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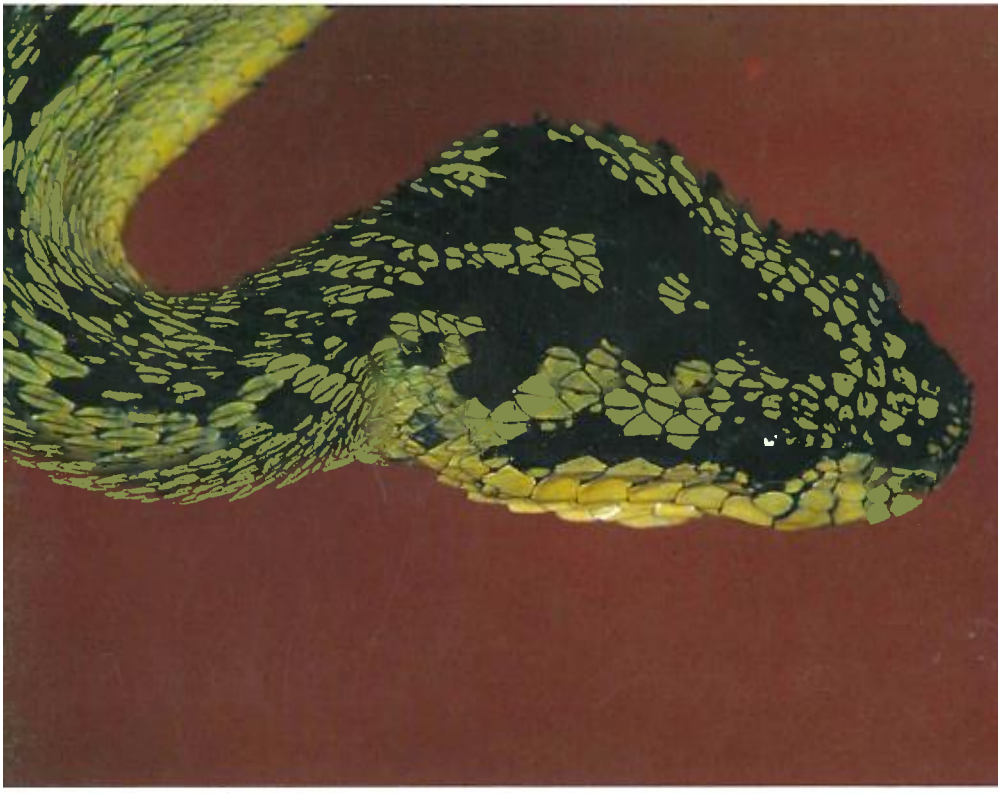
THE BRITISH HERPETOLOGICAL SOCIETY

BULLETIN



No. 32
Summer 1990

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 Herpetological Journal and British Herpetological Society Bulletin 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.

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.

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

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

FRONT COVER
Sedge Viper *(Atheris nitschei).*
See article "Notes on the genus *Atheris* (Family: Viperidae)" by Catharine Pook, on page 31.
Photo by J. Coote.

LONDON MEETINGS 1990

Meetings are held either in the Lecture Theatre of the Linnean Society of London, Burlington House, Piccadilly, London W1 (*), or in the Lecture Theatre of the Zoo Studies Centre, Zoological Society of London, Prince Albert Road (opposite Ormonde Terrace), London NW1 (**), and start at 7.00 pm, ending at 9.00 pm, unless indicated otherwise.

Please note that the June London meeting is to be held on Tuesday, 12th June, not 10th June, as previously published in the Winter 1989 Bulletin.

July 25th*	*Amphibia and Reptilia 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.
September 2nd**	*Care and breeding of amphibians and reptiles: an open meeting.* Contributions from members – live animals and photographic displays. There will be the opportunity for the sale and exchange of members private home-bred stock. A Saturday Afternoon meeting from 2.00 to 5.30.
October 10th*	Mr Mark O'Shea (Wolverhampton): Reptiles, especially snakes, of Papua New Guinea.
November 13th*	Mr J. Denton (Sussex University). Terrestrial ecology of the Natterjack Toad.

JOURNAL EDITOR'S REPORT, 1989

GENERAL MATTERS

No particular problems arose during the year. Volume 1 Numbers 8 and 9 contained a total of 1 review article, 14 full papers, 3 short notes and 8 book reviews – 108 printed pages, almost exactly the same as 1988 (107 printed pages). Book reviews in particular increased during 1989, a trend I hope to maintain. Forum, on the other hand, has been disappointing; doesn't anyone want to say something controversial?

Members may have noticed the disproportionate sizes of numbers 8 and 9; this was a deliberate policy with a view to producing a "bumper edition" just prior to the First World Congress of Herpetology. A substantial number of Journal back-issues were sold to participants at the Canterbury Congress.

COSTS

Total production costs for the two 1989 editions came to about £4,400, a small increase over 1988 (about 5%, less than general inflation). Institutional membership remained at about 150 and reprint + advertising charges brought in £286; taken together these sources of revenue accounted for about £3,650 leaving the Society with a net bill (excluding postage) of around £750. It is therefore the case that membership contributions to Journal production have crept up a bit over the past few years, though the total is still small compared with overall BHS income. I will nevertheless attempt to ensure that this trend does not continue.

PAPERS SUBMITTED

31 papers were received in 1989, exactly the same total as in 1988. Of these, 23 (74%) have been or probably soon will be accepted for publication. UK submissions continued the upward trend of 1988 (15 out of the 31 were from the UK in 1989).

Thanks for very efficient refereeing go this year to:

Prof A.Ar, Dr. P. Arntzen, Dr. R. Avery, Mr. B. Banks, Dr. R. Beattie, Prof. A d'A. Bellairs, Dr. B. Clarke, Prof. J. Cloudsley-Thompson, Dr. A. Cooke, Dr. J. Davenport. Dr. D. Deeming, Dr. R. Griffiths, Dr. A. Hailey, Dr. M. Lambert, Dr. C. McCarthy, Mr. R. Meek, Dr. C.

Reading, Dr. I. Spellerberg, Dr. H. Strijbosch, Mr. E. Wade, Prof. Y.L. Werner, & Dr. D. Yalden.

Trevor Beebee - March 1990

CONSERVATION COMMITTEE LEAFLETS

The Committee now has stocks of the following (cost price) leaflets.

Garden Ponds as Amphibian Sanctuaries	(12p)
Surveying for Amphibians	(20p)
Save our Reptiles	(40p)

Every BHS member (including Junior Herps) is entitled on request to one copy of each, but please send s.a.e. (not less than 25 x 18cm) for postal delivery. Larger quantities can be had at cost price plus postage. Requests to BHSCC, 28 Old Fort Road, Shoreham-by-Sea, Sussex BN43 5RJ.

MEETING ON SMOOTH SNAKES

A meeting on the biology and conservation of *Coronella austriaca* (Smooth Snake) and *Coronella girondica* (Southern Smooth Snake) is to be held at the University of Southampton from 12th-14th September 1990.

I am compiling a short paper on the possible role of disease in these two species. While primarily concerned with infectious and parasitic disease I am also interested in physical injuries, nutritional/metabolic disorders and developmental abnormalities.

I am writing to ask if you have any records to which I might refer or perhaps even pathological or fixed "normal" material from snakes which could be examined. Full acknowledgement will of course be given.

I apologise for troubling you over this but should be most grateful for any help or advice.

JOHN E. COOPER, FRCVS
The Royal College of Surgeons of England
35-43 Lincoln's Inn Fields, London WC2A 3PN

ANYONE IN THE MIDLANDS INTERESTED IN NATTERJACK TOADS?

Natterjacks were introduced to a sand quarry pool on Cannock Chase about 10 years ago. We know that the toads survived and bred, and were present as recently as 1989, but the site is poorly monitored because no Conservation Committee members live in the area. We (desperately!) need someone interested and willing to monitor this site for us, to see just how successful this introduction has been. Anyone interested should contact Trevor Beebee (434, Falmer Road, Woodingdean, Brighton; 0273-305634, evenings and weekends only) for further details.

DENDROBATID GROUP

A group of dendrobatid breeders has been established in Britain in order to maintain viable captive populations. If you are a committed dendrobatid keeper and breeder please write to: Prof. Malcolm Peaker, Hannah Research Institute, Ayr KA6 5HL, enclosing s.a.e.

SNAKEBITE

SAUL HALPERN

17 Kidbrook Park Road, Blackheath, London, SE3

This article is intended as a general overview of snakebites, as presented in my lecture at the B.H.S. 1989 AGM.

Snakebite is largely a problem of the rural tropics. It is difficult to estimate the full scale of bites and deaths worldwide, but epidemiological studies are certainly interesting. In Surinam, the incidence of bites was found to be 45:100,000 in urban areas and 600:100,000 in rural areas. A similar figure was found in rural parts of Nigeria where snake-bite victims can occupy 10% of hospital beds. A study of the rural Waorani tribe in Equador showed that 78% of the population had venom antibodies, indicating having been bitten at some time, and that 4.9% of deaths were attributable to snakebites.

What makes a snake dangerous? One criterion is the toxicity of its venom. Secondly, the population densities of snakes and men in any area, and thereby the extent of snake:human contact, and thirdly, the habits and temperament of the species must be considered. A snake that tends to be readily flightable, reclusive or disinclined to bite, albeit potentially lethal, is less of a problem than another that holds its ground, relies on camouflage and is aggressive by nature. The World Health Organisation has advocated five species as "medically important". These are:–

Echis carinatus (Carpet Viper) – Africa & Asia.
Vipera russelli (Russell's Viper) – Asia.
Bothrops atrox (Fer-de-lance) – Central & South America.
Bitis arietans (Puff Adder) – Africa.
Calloselesma rhodostoma (Malayan pit viper) – South East Asia.

PLATE 1. *Echis carinatus* bite.

In addition, cobra bites are not uncommon in parts of Africa & Asia, and kraits may cause significant morbidity and mortality in parts of Asia. (77% mortality in a survey of 35 cases of *Bungarus caeruleus* bites in India).

The species that is probably responsible for the greatest number of bites worldwide is *Echis carinatus* throughout its large range across Africa & Asia and variable sub-types and morphs.

The pathological effects of snake venom can be generalised by family. Elapid venom is mainly neurotoxic (acting on nerves), viperid venom is vasculo or haemotoxic (acting on blood vessels) and sea snake venom is myotoxic (acting on muscle). There are exceptions to these rules. For example, *Naja nigricollis* (Black-necked Spitting Cobra) venom has no neurotoxic effects, whereas *Crotalus durrissus terrificus* (Tropical Rattlesnake) and *Bitis atropos* (Night Adder) venoms are primarily neurotoxic. Some Australian elapid venoms are haemotoxic or myotoxic. Venom contains many components which together produce a clinical picture of local features (at the site of

bite) and systemic features (indicating widespread envenomation). Elapid venoms consist of small protein molecules which are absorbed into venous blood and spread into the body more rapidly than the larger proteins of viperid venom which tend to be absorbed via the lymphatic drainage. Human victims of snakebites do not collapse and die in minutes as some may believe. In fact, at least 50% of bites from potentially lethal species result in little or no envenomation. Fatal bites from elapids may lead to death in 5–20 hours, sea snakes in about 15 hours and vipers in 48 hours or longer.

Viper bites can produce local pain and swelling within minutes which may continue to increase with bruising and blistering for two to three days. This may either slowly resolve completely or leave local necrosis and gangrene. Systemic features include spontaneous bleeding and haemorrhage caused firstly by leakage from damaged blood vessels and secondly by non-clotting blood due to a deranged clotting mechanism. Death may be secondary to shock (loss of circulating fluid and low blood pressure) or haemorrhage into vital organs. Haemorrhage into the pituitary gland has been recognised following Russell's Viper bite and leads to long-term morbidity from impaired control of the endocrine system. *Vipera berus* (European Adder) and *Bitis arietans* (Puff Adder) bites cause marked pain and swelling with limited systemic features, whereas systemic features are predominant in *Echis carinatus* (Carpet Viper) bites. Local and systemic features are variable with *Vipera russelli* and in addition conjunctival oedema and renal (kidney) failure are noted in Burma and rhabdo-myolysis (muscle breakdown) in Sri Lanka.

Gangrene can also occur with some elapid bites but local features are generally less than those of vipers. The appalling gangrene that often follows *Naja nigricollis* bites, is mostly a result of direct cytotoxicity (killing of cells), whereas that following viper bite is mainly secondary to local vessel damage. Neurotoxicity can present within 15 minutes of an elapid bite with weakness of the eyelids and throat muscles. This may extend to affect the respiratory musculature causing death from suffocation. The mechanism of poisoning is blockage of impulse transmission at the nerve-muscle junction caused by the venom toxin reversibly combining with the normal receptor but not inducing transmission. Krait bites, e.g. *Bungarus candidus*, have minimal local effects but may cause extensive paralysis and thus a high mortality rate.

Sea snakes are not common biters, usually only attacking fishermen when trapped in nets or tipped on board, but are worth mentioning as they represent the third venom type. A bite can cause some swelling but generalised muscle pain and stiffness occurs as muscle cells are destroyed (rhabdomyolysis). The consequential release of potassium ions may lead to cardiac arrest or arrhythmia and death.

PLATE 2. Bleeding gums: a systemic effect from the bite of *Echis carinatus*.

Recommended first aid should employ the use of a compressive bandage rather than tourniquet, and to immobilise the bitten limb. The aim being to reduce the superficial venous flow and slow down absorption of venom without compromising the arterial supply. The wound should not be incised. Reassurance is obviously important in a frightened patient. The victim should be dispatched to hospital as soon as possible, preferably with the corpse of the offending snake for positive identification. Assessment in hospital for signs of systemic envenoming will decide when and if anti-venom (if available) is required. General supportive measures may also be required such as intravenous fluids for shock or artificial ventilation for respiratory paralysis. Further medical or surgical treatment may be needed in the recovery stage to prevent or treat infected wounds or debride necrotic tissue prior to healing by granulation or skin grafting.

ACKNOWLEDGEMENTS

I am grateful to Dr. R.D.G. Theakston of W.H.O. Collaborative Centre for Anti-venoms, Liverpool School of Tropical Medicine, for advice and use of slides for my lecture.

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THE THREATENED EGYPTIAN TORTOISE *(TESTUDO KLEINMANNI)*: PROPOSAL FOR A RESERVE AT HOLOT AGUR (WESTERN NEGEV, ISRAEL)

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SUMMARY OF A TALK GIVEN TO THE BHS ON APRIL 19th 1990

The Egyptian tortoise *(Testudo kleinmanni)* is a small terrestrial form which is found over a very limited range, from east Libya through northern Egypt and Sinai up to the northern Negev in Israel (Flower, 1933; Iverson, 1986; Loveridge & Williams, 1957; Lortet, 1887). It is the smallest of the Mediterranean species and is in danger of extinction throughout its range, mainly because of commercial collecting in Egypt and habitat destruction in Israel (Buskirk, 1985; Mendelssohn, 1982). The main aim of the study was to obtain knowledge on distribution of the Egyptian tortoise in Israel, its spatial organization, activity pattern, population dynamics, feeding habits and reproduction, in order that necessary measures may be taken to ensure its continued survival (Geffen & Mendelssohn, 1988, 1989).

In Israel the distribution of the Egyptian tortoise is limited to sandy areas and dunes in the western Negev and to two isolated sandy valleys (Mishor Yamin and Mishor Rotem) (Fig. 1). These areas have an average yearly air temperature of 20°C, with a mean maximum of 30°C and a mean minimum of 12°C. Precipitation range is 50-200 mm annually and falls between October and March. This area is part of the Saharo-Arabian region, but milder climatic conditions occur towards the Mediterranean coast. The *Artemisia monosperma* plant association constitutes the main vegetation.

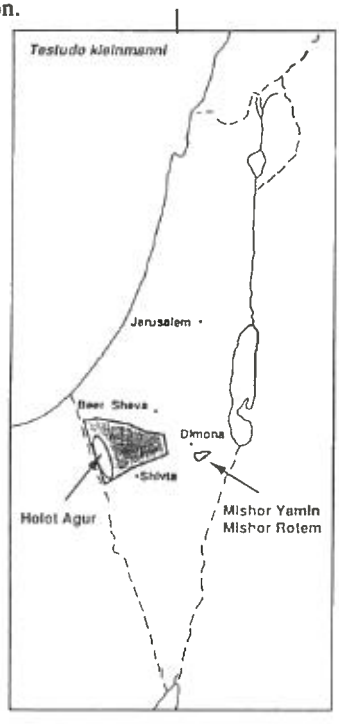

Fig. 1: Distribution map of the Egyptian tortoise in Israel. Stippled areas represent locations where individuals were observed.

Nine Egyptian tortoises were fitted with radio-transmitters and fixes from these individuals were collected 2-3 times daily. Egyptian tortoises have a well defined home range whose size varies connsiderably between individuals and sexes. Average home range size of males was 34.9 ha and of females 15.7 ha, but these were not significantly different. No correlation was found between body size or weight and size of home range. Home ranges overlapped considerably. Tortoises visited most parts of their home range during the year, but each used a much smaller area in its home range intensively. A large proportion of the home range was visited during winter and spring while in summer a very small area was used. A similar pattern was apparent in daily travel distances during the year, with largest distances travelled during winter and the shortest during summer. The daily distances travelled by males and females were significantly different; on average males travelled larger distances than females (Geffen & Mendelssohn, 1988).

Active individuals were observed mainly during winter and spring, while in summer activity was recorded only on a few occasions. Unimodal activity was observed during midwinter (December-February), and changed to a bimodal pattern towards the spring (March-April). During summer the tortoises were rarely active and only for short periods early in the morning. Active individuals at night were never observed. Most active tortoises were found at air temperatures of 21-24°C, but in much wider range of surface temperatures. Body temperature of most active individuals was within 28-32°C. In active tortoises, the correlations between air or surface temperatures and body temperatures were significant. Inactive tortoises were found all year round even under optimal activity conditions during winter and spring, when they were usually located under bushes. In summer, the tortoises were mainly found in rodent burrows. During summer, all tortoises in burrows were located at a mean distance (± SD) of 43.8±22.5 cm from the entrance and at mean depth (± SD) of 18.4±7.1 cm from the surface. Mean burrow diameter (± SD) was 10.0±9 cm. The mean burrow temperature during summer was 29.5°C±3.2. Burrow temperature and the body temperature of the occupying tortoise were significantly correlated (Geffen & Mendelssohn, 1989).

The population of tortoises in the study area consisted of 58.2% males, 26.8% females and 14.9% juveniles. Body length and weight distributions showed two main groups, one of males and the other mainly of females. The observed male female ratio was 2:1. The density of tortoises in the study area was estimated as 27 km^{-2}.

The main food of the Egyptian tortoise is annual vegetation; a few perennials are also eaten. Food items included leaves, stems and flowers. Feeding took place mainly during winter and spring (Geffen, 1985).

Mating was observed during March. Eggs were observed in the oviduct of females between March and June. Each female laid two to three clutches annually, each containing one to three eggs (usually two). The internesting period was between 20 and 30 days. Significant correlation was found between female body size and the width of eggs she was carrying. Nests were located under bushes in a shady spot. The eggs were buried 2-4 cm below the surface. The range of temperature in the nest during the incubation was 24.3-38.2°C. The water content of the sand around the eggs was low. In one nest two juveniles hatched after 70-90 days (Geffen & Mendelssohn, 1990). This type of reproduction is similar to other small and highly specialized tortoises.

The Egyptian tortoise is highly specialized for living in arid, sandy regions. Its main adaptations are small body size and ability to aestivate during the dry and hot season. Small body size not only enables this species to reach optimal body temperature rapidly during the winter (while food plants are abundant), but also allows the species to utilize available rodent burrows, thus saving energy that otherwise would have to be invested in digging its own burrows. Feeding during winter and spring has the advantage that tortoises can feed on nutritious and succulent plants, which are not available during the summer. This strategy facilitates sufficient storage of fat and water to allow aestivation through the summer, when food and water are scarce. Rodent burrows are not only the coolest place available during midday in summer, but also maintain a relatively high and stable level of humidity. This is possibly the reason why most tortoises aestivate in burrows. It appears that the drying up of the annual vegetation and the increase in ambient temperature in late spring are the main triggers for aestivation in the Egyptian tortoise.

The Egyptian tortoise in Israel, although legally protected, is threatened by habitat destruction resulting from agriculture, overgrazing and army manoeuvres. Ravens proved to be an effective predator of the Egyptian tortoise (Mendelssohn, 1982). Ravens cannot breed in a flat and treeless habitat; however, human settlements with buildings allow various predators, such as ravens, to breed in the sandy areas. Change in the status of Holot Agur (western Negev desert) from a restricted military zone to a nature reserve or a national park has been suggested. At present, this area is undisturbed due to its proximity to the Egyptian border but future plans for settlements are already in process. It is essential to make every effort to conserve this site, which is the only known location in the entire Egyptian tortoise range where a relatively dense population still occurs. Destruction of Holot Agur would probably contribute to the species' eventual extinction.

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CONSERVATION MATTERS. A REVIEW OF HERP CONSERVATION ISSUES IN THE NEWS DURING THE PERIOD SEPTEMBER TO DECEMBER 1989

BRIAN BANKS

30 Frenches Farm Drive, The Ridgeway, Heathfield, East Sussex TN21 8BW

CUMBRIAN NATTERJACK DISASTER WITH A SILVER LINING

In the BHS Bulletin Number 11 (March 1985) I reported some hopeful developments at an important Natterjack Toad colony in Cumbria. The toads were living on a disused ironworks in Millom, where, due to ideal conditions, there was a population of several thousand adults. At that time the population had been threatened with a proposal to tidy up the site, plant trees on the open grassland and create a picnic area, but this plan had fallen through, and the NCC were about to schedule the site as a Site of Special Scientific Interest. It was hoped that this would ensure the protection of the toads.

We were horrified in September this year to discover that the local Borough Council (Copeland) and Cumbria County Council were planning to build factory units on part of the terrestrial habitat. Worse still it was proposed to have an access road around the southern half of the main breeding pond, with scrub planted nearby. Anybody acquainted with Natterjacks will know that this species requires open habitats, and that roads and toads do not mix. Matters got worse at the end of the month when, after inadequate consultation, planning permission was granted for the development, and the bull-dozers immediately started operating on the site.

Fortunately conservation committee member Jonathen Denton was able to visit the site to determine which were the most important areas of terrestrial habitat for the Natterjacks. One of these was a small slag bank, the base of which was surrounded by many pieces of broken slag and other debris amongst which large numbers of toads were living. This data enabled strenuous objections from the BHS and the NCC to be made and a site meeting was arranged to discuss the future of the site. By this time it had been agreed that the pond would not be disturbed, and that no scrub would be planted, but the road was still planned, and worse still the work was to involve the removal of the important slag feature. A similar area had already been obliterated and it seemed likely that large numbers of Natterjacks had already been killed. It was therefore of paramount importance to prevent any-more carnage.

It was agreed that the conservation lobby would draw up a plan which would enable the development to proceed, with modifications built in to ensure that as large a population of Natterjacks could survive on the site once the development was completed. It was suggested that the factory units should occupy a smaller area, avoiding the important small slag bank, and that a toad-proof barrier be constructed around the site to prevent any unnecesary road mortality on the road. Finally we proposed that the remaining area of habitat should be designated as a local nature reserve. To their credit the NCC's north-west region worked hard to persuade the Council's to change their plans. At first there were even more worrying proposals about a phase II development taking up more terrestrial habitat, and one of the spawning ponds. At the moment though it appears that the NCC and BHS ojections have succeeded. The phase II development has apparently been abandoned, and a toad barrier will surround the factory unit area. The proposals to designate the rest of the ironworks as a local nature reserve are being considered at present and hopefully the result of this will be known in time for the next Bulletin. If this should happen it will be a most important development as the grasslands, and the pond for that matter, are in urgent need of management to prevent them becoming over-grown with scrub. With luck the surviving Natterjacks should enable a large population to be re-established on the ironworks.

A pair of Natterjacks from the last colony in Southern England, photographed by BHS member George McCarthy. This photograph is now available for sale as a postcard to raise money for the British Herpetofauna Conservation Appeal, price 15p each, plus a stamp for return by post, from B. Banks (address on inside back cover of the Bulletin).

The base of the large slagbank was the home to large numbers of Natterjacks days before the development started. (Photograph Dr. A.S. Cooke).

MORE SPECIES PROTECTION IN DORSET

The NCC and the BHS have won the first round of a conservation battle in Dorset by using the Wildlife and Countryside Act in a way that had not previously been tested. The issue was over a Sand Lizard hibernation bank on a bridleway just outside of the Corfe Mullen SSSI where a consortium of developers have an old planning permission to extract minerals. Their main problem is that there is no access road to the site and recent planning applications for one have been turned down. On 25th of November they were discovered to be bulldozing an old bridleway with the intention of turning it into an access track, and this would have obliterated a heathery knoll which was found to be full of Sand Lizard hibernation burrows. What followed next was an excellent case of co-operation between BHS and NCC. Our species protection officer, Doug Mills, and his wife Liz taped off the knoll and after informing the bull-dozer driver of the protected status of the lizards sat behind the tape. This proved to be essential as the driver had been told to continue with the work and the owner would pay the fines. The knoll was occupied for 2½ days by the Mill's, who showed extraordinary dedication, turning up at 6.30 am and staying until 10.00 pm.

Meanwhile the NCC first contacted the local planning authority who confirmed that planning permission was required and that this had not been granted. To ensure that the site was given the maximum amount of protection the NCC applied for a section 29 order from the Department of the Environment preventing the owner from doing anything further with the land. This is one of the most powerful protective measures under the Wildlife and Countryside Act and it is only rarely used when a feature of national importance is threatened. This particular situation is noteworthy because it is the first time that such an order has been granted outside of an SSSI. The order will last 9 months, although it can be renewed, and is intended to allow NCC to try to reach a satisfactory compromise with the owner enabling the site to be protected.

THE LEGACY OF THE LONG DRY SUMMER OF 1989

The exceptionally dry weather last year has predictably had an unfortunate out-come on many of our heathland rare reptile sites. While there were few fires on the few remaining Surrey sites there was a much publicised massive fire on the New Forest which burnt a large area of mature dry heather. The area has not been surveyed in recent years but it is possible that Smooth Snakes were present on the site. In Dorset, however, there were a number of fires which occurred on some well known reptile sites. A total of 11 fires occurred on rare reptile sites, including Canford Heath where there has already been much destruction due to building activities.

Fires are devastating to the rare reptiles for two reasons. The most obvious one is of course that many animals are killed during the fire. Those that survive are particularly sensitive to predation as the animals have no cover in which to hide. It is generally thought to take many years (possibly as many as 10) before such habitat is capable of supporting the rare species once more. This shows the importance of taking adequate measures to protect our heaths from accidental fires, and is one of the reasons why the BHS lobby land managers to provide features such as fire-breaks across our remaining heaths.

CRESTED NEWT RESCUES: HOW MANY CAN BE CAUGHT?

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BACKGROUND

Despite "protection" under the 1981 Wildlife & Countryside Act, Crested Newt ponds are still destroyed at a significant rate in Britain. One response to this problem has been the "rescue operation", during which as many newts as possible are caught and transferred to some other site before the pond is lost. Early in 1990, plans were finalised for what seemed to me to be an extravagent road improvement near Newhaven, in East Sussex; this work necessitated the infilling of a small pond identified a few years earlier as containing Great Crested Newts. As part of the plan, the BHS (in my personna) was commissioned by the County Council to catch and move as many newts as possible and to be present to take away remaining newts when the pond was pumped dry. This generally depressing situation did at least provide an opportunity to see just how efficiently newts can be caught under these circumstances, and this article recounts the results of my efforts.

THE SITE

The pond in question was virtually circular, about 15 metres in diameter, perhaps 1 metre deep in the middle (classically "saucer shaped") and set in unimproved pasture. It was one of several in the immediate vicinity with Crested Newts, and happily the only one to perish in the roadworks. Fairly dense beds of Flote Grass covered most of the pond, except for the deepest central region where there were abundant submerged plants such as Water Parsnip.

I was given one week's notice to catch newts before the pump-dry date. My strategy was: (1) To examine submerged plant leaves for newt eggs; (2) To carry out a preliminary torch survey to get some idea of newt numbers; (3) To net the submerged vegetation as vigorously as possible; (4) To set bottle-type newt traps every evening (10 altogether, about 1 per 4 metres of bank) and collect newts the next morning; and (5) To catch newts by net and by hand during the pump-out operation.

THE RESULTS

Inspection revealed many Crested Newt eggs on the Water Parsnip leaves, but the much more abundant Flote Grass was apparently unused. Interestingly, torch survey failed to show up any newts at all; although the water was clear, vegetation was just too dense for the method to be useful. A single extremely vigorous(!) netting session, on a warm day in mid March, produced just 5 Smooth Newts (Table 1). However, subsequent trapping revealed a very different picture with Crested Newts turning up in substantial numbers and outnumbering "smoothies" on almost every occasion. At the end of the week, about twice as many Crested as Smooth Newts had been caught. Draining the pond took almost an entire day, and used a pump with a mesh filter to ensure that no newts were sucked out unseen. Finding newts stranded as the water level dropped was straightforward, and it seems unlikely that many, if any, were missed. This operation yielded rather more Smooth newts than Crested, but overall the larger species was numerically superior in the pond by a small margin.

Trapping selected quite strongly for male Crested Newts, as expected with this method (Table 2), but strangely did not show this sex bias with Smooth Newts. This was contrary to general experience, including my own in other ponds. In part it presumably reflected the fact that female Smooth Newts outnumbered males in total (56 & 37 respectively), whereas the converse was true of Crested Newts with 56 males and 46 females. It was also interesting to note that a week's trapping caught about a quarter of the Smooth Newts present in the pond, but exactly half of the Crested Newts. It also had a significant impact on the sex ratio of the Crested Newts, taking out nearly two thirds of the males but only one third of the females.

TABLE 1: NEWTS FROM DENTON POND

	SMOOTH	GREAT CRESTED
No. NETTED : Male	1	0
Female	4	0
Total	5	0
No. TRAPPED: Male	6	36
Female	14	15
Total	20	51
No. LEFT: Male	30	20
Female	38	31
Total	68	51
GRAND TOTAL IN POND:	93	102

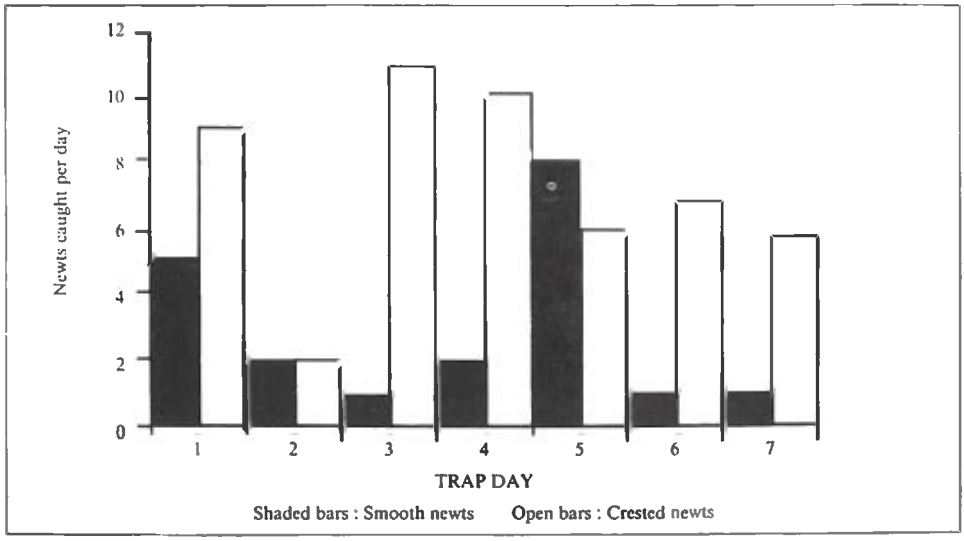
TABLE 2: CATCH PATTERNS

	SMOOTH NEWTS	CRESTED NEWTS
SEX RATIOS (M/TOTAL):		
- OVERALL	0.40	0.55
- BY NETTING	0.20	
- TRAP (AVERAGE*	0.48	0.74
(TOTAL	0.30	0.71
- LEFT IN POND	0.44	0.40
% CATCH:		
- BY NETTING	5	0
- BY TRAPPING		
Male	16	64
Female	25	33
Total	27	50

**Ascribing ratios when females were caught but no males to a value of 0.*

Figure 1 shows how the trap catch rate varied through the seven days. Smooth newt catches were erratic and showed no obvious trend; this was equally true if the sexes were examined separately. Crested Newt catches were consistently higher in the first part of the week than in the latter, excepting for night 2 which followed a particularly cold day. Weather throughout the rest of the week (during mid-March) was remarkably constant, with warm sunny days but cold, occasionally frosty nights. When examined separately for sexes (not shown), the change mainly reflected a fall in male catches; numbers of females caught showed no clear pattern, with the largest single catch (5) taken on night 6.

FIGURE 1: RATES OF CATCH



CONCLUSIONS

A striking feature of this pond was that two mainstream survey methods – netting and torching – failed dismally to show the presence of Crested Newts at all. On the other hand searching for eggs on plant leaves, a technique propounded by an active group in south Lancashire, proved extremely valuable as a simple demonstration of the species' occurrence. Bottle trapping not only confirmed the egg search indications, but was impressive in catching exactly half of the Crested Newt population within a single week. The traps were placed in the Flote Grass within a metre of the pond edge, so presumably the Crested Newts stayed in deep water during daytime but ventured into the shallows at night. Trapping during the day yielded no catches at all. Weather conditions were such that continued immigration during the trapping period was very unlikely, and the population sizes can probably be taken as roughly constant throughout. Of course the numbers of newts that might have come in later remain unknown, but after such a mild winter I suspect that most were already in place by mid March. Certainly numbers in my own garden ponds were apparently up to full strength long before that time, with first sightings before Christmas.

These observations indicate that a more sustained trapping programme, perhaps for two or three weeks under good weather conditions, might almost empty a pond of Crested Newts. This is perhaps good news for rescues, but a little worrying from the point of view of possible illegal over-collection from sites not endangered. However, it was reassuring to observe that the males were caught most easily leaving the less expendable females more difficult to trap out in the unlikely event of any such sustained assult on a Crested Newt population.

This work was of course carried out under licence and supported by a sympathetic County Ecologist. About half the newts were released in a pond some 500 metres distant with an existing Crested Newt population and the rest distributed to three unused ponds in which it is hoped new colonies may become established. Furthermore, the developers created a new pond as near as possible to the rescue site and if anything rather larger than the original. In due course Crested Newts will be trapped from the 500 metre neighbouring pond and translocated into the new one, this year or next depending on when sufficient vegetation establishes (some was transplanted from the old pond basin by the developers). A final bonus is that the BHS land fund receives £250 as my "fee" for the work done catching and moving newts. So all in all this story probably ends on a high note, but it would be quite wrong to leave the impression that rescues in general are a good idea. Much better, in my opinion, to have left the site completely alone and improved the road without impinging on the pond at all – perfectly possible in this particular situation. That, after all, is what a decent wildlife protection act could have ensured.

AN ACCOUNT OF THE BREEDING OF THE SPANISH GREEN LIZARD, *LACERTA SCHREIBERI*, IN CAPTIVITY, WITH NOTES ON REARING

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INTRODUCTION

During September 1988 I was fortunate to purchase a pair of adult Spanish Green Lizards. Both were received in good condition, albeit with regenerated tails. Their size approximated those of the European Sand Lizard, *Lacerta agilis.* The colour plates shown in A. Salvador's book on the Iberian reptile and amphibian fauna, typifies the female; however the male does not present the black marbling on its dorsal surface, rather a sprinkling of irregular black spots. The male in my possession may well be rather old judging by the deep sulcations separating head shields. Both sexes exhibit the same green ground colouration.

HOUSING AND ENVIRONMENT

Accommodation is a vivarium constructed of 13mm contiboard measuring 75 x 45 x 75cm. Lighting is supplied by 2 x 18 watt "truelight" fluorescent tubes. Heating is via a 40 watt spotlight, positioned at one end of the vivarium. Fluorescent unit and tubes are housed in a detatchable hood of contiboard and 5 plywood. Joints are screwed and sealed with silicone sealant. Ventilation grills have been installed in the back and hood. As *L. schreiberi* shows a preference for moister environments than others of the "green lizard" group, a terrace effect has been incorporated. A strip of acrylic sheet 40 mm. deep has been sealed diagonally in place, thereby dividing the floor area in two. The area furthest from the light source has a substrate composed of a mixture of peat, sand and potting compost, topped with a generous supply of bark chippings. This area is kept moist by regular spraying. Within this area a small specimen of the Weeping Fig, *Ficus benjamina*, offers cover and also permits climbing – this allows the inmates to get within 5 cm of the "truelight" tubes. A similar substrate is used at the opposite end of the vivarium, which is kept moderately dry. Branches are supplied to give the opportunity of basking under the spotlight. Cork bark provides ground cover. Water is supplied ad libitum in a shallow dish.

The vivarium is accessed by two sliding glass doors, running in plastic tracking, raised 8 cm above the base by a contiboard plinth. The combination of heating and lighting provides a temperature gradient of 20 - 30°C. For their first winter, temperatures were maintained within that range, on a 12 hr cycle. With lights and heating turned off during the hours of darkness, temperatures did not drop below 15°C.

DIET

Throughout the winter months a basic diet of crickets, *Acheta domesticus,* and various mealworm species, all dusted with a vitamin/mineral supplement. Additional items by way of spiders, moths and other invertebrates were offered when available; most were readily accepted. Occasionally a "pinkie mouse" was accepted, usually by the male. Although suitably sized locusts were offered they did not find favour.

MATING

Early observations indicated only limited gregarious or social behaviour; whilst no conflicts were observed each avoided the other. Only rarely would both be seen at the same time. This may have been due to the rather small area available, inhibiting normal interactions. During the first week of May '89, the pair were observed mating early one evening. No further copulations were noted although both stayed in close proximity to one another for a further two weeks. By late May it was evident that the female was gravid.

EGG INCUBATION

On the 30th May '89 it was noted that the female had regained her slim shape. Searching through the substrate revealed 12 eggs in a healthy hydrated condition. They were carefully removed, the upper surface marked before transference to a previously prepared incubator, as described by Elke Zimmermann. Temperatures within the incubator were kept at 29°C ± 2°C, controlled by an aquarium heater/thermostat. Humidity was maintained at 95%. At relocation egg size ranged from 9-11 mm x 7-8 mm.

HATCHING

According to Norrie and Langerwerf (1987), incubation period ranges from 41-65 days. The longer incubation periods relating to indoor incubation and a seasonally abnormal egg laying period. Forearmed with this information I had anticipated an incubation perod of 50 days, in view of a seasonally normal egglaying and a relatively high incubation temperature. At 40 days, to allow better observation of hatching, eggs were transferred to a smaller incubator at the same temperature but with reduced humidity (75%). Eggs ranged in size from 15-21mm x 13-17mm at 40 days.

EGG 1 Shell collapse at 42 days; 2 days later no sign of emergence, egg opened; fully developed dead foetus. No abnormality detected.

2 Shell swelled excessively at 43 days, at 46 days shell collapsed, at 48 days egg opened; large fully developed dead foetus.

3, 4, 5 Shell collapse at 51 days, no emergence; at 53 days eggs opened all three contained recently dead fully formed foetuses

6, 7, 8 Commenced hatching 53 days post laying, both assisted from shell 6 hrs post pipping.

9, 10, 11, 12, 13 Successful assisted hatch four healthy active young, 53 days post laying

After dead embryos were found on day 53 and to avoid the risk of further fatalities, I decided with some trepidation to open the remaining eggs. This assistance resulted in six healthy and active young. A possible cause for the poor natural hatch may have resulted from the environmental change initiated at 40 days. Reducing humidity at 40 days may have prevented emergence by interfering with shell pliability. No foetus alive or dead presented a large yolk sac, indicating hatching was imminent.

HATCHLINGS

The six survivors were housed in a vivarium measuring 60 x 15 x 20 cm. Access was gained via a detachable hood in which was housed an 18" "truelight" tube. A 25 watt pigmy bulb supplied heat. At hatching the young ranged in size from 30-35mm. SVL, with a tail length of approximately 45mm. Within 48 hrs all six were feeding avidly on young crickets and, especially, spiders, mainly *Zygiella x-notata* and *Enaplognatha ovata*. As the days passed these were supplemented with a regular supply of the small Magpie Moth caterpillar, *Eurrhypara hortulata*, found in abundance on Convolvulus, *Calystegia sepium*.

By the end of September '89 all six were progressing well. Sizes ranged from 60-65mm. SVL, with a tail of approximately 125mm. The distinctive juvenile pattern has gradually given way to the adult patterning, i.e. bold reticulations on a grass green or olive green background or a ground colour of green, speckled with irregular dark spots. There are two males and four females.

Six weeks after hatching they were transferred to a 120 x 30 x 45cm vivarium planted with Ivy, *Hedera helix*. When young these lizards are especially attractive and striking with broken white or yellow vertical bars on flanks over an olive green-brown background. The tail has a yellowish tint which stands out boldly. Unlike the parents these young are friendly, climbing on fingers and taking food from them. However, slow movements are required to prevent them from dashing off into the undergrowth.

FUTURE GENERATIONS

My intention was to prepare all for hibernation during December '89, as growth had been considerable, with plenty of fat as reserve. Measurements at this time were, for males 80-90mm.SVL. and females 65-75mm., tail lengths ranged from 150-170 (including one regenerated).

As both males had shown signs of territoriality I decided to transfer the whole group to a more spacious vivarium measuring 90 x 60 x 90cm high. Both males were in breeding condition; even this larger vivarium failed to stop the territorial disputes, on the contrary, only adding fuel to their fire. One male sustained a bite wound to its neck, posterior to the parietal shields. To prevent further injury he was separated. Attention of the dominant male was drawn towards the females, copulation was observed with one female (mid January '90).

The male received in September '88 died for no apparent reason, (possibly old age), this left the original female which was accomodated with her offspring where she became more tolerant of disturbance – taking food from forceps. The young remain tame.

Adult colour patterns have now been established. Both males are very similar and reflect that seen in A. Salvador's book mentioned earlier in the text. Each of the females is different: the larger shows large bold reticulations on a leaf green background; another has smaller black markings on a similar green background; the third shows an apple green back with a few scattered black spots; the smallest of the group has small black blotches on a light brown background.

Late January 1990 it was noted that two of the females were gravid. On 1st February '90 a female laid 5 eggs in damp vermiculite placed inside a margarine carton with a $2cm^2$ hole cut into its side. Another laid 7 eggs on 9th February in the dampened substrate. Both clutches were transferred to fresh dampened vermiculite for incubation.

GROWTH AND DEVELOPMENT, A SUMMARY

Rapid maturation, from hatching to achieving adult status in just six months, reflects the abundance of food on offer. This fare, dusted with a multivitamin mix, together with "truelight" illumination has resulted in six robust and apparently healthy young adults. Such rapid and sustained growth may not be desirable as it is not a natural phenomenon. In the wild, with hatching in May-June, such speedy development is unlikely. Certainly, in their natural habitat, six months would coincide with the hibernation, sexual activity not occurring until the following spring at the earliest. Therefore a minimum of twelve months is likely to be the norm, before the next generation is conceived. The omission of a hibernation period made early maturation possible, as photoperiod, temperature and food intake were maintained without interruption. Hopefully this does not give rise to a shortened life span. To reduce that possibility hibernation will be arranged for late October 1990. Throughout captivity I have attempted to optimize their microhabitat to approximate, as far as is possible within the confines of an artificial environment, a natural setting. In so doing one reaps the benefits of an aesthetically pleasing vision. In addition valuable insights are gained from uninhibited behaviour.

In order to minimize inbreeding depression and/or genetic defects as a result of sibling matings, I would be happy to hear from anyone in the UK whom may wish to exchange information and/or specimens of *L. schreiberi* for continued breeding success.

PRODUCTS MENTIONED IN TEXT

"Truelight" fluorescent tubes, Duro-Test International Corp., 700 Godwin Avenue, Midland Park, NJ. 07432 USA.

"Cricket Plus", Monkfield Nutrition, Cambridge, England.

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NOTES ON BLACK MAMBA *(DENDROASPIS POLYLEPIS)* ENVENOMATION TREATMENT USING THE PRESSURE/ IMMOBILISATION FIRST AID TECHNIQUE

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INTRODUCTION

Bites from the Black Mamba *Dendroaspis polylepis,* still today remain a very serious and traumatic experience despite the highly effective polyvalent antivenom available. Being a large, aggressive front-fanged snake, bites resulting in envenomation can easily occur during handling or when the snake is threatened.

Treatment and case histories of envenomation from this species have been described. Various snakebite treatments have been applied over the years. These included the cutting and sucking of the bite site, potassium permangenate, petroleum, torniquets, ice packs, etc. In addition a veritable cornucopia of unctions, extracts, ointments and elixirs, have been swallowed, inhaled or smeared into the bite sites. Success in the treatment of black mamba envenomations varied, from a near 100% fatality (Chapman, 1968) to a much higher success rate with the aid of modern medicine (Harvey, 1985; Hilligan, 1987).

Clear distinction must be made between the immediate first-aid treatment of snakebite, and its subsequent treatment under medical supervision. In the first instance treatment is involved with delaying the spread of the venom and/or the prevention of the onset of symptoms. Antivenom remains the most efficient method of neutralising the venom and thus stopping the symptoms. If antivenom is necessary, it is best given under medical supervision in a hospital.

Recently the pressure/immobilisation treatment was introduced to the South African herpetological scene as a first aid measure (Branch, 1985). It was subsequently used successfully in the treatment of several elapid envenomations including the Eastern Green Mamba, *Dendroaspis angusticeps* (Patterson & Morgan, 1985), the Egyptian Cobra, *Naja haje annulifera* (Els, 1988) and the Mozambique Spitting Cobra, *Naja mossambica* (Haagner, 1988).

THE PRESSURE/IMMOBILISATION TREATMENT

This method originated in Australia where it has been successfully used on several neurotoxic envenomations (Pearn, *et al*, 1981; Sutherland, *et al*, 1980; Murrell, 1981). According to Branch (1985) its efficacy originates from a reappraisal of the importance of the lymphatic drainage of the bite site. The lymphatic circulation acts as an auxillary system, collecting interstitial fluid forced by the body movements from the blood vessels into the surrounding tissues. Small valves in the lymph vessels prevent back flow and body movements force lymph along the vessels. The fluid eventualy drains into the blood system.

Important aspects regarding this method are that :

1. 98% of snakebites occur on limbs
2. venom is mostly injected into tissue, and not into the blood circulation
3. the lymphatics collect interstitial fluid draining from the tissues
4. lymph vessels are thin-walled and can be occluded by simple pressure from a broad elastic bandage, while full blood circulation to the limb is maintained.

The efficiency of this method in preventing the spread of small molecular weight elapid neurotoxins does not seem in doubt. However, reservation still exists on the advisability of this method for cytotoxic envenomations where local necrosis and severe swelling are normally present.

Application of this Method

The practical application of this first-aid treatment is well illustrated by Marais (1985) and Branch (1985). Do not apply a tourniquet as tourniquets can cause unnecessary pain and even severe tissue damage. Apply a firm pressure to the bite site immediately by using your hand. Then wrap a firm bandage over the bite site as tight as for a sprained ankle. Now wrap the entire limb in the pressure bandage and then into a splint to minimise movement. The victim must be kept still and carried to a vehicle and transported to hospital immediately. The pressure bandage must stay on the limb until the patient is hospitalised and under medical care. If possible, take the snake (live or dead) with you for identification. If a pressure/crepe bandage is not available, improvise by using any clothing, towels or even socks.

CASE HISTORY OF BLACK MAMBA ENVENOMATION TREATED WITH THIS METHOD

The Snake

A large, aggressive diurnal elapid occurring throughout Northern Transvaal and Natal (South Africa), Botswana, Zimbabwe, Zambia further north through Africa to Nigeria and Senegal in the west (Hakansson & Madsen, 1982). The Black Mamba is a slender snake which often reaches 300 cm (10 feet) in length with the largest recorded at 425 cm (14' 3") (Bennetts, 1956). The average size is between 180 cm (6 foot) and 240 cm (8 foot). The snake's colour varies from a uniform light to dark brown to a lead grey. Despite it's name, the snake is never jet black. The only black colouring on the snake is the interior of its mouth which distinguishes it from any other South African snake.

If provoked it will raise the anterior part of its body with an open mouth, displaying a narrow hood. If not immediately left alone, the snake will attempt to escape and strike as it passes. It does not hold on after a bite, but will deliver several quick bites in rapid succession when aggravated. Black Mambas feed on warm-blooded prey such as rodents, birds, squirrels, and other smaller mammals (Broadley, 1983). Although not essentially arboreal, the snake will spend some time basking in large trees. In more open bush-veld, old termitaria and hollow trees are favoured retreats.

The Victim

An adult, 28 year Caucasian male, 93 kg.

The Specimen

A three year old, captive raised male snake, measuring 1920 mm.

Bite Site

The victim was bitten on the top of the right index finger on 6 March 1989, with only one fang penetrating. The bite was a result of negligence while feeding the snake and an act of greed by the snake rather than aggression.

Relevant Previous Medical History

The victim had previously experienced several snakebites, including *Bitis a. arietans, Bitis caudalis, Dendroaspis angusticeps, Naja haje annulifera* and *Naja mossambica,* receiving antivenom for all except the *Bitis* bites. The victim showed severe allergy/hypersensitivity to the *Naja mossambica* venom with itching rash (urticaria) and bronchospasm (Haagner, 1988).

Symptoms and Treatment

12h42: immediate bleeding from bite site with burning pain. Walked to first aid kit (4 metres away) and applied crepe bandage within 20 seconds after bite.

12h45: drove to reception office and asked staff to phone hospital at Acornhoek. Strange taste in mouth and intense burning in hand. Sense of panic for victim was unable to find somebody to transport him to hospital. Feeling dizzy and nauseous.

12h48: collected antivenom and left for hospital, 45km away. Feeling very nauseous and pulse 97/min – onset of respiratory difficulty.

12h52: Pulse 97/min – pain in hand, difficulty in breathing and speaking. 'Pins and needles' feeling in finger tips and lips.

12h55: increased difficulty in breathing, losing control over facial muscles and unable to focus eyes.

13h10: arrived at hospital. Unable to get out of vehicle – paralysed. Breathing and speech eratic. Rushed to Outdoor Patients Department.

13h12: Ringers Lactate 500 ml IV immediately with 200mg Solu-Cortef. Victim feeling 99% sure that he is going to die.

13h15: 10 ampules (100 ml) antivenom administered intravenously through drip. Intense burning sensation as antivenom entered veins with 'pins and needles' all over body. BP 140/60 Pulse 98/min. Victim still conscious but unable to speak, convulsions and vomiting.

13h58: 0.5ml anti-tetanus intra-muscularly and 2 ml Proc Pen intramuscular. Reacted to the penicillin – rash on neck and arms.

14h02: 200mg Solu-Cortef IVI in drip. Intense pain in hand – crepe bandage removed and bite site disinfected.

14h22: 10 mg morphine intramuscular. BP 130/80 Pulse 84/min. Kept on Ringers Lactate. Hospitalised.

16h00: easier breathing and able to move body but focus still watery. BP 120/80 Pulse 88/min. Hand still painful. Still very nauseous, sporadic vomitting.

20h00: feeling better but still nauseous and unable to clear focus. 30mg Serapex to sleep. Slept through night.

Day 2: hand still sensitive but no swelling. Itchy feeling round bite site which remained for several days.

Day 3-5: kept under observation but no further symptoms developed from envenomation. Discharged from hospital and went home.

DISCUSSION

The rapid onset of symptoms are not surprising and have been previously described by Hilligan (1987) and Read & Foster (1959). In this instance, the onset of symptoms were extremely rapid with paralysis after only 15 minutes, despite the immediate application of the crepe bandage. This can probably be understood if the victim's hypersensitivity is taken into consideration. According to the medical staff at the hospital, the immediate application of the crepe bandage contributed greatly to the survival of the victim.

Although the onset of symptoms can be very rapid, it has been reported that patients have survived only receiving treatment as long as 5 hours after having been bitten (Louw, 1967). Black Mambas can inject large quantities of venom, up to 400 mg per single bite, with 10-15 mg being a fatal dose for the average human (Broadley, 1983). Therefore, large quantity of antivenom is sometimes needed to effectively neutralise the venom. Visser & Chapman (1978) reported a case where the victim died 8 hours after envenomation, having received approximately 80ml polyvalent antivenom. In this case the victim was bitten three times resulting in too large quantities of venom to be effectively neutralised by the available antivenom. Interesting to note that Harvey (1985) reported total recovery of a victim without the aid of antivenom. The victim reached the hospital 4.5 hours after envenomation and was kept alive by a respirator. The victim made complete recovery and was discharged after 7 days.

Tilbury (1989) commented that the author's immune system has been sensitised as a result of previous bites from different species, and that further envenomation will result in more serious forms of hypersensitivity – acute anaphylaxis or even death. Despite Tilbury's (1989) prediction, no sign of allergy was shown by the victim towards Black Mamba venom. With

the victim's earlier bite by a Green Mamba no sign of allergy was present, with slower onset of respiratory symptoms (Haagner, 1987).

CONCLUSION

The venom of the Black Mamba is a very potent neurotoxin that is rapidly absorbed, and as with other elapids causes paralysis of the nerves, especially those controlling the lungs, leading to respiratory arrest. At the same time, it paralyses the inhibitory nerve regulating the heart, causing a rapid and irregular pumping there-of. The victim will experience more and more difficulty in breathing until eventually death results from suffocation. The onset of symptoms appears to be a result of the amount of venom injected as well as the natural immune system of the victim. The onset of symptoms varies and is normally obvious in one to two hours after envenomation.

Due to the author's experience in the efficiency of the pressure/immobilisation treatment, this method can be strongly recommended as a first aid measure.

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BREEDING OF THE AMERICAN ALLIGATOR *(ALLIGATOR MISSISSIPPIENSIS)* IN THE SOUTHERN HEMISPHERE

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This account covers the successful breeding of the American Alligator *(Alligator mississipiensis)* and is the result of three formeı attempts. The most recent attempt was detailed in an earlier articfe (Eriksen 1987a).

HISTORY

The Alligator breeding population of the Ranch consists of two pairs – the first pair, (hereafter referred to as "Pair A"), consists of a 2.95m male, approximately 22 yrs old, and a 2.2m female approximately 20 yrs old. The second pair, (hereafter referred to as "Pair B"), consists of a 2.9m male, age unknown and a 2m female approximately 16 yrs old.

Pair A and the female from Pair B were imported from America by the Ranch, while the male from Pair B is on breeding loan from another Zoological institution. Pair A have been together for approximately 6 years and Pair B for 2 years.

ENCLOSURES

The enclosures for both pairs are virtually identical and are situated adjacent to one another. The dimensions are as follows:– the pens are 10 metres x 10 metres in diameter, the pool being of irregular shape, with a surface area of 45 square metres. The average depth is 1.5m. The pool is of concrete construction and is drained twice a week. Emphasis in the enclosures is to create as natural an environment as possible. At the rear of the enclosure is a small room, which is kept heated in winter; this has a river-sand base, but is not used by the alligators for nest building purposes. The water in the enclosure is not heated.

OUDTSHOORN TEMPERATURE RANGES

		FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	YEAR
	°C													
	MEANMAX	32	30	27	23	20	19	21	23	26	28	30	32	26
1987	MEANMIN	15	14	11	7	3	3	5	7	10	12	14	15	10
	RAIN mm	13	26	21	21	11	19	16	22	21	31	21	10	232 (total)
	MEANMAX	38	35	27	27	18	22	25	25	28	31	33	34	28
1988	MEANMIN	19	17	11	8	5	3	6	8	10	12	13	16	11
	RAIN mm	0	19	22	15	16	3	9	18	1	4	20	0	126 (total)

The water temperatures in summer average 25°C and winter 12°C.

DIET

The diet of the alligator originally consisted entirely of ostrich meat, (readily available in our area), however it was felt that this possibly contained too much calcium, as an ostrich head contains up to 50% bone. It was therefore decided to change the diet to donkey meat, with carcass meal and a vitamin mixture added.

The average feed rates are: 3kgs per animal per week during the summer months, i.e. October through to March. The alligators are not fed during the winter months.

BREEDING - 1987/88

The reproduction attempts of Pair A up until and including 1987 were discussed in my previous article. However, as stated in that paper, success was limited (1 hatchling born in 1987 subsequently died). To summarise, breeding of Pair A began in 1985 with a total of 45 eggs laid on the 14th January 1986. Of these eggs, one was broken and the remaining 44 were placed in an incubator containing no substrate. Five eggs were measured and weighed. These ranged in length from 72.5mm to 69mm, with a diameter of 40.5mm to 39.5mm – the weights averaging 67.5g to 61.9g. Of these eggs, 19 appeared fertile, however banding continued for only 14 days and then ceased. In 1987, 49 eggs were laid – 3 were badly damaged and 2 were cracked. A total of 46 eggs were placed in the incubator, once again, with no substrate. Of these, 28 appeared fertile and had begun banding.

After 58 days, on the 26th March, only 5 fertile eggs remained and on day 65 (2nd April), one hatchling broke through the eggshell. As the shell was very tough, the hatchling struggled to free itself requiring assistance after 20 + hours (detailed in previous article). The hatchling appeared to have a problem with its balance and subsequently died 2 months later through drowning, having had to be force fed until this time. At birth the length of the hatchling was 233mm with a weight of 35g.

By day 70, the remaining 4 eggs were opened revealing fully developed dead embryos. The average measurement of the eggs was 71mm long by 39.5mm in diameter, and weight average was 66g.

In 1987 Pair A produced no eggs, however from the 23rd of July 1987 heavy bellowing was heard from both pens, sometimes lasting up to 15 minutes and usually started by the males. This was observed on 18 different days up until the 9th November 1987. Bellowing occurred mostly in the early morning between 7am and 8am, and in the afternoons betweeen 4 and 5pm.

Pair B, which had been introduced to each other and the new enclosure on the 1st July 1987, produced eggs which were discovered on the 22nd January 1988. On the 8th January 1988 the female started moving the nesting material around and showed signs of aggression, snapping and hissing on approach. However, she made no attempt to attack. On the 17th, she displayed extreme aggression, chasing and lunging at everyone that entered the enclosure. On the 18th she was chased off the nest and a thorough check was made of the nest; however, no eggs were sighted. This was unusual, as her behaviour indicated a lay. Periodical checking of the nest continued until the 22nd January 1988 when it was decided to do a complete check of the whole area. At 9am, 12 eggs were discovered buried under about 5cm of ground, at the back of the nest. No banding had occurred and the eggs proved to be infertile. (It would seem probable that they had been laid on the 17th). Nine of the eggs were completely broken. The average dimensions of the 3 remaining eggs were as follows:– length 70mm, diameter 40mm and weight 63g.

BREEDING 1988/89

In 1988, both pairs produced eggs with pair B producing first.

Vegetation was placed in both pens at the end of October, consisting of a mixture of cut grass (Kikuyu) and leaves of a wild bamboo found in the area. The nests were watered down approximately once a week, to aid in decomposition and to provide moisture. During this period, heavy bellowing was heard from both enclosures. Towards the end of November copulation was twice observed in Pen A, both times occurring at approximately 8am. On the 30th December 1988 at 8am, Female B was observed using her back legs to scrape the nesting material into a mound. This continued for approximately one hour before she re-entered the water. On the 31st December at 8.30am, I entered Pen B. The female lunged off the nest with her mouth open. She was then chased off the nest and the nest was opened. One egg was found near the surface of the nest, with a further 16 found in the centre. One of the eggs had a soft leathery shell and 4 others were cracked. All 17 eggs were placed in a styrafoam box. Holes were punched in the base, with a 5 cm deep layer of dampened vermiculite, placed at the bottom (vermiculite was dampened until a drop of water was produced

when squeezed). This was followed by a 2cm layer of nesting material. The eggs were then placed one layer deep, on top of the vegetation, which was then covered with another layer of dampened vermiculite.

The styrafoam box was then placed in the incubator which was set at 29°C and a humidity of 94%. A temperature probe was placed in the vermiculite and registered 30°C. This temperature rose in the following week to 32°C, then dropped to 31.5°C where it remained for the incubation period. On the 30th January, the eggs were removed from the incubator, as 7 eggs were infertile and the remaining 10 had ceased banding at approximately day 14. The embryos appeared to have reached stage 12 (Ferguson, 1985).

Egg measurements were on average:– Length 69.2mm, diameter 42.3mm and weight 66g. On the 31st January 1989, one month after Female B's initial lay, one egg was found in the water of her pen, and on the 4th January 1989, 3 more eggs were found in the water. They were placed in the incubator, however, none of them showed any signs of banding and were removed after one week. We therefore had no success with Pair B for the 1988/89 breeding season.

The eggs in Pen A were laid on the 16th January 1989. (Prior to this date, no copulation or nesting behaviour was observed). For 2 weeks prior to this, the female spent most of her time in the water, however on the morning of the 16th, she was observed on the nest and at 7.30am we entered the enclosure. The female showed no real signs of aggression, even when approached to within 1 metre. This was completely contrary to her previous protective nesting behaviour, however it was decided to go ahead and check the nest. As soon as wooden barriers were placed against her, she attacked and did not want to leave the nest. The eggs were discovered scattered around the inside of the nest, which contained a lot of sand – obviously scraped up by the female. Most of the eggs were found approximately 1cm from the top of the nest and a lot of them were crushed. A further eight eggs were found approximately 30cm below these eggs and only 1 of these was cracked. The rest were found in clusters scattered around the nest. Some eggs, which were covered in yolk from those that had broken, were first washed in warm water and then rubbed in nesting material, before being placed in the polystyrene container. The minimum and maximum temperatures on the 15th January 1989 were: Min 17°C, Max 35°C, and on the 16th January 1989 the morning temperature was 21°C. Nest temperature measured 27°C. As a point of interest, for one week prior to the 16th January 1989, the female refused to eat. The container and incubator were prepared in exactly the same manner as for Pair B.

On the 22nd March 1989, at 8am, 65 days from date of laying, (the exact no. of days occurring for Pair A's previous successful hatching), pipping was heard coming from the box. However, as it was very weak it was decided to leave the eggs until stronger pipping could be heard. On the 23rd, at 2.30pm, the nest was opened and by this time, 3 hatchlings had already broken through the shells. By 5.30pm, 5 hatchlings had fully emerged – these were washed in warm water and transferred to the hothouse. By 3pm on the 24th March 1989 a total of 10 hatchlings had emerged. Of the remaining eggs, 1 hatchling was found dead in the egg, however it appeared to be under-developed. The remainder were infertile. At birth, the hatchlings measured on average:– Length 24cm, weight 40g. 10 healthy hatchlings were produced by Pair B for the 1988/89 breeding season.

HATCHLINGS

For eleven days the hatchlings refused food completely, however, on day 12, one began to eat and this was followed by the rest. The method of feeding was to roll the food mix into a small ball then drop it near the hatchling. This movement seemed to stimulate feeding. Once the hatchlings were eating well, the food was placed around the sides of the pool for the hatchlings to eat in their own time.

They are at present kept in an enclosure, within the hothouse, measuring approximately 5 square metres. The enclosure contains a 2.25 square metre pool with a 40 cm concrete apron bordering it. The pool has a gentle gradient, sloping down to a maximum depth of approximately 16cms. Floor, air and water temperatures are kept constant at 32°C.

HATCHLINGS' FOOD

The food mix for the hatchlings consists of 60% meat, 20% fish, 20% liver, with a vitamin mix added at a rate of 1%. The vitamin mix is based on the "Alligators Premix" (Joanen and McNease, 1981) and consists of the following:

SPECIFICATIONS	PER 1 LB
Vitamin A	1,800.000.00 USP u
Vitamin D3	200.000.00 IC u
Vitamin E	5.000.00 iu
Riboflavin	1.000.00 mg
d-Pantothetic Acid	2.760.00 mg
Niacin	4.50 gm
Choline Chloride	86.43 gm
Vitamin B12	1.35 mg
Folic Acid	90.00 mg
Biotin	20.00 mg
Pyridoxene Hydrochloride	1.000.00 mg
Menadione Sodium Bisulfite	4.283.00 mg
Thiamine mononitrate	1.000.00 mg
Inositol	5.000.00 mg
Para-Amino Benzoic Acid	5.000.00 mg
Ascorbic Acid	45.000.00 mg
Ethoxyquin	5.00 gm

The growth rate as at 31 May 1989, was as follows:

Average length: 37cm Average weight: 128g

CONCLUSION

Having finally succeeded in breeding Alligators, it would seem from our previous experiences that Alligator eggs do not hatch as successfully when no medium is used. When using a medium, it is my belief that nesting material, or some other form of biotic material, should be used around the eggs. This would seem to promote degradation of the egg shell as stated by Ferguson (1985). A high humidity (i.e. 94 to 98%) is also essential to prevent air spaces and regression of the yolk. Diet of the female alligator is an important consideration and too much calcium in the diet may create too thick an eggshell, thus making gaseous exchange and degradation of the shell more difficult. This is possibly borne out by our successful hatching for the 1988/89 breeding season, as the female was fed a diet of donkey meat with a small amount of calcium added. In previous years she had been fed a diet of ostrich offal, containing nearly 50% calcium.

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PROTO-PATTERNS IN FIRE-BELLIED TOADS AND EUROPEAN TREEFROGS

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Through the kindness of Julian Bentley I had the opportunity this year to rear and observe a number of frog and toad tadpoles of different species. It was a useful occasion for comparative study and raised a few queries without immediate answers.

One group that I reared together were mainly Oriental Fire-bellied Toad, *Bombina orientalis*, but with a few Fire-bellied Toad, *B. bombina*, and some which appeared to originate from hybridisation of the former with the Yellow-bellied Toad, *B. variegata*. There was little evidence of specific differences in these tadpoles and it was not until metamorphosis that variation became apparent.

The small tadpoles were at first blackish with a pale yellow-buff eye rim and a pale line along each side, which together with a pale line bordering the tail-base produced a variegated pattern. Later they became plain and blackish; but at about the time that the bulges for forelimbs first appeared the back became greyer, with the darker markings of the adults beginning to show. They tended to become a little paler, and by the time that the forelegs were about to emerge they showed on the back a pattern of four pale green spots. A pair of rounded spots were fairly close together on the upper back, and lower down were a pair of larger spots, more longitudinally elongated.

A number of the metamorphosed young appeared to be hybrids. In shape and behaviour they were like *B. orientalis* and the underside had the same colour and pattern, the background being the yellow of captive-bred *orientalis*. On the upper side, however, they were a kind of drab khaki, turning blackish in darker situations and with some greyish-white speckling on the flanks. Some showed variable small green patches on the nose and limbs. More strikingly, the green spots persisted as bold markings on the back, even in older individuals, the hinder pair tending to diverge posteriorly, and being fainter at times, and absent in at least one individual.

I could find no evidence of this pattern of spots on the back as a character of adult *Bombina* species; although in the European fieldguide (Arnold & Burton 1978) Ovenden shows the Yellow-bellied Toad with a similar pattern of four pale buff patches on the back. This does not seem to be apparent in photographs or on the few adults I have seen.

I checked tadpoles of the latter species and found that the four pale green spots appeared just as the fore-arms were developing; but within a matter of days, as they left the water and absorbed the tail, these became pale buff markings that were faint or barely detectable in most individuals. The situation would seem to be similar in the European Fire-bellied Toads in which the spots disappeared soon after they left the water.

I have not been able to check the Giant Fire-bellied Toad, *B. maxima*, but the pattern may be present on newly-metamorphosed young since Bray (1987) says that "The young toads resembled the adults closely but had many green markings on the back".

The young Oriental Fire-bellies also show a strong pattern and may have been the main influence on the hybrid pattern. They had four bold green spots, the lower pair tending to taper and diverge posteriorly. However, since the back rapidly turned green soon after metamorphosis the spotted pattern, which appeared to be still present and which fitted between the typical black markings, was concealed by a background of similar colour.

The overall occurrence suggests a protopattern; an ancestral pattern common to the genus and still genetically present, now disused except for its temporary occurrence at metamorphosis when it might possibly have a cryptic function in aiding the concealment of tiny toads at a very vulnerable stage.

I am intrigued by an apparent parallel with a study I once made of a pattern component in bird plumage. Paired green neck streaks are present on the males of many species of ducks, they occur in some hybrids even when the parent species show no visible evidence of them, they are important as part of the display plumage of a few species, and also occur on the head of the Mallard, *Anas platyrhynchos*, where they are lost in a background of similar colour but revealed by differential feather fluffing in some epigamic displays.

Another pattern noted during tadpole-rearing was that of the European Treefrog, *Hyla arborea*. Here the tadpoles, just prior to metamorphosis, showed a lighter brown back with a sparse scattering of irregular black spots. After metamorphosis these spots tended to persist for a while after the frogs had turned green, varying between individuals but becoming smaller and less distinct with growth. In frogs of 2-3 cm body and head length they were still apparent on some individuals.

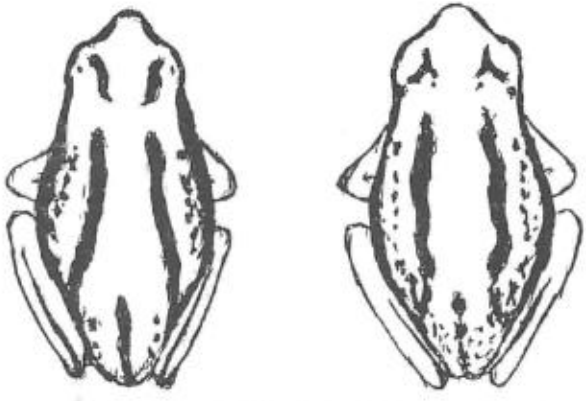

FIG. 1. Markings on treefrogs, *Hyla arborea*. See Addendum below, for explanation.

Arnold and Burton (1978) mention and illustrate the presence of dark spots on adults of the subspecies *H. a. sarda* from some western Mediterranean islands. They also state the Stripeless Treefrog, *H. meridionalis*, of southern Europe may have small dark spots.

As with the markings on juvenile *Bombina* it could be suggested that they had a function in increasing crypsis at the stage when the young might be on the ground or among lower and more mixed herbage. However, although these markings may appear random at first sight they tend to be aligned along tracts from the hinder edge of the orbit to the groin on either side of the body, and a few may be along the mid-line. This arrangement suggests the possibility that they are relics of an earlier striped pattern.

In their present occurrence these patterns may be of some interest to keepers of amphibians as something they may observe that is rarely commented upon in publications, but might also be of greater interest in that they appear to be inherent characters with some degree of individual variation that might give rise to more boldy-marked strains during captive breeding.

ADDENDUM

After completing the above comments on pattern, and sending them off, I was delighted to find in a shop some treefrogs that appeared to back up my hypothesis. They were described as of Portuguese origin, apparently an Iberian population of *Hyla arborea*. Although shown to similar scale the one on the left in the diagram is c. 2.5 cm head and body length, the right-hand one c. 1.5 cm. Both were in a dull brown colour phase with blackish striping. There are paired stripes from above the eyes to the hind-flan k, interrupted on the neck. There is a short stripe on the lower mid-back. Within a few days the larger frog turned bright green, the stripes becoming dark green and increasingly indistinct. However, the row of small pots on each side, which look as though they might have made a short stripe, persisted in the green phase as black spots above the irregular black line along the side of the body that is typical of the species.

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DEFENSIVE REFLEXES IN NEWTS OF THE GENUS *TRITURUS*

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In March 1989 I found a female Warty Newt *(Triturus cristatus)* on land returning to her home breeding pond. She was about to enter a gap in a dry-stone wall, so I gently pulled her back by the tail. When I released her she exhibited what can only be described as a defensive reflex. The tail was curled into a tight coil and the head and tail were bent towards each other over the back. The flank between the head and tail was turned upward exposing the orange belly. The eyes were closed and the foul smell released. This extraordinary position was held for about ninety seconds. She then relaxed and moved off into the wall. This reaction suggests that the purpose of the bright underside of this species could be related to deterring predators on land (possibly in daylight). A small predator at ground level would be shown a large area of the underside during this reflex, but presumably could only see it in daylight. The newt responded in this way at night but did have a torch shone at her during the encounter. The tail coiling and head bending response is probably related to reducing the area at which predators can grab or peck (the tail may be particularly vulnerable). I have regularly seen newts bend the head back over the body when handled, but can find no mention of tail coiling.

In May 1989 I found a newt eft (probably a Palmate) crossing a mettled road at Woolmer in Hampshire. On being torched the eft raised its tail to a near vertical position. The head was also raised up and both head and tail were pointed skyward for a few seconds before the eft moved off. I can only add that if a would be predator was as surprised as I was by this response, he may have been confused enough to end his investigation!

NOTES ON THE GENUS *ATHERIS* (FAMILY : VIPERIDAE)

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INTRODUCTION

The genus *Atheris* comprises a fascinating group of arboreal vipers distributed widely throughout tropical Africa. Many forms have been described but currently nine species are recognised (Welch, 1982) and subspecies have been defined for *A. squamiger* and *A. nitschei.*

Unfortunately, there is very little published information about this genus. Most studies have been directed largely at identification, habitat and distribution, with short references or assumptions being made on feeding habits, venom toxicity and breeding.

The list of species (Welch, 1982) includes: *A. hispidus* Laurent (1955), the longest and most slender of this group, occurring throughout Zaire, south east Ruwenzori, possibly extreme south west Uganda and western Kenya. Their scales are narrower and more elongate than in the other species, the keels are exaggerated, elongate and incurved, becoming spine-like particularly around the head and anterior body and giving rise to an almost hairy or bristly appearance. Typical colouration is a yellow/green with a light green venter (Pitman, 1974); Laurent (1956) also gives a detailed description of this species. *A. chlorechis* Schegel (1855) the most westerly form, occurring in Guinea, Sierra Leone, east to Cameroon, is pale green in colour with faint banded patterns (Love, 1988). *A. desaixi* Ashe (1968) of which very few specimens have been found, has a limited distribution in Kenya. It is a most attractive animal with dark green scales, each tipped with green/yellow, creating a speckled effect over the head and neck and developing into zig-zag type markings towards the tail. *A. ceratophorus* Werner (1895) occurs in the Usumbara Mountains, Tanzania; *A. hindii* Boulenger (1910), the Kinangop and Aberdare Mountains, Kenya and *A. katangensis* Witte (1953), Zaire. The most southerly form is *A. superciliaris,* occurring in Mozambique, up the Zambesi River to Lake Malawi and southern Tanzania. It is quite distinct from the other species, characterised by its large supraocular scales. Typical colour is greyish-brown with 3 rows of darker blotches broken up by a series of yellow dashes, which form an interrupted lateral line. The venter is pale greyish-white and it has dark chevron markings to the head. It is thought to inhabit rodent burrows, emerging at night to feed (Branch, 1988; Sweeney, 1971).

In the following account, I have concentrated on the remaining two and most closely studied species, *A. squamiger* and *A. nitschei* respectively, reviewing published information and incorporating observations on *A. nitschei* in captivity.

DESCRIPTION

Atheris squamiger Hallowell (1854): A small viper reaching an average length of 46cm. Pitman (1974) recorded a maximum length of 78cm and generally found females to be larger than males. Stucki-Stern, (1979) recorded maximum lengths of 55cm, 48cm and 53cm for 'standard', 'forest region' and 'grass-field' specimens respectively and the largest example measured by Laurent (1956) was 49.4cm (7.8cm tail), female. One female specimen which I examined measured 37.5cm from snout to tip of tail; it had died giving birth to 7 fully developed but dead young which each weighed approximately 2g.

The head is broad and flat, noticeably distinct from the neck and covered with small keeled scales. The dorsal scales are also lightly keeled. The body is moderately robust and laterally compressed (Isemonger, 1962) and the tail is short and strongly prehensile.

Colour: Normally various shades of green, bluish green or light olive, scales often tipped/ speckled with yellow giving rise to a light chevron pattern (Pitman, 1974; Laurent, 1956), with dull, light greenish or yellowish venter and sometimes yellow throat and usually a whitish tip to the tail; occasionally yellow or reddish specimens (Love, 1988; Mehrtens, 1987). My specimen was green/blue with faint brown and whitish chevron markings and a green venter.

The subspecies, *A. squamiger robustus*, was first described by Laurent (1956) as a proportionally larger animal to the nominate race but with a smaller number of subcaudals. He examined specimens from Nioka and Blukwa in Zaire and points out that at first sight the two specimens from Nioka closely resembled *A. nitschei* in colour and pattern but were nearer in shape to *A. squamiger* and on closer examination of the scales found that the counts were more fitting to those of *A. squamiger* (see Table 1). He also notes a greater number of labials and only one row of scales between the eye and the upper labials where there are two in *A. squamiger.*

Atheris nitschei Tornier (1902): reaches an average length of 60cm, Laurent (1956) records a maximum length of 65.6cm (tail, 10.3cm) male, and 69.7cm (tail, 11.2cm), female. I have found the females to be generally larger and more robust than males. A wild caught gravid female in my care produced 13 live young and although these were not weighed at the time, they were slightly larger than the baby *A. squamiger* described above.

They have broad, flat heads of more angular shape than *squamiger*, conspicuously distinct from the neck and again show the typical keeled scales that are characteristic of the genus. The last four upper labials are also slightly keeled (Pitman, 1974). The body is quite slender and the tail is strongly prehensile.

Colour: greens, from quite dull yellowish green through to brighter shades with distinct broad black zig-zags and paler green to creamy venter. There is usually a distinct or blotchy inverted 'A' centrally positioned on top of the head. The anterior of the head scales are margined with varying amounts of black and also the keels are black. The babies are slate-grey when born (also described by Love, 1988) with ivory white tipped tails.

Bogert (1940) described the subspecies, *Atheris nitschei rungweensis* as a green snake with symmetrical yellow markings on a green background instead of the typical black markings, this being the main distinguishing feature, together with a slightly differing scale count from the nominate race (Pitman, 1974).

SCALATION

Scalation is covered in detail by Pitman (1974), Stucki-Stern (1979) and in particular Laurent (1956). It is interesting to note that Laurent gives results for numerous specimens of *A. nitschei* collected from many different localities over a wide area and on summarising his results it can be seen that there is great variation in the scale counts, perhaps indicating a wide clinal variation in this species. Pitman also mentions that his results have been derived from some 160 specimens. (See Table 1).

HABITAT AND DISTRIBUTION

Atheris frequent forests and swamps and usually occur at higher elevations. The discontinuity of these areas results in the discontinuous distribution of the Tree-Vipers. Where they do occur they are usually common, suggesting that they are very local but widespread in suitable habitats. It is probably due to this discontinuity and the probable existence of clinal varients (see Scalation), that their taxonomy is confusing (Foster Vesey-Fitzgerald, 1975).

A. squamiger has the widest distribution of this genus, occurring throughout the main area of African rain forest, Togo, Cameroon and the Republic of Zaire, Gabon and southerly to Angola, easterly to Uganda as far as western Kenya but is thought to be absent in Liberia. According to Pitman (1974) it is thought to be widely distributed throughout the Uganda primary forests – Mt. Elgon to Budongo Forest, Mabira Forest and lake shore forests – Victoria Nyanza, to Southwest Kigezi, and eastern slopes of the Ruwenzori Mountains which straddle the equatorial border between Uganda and Zaire. He adds that in this area the material was not examined and could refer to the subspecies *A. robustus* described by Laurent (1956) also from a limited region – Ituri Forest.

A. nitschei is restricted to elevated regions, western Uganda (common on the lower eastern slopes of the Ruwenzori Mountains) especially Mobuku Valley, abundant southwestern Kigezi, swamp regions Lakes Bunyonyi, Mutanda and Mureyhe, southwesterly from Ruwenzori,

PLATE 1. *A. nitschei* illustrating keeled-scales and distinctive "A" marking on top of head.

PLATE 2. *A. nitschei.* This specimen predominantly green in colour with fewer black markings.

Table 1. Scale Counts.

A. squamiger

	Sex	Ventrals	Sub-caudals	Mid-body Scalerows	Upper Labials	Lower Labials	Anal
PITMAN	N.D.	148-175	40-65	15-25	8-12	9-13	entire
STUCKI-STERN	N.D.	standard 153-173	45-65 single	15-25	9-12	N.D.	entire
	N.D.	forest reg 171	52 single	17	9	N.D.	entire
	N.D.	grassfield 168	58 single	21	9	N.D.	N.D.
LAURENT	♂ 3	152-154	58-60	18-19	9-10	11	N.D.
	♀ 2	152-157	49	19-21	10-11	10-12	N.D.
POOK	♀ 1	157	49 single	N.D.	10	12	entire

I also recorded the following additional measurements: head – 20 mm at widest point, length 30mm, depth 10mm (rear); diameter of eye 5mm; length of fang 5mm. N.D. = Not determined.

A. robustus

LAURENT	♀ 1	155	42	21	10-11	13	N.D.

A. nitschei

PITMAN		141-162	35-49	22-32	8-13	9-15	N.D.
LAURENT	♂ 42	143-160 ($\bar{x}$ 151)	41-59 ($\bar{x}$ 49)	23-38 ($\bar{x}$ 25)	9-13 ($\bar{x}$ 10)	9-15 ($\bar{x}$ 11)	N.D.
	♀ 42	141-159 ($\bar{x}$ 153)	38-49 ($\bar{x}$ 42)	25-31 ($\bar{x}$ 27)	8-13 ($\bar{x}$ 10)	11-15 ($\bar{x}$ 12)	N.D.
POOK	♂ 1	150	49	24	12	13	entire
	♂ 1	148	47	25	10	9	entire

A. nitschei rungweensis

LOVERIDGE	N.D.	156-164	49-58	27-31	10-12	N.D.	entire

Rwanda-Burundi and northwestern Tanzania. The Uganda habitat tends to be to a greater extent Papyrus, phragmites swamps, riverine elephant grass, to a lesser extent scrub, elevated valleys and montane forest up to bamboo zone (Pitman, 1974). Numerous localities are listed for both species by Pitman and Laurent. *A. nitschei rungweensis* is restricted to the Rungwe Mountains, Tanzania. Loveridge recorded the first findings in northwest Nyasaland on the fringes of the Matipa forest.

FEEDING

According to Pitman (1974), he himself, Loveridge and Ionides found a mammalian preference of small rodents. Stucki-Stern (1979)-records tree frogs, lizards, small mammals but has no records that they take birds or bird eggs.

Pitman also records chameleons, lizards and pigmy mice for *A. nitschei.* Loveridge (1953) has witnessed *A. nitschei rungweensis* eating cricket frogs which form the main part of its diet and are abundant in its habitat.

I have always fed pre-killed weaned mice but this is not always favourable (see Love, 1988). Some animals tend to be reluctant to strike and I have often found that when offered food they stubbornly cling to the branch and flick their heads before taking off at speed in the opposite direction, negotiating adeptly the finest of branches – I have often held a food item to the animal's lips and teased it considerably without a single bite. Striking is more easily encouraged in a more confined situation. The eventual bite response is quick, direct and often out of aggression or in defense but at this stage they will often hold onto the food and proceed to swallow it providing that there are no distractions. After a few feeds, most specimens seem to familiarise with the smell of the food and will accept it quite readily. I have two animals which need to be teased for several minutes before they will feed; this may be stressful to them but results in regular feeding and healthy animals.

Wild caught adults are also reluctant to drink from a water bowl and need to be sprayed frequently. They are often stimulated by a short spray and will then roam the cage sipping droplets and start drinking from puddles or the water bowl if they come across it (also described by Love, 1988).

Of our 13 young, all had taken a mouse "pinky" within one week. They often wriggled the white tips of their tails in maggot-like motion when offered food or disturbed and often reacted quite defensively, winding their bodies backwards and threatening with their mouths wide agape before striking.

ACKNOWLEDGEMENTS

I would like to thank Chris Wild for his help and influence in establishing the captive group of *Atheris nitschei* described in this article. Thanks to Jon Coote for supplying the photographs.

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BRITISH HERPETOLOGICAL SOCIETY (FOUNDED 1947) RULES
(amended 1988, 1990)

1. TITLE. The Society shall be called the BRITISH HERPETOLOGICAL SOCIETY (BHS).

2. OBJECTS. The promotion of the study and protection (including conservation through education and captive breeding) of amphibians and reptiles, particularly the European species.

3. MEMBERSHIP. Membership of the Society is open to all interested in the different aspects of herpetology.

4. SUBSCRIPTION

(a) The annual subscription, due on 1st January, shall be determined by the Council, which may alter it at any time, normally making any proposed change known to Members at the Annual General Meeting previous to the change. Institutional and Library Subscription Membership fees will also be determined by the Council.

(b) The subscription will include Society publications and should be paid before the end of the taxation year (6th April) at which time thereafter, otherwise, a reminder will be sent. Publications will be forwarded upon receipt of the subscription. A Member who fails to pay the subscription by 30th June shall cease to be a Member, but will receive a final reminder stating that his or her name will be restored to the Members' List by payment of the subscription.

(c) **Institutional and Library Subscriptions.** Institutional and Library subscribers may be unlimited in number and their annual subscription shall be greater than the Ordinary membership subscription, as determined by Council from time to time.

5. CATEGORIES OF MEMBERSHIP

(a) **Ordinary Membership.** The Society shall consist of an unlimited number of Ordinary Members resident in any country. Every Ordinary Member shall pay an annual subscription unless joining after September, in which case the sum for that year will be halved. Payment of the subscription implies acceptance of the Society's Rules. Membership for persons over the age of 65 shall, upon application, be half the Ordinary Membership fee.

If a Member, in the opinion of the Council, acts in a manner injurious to the interests or good name of the Society, the Chairman or his deputy will be directed to contact that Member, stating the nature of the alleged offence and asking for an explanation. The Council shall than allow **28** days for a reply or for a request from the Member to appear before Council. If the Council decides that the Member's explanation made in writing or verbally is unsatisfactory, it shall have the power to remove his or her name from the Society's List.

Honorary Membership. Persons who have rendered outstanding service to the Society or to herpetology are eligible for election as Honorary Members on the nomination of Council. Apart from Past Presidents such members shall not exceed **10** in number; they will receive all privileges of Ordinary Members and will be able to purchase Society publications at rates determined by Council.

(b) **Family Membership.** This will be at a rate set by Council, normally 1½ times the Ordinary Membership rate. Family Membership includes all members of a family (a family is defined as up to 2 adults and unlimited numbers of children below the age of 18) in Ordinary and Junior categories as appropriate, and entitles attendance at meetings. Families receive a single copy of each publication of the *Journal* and *Bulletin*, and of the *J. Herps Newsletter* if the family includes one or more junior members. Other qualifications apply as in 5(a), except that both adults may vote at General Meetings.

Junior Membership. Schoolchildren up to the age of **17** are eligible to join the Junior Section of the Society on payment of an annual subscription determined by Council. Council may require proof of age.

Junior Members will receive the *J. Herps Newsletter* plus the *Bulletin* and are eligible to participate in any Junior Section meetings or projects that may from time to time be organised by the Education Officer. Junior Members do not receive the *Journal*, but can purchase that at a subscription rate decided by Council.

Junior Members may attend ordinary Society meetings.

Junior Members may be expelled from the Junior Section if, in the opinion of the Council, they act in a manner likely to be injurious to the good name, interests or aims of the Society.

6. COUNCIL

(a) **Composition.** The business of the Society shall be conducted by a Council consisting of Officers of the Society and other Members. The Officers will be the President, Vice-President (immediately retiring President for the period of one year), Chairman, Membership Secretary, Treasurer, Editor of the *Journal*, Librarian, Editor or co-editors of the *Bulletin* and Education Officer. Other Members of the Council shall be Chairmen of Committees and Sections, regional Branches and Associations, and Specialist Groups, and six elected or co-opted Ordinary Members. Ordinary Members shall not serve on the Council for more than **three** consecutive years. If without due reason or explanation an Officer or Ordinary Member fails to attend **three** consecutive Council Meetings, he or she will be deemed to have lost interest and resigned if no explanation in response to a written enquiry is received.

(b) **Powers.** The Council shall meet not less than **three** times yearly as and when necessary. A quorum shall be **seven** Council Members. The Council shall have the power to suspend any Officer by a majority vote of three quarters of the Council Membership, following which a decision shall be made at a General Meeting to be called within 30 days if requested by the Officer concerned. In the event of a vacancy occurring between two Annual General Meetings, Council shall have the power to appoint a substitute to serve until a new election can be made at an Annual General Meeting or at an Extraordinary General Meeting.

(c) **The President.** The President shall be elected by the Council and will serve for a period of **five** years. He may stand for re-election against other candidates proposed by the Council or by Ordinary Members.

(d) **Other Council Members.** Other Officers and Ordinary Council Members shall be elected at an Annual General Meeting (AGM). The names of nominees of the Council for election or re-election shall be circulated not less than **45** days beforehand. Ordinary Members may put forward other candidates whose nominations, signed by at least two members and the candidate, must reach the Chairman 30 days before the AGM. In default of other proposals, Members recommended by the Council shall be deemed to have been elected. Only members who have been subscribers to the Society at the time ballot papers are circulated are entitled to vote. If alternative proposals have been submitted, the names of all candidates shall be circulated to all Members at least **10** days before an AGM when an election shall be held. A Member unable to be present at the AGM may record his or her vote by sending it in a sealed envelope to the Chairman, signed and marked "Ballot Paper". Such envelopes are to be opened by the AGM Chairman and the ballot paper handed to the scrutineers.

(e) **Deputies.** The Council may appoint a deputy or assistant to act for any Officer for an unspecified period.

(f) **Officials.** The Council shall have the power to appoint Officials (by a majority vote of two-thirds of Council membership) to undertake specified tasks on behalf of the Society. Such Officials may be honorary or paid. No Official shall *ex officio* have a seat on Council, but may be required to attend Council Meetings as part of his/her recognised duties.

7. DUTIES OF COUNCIL OFFICERS

(a) **Chairman.** The Chairman will be the Society's chairman in the absence of the President and will be responsible for co-ordinating the Society's activities with the assistance of other Council Members to whom he may turn. He will organise the talks to be given at Meetings and will appoint Deputy Chairmen, as necessary, who will be responsible for ensuring a vote of thanks is proposed for speakers on behalf of the Society and that minutes are taken for each meeting, chairing the meeting themselves in the absence or instead of the President or Chairman. The Chairman will liaise between Officers of the Council, ordinary Council Members, Ordinary Members and representatives of other Societies, being involved with the Society's external relationships with other Bodies.

(b) **Membership Secretary.** The Membership Secretary will be responsible for receiving the Society's mail. He or she will keep an up-to-date list of Members and their addresses, recording the date when they first joined the Society and providing outline information on their interests. He or she will deal with enquiries, passing them to deputies as necessary, and will co-ordinate the Society's administration, including booking dates for the meetings, liaising closely with the Treasurer and taking minutes at Council meetings, should the Chairman be in the chair, and at the AGM. He or she should seek the assistance of Members outside the Council for the administrative duties involved, especially in connection with the distribution of the Society's

publications, organising sub-committees as necessary. He or she will be a Member of the Society's Secretariat (administration committee).

(c) **Treasurer.** The Treasurer's duties will be to maintain books of accounts, control the receipt and payment of cash, liaise with the society's Bank, ensure annual accounts are prepared, maintain an up-to-date list of fully paid-up Members, prepare lists of subscriptions due and send reminders to Members as specified in Rule 4, budget for future expenditure, present up-to-date financial returns at Council meetings or, after notice, when required and confirm the Annual Accounts Statements with two Auditors, who are Members of the Society but not Members of the Council. He will be a member of the society's Secretariat.

(d) **Editors of the *Journal* and *Bulletin*.** On behalf of the Council, the Editors will be responsible for all matters connected with the publishing of the *Journal* and *Bulletin*, appointing editorial assistants or editorial sub-committees as appropriate.

(e) **Librarian.** The Librarian will be responsible for all matters connected with the Society's Library and publications. He or she can seek the assistance of other Members for the duties involved, especially for the sales of the Society's publications. He or she will draw-up a separate set of rules for the use of the Society's Library, liaising with the Librarian of the Linnean Society of London, where the Library is housed, as necessary.

(f) **Education Officer.** The principal duty of the Education Officer shall be to take responsibility for the running of the Junior Section of the Society. This responsibility entails the production and distribution of the *J. Herps Newsletter* three times a year, the distribution of the *Bulletin* to Members of the Junior Section, the running of the stamped-addressed-envelope Advisory Service for *J. Herps.* and the organisation, if possible, of occasional meetings for Junior Members.

The Education Officer shall prepare an annual report of his or her activities and expenditure which will be presented at each AGM and published in the *Bulletin* following.
The Education Officer may solicit the aid of other Members when needed.

8. MEETINGS. The Society shall normally hold eight Meetings during the year which will include talks on a wide range of subjects of herpetology.

9. ANNUAL GENERAL MEETING. The Annual General Meeting shall take place before the end of the taxation year in late March or early April. The business transacted shall be the passing of the accounts for the previous year, the adoption of the Annual Report of the Council, including the regulation of the editing of the *Journal* and *Bulletin*, the election of the Officers and Members of Council, reports of the work of the Committees and Sub-Committees, Sections, Regional Branches, Associations and Specialist Groups, and any business for which due notice has been given to the Chairman, including a change in the Rules of the Society.

10. EXTRAORDINARY GENERAL MEETING. An Extraordinary General Meeting may be summoned by the Council or by not less than five members of the Society on a written request addressed to the Chairman. During this meeting, the business for which it was convened shall alone be discussed. When calling a special general meeting on any application, the Chairman shall allow at least **14** days to intervene between the date of issue of the notices and the date fixed for the meeting. Should the date selected, upon agreement, coincide with a meeting of the Society, the subject matter of that meeting will follow the business for which the Extraordinary General Meeting was called. Otherwise, the meeting shall be held in London within **30** days of the receipt of the original request by the Chairman.

11. COMMITTEES AND SUB-COMMITTEES. The Council shall have the power to appoint Committees and Sub-Committees for special purposes. Membership of such Committees and Sub-Committee shall normally be restricted to Members of the Society. The period of office for all Members of Committees and Sub-Committees shall expire at the Annual General Meeting, but may be renewed by the Council then elected. Any Member of Council may attend a meeting of a Committee or a Sub-Committee, but shall not have a vote unless he has been appointed a Member of that Committee or Sub-Committee.

12. REGIONAL BRANCHES AND ASSOCIATIONS, SPECIALIST GROUPS. Regional Branches and Associations, and Specialist Groups, collectively considered as Branches, can be approved by the Council, any person being permitted to join any Branch wherever he or she may reside. The British Herpetological Society is a National Society and recognises a regional herpetological need.

A Branch shall accept, in general, the objects of the Society.

A Branch shall become self-supporting financially, organise its own programme and select its own body of Officers. Meeting fixtures should not coincide with those of the main Society, but may be held on behalf of the Society.

Branch membership shall normally be restricted to those already Members of the Society.

Any major changes in policy of a Branch shall be subject to approval of the Council.

13. ALTERATIONS TO THE RULES. Any alterations or changes in the Rules may be adopted by two-thirds of the Members present at an Annual General Meeting or at an Extraordinary General Meeting convened for the purpose. The proposed change(s) must be stated in the circular convening the meeting and none which would cause the Society to cease to be charitable in law.

14. DISSOLUTION OF THE SOCIETY. In the event of the termination of the Society, any assets remaining should be made over to a charitable institution with similar objects.

BRITISH HERPETOLOGICAL SOCIETY COUNCIL 1990/91

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