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THE BRITISH HERPETOLOGICAL SOCIETY

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THE BRITISH HERPETOLOGICAL SOCIETY

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The British Herpetological Society was founded in 1947 by a group of well-known naturalists, with the broad aim of catering for all interests in reptiles and amphibians. Four particular areas of activity have developed within the Society:

The Captive Breeding Committee is actively involved in promoting the captive breeding and responsible husbandry of reptiles and amphibians. It also and advises on aspects of national and international legislation affecting the keeping, breeding, farming and substainable utilisation of reptiles and amphibians. Special meetings are held and publications produced to fulfill these aims.

The Conservation Committee is actively engaged in field study, conservation management and political lobbying with a view to improving the status and future prospects of our native British species. It is the accepted authority on reptile and amphibian conservation in the UK, works in close collaboration with the Herpetological Conservation Trust and has an advisory role to Nature Conservancy Councils (the statutory government bodies). A number of nature reserves are owned or leased, and all Society Members are encouraged to become involved in habitat management.

The Education Committee promotes all aspects of the Society through the Media, schools, lectures, field trips and displays. It also runs the junior section of the Society – THE YOUNG HERPETOLOGISTS CLUB (YHC). YHC Members receive their own newsletter and, among other activities, are invited to participate in an annual "camp" arranged in an area of outstanding herpetological interest.

The Research Committee includes professional scientists within the ranks of the Society, organises scientific meetings on amphibian and reptile biology and promotes The Herpetological Journal, the Society's scientific publication.

Meetings
A number of meetings and events take place throughout the year, covering a wide range of interests.

Publications
The BHS Bulletin, Herpetological Journal and YHC Newsletter are all produced quarterly. There are in addition a number of specialised publications available to Members and produced by the various Committees, such as notes on the care of species in captivity, books and conservation leaflets.

Subscriptions
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Correspondence, Membership applications, subscription renewals and purchase orders for publications should be addressed to the Secretary (address as at page top) EXCEPT for YHC matters. YHC Membership and renewal details are available from the Education Officer (address on inside of back cover). PLEASE INCLUDE A STAMP-ADDRESSED ENVELOPE WHEN WRITING TO THE SOCIETY.

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
Simon Townson and Neill Clark.
Contributions and correspondence arising from the Bulletin should be sent to:
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FRONT COVER Roosting female Western Pygmy Chamaeleon *Rhampholeon spectrum* from Mount Kupe, Cameroon. Photo by Chris Wild.

EDITORIAL

For the first time in many years, the list of BHS meetings has been usurped from its traditional front page slot, and replaced by a note from your Editors, (the meetings are overleaf).

This *Bulletin* is rather late, ideally it should have been issued in October. However this was not possible with this edition simply because, until mid-September, we only had eleven pages of text, including advertisments.

Therefore the reason for this editorial, and for its' prominent location, is to enable us to ask for contributions, large or small. The BHS is the leading herpetological society in the country, and the *Bulletin* is the only means of communicating to the membership as a whole. Over the years it has established an enviable reputation, both for the quality of the articles, and its standard of production. This, however, is due solely to the members who write the articles.

Any contribution, long or short, on any herpetological subject will be considered. We are particularly keen to receive articles on husbandry and captive breeding, these have been lacking recently and the *Bulletin* has a strong tradition in this field, as reference to the Society's new book will testify. We will be pleased to receive short notes or observations, and particularly letters; judging by views expressed to the Editors recently some members may have found articles controversial.

Please turn on your WP, or pick up your pen, and send your articles and photos to us, to ensure the *Bulletin* retains its' respected position.

Neill Clark and Simon Townson

BRITISH HERPETOLOGICAL SOCIETY MEETINGS FOR 1995

PRELIMINARY TIMETABLE

Meetings are usually held at Birkbeck College, Malet Street, London WC1 or at New Denham Community Centre, Oxford Road (A4020), New Denham, Uxbridge, unless otherwise stated.

February 4th	Herpetofauna Recorders' Meeting 1995 (Details on separate leaflet)
February 18th	Hepetological Speakers Workshop, Birmingham. Details given separately in *Bulletin.*
March 18th	Annual General Meeting (Birkbeck) (i) Lee Brady (DICE): "Leeches, malaria & cyclones: studying chameleons in Madagascar". (ii) Ian Bride (DICE): "The welfare aspect to the retail pet trade in reptiles and amphibians". (iii) Mark Fisher (Sussex): "Conservation through commercialisation".
March 25th	Captive Breeding (Veterinary) Meeting.
April 8/9th	Joint Conservation/Education Meeting (Merseyside)
Mid May	Leapers & Creepers/visit to Beam Brook (Surrey.
May 27th	Captive Breeding Meeting: Chelonia. Paul Eversfield.
July 29th	Captive Breeding Meeting: Breeding reptiles commercially for the trade.
October 14th	October General Meeting (Birbeck College, 1 pm) (i) Stephen Divers (London): "Mortality and disease of imported royal pythons". (ii) Rob Quest (Heathrow): "Reptile imports". (iii) Mary Swan (Huntingdon): "Results from the National Amphibian Survey".
October 7th or 28th	Captive Breeding Meeting: Breeding monitor lizards.
December 2nd	Research Meeting (Birkbeck College, London)

Please note that further details concerning time and venue for most of these meetings will be published in the *Bulletin* as soon as they are available.

THE GOOD OLD/BAD OLD DAYS

A survey of reptile and amphibian species traded during the period 1948-1957

LEIGH GILLETT

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INTRODUCTION

During the Second World War, and for several years after, it can be presumed that there were rather few exotic reptiles and amphibians featuring in trade. The decade covered by this survey saw the resumption of relatively large-scale importation. In part 1 (which appeared in *Bulletin* No. 48), I reviewed the lizard species involved. Here, in part 2, I consider the snakes, and, in part 3 (due to be published in Bulletin No. 50), I will conclude with a look at the chelonians and crocodilians, and amphibians.

OBSERVATIONS

From a consideration of the lizards alone, a number of differences may be observed between what was offered for sale in the period under consideration and what is available at the present time. Firstly, and perhaps predictably, there seem to be very few captive-bred animals to be had between 1948 and 1957. The one exception, rather more surprisingly, was a chameleon *Chameleo bitaeniatus ellioti).*

Secondly, many species were being imported from Western Europe and Australia; conservation legislation has long since effectively ended trade with the latter and, more recently, reduced it considerably with respect to the former. South Africa also featured fairly strongly in this period before economic sanctions. (There are some indications that trade has increased again recently, following the political changes in that country). Very little came in from South America, though, and Asia was represented almost solely by India, with Southern China contributing a single species *(Gecko gecko).* The countries of the British Empire (or Commonwealth) were otherwise unrepresented.

A third difference, somewhat less obvious due to the effects of inflation over the last 40 or so years, is in the prices of animals; £16 for an Australian lizard *(Chlamydosaurus kingi)* would have been an unthinkable amount even to the most fanatical working class reptile enthusiast. On the other hand, £2/19- for 100 wall lizards *(Podarcis muralis)* seems to show that a massive discrepency existed between the monetary values of the more unusual, and of the "common", species.

In examining the snakes, similar patterns may be noticed. In addition, the number of poisonous species was greater than would be expected today, reflecting the fact that legislation concerning the keeping of "dangerous wild animals" had not been enacted at that time.

PART 2: SNAKES

Ablabophis rufulus	Brown water snake	South Africa	£1/10/-
Acanthophis antarticus	Death adder	Australia	£15
Agkistrodon contortrix contortrix	Water moccasin	Eastern USA	£5
Agkistrodon mokasen	Copperhead	Eastern USA	£5
Agkistrodon piscivorus	Cottonmouth moccasin	South-eastern USA	£5
Agkistrodon piscivorus leucostoma	Water moccasin	South-eastern USA	£5
Bitis arietans	Puff adder	Africa	£5
Bitis gabonica	Gaboon viper	Africa	£5
Bitis nasicornis	River Jack adder	Africa	£10
Boaedon lineatus	Brown house snake	South Africa	£2
Bothrops atrox	Fer-de-lance	South and Central America	£5
Bungarus candidus	Common krait	India	£5
Bungarus fasciatus	Banded krait	India	£5
Chlorophis hoplogaster	Southern green snake	South Africa	£2
Chlorophis natalensis	Natal green snake	South Africa	£3
Coluber anthicus	Snake	Central America	£1/10/-
Coluber asianus	Snake	Israel	£2/15/-
Coluber constrictor	American black racer		
Coluber jugularis	Dark green snake	Tel Aviv	£1/10/-
Coluber jugularis caspius	Caspian whip snake	Hungary	£1/10/-
Coluber najadum	Dahl's whip snake	Tel Aviv	£2/10/-
Coluber viridiflavus	European whip snake	France Italy	17/-
Coluber viridiflavus carbonarius	European whip snake	Italy	
Coluber viridiflavus viridiflavus	European whip snake	Sardinia	
Conophis lineatus	Road guarder	South and Central America	£4
Constrictor constrictor constrictor	Boa constrictor	South America	£5
Coronella austriaca	Smooth snake	France, Holland	7/-
Coronella girondica	Southern smooth snake	Spain	16/-
Crotalus sp.	Mexican green rattlesnake	South and Central America	£5
Crotalus adamanteus	Eastern diamond-backed rattlesnake	North America	£10
Crotalus atrox	Western diamond-backed rattlesnake	Texas	£4/15/-
Crotalus cerastes	Sidewinder, Horned rattlesnake	North America	£10
Crotalus confluentus	Prairie rattlesnake	North America	£10
Crotalus horridus	Timber rattlesnake	North America	£10
Crotalus viridis	Prairie rattlesnake	Texas	£5
Dasypeltis scabra	Egg-eating snake (unmarked)	Africa	£1/10/-
Dasypeltis scabra	Egg-eating snake (marked)	Africa	£2/10/-
Demansia textilis	Australian brown snake	Australia	

Denisonia superba	Australian copperhead	Australia	
Diadophis punctatus arnyi	Prairie ring-neck snake		10/-
Dispholidus typus	Boomslang	South Africa	£9
Drymarchon corais couperi	Indigo snake, Gopher snake	Everglades	£10
Elaphe guttata confinis	Corn snake	Texas	£1/5/-
Elaphe guttata emoryi	Corn snake	Utah	£1/5/-
Elaphe laeta	Prairie blotched chicken snake	Central America	£1
Elaphe longissima	Aesculapean snake	Hungary	£1
Elaphe obsoleta lindheimeri	Chicken snake	Central America, Texas	£2/15/-
Elaphe obsoleta spiloides	Chicken snake	USA	£4
Elaphe quatuorlineata	Four-lined snake		£3/10/-
Elaphe scalaris	Ladder snake	France, Spain	£1/5/-
Epicrates cenchris	Rainbow boa	Central and South America	£5/10/-
Epicrates striatus	Bahama Island boa constrictor		£10
Eunectes murinus	Anaconda	South America	£12
Haldea striatulata	Burrowing snake	Central America	15/-
Heterodon contortrix	Common hog-nosed snake	Central America	15/-
Heterodon contortrix kemerleryi	Hog-nosed snake	Central America	£1
Heterodon platyrhinos platyrhinos	Hog-nosed snake	Texas	£2/5/-
Hypsiglene ochrorhyncha	Snake	Central America	
Lachesis muta	Bushmaster	South and Central America	£30
Lampropeltis annulata	Tropical king snake	Central America	£4
Lampropeltis doliata	Milk snake	King County	£5
Lampropeltis getulus floridana	Florida king snake	Everglades	£10
Lampropeltis getulus holbrooki	Salt and pepper king snake	Mississippi	£4
Lampropeltis getulus yumensis	Arizona king snake	Arizona	£3/10/-
Lamprophis inornatus	Olive house snake		£10/10/-
Leimadophis albiventralis	Green snake	South America	£1
Leptodeira annulata	Night snake	Brazil	£1/8/-
Leptotyphops dulcis	Burrowing snake	Central America	10/-
Malpolon monspessulanus	Montpellier snake	Spain	£1/5/-
Masticophis flagivularis	Coachwhip snake	Central America	£3
Masticophis taeniatus schottii	Whip snake	Texas	£4
Micrurus fulvius tenere	Coral snake	USA	£5
Micrurus lemniscatus	Coral snake	South America	£2/10/-
Naja flava	Cape cobra	Africa	£8
Naja hannah	King cobra	India	£30
Naja naia	Indian cobra	India	£5
Natrix erythrogaster transversa	Yellow-bellied water snake	USA	£1/10/-
Natrix grahamii	Graham's water snake	Central America, USA	£1/5/-
Natrix maura	Viperine snake	France, Spain	8/-

Natrix natrix astreptophora	Spanish grass snake	Spain	6/-
Natrix natrix cetti	Sardinian grass snake	Sardinia	
Natrix natrix helvetica	Grass snake	South and Western Europe	£2/14/- per 100
Natrix natrix natrix	Central European grass snake		
Natrix natrix persa	Striped ring-necked snake	Hungary	8/-
Natrix rhombifera	Diamond-backed water snake	Central America, Texas	£1/10/-
Natrix sipedon confluens	Blanchard's water snake		£3
Natrix tesselata	Dice snake	Hungary, Italy, Tel Aviv	4/-
Natrix tesselata	Dice snake (black variety)	Hungary, Italy, Tel Aviv	10/-
Notechis scutatus	Tiger snake	Australia	£6
Opheodrys aestivus	Rough green snake	USA	£1/10/-
Opheodrys vernalis	Keeled green snake	Central America	£1/15/-
Oxybelis acuminatus	Green vine snake	South and Central America	£3
Philothamnus semivariegatus	Green bush snake	South Africa	£3
Pituophis melanoleucus melanoleucus	Pine snake	Texas	£4/10/-
Pseudaspis cana	Mole snake		£1/10/-
Pseudechis porphyriacus	Black snake	Australia	£10
Pseudoboa cloelia	Mussurana	South and Central America	£6
Python amethistinus	Amethyst python		
Python molurus	Indian rock python		
Python regius	African royal python	Africa	
Python sebae	African rock python	South Africa	£15
Python spilotes	Diamond Python		
Python spilotes variegata	Carpet python		
Python reticulatus	Regal python		£15
Rhinocheilus lecontes	Snake	Mexico	£3
Salvadora lineata	Snake	Mexico	£3
Sistrurus miliarius	Pygmy rattlesnake	North America	£5
Storeria dekayi	De Kay's brown snake	Central America, USA	£1
Tachymenis vivax	Cat snake		£1/10/-
Tantilla fumiceps	Snake	Central America	
Thamnophis elegans terrestris	Great Basin garter snake	USA	£1/10/-
Thamnophis maccyi	Garter snake		£1/5/-
Thamnophis marcianus	Garter snake	Texas	£1/5/-
Thamnophis ordinoides	Garter snake	Florida	£2/5/-
Thamnophis sauritus	Ribbon snake	USA	£1/8/-
Thamnophis sirtalis proximus	Garter snake	Texas	£1/5/-
Thamnophis sirtalis sirtalis	Garter snake	USA	16/-
Tropidoclonium lineatum	Ribbon snake		15/-
Vipera ammodytes	Horned viper	Europe	£1/10/-
Vipera aspis	Asp viper	France	£1/10/-
Vipera berus	Adder	Germany	3/6
Vipera russellii	Russell viper, Tic-plonga	India	£5
Vipera ursinii	Ursini's viper	Europe	£2

TREATMENT OF REDLEG IN TADPOLES OF *PLEURODELES*

ANDREW W. READ

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Tubifex Worms sometimes carry bacteria which are pathogenic in salamanders. When such worms are fed to salamanders which have not previously been exposed to the pathogenic bacteria, and which have not become resistant to them, disease symptoms can develop, often very rapidly. The disease symptoms I have seen myself often resemble the 'molchpest' described by Reichenbach-Klinke and Elkan where first the skin and then the muscle of the limbs and tail are destroyed. The symptoms usually develop very rapidly but the animal remains alive for many days. I have found this disease responds well to treatment with co-trimoxazole.

More unusual is the development of 'red-leg' which is not associated with the enormous tissue destruction of 'molchpest', but with general haemorrhage and haemolysis. These symptoms can develop suddenly with the animal collapsing and unable to move. I have successfully treated tadpoles of Pleurodeles, which showed no signs of life except heartbeat, with the following bath:-

10 parts treatment bath : 1 part tadpoles
NaCl 6g L^{-1}
Ciprofloxacin 12m g L^{-1}
Gentamycin 20mg L^{-1}
Nystatin 10000 Units L^{-1}
Amprolium 3-84% 1 part per 100
Vitamin K (Menadiol Sodium Diphosphate) 1 mg L^{-1}

Because of the haemolysis, respiration failure is often the cause of the collapse. The tadpoles were therefore kept in pure oxygen. High temperatures make respiration more difficult both because oxygen concentrations in mucus are reduced at high temperatures and because metabolism is generally increased at high temperatures. However, I found the tadpoles deteriorated at low temperatures, probably because these favoured the growth of the bacteria and reduced the tadpoles immune response. The tadpoles were kept in oxygen at 30°C. I observed recovery between one and twenty four hours.
Both Ciprofloxacin and Gentamycin are bactericidal, but only Ciprofloxacin will penetrate the tissues effectively.

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A CASE OF PREDATION ON *COLUBER RUBRICEPS* BY A SMYRNA KINGFISHER IN ISRAEL

HENK K. MIENIS

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On 30 May 1992, at 5.45 am, a small group of 7th grade school-children and the author witnessed a case of predation on a snake by a Smyrna or White-breasted kingfisher *Halcyon smyrnensis* (Linnaeus, 1758) in Kibbutz Netzer Sereni, Israel. While waiting for a bus near the back of the communal dining-room a Kingfisher landed on a low-tension powerline some ten meters from the group. The arrival of the Kingfisher did not cause a sensation because the lines are in daily use as a perch for a pair of those birds. It was just the fact that a wrigling snake was dangling from its bill that caused a near commotion.

In order to calm down the movements of the snake, the Kingfisher knocked it several times with considerable force against the powerline. This was followed by swallowing the snake head first. This whole event lasted about two minutes, then the bird flew away with the tail of the snake still dangling out of its bill.

This event happened so close by that it was possibel to recognize the victim as a Red-headed whip snake *Coluber rubriceps* (Venzmer, 1919), with a total length of about 25-30 cm.

Although snakes are included in the list of prey taken by Smyrna kingfishers in Israel (Paz, 1987: 162), the only specific records of predation on snakes are those by mienis (1980: 135) and Eshbol (1983: 146 and text-fig.) Both authors described a case of predation on the Diced watersmake *Natrix tessellata* (Laurenti, 1768).

Since the author has witnessed now two cases of predation on diurnal snakes by this Kingfisher in a time span of twelve years, this bird is most probably more often feeding on snakes than has presumed so far. Other records may therefore be expected in the future.

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LETTERS TO THE EDITORS

Dear Sir,

LEGAL PROTECTION OF EUROPEAN HERPS

I read with considerable interest Bringsøe & Bosch's paper on the legal protection of European herpetofauna in the Spring 94 issue of the Bulletin (number 47). While I agree with a majority of the points raised by Bringsøe & Bosch, I would like to raise a couple of points of my own.

Firstly, Bringsøe & Bosch mention *Triturus cristatus* as a species which is sufficiently abundant not to require special protection. While this may be true on the European Continent, it is certainly not the case in the British Isles. It would be unfortunate if a drive for homogeneous pan-European conservation legislation were to remove the special protection which this species currently enjoys under the Wildlife & Countryside Act 1981, simply by virtue of its abundance on the Continent.

The point here, I think, is that legislation at the European level is a not entirely suitable vehicle for the protection of herpetofauna. The protection of locally unusual species at a national or even local level is more appropriate in the case of relatively sedentary reptile and amphibian populations. This allows for the protection of species where they are rare without devaluing that protection by also extending it to locally abundant species which happen to be rare elsewhere in the same artificial administrative unit. After all, all species are rare on the fringes of their distributions.

The herpetofauna of the British Isles is a special case, since it has been isolated from that of European Continent for a considerable period of time, although not long enough for species to become endemic. There is no possibility (except human interference) of a species extinct in Britain being restocked from abundant Continental populations, besides which British populations, although usually not sub-species, are certainly genetically distinct from continental populations.

All the British herpetofaunal species are relatively abundant elsewhere in Europe. Are we to cease efforts to conserve them because there are plenty in Germany, France etc?

While Britain is an extreme case, being an island, the sedentary nature of herpetofaunal populations suggests that restocking of depleted areas will be slow at best, even on the Continent.

In short, isolated faunas (which herpetofaunas tend to be) are best protected by isolated legislation.

My second point is that I, as one of the maligned amateur herpetologists, have not succeeded in seeing either the text of the Directive or the species lists (Annex IV) and thus may be breaking the law unawares.

I have in my small captive collection a single specimen of *Chalcides ocellatus* which was legally purchased in 1991. From Arnold, Burton and Ovenden's guide I find that this species is present in Greece (although it also has a wide global distribution, I think my specimen may be African). From this I assume that this species is strictly protected within the EU under the 1993 Directive. Am I thus breaking EU law in keeping the animal? Do I need a licence? All of these possibilities were suggested in the Bulletin before the Directive appeared, but then nothing more. Nor have I encountered any mention of the Directive in any national newspaper or on radio.

Would it be possible for the B.H.S. Bulletin to publish the relevant parts of the Directive and Annexes for the information of members?

Yours faithfully,

Roy Niblett
Nether Hall, Hamilton Lane, Scraptoft, Leicester, LE7 9SU

Dear Sirs,

"FROG PLAGUE" IN COMMON FROGS AND RELATED SPECIES

In the *Bulletin* for Summer 1994 Geoff Riley queries whether the frog diseases affect Common Toads. We have now had evidence of the current "frog plague" in a small suburban garden with a number of ponds for two successive years.

In the garden some species can mix freely. Death has occurred in a number of Common Frogs *Rana temporalis*. In the current year when some of these were found dead, two Italian Agile Frogs *R. latastei* kept in a small greenhouse died in similar fashion. If the deaths were related then the closely related species of the "Brown Frog" or "Grass Frog" group within the genus *Rana* may be vulnerable.

A small number of Edible Frogs *R. esculenta* and Pool Frogs *R. lessonae* of the "Green Frog" or "Water Frog" species group have been mixing with the Common Frogs in two year without any losses, and we understand that this has been noted elsewhere.

Common Toads *B. bufo* and various newt species are also present and show no similar type of losses. However, when some Midwife Toads *Alytes obstreticans* had been present in 1993 two adults and a newly metamophosed young one were found dead in what looked like a similar fashion, although lesions of any type were not present. They therefore remain a query species, possibly vulnerable in this respect.

As regards the Common Frogs, about 18 pairs had bred in 1993. They dispersed and the tadpoles grew up. Some larger individuals remained around the ponds. From late July onwards deaths occurred among these larger frogs that were spending their time in and around water. Smaller individuals were occasionally seen around the garden but none was found dead.

Deaths were occurring until late September. In early October seven frogs, including one obviously sick one, were collected and put into a container with wet turf on the expectation that they would shortly die. They were the only ones apparently present in the garden. The sick one soon died and was removed. The others were still in apparent good health in February 1994 when an unexpected very cold night killed them.

With the losses in 1993 a breeding population in 1994 seemed doubtful. The population occupied a circumscribed group of continguous small back gardens. Unexpectedly some 50 pairs together with additional unmarked individuals assembled for breeding. While they were assembling one individual was found dead, and another during later dispersal. As usual a small number of adult individuals remained around the pools for the summer. The relatively small number and sparse distribution of these raises a mental query concerning some possible degree of territoriality. At the end of a hot period, in August and into early September when this is being written, there were a number of deaths of the type typical of the "Frog Plague", affecting these individuals.

Our present observations at this site suggest a lack of deaths in cold periods and among individuals away from water; and outbreaks of death occurring, of adults remaining in and around water, in hot weather in the latter part of the year.

Colin J. O. Harrison and Julian E. Bentley

SURVIVAL OF SOME CAPTIVE-REARED GREAT CRESTED NEWTS ON RELEASE INTO THE WILD

JOHN BAKER

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The captive rearing of great crested newts for release into either garden ponds or conservation areas has been considered as a potentially useful element of conservation strategy for this species (Whitten, 1990, Elebert, 1991). The present note reports the survival of newts that were reared in captivity, from wild caught eggs, and released back into their original population as adults.

Newt eggs were collected from a pond on the campus of the Open University, Milton Keynes, in 1988 so that larvae could be reared to allow a study of growth. This resulted in sixteen newts attaining sexual maturity in 1990. Sexual maturity can be reached more rapidly under captive conditions than in the wild (Elebert, 1991), but this is not the case here, because free-living newts have also been found to mature at two years at this particular study site (personal observation). The newts were released back into the pond of origin in January 1990. It was possible to assess the subsequent survival of these released newts, because of regular monitoring of the great crested newts at this site. To assess the survival of the captive-reared newts, their frequency of recapture was compared with that of adult great crested newts already present in the population. 53 adults from the wild population were captured at a drift fence as they migrated towards the breeding pond (7-2-90 to 20-3-90). Once the newts had entered the pond, the population was further sampled from 12-4-90 to 26-4-90, by capturing newts in funnel traps. Records of all newts were made by photocopying the belly patterns of animals that had been anaesthetized in a 1:1000 solution of MS-222, modifying Hagström's (1973) photographic technique for recognition of individual great crested newts.

During the course of their first aquatic season, survival of the captive-reared newts seems to be no different to that of the wild newts. Table 1 shows the number of newts from the captive-reared group and from the sample of wild newts, taken at the drift fence, that were recaptured in the pond. The proportion of captive-reared newts recaptured (38%) was similar to the proportion of the wild sample recaptured (42%), with no significant difference in the numbers of recaptured and unrecaptured newts between the two groups (X^2 = 0.82, 1 d.f., $p > 0.05$). To assess the survival of the captive-reared newts one and three years after release, the population was again intensively monitored in 1991 and 1993. The same trapping procedure was used in 1991, whilst in 1993 only funnel traps were used. After one year, the percentage of captive-reared newts that was recaptured dropped to 6%, compared to 64% of the wild newts (see Table 1). The difference in the proportion of recaptured to unrecaptured newts between the two groups is statistically significant, X^2 = 16.5, 1 d.f., $p < 0.001$. The recapture data three years after the release of the captive-reared individuals, repeat the pattern for 1991. Only 6% of the captive-reared newts were captured compared to 45% of the wild sample. The recaptures of captive-reared newts were again significantly lower than that of the wild sample, X^2 = 8.1, 1 d.f., $p < 0.01$.

TABLE 1. **Recaptures of newts over three** breeding seasons (1990-91 and **1993)**

	initial no. 1990	no. recaptured 1990	no. recaptured 1991	no. recaptured 1993
Captive-reared newts	16	6 (38%)	1 (6%)	1 (6%)
Wild newts	53	22 (42%)	34 (64%)	24 (45%)

The results of this monitoring show that a cohort of great crested newts, reared under captive conditions until maturity, and released back into its original population, exhibited much lower survival than the adults already present. The captive-reared newts disappeared from the population after their first terrestrial phase in the wild. I propose four, non-mutually exclusive, possible explanations for this reduced survival of the captive-reared stock. First, it is possible that some aspect of the captive-rearing regime had an adverse effect, reducing the vigour of the newts and lowering subsequent survival in the wild. Second, it is possible that captive rearing allowed individuals, that in nature would not have survived, to attain sexual maturity. Consequently these animals were unsuited to survival in the original habitat. Third, the captive-reared newts, although of similar size to the smallest wild newts captured, were smaller than most of the wild individuals. Snout-vent lengths of captive-bred males and females were 61-64 and 60-72 mm respectively. The smallest wild male and female captured measured 62.5 and 63 mm, but mean snout-vent lengths were 80.1 and 86.6 mm for males and females respectively. Hence, differences in body size could be related to the differential survival between the two groups. Fourthly, it is possible that the captive-reared newts were denied the opportunity to develop a spatial map of their terrestrial environment. The terrestrial habitat at this site does not appear to be particularly hospitable to newts. Moreover, it was noticeable that newts migrating to the pond tended to approach from the north, suggesting that the terrestrial habitat is not randomly occupied by overwintering newts. If newts do utilize a spatial map, then it is possible that those newts breeding in this pond are those that have successfully located favourable terrestrial overwintering sites. The disappearance of the captive-reared newts from the population may be due to their failure to locate suitable overwintering quarters.

The findings of this study raise questions pertinent to several issues in great crested newt conservation. If it is the case that the low survival of the artifically reared newts was due to some effect of the rearing regime, then this would suggest that captive rearing programmes should utilize ponds rather than aquaria in which to rear the 'captive stock'. If low survival was due to small body size, then this would also have implications for captive rearing schemes, namely that newts should be well-grown prior to release. If, however, newts do develop a spatial map of their terrestrial habitat, then this would bring into question the policy of translocation of newt populations. Unfamiliarity with the terrestrial habitat around a recipient pond may result in lowering adult survival. Translocation is a commonly used strategy for 'saving' populations of great crested newts in disputes over land development. However, the success of these translocations had not been sufficiently monitored to allow the effectiveness of the strategy to be fully evaluated (Oldham et al., 1991).

It should be feasible to answer the questions raised above. The individually recognisable belly patterns of this species and the relative ease with which a breeding population may be sampled make it possible to trace the long-term survival of individuals. Further

work on this species is needed to assess the survival of captive-reared and translocated great crested newts, and to investigate the terrestrial ranging of individuals.

ACKNOWLEDGEMENTS

I am grateful to Ken Hollinshead for allowing me to work at the Open University pond, to English Nature for issuing licences required to handle the newts, and to Tim Halliday for helpful comments.

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An Appeal on Behalf of the Education Committee

The YHC camp is just one of many events organized by the BHS Education Committee. Although the camp is run along very professional lines, in the past no one has been paid to do this. The smooth-running of the 1994 camp was in great part due to the voluntary efforts of a staff that boasts a diverse array of necessary skills, and in particular to the efforts of the Education Officer, Colin Fitzsimmons.

As well as the successful expansion and running of the YHC, the Education Committee is also involved in the promotion of reptiles and amphibians to the wider public. This has taken the form of manning stands at public events, media appearances, presentation of lectures, visits to school and youth groups, guided walks, field trips and workshops. Now that the BHS has a salaried Education Officer, our educational activities will be greatly expanded and enhanced. However, to obtain the most from the new appointment, money is needed to provide the resources required to support a full-time post. The Education Committee is currently seeking sponsorship to supply such finances, particularly with respect to providng a vehicle. Before it was finally laid to rest, Colin's 'C' registration Vauxhall Astra clocked up 150,000 miles, primarily as a result of a busy schedule of lectures and other events attended on behalf of the BHS.

If you can help with sponsorship or other funding, then please contact: Colin Fitzsimmons, 45 Sycamore Close, Creekmore, Poole, Dorset. Phone 0202 692378

Any sponsorship will be fully acknowledged

REPORT ON THE YHC ANNUAL CAMP

(May 28th-June 4th, 1994)

JOHN BAKER

(BHS Education Committee)

The Young Herpetologists Club annual camp is the highlight of a very full calendar of events. For a few days YHC members stay in an area of herpetological interest, where they are guided through a herping holiday that combines fun with education. This year saw a return to Dorset, where a new venue, Carey Outdoor Education Centre, was hired to accommodate the camp. The Education Centre is situated at a secluded location, just outside Wareham, and lies within easy reach of many of Britain's most important rare reptile sites. Since the Outdoor Education Centre, owned by Dorset County Council, is dedicated to providing school and youth groups with the accommodation and educational facilities necessary to such residential activities, it serves as a very suitable base for a YHC camp. The Centre provides tents, catering, a class room and recreational areas, and is staffed by teachers and other Dorset County Council employees.

The YHC Camp has now become so popular that two camps are run in succession. This also allows the camp participants to be split into two age groups; eight to twelve and thirteen to eighteen. Despite the age difference, both groups participated in a similar programme of events, which allowed over seventy participants to visit several nature reserves of herpetological interest, to be shown rare reptiles and amphibians and also to see a variety of outdoor vivaria. The programme included a walk over Studland Heath National Nature Reserve, led by the Reserve Warden, Rees Cox, a torchlight amphibian safari, a guided tour of the Forestry Commission's reptiliary, in The New Forest, led by Derek Thompson, and a visit to Marwell Zoo, to see vivaria that are home to one of the BHS's captive breeding projects. These vivaria are not open to public viewing, but Paul Edgar, from the BHS Conservation Committee, gave YHC members a tour, and explained the work being done breeding sand lizards, taken from doomed sites, and releasing their offspring at suitable recipient sites. Paul was also able to show members natterjack toads from a newly started venture that is intended to breed this species, also for a release programme.

The older age group also visited BP's Wytch Farm Oil Well, to learn about oil exploration, extraction and the consequences for the environment. The younger age group rescued slow worms from a doomed wasteland site, so that they could be released into a more secure environment. During this activity, and for the remainder of that day, YHC members were tailed by a BBC television crew, filming for the children's programme, *The Really Wild guide to Britain,* which was broadcast in July this year. Several YHC members were intereviewed by presenter, Janice Acquah.

At the end of their camp, YHC members left having seen all of Britain's rare herps, and most of the common ones, with the exception of the smooth newt. They had learned about the conservation problems of precious heathland habitat and also about field herpetology. YHC members John Lyons (13) and Martin Worth (12) were voted 'herpetologists of the camp' by staff and fellow members. In addition, the YHC members and the BHS staff had greatly enjoyed their visit to Dorset.

In organizing this Camp, Colin Fitzsimmons had drawn together a very strong staff team which was able to contribute a variety of essential skills. The Education Committee would like to thank the following for voluntarily giving their free time and professional skills to the camp: Julie Budgen, Rees Cox, Mary Denny, Paul Edgar, Martin Edser, Sue Flynn, Sean Flynn, Pete Gahan, Michelle Garner, Alan Kibblewhite, Robin Longman (BP), Richard Osmond, Paul Rooney, Steve Sharpe, Des Sussex, Harold Stone (Purbeck School Parents Committee) and Derek Thompson. We would also like to thank Helen Thompson, the Education Centre manager, and her staff for acting as our hosts.

MEMBERS' ADVERTISEMENTS

FOR SALE: Breeding Groups Musk Turtles. Common Musk £20 pair (3 pairs). Razorbacks £30 trio (2 males, 1 female). Loggerheads £30 trio (2 males, 1 female). Tel: York (0904) 704143.

Alien Amphibians in Wales: As an adjunct to the National Amphibian Survey of Wales being co-ordinated by Ben Proctor from the University of Cardiff Field Centre at Llysdinam, Newbridge-on-Wye, Powys, LD1 6NB, Ben would be interested in any records of alien amphibian populations in the Principality to add to the couple of *Xenopus* records currently to hand. Ben can be contacted at the above address or by phone on 01597 860308 (Fax 01597 860381).

Wanted: (i) Basoglu, M. & Baran, I. (1977 & 1980). *"The Reptiles of Turkey"*. Parts I & II. Eye Universitesi. IEN Fakultesi. Reports 76 & 81. Bornova, IZMIR. (ii) Smith, M.A. (1951). *"British Amphibians and Reptiles"*. New Naturalist, Collins. Stuart Campbell, 4 The Laurels, Moreton, Wirral, Merseyside L46 3SU. Telephone 051 677 7047 (home) 051 473 1110 Extn 151 (office).

Call for Faecal Samples: This unusual request comes about as part of a preliminary research programme aimed at understanding the relationship between importation of reptiles and the balance in the number of parasites in their intestinal tracts. This has involved studying the prevalence of parasites (ie. percentage of individuals infected) in wild reptiles, recently imported and petshop animals. The theory is that the number infected should rise after import then drop off during captivity. However, in order to make full sense of my results, I need faecal samples from animals (in particular lizards and amphibia) which have been in captivity for a known period of time greater than 6 months. I have already contacted a couple of BHS members with large collections and they have been very helpful in sending me samples.
To make up my study numbers, I am asking for anyone coming to the Ocotber 15th meeting (Birkbeck College, London) or November 5th meeting (New Denham Community Centre, Uxbridge), to bring fresh faecal samples along. Simply put an individual faecal sample in a small airtight pot (eg. a camera film container) the day before, and bring it along. I only need details of the species, how long since purchase (and where from) and whether the animals have been treated with any drugs. For my part, I will get back in touch with everyone who brings a sample and tell them what parasite eggs are present in their reptiles faeces.
If anyone wants more information, please contact me on 081-547 2000 x2476 or write to Dr. Peter Daszak, School of Life Sciences, Kingston University, Penrhyn Road, Kingston-upon-Thames, Surrey KT1 2EE.

Wanted: Marbled Newts *(Triturus marmoratus)* adults or juveniles. Will buy or exchange for captive bred Alpine Newts *(Triturus alpestris)* or Banded Newts *(Triturus vitatus)* all sizes. Ring Steve Haley on 0542 416022

For sale: Baby Boa Constrictors, offspring of a Surinam Red-Tail *(constrictor)* and a Colombian *(imperator)*. Beautifully marked and feeding well. Tel. Simon Townson 081-531 1378 or Chris Wallace 0277 821194. Also adult male Colombian available (ST).

PALAEONTOLOGICAL AND ARCHAEOLOGICAL EVIDENCE FOR TURTLES ON CYPRUS, WITH NEW INFORMATION ON LIVING TORTOISES

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INTRODUCTION

There are very few reports of turtle remains (terrestrial, fresh-water, or marine) from palaeontological or archaeological sites of any period on Cyprus. The available data is surveyed here. In this note we also present new evidence for wild terrestrial turtles (tortoises) on the island.

Cyprus has been an island for roughly 15 million years (Boekschoten and Sondaar 1972:333). As a result, all terrestrial (and fresh-water) animals have had to reach the island by swimming, drifting on floating vegetation or wood, or to have been imported by man.

Cyprus today does not have a large herpetofauna, and very little work has been done on them (Schätti and Sigg 1989; Osenegg 1989; Demetropoulos and Lambert 1986). No regional or national surveys have been undertaken, and no mapping data exists (Corbet 1989).

THE PALAEONTOLOGICAL EVIDENCE

Reed (1932) published on a Miocene fresh-water turtle, probably *Trionyx (Aspideretes)* sp., from 136 ft. below the surface in a water-shaft located 1.2 Km northwest of Peristerona village. It was identified by Dr. W. E. Swinton in 1932 and is number C.9182 in the Sedgwick Museum, University of Cambridge, where the catalogue entry records that it was collected by C.P. Manglis, is Miocene in date, and is represented by costal plate fragments (personal communication from M. Dorling to Reese, 6 February 1992).

Two Pleistocene turtle carapace fragments were found in 1969 by Boekschoten and Sondaar (1972) in the lignitic clay in the lake bottom deposit at Kythrea-*Kephalovrysi*. These bones are presently stored in the Faculteit Aardwetenschappen (Room W.324, Tray P58), Universiteit Utrecht, The Netherlands.

THE ARCHAEOLOGICAL EVIDENCE

There are nine turtle samples from the pre-Neolithic (ca. 8500 B.C.) site of Akrotiri-*Aetokremnos* on the south coast (analysis by Reese). Aceramic Neolithic Dhali-*Agridhi* yielded one tortoise femur (Croft 1989). Late Neolithic Ayios Epiktitos-*Vrysi* on the north coast produced 14 samples of a marine turtle (Legge 1982).

One small plastron fragment of a *Testudo* was found in Trench 9 (Koufos locality), Layer 47, in the Middle Cypriot III to Iron Age dump at Kalopsidha-*Tsaoudhi Chiftlik* in eastern Cyprus (Gejvall 1966). A *Testudo* carapace fragment was found in Tomb I (MC III-Late Cypriot [LC] I) at Toumba tou Skourou in the northwest (Vermeule and Wolsky, 1990, personal analysis by Reese).

LC IA (ca. 1650-1575 B.C.) Phlamoudhi-*Melissa* in the north yielded a polished turtle carapace fragment measuring 25.2 X 16.9 mm. (Hesse *et al.* 1975).

LC IIC (ca. 1300-1190 B.C.) Kition in the south produced a *Testudo graeca* carapace of an immature individual with a man-made hole in the centre of the shell (Reese 1985).

Enkomi in the east produced a broken but rather complete LC III (ca. 1220-1100 B.C.) *Testudo* carapace and attached plastron. The plastron has been cut at the anterior end (Spitzenberger, 1979) personal analysis by Reese). It was found in Area I, Well 3, Level 1740, and measures 14 cm. long and 11 cm. wide. The well is in the southwestern corner of Court 64 (Dikaios 1969:178).

Ten *Testudo* carapace fragments were found at LC III Hala Sultan Tekke in the Area 8 West Well F1750 at a depth of 7-8 m. (personal analysis by Reese).

THE RECENT EVIDENCE FOR TERRESTRIAL TURTLES

Unger and Kotschy (1865) report *Testudo marginata* as present on Cyprus. However, Boulenger (1888) queries this identification. Tortoises are not noted by other herpetologists who have worked on the island (Werner 1936; Birkenmeier 1953; Clark 1973; Schätti and Sigg 1989).

Demetropoulos and Hadjichristophorou (1981:13-14) found *Testudo graeca ibera* on Cyprus, but considered it to be a possible introduction. Reese (1985:409) noted that tortoises are not found on the island today.

Isolated specimens of *T. graeca ibera* and *T. marginata* have also been recorded by Demetropoulos and Lambert (1986) on the island since 1970. They also believed that these specimens probably arrived on Cyprus from Greece through translocation by Greek Cypriot residents and students who attended university on the mainland.

We can now report three specimens of *T. marginata* found in 1992 in the Eliades Mantarin orchard located one Km north of the city of Paphos. All three specimens were kept by the people who collected them; two later escaped into the area where they were collected. A fourth tortoise of the same species was found 1.5 Km north of this orchard in July 1993. Based on its much larger size, we believe that this was a fourth individual. This was the first time that such a large number of the same species of *Testudo* were found in one area, and may indicate that a small colony had established itself near Paphos.

This area is agricultural, but with the expansion of the city the habitat is diminishing. In addition, with the custom of the local people to collect the tortoises for pets, it would seem that this population does not have much chance of avoiding extinction.

Also, in the summer of 1992 there were five tortoises in the Zoological Garden of Limassol. Three of them were *T. marginata* and two *T. graeca*. The zookeeper could not trace the people that brought them to the zoo, but he was told that they were collected in the wild. In November 1992 another *T. marginata* was brought to the zoo which was found in a garden in Limassol.

Three *T. marginata* were also present at the Larnaca Zoo, however their origin could not be traced. These tortoises were stolen from the zoo in 1993.

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The authors wish to thank Mr. Pantelis Eliades for informing us of the tortoises that he found in his orchard near Paphos.

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BOOK REVIEWS

The Lizard Man Speaks, by Eric R. Pianka. Published by University of Texas Press, July 1994. 179 pp., 16 colour and 31 black and white photos. ISBN 0-292-76552-5. Price £25.00.

The name of Eric Pianka will be familiar to many readers of this *Bulletin.* He is Professor of Zoology at the University of Texas at Austin, and is regarded as the world's leading authority on the ecology of desert lizards. He is the author of *Evolutionary Ecology,* regarded as a classic in its field; and *Ecology and Natural History of Desert Lizards,* a useful volume which certainly receives regular usage in my library.

I will admit to approaching this book with a little trepidation, simply because *Ecology and Natural History of Desert Lizards,* whilst being an immensely useful book to the lizard enthusiast, is not a particularly easy read. However my fears were unfounded, and *The Lizard Man Speaks* is a very readable book.

Professor Pianka is one of those fortunate people who is able to earn his living doing what most of us regard as a hobby. This book sets out to describe his way of life, and in so doing covers many topics apart from Herpetology.

It commences with a description of his childhood, including a very close shave with a Bazooka shell, and goes on to describe his early studies in North America and Mexico.

The bulk of the book is devoted to Australia, and in particular the Great Victoria Desert of Western Australia. This area has the richest lizard fauna in the world, and has been the main centre for Professor Piankas' research. As well as describing his herpetological work, we are given a fascinating insight into the very real dangers of the outback, and the author's regard and respect for the Australian Aborigines he has encountered is readily apparent.

The author's other areas of study, the Kalahari and Namib deserts are also discussed, although in sparse detail compared to Australia.

At no time does this book become a textbook, the scientific detail is well balanced, such that the enthusiast is satisfied, and the layman in no way bemused. There is always a risk with this type of publication that the science becomes too dominant, at the expense of the book as a whole, and Professor Pianka has skilfully avoided this trap.

I would recommend this book not only to the Herpetologist, but to anyone interested in travel and natural history. It provides an insight into the work of the field biologist that should be compulsory reading for anyone considering embarking on a career in this branch of science.

Neill Clark

Vipere e altri serpenti italiani. Sergio Abram & Michele Menegon. (1994). IV + 176 pp. Siste Edizioni s.n.c., Trento. Ital. Lire 30,000.

In recent years, several laymen's books on vipers and other snakes of Italy have been published, this being the latest one. The aim of this book, as well as of its "ancestors", is to provide a concise though informative vehicle for identifying the Italian snake species, including notes on their biological and behavioural traits.

As is the rule in such books, the iconographic dress is admirable, and most illustrations (colour photos and black-and-white drawings of both animals and habitat types) are of high quality. The great majority of the Italian snake species are presented in more than one colour illustration, thus permitting the reader to become familiar with various chromatic morphs. In this regard, considering the target of the book, we find it unpleasant that no figure of *Natrix natrix cetti* is displayed; this endemic Sardinian grass snake is characterized by such a different colour pattern from that of the mainland populations, that it should have deserved attention in the book.

The book is organized in a very usual way: introductory notes on general features of snakes (i.e. anatomy, systematics, habitats, general biology, etc., pp. 5-35), conservation (pp. 36-39), myths and superstitions (40-41), venoms and envenomations (42-53), precede the final section with identification keys, and morphological, behavoural and biological notes on each Italian snake species (59-167). On the whole, serious scientific errors have been avoided, but, with the unique exception of the section on venoms and envenomation, the text is extremely superficial (and the chapter dealing with myths and superstitions is even maddening!). There is no distribution map in the book, and even the eco-ethological notes on each species are so superficial that it is often difficult to detect any one of the many differences existing between ecologically diverging taxa like, e.g., *Vipera aspis* and *V. berus.* Conversely, a fairly complete and regionally-ordered list of vernacular names is given for each taxon, but it is unpleasant to find that many of the names listed in each entry are just minor spelling (dialectal) variations of one and the same word (e.g. *bìs, bès, bisso* for *bissa).* The list of references is not exaustive at all. Many such books present the same problem, but in this case the reader surprisingly finds, besides some herpetological books, (i) books on assorted topics like birds, artifical nests and mangers, roosters, fish, shells, insects, conservation of hornets, etc., (ii) lexical dictionaries of Italian and other regional idioms, and even (iii) a paper from Kittel-Friedrich's New Testament dictionary (!), while no recent scientific literature on snake behaviour or systematics is cited. Errors include (i) the absence of *Elaphe scalaris* from the text, though this taxon is surely distributed within the Italian borders; (ii) the use of the old-fashioned name *(Coluber gemonensis)* for the Balkan whip snake, nowadays called *Coluber laurenti;* (iii) the claim that the horsewhip snake is monotypic within the Italian border while the ssp. *nigrescens* (Cattaneo, 1985) has been described from Pantelleria island); (iv) the claim that *Malpolon monspessulanus* mating occurs in April-June, while this taxon is characterized by spring spermatogenesis and thus cannot mate before the end of May; (v) the statement that adder mating season extends from April to June, while it is restricted to less than three weeks per year (in May, as the alpine populations is concerned); (vi) the statement that the bites of *Coronella girondica* cause torpor in adult lizards, etc.

In conclusion, though this book may be appreciated by beginner herpetologists and nature enthusiasts, we really doubt whether it can be profitably used by advanced naturalists, because either of the supericiality or the frequent imprecisions of the text.

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AN ACCOUNT OF SUCCESSFUL CAPTIVE REPRODUCTION OF *BOMBINA BOMBINA*, THE EUROPEAN FIRE-BELLIED TOAD

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INTRODUCTION

Species of the genus *Bombina* are popular vivarium animals, being colourful and active and generally easy to keep and breed in captivity. *B. bombina*, unlike the commonly kept *B. orientalis* and *B. variegata*, hardly ever breeds under captive conditions (Mattison, 1993) although animals adapt well to captivity and show considerably longevity.

The species has a wide distribution in the wild, from Denmark in the west to the Urals in the east and Greece in the south (Corbett, 1989). It is declining in especially the north-western part of its range and is naturally extinct in Sweden (Arnold and Burton, 1978; Corbett, 1989) although some reintroduction has taken place. The decline is attributed to factors affecting many amphibian populations, namely agricultural practices, habitat destruction and population isolation (Corbett, 1989).

CONDITION OF ADULTS

Two male and one female adult specimens of *B. bombina* were purchased from a specialist dealer in September 1993. The animals were said to be of wild caught Russian origin, as well as being part of a batch of 2000 animals (1800 of which went to America); supposedly the last of this species to be legally taken from the wild.

The three specimens were maintained under natural spectrum lighting in a 60 x 30cm vivarium, the floor area of which was 60% water, about 8cm deep. Artificial lighting was switched on from 9am to 4pm daily, however the vivarium was situated close to a window so as to subject the animals to natural fluctuations in day length. Low growing and aquatic plants and broken pots were provided to create hiding places. Food consisted of crickets and other suitable invertebrates supplemented with a specialist vitamin supplement.

This regime was maintained throughout the winter. Feeding was continued throughout, although reduced considerably during December and January when the animals showed minimal activity.

INDUCING AMPLEXUS AND SPAWNING

One of the males was heard calling on the 3rd of April 1994, the vivarium temperature at this time reaching 25°C during the middle of the day. On 10th April, the animals were transferred to a vivarium 30 x 30cm by 40cm tall (an old acid container). This was heated by a 40 watt bulb, switched on 8am to 8pm. Air temperature reached a maximum of 32°C, the water temperature being roughly constant at 26°C. Water 10cm deep was provided. The vivarium was richly furnished with *Elodea* and *Salvinia* plants, and an island of floating cork enabled the animals to leave the water if desired.

Over the next few weeks, both males were observed calling deeply and rapidly, and approaches to the female were made. All attempts at amplexus were resisted, the female diving to the bottom of the water on each occasion.

The water level in the vivarium was allowed to fall slowly with evaporation until the 11th of May. At this time cold rainwater was added which increased the water depth to 25cm in an attempt to simulate natural flooding of the species' preferred habitat (Corbett, 1989). The males called incessantly on every night subsequent to this until on the evening of the 21st of May newly-hatched tadpoles were observed clinging to the vivarium sides. Unfortunately, despite daily observation, amplexus and spawning went unobserved. Examination of aquatic vegetation was carried out every evening, and as no eggs were observed on the 20th, spawning probably occurred in the early hours of the morning of the 21st. This would indicate that development and hatching of the tadpoles occurred in less than 20 hours. Experiences with *B. orientalis* indicate that (with this species at least), tadpoles may hatch within 22 hours of spawning when maintained at a temperature of 24°C or above.

REARING OF TADPOLES AND TOADLETS

The adults were removed from the vivarium to prevent consumption of their offspring. After 2 days the tadpoles were swimming freely and feeding on aquatic vegetation provided, they were about 4mm in length at this time. They were transferred to a large aerated acquarium maintained at 26°C. 94 tadpoles were recovered. Food was given in the form of fresh aquatic plants as necessary, small amounts of catfood and daily pinches of Tetra Ruby colour food for tropical fish. The latter has proved useful in improving the colour of metamorphosing *B. orientallis*, which tend not to develop their vivid adult colouration under captive conditions.

The first of the tadpoles developed back legs (at about 30mm in length) on June the 11th, and had begun to leave the water by the 15th. Metamorphosis of all tadpoles was not complete until the end of July, the toadlets ranging in size from 9 to 12mm (for the first to leave the water) by this time. The toadlets were fed on newly-hatched crickets dusted with vitamin supplement and garden blackfly. In total, 52 toadlets survived to one month after metamorphosis; the majority of mortality occurring due to larval cannibalism, and a few deaths immediately after leaving the water.

CAPTIVE BREEDING AND CONSERVATION

In view of the apparent decline of the species in the wild, it would seem that the herpetologist could play a significant role in the conservation of this species by the proper maintainance and management of captive, breeding populations of this species which may then be used for provision of toadlets for reintroduction programmes. The success of such activities would of course depend upon the retention and maintainance of suitable habitats into which reintroduction could take place.

The author would be interested in hearing from other individuals or institutions who have successfully bred this species, or who are working on population and habitat conservation in the field.

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RESCUING GREAT CRESTED NEWTS A REPORT FROM THE BATTLEFIELD

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INTRODUCTION

The great crested newt *(Triturus cristatus)* or 'GCN' to its friends, is the largest and most spectacular of the British species of newt. It is also the rarest, having been largely unable to offset losses through the destruction of rural ponds by colonising garden ponds (unlike the common frog and smooth newt, for example). In particular, it requires fish-free ponds because the larvae, which swim in open water, are easy prey to them. Also they require relatively larger sized ponds than the average garden pond because of their larger size. Although not as localised as the natterjack toad, it was given full protection under the Wildlife and Countryside Act (1981) and more recently under the Bern Convention and EC Habitats and Species Directive, making it the most highly protected British 'herp'! This was largely due to the international significance of British colonies and the sharp decline in its numbers since the second world war.

The following report is an account of a major GCN rescue which took place in the northernmost borough of London, Enfield, in the spring of 1994. During the lengthy process of saving the newts from imminent destruction we encountered all sorts of legal and diplomatic problems and this account may be of interest and help to anyone involved in the worthwhile occupation of conserving populations of our native herpetofauna.

THE EARLY STAGES

I was first made aware of the threatened colony of GCN by Clive Herbert, the herpetological representative of the Herts and Middlesex Wildlife Trust. The Trust, in turn has been alerted by the developers who reported that a local resident had said that a pond they were about to destroy on land designated for new housing contained GCN. The Wildlife and Countryside Act gives protection to the 'sheltering places' of species like the GCN, and in this case such a place is taken to include the breeding site, ie the pond. This is where the first legal problem arises – the important loophole that protection cannot be granted of a site retrospectively, ie after the planning enquiry and after planning permission has been granted. Sadly in this case the resident hadn't got his act together soon enough – a year earlier and the whole development might have been stopped. It also removed any legal responsibility from the developers to protect the pond and its newts.

A phone call to the developers ensured that we could visit the site after dark, the best time to observe the secretive GCN. As we trod across the rest of the site, consisting of banks of earth and rubble and compacted clay, it was obvious that the terrestrial habitat for the newts had been effectively destroyed and consequently even if the pond at this late hour could be saved there would be little point as the adjacent habitat for the newts is just as important. The pond itself had been partly bulldozed and was about half its original width, now 6m by 17m long, but since the GCN alert the workmen had been careful not to destroy any more of it. The water was

very turbid, a mixture of clay particles and an algal bloom reducing visibility even with a strong torch beam to a few inches. Eventually, though, a random sweep of the net produced a small female GCN. This raises another problem – it is illegal under the letter of the law to handle a GCN – a possible fine of £5,000 per newt awaits you if you dare! It is necessary to apply for a licence from English Nature, (the body which oversees conservation law in Britain) in order to avoid the potential embarassment and worse of being charged with illicit newt-handling. If there is simply no time to wait English Nature may grant a licence after you have actually done the work, but as it stands the law means you have to take a risk if, for example, you lift a GCN from the road to avoid it being crushed by a juggernaut. To their credit English Nature worked fast to provide Clive Herbert with a licence as he did not already have one.

After that first night we had ammunition viz a single GCN. Now since the mention of the newt can bring on palpitations in the most hardened of developers, they could have gone ahead with the original plan which was to fill in the pond on the day after our visit. It is to their credit that they gave a stay of execution to the pond of a month whilst we tried to fish out as many of the newts as possible.

So the idea was simple – visit the pond as often as possible and fish out the newts. But there were further difficulties. One of the most amusing was the arrival of the police, tipped off by a zealous resident who presumably thought we were thieves stealing building materials from the site. When they discovered several people standing waist deep in a pond with torches and nets they were relieved and somewhat amused themselves. Also making a nocturnal appearance at the pondside was a species which will defend its habitat vigorously, Enfieldus nimbyensis – "Not-in-my-backyard man". The residents, not surprisingly irate at the prospect of a large private garden suddenly being transformed into a series of houses commanding excellent views of the existing houses' bedrooms, had stopped at nothing to stop the building, but with little success. They had clubbed together to get legal backing and tried pulling strings in golf clubs and one or two less traditional things as well, and now, finding people like us telling them the GCN were highly protected, they assumed we would be 'on their side'. And so here was another problem. For once the conservationists (us) weren't on the side of the NIMBY'S (also 'us') but were removing the newts, their last hope, so that the developers (them) could develop. This made us look like them, if you see what I mean. All I could say was that if they had told us about the newts at the planning enquiry stage then it could have been a different story, but our first priority were the newts, and since their habitat was no longer protected and indeed had mostly been destroyed we had to get them away from the area.

During all of this nocturnal discussion, we did manage to catch some newts and in fact it became clear that we were dealing with a quantity of newts which was very significant indeed, at least in Greater London terms. We caught over 100 animals (which reaches the threshold for SSSI status) and there was no real sign that the numbers were diminishing. In addition it was evident that there were several hundred of the smaller and commoner smooth newts in the pond and some frogs left in the pond after they had spawned. Plan B was therefore necessary. . . .

Plan B: Plan B involved the complete draining of the pond by day, giving us the opportunity to fish out the newts as they became visible. Straightforward? Not quite. For a start we had to complete the operation within a day or the newts would abandon the pond at night if it had lost half of its depth. We then had to arrange for the

Plate 1. – One of the 200 GCN rescued from the doomed pond in Enfield – a typically marked male with the high crest during the breeding season.

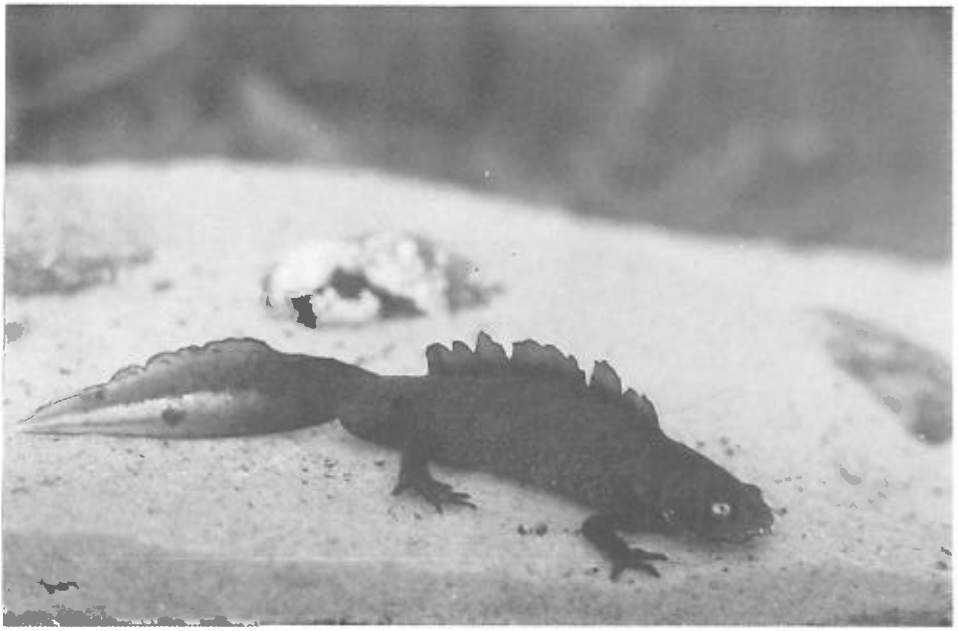

Plate 2. – An unusual partially melanistic male GCN clearly very different from the others in the pond. Note the reduced crest and grey/black colour. Its belly was almost entirely black.

Plate 3. – Midway through the pond drainage, a few days later the same area was buried under concrete and brick, but hopefully all the newts had been safely translocated.

Plate 4. – A bucketful of newts, several dozen adult GCN about to be relocated to a suitable newt pond several miles from their old home.

builders to supply a suction pump which would work quickly enough to remove the water but not to remove or mince the newts. We also needed to arrange for volunteers to remove assorted denizens of the pond such as smooth newts and common frogs, and finally we had to contend with the treacherous quickmud which remained as the water drained from the pond.

We arrived at the site on a sunny morning just after nine o'cock – a motley band of members and friends of the local wildlife trust, some perhaps better prepared than others for the rigours of the day – Yours truly, for example, had brought no drink or food and by late afternoon sorely wished he had. The first problem was the pump – very efficient but at the front was a nozzle with a metal rose just large enough to mangle GCNs. Experiments with fine mesh in front failed (the pump wouldn't work) and so we were reduced to putting fingers in front of the rose in order to grab newts as they got sucked towards it (any loss of fingers, not being scheduled species was deemed permissable). In the end only 1 newt was mangled largely due to the heroic work of one of our volunteers. The second problem was the impossibility of working on the banks or floor of the pond directly, that is without snowshoes or somesuch to spread our weight, and so an elaborate network of planks was spread into the pond as the level of water went down. From this we plucked newts heron-like from the water and put them in plastic picnic hampers bought from a petrol station, which proved ideal newt carriers. We worked through the day, being assisted by helpful brickies who quickly became adept newters (encouraged by our female volunteers) and interrupted by the local press and residents. The latter philosophically wished us and the newts the best of luck as the newt home was transformed into new homes.

At the end of the day we had accumulated another 100 GCN and over 800 smooth newts as well as 60 frogs. The total number of rare GCN was therefore 200 from a relatively small pond. It just goes to show what an incredible biomass of amphibians can be supported within a small area, particuarly in the breeding pond, provided fish and so on are excluded.

The final thing to do was to release the newts in their new homes. In the interests of this protected species I won't divulge their precise locations, except to say that they are all reasonably close to their old home. In fact another problem with translocations such as this is finding a suitable pond – it must be fairly close to the original one, be suitable for GCN (including the terrestrial habitat) but not have an existing colony (for reasons of possible overcrowding and the current conservation vogue of maintaining genetic integrity even of frogspawn). We chose ponds which had recently been created in nature reserves in the main, and to avoid putting our eggs in one basket several different reserves were chosen. We will monitor the fate of the colonists, but there's every reason to suppose that they should do well in areas which are hopefully protected from development.

CONCLUSIONS

Although there was nothing we or the law could do to save the original pond, I think there are reasons to be pleased with the outcome of this rescue. For a start, the developers in this case were clearly not the ogres that they often can be (even if the motives were to do with good publicity, it's the newts that we're concerned with). Secondly English Nature were quick in their licensing and approval of release sites for the newts, as were the borough conservation officers who had to be consulted

before we released the newts into their territory. Finally the future of the animals themselves is a bright one, and the sheer numbers caught in this pond may inspire pond owners to go for all-out productivity in their own ponds. By now the human residents will have moved into the site with no knowledge of the conservation battle to rescue the newts that took place in their living rooms just a couple of months ago.

ACKNOWLEDGEMENTS

I would like to thank the volunteers who helped with the rescue, in particular Clive Herbert who liased with the developers so diplomatically. I would also like to thank Jan Clemons, Chair of the BHS Conservation Committee for her advice.

ECOLOGY OF THE WESTERN PYGMY CHAMELEON *RHAMPHOLEON SPECTRUM* BUCHHOLZ 1874 (SAURIA: CHAMAELEONIDAE)

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INTRODUCTION

The aim of this paper is to present and discuss information from field records of 322 observations of *Rhampholeon spectrum* accumulated by the author over the course of 12 months field work in the South-West and Littoral Provinces of Cameroon, West Africa, carried out during 1990 and 1992/3/4. Field relations with the genus *Chamaeleo* are considered and notes given on the diet, altitudinal occurrence and microhabitat utilisation by the species.

TYPE LOCALITY

The type locality for *R. spectrum* (Buhholz, 1874) is Victoria (=Limbe) and Bonjongo, Kamerun (=Cameroon), later restricted by Mertens (1938) to Bonjongo. Both these localities lie near sea-level on the southern aspect of Mount Cameroon.

SYSTEMATICS

The taxon *boulengeri* (Steindachner), considered by Loveridge (1951) to be a subspecies of *Brookesia spectrum,* is presently considered by Böhme (pers. comm, 1994) to be a valid species and a somewhat distant relative of *Rhampholeon spectrum.* In addition, Böhme (pers. comm., 1994) considers *R. affinis* (Steindachner, 1911) from Beni, Kivu-District, Zaire, (synonymised with *R. boulengeri* by Werner, 1911), to be conspecific with *R. spectrum.* Presently, however, there is insufficient data to determine whether the Kivu population deserves subspecific status to distinguish it from the allopatric western equatorial populations. Pending further taxonomic investigation, *R. spectrum* may be regarded as a monotypic species with a disjunct distribution (Böhme, pers. comm, 1994).

DISTRIBUTION AND BIOTOPE

In contrast to the chameleons of the genus *Chamaeleo,* there has been no radiation within the genus *Rhampholeon* in the montane forests and adjacent highlands of Cameroon. The distribution of montane and restricted range species of *Rhampholeon* is confined to forested parts of the East African highlands where the genus exhibits its' greatest diversity. *R. spectrum* is a lowland, euryzonal species of the Central African rainforest. In the western equatorial populations referred to in this paper, *R. spectrum* occurs in the Congo, Gabon, Equatorial Guinea (including the island of Bioko), Cameroon to south-eastern Nigeria. The species is known from coastal lowland and inland evergreen and semi-evergreen rainforests near sea-level and closed canopy montane cloudforest up to 1900m above sea-level. The distribution of the geographically isolated populations of *R. spectrum* from Kivu (Zaire), await further investigation.

The distribution of *R. spectrum* is confirmed to rainforests which experience precipitation in excess of 1600mm per annum. According to Tye (1986), areas north

of 6°N (southern Nigeria and south west Cameroon) have a tropical climate with one wet and one dry season. At the beginning and end of the wet season, rainfall comes in intense thunderstorms. During the main part of the wet season, rain is less heavy but more prolonged and many days are completely overcast. Areas south of 6°N (southern Cameroon and neighbouring Gabon and Equatorial Guinea) experience reduced rainfall between June and August. Consequently this region has a double rainfall maxima with a small dry season from June to August and therefore experiences the four seasons of a true equatorial climate.

Specific localities in Cameroon where the author recorded this species are: Mt. Rata (Dikome Balue) 1100-1400m; Mt. Manenguba 1900m; Mt. Kupe 400-1800m (Ndom 850m, Kack 850m, Nyasoso 700-900, Mbulle 750m, Tombel 400m); Kupe-Manenguba intermontane ridge 1000m (Ngombo-aku 1000m, Abang 1000m); Bakaka Forest Reserve 300-600m (Ekomtolo, Badjong, Badjoki, Balondo Nlonako); Bakossi Highlands 180-1250m (Bangone 180m, Edib 1100m, Lake Edib 1250m, Messaka 450m, Nlog 600m, Ngusi 450m, Babubok 450m); Manehas Forest Reserve 800-1100m (Nyang 800m).

EURYZONALISM AND SYMPATRY

The ability of a species to exhibit a broad altitudinal amplitude from true lowland rainforest near sea-level to wet montane forest above 1500m a.m.s.l. (euryzonal) is a relatively rare phenomenon in the Afro-tropical rainforest herpetofauna. In the Cameroon Highlands a number of ophidian species demonstrate euryzonalism (Wild, in preparation) but of the saurian taxa, apart from *R. spectrum*, only a few skinks of the genus *Panaspis*, a lacertid *Adolphus africana* and possibly a gecko *Cnemaspis koehleri* do so. In the savannah zone however, euryzonalism is common with numerous typical lowland species occuring at altitudes in excess of 1500m.

The euryzonal distribution of *R. spectrum* has resulted in a wide sympatry with many other lowland and montane chameleons *(Chamaeleo)* in the region. In the field the author found *R. spectrum* to be sympatric with ten of the eleven recognised species of *Chamaeleo (C. camerunensis, C. cristatus, C. eisentrauti, C. g. gracilis, C. montium, C. oweni, C. pfefferi, C. q. quadricornis, C. wiedersheimi perreti)* occurring in the rainforests of Cameroon. In addition, various museum records (as yet unverified) suggest that this species is also sympatric with other members of the genus *Chamaeleo* which occur within its' range: *C. chapini* in Gabon, *C. dilepis* and *C. quilensis* in Equatorial Guinea and *C. feae* in Bioko. This general sympatry with *Chamaeleo* is attributal to *R. spectrum* being essentially terrestrial when diurnally active whereas the prehensile tailed *Chamaeleo* are exclusively arboreal in habit. Of the ten sympatric species found by the author, three were found to be restricted to the shrub layer in primary forest. These were, *C. cristatus, C. camerunensis* and *C. wiedersheimi perreti,* none of which however, were found on forest floor leaf litter. The distributional ecology and sympatric relations of the *cristatus* species group will be discussed in more detail in a separate forthcoming paper.

R. spectrum was invariably found to be abundant in premontane, submontane and montane forests between 500 and 1700m on and adjacent to mountains (e.g. Mt. Rata, Mt. Kupe, Edib Hills, Bakaka Forest Reserve, Mt. Manenguba). In contrast, this species was found only occasionally in lowland forest more than 5km away from the 500m contour surrounding mountains despite apparently suitable habitat being available e.g. Dja Faunal Reserve and the lower Bakossi forests near the Mungo River. A higher level of incidence of this species was also found by Lawson (1993) in mountainous areas (Mt. Yuhan, Nta Ali and Rumpi Hills) compared to the Korup lowlands. The relatively high density of sympatric species of *Chamaeleo* in montane

areas (e.g. seven species around Mt. Manenguba whereas the maximum number of sympatric *Chamaeleo* in lowland Cameroon is four species) is concordant with higher local abundance of *R. spectrum*. This suggests that there exists a negligible overlap in niche competition between *Rhampholeon* and *Chamaeleo.*

DIMENSIONS

Measurements of head-body length, mouth width, and body weight from 147 mature adults were taken in the field and are presented Table 1.

TABLE 1

MALES	n=82	max	mean	st. dev
Mouth width (mm)		11	9.4	0.825
Snout-vent lenght (mm)		58	44.9	4.998
Weight (g)		5	4.2	0.677
FEMALES	n=65	max	mean	st. dev
Mouth width (mm		10.5	8.8	0.525
Snout-vent length (mm)		57	48.3	6.20
Weight (g)		7	4.6	1.17

Note: the greater body weight of females was attributal to gravid individuals.

Plate 1. Male *Rhampholeon spectrum* on specific daytime foraging microhabitat of forest floor leaf litter. Photo by Chris Wild.

Plate 2. Cloud forest at 1800 metres on Mount Kupe. Habitat for *Rhampholeon spectrum,* occupying leaf litter by day, and roosting on exposed plants mainly below one metre at night. Photo by Chris Wild.

COLOUR

This species has limited ability to change colour, the main ground colour usually being a shade of brown with between one and three distinct dorso-lateral black stripes diagonally aligned across the body. The chromatic state of individuals varies greatly, however, with specimens often being more brightly coloured at night whilst roosting. Many individuals, particularly females, were red in colour. Occasionally males may be a pale pinkish-white with between one and three distinct black dorso-lateral stripes. This may be indicative of male courtship activity. In all cases individuals tended to be paler ventrally. One remarkable adult male collected by the author at night from Mt. Rata at 1300m, exhibited a brownish black body colour irregularly spotted with numerous bright metallic green and gold spots. This rare and unusual chromatic state disappeared by daylight the following day. Colour and pattern are a major factor in the cryptic defence which is further aided by the disrupted body profile and slow, discreet locomotion when foraging.

FORAGING ECOLOGY AND MICROHABITAT PREFERENCES

Only 27 observations of *R. spectrum* were made during day-time by the author during the entire fieldwork period. This is thought to be due to the fact that this species is remarkably cryptic thus preventing it from being seen easily. Of these, 25 observations (3 juveniles, 22 adults) were of the animals walking on leaf litter debris on the forest floor. Another adult was found perched at the base of a raphia plant *Raphia sp,* some 37cm above the ground amongst dead fronds. The other specimen was seen in dead vegetation overhanging a large rock near a stream. The species has a patchy distribution in the forest and was found to be particularly abundant in riparian vegetation where it was regularly found at night roosting on the banks of running

or dry, intermittent, and seasonal streams. Elsewhere in the forest it appeared to favour closed canopy forest with moderate ground cover and moist shaded leaf litter. It is not clear whether the habitat requirements for the species are determined more by its' diurnal foraging ecology or its' nocturnal roosting requirements. The occurrence of the species appears to be concordant with changes in habitat physiognamy, being scarce or absent from areas with an open canopy and resultant dense herb layer, such as in severely degraded forest or farmbush. Although this species was found in secondary forest where it was recorded in abundance near streams and where there was a lesser herb layer, only 6 records were made from agricultural farmbush. Moreover, these six records were all from remnant thicket or clearings with canopy cover and a leaf litter substrate. It is unlikely therefore that *R. spectrum* can tolerate extensive habitat disturbance, although it seems able to persist in small habitat islands < 100 metres square.

Two observations of individual specimens feeding were made. The first observation included an adult male avidly feeding upon a colony of termites (Isoptera) on the forest floor. Another individual consumed a bug (Hemiptera) whilst being photographed at it's discovery site in the forest. Intestinal and stomach contents from ten adult specimens of *R. spectrum* collected from primary forest around 1000m on Mt. Kupe (Cameroon) were examined (see Table 2). All stomachs contained food and were represented by invertebrates from four classes and eight orders indicating a catholic diet for the species. The frequency of prey items in the pooled sample was dominated by spiders (34%), crickets (22%) and juvenile cockroaches (15%). Crickets and juvenile cockroaches however, dominated the volume of the sample and are therefore probably the most significant prey item. A full list of contents from the pooled sample is given in Table 2.

TABLE 2

CLASS	ORDER	TYPE AND FREQUENCY
INSECTA	Orthoptera	crickets (7), grasshopper (1)
	Dictyoptera	cockroaches (5)
	Diptera	fly (1)
	Lepidoptera	moths (2), green caterpillar (1)
	Hymenoptera	honey bee (1)
ARACHNIDA	Aranea	spiders (11)
DIPLOPODA	-	millipedes (2)
MALACOSTRACA	Isopoda	woodlouse (1)

ROOSTING ECOLOGY AND ANTI-PREDATOR STRATEGIES

Individuals were found easily at night by torchlight when they were conspicuous roosting on perches above the forest floor. The night-time perching habit of the species contrasts sharply with the day-time perching habit which is essentially confined to forest floor leaf litter. A total of 295 individuals were seen roosting at night in this manner with measurements of perch height taken with a tape measure for 188 individuals. From the roosting records only one individual (a juvenile) was actually perched on the leaf litter itself. The remaining 187 were on perches ranging between 2 - 196cm above the ground. 91% of observations were below 100cm; the mean perch height was 48 cm. Typical perches varied between dead or living stems, broad or narrow leaves, fern fronds etc, but most were characterised by being raised above the leaf litter in an exposed and isolated position. Preference was shown for small herbaceous plants and woody stems protruding from the leaf litter rather than on the peripheral perches of larger shrubs. It is suggested that these arboreal roosting perches, not normally utilised during the species day-time behaviour, are an anti-

predator strategy against active nocturnal foraging predators which may include opisthoglyphous colubrid snakes such as *Dipsadoboa spp.* and *Toxicordryas (Boiga) spp.* Broadley and Blake (1979) reported much greater night-time perch heights of up to 4.5m for *Rhampholeon m. marshalli.*

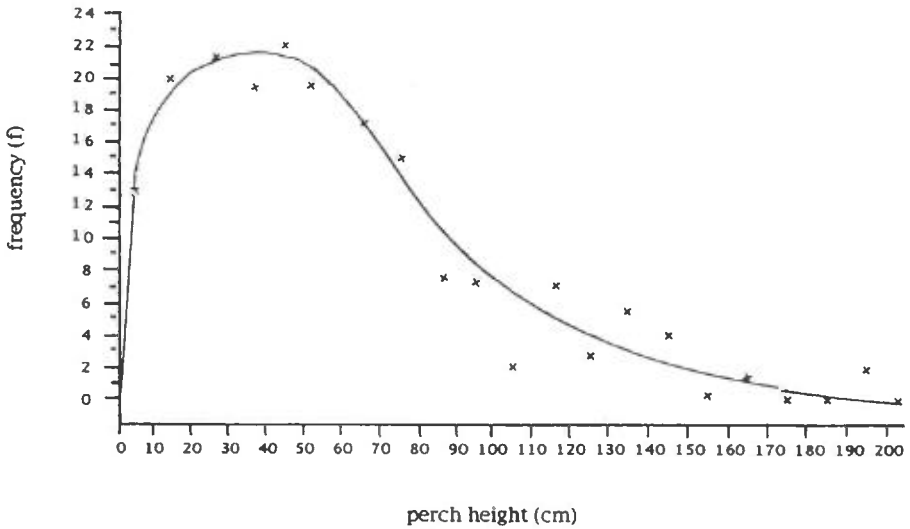

Figure 1. Frequency graph of roosting perch heights of *R. spectrum* in centimetres. total number of individuals = 188.

The author noted that when this species is held in the hand (and therefore under stress) it is capable of emitting a series of short inaudible vibrations which are initially alarming and irritating. The duration of an emission was approximately 1 second and could be repeated every few seconds until the animal either became exhausted or relieved of the cause of threat. The function of these emissions is not known but they appear to be defensive. Lawson (1993) provides additional notes on this behaviour.

REPRODUCTION

Courtship was never observed but on 7 occasions an adult pair (male and female) were found roosting together on the same perch. Gravid females from Mt. Kupe were recorded in all months from January through to July (inclusive). It was not possible to examine any adult females from August to December but it is possible that this species reproduces all year round as is the case with *Chamaeleo montium* on Mt. Kupe (Wild, unpubl. data.). Two gravid females were found to contain two eggs each. Palpation of other gravid females indicated that two eggs were a typical clutch size and no more were recorded in any single individual. One captive female deposited two relatively large eggs, each measuring 14 x 7mm. According to Broadley and Blake (1979), *Rhampholeon m. marshalli* lays eggs of similar dimensions (13 x 8 mm) but in contrast to *R. spectrum* lays clutches of up to 18 eggs (Fitzimons, 1943).

DISCUSSION

Factors limiting population density of *R. spectrum* in relation to their proximity to mountains, both biotic and abiotic, invite further research. From my own observations I found a negative correlation between the local occurrence of *Bufo*

camerunensis, a diurnal, leaf litter anuran found to predate upon crickets, and *R. spectrum.* There appears to exist an inverse relationship in local abundance between these taxa in all localities visited, whereby *R. spectrum* was found to be very scarce or even absent in areas where *Bufo camerunensis* occurred. Consideration of their diet, diel activity, and microhabitat utilisation, suggests that there may exist a significant overlap in the niche of these two species.

In addition, mountanious areas are known for their unique gradient of microclimatic conditions (Tye, 1986).. Increased local rainfall and humidity, coupled with reduced insolation and decreasing temperatures with increasing altitude, may have a significant effect on the local occurrence of *R. spectrum.*

The limited abundance of this species in severely degraded habitats indicates that the species is locally threatened where there is extensive habitat destruction resulting in increased insolation and changes in forest floor vegetation. It is not apparent however, that the species as a whole is threatened at present.

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