meeting with NCC, NW Region. He, Maggie and Trevor Beebee, with Dave Race met also at the BHS Reserve at Sellafield on 20th April, 1987. Dave found a Slow-worm here. On April 19th, Brian and Keith Corbett visited the BHS scrapes on Sandscale Haws. These meetings were to discuss management. Brian also met with NW NCC representatives on site in December to review management of the Cockerham (Lancs) Natterjack site: the colony here seems to be dying out. With the same NCC Region, Brian is negotiating for the lease or purchase of a Natterjack site at Dunnerholme Golf Course. He monitored these amphibians in Cumbria and on S. England sites. The Natterjack Sub committee, through Brian and Trevor, have produced a policy document and five year plan, agreed by the Committee and (more or less) by Arnie Cooke (NCC and Adviser).

The Committee met three times in 1987, twice at the London Zoo HQ and once (without Advisers) at Shoreham. Before this last meeting there was a full and lengthy discussion about the Committee's future plans, including its relations with BHS generally. A Rare Reptile Site Subcommittee was formed and also a Publicity Group to improve information to BHS. Few Committee members attend BHS lectures or meetings and thus most are not known personally to the membership that does this. For the same reason, the Conservation Committee is unaware of and essentially not interested in the political strife that so often racks BHS Council. As part of BHS, its Conservation Committee was concerned about newspaper reports of unacceptable behaviour by BHS members and I asked Council in 1987, on the Committee's behalf, to act to protect the Society's good name. Advantages of the BHS structure include the almost complete freedom of action granted by Council to its Committees appointed under Rule 11; recruitment through the Society, a source of funds for purposes not supported by grants and the *Journal* and *Bulletin*. It is most desirable that a meaningful dialogue should take place regularly between the captive breeding and conservation interests of the Society, but only if the political will exists to make such discussions useful.

Between January 11th and December 6th 1987, the Committee carried out 12 organised Sunday tasks, clearing pine, birch and gorse from heathland sites for the benefit of Natterjacks and the rare reptiles. At least 14 sites were tackled, 9 in Dorset and the Dorset/Hants border areas and the remainder on Hants/Surrey heaths. Attendances were between 10 and 21 (average 15). In addition, several members worked at odd times on areas such as Ferndown, Churt and Woolmer Forest where we have special interests. Several BTCV tasks were arranged and supervised. This clearance of heathland is a never-ending need: without it the habitat is soon lost.

During the 1987 "summer" months, Committee members continued to search for rare reptiles, finding such a colony of Sand lizards on a Dorset site as at once qualified it to be made a SSSI: NCC rapidly responded to our field records in this case.

Mike Preston reported on the captive breeding results and releases of Sand lizards in 1987, under the aegis of the Subcommittee of which he is Convenor.

The 14 Committee members forming the Smooth snake survey team contracted to NCC ended their final season: a Report for NCC is in preparation.

In my last Report (*Bulletin* No 20, p.2) I mentioned the sale of the Arne Plantations to a new private owner. This man, a builder, has refused co-operation with BHS and the two sites previously managed by us have been lost.

Our former President, Deryk Frazer, continued his search for amphibians in Kent ponds.

During the year D.L. Tamarin gave the Committee a copy of his Report on Herpetological Field Studies, made to the NCC on his observations between 1977 and 1986. He worked on Dorset and New Forest heathland and made many observations of direct practical interest.

Colin Fitzsimmons (BHS Education Committee) sent copies of the Hertfordshire Pond Report (1986), a very thorough survey of ponds in that County prepared by the Hertfordshire County Council Countryside Group. Such a Group could do similarly excellent work in so many other counties whose ponds are unsurveyed and threatened. The Herts document is a good model for such work, indeed for your Committee. I had a useful meeting with Colin: we hope for future practical collaboration.

Following his previous report on the amphibians there (see 1986 Report), Ray Buckland kindly sent your Committee a description of the status of the reptiles (Common lizards, Slow-worms, Adders and Grass snakes) in the Fens Pool Area of Pensett, West Midlands, in 1987, as recorded by the Pensett Wildlife Group. We are most glad to have these records from field observers.

**Finance.** Funds for management (i.e. employment of Conservation Volunteers etc) and Sand lizard captive breeding were given by NCC and WWF-UK (through Heinz "Guardians of the Countryside" project). BHS paid for Licences and for BTCV insurance. NCC funded 50% of the standard rate of members travel expenses for management and monitoring tasks. The Conservation Officer was funded as set out in my 1985 Report (*Bulletin* No 17, p.4 [1986]) with extra support from NCC and WWF-UK. "Free" money was used for reprints of our leaflets.

Sometimes I ask myself: what are we, grown men and women, doing on these heaths in all weathers working ourselves to exhaustion for the sake of a few toads, lizards or snakes? To me the answer is one word: civilisation.

I thank the following for their generous help at our tasks in 1987:

C. Adams, Joyce Allen, Judith Allen, J. Baker, A. Beebee, G. Clay, A. Damon, R. Davis, E. Eley, M. Grubb, R. Jones, T. Langton, A. Laydon, K. Leaver, Anne Malloy, C. Murgatroyd, Puky Miklos, V. Read, K. Sherrard, A. Spinney, J. Sutherland, A. Thorne, J. Tomkins, A. Welch.

#### **Conservation Committee 1987:**

B. Banks<sup>1</sup>, M. Beebee<sup>1</sup>, T. Beebee<sup>1</sup>, D. Bird<sup>3</sup>, A. Braithwaite<sup>2 3</sup>, J. Buckley<sup>1 3</sup>, K. Corbett<sup>1 2 3</sup>, D. Dolton<sup>2 3</sup>, M. Dolton<sup>2 3</sup>, P. Edgar<sup>3</sup>, J. Gaughan<sup>3</sup>, R. Griffiths, E. Haslewood<sup>3</sup>, G. Haslewood<sup>1 2 3</sup>, H. Inns<sup>2 3</sup>, M. Jones<sup>1</sup>, A. Langford, M. Langford, M. Preston<sup>2</sup>, D. Race<sup>1</sup>, P. Reynolds<sup>3</sup>, C. Raxworthy, E. Wade, J. Webster<sup>2 3</sup>, W. Whitaker<sup>3</sup>.

#### **Advisers:**

E. Arnold, H. Arnold, P. Bryce, A. Cooke, J. Griffin, J. Rudge, R. Stebbings, C. Tydeman, M. Vincent<sup>3</sup>, J. White, A. Wright.

<sup>1</sup> Natterjack Subcommittee

<sup>2</sup> Sand lizard breeding/release Subcommittee

<sup>3</sup> Smooth snake survey

February 1988

G.A.D. Haslewood

## **CONSERVATION MATTERS: A REVIEW OF HERP CONSERVATION ISSUES IN THE NEWS, SEPTEMBER-DECEMBER 1987.**

**BRIAN BANKS, B.H.S. Conservation Committee**

### **Redditch news set a precedent**

Redditch Borough Council were recently criticised by some local residents and praised by conservationists for agreeing to reinstate a crested newt site on a former childrens' play-ground. The recreation area was built on the site of a pond but continued to flood after it was completed. At this stage great crested newts were identified using the reformed flood areas, and with a peak count of 150 animals this was identified as the best site in the county (Worcestershire). Although some animals were initially translocated to other pools, following representations from the Nature Conservancy Council, the Borough Council offered to turn the play-ground back into a pond. They have donated £500, a quarter of the estimated cost of the project, and are seeking help from other conservation organisations to raise the remainder. For the newts this should be a welcome development as the existing puddles dessicate too early, and plant life is so scarce so that empty crisp packets have been used as egg-laying sites.

Local residents were not happy, however, and a petition has been raised to protest against the decision. The Borough Council argue however that they had no option but to reinstate the pond as the amphibian is a specially protected species, a most useful precedent.

### **Westwardly mobile Conservation Officer**

Elsewhere development continues to threaten our rarest reptiles, particularly in Dorset. These are so frequent that your Conservation Officer, Keith Corbett is having to move home and office to that county from London to reduce the number of stressful journeys from the capital. Recent cases have involved two planning applications which threatened a number of important reptile sites, and which are currently being considered. For further information, and the outcome, watch this space. . .

### **Adders remain unprotected**

In Bulletin number 19 this column reported that the NCC had advised the government that all of the British reptile species should be protected from deliberate killing or injury. Unfortunately on 30th of November it was announced that the Government intend to amend the Wildlife and Countryside Act (1981) to protect the non-venemous species only. This is a most undesirable state of affairs since snakes in particular suffer from indiscriminate killing, and a member of the public could, on killing a grass snake, claim he had mistaken it for an adder. Furthermore other more advanced European countries have gone so far as to protect the adder because it is likely to be under threat, it is a pity that Britain is not a member of this enlightened group.

### **Natterjack conservation on Merseyside**

For some time now the Conservation Committee have aimed to establish a chain of viable natterjack breeding scrapes along this stretch of coast. This autumn they were able to complete two major links by hiring a J.C.B. for one week to move vast quantities of sand. The work was organised by BHS and paid for by Sefton Borough Council (using NCC grand aid) and the World Wildlife Fund, in one case. Another scrape was paid for directly by NCC and WWF (from the Heinz fund) to excavate a scrape on land promised to the Conservation Committee as a nature reserve by a local golf course company.

The new pools are very shallow, unlike the more permanent excavations of the late 1970's which have caused a population explosion of the competing common toad, and which is a problem which still needs to be solved.

## B.H.S. RESERVE FOR REPTILES AND AMPHIBIANS IN HERTFORDSHIRE

COLIN FITZSIMMONS

*107 The Ridgeway, Northaw, Potters Bar, Hertfordshire EN6 4BG*

In November 1985 an area of British Rail embankment near Potters Bar became the first B.H.S. Reserve for commoner herptiles in Hertfordshire.

The site is an area I have known for more than 10 years to be good for Viviparous Lizards (*Lacerta vivipara*) and Slow-Worms (*Anguis fragilis*). On the edge of a Station car park there was always the possibility that British Rail would extend the area available for car parking. Indeed this happened in September and October of 1985. As the contractors moved onto the site the reptiles were moved-off. A few local B.H.S. members including 'J - Herps' (Junior B.H.S. members) and Members of the Cheshunt Natural History Society, spent as much time as possible catching and moving adults and young, with the full approval of British Rail. During this 'Operation Railway Rescue' almost 100 Viviparous Lizards were relocated, together with 15 slow-worms and a handful of amphibians. The herptiles were released at the far end of the embankment from which it was hoped they would not 'retrace their tracks'.

While the rescue was going on I made enquiries to see if the remaining area used by 'my' reptiles could become a Nature Reserve. I contacted Tom Langton (then Hon.B.H.S. Conservation Officer) who acting on behalf of the B.H.S. Conservation Committee has drawn up a licenced agreement with B.R. for the site.

Winter working parties have already cleared areas of thorn and scrub in an attempt to open up part of the embankment to more sunlight. It is hoped that proper management plan will be drawn up soon with the help of the Conservation Committee, and a system of coppicing will be put into practice. Future plans may include the installation of a pond. Common Frog, Toad and the Smooth Newts have all been found on the Reserve. One Grass Snake was seen, some years ago. Creation of an egg laying site may encourage this species back. Adders have not been recorded in Hertfordshire, despite reports from B.R. staff to the contrary. A greater liaison between B.H.S. and B.R. would be beneficial. B.R.'s many miles of embankments must harbour good numbers of all our native reptiles and amphibians, but obviously unauthorised access to all such embankments is strictly prohibited.

As you may know trespass on Railway property carries a heavy fine, and thus access to this Reserve is STRICTLY PROHIBITED unless accompanied by myself. This is a condition of the licence for the site, and it is hoped members will respect this. I am hoping to arrange a guided tour of the Reserve for B.H.S. Members. A provisional date being SUNDAY 7th AUGUST. Please contact me for more details. Help with Management; Scrub Clearance etc., would be very welcome, during next winter.

I hope also that this Reserve will act as a model for other B.H.S. Members, we all know good areas for the commoner herptiles in our locality. It is up to us to keep them that way!

### Further reading:

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Fitzsimmons, C. (1986). 'From Rescue to Reserve'. *Newsletter, Hertfordshire and Middlesex Trust for Nature Conservation*. No. 69, 6.

## MEMBERS' ADVERTISEMENTS

**Wanted:** newts of the genus *Triturus* to initiate and augment colonies for captive breeding. Details of facilities available on request. Leigh Gillett, 1 Fleets Lane, Tyler Hill, Canterbury, Kent CT2 9LY. Telephone: 0227 471913



## A NOTE ON THE HERPETOFAUNA OF CENTRAL AUSTRALIA

J. L. Cloudsley-Thompson

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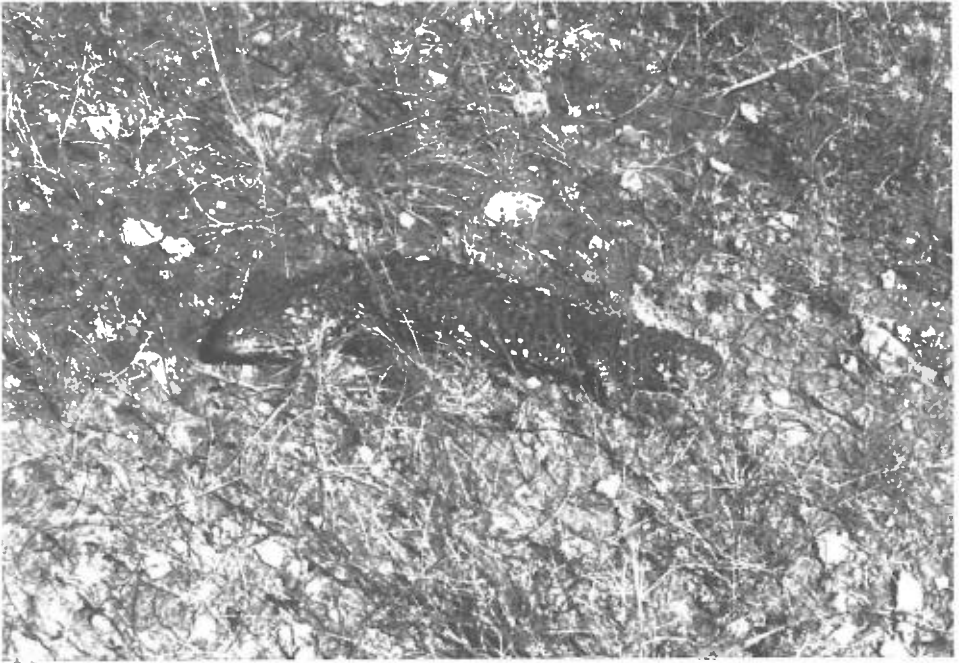
The reptile fauna of Australia is extraordinarily rich and varied. Cogger (1986) lists well over 700 species, and new discoveries are continually being made. Yet, in the central Australian desert, my wife and I saw far fewer snakes and lizards than we had expected: the object of this note is to explain the situation to other British herpetologists who may be misled as to the true situation if they have not actually visited the region.

In New South Wales and A.C.T., on two day-trips, we saw Murray turtles (*Emydura macquarii*), water dragons *Physignathus lesueurii*), a blue-tongued lizard *Tiliqua scincoides*), water skinks (*Sphenomorphus tympanum*), as well as a red-bellied black snake (*Pseudechis porphyriacus*) and a brown snake *Pseudonaja textilis*). The latter is dangerously poisonous to human beings, but not aggressive. Across the Mount Lofty Range from Adelaide, in quick succession one afternoon, we saw and photographed a stumpy-tailed or shingle back lizard *Trachydosaurus rugosus* (Fig. 1) and a mallee dragon (*Ctenophorus fordi*) (Fig. 2). Agamidae are known as 'dragons' in Australia, Varanidae as 'goanneas'.

The situation was different in the more arid country around Alice Springs on the fringe of the Simpson Desert, where my wife and I stayed from 6 November until 8 December 1987. At this point, I should explain that the Australian arid regions are quite unlike the deserts in Asia, Africa or America because they are richly vegetated. This applies even to the endless sand dunes of the Simpson Desert. On these grow xerophytic grasses, shrubs, and even trees, although it is the hottest and most arid part of Australia. The rainfall is exceedingly irregular and periods of drought may extend for years. Two or three times in a century, however, there may be years of extremely heavy precipitation and consequent flooding. Enough water is then trapped below ground to enable trees and shrubs to survive for decades until rain again falls in quantity. The vegetation at the time of our visit was still rich, following the heavy rainfall of 1972-73.

The region around Alice Springs and the MacDonnell Range is dominated by mulga (*Acacia* spp.) and other shrubs or by spinifex (*Triodia* and *Plectrachne* spp.). In South Australia, in the semi-arid Brookfield Conservation Park, east of the Mount Lofty Range, mallee is the dominant vegetation type. In mulgas, most leaves point upwards so that rain dribbles down the branches and trunks to soak the ground beside the trunks. Spinifexes are most of the world's hardest grasses. As the central roots and leaves of the original plant exhaust the soil and begin to die, the outer parts of the tussock take root in fresh soil, forming new plants so that a ring develops around the dead centre. Spinifex provides shade and protection for many animals, including reptiles, birds, mammals and insects.

The *Eucalyptus* species that comprise mallee present the branching aspect reminiscent of a pollarded willow. None of these vegetation types is exclusive, however. Spinifex may grow beneath mulga, and saltbush or bluebush (*Atriplex* and *Maireana* spp.), as well as mitchell grass (*Astrelba* spp.) beneath mallee. Soil nutrients are extremely low in these vegetation climaxes. Dead plant material is rapidly consumed by the ever-present termites and ants, upon which many of the lizards depend. For instance, the mallee dragon "appears to be confined to mallee and related arid scrubs, where it occurs only in the presence of porcupine grass (*Triodia* spp.). Feeds almost solely on ants" (Cogger, 1986).



**Plate 1. Shingleback lizard**



**Plate 2. Mallee dragon**



Plate 3. Dorsal surface of juvenile perentie



Plate 4. Children's python.

There is a surprisingly rich assemblage of lizards in arid Australia (Pianka, 1986), especially in spinifex which grows on unusually infertile soils. Here, termites provide an abundant food resource suitable for lizards, many of which are arboreal, but for few other vertebrates. Trees grow sparsely throughout spinifex and *Acacia* shrublands, thereby adding to the complexity of the reptile fauna (Morton & James, 1988). Despite this, reptiles are extremely difficult to find, let alone to catch – except in pitfall traps. Most species are nocturnal, or hide in the spinifex where they are inaccessible and can seldom be seen.

Thus, we were fortunate to see and photograph central netted dragons (*Ctenophorus nuchalis*) near the Aboriginal rock carvings at Ewaninga, but we found neither military dragons (*C. isolepis*) which inhabit spinifex, nor the long-nosed dragon (*Lophognathus longirostris*), a swift arboreal species said to be common and conspicuous at Ormiston Gap in the Chewings Range. Neither did we find a thorny devil (*Moloch horridus*) nor a Gould's goanna (*Varanus gouldii*). [The frilled lizard (*Chlamydosaurus kingii*) only occurs further north.] We did not even see the common nocturnal gecko (*Diplodactylus stenodactylus*, although we managed tree dtellas (*Gehyra variegata*), the latter on buildings. [Surprisingly, we did not find any house geckoes in Tahiti or New Caledonia on the outward journey although, of course, there were plenty in Indonesia, Singapore, Sri Lanka and Oman on our return]. On a couple of occasions, too, we were fortunate in finding skinks (probably *Ctenopus pantherinus*), both on walls and in spinifex.

Once we came across the corpse of a young perentie (*Varanus giganteus*) which had been killed on the Stuart Highway 20 km north of Alice Springs. (This species is second in size only to the Komodo dragon, the world's largest lizard.) The perentie averages about 1.6m in total length, but specimens exceeding 2m have been found (Cogger, 1986). The suggestion has been made that traditional Aboriginal sand paintings are based on the pattern of spots on the dorsal surface of immature specimens of this formidable and impressive reptile (Fig. 3). The only snake we met with was a Children's python (*Liasis childreni*) which had entered a private house where it was not welcome. We were able to photograph it before its release two days later (Fig. 4).

All this amounts to very little really, when it is remembered we drove over 3,000 km, visiting places as far from Alice Springs as Ayres Rock and the Olgas (480 km SW), Finke National Park and Palm Valley (130 km WSW), Glen Helen (135 km W), Ross River (80 km E), Maryvale, and Chambers Pillar (180 km S).

Around Perth, skinks predominated. We saw several *Ctenopus* sp. in the John Forest National Park and *Lerista muelleri*, a species with reduced limbs, in King's Park.

Warmest thanks for hospitality, information, and advice are due to Drs Meredith and David Happold (Canberra), Les Heathcote and Sandy Tartowski (Adelaide), Steve Morton and Bill Low (Alice Springs). The writer is also indebted to the Australian National University for an honorary Fellowship (which enabled him to rent a University 4-wheel drive pick-up at very moderate cost) and to the Leverhulme Foundation for an Emeritus Fellowship which provided most of his travel expenses.

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# HERPETOLOGY IN MAURITIUS A HISTORY OF EXTINCTION, FUTURE HOPE FOR CONSERVATION

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*This is another of a range of articles published, in the BHS Bulletin on herpetology in different Commonwealth countries and of importance in relation to the first World Congress of Herpetology (of which BHS is a Co-Host) taking place in the UK in September 1989. His Royal Highness the Duke of Edinburgh (President of the World Wildlife Fund and Vice-President of IUCN) is Patron and Prof. Angus Bellairs (BHS Honorary Life Member 1982) Honorary President. Every encouragement is to be given to Commonwealth nationals, especially from developing countries in the tropics (where most of the world's herpetofauna occur), to attend and participate in the Congress.*

## INTRODUCTION

Mauritius, making up an area of 805 square miles (2085 km<sup>2</sup>), includes Rodrigues, and the dependent islands of Agalega and St Brandon. Excluding the latter two islands, Mauritius and Rodrigues, together with Réunion (an Overseas Department of France), make up the Mascarene islands (named after the Portuguese navigator, Pedro Mascarenhas) in the west of the southern Indian Ocean. Called Dinarobin on earlier Arabs' maps, Mauritius first became known to the Portuguese in 1511. Visited by the Dutch in 1598 (a Dutch colony from 1638-1710) and possessed in 1715 by the French, who settled there in 1720, Mauritius remained under French administrative power until 1810. Under British Rule for 158 years, Mauritius became an independent member of the Commonwealth in 1968 with French and the local creole the main languages, but with English, an official language with French, also widely spoken.

Mauritius enjoys a sub-tropical maritime climate with high humidity and a wide range of rainfall and temperature resulting from mountainous areas. The island is subject to cyclones that strike with demonic force at irregular intervals between January and March. The lowland areas of the island are blanketed green almost everywhere by sugar cane, but some natural vegetation intensely mixed with exotics survives in upland areas especially in the south-west. The Black River Peak (826m) is Mauritius's highest mountain. As a helpful introductory work on Mauritius, although now a little out-of-date, a book by Wright (1974) was published by David & Charles in the Islands Series. This is usefully complemented historically and politically, however, by Mannick's (1979) more detailed *Mauritius: the development of a plural society*.

Sugar is the main export and 'up-market' tourism a major source of income, but Mauritius is probably best known for the rare Mauritius Blue postage stamp and as home of the extinct Dodo. In September 1987, Their Royal Highnesses the Duke and Duchess of York made a visit to Mauritius which received much publicity in Britain.

During the 19th century, Nicholas Pike (1873), American Consul in Mauritius, took an interest in the general natural history of the island and described his wanderings in a delightfully entitled book (only available secondhand) "Subtropical rambles in the land of the Aphanapteryx". More recently, Gerald Durrell (1977) provided a light description of his experiences collecting rare species for captive-breeding at the Jersey Wildlife Preservation Trust (JMPT) in a book entitled "Golden bats and pink pigeons". His wife, Lee, accompanied him on later expeditions, but one of his companions on the early ones was his assistant, John Hartley, who gave a lecture on their work at a BHS evening in October 1981.

## A HISTORY OF EXTINCTION

Extinction of species that have evolved in isolation appears to be a feature of Mauritius and other Mascarene islands. The best known species, the Dodo, a kind of terrestrial pigeon the size of a turkey, and a lesser known bird, the *Aphanapteryx*, were persecuted and became extinct between 1638 and 1710. Giant tortoises also inhabited the Mascarene islands at that time, and in an excellent account of the ecological history of Mauritius and other Mascarene islands, Cheke (1987b) reviews the early literature on these enormous creatures (which were sought as a food supply) and recounts their extinction. He concludes from the log of a ship, the *Courrier de Bourbon* (1721), that tortoises were extinct on mainland Mauritius by 1721. They survived on Rodrigues for longer, effectively until 1805, although only pronounced extinct forty years later ([Corby, 1845], cited by Cheke, 1987b). Certain plant species have also become or are very close to extinction on Mauritius, the Tambalacoque tree, which still just survives, probably being the best known of these. Temple (1977) suggested that the demise of this tree is due to the extinction of the Dodo for some mechanism of endocarp abrasion is required to facilitate germination and he proposes that this was accomplished by the Dodo's gizzard. In a recent note, Iverson (1987) proposes that the giant tortoises were responsible for this function, especially since the seeds of certain species germinate more readily after passage through the gut of both Galapagos (Pacific Ocean) and Aldabran giant tortoises, but Cheke (1987b), who also suggested that tortoises were involved, surmised that removal of the endocarp was carried out in the mouth (on account of the large size of the seeds) and not the gut.

The giant tortoises of Mauritius and other Mascarene islands were undoubtedly abundant herbivorous inhabitants during the Pleistocene. They have inspired a certain degree of interest among herpetologists since Günther's (1873, 1874, 1877) work on "gigantic land tortoises". This stimulated further work (e.g. Boulenger, 1891; Gadow, 1894; Haddon, 1879; Rothschild, 1906, 1915; Sauzier, 1892, 1893; Vaillant, 1885, 1893, 1899, 1903). More recently, Arnold (1979, 1980) and Bour (1980) have considered the systematics and distribution of species on the Mascarene islands, the latter author reviving the genus *Cylindraspis* (see also Bour, 1978), and concluded that two species occurred on Rodrigues (*Geochelone vosmaeri* and *G. peltastes*), two on Mauritius (*Geochelone inepta* and *G. triserrata*, named by Günther) and one (*Geochelone borbonica*) and probably another, *G. triserrata*, on Réunion (Arnold, 1979). There have been new doubts over the allocation of names to species for *gigantea*, usually applied to Aldabra tortoises (*Dipsochelys* and *Aldabrachelys* have also been used as generic names for this species), was apparently based on a Mascarene specimen in the Paris Museum of Natural History (Bour, 1984).

Arnold (1980) and Cheke (1987b) have also recently considered other extinct forms of reptiles on Mauritius, Rodrigues and Réunion. A giant skink, *Leiolopisma (Didosaurus) mauritiana* Günther occurred on Mauritius and reached a snout-vent length of around 340mm. It is related to the smaller (up to 171mm) *Leiolopisma telfairi* (Desjardins), which now survives only on Round Island, one of the islands off the north coast of mainland Mauritius. There are also two endemic Round Island geckos: *Nactus (Cyrtodactylus) serpensinsula* (Loveridge) – also on Serpent Island (another northern Mauritian island) – and *Phelsuma guentheri* Boulenger, and two bolyerine snakes: *Casarea dussumieri* (Schlegel) and perhaps another, *Bolyeria multocarinata* (Boise), which has not been seen on Round Island since 1975 (Bullock, 1977) and then only previously in 1967 (Vinson, 1975). Bullock has also quite recently discovered a small gecko, *Nactus coindemirensis* n. sp., new to science on Gunner's Quoin (Coin de Mire) off the north coast of the Mauritian mainland which has been described by Bullock, Arnold & Bloxham (1985). *Phelsuma gigas*, the world's largest gecko, is now extinct on Rodrigues, having become so in the 1840s.

## CONSERVATION

When Chairman of Council of the Fauna (now & Flora) Preservation Society (FFPS), Sir Peter Scott was invited to visit Mauritius in 1973 and advise on conservation problems, he recommended the need for properly managed national parks and nature reserves to protect remnant habitats (Scott, 1973). Round Island and Maccabee Forest (comprising the Black River Gorge), among other areas, were set up as National Reserves. After a two-year investigation from early 1973, Temple (1974b) outlined the Mauritian wildlife conservation problems in

FFPS's journal, *Oryx*, having already publicised the threat of habitat alteration to the rare reptiles on Round Island from the ravages of goats and rabbits that had bred prolifically after being released there in about 1850 (Temple, 1974a). A fuller account of conservation problems in Mauritius has been given by Procter & Salm (1975) and a list of the reserves on Mauritius and their sizes by Owadally (1981). Cheke (1987a) has also provided an update on the conservation situation in Mauritius.

Besides terrestrial species, there are other species that can be considered to be indigenous to Mauritius with its situation in the Indian Ocean. These include three marine turtles (*Chelonia mydas*, *Eretmochelys imbricate* and *Dermochelys coriacea*) and a sea snake (*Pelamis platurus*). *Chelonia mydas* (Green Turtle) is classified as an endangered species under CITES and as a harvestable species requiring protection under the Draft Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region. In a White Paper on conservation strategy in Mauritius (Ministry of Agriculture, Fisheries and Natural Resources, 1985), the Green Turtle is reported to have become extremely rare around Mauritius but is fairly common on some islets of the St Brandon Shoal. Fishing of turtles is prohibited, but the protection of the nesting ground where the species is most vulnerable is still required. It was proposed that turtle reserves should be created at Pearl and Frigate islands in the St Brandon Shoal by protecting nesting grounds of the species and allow for maximum hatching success and recruitment in the turtle population. The Ministry for Rodrigues and the Outer Islands would be responsible for the implementation of management plans.

The first opportunity to visit Mauritius was given to Lambert in May 1981 in order to conduct a training course at the behest of the Mauritian Government through sponsorship of the Overseas Development Administration (ODA). He had the good fortune at that time, through John Hartley, to meet Gerald and Lee Durrell, whose visit to make a film on their work in Mauritius coincided. Gerald Durrell in desperation felt that strychnine used under the name of 'bunny-slumber'(!) could be one quick, albeit somewhat drastic, way of resolving the rabbit nuisance on Round Island. However, a successful solution to the problem has now been found after putting a proposal by a New Zealand expert Don Merton (Merton, 1985, cited by Cheke, 1987a) into action in July 1986. A further visit by Lambert was provided again through ODA in March/April 1987 and Owadally was invited to contribute to a training course on pesticide management. He spoke on the side effects of pesticides and other agrochemicals on the fragile Mauritian wildlife, Cheke (1987a) having suggested that DDT used for malaria control in the 1960s is a contributory factor in the decline of the Mauritian Kestrel. Interestingly, the kestrel feeds largely on the endemic *Phelsuma* geckos (Jones, 1987), which it catches on tree trunks (Fox, Fox & Bailey, 1985).

## RECENT HERPETOFAUNA

The beautiful green Day Geckos of the genus *Phelsuma* are typical Indian Ocean species and have attracted the attention of herpetologists over the years. Four occur on the Mauritian islands and have a complex nomenclatural history. Loveridge (1942) provided a revision of the genus and included the Mascarene forms, *P. newtoni* Boulenger (Rodrigues), *P. inunguis* (Cuvier) (Réunion, Mauritius) and *P. guentheri* (Round Island). A further revision of the genus was provided by Robert Mertens of the Senckenberg Museum, Frankfurt am Main (Mertens, 1962), who included *P. inunguis* under *P. cepediana* (Merrem). Mertens (1963b) then included the earlier described *P. vinsoni* (Mertens, 1963a) and described *P. guimbeaui* n. sp. for Mauritius. Later, Mertens (1966) gave *P. cepediana* and *P. vinsoni* nominated subspecific status in describing *P. cepediana borbonica* and *P. vinsoni inexpectata* for Réunion, and resurrected (Mertens, 1970) *P. ornata ornata* for *P. vinsoni* on Mauritius and *P. ornata inexpectata* for the form on Réunion. A complete run-down of the *Phelsuma* geckos and their distribution (with localities) on the coasts and islands of the Indian Ocean has been provided by Böner (1972).

Reptiles have featured in Mauritian postage stamps and in 1983, two species of *Phelsuma* were used: *P. cepediana* and *P. guimbeaui*.

New reptiles species from Mauritian islands have been described in recent years. The gecko, *Phelsuma agalegae* n. sp., was found on the island of Agalega and described by Cheke (1975), although he subsequently reduced this (Cheke, 1982) to a race of *P. borbonica* (itself raised to full specific status, the nominate occurring on Réunion). The previously mentioned *Nactus*

*coindemirensis* on Gunner's Quoin occurs with *Phelsuma ornata* and the skinks, *Scelotes (Gongylomorphus) bojerii* (Desjardins) and *Cryptoblepharus boutonii*, which are also found on Round Island.

Round Island off the north-west coast of mainland Mauritius has received much attention from conservationists in recent years while the extant herpetofauna has aroused interest amongst herpetologists. A local naturalist, Jean Vinson (formerly Director, Mauritius Institute, Port Louis), worked on the reptiles of Mauritius with his son, Jean-Michel (Vinson & Vinson, 1969). Jean Vinson made nine visits to Round Island between 1948 and 1965 to carry out investigations on the reptiles and insects. Further visits were made by his son between November 1966 and February 1975 which amounted to 477 man-hours, 350 of which were devoted to exploration, and notes were made specifically on the reptile species (Vinson, 1975). Already known on Round Island and well known on the mainland in the early 19th century, the skink, *Scelotes bojerii*, was also rediscovered deep in the Maccabee Forest of mainland Mauritius (Vinson, 1973). *Cryptoblepharus boutonii* is also rare on mainland Mauritius. In his light-hearted account, Gerald Durrell (1977) describes his experiences collecting rare reptiles on Round Island for the purpose of captive-breeding at JWPT. Accounts of their successes with two lizard species: the gecko, *Phelsuma guentheri* (Bloxam & Tonge, 1980), and the skink, *Leiolopisma telfairii* (Bloxam, 1977; Tonge, 1985), have been produced, two in BHS publications. After initial difficulty, there has also been recent success with the bolyerine Round Island Boa, *Casarea dussumieri* (e.g. Tonge, 1986). Detailed investigations on the reptiles of the northern Mauritian islands have also been made in recent years, one during an expedition from Edinburgh University over five weeks in July and August 1975 (Bullock, 1977) and another in 1982 (Bullock & North, 1984), the findings being given provisionally in *Oryx*. Further details of the ecology of the reptiles on Round Island and Gunner's Quoin have been published in *Biological Conservation* (Bullock, 1986). A day was also spent in 1982 looking for reptiles on Isle aux Aigrettes (D.J. Bullock, *in litt.*), a nature reserve off the southern coast of Mauritius, and during a further visit to Mauritius planned for July/August 1989, a revisit to Isle aux Aigrettes is intended with a view to setting up a study of the comparative ecology of the reptiles. We give a complete list and island distribution of Mauritian herpetofauna in Table 1.

TABLE 1. Amphibians and Reptiles of Mauritius (including Rodrigues), living and extinct, and only showing those on the other Mascarene island of Réunion that occur there also.

	MARIITIUS		RODRIGUES	REUNION
	Main island	North islands		
AMPHIBIA				
Bufonidae				
<i>Bufo gutturalis</i>	II			II
<i>Bufo marinus</i>	(I)			
Ranidae				
<i>Rana (= Ptychadena) mascareniensis</i>	II			II
REPTILIA				
Cheloniidae				
<i>Chelonia mydas japonica</i>	+	+ <sup>1</sup>	(+),* <sub>6</sub>	I+P
<i>Eretmochelys imbricata bissa</i>	+	+ <sup>1</sup>	*	+
Dermochelyidae				
<i>Dermochelys coriacea</i>	+			
Trionychidae				
<i>Amyda (= Trionyx) cartilaginea</i>	II			
Pelomedusidae				
<i>Pelusios subniger</i>	I			
Testudinidae				
<i>Asterochelys radiata</i>	I			I
<i>Cylindraspis indica</i>	E	)E <sup>1</sup>		
<i>Cylindraspis inepta</i>	E			
<i>Cylindraspis peltastes</i>			E	
<i>Cylindraspis vosmaeri</i>			E	
<i>Dipsochelys elephantina</i>	I P			I
Gekkonidae				



**MARITTIUS**                      **RODRIGUES REUNION**  
**Main island**   **North islands**

<i>Ebenavia inunguis</i>	II		
<i>Gehyra mutilata</i>	II	II	II
<i>Hemidactylus frenatus</i>	II, ?*	II	II
<i>Hemidactylus mabouia</i> (= <i>mercatorius</i> )	II	I	II
<i>Hemiphyllodactylus typus</i>	II	II	II
<i>Lepidodactylus lugubris</i>		"	
<i>Nactus</i> (= <i>Cyrtodactylus</i> ) <i>serpensinsula</i>	E	* 1 2	
<i>Nactus coindemirensis</i>		* 3	
<i>Phelsuma borbonica agalegae</i>		* 5	
<i>Phelsuma cepediana</i>	*		I
<i>Phelsuma edwardnewtonii</i>		E	
<i>Phelsuma gigas</i>		E	
<i>Phelsuma guimbeau</i>	*		
<i>Phelsuma guentheri</i>	E	* 1	
<i>Phelsuma lineata</i>			I
<i>Phelsuma ornata</i>	*	* 1 3 4	+
Agamidae			
<i>Calotes versicolor</i>	II		II
Scincidae			
<i>Cryptoblepharus boutonii</i>	(+)	* 1 3 4	E
<i>Leiolopisma</i> (= <i>Didosaurus</i> ) <i>mauritiana</i>	E		
<i>Leiolopisma telfairii</i>	E	* 1	E
<i>Scelotes</i> (= <i>Gongylomorphus</i> ) <i>bojerii</i>	(+)	* 1 2 3 4	E
Typhlopidae			
<i>Ramphotyphlops braminus</i>	II		II
<i>Typhlops cariei</i>	E		
Colubridae			
<i>Lycodon aulicus</i>	II		II
Tropidophidae			
<i>Bolyeria multocarinata</i>	E	? + 1	
<i>Casarea dussumieri</i>	E	* 1	
Hydrophiidae			
<i>Pelamis platurus</i>	+		

**Footnotes:**

- <sup>1</sup> Round Island  
<sup>2</sup> Serpent Island  
<sup>3</sup> Gunner's Quoin (Coin de Mire)  
<sup>4</sup> Flat Island  
<sup>5</sup> Agalega (over 1200 km from Rodrigues)  
<sup>6</sup> St. Brandon (over 500 km from Rodrigues)

- \* Present (indigenous)  
+ Indigenous (accidental)  
(+) Indigenous (rare)  
E Extinct  
II Introduced, common  
I Introduced, but rare or localised (P = captive)  
(I) Introduced, but not extant

**Common species:**

While based at Flic en Flac, 14 km from quatre Bornes, on a warm, relatively dry part of the west coast of Mauritius, Lambert saw several species between 20 March and 6 April 1987 that could be regarded as common and which any short-term visitor to Mauritius might expect to see without much difficulty:

*Phelsuma guimbeau*, an indigenous (endemic) species of green Day Gecko. An individual plied the surfaces of the fronds of a palm tree for small insects at 3-4m above the ground in Flic en Flac and was seen emerging in the morning sunshine at about 7.30 on several occasions. The species is characterised by a dark median line in the neck region. It occurs on the western part of the island (Port Louis to Baie du Cap) and several were also seen in Casela Bird Park.

*Phelsuma cepediana*, another indigenous (endemic) green Day Gecko. Characteristically bearing a large red dot between the eyes, occasional individuals of this species, which is widespread over most of the island, but mainly on the east side, were seen on ornamental garden trees

and shrubs. One was seen on a banana tree in a garden in Curepipe (28.iii) and the species is most common in moist, shady areas and enters houses.

*Hemidactylus frenatus*, a small introduced gecko. A sub-adult of probably this species was observed on a low wall around the garden of a house at Tamarin (21.iii) about 5 km along the coast south of Flic en Flac. Others of probably this species (or *H. mabouia* = *mercatorius*) were seen inside buildings at Flic en Flac. This species and other introduced geckos, such as *Gehyra mutilata*, and sometimes the indigenous *Phelsuma cepedianana*, are common in houses. Certain pesticides are used to control geckos in houses, both being used as baits with sugar. One, surprisingly (on account of its low toxicity to mammals – also vertebrates), is K-Othrine (deltamethrin), which is available as a wettable powder formulation in 70 g sachets and is sprinkled around the house at the rate of 15 mg m<sup>-2</sup>; the other is Diptorex (trichlorophon). It is perhaps regrettable that these small geckos commonly found in houses in the tropics are not more greatly appreciated locally as natural insect pest controllers!

*Calotes versicolor*, the Indian Garden Lizard. Several were seen on trees and on wire-mesh fences basking in the morning sunshine, especially after rain during the evening before. A native of southern Asia (India to Java), this small agamid is locally known as “chameleon”. Although introduced earlier, in about 1900, it was deliberately introduced to Mauritius from Réunion in 1914 as a predatory control agent, unsuccessfully, against the Pink Stem Borer of sugar cane (Greathead, 1971). Rustling sounds gave escaping individuals away amongst the fronds of sugar cane when walking along the side of the road between Flic en Flac and the junction with the main Port Louis-Black River coast road (21.iii). Three adults were also to be seen basking on the trunks of bottle palms by the sides of the driveway to the administration buildings of the University of Mauritius at Reduit (26.iii), their bodies directed downwards and the head, neck and fore part of the body held away from the surface. One was found as a road-kill on the 3 km of tarmac road behind the beach between Flic en Flac and Wolmar (30.iii). It feeds mainly on insects and occasionally on small birds. It has also been introduced to the Hawaiian Islands and Sean McKeown of the Fresno Zoological Society (Roeding Park Zoo), California, USA, has reported it to be saurivorous. It could be a problem species in Mauritius for its impact on indigenous lizard species is not known and so a study of its trophic ecology would probably be worthwhile. It occurs in the Isle aux Aigrettes nature reserve.

*Lycodon aulicus*, Indian Wolf Snake. This species has been introduced to Mauritius from southern Asia and is known locally as “couleuvre”. It is found especially where conditions are warm and dry, and a road-kill specimen was collected near Wolmar (30.iii).

*Bufo gutturalis*, Common African Toad. Known locally (and appropriately) as “crapaud”, this species is common at Flic en Flac. Several half-grown and adult individuals were seen on concrete beach paths in the early hours of darkness, especially after heavy afternoon rain, and on the road between Flic en Flac and Wolmar as road-kills, five being counted one morning (30.iii). The species was introduced in 1922 as a predator to control the scarab beetle, *Clemora smithi*, but it feeds little on this pest species (Greathead, 1971). Interestingly, the giant *Bufo marinus* has similarly been introduced to Mauritius as a predator of *C. smithi* with attempts being made on two occasions. In 1938, 80 toads from Puerto Rico were released in eight localities, and in 1950-51, 346 toads were sent from Trinidad by what is now CAB International Institute of Biological Control (CIBC), but only 164 survived to be released and none was recovered. The reason for the lack of success of *B. marinus* is obscure (Greathead, 1971) for it has become often all too easily established in tropical islands elsewhere (e.g. Papua New Guinea, Jamaica).

*Rana (Ptychadena) mascareniensis*, Mascarene Frog. A small 2.5 cm long frog, undoubtedly of this introduced species, jumped upon disturbance from the edge into the water of a pond just outside the neatly kept entrance of the driveway to the Casela Bird Park, near Clarence, some 5 km north of Tamarin. Known locally (and appropriately) as “grenouille” and a native of Madagascar, it is primarily nocturnal and not often seen for it does not occur in such large numbers as the crapaud (*Bufo gutturalis*).

## GIANT TORTOISES IN CAPTIVITY

A number of Giant Tortoises (*Dipsochelys elephantina*) brought from Aldabra Atoll (Seychelles) are kept in collections in Mauritius. Besides the long lily pond in which great pads of *Victoria amazonica* are floating (as in the tropical house at Kew Gardens), the Pamlemousses Botanical Garden (created by the first governor, le Comte de Labourdonnais, around his home of Mon Plaisir between 1735 and 1746) includes an enclosure for Giant Tortoises. Lambert observed males mounting females in May 1981, but the creatures have not bred. About five Giant Tortoises and four Radiated Tortoises (*Astrochelys radiata*) – presumably brought in from Madagascar – are also kept in a large enclosure in the Casela Bird Park. In a small pen separate from the adults within the main enclosure, about twelve juvenile and immature tortoises were being kept. These included *D. elephantina*, suggesting that some breeding had taken place. Small collections of Aldabran Giant Tortoises are also found at Balfour Garden, Beau Bassin (about ten specimens); Robert Edward Hart Garden (ex – Les Salines), Port Louis (about 12 specimens); Le Reduit Ground (about six specimens) and on the small offshore Ile aux Cerfs on the east coast of Mauritius for the benefit of tourists (about six specimens). A few sugar estates also hold small collections e.g. Mon Désert/Mont Tresor and Belle Vue Mauricia. Private people in various parts of the island also have one or two Giant and Radiated Tortoises as pets.

Having observed the conditions in which some of these striking reptiles are being kept in Mauritius, it is appropriate to make suggestions here on how their maintenance could be improved:-

- a. the tortoises should not be kept in paved or concreted areas, as observed at Balfour Garden and Pamlemousses Botanical Garden.
- b. the tortoises should be provided with a variety of food items so that protein and vitamin intake can be increased – the main food item at present is *Euphorbia lactea* – and calcium should be included with the diet.
- c. tortoises in private collections should have dogs, cats and other domestic animals kept away from them, nor should rats be able to come into contact with them, especially in the case of young tortoises. Children should not be allowed to ride or jump on them.
- d. tortoises, especially in private collections, should be allowed access to water for drinking purposes.
- e. to avoid the development of infections, tortoises should not be kept on heaps of sand.

## LA VANILLE CROCODILE FARM

On the road between Nouvelle France and Souillac in the south of Mauritius, just 2 km from the small village of Rivière des Anguilles and approached through fields of sugar cane, there is a small crocodile park. Apart from the main exhibit of captive-bred crocodiles (*Crocodylus niloticus*), there were several amphibia and reptiles, and other vertebrates, on display for the park has an educational function. An enclosure contained several big adult breeding crocodiles, introduced from breeding stock in Madagascar, and others hatchlings of different ages from egg clutches laid in 1980, 1981 and 1983. The other herpetofauna, mainly illustrating those species found in Mauritius, included *Lycodon aulicus*: five snakes in a vivarium with about a dozen eggs being allowed to incubate in a transparent-lidded plastic box kept separately inside the vivarium; *Phelsuma cepedianana* and *P. guimbeaui*: one each in separate vivaria (another green Day Gecko, *P. ornata*, common in lowland parts of Mauritius, especially on the west side, was not on display and is differentiated from the other two species on the main island by a white line above the eyes – all three species are being bred in California, USA, by Sean McKeown at Roeding Park Zoo). *Astrochelys radiata*: about three adults and ten juveniles (indicating breeding success) in a large vivarium; *Chrysemys picta* (from USA): six adults in an extemporised tank; *Calotes versicolor*: four in a vivarium; *Amyda (Trionyx) cartilaginea* (native to China and introduced in 1920 to rivers in Mauritius including River Cascade, Grand River North West, River Moka, Rivière des Creoles, Belle Eau River and Riche Mare River, but is not generally widespread): none in a tank; *Bufo gutturalis*: two in a vivarium, and *Rana mascareniensis*: two 2.5 cm frogs in a vivarium.

## CASELA BIRD PARK

Besides several large aviaries containing some colourful bird species, including the indigenous (and endemic) Mauritian Pink Pigeon, there are a few reptiles also being kept in addition to Giant and Radiated Tortoises. Basking on an artificial rock in the middle of the waders' aviary pond and presumably included to add variety, three Painted Terrapins, *Chrysemys picta*, were to be seen (29.iii). Several brilliantly coloured *Phelsuma guimbeaui* were also seen scuttling about wild, no doubt finding a kind of sanctuary in the bird park. The small geckos were basking and plied the edges of the aviaries containing a range of parrot species and the Pink Pigeons for their prey on insects. Three *Calotes versicolor* shot across the dried-leaf strewn ground upon disturbance and scrambled up the trunks of small ornamental trees in their haste to escape. There is a splendid view from the bird park across the sugar cane fields over to Tamarin Bay in the south-west.

## BLACK RIVER BIRD SANCTUARY

The Black River Breeding Project is organised by the Mauritian Government, the International Council for Bird Preservation and JWPT (Cheke. 1987a). The breeding project is run by Carl Jones at the Forestry Quarters, Black River (on the west of the island) and was started in 1979. Visited by the Duke and Duchess of York while in Mauritius in September 1987, Carl Jones demonstrated the feeding of Mauritian kestrels. Young kestrels depend mainly on green *Phelsuma* geckos as food, and the natural availability of the geckos in undisturbed habitats is probably crucial to this most endangered raptor's survival. Pink Pigeons are also being bred at the sanctuary. Besides birds, Round Islands reptiles, *Leiolopisma telfairii* and *Phelsuma guentheri*, which have been bred successfully by JWPT, are also being maintained as a breeding stock there. The work is partly an outcome of the White Paper on conservation strategy in Mauritius (Ministry of Agriculture, Fisheries and Natural Resources, 1985).

## MAURITIUS INSTITUTE, PORT LOUIS

In the Mauritius Institute at Port Louis, the capital town, there is in addition to a library on the island's literature a small natural history section. Concentrating on marine organisms, there is a stuffed Hawksbill Turtle, *Eretmochelys imbricata*, amongst the specimens on display. There is also a specimen each of the Round Island boas, *Casarea dussumieri* and *Bolyeria aultocarinata*. The best existing skeleton of the giant skink, *Leiolopisma (Didosaurus) mauritiana*, has also been retained in the Institute.

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**Ed. note.** Wahab Owadally has been involved with wildlife conservation in Mauritius for many years. As conservator of Forests since 1969, he has taken a particular interest in the impact of introduced plant and animal species on the island's forests, which include several endemic tree species (Owadally, A.W. (1980). Some forest pests and diseases in Mauritius. *Revue agricole et sucrière de l' Ile Maurice* 59, 76-94). He assisted Gerald Durrell and his team from JWPT in Mauritius, and is a "Ridder" of the Most Excellent Order of the Golden Ark, which he received from HRH Prince Bernhard of the Netherlands, and a recipient of the Peter Scott Award (1984). He was last in the UK in 1984 for an ITV programme "This is your life", which featured Gerald Durrell.

## THE FASCINATION OF HIBERNATION

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I guess that to most herpetologists (certainly those interested in temperate-zone species) winter is a pretty boring time. However, it has gradually dawned on me over the years that some odd things go on during this quiet period of a herptile's life. In particular, I've realised that species differ quite a lot in what they actually do in winter. Here, then, is an account of a few observations I've either made myself or heard about from friends and colleagues; it would be nice to know the reasons for the variations in winter "strategies", but I think many more systematic studies (obviously difficult at this time of year) would be needed to do that.

### AMPHIBIANS

For some years now I have kept several specimens each of the European Green Toad (*Bufo viridis*) and the Natterjack (*B. clamita*), the latter as part of a licensed captive-breeding programme. The Green Toads live throughout the year in a greenhouse, whereas the Natterjacks spend spring and summer in an outdoor vivarium but are put in the greenhouse, with the Green Toads, each autumn for hibernation. A striking difference in overwintering behaviour between these two species (at least, in relation to my specimens – it may be dangerous to generalise!) has become apparent. Both types of toad burrow into a large pile of sand to make their winter retreats; and over several years I have not lost a single specimen of either species during the winter. However, once the Natterjacks "go down" (usually in late October or early November) they are never seen again until mid-late March the following year. This has been an absolute rule – I check the greenhouse, which is bare in winter and easy to search, on a regular basis all year round. Even a very mild winter (like the present one) will not tempt them out before March. The Green Toads could hardly be more different; not only do they come out regularly in mild weather (at night), but even when temperatures are only a degree or two above freezing they can be found under stones etc away from their sand pile. Only in really frosty weather do they disappear completely; on mild January evenings they can be seen prowling around, just like when they are hunting insects in midsummer. Again it's a very general rule – all my Green Toads do it every winter.

Which pattern do other species follow? European Tree Frogs (*Hyla arborea*) also live in the green house, and behave much like the Green Toads. So, it seems, does *Bombina orientalis* (though I am judging on the basis of only a single winter in this case; I was given a pair last autumn). Common Toads, on the other hand, seem to be deep-sleepers in the Natterjack mould. Common Frogs can become active very early, of course, depending on the part of the country in question; even so, I believe they are basically "British" in their wintering behaviour. Certainly in my garden they tend to disappear during the autumn and can be found holed-up deep in compost, or sometimes on the bottom of the ponds. They are very sluggish, and do not emerge to prowl about in mild spells until migration to the breeding ponds gets underway. This is definitely the case with Green Frogs (*Rana esculenta*), which I obtained years ago from the established UK colonies around Newdigate in Surrey; a number of these live wild in, and hibernate in, my garden ponds. They are almost never seen between October and April, unless a sleepy female is dragged out of the bottom mud by an ardent male Common Frog in February or March (This has happened at least once every year in my pools). By this winter behaviour test, these Green Frogs are true Brits!

It would be nice to add something about newts, but I don't have a clear view of what they do on winter. I do know that they never hibernate in my ponds, but like frogs all 4 species in my garden (the 3 natives + Alpines) accumulate in compost heaps in autumn. Also like frogs, the three native newts can start their migrations very early in a mild winter; this time around I had Commons, Palmates and Crested Newts coming in on December 30th though this degree of earliness is very exceptional. Alpines make an interesting comparison; they never come to the ponds before March no matter how mild the winter. My Alpine Newt colony

is now more than 10 years old and the founders were from the Continent, so the “rule” apparent with my anurans (i.e. that British species hibernate more deeply than their European relatives) doesn’t appear to operate on newts – just the opposite in fact!

## REPTILES

My experience with reptiles is much more limited but there seem to be different strategies here, too. For more than 10 years now I have kept British Sand Lizards (*Lacerta agilis*), again as part of a conservation captive-breeding programme, in an outdoor vivarium where they spend the entire year. They breed annually and mortality rates have been very low (almost nil in winter); to hibernate they dig deep burrows into the sandy substrate provided. Adults normally disappear during late August or early September – remarkably early, and irrespective of how warm the weather is. Interestingly, “new” adults put in the enclosure in August always stay up longer—often well into October – showing they don’t need to start hibernating as soon as most choose to do. Like Natterjacks, these Sand Lizards never come out mid-winter; the first males reappear early – mid March in most years, followed by females up to a month later. Contrast this behaviour with the wild colony of Wall Lizards (*Podarcis muralis*) established a few miles away at Shoreham, originating from European specimens more than a decade ago. Geoff and Beth Haslewood live “among” this population, and individuals are seen regularly throughout the winter whenever there is a sunny day; very much the “Green Toad” pattern. However, no clear rule is emerging here: I also have a pair of Green Lizards (*Lacerta viridis*), of European origin, that have lived and hibernated in my greenhouse for several years. These animals are sound hibernators just like the British Sand Lizards.

It would be interesting to know about more reptile species, including snakes. Certainly there is no shortage of anecdotal accounts of Common Lizards and Adders above ground in winter – but are these the exceptions or the rule? And who has ever seen a grass snake out in winter?

## WHAT’S GOING ON?

Although the observations are still rather few, I strongly suspect that at least some of these differences are real and warrant explanation. It could be that British species have adapted not to emerge in mild weather, thus avoiding wasting energy and exposing themselves to predators at a time when food is unlikely to be available; such mild spells are presumably much less frequent in central European winters, so animals there may be unadapted to mildness and “tricked” into coming out in British winters. However, though the above anuran observations fit that idea, it is evidently not a good explanation for the newts or lizards. I’d be interested to hear of other members’ ideas or observations on overwintering by herps.



## HUSBANDRY NOTES ON THE ASIAN RAT SNAKE *GONYOSOMA OXYCEPHALA*

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The reproductive biology of rat snakes is relatively well documented although much of this data deals with the North American forms (e.g. Coote & Riches, 1978). However, there is little detailed information on the Asian rat snakes despite their rather frequent appearance in the pet trade. One Asian species often imported is *Gonyosoma* (= *Elaphe*) *oxycephala*, an arboreal form with a reputation in captivity for being "difficult" particularly when dealing with wild caught adults (Trutnau, 1986). It is found over a wide area in Southeast Asia where it principally inhabits regions with dense vegetation and very high humidity levels and indeed in captivity such conditions are apparently required if reproduction is to take place (Trutnau, 1986). However, whilst reviewing the recent literature on captive husbandry of snakes we were unable to locate any detailed descriptions of egg incubation techniques, or rearing of the hatchlings of this species. In this paper we provide this basic information, which concerns a clutch of eggs deposited by an imported adult.

### OBSERVATIONS

A clutch of seven eggs were deposited by an imported female *Gonyosoma oxycephala* on 18 November 1986. These were placed in vermiculite to which water was added and maintained at a weight ratio of three parts water to one part vermiculite. Temperatures during incubation were kept at 26-30°C. Hatching began on 30 March 1987 continuing over a three day period, thus giving an incubation period of approximately 132 days. This is considerably longer than



Plate 1: Threat posture adopted by juvenile *Gonyosoma oxycephala*

found for North American rat snakes at similar incubation temperatures (eg Coote & Riches, 1978; Meek 1980). Table 1 shows total lengths and weights of the hatchlings and also the dates of the first sloughs.

The animals were housed individually in small plastic containers for ease of feeding. The containers were maintained at around 28°C, however, initially all the snakes refused food (small dead mice 1-7 days old) and were subsequently force fed on one small dead mouse per week, covered in a multivitamin paste (St Aubrey High Calorie Vitamin Concentrate). The mice were offered to the snakes in the afternoon and left in the containers overnight; those snakes which did not eat were force fed the following day. Voluntary feeding first occurred in snakes 6 and 7 on 15 June 1987 but eventually, by August, all were feeding of their own accord on approximately one small mouse per week which was usually consumed during night or late evening. Due to space limitations it was decided to retain only three snakes (numbers 3, 6 and 7 in Table 1) for exhibition purposes, the weights of which on 20 October 1987 are shown in Table 1 indicating an approximate two-fold increase in weight since hatching.

In contrast to adult *G. oxycephala* which can on occasion be somewhat docile, the juveniles were all rather fierce, adopting a threat posture of rearing up and inflating the throat and striking when approached (Plat 1). This behaviour has persisted to an age of seven months.

TABLE 1

Hatchling measurements of *Gonyosoma oxycephala* with secondary weight measurements of three retained snakes.

	Weight at hatching (g)	Weight on 20.10.87	Length at hatching (mm)	Date of first slough
1	19.5		560	12.4.87
2	16.1		510	16.4.87
3	18.8	29.5	565	13.4.87
4	15.6		530	17.4.87
5	18.3		550	12.4.87
6	19.1	31.5	560	13.4.87
7	17.3	37.5	540	14.4.87

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## CAPTIVE BREEDING OF THE BRAZILIAN RAINBOW BOA *EPICRATES CENCHRIA CENCHRIA*

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### AN INTRODUCTION TO THE GROUP

In 1984 I purchased 6 Brazilian Rainbow Boas. Male No. 1 (M.1) and Female No. 1 (F.1) were unrelated to each other and had been captive bred in California in late 1983. Male No. 2 (M.2) and Females 2, 3 and 4 (F.2, F.3, F.4) were bred in June 1984 by a breeder in Florida.

M.1 was probably the least attractive, being brown rather than orange or red. He did, however, have nice markings, the 'eyespot' down his flanks being centred with tangerine.

The four snakes bred in Florida were all a nice shade of orange with grey flanks and strong deep mauve patterning.

The most striking of the six had to be F.1 bred in California (see Fig. 1). Even at this young age she had a nice red colouration, again with strong mauve markings and a beautiful iridescence to her scales.

As they grow older *E.c. cenchria's* colours become richer and more attractive, unlike other members of the family such as *E.c. crassus* and *E.c. maura*. They also grow much larger than these other subspecies, attaining lengths in excess of 2 metres in some cases.



Photo: Chris Mattison

### MAINTENANCE

They were originally housed in 12" x 12" plastic freezer tubs with ventilated sides. Newspaper was used as substrate. A clay pipe for hiding and to assist with sloughing and a small clay

water dish were the only furnishings. The boxes were placed on shelves in a small thermostatically controlled room with the temperature set at 29°C. A light cycle of 16 hrs day/8 hrs night was maintained by means of a 5 ft fluorescent 'Northlight' connected to a timeswitch.

The young boas grew rapidly on a diet of freshly killed rodents. Within six months they had outgrown their boxes and were transferred to their current cages which are contiplas units with sliding glass fronts. Each unit measures 6 ft x 2 ft x 21 ins high. There is a partition splitting each unit into two 3 ft cages. Each snake has a 3 ft section to itself with a hide box at one end. A shelf was fixed above this and a large water bowl provided for drinking and bathing. The substrate was dust free wood shavings.

For heat and light there was a 60w incandescent light bulb fitted to the ceiling of each cage about 6" from the middle partition. There is a low wattage heat pad under the wood shavings below the bulb, giving a hotspot if needed. The cages were designed this way so as to give a temperature gradient, the coolest position being inside the hidebox where it rarely reaches 25°C even on the hottest summer's day. (Although I have no accurate records it seems to hover around the 18°-23°C mark). On the hotspot however it quite often reaches 35°C, and this is hardly ever used by the snakes. In the height of the summer the heat pads are switched off (unless the snake in the cage is gravid).

Needless to say these nocturnal jungle dwellers rarely venture out during the warm daylight hours and can only be seen prowling around their cages in the cool darkness of night. The average night-time low is 22°C and even as youngsters the boas functioned well at these temperatures.

The 16 hr day/8 hr night light cycle was maintained in these permanent cages and it was only changed when the animals were older and being prepared for breeding.

In November 1985 the boas were measured, their approximate lengths being:-

M.1	2 years old 4½ ft
F.1	2 years old 5½ ft
M.2 )	
F.2 )	18 months old 4 ft
F.3 )	
F.4 )	

### PREPARING THE SNAKES FOR BREEDING

Although the snakes had grown considerably in length they still needed to put on quite a bit of weight before they could be bred.

Walsh and Davis (1983) had breeding success with females weighing 1751-2345 grams. Although my animals were not far off the weight of the lightest of their group, they still did not seem to be heavy enough, considering their length. (I had bred Boa Constrictors on three occasions previously and had found that the females had to be carrying a fair amount of fat prior to mating, in order to recover quickly and fully after parturition).

I do not think adult non-breeding snakes should be over fed but in the case of breeding females boas, which may not eat for 6 to 9 months while gravid, as much food as possible needs to be offered while they will eat it. A heavy feeding regime was introduced with a view to breeding the group in the 1986-87 season.

F.1 and M.1 were the main hope of success; they were just that much older and larger than the others, so I concentrated on these two in particular.

Food was offered every 7-10 days and if refused one day a fresh meal was offered the next and the next until something was eaten. F.1 rarely did refuse and in no time at all she was taking large adult rats, sometimes two per meal.

Over the next 12 months F.1 grew another 12 inches in length and when weighed in November 1986 scaled 2700 grams. The others were not weighed but all except F.4 were thought to be heavy enough to breed.

M.1 although nowhere near as big as F.1 had grown large white pelvic spurs. A year before these spurs were hardly visible and indeed M.2's spurs were much smaller than those of his older counterpart. This must be, I thought, a good sign of sexual maturity.

Brunner (1977) and Huff (1977), both working with *Epicrates* spp. found that a period of lower temperatures enhanced the breeding results of their snakes. My own experiences with *Boa Constrictors* showed a short period subjected to lower temperatures worked wonders.

I decided to cool off the group for a period of 6-8 weeks. I did not want to put the snakes through a hibernation, but just to drop the ambient temperature by a few degrees, especially the night-time low.

Firstly I introduced M.1 into F.1's cage and put M.2 in with F.2 and F.3. (F.4 was the lightest of all so she was kept separate and warm and feeding was continued).

I then turned off the heat pads, changed the 60w bulbs for 40w, reversed the light cycle to 8 hrs day/16 hrs night and made the reptile room generally colder by opening vents in the skylights and turning on an extractor fan fitted into an outside wall.

This was all carried out in one go, not as a gradual process. All feeding was stopped, in fact no food had been offered for a few weeks in order to prevent undigested food remaining in the stomachs of the animals during this colder period.

A careful check was kept on the room temperature and on the weather forecasts. If there was likely to be a severe frost or strong winds that night the vents were closed or the extractor turned off.

The cooling period was started on the 14th November 1986 and lasted 52 days in all. In that time the minimum night-time temperature hovered around 18°C. The lowest recorded was 15°C (on several nights). The highest during the day was 26°C with an average nearer to 24°C.

## BREEDING

I decided, on the 4th January 1987, to warm the group up. I closed off the skylight vents and the extractor, replaced the 40w bulbs with 60w and turned on the heatpads. The day/night cycle was reversed back to 16 hrs day/8 hrs night. A room heater was connected to a thermostat in case of very low night temperatures (which indeed did happen shortly afterwards with the 1987 big freeze). This heater was set to keep the room temperature above 20°C.

Within 48 hours the cages were back to pre-cooling temperatures and the snakes gradually became more active. After one week they were offered food. The males refused but all three females ate a small rat each.

No mating activity was suspected until the morning of 14th February when the cage housing M.1 and F.1 was found in disarray. On the 17th February copulation was witnessed between these two snakes and lasted for at least 12 hours, this being the only time mating was actually observed.

M.1 and F.1 were kept together for another week but as no more activity took place M.1 was introduced into the cage containing F.2 and F.3. M.2 was transferred to F.1's cage. No action took place with any of these pairings and after about 10 days the males were put back with their original females.

It wasn't until May that M.2 showed any sexual interest at all in the females. He was seen on the 16th copulating with F.2. For several nights after this the cage was in disarray and as F.3 was also in with them it is possible he had mated both females.

Food had been offered occasionally since the start of mating activity but had been refused by all individuals except F.1. She had eaten a small rat on 17th March. This was to be her only meal for 9 months.

## THE PREGNANCY

It was obvious by mid May that F.1 was gravid. A large egg-mass had started forming in her mid-body region. It felt, and looked as if she had just eaten a large rat. Over the following weeks this swelling deflated somewhat and spread tail-wards.

She was given the run of a 6 ft unit at this time with the choice of several hide boxes. She used two of these boxes during pregnancy. A warm styrofoam box filled with damp sphagnum moss was used most nights and when this became too warm during the day she moved into a cooler box containing dry wood shavings. Both boxes were placed partly over the heat pads. The moist box was that much warmer during the day because it was directly under a light bulb. The temperatures in these boxes ranged from 25-30°C in the cool box to 30-35°C in the warm one.

F.2 was examined on the 10th June and she too appeared gravid. She was separated and given the choice of two hideboxes. F.3 was thought to be gravid around this time but later proved not to be. She seemed to have formed the initial egg mass but this disappeared in time and she recommenced normal feeding.

During gestation F.1 spent more and more time inside the warmer moist box. She became very 'pear shaped' with the adipose tissue along her backbone being absorbed into the developing young. Her scales became extremely distended along her flanks and she became very solid to the touch.

She shed twice during pregnancy, once on the 10th June then again on the 4th August. F.2 shed only once, on the 26th September.

On the 10th August F.1 was found inside the nestbox completely upside down. I have witnessed this with gravid Burmese Pythons (*Python molurus bivittatus*) and have heard accounts of it happening with Childrens Pythons (*Liasis childreni*). Also the Colombian Boa Constrictors I used to breed would sometimes lay on their side as if in some discomfort. This is probably a way of redistributing the weight of the eggs or developing young inside their bodies. F.1 was always a very placid snake but became quite irritable after her second shed. She did not actually strike but hissed a lot when disturbed. She was left in peace as much as possible.

## THE BIRTH AND CARE OF YOUNG

On the 29th September F.1 gave birth to 19 live babies. There were 3 fully formed but dead youngsters and 3 infertile eggs. They were deposited inside the moss filled box at 0700 hrs in the morning. It took her a total of 1 hour 15 minutes from beginning to end. Afterwards she showed no interest in the neonates and crawled into a vacant box.

The birth came 56 days after the last shed which does not corroborate the findings of Walsh and Davis in their 1983 paper. I haven't found the shed to birth gap to be a good indicator of parturition time in live bearing boas. My experiences with *Boa c. constrictor*, *Lichanura t. trivirgata* and now *Epicrates c. cenichria* show that shed to birth times can be vastly different between individuals of the same species.

At birth most of the young were active almost immediately, some were still in their fetal membranes and were placed in plastic tubs filled with damp sphagnum moss. The tubs were placed in the environmental room at a temperature of 29°C.

The only youngster measured was a female I decided to keep for future breeding. She was no bigger than the others and measured 450mm (Fig. 2).

Most of the brood had their mother's colouring of red, although a few looked like the father. Some had the mother's red colouring and the father's beautiful tangerine centered 'eyespot' along the flanks.

During the following 14 days all shed, and all had fed before they were 1 month old. The female did not eat until she had shed again, which was on the 16th October.

As mentioned, F.2 shed on the 26th September. All seemed well with her but unfortunately she passed a large quantity of infertile eggs and one partly formed baby on the 21st October.

She was very thin and wasted after this and is only just beginning to put on weight again, 4 months after the birth.

### CONCLUSION

I feel the reason for the infertile eggs passed by F.2 was that she was too young. Although their growth is very rapid I think it best not to try pairing *E.c. cenchria* until their 3rd or 4th winter.

The males' pelvic spurs seem to be a good guide to their maturity: they became very noticeable on my two when they were between 2½ and 3 years of age. The possible reason for M.2 not showing any interest in mating until May, when M.1 had mated in February, could be that he just was not fully mature and those extra few months made all the difference.

Brazilian Rainbow Boas make ideal captives, they are extremely attractive and seemingly easy to breed, and for the most part are completely non-aggressive.

### ACKNOWLEDGEMENTS

The author wishes to thank Chris Mattison for his excellent photographs which accompany this article.

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## THE CITES CONSERVATION CIRCUS

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The convention on international trade in endangered species of wild fauna and flora (CITES) has noble aims: to help save species endangered by international trade through the recognition that success demands not only cutting off the supply by clamping down on poachers, but also limiting the demand by making imports illegal in consumer countries. At biennial meetings, representatives from more than 95 countries can list species on the appendices to the convention. Listing establishes either a virtually total prohibition on export and import (appendix I) or a monitoring of trade by a permitting system (appendix II). Unfortunately, decisions taken at the most recent CITES meeting in Ottawa last July are not encouraging.

There are a great many endangered species, but not all of them are endangered by trade. According to criteria adopted at Berne in 1976 for placing species in the appendices, both the biological status and the extent to which the species is threatened by trade must be taken into account. Information provided should preferably include scientific reports on population size and range, or at least some indication of the potential causes of extinction. On the trade side, requirements depend on which appendix the species is being listed. Even for appendix II listing (monitoring), evidence that actual or potential trade constitutes a threat to survival is needed.

There are obvious reasons for limiting a convention on trade to species endangered by trade. Even this is a huge task: so many different countries, animals and plants are involved; there is a danger of re-export of products in different forms; and the problem of distinguishing endangered species from others that may look similar. To achieve its aims, CITES must be practical and credible. If it becomes too complex it will be unenforceable, and if it seeks to stop trade in animals that are not endangered by trade it may lose support.

The case of the poison-arrow frogs of the genus *Dendrobates* illustrates the problems. These animals are small, generally brightly coloured amphibians found in tropical central and South America. Most species have probably not been used by Indians for poisoning arrows, although they do contain toxins. There are about 50 species in the genus, some arboreal and hard to study despite being conspicuous.

At the most recent CITES meeting, the representative from Surinam proposed that the whole *Dendrobates* genus be placed in appendix II. Few population data exist, nor is there any evidence that *Dendrobates* spp. are in danger of extinction. There is some demand in Europe and elsewhere for these colourful frogs to adorn terraria, but there is no evidence that this trade is affecting wild populations. *Dendrobates* are quite easy to breed in captivity and some of the pets in Europe come from such stocks.

Not only did the proposal to list *Dendrobates* on appendix II fail to meet the Berne criteria, but other information presented at the meeting strongly indicated that these frogs should not be listed. This information was compiled by the IUCN Trade Specialist Group and was based largely on the work of Charles Myers (American Museum of Natural History), one of the few people to have studied poison-arrow frogs extensively in the wild. Among the cogent points are: (1) the species appearing most often in trade are mainly those with the largest ranges, and are often among the most abundant vertebrates in their habitats; (2) apparent small ranges for some species may simply be the result of inadequate study of other areas; (3) there is no evidence that these frogs are dependent on primary forest – they occur in mixed second growth and in banana plantations, for example; and (4) collection of large numbers of frogs does not seem to depress local populations. Sometimes they seem even more abundant after collection. Amie Brautigam, compiler of the IUCN report, notes that “Myers reports



that during a 4-year study on *D. histrionicus* during which he collected 7,600 specimens from one population for scientific purposes, the population actually increased rather than decreased". Taken together, there is no evidence that *Dendrobates* are endangered at present by trade – or by anything else. Yet the proposal from Surinam to put them on appendix II was passed, largely with the support of the South American countries who may have voted more in a spirit of regional solidarity than on the basis of scientific evidence.

The listing of such species may seem like a victory or at least a symbolic gesture for conservation, but is it really helpful or is it counterproductive? Burdening administrators and customs agents might distract effort from species that are incontestably being threatened by trade. Indiscriminate listing of species and regional block voting, especially in the scientific committee, could turn CITES into a circus for political exhibitionism. Endangered species deserve the best science, not political posturing. Accepting flawed proposals actually discourages the research into the predicament of a species and the field investigations that should precede an adequate proposal. The poison-arrow frogs are only one example of the listing of species on the appendices without scientific justification. At its best, CITES is a splendid example of cooperation between rich and poor countries, but if it does not place the utmost importance on scientific considerations, it may survive for even less time than some of the species that need its help.

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## CONSERVING SEA TURTLES

by Nicholas Mrosovsky

*Published by the British Herpetological Society*

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## Program Announcement

# FIRST WORLD CONGRESS OF HERPETOLOGY Canterbury, United Kingdom - 11-19 September 1989

THE CONGRESS will be held at University of Kent and in Canterbury. H.R.H. Prince Philip, President of the World Wildlife Fund, will serve as Patron of our Congress and Professor Angus d'A. Bellairs as Honorary President. The Congress will also serve as the official 1989 meetings of Societas Europaea Herpetologica, Herpetologists' League, and Society for the Study of Amphibians and Reptiles. It will be co-hosted by the Zoological Society of London, Fauna and Flora Preservation Society, Societas Europaea Herpetologica, and the British Herpetological Society.

The Scientific Program, subject to modification is listed below. Plenary speakers and Convenors are now being invited. *Persons who wish to participate in events should contact the Convenors*, whose names and addresses may be obtained from the Secretariat (see below). There will be poster sessions open to all persons but no oral contributed papers. All presentations will be in English, but discussions can be in other languages.

### PLENARY LECTURES

THE STATE OF HERPETOLOGY - EVOLUTION AND ECOLOGY OF PARTHENOGENESIS - BIOGEOGRAPHY OF SOUTH AMERICA - INTERNATIONAL CONSERVATION - SEXUAL SELECTION - SYSTEMATICS AND PHYLOGENY - PALEOHERPETOLOGY - ECOLOGICAL PHYSIOLOGY - COMMUNITY ECOLOGY - BIOLOGY OF SALAMANDERS

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- |   |   |
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- |   |   |
|---|---|
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#### Ecology

- |   |   |
|---|---|
| S.8. LONG-TERM STUDIES                    | S.12. HERPETOFAUNAS: EXPLORATIONS & STUDIES |
| S.9. SNAKE ECOLOGY AND BEHAVIOR           | R.5. THE ECOLOGY OF THE TUATARA             |
| S.10. ADAPTATIONS TO EXTREME ENVIRONMENTS | W.1. SKELETOCHRONOLOGY                      |
| S.11. AMPHIBIAN COMMUNITY ECOLOGY         | W.2. FIELD METHODS AND BIOTELEMETRY         |

#### Evolution

- |  |   |
|--|---|
| S.13. EVOLUTION AND PHYLOGENY OF FROGS | S.16. ISLAND HERPETOFAUNAS                  |
| S.14. ORIGIN OF AMPHIBIA AND REPTILIA  | S.17. LIFE HISTORY EVOLUTION OF TURTLES     |
| S.15. PALEOHERPETOLOGY                 | R.6. BIOGEOGRAPHIC REVIEW OF THE CONTINENTS |
|  | R.7. CAECILIAN BIOLOGY AND EVOLUTION        |

#### Systematics and Genetics

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|--|--|
| S.18. MOLECULAR SYSTEMATICS              | S.22. BIOLOGY AND GENETICS OF PIPIDAE        |
| S.19. CYTOGENETICS                       | R.8. PHYLOGENY AND CLASSIFICATION OF LIZARDS |
| S.20. PARTHENOGENESIS AND HYBRIDOGENESIS | W.3. MOLECULAR TECHNIQUES                    |
| S.21. SYSTEMATICS AND PHYLOGENY          | W.4. AMPHIBIAN LARVAE                        |
|  | W.5. PHYLOGENETIC ANALYSIS                   |

#### Physiology and Development

- |                             |                               |
|-----------------------------|-------------------------------|
| S.23. ENERGETICS            | S.25. FUNCTIONAL MORPHOLOGY   |
| S.24. ECOLOGICAL PHYSIOLOGY | S.26. REPRODUCTIVE PHYSIOLOGY |
|                             | S.27. DEVELOPMENTAL PROCESSES |

#### General Topics

- |  |  |
|--|--|
| R.9. FIELD RESEARCH & NATIONAL REGULATIONS | R.11. MEDICAL AND RESEARCH ASPECTS OF VENOMS |
| R.10. AMATEUR CONTRIBUTIONS TO HERPETOLOGY | W.6. PHOTOGRAPHIC TECHNIQUES                 |

**EXCURSIONS:** Pre- and post-Congress trips are planned to Europe, Russia, the Mediterranean, Belize, Honduras, the Amazon, Ecuador, various sites in Africa, Indian Ocean, Malaysia, China and Australia, each led by professional herpetologists. Day or half-day trips to Darwin's home, London, Cambridge, Oxford and Paris are also planned.

**FIRST CIRCULAR:** The complete program and full details of excursions, including prices, are given in the First Circular, available from the Secretariat. This includes a Provisional Registration Form. Registration begins January 1988; £90 fee covers abstract book and program, refreshments, and costs of hiring meeting rooms and equipment. *Advance registration is strongly encouraged* for planning purposes and to insure that you receive all other announcements promptly.

**SECRETARIAT:** Address all inquiries to: First World Congress of Herpetology, Ecology Research Group, Rutherford College, University of Kent, Canterbury, Kent CT2 7NY, U.K. *Telephone: (0277) 76400, ext. 3501. Telex: 965449.*

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