

BRITISH HERPETOLOGICAL SOCIETY

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

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

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

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

Publications

British Journal of Herpetology, published each June and December, contains papers or original research in herpetology.

British Herpetological Society Bulletin, also published each June and December, contains notices, news items, articles and original papers on all aspects of herpetology.

The Care and Breeding of Captive Reptiles, a new book containing a collection of papers on recent developments in breeding reptiles in captivity. This publication is not included in members' subscriptions, but is available to members at a price of $\pounds 3.00$. Applications to purchase should be made to the Chairman of the Captive Breeding Committee.

Conserving Sea Turtles, by Nicholas Mrosovsky. A critical review of the current problems and controversies of sea turtle conservation. Price U.K. \pounds 5.00+ \pounds 0.75 postage (surface mail) or \pounds 2.80 (air mail), U.S.A. \$10.00 + \$1.00 postage (surface mail) or \$1.00 postage (surface mail) or \$5.00 (air mail), U.S.A. \$10.00 + \$1.00 postage (surface mail) or \$5.00 (air mail), U.S.A.

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 Simon Townson and John Pickett

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

MEETINGS 1985

The meetings are held in the Lecture Theatre of the Linnean Society of London, Burlington House, Piccadilly, London W1 and start at 7.00 p.m. unless indicated otherwise.

- FEBRUARY 28th The Earl of Cranbrook (President, BHS): The herpetofauna of Vanuatu (Pacific Ocean).
- MARCH 19th A.G.M. (see separate Agenda) and Dr M.R.K. Lambert (Chairman, BHS): A few herpetofauna in the Commonwealth (Australia, Seychelles, Malawi, Zimbabwe).
- APRIL 25th Mr Brian Banks (Biological Sciences, Univ. Sussex): Breeding ecology of the Natterjack in Britain in relation to conservation.
- MAY 13th Prof. Kraig Adler (Section of Neurobiology and Behavior, Cornell Univ., Ithaca, New York, U.S.A. and Pembroke College, Univ. Cambridge): Sensory basis of amphibian orientation and navigation. A research talk illustrated by North American species.
- JUNE 19th *Amphibians and reptiles Worldwide. A discussion on care and breeding organized by the Captive Breeding Committee.
- SEPTEMBER 26th (Meeting topic to be arranged by the Captive Breeding Committee).

OCTOBER 23rd

Dr Alan Charig (Chief Curator of Fossil Amphibians, Reptiles and Birds, Dept. Palaeontology, British Museum (Natural History), London): Dinosaurs: myths and misconceptions. (Carried over from 1984).

NOVEMBER 19th Dr Andrew Laurie (Dept. Zoology, Univ. Cambridge): Marine iguanas on the Galapagos Is. (Pacific Ocean) and El Niño. (Date to be confirmed).

*Members are encouraged to bring live animals, preserved specimens and 35mm slides for display and to illustrate discussions.

BULLETIN GOES QUARTERLY

This year, 1985, the subscription has unfortunately been raised to £15 to cover the increased costs of running the Society: printing costs, postage, meeting room expenses, etc. However, in partial compensation, it is now at last possible to increase the frequency of the Bulletin to four issues per year, which will mean an improved service to members. The Bulletin will now be published each March, June, September and December.

PROVISIONAL MINUTES OF THE 37th ANNUAL GENERAL MEETING OF THE BRITISH HERPETOLOGICAL SOCIETY 1984

The 37th A.G.M. was held at 7.00 p.m., 13th March 1984, in the Lecture Theatre of the Linnean Society of London, Burlington House, Piccadilly, London W1.

The President, the Earl of Cranbrook, took the Chair. The Attendance Sheet (in minutes) was signed by 38 members and nine guests. Apologies were received from Dr H.R. Bustard and Dr G.J. Walters.

1. The minutes of the 36th AGM held on 22nd March 1983 were read by the Chairman, approved *nem. con.* (proposer: Prof. G.A.D. Haslewood, seconder: Dr S. Townson) and signed.

2. Matters Arising.

The decision whether or not to publish the facsimile of the Journal Vol. I had been extended to 30th April 1984, to encourage further contributions.

3. Financial report.

Mrs M. Green, who had been co-opted to take on the responsibilities of Membership Secretary and Treasurer, reported that there had been an excess of expenditure over income of £500 during 1983. This would have been far greater had there not been an increase in Ordinary Members. The biggest items by far were publications. Because of deficits in both 1982 and 1983, constraints on page numbers in both the Journal and *Bulletin* were now strict and will lead to a backlog. Financial reports for 1981, 1982 and 1983 will be published in the *Bulletin*. The report was approved *nem. con.* (proposer: Mr P. Curry, seconder: Mr V.F. Taylor).

4. Council's report.

As circulated. Dr A.J. Millwood enquired how many more contributions were required for the Journal Vol. I facsimile. Mrs Green replied that 98 had been received. Dr Lambert added that 250 were required in all; he had approached three secondhand book dealers, including Wheldon & Wesley. The report was approved *nem. con.* (proposer: Mrs. B. Haslewood, seconder: Mr L. Goulding).

5. Rules amendments.

Before voting on the proposed amendments, a member enquired whether grandchildren could be included in Family Membership. The President replied that this had not been discussed in Council.

a. The following amendments to the Society's Rules were approved:

i. Insert as Clause 5(c), therefore displacing present 5(c) to 5(d) etc.:-

"Family membership. This will be at a rate set by Council, normally $1\frac{1}{2}$ times the ordinary member 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 17) 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)" (29 votes in favour, 2 opposed).

ii. In present Clause 5(g), insert and adjust end of third sentence from end to read "... to all members at least 10 days before an A.G.M. when an election will be held." (*nem. con.*).

b. After discussion, the following amendment proposed by Council was rejected: Under present Clause 5(e), add to Council Members the post of "Conservation Officer" (16 in favour, 17 opposed).

6. Subscription increase from £10 to £15.

Mr N. Bessant enquired whether the number of Bulletins would be increased to four yearly. The President replied that this was the stated intention of Council, but must depend on financial considerations. Dr Millwood spoke in favour of the raised subscription. The increased subscription was approved *nem. con*.

7. Honorary Member.

Prof. H. Saint Girons (Paris) was appointed in recognition of his outstanding contribution to herpetology.

8. Election of Officers and Council.

With the exception of the Conservation Officer, the Officers were elected or re-elected. There were no vacancies for Ordinary Council Members, but two alternative candidates had been proposed. A paper ballot was held. The following were declared by appointed scrutineers (Mr Curry and Mr E.Z. Wade) to be elected: Dr H.R. Bustard, Mr K. Lawrence, Dr S.P. Gittins, Dr G.J. Walters and Dr T.J.C. Beebee. For the sixth member, there were equal votes (34) for Dr B. Groombridge, Mr M. Nolan and Mr S. Norrie. Dr Groombridge therefore remained undefeated, but a technicality was raised that his membership was paid for institutionally. It was resolved to postpone further discussions of this issue until the next Council meeting.

9. Education Committee (Junior Section's) report.

A full report will appear in the Bulletin. Mr Taylor, wearing COBRA shoes, would be running in the London Marathon as "BHS".

10. Conservation Committee's report.

A full report will appear in the Bulletin. Prof. Haslewood announced that members' travel was now reimbursed by the Nature Conservancy Council at 6.6p per mile. A project was being initiated on the smooth snake.

11. Captive Breeding Committee's report.

A full report will appear in the Bulletin. Dr Townson discussed sales of Mrosovsky's book on conserving sea turtles, indicated that copies of *The care and breeding of captive reptiles* were still available for sale and displayed crested newt (garden pond rearing) information sheets, which were also available.

12. Any other business.

Dr Lambert displayed a copy of Deryk Frazer's rewrite of Malcolm Smith's New Naturalist book on British species which had been published in 1983, and announced that the next meeting of Societas Europaea Herpetologica would be held in conjunction with the Conference of Herpetologists of the Socialist Countries in Prague, 19-23rd August 1985, where it would be possible to meet Soviet herpetologists. He hoped that herpetologists from the U.K. would be better represented than at the 1983 meeting in Leon, Spain.

13. At 8.20, Dr Alan Charig, the guest speaker, started his lecture "Dinosaurs: myths and misconceptions", which unfortunately could not be finished due to protracted business matters. The President apologized on behalf of members and hoped Dr Charig would be able to deliver his complete lecture to the Society later in the year.

The meeting ended at 9.00 p.m.

CHANGES IN BHS COUNCIL MEMBERSHIP

As an outcome of the AGM in March 1984, the election of Ordinary Council Members was discussed at the Council meeting held on 22nd May 1984. As indicated in the provisional minutes of the AGM, item 8, the elections held in the unusual circumstances of there being no vacancies for Ordinary Council Members resulted in a tie for Dr B. Groombridge, Mr M. Nolan and Mr S. Norrie. Dr Groombridge therefore remained undefeated. Subsequently, not always having sufficient time or access to funds to travel to London for Council meetings, Dr Groombridge tendered his resignation. A proposal in Council was therefore accepted by a majority vote that, in alphabetical order, Mr M. Nolan would be invited onto Council to replace Dr Groombridge and Mr S. Norrie co-opted under the BHS Rule 5e ('in exceptional circumstances') as an extra member until a vacancy occurs naturally.

At the same time, it was agreed *nem. con.* by Council that Mr T.E.S. Langton should be reco-opted onto Council for a further year to perform the special function (also rule 5e) as the Society's Conservation Officer.

Mr G. Laverick has also been co-opted onto Council as the representative for the newly formed BHS North-East Regional Group.

CAPTIVE BREEDING COMMITTEE (CBC) REPORT 1983/84

1. TERMS OF REFERENCE

(i) Appointment

The Captive Breeding Committee is appointed by Council under Rule 10.

(ii) Aims & Functions

- a. To encourage and advise on responsible vivarium keeping, good husbandry techniques, and the captive breeding of reptiles and amphibians, with special emphasis on the study of reproductive biology at both the professional and amateur levels. These activities have both intrinsic scientific interest and practical value in producing captive bred animals for others to keep and study.
- b. To undertake captive breeding and research projects, and to inform the Society of the results of this and other work through the pages of the *Bulletin* or *Journal*.

- c. To produce literature on husbandry, captive breeding, veterinary care and related subjects ranging from simple 'care' sheets to professionally produced books and scientific reports which will normally be made available to members free of charge or at reduced costs.
- d. Carry out conservation projects involving the maintenance and propagation of both common and rare species, and to collaborate with other conservation groups on matters of mutual interest. The role of captive breeding in conservation must be taken seriously since introductions of animals from thriving zoological or private collections could help prevent the extinction of wild populations.
- e. To give advice where possible on the legal requirements for the import/export of captive bred and wild caught animals, and on the particular captive requirements of animals to support worthy applications to the Department of the Environment for licences to import/keep certain species. In addition, the Committee will represent the Society to outside bodies such as government committees and provide expert advice (e.g. Dangerous Wild Animals Act 1976; Zoo Licensing Act; advice on suitability of species for importation etc.)
- f. Other general functions of the Committee will include:
 - (a) arranging evening meetings and special symposia;
 - (b) provide speakers for BHS and external meetings;
 - (c) liaise with outside organizations with shared interests;
 - (d) promote the educational value of keeping reptiles and amphibians.

(iii) Composition & Responsibilities

The Committee will consist of a Chairman, Ordinary Members (approved by Council) and Advisors).

- Chairman The Chairman is responsible for the overall running of the Committee and will represent the Committee on Council. Other responsibilities will include (a) the appointment of Advisors; (b) the administration of funds and presentation of audited accounts and (c) the production of an annual report for publication in the Bulletin.
- b. Ordinary Members There will be no fixed number of Ordinary Members. Such persons will be expected to make a positive contribution to the running of the Committee and towards its Aims and Functions and will have the right to vote at Committee Meetings.
- c Advisors Advisors will be appointed by the Chairman and need not be members of the Society. They will be entitled to attend Committee Meetings but not to vote. Responsibilities will involve any contribution to the work and aims of the Committee.

(iv) Meetings

At least two meetings will be held each year and five members or 50% of the total membership (whichever the smaller) will constitute a quorum. Notice of meetings will be sent to all Committee Members and Members of Council (who are entitled to attend).

(v) Funding

The Committee shall be entitled to a fair share of Society funds allocated by Council. In addition, the Committee will seek funds from external sources and generate its own funds (e.g. book sales etc.)

2. REVISED MEMBERSHIP AND ADVISERS

The names and addresses of present members of the CBC are listed below with their special areas of interest in parentheses. Mr Dudley Lucas has resigned from the BHS and is therefore, no longer involved. We are delighted to welcome six new members, Mr M. Nolan, Mr S. Norrie, Mr J. Coote, Mrs M. Green, Mr P. Eversfield, Mr C. Snell, and three new advisors, Prof N. Mrosovsky, Mr R. Hine, and Mr M. Hines. BHS members with any herpetological queries are encouraged to write to CBC members at the addresses below.

Members

Dr Simon Townson (Chairman), Wadley Warren, 10 Wadley Road, Leytonstone, London E11 1JF. Tel: 01-556 3373. (Reptiles and amphibians in general, particularly snakes).

Mr John Pickett, 84 Pyrles Lane, Loughton, Essex. Tel: 01-508 6624. (Reptiles and amphibians in general).

Dr Anthony Millwood, 8 Whiteshott, Basildon, Essex. Tel: 0268 415168. (Amphibians).

Prof. Malcolm Peaker, The Hannah Research Institute, Ayr, Scotland KA6 5HL. (Reptiles and amphibians in general, particularly snakes and chelonians).

Mr Peter Bennett, 45 Holdenhurst Avenue, Finchley, London N12. Tel: 01-346 8685. (Amphibians).

Mr Nick Millichamp, MRCVS. Working abroad at present.

Dr H.R. Bustard, Airlie Brae, Alyth, Perthshire PH118AX, Scotland. Tel: 082832501. (Reptiles and amphibians in general, particularly the captive breeding and conservation of crocodiles and sea turtles).

Mr Peter Curry, Centre for Life Studies, Regent's Park, London NW1. Tel: 01-586 3910. (Reptiles and amphibians in general, particularly the reproductive biology of amphibians).

Mr Bert Langerwerf, Benedenkerkstraat 36A, NL5165CC, Waspik, Netherlands. (Large-scale breeding of lizards).

Mr Keith Lawrence, MRCVS, 23 Woodside Gardens, Chineham, Basingstoke, Hampshire. Tel: 025679 8061. (Veterinary aspects).

Mr Mike Nolan, 29 Rodney Close, New Malden, Surrey KT3 5AA. Tel: 01-942 0177. (Mainly snakes, including venomous species).

Mr Steven Norrie, 14 Newtonwood Road, Ashtead, Surrey. Tel: 27 73643. (Mainly snakes).

Mr Jon Coote, 195B College Street, Long Eaton, Notts. Tel: 0602 729273. (Mainly Colubrid snakes).

Mrs Monica Green, 49 Greenway, Colindale, London NW9 5AU. Tel: 01-205 7635. (Chelonians).

Mr Paul Eversfield, 67 Prestbury Crescent, Woodmansterne, Surrey. Tel: 07373 50856. (Mainly amphibians).

Mr Charles Snell, 76 Birdbrooke Road, Kidbrooke, London SE3 9QP. (Reptiles and amphibians, particularly in outdoor vivaria).

Advisors

Prof Nicholas Mrosovsky, Dept of Zoology, University of Toronto, Ontario M5S 1A1, Canada. (Marine turtle biology and conservation).

Mr Ray Hine, 34 Freshwell Gardens, W. Horndon, Essex. Tel: 0277 811495. (Snakes).

Mr Mike Hines, York Lodge, The Street, Stowlangtoft, Suffolk. Tel: 0359 31609. (Chelonians).

3. MEETINGS/SYMPOSIA

Meetings organised by the CBC were the most successful BHS meetings during the period 1983/84, in terms of both good attendance and breadth of subject matter. The open meetings held during the evening at Burlington House involved contributions (slides, talks, live animals) by ordinary members of the Society rather than formal speakers, and all three meetings ran overtime because of the number of enthusiastic presentations. The joint CBC/British Veterinary Zoological Society meeting held on Saturday, 1st October at the Centre for Life Studies, received 130-140 delegates from both veterinary and herpetological backgrounds. Eight papers were read on a variety of topics concerned with captive breeding, husbandry, behaviour/thermoregulation, conservation, and veterinary science/care. The proceedings of this meeting have formed the basis of a new CBC book, presently in press, which will be made available to BHS members at reduced rates (see later under "Publications"). It was most unfortunate that Mr Ernie Wagner (Curator of Reptiles, Woodland Park Zoological Gardens, Seattle, USA) was unable to speak to the Society on 13th October 1984 due to ill health. However, we were very grateful to Mr Jon Coote and Mr John Pickett who gave excellent talks on "Breeding Colubrid Snakes" and "The Italian Snake Festival" respectively. A paper based on Mr Coote's talk is being included in the new CBC book referred to above.

If an appropriate venue can be found it is hoped that another Saturday meeting can be arranged sometime towards the end of 1985. (Details in next *Bulletin*).

4. SPECIES BRED BY BHS MEMBERS

Again, many species have been bred by our members, including several species which have not been recorded before. It is particularly encouraging to see that breeding beyond the first generation is becoming commonplace with no apparent loss of fertility and vigour in most cases. However, our records are far from complete and we would welcome up to date information from our members.

Species bred:

Amphibians

Alytes obstetricans, Bombina orientalis, Bombina variegata, Discoglossus pictus, Bufo bufo, Bufo calamita, Bufo viridis, Rana temporaria, Rana esculenta, Xenopus tropicalis, Xenopus laevis, Hyla arborea, Hyperolius marmoratus, Litoria infrafrenata, Litoria caerulea, Ambystoma mexicanum, Salamandra salamandra, Pleurodeles waltl, Triturus marmoratus, Triturus alpestris, Triturus vulgaris, Triturus vittatus, Triturus cristatus, Triturus helveticus, Triturus boscai, Cynops pyrrhogaster.

Reptiles

Testudo graeca, T. hermanni, T. marginata, T. pardalis, Cuora amboinensis, Lacerta vivipara, L. viridis, L. lilfordi, L. lepida lepida, L. lepida pater, L. trilineata, L. agilis, L. parva, L. strigata, L. laevis, L. saxicola, L. unisexualis, L. armeniaca, L. monticola, L. rudis, L. danfordi, L. praticola, L. mosorensis, Podarcis milensis, P. peloponnesiaca, P. muralis, P. pityusensis, Eremias arguta, Algyroides nigropunctatus, Agama caucasia, A. stellio, A. lehmanni, A. sanguinolenta, Gerrhonotus multicarinatus, Ophisaurus apodus, Anguis fragilis, Physignathus cocincinus, Iguana iguana, Basiliscus plumifrons, Anolis equestris, Anolis sp., Eublepharis macularius, Gekko gecko, Phelsuma ornata, P. guimbeaui, Thamnophis sirtalis sirtalis, T. sirtalis infernalis, T. sirtalis parietalis, T. radix, T. butleri, Natrix natrix, Elaphe obsoleta obsoleta, E. obsolete quadrivittata, E. guttata, E. quatuorlineata, E. subocularis, Pituophis melanoleucus, Drymarchon corais couperi, Lampropeltis getulus getulus, L. getulus californiae, L. getulus floridana, L. calligaster, L. triangulum sinaloae, L. triangulum hondurensis, L. zonata, L. pyromelana, Boaedon fuliginosus, Constrictor constrictor, Epicrates cenchris cenchris, E. cenchris maura, Eunectes notaeus, Python molurus molurus, P. molurus bivittatus, P. regius, Liasis fuscus, Chondropython viridis, Bitis caudalis.

5. CRESTED NEWT BANK

The Crested Newt (*Triturus cristatus*) bank was established by CBC members during 1981 to provide a source of captive bred newts for members to establish colonies in their garden ponds. Dr Millwood has been largely responsible for this project, and during the period 1983/4 several hundred eggs and larvae have been supplied to interested persons. In addition to this, captive bred newts have been introduced to the wild at sites in Essex to hopefully establish new colonies (under licence from the D of E).

Members wishing to obtain Crested Newt eggs or larvae during 1985 should contact Dr Millwood (address above). Our leaflet entitled "Establishing and Maintaining Crested Newts in gardens ponds" is still available free to members (see under "Publications" below).

6. SAND LIZARD PROJECT

Members of the CBC have been raising captive bred Sand Lizards (Lacerta agilis) obtained from Bert Langerwerf. Results show that the lizards reach full sexual maturity within 3-4 months of hatching. One member, in December 1984, had three clutches of eggs in incubation, laid by females born in August of the same year. Other females are also gravid, and the females which have already laid are gravid again from further matings. The individuals concerned have not been hibernated. They have been fed daily on crickets, locusts, mealworms and fly larvae dusted with a mixture of SA37 vitamin/mineral powder and calcium orthophosphate, and have been kept under special ultra-violet lighting. This indicates that two generations of Sand Lizards in one year should be possible in captivity and, given the high rates of fecundity obtained by Bert Langerwerf, very large numbers could be raised with relative ease. We plan to expand this work and make more controlled observations during 1985, and reports of our experiments will appear in subsequent *Bulletins*.

7. DANGEROUS WILD ANIMALS ACT 1976 (MODIFICATION) ORDER 1984

An expert committee was convened by the Department of the Environment to consider modifications to the list of species covered by the Dangerous Wild Animals Act 1976. Animals covered by the Act cannot be kept without a licence issued by a local authority. Dr Townson represented the BHS and recommended that the rear-fanged venomous snakes Actractaspis (Mole Viper), Thelatornis (Twig Snake), Dispholidus typhus (Boomslang), Rhabdophis subminiatus and R. tigrinus (Keelbacks), be added to the schedule, since bites from these species can be serious or even fatal. It was also recommended that Dwarf Crocodiles (Osteolaemus) and Caimans (Palaeosuchus) be removed from the schedule since neither genera grow much above 1 m in length and therefore, do not pose any serious threat to humans. The committee agreed to the addition of the rear-fanged snakes but was divided over the Dwarf Crocodile/Caiman proposal which was eventually rejected after objections from some vets and the RSPCA. The RSPCA proposed numerous new species for addition to the schedule, clearly none of which belonged there. As far as herpetology was concerned, they proposed the addition of species which can carry Salmonella (e.g. Chelonians) and frogs with toxic skin secretions. Dr Townson opposed these proposals on the grounds that this was a deliberate misinterpretation of the Act. which was intended to cover overtly dangerous animals. It was pointed out that people are far more likely to pick up Salmonella from handling raw chicken from the supermarket than from chelonians, and that in any case such matters were covered under hygiene/public health areas. The "toxic frogs" issue was dismissed by your representative as ridiculous, since members of the public were unlikely to consume small escaped tropical frogs which were likely to survive only for very short periods. Besides, if these criteria were to be used to justify the addition of species, then we should surely include Common Toads, Crested Newts, Salamanders (and household bleach!), all of which can have dire consequences if eaten. The committee dismissed the proposals to add chelonians and certain frogs to the schedule. However, at a later date, the Department of the Environment decided to add three new types of rear-fanged snakes without re-consulting the committee. These are Malpolon (Montpellier Snake), Psammophis (Sand Snakes), and Boigg dendrophilg (Mangrove Snake). Those of us on the committee who gave up a great deal of time to advise the Department were exasperated by this move, as there seems to be little or no justification for the addition of these new species, which will cause considerable difficulty and expense to those people already in possession of such animals.

The complete list of species covered by the Act is as follows:

Crocodilians

Alligatoridae

Alligators and caimans

Crocodylidae

Crocodiles and the false gharial

Gavialidae

The gharial (otherwise known as the gavial)

Lizards and Snakes

Colubridae of the species of the genera Atractaspis, Malpolon, Psammophis and Thelatornis and of the species Boiga dendrophila, Dispholidus typhus, Rhabdophis subminiatus and Rhabdophis tigrinus

Mole vipers and certain rear-fanged venomous snakes (including the moila and montpellier snakes, sand snakes, twig snakes; the mangrove (otherwise known as the yellow-ringed catsnake), the boomslang, the red-necked keelback and the yamakagashi (otherwise known as the Japanese tiger-snake).

Elapidae

Certain front-fanged venomous snakes (including cobras, coral snakes, the desert black snake, kraits, mambas, sea snakes and all Australian poisonous snakes (including the death adders).

Helodermatidae

The gila monster and the (Mexican) beaded lizard.

Viperidae

Certain front-fanged venomous snakes (including adders, the barba amarilla, the bushmaster, the copperhead, the fer-de-lance, moccasins, rattlesnakes and vipers).

For further information on the Dangerous Wild Animals Act 1976, BHS members can write to the CBC for a free information sheet (see under "Publications").

8. PUBLICATIONS

- (i) Our new book "REPTILES, breeding, behaviour, and vetinary aspects" is now available at reduced rates to BHS members if ordered during 1985 (see advertisement). This book contains most of the papers presented at the Captive Breeding Committee/British Veterinary Zoological Society meeting held on 1st October 1983, as well as several additional contributions.
- (ii) "The Care and Breeding of Captive Reptiles" is still available at reduced rates to members (see advertisement).
- (iii) "Conserving Sea Turtles" by Prof. N. Mrosovsky. A paperback book published by the CBC in February 1983 (see advertisement). This volume is a major contribution to the present controversy and debate on sea turtle conservation. It is a 'must' for anybody interested in marine turtle conservation, breeding, politics, and the general ecology and biology of these fascinating creatures.
- (iv) "Establishing and Maintaining Crested Newts in Garden Ponds". This leaflet is free to members and details pond design, management, acquiring captive bred stock and the setting up of a colony. Please send a stamped addressed envelope to Dr S. Townson or Dr A. Millwood (addresses above).
- (v) Information Sheets. Members are reminded that basic information sheets on the care of reptiles and amphibians in captivity are available free of charge. Several of these sheets have recently been updated, and we are pleased to add a new one to the list — "Rearing Tadpoles". Subjects covered at present are listed below. Please send a large stamped addressed envelope to Dr S. Townson (address above).
 - 1. Tortoises
 - 2. Terrapins
 - 3. Yellow and Fire Bellied Toads (Bombina spp.)
 - 4. Clawed Frogs (Xenopus spp.)
 - 5. Salamanders (mainly Salamandra salamandra)
 - 6. Tree Frogs (Hyla cinerea and arborea)
 - 7. European Lizards (mainly Lacertids)
 - 8. Iguanas (Iguana iguana)
 - 9. Garter Snakes (Thamnophis spp.)
 - 10. Pythons and Boas
 - 11. Rat and King Snakes (N. American Elaphe and Lampropeltis)
 - 12. Venomous Reptiles and the Dangerous Wild Animals Act 1976. (This deals with legal aspects only and not care)
 - 13. Painted Frogs (Discoglossus pictus)
 - 14. Axolotls (Ambystoma mexicana)
 - 15. Rearing Tadpoles
- (vi) We had planned to publish a new booklet on basic husbandry and captive breeding. Unfortunately no funds have been available to date, although it is hoped that we can go ahead with this in 1985.
- (vii) The CBC has been offered an important new manuscript on the conservation and captive breeding of crocodiles, which will hopefully be published as a new paperback book during 1985.

Advertisement

REPTILES

Breeding, behaviour, and veterinary aspects *Edited by* SIMON TOWNSON

and

KEITH LAWRENCE

A new book published by the British Herpetological Society. Publication date : January 1985.

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THE CARE AND BREEDING OF CAPTIVE REPTILES

Edited by: S. Townson, N.J. Millichamp, D.G.D. Lucas and A.J. Millwood



A collection of papers published by the British Herpetological Society. (ISBN 0 9507371 0 0) This new paperback volume contains 100 pages, 22 photographs and numerous figures and tables.

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CONSERVING SEA TURTLES by Nicholas Mrosovsky

Published by the British Herpetological Society

Description:

"Conserving Sea Turtles" is a critical review of the current problems and controversies of sea turtle conservation. In the words of the author: "Sea turtles are beautiful complex creatures, mysterious enough to become addicting for the biologist, absorbing for anyone to watch, and of great value for their eggs, meat, shell and leather. This book is not concerned with demonstrating that sea turtles are worth preserving; that is taken for granted. It is concerned with the methods being used to achieve that end; it argues that much is wrong. If my criticisms can be refuted, then current activities on behalf of the turtles — and the turtles themselves — will emerge all the stronger. If my criticisms stand, then, it is time that a strong light was shone into the dark corners of the conservation biology of these species — and of others too perhaps. I am also convinced that the intentions of those active in sea turtle conservation are irreproachable. It is only the means of proceeding that I wish to debate"

It is written in a clear and uncomplicated style, and will be of interest to the general reader as well as the specialist biologist. The principles discussed are currently of crucial political importance, not only for sea turtle conservation but applied generally to the conservation of the world's fauna.

Contents:

Foreword — Preface — Turtles are Big — A Brief Life History — The Tagging Reflex — Head Starting: The Heart Has Its Reasons — Operation Green Turtle — The Styrofoam Box Story — Kemp's Ridley in a Technological Fix — The Anathema of Farming — Four Thousand Unwanted Turtles — Dangerous Categories — The Alarmist Strategy — Problem Resolving — Splitting: Strategy or Science? — An Egg-Laying Machine — Abbreviations — References — Index.

Specifications:

176pp. Paper Cover. Lacquered. ISBN 0 9507371 1 9. Publication date: February 1983.

Price:

U.K. £5.00 + 75p postage (surface mail) or £2.80 (air mail).

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International Money Orders and Cheques should be made payable to the British Herpetological Society. Orders should be addressed to Dr S. Townson, British Herpetological Society, c/o Zoological Society of London, Regent's Park, London, NW1 4RY, England.

9. FINANCES

Income

£2,531.31 — Booksales and postage 7.00 — Donation

7.00 - Donan

Total: £2,538.31 (Note: no funding was received from the Society for 1983 or 1984).

Expenditure

£

181.17 — deficit from 1982

- 403.50 book postage and packaging
- 41.00 advertising fly sheets for "Conserving Sea Turtles"
- 30.00 Costs of 1983 meeting at Centre for Life Studies
- 15.00 Costs of 1984 meeting at Centre for Life Studies
- 46.00 Photocopying and postage
- 7.00 Bounced cheques
- 2000.00 Cost of printing new CBC book "REPTILES"

Total: £2,723.67

Deficit at start of 1985 of £185.36.

We are very grateful to Mrs Hope for her donation.

10. In conclusion, the CBC has made considerable progress towards its aims and objectives and has made a major contribution to the running of the Society, by (i) organising meetings, (ii) providing speakers for internal and external meetings, (iii) representing the Society on government committees, (iv) providing a liaison service for members and information service for the great majority of enquiries received by the Society, (v) providing information sheets, leaflets, and original books made available to members either free of charge or at reduced rates, (vi) organising captive breeding and conservation projects involving live animals, (vii) providing space and soliciting articles on husbandry, breeding, and conservation in the BHS *Bulletin*. In addition, the CBC has been largely responsible for the considerable recruitment of new members to the Society through its information sheets and book sale service, and through retail shops and outside meetings.

However, we very much regret to report that Council has refused to fund CBC activities during 1983 and 1984, which has greatly slowed our progress, despite paying large sums of money to the Conservation Committee. We feel that our broad interest in herpetology is a legitimate one and is shared by the majority of members of the Society, and therefore deserves a fair share of funding. We look forward to a more representative and enlightened Council in 1985.

Simon Townson (Chairman)

EDUCATION COMMITTEE REPORT FOR THE YEAR ENDING APRIL 1st 1984

One of the most difficult, but essential, duties which the Education Committee undertook during the year was the drafting and submission of its Terms of Reference to BHS Council. At this point in time final agreement on some of the small print has still to be reached but the main structure and functions of the Committee is agreed. The aims of the Education Committee are stated as follows:

a) The primary aim of the Education Committee is to enable children between the ages of 9 and 17 who have an interest in herpetology to develop their interest with particular regard to improving their field and husbandry techniques based on the platforms of sound conservation practice and animal welfare considerations.

b) The secondary aim of the Education Committee is to communicate with non-members of all ages in order to bring about an awareness of the work of the Society and to generate a general sympathetic interest in all aspects of herpetology.

At present the members of the Committee are as follows:

Vic Taylor	 Education Officer
Janet Pracy	 Administrative Secretary
Dr Graham Walters	- Secondary Specialist
Dr Oliphant Jackson	 Veterinary Specialist
Robbie Gook	- General Adviser
Betty Gook	- General Adviser

Each member of the Committee has an important role but possibly none more so than Janet Pracy who undertakes all of the routine banking and correspondence in respect of subscriptions and renewals. She also sends out the Newsletters, keeps membership records, hosts meetings of the Committee and prepares the minutes of same. By cheerfully undertaking these essential tasks she ensures that the rest of the committee can function.

The past year has been a busy and exciting one. In the last ten months I alone have received 144 letters which in the main do not include the routine administrative matters which go direct to Janet. I know that all of my colleagues on the Committee have also been engaged in their own correspondence over the same period. Despite the fact that J. Herps are trained to send an SAE with any queries we are still paying out something like 45% of each J. Herp subscription on postage.

During the year we put on two exhibitions these being a 3 month display at the East Surrey Museum in Caterham and a 2 day exhibit at the annual Countryside Weekend at Capel Manor Institute. The former display generated a lot of interest among school parties who visited the museum. We would like to thank local BHS member Geof Tate who was instrumental in arranging for the exhibit to take place, kept an eye on it whilst it was up and even stored it for a while after it was taken down. Thanks are also due to Ed Wade and those members of the Conservation Committee who supplied material for the event. The Capel Manor exhibit was manned by BHS member Colin Fitzsimmons assisted by a group of miscellaneous J. Herps with reptiles.

Various members of the Committee have given talks to various organisations but perhaps the most potentially valuable was a short talk entitled "The J. Herp — a New Urban Species" which I gave to the annual conference of the National Association of Field Studies Officers at Manchester in the New Year and a session which Dr Jackson, Dr Walters and myself gave to teachers at the Waltham Forest Teachers Centre. We hope to be running similar sessions for teachers in other London Boroughs over the next year.

The first J. Herps only meeting was held at the Centre for Life Studies last August when Peter Curry answered numerous questions on husbandry whilst showing members his reptile and amphibian collection. Following this the party visited the Reptile House at the London Zoo. The success of this day was due to the stirling efforts of Peter Curry who even suggested that we make the trip an annual event. We are deeply indebted to Peter and will take him up on his kind offer.

Graham Walters organised a series of J. Herp conservation task days in Epping Forest but sadly these were badly supported. However, we have plans afoot to try to generate some interest in this project over the coming summer by holding a field trip and possible camp to motivate our potential workforce. Over the coming year Graham also hopes to have completed our submission to the Duke of Edinburgh's Award Scheme on a revised syllabus for their award in herpetology.

The Junior Newsletter has improved in quality following our change of printers. Our target date for the dispatch of each issue is during the half term holiday period and most issues do in fact get sent out within two weeks of this target unless the dispatch is held up because we are waiting for the current issue of the Bulletin to be sent in the same envelope. An examination of postal costs shows that we could not afford to send the two publications out under separate covers without putting up the cost of Junior Subscriptions and this we are loathe to do. In order to cater for ex J. Herps who have come of age and "gone up" into the main Society but miss their termly Newsletter we are now offering a Newsletter Only subscription for $\pounds 2$ p.a. This is available to any person be they a member of the Society or not and, although only very recently introduced, we have one or two who have taken advantage of this offer.

The next year seems set to prove equally interesting and challenging. We have plans to exhibit at three major exhibitions and hope to organise some more Junior activities and meetings. Our appeal in the Bulletin for members to help answer childrens' letters on specialist subjects resulted in the nucleus of an advisory panel being formed but we still need more help in this respect. We would also like to hear from any members who might be interested in helping to organise Junior activities in their area; in particular we need to hear from any member with primary teaching experience who might be interested in trying to organise activities for primary school groups on a national level and who would be willing to sit on the Education Committee as "Primary Specialist".

There follows a breakdown of our income and expenditure from 22nd March 1983 to 31st December 1983:

J. Herp. Subscriptions: Donation:	Income 171.50 1.00	Expenditure
Printing of Newsletter:		70.00
Postage & Stationery + general expenses:		77.65
	172.50	147.65
Balance of income over expenditure:		24.85
Cash at Bank:	18.42	
Cash in Hand:	6.43	
	24.85	24.85

Notes: Our position has improved so far this year as at the end of February our Bank balance stood at \pounds 84.82; however the above statement only covers a nine month period which includes only two editions of the Newsletter the printing costs of which are estimated at £100 plus per year.

Any BHS members wanting further information on any aspects of this report, or who are interested in helping the Education Committee are invited to contact Vic Taylor direct. For address and telephone number see the inside back cover of this Bulletin.

NORTH EASTERN GROUP : A PLEA FOR HELP

The newly founded north eastern group at present has a small membership. For this reason members living in the region are encouraged to support the group by attending meetings if possible and by introducing potential new members to the Society. If it is to survive the regional group must increase its membership.

It is hoped that some members living in the region will offer to join the Society's committees and further their work in the region. There are already representatives on the conservation committee. One of the active interests of this committee is the conservation of Cumbrian Natterjack populations and any help along these lines would be welcomed. It would also be helpful to have captive breeding committee representatives in the region to strengthen the position of this group in the area. Finally a flourishing junior group would be a great assistance to membership recruitment in the north east. Anybody interested in starting a junior group should contact the Chairman of the Education Committee for advice. The addresses of chairpersons of these committees are available on the back pages of the Bulletin.

NORTH EASTERN GROUP SPRING & SUMMER MEETINGS 1985

The following meetings have been arranged for 1985 with evening meetings being held at the Adult Education Centre, 32 Old Elvet, Durham, starting at 7.15 p.m.

APRIL 17th	Mr C. Raxworthy (Dept. Zoology, Bedford & Royal Holloway College, Univ. of London, Egham, Surrey). Herpetofauna of SW Morocco — results of a University of London Union Natural History Society Expedition 1983.
APRIL 21st	A joint field trip with other naturalists groups to the Ravenglass Nature Reserve (Cumbria). The site has large populations of all six native amphibians, adders, common lizards and slow worms. A coach will leave from the north east at 8.30 a.m. For further details please send an S.A.E. to Mr I. Jenkins, 449 North Road, Darlington, Co.

Durham, before 31st March 1985.

JUNE 19th

Mr D. Brownlea. The captive breeding and care of King and Rat Snakes in captivity.

Two further meetings are arranged for the autumn and will be announced in the next Bulletin when the dates are finalised.

RELATIONSHIP OF PARASITIC PENTASTOMID BEHAVIOUR WITH REPTILES

Abstract of a talk given at an Evening Meeting of the BHS on 25th April 1984

Pentastomids are arthropod parasites of the respiratory tract of vertebrates — the majority infect reptiles and use intermediate hosts to effect transmission. Two species, belonging to the primitive order Cephalobaenida, infect lizards and amphisbaenians respectively and both utilize insects as intermediate hosts. One of these species, Raillietiella frenatus, a gecko parasite, the intermediate stages of which occur in coprophagous blattids, has a high transmission efficiency - as evidenced by a high prevalence in geckos and a low fecundity - because of strong trophic links between the egg-contaminated lizard faeces, the cockroach intermediate host and the gecko. The other closely-related cephalobaenid, R. gigliolii is a lung parasite of the South American worm-lizard Amphisbaena alba. In Trinidad we know that A. alba inhabits, for most of its life, the nests of the leaf-cutter ant Atta cephalotes where it feeds mainly on inquiline beetles and their larvae which in turn feed in the refuse chambers of ant nests. Ants are meticulous about nest hygiene and spend a considerable proportion of their time in the nest licking nest surfaces to remove particulate contaminants which are then ejected onto the refuse dump. R. gigliolii is common in worm-lizards (86% prevalence) and has a low fecundity, which again suggests a high transmission efficiency. We have demonstrated that egg-contaminated amphisbaenian faeces introduced into captive ant colonies are rapidly cut-up and thrown onto refuse tips where, under natural circumstances, they would be consumed by beetle larvae. We have shown that the larvae of the three-horned rhinoceros beetle. Coelosis biloba, is a potential intermediate host; infective larvae grow in the haemocoel and the life-cycle is completed when A. alba consumes infected beetle larvae. Thus ants constitute an essential link in the transmission of R. gigliolii.

Pentastomids belonging to the advanced order Porocephalida are generally characterized by a high egg output and, so far as is known, only vertebrates are used as intermediate hosts. The rattlesnakes parasite *Porocephalus crotali* may live for up to 8 years in its definitive host during which time females produce millions of eggs. These remain viable for months and can only develop into an infective stage in small rodents which acquire eggs as contaminants of food or water. Seven stages, each separated by a moult occur in the mammal, before the instar infective to rattlesnakes is produced. The closely related species *P. stilesi* infects the bushmaster (*Lachesis muta*) in South America, and in Trinidad infections show high prevalence and intensities. Under natural conditions hosts apparently tolerate high parasite burdens with no obvious pathological effects. Such hosts brought into captivity however may become stressed, the stress communicates to the parasites (by an unknown mechanism) which may then behave abnormally by migrating into the trachea thereby killing the host.

Similar behaviour is shown by nymphal *Kiricephalus* pentastomids in their second intermediate snake host. There is strong evidence to suggest that three vertebrates are necessary to complete some *Kiricephalus* life-cycles. Eggs are known to be infective to amphibians in which early nymphal stages are found. These then develop to a relatively advanced stage in the body cavity of amphibian-eating snake second intermediate hosts. If such infected hosts are stressed by (say) rough handling, nymphs are stimulated into activity in the belief that the snake has been swallowed by an ophiophagous snake definitive host: infective nymphs may emerge through the epidermis, nares etc. in the expectation that they will find themselves in the stomach of a snake.

Lastly studies on the pentastomid Subtriquetra subtriquetra, which inhabits the nasal passages of the spectacled caiman (Caiman crocodilus) is of considerable interest because it is the only pentastomid known to produce free-living larvae; these are able to crawl, laboriously, in water. Very low parasite fecundity is, to some extent, offset by larval behaviour which is directed towards enhanced transmission to the fish intermediate host. The larva has a long tail equipped with sharp hooks, which it uses to fasten onto passing fish. Direct penetration through the body surface of the fish is followed by development in the swim bladder. When larvae become infective they may affect fish buoyancy rendering it more liable to predation by the crocodilian definitive host.

Dr J. Riley, Department of Biological Sciences, The University of Dundee

FOUR RECENT ADDITIONS TO THE BHS LIBRARY FROM SOVIET RUSSIA

- O.A. Skarlato (Ed.) Herpetological Collected Papers: Proceedings of the Zoological Institute, Soviet Academy of Sciences, Vol. 74. 137 pp. 1977.
- (2) N.B. Ananjeva & L.J. Borkin (Eds.) Ecology and Systematics of Amphibians and Reptiles: Proceedings of the Zoological Institute, Soviet Academy of Sciences, Vol. 89. 124 pp. 1979.
- (3) N.B. Ananjeva & L.J. Borkin (Eds.) The Fauna and Ecology of Amphibians and Reptiles of Palaearctic Asia: Proceedings of the Zoological Institute, Soviet Academy of Sciences, Vol. 101, 123 pp. 1981.
- (4) L.J. Borkin (Ed.) Herpetological Investigations in Siberia and the Far East. Zoological Institute, Soviet Academy of Science. 148 pp. 1981.

The Soviet Union covers a vast geographical area, containing a wealth of different environments ranging from the steppes and pine forests of Siberia to the blisteringly hot deserts of the south. It is not surprising, therefore, that the herpetofauna is both large and diverse.

There are now a considerable number of Soviet herpetologists, stationed at museums, zoological institutes and in the zoology departments of universities. Their work is not as well known in the West as it ought to be, partly because of the language problem, and often because Soviet journals are difficult to obtain, and books go out of print very rapidly. This is a pity: much of the Soviet work is of great interest and value, and some of it relates to species which are familiar to us in western Europe, or to their close relatives.

Thanks to the generosity of Dr Leo Borkin, who works at the Herpetology Department of the Zoological Institute in Leningrad, the BHS Library has recently received the four books listed above. All four are essentially collections of scientific papers, on a wide variety of topics but with emphasis on morphology, taxonomy, geographical distribution, ecology and palaeontology. Since Russian is not a familiar language to most members, I thought it might be useful to give some indication of their contents — (1) to (3) have short English summaries, (4) has only the titles of articles in English. Inevitably I have been selective; these four books contain a total of 73 scientific papers, and it would be impossible to review them all. I have picked out those articles which I think are of particular interest, or which seem to make a significant contribution to herpetology. For many members I expect that the data on geographical distribution will be of most use, but I have not included comments on this because it is one of the few topics for which a knowledge of Russian is not required to extract the gist — you can look at the maps!

The systematics and variation of frog populations is a recurring theme in some of these volumes, see An analysis of population polymorphism in mid-dorsal stripe ("striata") and of its correlation with size in the brown frog Rana arvalis Nilsson (L.J. Borkin), On a new record and taxonomic position of the brown frogs of Kopet-Dagh, Turkmenia (L.J. Borkin) and Karyotypes of some brown frogs of Eurasia and a taxonomic analysis of karyotypes of the group (V.F. Orlova, V.A. Bakharev & L.J. Borkin) in (1) and On morphological distances and resemblance of the brown frogs of the USSR fauna (V.G. Ishchenko & Y.U. Elkin), Colour polymorphism in a population of the Siberian frog (Rana amurensis Blgr.) (V.A. Bakharev) and On genetics of colour polymorphisms in the moor frog (Rana arvalis Nilss.) 1. Mid-dorsal stripe in (4). The mating behaviour of toads is also dealt with, see Visually-guided responses of common toad (Bufo bufo asiaticus) choose its mating partner by body size? (S.L. Kondrashev) in (4).

Taxonomy is also a recurring theme and several new species are described, e.g. Lacerta clarkorum and L. uzzelli in (1). I particularly liked two papers in (3) in which a new species of sawscaled viper (Echis multisquamatus) is described by V.A. Cherlin, and then its behavioural thermoregulation, particularly at the mouth of the burrow, elaborated in great detail by Cherlin and A.J. Tsellarius. In the same volume there is an interesting note on the range of the adder Vipera berus in the far north of Yakutia in eastern Siberia (L.J. Birkin & F.N. Krillov): it extends to latitude 63°30' N.

Conservationists will be interested in an article On protection of the Amphibians and Reptiles of Siberia and the far East of the USSR by L.J. Borkin & Y.M. Korotkov in (4), and experimental biologists in A study of the degree of genetic homogeneity in the unisexual lizard Lacerta unisexualis Darevsky using skin graft techniques by I.S. Darevsky & F.D. Danieljan in (2).

I cannot conclude without remarking with envy how cheap these books are — the most expensive of them cost only one rouble. This is only a fraction of what one would have to fork out for an equivalent volume in the West.

R.A. Avery

EDWARD ELKAN MEMORIAL FUND — FURTHER DONATIONS NEEDED

The Edward Elkan Memorial Fund was established in order to perpetuate the name and work of Dr Edward Elkan, the internationally renowned lower vertebrate pathologist, who died on 4th July 1983. Since its inception in August 1983, the Fund has attracted considerable interest and support, and so far £900 has been received and work has already started on the preservation and cataloguing of Dr Elkan's unique collection of drawings, books, microscopic slides and pathological specimens. The aim is to ensure that the "Edward Elkan Reference Collection of Lower Vertebrate Pathology" will be widely used for study by herpetologists, pathologists and researchers from a range of disciplines. Herpetologists have responded excellently to the Appeal and the list of subscribers will be published in due course.

However, more donations are needed if the Collection is to be properly collated, mounted and maintained. Furthermore, assistance with the collation of the Collection would also be appreciated. An opportunity is available for a volunteer, perhaps a retired person or a student, to spend some time at the Royal College of Surgeons of England listing and rearranging the specimens. A detailed knowledge of pathology is not required, although some familiarity with scientific terminology and an interest in herpetology would be an advantage. Offers of assistance in this way, providing information on availability and experience, and further contributions are therefore welcomed. Cheques should be made payable to "The Edward Elkan Memorial Fund" and forwarded to:— J.E. Cooper, MRCVS, Royal College of Surgeons of England, 35-43 Lincoln's Inn Fields, London WC2A 3PN.

AMENDMENT TO LIST OF EUROPEAN HERPETOLOGICAL SOCIETIES

A list of the European Herpetological Societies was published in *BHS Bulletin*, No. 7: 18-29, June 1983. An amendment has been received from Israel.

Israel

ISRAEL HERPETOLOGICAL INFORMATION CENTER (I.H.I.C.) Mr Amos Bouskila, Director Har Gilo D.N. Harei Yerushalaim 91076 ISRAEL Publications: Hardun, published twice yearly, in Hebrew with English summaries of

Publications: *Hardun*, published twice yearly, in Hebrew with English summaries of articles, IHIC News in English.

HERPETOLOGY IN EPPING FOREST

Several scrub clearing exercises have already taken place this winter, the fourth winter of clearance work specifically designed to restore herpetofauna habitat in Epping Forest. It seems that Common Lizards will move into an area with rather undeveloped ground cover the summer after it has been cleared, but Adders prefer to wait until three summers have passed since clearance, when the ground cover is continuous and well developed. Although we have achieved encouraging results, our work force is very small and we are constantly in need of more labour. Anyone interested in wielding an axe or saw for the benefit of Epping Forest's herpetofauna should contact Graham Walters (01-521 0134) for details. Remaining clearance dates for this winter are as follows:

Sunday 27 January 1985 Sunday 24 February 1985 Sunday 24 March 1985 Sunday 14 April 1985

We also need observers for a spring census, to monitor the result of our efforts. If you are interested, please get in touch.

Graham Walters 6 Avon Road, Walthamstow, London E17 3RB. Tel: 01-521 0134

TRITURUS GROUP

As the result of enthusiasm in Europe and North America, a *Triturus* information scheme is being formed. It is also hoped to hold a conference on the Evolutionary Biology of *Triturus* in June or July 1984 which will be organised by Prof. Herbert Macgregor (Univ. Leicester) and Dr Tim Halliday (Open Univ., Milton Keynes) and will be held at the University of Leicester. For further details for both the information scheme and conference, please contact Dr T.R. Halliday, Department of Biology, The Open University, Milton Keynes MK7 6AA.

CRESTED NEWT APPEAL

1985 sees the third year of an investigation into the status and ecology of the Crested (Warty) Newt, aimed at forming a sound basis for conservation policy relating to this protected species. The project is being undertaken on behalf of the Nature Conservancy Council, and includes a national survey in which the public are asked to contribute records of sightings and/or to complete questionnaires describing Crested Newt (or other) ponds. Full details are available from Mark Nicholson, School of Life Sciences, Leicester Polytechnic, P.O. Box 143, Leicester.

OPERATION RALEIGH — OPERATION TORTOISE

Operation Raleigh (headquarters: The Warehouse, St. Katherine's Dock, 52 St. Katherine's Way, London E1. Tel: 01-265 0251/2/3/4) follows on from the considerable success of the much publicised Operation Drake a few years ago.Patron: HRH the Prince of Wales, Honorary President: Walter H. Annenberg K.B.E. (U.S.A.), Chairman: General Sir John Mogg and organized by the Deputy Chairman: Col. J.N. Blashford-Snell and P. David King, Operation Raleigh intends to circumnavigate the world and be involved with scientific, conservation and community projects on land and sea. The research projects are being planned by recognised scientific and conservation bodies in cooperation with host governments. These will include comparative zoological, botanical and geographical surveys of tropical rainforests, desert and montane environments. Links with international and local agencies will enable Operation Raleigh to cooperate in environmental development programmes and community projects. It is the biggest, most ambitious multinational expedition ever undertaken and will continue from November 1984 to June 1989 starting in the Bahamas and Jamaica, and after going round the world, ending at Brazil and Venezuela.

One of the principal projects is Operation Tortoise.

Operation Tortoise (Director: Dr Ian Swingland, University of Kent, Canterbury, U.K.; Chairman: IUCN Species Survival Commission Tortoise Group) will involve animal ecologists in a large number of countries who specialise on tortoise ecology, behaviour and in particular their distribution. Many of the species are endangered and populations are being decimated each year by collecting, fires, agricultural and urban development, gassing, dune-buggies and other off-road vehicles, missile site construction, competition with grazing stock, human food when the normal staple diets are absent and for making into musical instruments. Operation Tortoise's main function will be to determine the status and examine the comparative ecology of many of the world's tortoise species for purposes of conservation. The funding organization will be the People's Trust for Endangered Species (Director: Mr W.J. Jordan MVSc, BSc, MRCVS), Hamble House, Meadrow, Godalming, Surrey GU7 3JX. Tel: (14868) 24848. Donations for the project are welcome!

Since the inaugural meeting, in October 1981, of the IUCN/WWF Tortoise Specialist Group (see BHS Bulletin No. 4: 13-15, 10-12, December 1981), an action plan for ecological research and the worldwide conservation of tortoises has been in operation. However, considerable gaps in our knowledge of their status, distribution and ecology has made the task of conserving the remaining 39 species (of which three are endangered and several subspecies have already become extinct in the last 70 years) formidable. Although we have been successful in funding two major single-species studies in Europe and North America, because of our existing detailed knowledge and the high level of public interest in tortoises (the creature apparently being emotive), we are so woefully ignorant of even basic information on most species that effective conservation plans cannot be formulated. For this reason, Operation Raleigh is the ideal vehicle for a coherent and directed examination of the status, distribution and basic ecology of many species.

There are a number of important aspects relating to Operation Tortoise:-

1. There is a very strong comparative element, with similar studies on species in South America, Asia and Africa, which should provide a fascinating insight into general tortoise ecology, and common themes may be developed for the conservation of several species.

2. The work can be successfully carried out entirely in the field with only a modest amount of equipment and is not dependent on major back up facilities. The methods have been used successfully on previous single species studies, including expeditions, and have provided rigorous data suitable for publication.

3. None of the work is of a highly skilled nature and several Venturers can be usefully employed on a variety of tasks, varying from general prospecting in search of tortoise populations, to detailed observations focussed on individual animals. For example, the availability of several Venturers would enable a shift system to operate, so that the full daily activity pattern of tortoises can be monitored.

4. It is unlikely that the tortoise work will be conducted in isolation. Realistic management plans must take into consideration other wildlife, the habitat and local human factors, thus a high degree of liaison with other projects is anticipated. This will include joint work with senior personnel and collaborating researchers from many countries.

5. The main body of the work, which will be carried out in the same manner at each site visited, will comprise a controlled sampling programme in well defined areas, and all tortoises found will be uniquely marked and measured and their activity noted. All data will be recorded in a standard format which will be directly comparable between sites and with existing data sets for European and other species.

The Ecology/Computing Group at the University of Kent with its excellent facilities will be the operational base for analysis and writing up after the field work.

Further reading

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March 1984

I.R. Swingland/M.R.K.L.

REPORT ON THE COMBINED MEETINGS OF ASIH-HL-SSAR, 28 JULY — 3 AUGUST 1984, UNIVERSITY OF OKLAHOMA, U.S.A.

Between 28 July and 3 August 1984, the American Society of Ichthyologists and Herpetologists, the Herpetologists' League and the Society for the Study of Amphibians and Reptiles held combined annual meetings at the University of Oklahoma, USA. With almost 1000 registered participants, this was the largest gathering of fish, amphibian and reptile biologists ever seen in the USA. The great majority of these biologists were from universities and research establishments in the New World, and this was reflected in the fact that most of the papers given were of studies of New World species. Approximately 45% of all papers were concerned with reptiles, 33% with fishes and 22% with amphibians.

Opening Session

1. Welcoming addresses.

2. ASIH Presidential Address, by Dr Marvalee Wake (University of California at Berkeley): 'Caecilians and I — our first twenty years'.

3. ASIH Distinguished Fellow Lecture, by Dr John Randall (Bishop Museum, Honolulu, Hawaii): 'On the importance of marine sanctuaries to ichthyological research'.

4. HL Distinguished Herpetologist Lecture, by Dr David Wake (University of California at Berkeley): 'Species, genes and morphology: a perspective on evolution in salamanders'.

Symposia

1. 'Predator-prey relationships in lower vertebrates'. Part I: Physiology and Morphology, chaired by Dr Martin Feder (University of Chicago). Part II: Ecology and Behaviour, chaired by Dr George Lauder (University of Chicago).

2. 'Biology of *Cnemidophorus*'. Sessions chaired by Drs John Wright (Los Angeles County Museum), Laurie Vitt (University of California at Los Angeles) and Joseph Schall (University of Vermont).

Special Sessions

1. Regional Herpetological Societies Conference, chaired by Dr Jeffrey Black (Oklahoma Baptist University): 'Monitoring reptile and amphibian populations'.

2. SSAR Zoo Liaison Committee, chaired by Dr Peter Tolson (Toledo Zoologicial Gardens): 'Management of endangered reptiles and amphibians in captivity'.

3. 'Workshop on larval amphibian biology', coordinated by Dr Richard Wassersug (Dalhousie University).

Special Invited Address

Given by Professor Er-Mi Zhoa (Academia Sinica, Chengdu, China): 'A brief review of the amphibians and reptiles of China'.

General Paper and Poster Sessions

- 1. Community ecology.
- 2. Population ecology.
- 3. Zoogeography.
- 4. Systematics.
- 5. Life histories.
- 6. Morphology.
- 7. Foraging ecology.
- 8. Herp thermal biology.
- 9. General physiology.
- 10. Reproductive biology and physiology.
- 11. Larval biology.
- 12. Herp communication and behaviour.

Field Trip

A short trip to the Oklahoma University Biological Station, visiting a number of water courses en route.

Social Events

- 1. 'Start of the meetings' social.
- 2. Visit to Oklahoma City Zoo, with barbecue.
- 3. Slide presentations of 'Amphibians of the Appalachians' (David Dennis and Eric Juterbock) and 'Herpetologists then and now' (David Dennis and Kraig Adler).
- 4. Auction of ich/herp miscellania.
- 5. Picnic, with dancing by Kiowa Indians.
- 6. Banquet of roast bison.
- 7. Numerous trips to numerous bars (for intellectual stimulation only!).

After the meetings, I was invited to go on a collecting trip through the states of Oklahoma, Missouri, Tennessee and North Carolina. Although our party were primarily interested in plethodontid salamanders, I was fortunate enough to experience such delights as catching hellbenders (*Cryptobranchus alleganiensis*) in the Missouri Ozarks and blind salamanders (*Typhlotriton*) in Oklahoma caves. My visit to the USA, lasting nearly three weeks, finished with a few days at the University of Chicago.

I thank the Open University Overseas Travel Sub-committee for financing part of my trip, and many American friends for making my stay so very enjoyable; special thanks go to Lynne Houck, Nancy Reagan, Steve Arnold, Steve Tilley and Dave Sever.

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UNIVERSITY OF LONDON NATURAL HISTORY SOCIETY HERPETOLOGICAL EXPEDITION TO MOROCCO 1983: A BRIEF SUMMARY

During the summer of 1983 the Natural History Society expedition was based at Cap Rhir — a headland on the west coast of Morocco. A herpetological survey was made of the area and the following species studied:—

Acanthodactylus pardalis Psammodromus algirus algirus Tarentola mauritanica Saurodactylus mauritanicus Chalcides mionecton mionecton Agama bibroni Testudo graeca

Distribution, substrate preference (and its role in niche description), refuge type, escape behaviour and activity was studied. Interestingly it was also found that *Testudo graeca* (Spur-Thighed-Tortoise) was aestivating in this region during August. This observation has been confirmed by a follow up study of the tortoise population at Cap Rhir made by Mr C.J. Raxworthy in April 1984, when, unlike the previous August, tortoises in April were active and feeding.

An expedition report has been published:-

A Study of the Reptile Fauna at Cap Rhir, Morocco. C.J. Raxworthy, S. Rice, D. Smith and F. Claudius. ISBN 0 950 7556 13. Price £2.50 (including postage and packing) which gives the full results of the study. Additional notes are also included, such as observations on the tortoise souvenir trade, behaviour of the Atlas Gecko Quedenfeldtia trachyblepharus, and suggestions made on separating Acanthodactylus pardalis and Acanthodactylus erythrurus in the field. The report also includes a complete list of reptiles and amphibians seen on the expedition (30 species) including sites for Morocco, and is illustrated with 18 figures (including maps), 5 tables, 22 reproduced photographs, and is 78 pages.

Copies can be obtained for £2.50 from Mr Chris Raxworthy, 3 Hillside Gate, St Albans, Herts, AL1 3QN.

SNAKE HIBERNATION: IN AND OUT OF THE ZOO

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Visitors to the zoo reptile facility during recent winter months were often surprised to see a number of empty exhibit cages. Instead of the snakes that are residents of these enclosures during the warm season, the visitor is greeted with signs which state "These animals are temporarily in hibernation". Though the text of the signs gives brief explanation that some reptiles require a several month hibernation period in order to successfully reproduce, the details of this phenomenon have, through space restrictions, been omitted.

One purpose of this article is to delve a bit deeper into the intricacies of snake hibernation both in Nature and in the captive collection and to relate how this program is of major importance to the overall goals of animal breeding and conservation. Foremost, however, this article attempts to show that in any collection of captive snakes, whether large or small, zoo or private, hibernation or cooling can be instrumental in establishing not only a self-generating source of specimens, but a potential base for scientific study.

Too often, zoologists tend to disregard data generated from studies on captive specimens, indicating that observations are invalid or not applicable to studies in Nature based upon behaviour brought out through captive restraints. It seems, however, particularly in an animal species that reacts primarily to instinctive devices for survival, that these restraints are lessened by subjecting the animal to as close to natural conditions as possible. In rare forms of animals where little or no work has been done on natural populations, data from captive specimens can provide this base for future study.

In temperate climates, response to the approach of winter can be readily observed throughout the animal kingdom; birds will be seen in large flocks heading south, squirrels spend much of their time gathering and storing nuts, certain hoofed mammals such as caribou move down the mountainside to their winter feeding grounds, domestic dogs and cats begin to develop their "winter coats", and even human beings go through a variety of ritualistic though not necessarily instinctive procedures. Hibernating mammals, such as bears, must not only grow a protective coat, but at the same time develop an insulating layer of fat from which the body feeds during their winter dormancy.

But what about snakes? Consider for a moment the example of a Western Diamondback Rattlesnake (*Crotalus atrox*) somewhere in Texas. Temperate Zone to be sure, with plenty of seasonal temperature extremes and a hard winter in the forecast for the months ahead. The snake coils basking in the midday sun under a blue, late September sky. During mid-afternoon, the wind picks up, clouds roll in and a chill is in the air. The first hint of a "blue norther" (as typical fall cold fronts are termed in Texas) has reached the region! As night-time temperatures fall into the 40s for the first time since spring, certain instincts, going back perhaps many thousands of years, begin to go to work. Responding to the overnight chill and shortened days, our snake begins a journey of up to ten miles, through several meadows, across a number of streams, up and back down a few low hills, and perhaps transversing a road or two. The destination is a series of well-worn rock crevices halfway up the southeast facing slope of a distant mountain. Barring tragedy along the way, our snake will join others of its species, possibly numbering into the hundreds, that have also obeyed their instincts in this annual migration to this specific den site.

These snakes will spend what time is available to bask during the sunny days, and retreat into the crevices at night until the cold settles in. At this time, they are deep within the mountainside where they will remain until springtime finally arrives. The inner crevices will hold the temperature somewhere between 40 and 50 degrees, and since snakes are cold-blooded (as are other reptiles), their body temperatures will also remain close to this temperature. Unlucky are those that for some reason cannot make it to the security of the den site, for as temperatures plummet to the below freezing mark, so must their body temperatures! Freezing temperatures for any length of time are usually fatal to all reptilian species.

The first few days of spring in early March are usually not enough to bring the snakes out of dormancy. A week or two of strong sun brings about a slow increase in inner den temperatures, and it is at this point that basking at the den entrance begins with retreat at night, as was the case back in the fall. This delayed response to early spring temperatures is most probably an instinctive protective mechanism, for a premature dispersal could have the same disasterous effects as would late arrival to the den in fall! After another week of daily temperature increases, dispersal begins *in mass*, and the snakes move out once again to their summer feeding grounds. Visitors to den sites during the summer are hard pressed to even recognize them as such, and few if any snakes are ever seen. It is not known if instinct takes the snakes to the same summer living quarters each year, but this is interesting, for certainly a single feeding area couldn't support the entire den population!

And so it goes, season after season, for our group of Diamondback rattlesnakes. It is thought by some that gravid females instinctively return to the proximity of the densite a month or so before all others in order to give birth. Supposedly, through this process, the newborn snakes will in turn instinctively know where they must travel with the approach of each future winter. Accumulating scientific evidence, however, points to the probability that young are born mostly a short distance from the den and spend their first or second winter in local available mammal holes or other retreats, eventually locating "family" densites through olfactory trailing sometime at a later time.

Needless to say, the couple of weeks spent in fall and spring basking around a den site (called the "lying out period") can be most critical for survival. Studies of various dens have shown entire populations wiped-out from one season to the next by snake-hating "sportsmen" or overzealous collectors who happen upon the dens during these times of congregation.

My first experience with a snake den occurred in the fall of 1975. It was a beautiful late October day with bright skies and temperatures in the high 70s when Steve Dobbs, former Director of the Atlanta Zoo, and I set out to locate a den just south of Dallas in the Cedar Hill community. Years earlier, while Steve was a Reptile Keeper at the Fort Worth Zoo, he had found this den which housed large numbers of Diamondbacks, along with an occasional Copperhead and Coachwhip. The Cedar Hill area, incidently, is the furthest East the Western Diamondback is known to range in north-central Texas.

We parked the car, and after gaining permission from the land owner, walked about a mile through wooded cow pastures until we reached a bluff several hundred feet above a large meadow. From this prominence, the skyline of the city of Dallas could easily be seen in the distance. The edge of the bluff contained horizontal limestone fissures, and as we began descending the 45 degree slope, Steve instantly pointed out an adult Diamondback, then another, coiled among the dried brown leaves and chips of limestone rock. Their coloration was so cryptic that I had trouble spotting them! Steve suggested that I look for anything reminiscent of a "cow-pie", and soon the analogy was complete, as a number of others were located and identified as Diamondbacks coiled basking in the afternoon sun. Fortunately, our presence had not been immediately detected by the snakes, and as we sat watching for a few moments, two individuals crawled leisurely from the crevices to assume the characteristic, coiled basking position, totally unaware that their potential, mortal enemy sat observing not 15 feet away!

Soon our movement was noted, and one specimen made a beeline for the sanctuary of the limestone fissures, rattling briefly as he went. Others remained still until they determined we were too close for comfort. One very large, probably very old individual had apparently just eaten a huge meal, most likely a rabbit judging from the size of the lump at midbody. This snake appeared to be asleep as we approached to within a few feet. After taking several photos, we touched him with our snake hooks, and after a few gentle prods, his head swung around in apparent confusion. Once realizing the situation at hand, he made a rather awkward and undignified retreat toward the rock crevices and directly between two narrow saplings ... too narrow, in fact, to allow passage of the section of body containing the food item! So there he struggled helplessly for a moment or two until we finally assisted him on his way.

In all we spotted about 25 snakes, mostly adults ranging in size from two to slightly over six feet in length. Steve was overjoyed to see that his den was still an active one with plenty of snakes twelve or so years after its initial discovery. Though neither of us has revisited the site since that Fall day in 1975, we both hope it continues to survive regardless to its close proximity to the rapidly expanding Dallas-Fort Worth area ("Metroplex", as the area is locally termed). To Steve and myself as herpetologists, the re-discovery of this active den site was an exciting and rewarding experience. The average citizen of Dallas, on the other hand, would no doubt be mortified to learn that such a large aggregation of venomous snakes survives but a few miles from his home!

It was at this point that I began to see first hand that hibernation was in fact a very normal and perhaps very necessary part of the life cycle of a reptile living in the Temperate Zone, but I wondered how it related to my specimens in captivity. I began to search through the scientific literature for articles which dealt with reptile hibernation and found them few and far between. Most early papers were concerned mainly with snakes discovered here and there during the winter months, but a few were more thorough, such as the Prairie Rattlesnake (*Crotalus viridis*) den studies expounded upon by the late Lawrence Klauber in his monumental, two-volume set of books on the life histories of rattlesnakes, and other papers. Another thoroughly studied den site for Red-Sided Garter Snakes (*Thamnophis sirtalis parietalis*) in Manitoba, Canada was made famous by herpetologists Michael Aleksuik, Patrick Gregory and others through numerous technical papers and one article which appeared in the November 1975 issue of *National Geographic* entitled "Manitoba's Fantastic Snake Pits".

Although Aleksuik and Gregory's studies dealt primarily with snakes in Nature, several points relevant to our captive animals were noted. First, because the warm season was so short in Manitoba, timing for breeding was fixed within a period of a few days, and this had to occur immediately upon emergence from hibernation in order for there to be sufficient time for gestation and birth prior to cool (and sometimes downright cold!) Fall temperatures. Secondly, through a series of experiments, they determined that for these Garter Snakes, temperature fluctuation alone was the key triggering mechanism which induced breeding behaviour. Finally, the female snake, after giving birth, had to have sufficient time to obtain enough food to allow her body weight to return to normal if she was to produce another brood the following season.

From available evidence accumulated to date, reproductive success (or failure) in most species of snakes is of course multifaceted but is most likely a result, directly or indirectly, of temperature and its effects. Subsequent to the above mentioned studies and my own work, two recent technical papers, one by Bill Garstka, Brian Camazine and David Crews in 1982, the other by Antonella Bona-Gallo and Paul Licht in 1983, both appearing in the journal *Herpetologica* and both dealing with the Red-Sided Garter Snake, showed that factors of temperature were not only responsible for reproductive cycling *per se* but also influenced reproductive behaviour in these snakes.

In a nutshell, Gartska and his colleagues showed through various experiments that male snakes must experience an extended period of low temperature dormancy in order to become sexually active. In fact, even castrated males showed courtship behaviour after at least seven weeks of hibernation, and in all males, courtship was directly proportional to the duration of the cooling period. Bona-Gallo and Licht experimented with females and reported that with few exceptions, only snakes kept in simulated hibernation for sixteen weeks or more were sexually receptive to male courtship attempts and permitted copulation. Further, they showed that only those females that actually hibernated completed the reproductive cycle. Well-fed females maintained at about 85 degrees and not hibernated, although sexually attracted to males, possessed completely regressed ovaries and remained in this state for over a year. In summary, these papers show that physiologically and behaviourally, the reproductive cycles of Red-Sided Garter Snakes are strongly dependent upon climatic or environmental conditions, as could be expected in the most northerly occurring reptile in the western hemisphere.

Summing it all up, I felt that artificially hibernating captive specimens could be the key to successful reproduction, particularly with the "difficult" forms, but there could be drawbacks. I began in 1975 with my own personal collection, comprised primarily of various species of kingsnakes (*Lampropeltis*), ratsnakes (*Elaphe*) and a few varieties of small, mountain-dwelling rattlesnakes (*Crotalus*), all of which in Nature experience a natural period of dormancy. Admittedly, I was concerned that losses would occur, particularly after reading of the death rates of as much as ten percent and more for various natural populations which had been studied, and

up to thirty-four percent for one group of snakes placed in a man-made hibernaculum! After all, many of my twenty-five or so specimens had been in captivity for years under more or less constant thermal conditions, and most could not be easily replaced, if at all! But, on the other hand, I had not been successful in breeding any of them, so I had to take the chance.

Feeding in my collection was discontinued in early November, 1975, and on December 1, I sealed off the heat duct in my snake room, closed the door in stages, and slowly over a period of about one week, the temperature fell from a comfortable (to me!) 80 degrees to about fifty-five. Each specimen in its appropriately sized aquarium had access to water and a darkened hiding area in which most spent the majority of the winter months. I checked the animals as often as possible, expecting, I guess, to find some of my choice specimens turned "belly-up". Surprisingly, (but not really) it didn't happen, though most movement ceased whenever the temperature fell much below 55 degrees. I attempted to keep temperatures somewhere between 50 and 60 degrees until the first of April, a good time for warming, I assumed, since temperate snake activity in Nature begins to occur with regularity about then. Temperatures were recorded twice daily, and though on several occasions it fell to about 45 degrees and rose to slightly above 70, the snakes appeared in good condition.

In an article appearing in 1980 in Animal Kingdom, Bronx Zoo herpetologist Peter Brazaitis reported that hibernating temperatures for a New York population of Timber Rattlesnakes (Crotalus horridus) under observation fluctuated at about 52-54 degrees for most of the winter. Even in the harshest of environmental conditions such as those in Manitoba, Canada where surface temperature may reach —40 degrees or lower, it is doubtful that temperatures within snake hibernacula fall much below 38 degrees.

Warming in my collection began slowly in mid-March, and feeding was initiated in mid-April. About two weeks later, breeding behaviour was seen in my Gray-Banded Kingsnakes (*Lampropeltis alterna*), a secretive west Texas and Mexican variety, and in late June of 1976, both females presented me with fine, fertile clutches of eggs! This was followed (after a second hibernation period) in 1977 by three more clutches of eggs from these kingsnakes and one brood of live young from an Arizona Ridgenose Rattlesnake (*Crotalus willardi willardi*), the second ever to be reported from a captive-breeding. In later years, due to a number of these captive-bred babies maturing and producing young of their own, well over 100 Gray-Banded Kingsnakes and five more Rattlesnake broods have been the result of chances taken, I thought, back in 1975.

So encouraged was I by the success in breeding Gray-Banded Kingsnakes that I gradually acquired hatchlings of a number of other varieties of Mexican kingsnakes, mostly offspring hatched in the collections of friends and zoos. These were raised to maturity and in 1983, fifteen of sixteen mature females of six varieties produced eggs, along with an additional brood of six Ridgenose Rattlesnakes. The identical thermal regime has been used on all of these adult specimens. Though a few offspring are retained from year to year to enhance breeding potential in my own collection, most have been transferred to zoos and other individuals interested in establishing breeding groups or conducting behavioural research on these interesting species.

In 1977 I began to record the weights of my specimens. From all I had read, hibernating snakes were prone to a weight loss of up to and exceeding ten percent in adults and as much as twenty percent in juveniles, and one would assume that any animal that goes without food for five months out of each twelve would have to lose weight! Right? Well, not necessarily, as I was about to discover. I weighed each of my specimens on December 1 after they had fasted for two to three weeks and immediately prior to cooling, and then again on April 1, a week or two before their first Spring feeding. When I compared the figures, I was amazed to learn that contrary to what I had fully expected, only a very few animals lost any weight whatsoever. In fact, a number showed slight increases of a few grams or so! I attributed these gains to water consumption as temperatures, and subsequent animal activity increased. It was felt that this weight stabilization, and the fact that I experienced a zero death rate was most significant, for it showed that, among other things, the temperature range chosen for hibernation seemed ideal.

Compilation of these weight data over the years has also pointed out other interesting information. For example, growth can be calculated over an active season by comparing April with December weights for individual specimens. From my figures on Gray-Banded Kingsnakes, it takes about four to five times more food in order for reproductively active females to maintain their weight from one season to another than for males in the same age brackets. As a result, in Nature, annual egg production may not occur, particularly during lean seasons. The cost of annually producing that clutch of eggs (much less two clutches, as has been seen in a number of kingsnakes and other colubrid species) is enormous, and most probably, some snakes lead much more productive lives in captivity. One of my females has produced a total of nine clutches in a six year period of time, and considering that clutch size for this species is usually eight to ten eggs with a maximum of thirteen, this has resulted in a pile of baby kingsnakes!

Also, for these kingsnakes, size rather than age seems to be the critical determining factor for initial reproduction. Generally, snakes hatched in late Summer or Fall will not be hibernated until their second Winter in order for them to achieve maximum growth. In these Gray-Banded Kingsnakes, females achieving a weight of about eighty-five grams prior to their first hibernation will produce eggs the following Spring; those much under this weight will not, though all are approximately the same age. Current studies by myself and others are beginning to show this to be true for other varieties of colubrid snakes as well, including the Mexican forms mentioned above.

An additional experiment involved actually hibernating a number of kingsnakes in their first winter after hatching. In this case, seventeen babies were each fed (or not fed) from zero to five meals between hatching in early September to cooling on December 1st. The results were not surprising as three or four entering hibernation without feeding died prior to April 1 (the fourth died shortly thereafter), two of four with one meal consumed died, and all those which had taken three or more meals survived in good condition. Unfortunately, the weights of the above kingsnakes were not recorded, but those of two Ridgenose Rattlesnakes were. From birth in August at weights of about 6.5 grams to December 1 with average weights of about 16 grams after ten meals each, these specimens were cooled and weighed again on April 1st. Comparisons revealed almost no significant change over a four month period of time. Undoubtedly, these results are duplicated in Nature.

Just as the Red-Sided Garter Snake can be considered one of the most thoroughly studied of all snakes both in Nature and under controlled captive conditions, the Ridgenose Rattlesnake represents one of many species known primarily from observations on captive specimens. Since the nominate form was described to science in 1905, four other subspecies have been recognized, all occuring in Mexico. Two enter slightly into the United States, one in southwestern New Mexico, the other in southeastern Arizona. All are found in forested, montane habitat mostly at elevations of from 6,000 to 10,000 feet where true wintertime, and thus an extended hibernation period are the rule. Summer temperatures may vary considerably, particularly during rainy periods, and occasional daily temperature fluctuations of 30 degrees (and more) are not altogether uncommon. As may be expected, more is known about the Arizona subspecies, the nominate form, than probably all others combined.

My interest in this unique species dates back to the very first time I read a book entitled "Snakes and Snake Hunting" by the late Carl Kauffeld, longtime Curator of Reptiles at the Staten Island Zoo. Published in 1957, this book is now commonly referred to as "The Bible" by a small army of snake enthusiasts, professional and otherwise. Kauffeld's obsession with field collecting, and rattlesnakes in particular, combined with his vivid written descriptions of collecting adventures gave the zoo worldwide notoriety. Chapter six, aptly called "Huachuca heaven" relates how in 1941 Kauffeld secured two *willardi* there, at that time the thirteenth and fourteenth specimens known from the United States.

Through repeated readings of Kauffeld's book, interest became obsession. Then in March of 1972, during a collecting trip in South Carolina, I was fortunate to meet Brent Martin, then a student at the University of Arizona in Tucson, who, as it turned out, shared my obsession with this snake. But there was a big difference ... Brent had actually collected *Crotalus willardi*! Brent extended an invitation which could hardly be turned down, and in July of 1973, armed with an Arizona scientific collecting permit, I made my first trip west. On 15 July 1973, I found my first *willardi*, a beautiful female, and the obsession became reality ... a long story short to be sure! Not long thereafter I acquired a young male, and another trip to Arizona in 1974 netted an additional female.

Much discussion ensued during these trips as to the best way to maintain *willardi* in captivity... certainly, one had to look at natural conditions and go from there, we figured. Brent was one of the first individuals I know to actually attempt artificial hibernation with his captive snakes. In the Fall of 1975 Brent found a gravid female which gave birth shortly after capture (the first record of viviparity in this species), and in late 1975 he published the results of the first documented captive-breeding from his own collection. In 1976, another publication (all in the *Bulletin of the Maryland Herpetological Society*) described the birth, again resulting from captive-breeding, of *Crotalus willardi obscurus*, the subspecies occuring in New Mexico.

In 1976 after a first hibernation period, a pair of my specimens bred which resulted in the 1977 brood spoken of earlier. I published the results of this breeding in 1978 (once again in the *Maryland Bulletin*). From all that was known from combined observations at that time, *willardi* apparently mates one season and produces young the next. I thought that this type of reproductive strategy was based upon climate and food availability in Nature, and this coincided with studies on a few other varieties of rattlesnakes which in Nature produce broods of young only every other year or two based upon the above factors.

As it turned out, my conclusions, although perhaps applicable to some *willardi* in Nature, are not an indication of the potential for this species. Brent was kind enough to give me a newborn female from his captive-bred brood of 1975, and a newborn male from an additional wildcaught gravid female was secured in 1976. This pair of snakes was placed together for the first time on 6 August 1978 when breeding occurred almost immediately. From this one breeding and after a hibernation period, birth took place almost exactly twelve months later. At that time I assumed it would be another two seasons before I could expect an additional brood, but breeding again took place in October of 1979 which produced a brood in August of 1980. From other pre-hibernation copulations, this pair has been successful in 1981 and 1983 in producing broods of healthy offspring!

From interest, to observation, to a combination of both, relating these years and experiences with *Crotalus willardi* are included to point out that the results of longterm observation on captive animals, particularly the little known forms, can become a baseline from which an understanding of the animal's entire natural history can be drawn.

Prior to the last decade, reptile reproduction in zoo facilities was not only minimal but largely by chance. Indeed, temperature was an important factor in maintaining these animals, but it was usually kept at a high level the year around. It was determined that a temperature range of between 80 to 90 degrees was optimal for most reptilian species, and this was what was instituted in most facilities. Specimens began establishing noteworthy longevity records, but still little reproduction occurred. Then, in the early 1970s, biologist Paul Licht of the University of California at Berkeley, through his work with reproductive patterns in lizards, concluded that, unbelievably, certain lizard species maintained at what was considered to be their "optimum" temperature year around not only failed to cycle reproductively, but often turned out to be sterile! Though it is not known with certainty if other reptilian forms suffer the same consquences, available evidence points quite clearly to the fact that constant conditions under "optimum" temperatures can create a reproductive malfunction in some temperate species.

In the late 1970s, a number of progressive zoo reptile departments began experimenting with hibernation. Slowly but surely, more varieties were exposed to a hibernation or at least a cooling period, and in the winter of 1983-1984, approximately one third of the Knoxville Zoo's reptile inventory underwent this procedure. This was comprised of mostly North American forms, including various species of kingsnakes (*Lampropeltis*), ratsnakes (*Elaphe*), moccasins (*Agkistrodon*) and a variety of rattlesnakes (*Crotalus*). Since it has become apparent that even tropical species undergo some seasonal temperature fluctuations in Nature, certain of the boas, pythons, tropical kingsnakes and rattlesnakes are cooled to a temperature of about 68 to 70 degrees for approximately two months with feeding discontinued or infrequent. Through the use of spotlights and heating plates, some specimens receive a significant daily thermal fluctuation. Cooling tropical forms was unheard of just ten years ago.



Plate 1. Crotalus willardi willardi. Captive bred 1985. B.W. Tryon.



Plate 2. Lampropeltis hatchlings, 1983. B.W. Tryon collection.

Though thermal manipulation has proven effective time and again, a classic example of success involved a trio of Angolan Pythons (*Python anchietae*). Two Knoxville Zoo males were sent to the Houston Zoo to pair up a single adult female in 1971. Every effort, including artificial insemination, was made to breed these rare snakes, for these were the only zoo specimens in this country, and the species is extremely uncommon even in African collections, with no breedings having been recorded elsewhere to date. Attempts were unsuccessful, though the specimens were observed to copulate annually, until 1981, after they were placed in a thermally fluctuating environment in a cool room with a base temperature of about 70 degrees. The five eggs and hatchlings in 1981, followed by seven additional hatchlings in 1983, may for a long time be the most significant reptile breedings achieved through thermal manipulation.

Thus, the hibernation or cooling of most snakes appears to be as important in captivity as it undoubtedly is in Nature. A primary goal of most major zoo and personal collections today is the conservation of rare and endangered species through captive-breeding, and thermal manipulation of these captive animals is becoming an increasingly important management tool utilized to help achieve this goal. In addition to stimulating the incentive for breeding in some species, to assuring successful reproduction in many, and to establishing a fixed time of the year for reproductive cycling in most, hibernation may actually be shown to extend captive longevities. As opposed to just ten years ago, an examination of the makeup of reptile collections both in and out of the zoo shows an ever increasing percentage comprised of captive-bred specimens.

1.

It would seem a reasonable prediction that after another five to ten years down the road, few if any specimens will ever have to be removed from that den site in Nature for zoological exhibition and breeding purposes.

NOTES ON THE GIANT GIRDLED LIZARD CORDYLUS GIGANTEUS A. SMITH

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The giant girdled lizard, *Cordylus giganteus*, is one of South Africa's largest and most impressive Cordylids. Though abundant and well known where it occurs, very little has been written about this lizard. Very popular in zoo and private collections and, until recently, easily obtainable from dealers in Europe and U.S.A., the species is now protected throughout most of its range, and it is therefore unlikely that many more specimens will reach the "pet trade" in future.

COMMON NAME

Giant girdled lizard; sungazer; Lord Derby's girdled lizard; and, in Afrikaans, sonkyker ("sunwatcher") ouvolk ("old people") or skurwejan.



Cordylus giganteus

RANGE

North-eastern Orange Free State and adjacent southern Transvaal. Possibly occurs in bordering areas of Lesotho in the east and the Cape Province in the south. Branch and Patterson (1975) stated that the presence of *Cordylus giganteus* in the southern Transvaal "is now doubtful". This species is, in fact, abundant in that region. *Cordylus giganteus* has recently been found in Natal.

SIZE

Largest specimens measured by De Waal (1978) during his survey were as follows: a male measuring 204 + 172 = 376 mm and a female measuring 205 + 181 = 386 mm.

HABITAT

Flat or sloping, mixed to sour grassveld where it excavates its own burrow. The flattened oblong burrow entrances are well-worn and may face any direction. The burrows average 2-3 metres in length and from 30-45cm in depth. They do not end in an enlarged chamber as reported by FitzSimons (1943) but are often wide enough for the lizard to turn around along the length of the burrow. Several lizards may inhabit one field or slope and as many as 140 active burrows, some less than a metre apart, have been located by the author within an area of 500m².

Heavy rains may flood the burrows without drowning the occupants. It has been suggested that the ends of the burrows are a little nearer to the surface than the deepest vertical part, thus trapping some air and enabling the lizard to breathe until the water drains away.

Each male apparently inhabits his own burrow, while one or two females may inhabit a burrow with one or two juveniles and one or two sub-adults. Captive males have been observed eating juveniles.

Because of the unique shape, depth and length of the burrows, it is unlikely that *Cordylus* giganteus utilizes deserted animal burrows, as stated by FitzSimons (1943).

SEXUAL DIMORPHISM

Males are distinguished by two to three rows of swollen glandular scales anterior to the femoral pores. See Figure 1.



Figure 1

BREEDING

Ovoviviparous, giving birth to one or two young in late summer (February to March). The young measure 114-135mm and average 124mm (40 newly-born specimens examined).

DIET

Insectivorous and carnivorous, feeding on virtually any creature that can be overpowered. It will usually dash towards its prey, stop with head and forepart of the body well-elevated, and then lunge forward to seize the food-animal in its powerful jaws. Rodents are killed by being rapidly shaken and hit against the ground.

FIELD NOTES

Cordylus giganteus occurs at altitudes over 1300m above sea level which have summer rainfall varying between 450-750mm per annum. Temperature extremes (summer maximum to winter minimum) are great, varying from well above 36 degrees Centigrade to well below freezing. Severe frosts occur in winter.

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Emerging from their burrows in the mornings, the lizards bask in the sun with head and forepart of the body elevated. Initially lying at right angles, once they have warmed up they will face the sun and have the rays falling more obliquely on their bodies. The light yellowish chest, which is highly reflective, then receives most of the rays whereas the absorptive back receives very little. From about 11H30 to 14H00, on hot summer days, they go back into their burrows to escape from the heat of the day. They may then lie up near the burrow entrances or otherwise move deeper into the burrows.

This shy lizard disappears down its burrow the moment it is disturbed and may remain there for as long as one or two hours, sometimes even longer. In areas where cattle graze among the burrows, however, the lizards are accustomed to being disturbed and may re-emerge a few minutes later. To bask, they seldom venture far from their burrow entrances.

Once they disappear into their burrows they obviously face away from the burrow entrances. Any attempt to seize a specimen by its tail would result in the lizard thrashing its spiky tail about, often drawing blood. If successful in seizing a tail and attempting to pull the lizard from its burrow, it will merely hook the four occipital spines into the roof of the burrow. Further tugging usually results in some of the occipital spines snapping or a section of the tail breaking off. *Cordylus giganteus* seldom, if ever, attempts to bite when first captured.

In winter, night temperatures soon drop below freezing and the lizards go into hibernation. They will then hibernate throughout most of winter, even if day temperatures exceed 20 degrees Centigrade. At least three frog species, *Kassina senegalensis, K. weallii* and *Cacosternum boetgerii*, are known to hibernate in the burrows with *Cordylus giganteus*.

THE STATUS OF CORDYLUS GIGANTEUS IN 1984

In the past hundreds (or perhaps thousands?) of *Cordylus giganteus* were exported from Johannesburg and Durban in South Africa to various dealers in Europe and U.S.A. Most of them were thus fairly inexpensive and easily obtainable. This lead to poor captive conditions and high mortalities. The commercial exportation of all reptiles, from Natal, Orange Free State, Cape Province and the Transvaal, is now strictly controlled. Masses of lizards will no longer leave South Africa. Most of the independent homelands, i.e. Swaziland, Transkei and Boputhatswana do not permit the commercial exportation of reptiles. None of the homelands have international ports.

Commercial exploitation for the "pet trade" no longer seems to threaten the survival of this species. Habitat destruction still remains as a major threat. The areas in which *Cordylus giganteus* is found are ideal for agriculture but in many areas the ploughed up soil is beginning to break down into sand. Branch and Patterson (1975) reported that the practise of rotation farming, in which periods of crop-farming and cattle-grazing are interspersed with periods in which the land is allowed to remain fallow, does not seem to endanger populations. There is, however, no doubt that ploughing and the accompanied destruction of natural grassveld adversely affects populations.

Other forms of development, i.e. the construction of new power stations, factories, mines and roads, add to the loss of habitat. As far back as 1978 *Cordylus giganteus* was listed as "vulnerable" in the C.S.I.R. Red Data Book (McLachlan, 1978).

Cordylus giganteus is still common and abundant over most of its range in the Orange Free State. At present a conservative estimate of the southern Transvaal population alone would be well in excess of 70,000 specimens.

CORDYLUS GIGANTEUS IN CAPTIVITY

This rather attractive, pre-historic-looking lizard is very hardy and does well in captivity. Though shy and retiring it settles down well, even taking food from one's hand.

Outdoor enclosures are ideal (climate permitting) and the lizards soon dig their own burrows if conditions allow. They may dig beneath the walls of the enclosure but do not usually surface on the outside to escape, unless the burrow collapses. If they cannot burrow they will seek refuge beneath any suitable shelter, even amongst rocks.

Though they come from a dry environment they can tolerate a fair percentage of humidity and do well in an open enclosure in Durban, South Africa, at sea level. They cannot cope with excessive humidity, e.g. Florida, U.S.A. In cold, wet regions it is advisable to accommodate this species in glass enclosures.

They feed readily on a variety of insects and the adults soon accept pets mince from a dish. The juveniles are more visually attracted to their food and should be fed on live insects (crickets and locusts) dusted with mineral/vitamin supplements. Water can be provided in shallow dishes and the enclosure should be sprayed down twice a week. These lizards, especially juveniles, readily lick up water drops. Add Calcium lactate and Vitamin D3 to the water.

Several specimens can be housed in one enclosure. Juveniles, however, should be accommodated separately as the males are known to be cannibalistic.

ACKNOWLEDGEMENTS

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NOTES ON THE CAPTIVE REPRODUCTION OF THE AUSTRALIAN SKINK, *TILIQUA NIGROLUTEA*

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Tiliqua nigrolutea is a resident of the comparatively cool, higher elevations of southeastern Australia (Cogger, 1975; Jenkins and Bardell, 1980). While two color phases of the lizard are generally recognised (the larger and more brilliantly coloured of which is considered to be truly an Alpine creature), they have persistently resisted subspecific designations.

The smaller morph of *nigrolutea* is clad in more muted colours and is a resident of the less lofty altitudes. It was this form that was chosen for our breeding programs in southwestern Florida. It was thought that being of lower, hence warmer, ranges that they would be more tolerant of our uncomfortably hot, humid summer conditions than would the alpine form.

Nigrolutea, which is quite appropriately commonly known as the "blotched blue-tongued skink", displays the darkest dorsal ground colour of any of the members of the genus. This may run from chocolate-brown through olive-black to black. Dorsally there is a series of roughly outlined, usually paired, russet to orange blotches. The dorsal surface of the head is lighter, the lips gray to russet. Colours pale laterally and take on a rather vague pattern of vermiculations. The throat is from off-white to gray and the venter is pale gray, the centre of each scale being slightly darker, hence forming a series of ill-defined stripes.

The blotched blue-tongue, while large, nearing or occasionally exceeding 25cm snout-vent length, and robust, gives the impression of being more serpentine than its more commonly seen relative, *Tiliqua s. scincoides*, the eastern blue-tongue, for its legs are proportionately shorter.

In fact, when frightened it relies little upon its limbs to effect its escape, resorting instead to a series of stiff lateral undulations.

Its tail is short, being barely 50% of the svl.

Our colony, which consists of 3.2 individuals, was obtained as half-growns.

Our geographic location makes it possible to maintain numerous species of reptiles and amphibians out-of-doors year round. The facilities offered our various scincids consist of uncovered pens some 3m in diameter, formed by sinking sheet aluminium of 92cm height 32cm into the ground. Horizontal plastic piping is offered as sub-surface refugia, the entrances sloping gently from ground level. Additional areas of seclusion in the form of piles of coral-rock are available also. Into these the lizards retire during extremes of heat or cold or during periods of rain. Neither photoperiod nor heating are augmented.

Food is offered daily except during periods of winter cold which render the animals temporarily dormant. Mixtures of grated apple, grated pear, ripe banana, ripe melons of several varieties and numerous kinds and flavours of canned catfood are consumed eagerly. To this is added liberal quantities of such vitamin-mineral supplements as "Vionate", "Osteoform Improved" and powdered calcium lactate. Live crickets, young mice and an occasional garden slug or snail periodically augment the diet of prepared foods.

Nigrolutea has so far proven to be an easily cared for, interesting lizard. Quite unlike two of their congeners with which we also work, i.e. *T. s. scincoides* and *T. gigas*, the *nigrolutea* have displayed no periods of excessive hostility towards cagemates, even during the breeding season.

Entirely diurnal during the colder months, breeding activity on warm February and March days has prolonged the activity period until darkness. Copulation has never been observed during the hours of daylight but rather is accomplished during the diminishing light at day's end.

Frequently more than one male is in attendance of a given female, trailing the one behind the other as the female leads the way about the pen. Copulation is usually, but not invariably, accomplished by the male immediately behind the female. Slowly overtaking the female he begins courtship by nudging the female on her posterior sides and groin, all the while flicking the area with his tongue. Slowly he advances along her length, eventually grasping her nape or shoulder area in his jaws. Receptive females then cease moving. Continuing to grasp her the male then forms a crescent with his body bringing his tail down and under that of the female's until their cloacal openings are juxtaposed. At that time a hemi-penis is inserted after which gentle periodic convulsive movements become noticeable. This position is maintained from 5 to 30 minutes.

Because of the several weeks long breeding period it has been impossible to ascertain gestation, but it was obvious that the females were gravid by late May.

The first of the two females gave birth on 15 June, parturition beginning at 1600 hrs with the birth of a dead, slightly undersized baby. This measured 116mm tl, 84mm svl and 20mm hl (head length). The second, slightly larger and living baby was produced at 1700 hrs. Measurements were not taken of this neonate. The third and final baby, also alive, was born at 1730 hrs. Larger than either of its siblings it measured 128mm tl, 93mm svl, and 22mm hl.

Immediately after being born the neonates consumed the attached placenta and sought refuge among the profusion of plants. The young were removed, placed in a separate enclosure, and offered live crickets which were immediately consumed. The day following their birth they were offered small portions of our prepared "skink mixture" most of which was consumed during the day.

The second female gave birth to two healthy babies on 22 June.

The "lowland" morph of *T. nigrolutea* has proven compatible with the vagaries of Florida's weather. As surmized in literature, they are active at temperatures far lower than those which activate their congeners. They have left their refugia to thermoregulate on even our coldest winter day, the single criterion seeming to be ample sunshine in which to bask. Conversely, on hot summer days they return to cover long before their congeners in adjacent pens with similar conditions.

While not actually crepuscular, during the heat of summer they do display peak activity periods in early morning and late afternoon. They remain active throughout the day in cooler weather.

While no cloacal temperatures have been taken it seems likely that the dark dorsal colouration of *nigrolutea* makes them more efficient baskers than their lighter coloured relatives. Certainly they become "warm" to our touch while congeners basking for similar duration under identical conditions remain "cool".

The clutch size, averaging 2.5 young per female, is significantly smaller than those of the other three *Tiliqua* species which we have succeeded in breeding. As a comparison, *T. s. scincoides* averages 15.5, *T. gerrardi* 18 and *T. gigas* 7. We hypothesize that *nigrolutea* produces larger clutches with increasing age. This has proven so with the allied *Egernia cunninghami kreffti*, most of which have produced 2 young in their first brood and up to 7 in those subsequent.

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SITE TENURE IN THE MOORISH GECKO TARENTOLA MAURITANICA

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Since very little is known of the spacing patterns and site tenure of noctural geckos other than *Gehyra* spp. (Stamps, 1977), I took the opportunity, whilst staying with my son and daughter-inlaw, Hugh and Olwen Cloudsley, at their home 10 km North of Portimão, Algarve, Portugal, (13-20th September, 1984), to note the positions of the geckos on the walls. In all, I recorded 9 Moorish geckos *(Tarentola mauritanica).*

Most evenings, three and occasionally four juveniles (about 5cm long) emerged at intervals of about 3-4 m on a low south-facing wall beside a patio: two full-grown geckos occupied respectively the south and east walls of the house, and a third specimen inhabited our bedroom. The two remaining geckos were about 10cm in total length. One also lived in our bedroom; the other shared the east wall with, but at the opposite end from, the adult already mentioned. The animals were apparent usually only between 18.30 and 21.00 hrs and always in approximately the same regions. One of the 10cm specimens was regenerating its tail, and one of the babies lost its tail during the period of observation. These sight records suggest that *T. mauritanica* exhibits Stamps' (1977) Type 3 spacing pattern, as apparently do *T. annularis* and *Hemidactylus brookii* (Cloudsley-Thompson, 1972, 1981).

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AN ENQUIRY REGARDING THE DISTRIBUTION OF TESTUDO MARGINATA ON MAINLAND GREECE

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I recently undertook an herpsearching holiday to Epirus, N.W. Greece, between 7th and 21st May 1984. Staying in the village of Parga on the Ionian coast, I made daily trips searching the surrounding countryside up to an altitude of 700-800 metres.

On these walks I observed and photographed a substantial number of *Testudo marginata;* a total of fifteen animals altogether.

This surprised me because according to the distribution map comprised by Arnold, Burton & Ovenden (1978), *T. marginata* does not occur this far west in Greece. The text gives the northernmost extent of the range as Mount Olympus, but doesn't say how far west this extends. As this is the only reference work I have access to, and there is always the possibility of a misprint, I was wondering if any interested members could confirm the distribution of *T. marginata*.

A possibility that has occurred to me is that of an introduction into this area. If this has occurred the species has established itself fairly profoundly in the vicinity of Parga (see map) and also further afield as one animal was found on the road to Igoumenitsa between Margarition and Karterion.

Another interesting point regarding the distribution of T. marginata is the observations of Loumbourdis & Kattoulas (1983) who have sighted this species "about 100km further north than the previously stated northernmost limit of the species range in Greece".



Sightings of *T. marginata* in Epirus, N.W. Greece, 7-21 May '84. *T. hermanni* were also seen in the same area, but apart from * all *T. marginata* were observed at a higher altitude, up to 700-800 metres around Parga.

Bearing this in mind, I was considering the possibility that if my sightings were to be confirmed as an extension of range then it would follow that the range of *T. marginata* might possibly be extended to cover most of mainland Greece.

Other species also seen were:

Bombina variegata Bufo bufo Rana dalmatina Rana ridibunda Emys orbicularis Mauremys caspica Algyroides nigropunctatus Lacerta trilineata Podarcis taurica Anguis fragilis Ophisaurus apodus Malpolon monspessulanus Coluber najadum Coluber gemonensis Elaphe quatuorlineata Elaphe longissima (Paxos) Natrix natrix Vipera ammodytes

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SOME REPTILES OF CORFU

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INTRODUCTION

Corfu, second largest and best known of the Greek islands, lies off the extreme North West coast of Greece, being in fact much closer to Albania. It is approximately forty miles long by twenty miles wide, at the widest point.

This geographical position gives Corfu the typical long, hot and dry Mediterranean summer, with a surprisingly cold and rainy winter. The winter rainfall (and northerly position) makes Corfu perhaps the most lush and green Greek island. Even in midsummer the olive groves and dark green Cypress trees certainly appear so, in stark contrast to the barren hills of Albania, only a few kilometres away.

Along with thousands of other English tourists, I visited Corfu in early August, long captivated by Gerald Durrell's description in his book "My Family and other Animals". Mid summer is, of course, not the ideal time to see much Mediterranean herptofauna as many species aestivate during the hotter months, whilst others become nocturnal. Indeed the most immediate feature was the lack of small lizards.

I intend to describe the herpetofauna seen in four rather different areas of the island visited during my holiday.

ROCKY HILLSIDES AND OLIVE GROVES

As a generalisation, Corfu is more rocky and mountainous in the north, with flatter, more agricultural land in the south.

The most striking features of the northern area are the olive groves with dry-stone terracing. Every possible site on the steep hillsides is exploited and the terracing must represent thousands of man-years of work. These terraces must do wonders to prevent soil erosion, partly explaining the green appearance of the island, and also afford a multitude of cover for reptiles.

The first creature seen was a Montpellier snake (*Malpolon monspessulanus*) crossing the road in the heat of the day. It appeared to be searching for prey along cracks in the rock face at the roadside, and rapidly dashed into a pile of underbrush when approached closely, although it held its ground initially. According to some locals I spoke to, snakes were common in this area and snake bite was a "big problem". Presumably the snake in question was the Horned Viper (*Vipera ammodytes*).

Another local told me that this particular area was sprayed with insecticide by air in order to keep down the number of mosquitoes. This could possibly explain the lack of small lizards here, although the lack was apparent all over the island. The only lizards I saw here were a juvenile lacertid basking on a rock (probably *Podarcis taurica*), and a gecko, *Hemidactylus tauricus*, seen on a mossy wall at twilight. "Stone turning" was extremely unprofitable here, as it was on most of the island. This was because I found the ground as dry under rocks as out in the direct sun, and so I think most reptiles would seek the deeper refuge of the dry stone walls. The sloughed skin of a snake (whip snake?) was found whilst searching one such wall.

FARMLAND NEAR LAGOON

There is a lagoon situated on the south west coast of Corfu, and the land around it is much flatter than that of the previously described area. The area was farmed, though this seemed a fairly casual activity — while wandering through a grassy meadow I suddenly realised that I was in the middle of a patch of water-melons! The fields were interspersed with grassy areas, heathland with heather growing, as well as being dotted with the ubiquitous olive trees. My first find was a spring-fed pool, shady and beautifully cool. Swimming round the perimeter of the almost circular pool was a small eel. The crystal clear water fed a small stream but at this time of year it was dry, the water sinking into the ground after only a few feet. Basking on the bank was a small Stripe-Necked Terrapin (*Mauremys caspica*). The habitat of this terrapin must have been an area measuring approximately two by three feet at this time of year! Although small, the terrapin seemed healthy, and was not suffering from the algal infection of the carapace described later.

I next saw a large green lizard basking in the full heat of the afternoon sun at the side of a field. On being disturbed, it flashed away into the heather. However, as I have also noticed in France, these creatures are great "frauds". They only move at this tremendous pace for a few yards, and then lie still, relying on camouflage. By keeping fairly still and carefully scanning the undergrowth I could see the lizard quite clearly. It was apparently *Lacerta viridis* although Corfu is one of the few Greek Islands where *L. trilineata*, the Balkan Green Lizard occurs with *L. viridis*. Incidentally the two species are very similar in appearance and have been known to interbreed.

The third reptile found in this particular habitat was Hermann's Tortoise (*Testudo hermanni*). After searching for about two hours out in the blistering sun I came across two individuals which were very sensibly buried in a shady leaf-filled ditch, under the roots of a fig tree. This species is commonly imported into the United Kingdom and lacks the thigh-spurs of *T. graeca*. The larger of the two, with a carapace length of about 20cm appeared healthy, but the smaller one (15 cm) had a very battered shell, with some large chips missing. However, the edges were worn smooth and the creature seemed none the worse for its disfigurement.

Also possibly of interest, I found a large black and brown striped centipede under a rock. Its body was almost as wide as my finger.

RIVERBANKS AND GARDENS

This area was on the banks of a river near the island capital, Kerkira (Corfu Town). It consisted of the vegetation actually growing along the banks of the river, and the surrounding areas or gardens or allotments, with some woodland.

It was here that I actually saw some small lizards. They were Dalmation Algyroides (*Algyroides nigropunctatus*). The first was seen on the wall of a tumbledown church. This was at about 5 pm, as the sun was beginning to lose its heat. However, the lizard still kept to the shade. This lizard is not a great lover of sun, and appears to behave more like a skink than a lacertid. The first one seen was an adult in breeding colours and was quite a striking animal with bright pillarbox red flanks. On the return journey, almost at twilight, the reeds and piles of cut vegetation along the river bank were filled with the rustles of these lizards. One was also seen on the trunk of a pine tree, moving round to keep out of sight in the manner of a squirrel.

Coming to a less steep and more open part of the river bank I disturbed a snake which appeared to shoot away across the tops of the low bushes like an arrow, almost without seeming to flex its body. On keeping still for a few minutes, I realised that this snake — like the green lizard — was a "fraud", in fact it had only moved a few yards and then remained immobile. It was a Dahl's Whip Snake (Coluber najadum), and I was surprised to find it in such a moist riverine environment, being under the impression that the favoured habitat of most whip snakes is dry, rocky areas.

This species is unmistakable in appearance, having diamond-shaped black markings with olive green background for only the anterior quarter of the body, the rest of the animal being a dull mid-brown. When seen alone, the effect is striking but seen in its natural habitat, needless to say, the camouflage is almost perfect.

On wandering away from the river slightly, among the farmlands, allotments and gardens, I asked several people I met if there were any tortoises in the area, by the simple expedient of knowing the Greek word for "tortoise" and sign language. The most common response was an enquiry as to whether or not I intended to eat the reptiles! Eventually, however, a family in their garden began searching in response to my question and handed me a tiny, beautifully marked *Testudo hermanni* with a carapace length of about 5 cm. I estimate it must have been that year's hatchling.

Although quite late in the evening, the tortoise was found under a pile of garden cuttings. This, combined with my earlier observation on the species, has led me to believe that *Testudo hermanni* may be almost nocturnal at this time of year in Corfu, and this was borne out later in the holiday when a friend told me she saw a tortoise moving along the edge of a road well after dark. This seems somewhat different to the behaviour of the Southern Greek Marginated Tortoise (*Testudo marginata*) which seems to need very bright light intensities for foraging.

SWAMP

Inevitably, the most "profitable" area, both in species and individual numbers, was found on the penultimate day of the holiday. It consisted of a wide, flat valley between two low hills, on the North East coast of the island. Presumably a river flowed in the wetter seasons, but at this time of year the area consisted of several shallow lakes and soft, evil-smelling mud, heavily overgrown with reeds.

The most numerous reptile here was the European Pond Terrapin, (*Emys orbicularis*). There were some very large specimens basking on tussocks out in the middle of the lake. In the relatively small area of these lakes I estimate there were several hundred individuals. This concentration was probably because of the low water levels. The water, which felt almost at blood-heat, was teeming with fish fry, and the terrapins could be seen feeding voraciously. By sitting quietly on an old boat half submerged in the mud, I was able to watch the feeding technique. The terrapins would work their way into the shore, driving the fry before them, and would then snap them up, their heads striking out in all directions. Indeed, they were so engrossed in feeding that it was a simple matter to pick up any that wandered near enough to the boat. The fish also attracted a pair of kingfishers, and many species of dragonfly could be seen, one having a striking bright red abdomen.

Rather less common than *Emys* was the Stripe-Necked Terrapin, *Mauremys caspica*. All the specimens found were considerably smaller (about half the size) of the average *Emys*. The first one found was lying with head and legs submerged in the mud, possibly aestivating, although others were seen feeding in the manner of *Emys*. All *Mauremys* examined had algal growths on the carapace as described by Arnold and Burton. This often resulted in the top layer of shell, together with the layer of algae rubbing off when the terrapins were handled. Indeed, a few *Emys* were seen with a similar condition, one individual having algae growing from the top of the head, giving the appearance of hair. Also much to my wife's disgust, the specimen of *Mauremys* which I asked her to hold for photography had a small leech attached to its underside!

The other inhabitants of the swamp were Grass Snakes (*Natrix natrix*) and its prey the Marsh Frog (*Rana ridibunda*). The Greek form of the grass snake is quite unlike the subspecies found in Western Europe, having bright yellow stripes running longitudinally down its body. The first impression was that they were very similar to the North American Garter Snakes, although on closer examination the head is that of a typical grass snake. Most of the snakes were seen swimming. Some quite large specimens were seen, one estimated at almost five feet in length.

Finally, the ony amphibian seen on Corfu was *Rana ridibunda*, which could be seen leaping to escape from the grass snakes as they approached.

I would like to point out that whilst exploring this swamp the ground was very soft, and I would advise anyone in a similar area to proceed with care. Several times I found myself going from ankle-deep to knee-deep mud within a few paces of each other.

All specimens were released in the field after examination and photography.

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CAPTIVE REARING AND BREEDING OF NORFOLK NATTERJACKS, BUFO CALAMITA

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During 1980 I became interested in the possibility of rearing and breeding native Natterjacks, with a view to setting up or assisting with future conservation projects involving this species. Accordingly I applied for and was granted a licence from the Nature Conservancy Council and, armed with some preliminary advice from Trevor Beebee, in June 1981 I collected a dozen tadpoles from a duneland site on the Norfolk coast.

The survival rate was high and, at the beginning of December, I put nine well-grown toadlets into hibernation in a tank half full of sand, placed in my garden shed. At this point my luck ran out as I had failed to appreciate just how cold the winter of 1981/82 was going to become. The toadlets had dug into the sand which was about five inches deep, and which was overlaid by layers of slightly damp moss. However, the cold penetrated through the sides of the aquarium before it occurred to me to "lag" it, and the entire contents were frozen. The result was eight dead toadlets, and another which never really recovered, and which died shortly after emerging from hibernation the following March. It may be significant that this was the largest of the batch, and so may have been more resistant to cold.

In May 1982 I collected another batch of Natterjack tadpoles, 25 in all, which had just reached the free swimming stage. These came from the same site as the first batch and were collected a few from each dune-slack to minimise the chances of future inbreeding. My present breeding stock originates from this batch, as does Roger Gouldby's.

So far I have achieved a 100% survival rate with these toads and I have retained 15, having passed on 10 to Roger Gouldby (5 in 1983 and 5 in 1984).

The method of raising tadpoles and toadlets, which we have both adhered to, and which seems to work well, is as follows. The tadpoles, which can be reared from spawn quite easily, can either be kept in a large tank with a sandy bottom and an inch or two of water, or in a shallow p.v.c. "slack". In each case they need a good deal of sun and are happy in quite tepid water, as long as they are not overcrowded. Water plants are not necessary and, if present, should be kept sparse.

The tadpoles will feed on rabbit-pellets, which seem to provide a fully balanced diet. However, if crickets or earthworms fall into the water these will also be devoured.

It is a well known fact that Natterjack tadpoles develop rapidly and the spawn to toadlet cycle can be as little as five or six weeks. In my experience the most crucial time in rearing Natterjacks is during the transition stage from tadpole to toadlet. One cause of fatality is drowning; if the developing toadlets cannot leave the water with ease they will become exhausted very quickly and will go under. Therefore it is essential that a pond or slack has very gently sloping sides so that the toadlets can walk out of the water with the minimum of effort. A saucer-shaped profile is ideal. It is during metamorphosis that many of the weaker animals seem to succumb. The survivors do not attempt to feed until their tails have been completely reabsorbed. At this time they are capable of feeding on only the smallest of invertebrates, and getting this sort of food for them can be tricky. A method which I have found to be successful is to take a bucket and hold it under a hedge or nettle-patch whilst beating the vegetation with a coal-shovel. This will result in a large number of invertebrates of varying sizes, ranging from mites to hoverflies, all mixed in with dead leaves and twigs. These hedge-beatings can be tipped into a corner of the toadlets' tank, and the litter removed much later, when the toadlets have been through it and have selected the most manageable food-items. If one is not careful one can easily remove small toadlets when removing the litter, and it is also wise to keep an insect-proof lid on the tank during feeding to prevent the "beatings" from escaping all over the house. Hedge-beatings will be available until November, but they are difficult to collect from wet vegetation and this is important to remember, as the small toadlets need to be fed daily.

Natterjack toadlets can grow rapidly when provided with a plentiful food-supply and by the beginning of their first hibernation the average length of this batch was just under 3cm. One specimen reared by Roger Gouldby in 1983 measured 42mm prior to being hibernated, which must be a record for a Natterjack less than six months old. The average length of my toads at the end of the second year was just over 51mm.

It is best to rear toadlets in an indoor tank for at least the first year of their lives, and to get the best results it is vital not to keep too many. As they grow so do their appetites and, on two occasions I have found it necessary to pass on small numbers of rapidly-growing toads because I was having trouble in finding enough food to go round.

The newly-metamorphosed toadlets should be kept in a well-ventilated tank with an inch or two of sand on the bottom. Some loose moss should be provided at one end, and this should be kept damp, but not sodden. I consider that a water-tray is not necessary and may even be a hazard, and so I keep the tank interior slightly damp by judicious application of a plant-sprayer or atomiser. The interior of the tank should not be allowed to become humid but some sunshine can and should be allowed in. The toadlets should be kept in damper conditions for the first few days after metamorphosis than subsequently as at first their skin is damper and more delicate. However, after this time, the skin becomes lighter in colour and drier in texture and the toadlets then become more lively and mobile.

Hibernation is the next obstacle for the young toads, and their survival rate will largely be dependent on the provision of suitable quarters, and on their size and health. For their first two winters my Natterjacks have mostly been hibernated in tanks in one of my sheds. These tanks were furnished as previously described, and were placed on old kitchen units close to the single shed-window, where they received little direct sunlight. One batch spent the first winter in a coldroom at the University of East Anglia where they hibernated successfully at a constant low temperature, in a similarly furnished tank. Under these circumstances I have tended to put toads into hibernation at the end of October, and I have dug them out again in early to mid-March, as soon as the first animals have begun to emerge. The tanks have then been placed in a conservatory which receives afternoon sunshine.

Feeding Natterjacks seems to present no problems except that of finding enough food, as they have voracious appetites whatever age or size they are, and will feed readily as long as their body temperature is high enough. The adults will eat spiders, grasshoppers, crickets, mealworms, earthworms, caterpillars and moths, and I feel that it is important to provide Natterjacks with as varied a diet as possible at all times.

As for breeding Natterjacks in captivity, this has been reasonably straightforward, and seems to be dependent on:--

- a) Rearing robust healthy animals
- b) Providing conditions for breeding and living which are as similar to those of the toads' natural environment as possible.

Following emergence from their second hibernation in mid-April, my Natterjacks were kept in a large tank for about two weeks, and then transferred, a few at a time, into the outdoor enclosure which I had previously adapted to suit their needs. This enclosure, which forms part of a complex which includes two other larger ones, measures $6' \times 7'$ with a two foot high wall and is placed to receive sunlight for the greater part of the day. The toads had previously spent several months in it during the previous summer, and had done well.

Interior landscaping has been designed to resemble a section of dune or heathland and the enclosure had to be filled to a depth of up to one foot in places with sand, to enable typical heathland plants to become established (our local soil is heavy and clayey, and quite unsuitable for such a flora). The raising of the interior level of the enclosure also countered the shading effect of the walls, increasing the amount of sunshine within. This is an important factor, as it is known that Natterjacks need sunlight and like to bask (Beebee, 1983). Plants chosen for the enclosure included *Festuca glauca; Erica carnea;* and cultivars of *Erica tetralix* and *Calluna vulgaris.* The sandy areas between the plants have been kept largely clear of weeds to enable the toads to dig freely, as they would in their natural environment, and there are a number of pieces of old gorse-wood and small logs scattered about, also for cover. A shallow p.v.c. liner "slack" approximately 2'6'' × 3'6'', and 4'' maximum depth occupies a dip in the centre of the enclosure.

Following their re-introduction into the enclosure the male toads soon began to congregate in the slack and to call. This occurred mainly during the evenings and at night, but sometimes during the morning as well. The noise from over-flying jet aircraft seemed to act as a stimulant and would usually start off a spate of croaking. Probably no more than two or three males were ever calling at any one time, but even so, the noise was audible in the house even with the television on! Roger Gouldby experienced similar behaviour from his colony which were kept in a similarly landscaped but larger $(9' \times 11')$ enclosure. Females which ventured into the slack were quickly grasped by the males, which would maintain the amplex even if the female subsequently left the water. The sex ratio amongst my Natterjacks appears to be 9:6 in favour of the females, and Roger Gouldby also has a greater number of females than males.

Although a large proportion of the males appeared to be sexually mature and in breeding condition, the females seemed not to be so well developed, and the breeding activity resulted in only two spawn strings for my colony, and three for Roger's. The spawn strings laid in my enclosure were both largely fertile and were deposited at night on the 26th May and 26th June. The strings laid by Roger Gouldby's toads were laid on the 14th June, 26th June and 10th July. The first and third strings were mainly infertile but the second string was almost completely fertile.

The tadpoles which resulted from these spawnings were reared, both in the enclosure slacks and in aquariums to a stage where they were about to develop back legs and were then collected up and released at an introduction site in North-west Norfolk. Roger and I estimate that we released at least 6,000 well grown tadpoles, but this is a conservative guess. In addition I have passed on 55 toadlets to persons who expressed a desire to rear and hopefully breed from them. I originally kept back 100 tadpoles for rearing to toadlets, but following metamorphosis, I lost nearly half of these, simply because however much food was supplied, the smaller ones could not seem to compete with their larger brethren. As I passed on toadlets and reduced numbers in the tank so the smaller specimens received more intensive care and the survival rate increased accordingly. Once I got down to 20 or so, there were no more fatalities.

One observation of breeding Natterjacks, which was made by Roger one night when he was watching his toads by torchlight in the company of a photographer, may be of particular interest. A male was seen to be calling on the edge of the p.v.c. "slack". It would call for a few seconds and then swivel round a few degrees and commence to call again. Eventually the toad had completed a full circle in this way having called to all points of the compass.

At the time of writing my Natterjack colony is preparing to spend its first winter outdoors in the enclosure, and most individuals have now dug burrows into the sand or else have graduated towards the brickbuilt hibernation chamber located in one corner. It will be interesting to find out if they can succeed in breeding again, perhaps more successfully, in 1985.

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NOTES ON THE HUSBANDRY AND BREEDING OF THE COMMON BRITISH REPTILES AND AMPHIBIANS PART II: THE COMMON TOAD (BUFO BUFO)

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INTRODUCTION

The Common Toad has, in the past, suffered much persecution by man who surrounded it with many superstitions and myths. It was considered to be deadly venomous, malevolent in disposition and the possessor of evil or even magical properties. Needless to say it was killed whenever encountered, often in a very cruel manner. Early this century Kenneth Graham, in his much loved classic, "The Wind in the Willows" somewhat redressed the balance with the immortal "Toad of Toad Hall", an endearing little rogue despite all his conceit and capriciousness, whose exploits have delighted several generations of children.

Happily, the Common Toad no longer suffers widespread persecution thanks to more enlightened attitudes, in fact it is difficult to comprehend why such a harmless, inoffensive creature could ever have been the source of such fear and hatred. True, it is able to emit toxin from its parotid glands, but this is done in self-defence when in extreme danger, usually as a last resort. I have never heard of one doing so when being handled no matter how frightened it is of the experience.

DESCRIPTION, DISTRIBUTION AND HABITAT

The Common Toad is robustly built with a large, broad head and sturdy limbs; the basic colouration is a rather uniform brown, grey or brownish black while the underside is a drab whitish-grey speckled dark brown. Sometimes juvenile specimens are found of striking copper colour or even brick red. Unfortunately these hues invariably fade with maturity. Many large tubercles occur on the back, and the large parotid glands are quite prominent; the eyes are a beautiful coppery-red, real living jewels; female attain much larger sizes than males which seldom exceed 8cm in overall length. Females can reach a length of 13cm.

The Common Toad has an extensive range, being found throughout the whole of Europe except Northern Scandinavia, Ireland and the Mediterranean Islands; it also occurs in the temperate zones of Asia. It is not particular in its choice of habitat which includes woods, fields and gardens. Dry conditions are tolerated so it can exist in well-drained localities such as arable farmland or dry heath. It also thrives on a variety of soil types but prefers lighter soils which it can burrow into. On heavier soils it utilises the burrows of small mammals such as voles or mice.

Lakes, meres, disused gravel pits, canals or slow moving rivers are preferred for spawning purposes and since these larger bodies of water are often used for human recreational activities, boating, angling and suchlike they are not under such direct threat of destruction as are the small ponds and ditches favoured by Common Frogs for spawning. This has ensured a relatively stable Common Toad population but local declines have undoubtedly occurred due to the usual causes, namely urbanisation, pollution and agricultural "improvement" schemes.

HUSBANDRY AND BREEDING

For most of the year the Common Toad makes a good vivarium inmate soon becoming confiding enough to accept food from the fingers. It is also undemanding in its requirements, being able to withstand aridity or high temperatures with equanimity. Although it is crepuscular or nocturnal in its habits, emerging from its daytime retreat at dusk to hunt for worms, slugs, spiders, woodlice and insects. in captivity it can soon be tempted out of hiding during the day with a mealworm or earthworm placed in front of its retreat. In fact if this is done regularly, it will soon emerge whenever the vivarium is approached in expectation of an extra meal. Life in captivity suits Common Toads admirably during summer, autumn and winter, with hibernation taking place naturally in outdoor vivaria. The problems arise when they awaken from hibernation in spring to begin futile but ceaseless attempts at escape from what has now become a prison in order to migrate to their traditional beeding haunts. This migratory instinct is so strong at this time of year that it seems to me rather unfair to confine them against their will. Quite often they will not mate or spawn in the vivarium at all, any spawn that is eventually laid proving infertile.

It is, however, reasonably easy to establish a garden colony of Common Toads but a largish pond is essential, at any rate not smaller than 30 square feet. It should contain a shallow margin of about 6-8 inches depth as shallow water is preferred for depositing spawn.

Because Common Toads usually return to their birth place each year to breed, the obvious way to ensure success is to start with spawn which can be obtained from fellow B.H.S. Members at the relevant time of year.

General emergence from hibernation takes place in late February or early March depending on prevailing weather conditions as well as geographical location, earlier in Southern and Western areas, later in the North and East. They immediately make for their chosen breeding sites, males and females travelling together; often the males will get into amplexus with a female encountered en-route, thereby obtaining a free ride for the remainder of the journey.

Males usually outnumber females by four or five to one, and there is great rivalry between them as they compete for "unattached" females in the water; sometimes a female can be seen with several males attached all trying to prise each other off.

Several weeks are often spent in the water before any spawn is laid, the males calling throughout the day and night. It is usually late March or early April before the spawn is laid, the familiar strings being wound carefully around underwater plants by the female who lays between 3,000 and 5,000 eggs. Soon after the spawn has been laid the females leave the water but the males stay on hoping to attract another gravid female. It is sometimes late May before they finally abandon the water completely.

In my own experience most garden pond fish seem to ignore both spawn and tadpoles of the Common Toad because they are noxious and therefore unpalatable to the fish. I have a large pond containing Koi, Orfe, Tench, Rudd and Goldfish which is used annually by Common Toads for spawning, yet even when the tadpoles swim in the open water away from the plant cover they are completely ignored by the fish. However, B.H.S. Member, Charles Snell of South-East London once informed me that he has actually witnessed his large Mirror-Carp eating Common Toad tadpoles, so perhaps some caution is required here.

The golden rule with rearing all tadpoles is not to overcrowd them; I would say that about 12 per square foot of water surface area is the optimum number for Common Toad tadpoles. These tadpoles love the sun and warm, shallow water; when the weather is warm and sunny they congregate in the shallows in large numbers, hence the importance of a shallow margin in the garden pond.

For the first few weeks after hatching the tadpoles browse on algae growing on underwater plants and sides of the pond, later they scavenge on animal or vegetable matter. They will also accept raw or cooked meat and fish plus any kind of fish flakes or pellets. In a large pond they should be able to find enough food for themselves without any supplementary feeding. Metamorphosis is usually completed within 12-13 weeks, the minute toadlets leaving the water during July to disperse far and wide.

Common Toads are more phlegmatic, less secretive creatures than Common Frogs, and will probably be seen quite frequently in the garden, taking up a regular territory and becoming semitame while still retaining complete freedom. They seem to find the average garden very much to their liking, and once they have "staked out" their territory they should remain for many years. Some difficulty might be experienced in starting a garden colony of Common Toads without a generous sized pond, but once adult toads begin returning to spawn the likelihood is that within a couple of years or so very large numbers will be making the annual pilgrimage until the pond becomes so overcrowded with spawn that most of it will need to be removed to other suitable sites.

In my next article in this series, aimed specifically at the younger or inexperienced herpetologist, I will discuss the care and captive breeding of our most adaptable British amphibian, the Smooth Newt.

HUSBANDRY AND CAPTIVE SPAWNING OF THE COMMON SPADEFOOT TOAD (PELOBATES FUSCUS INSUBRICUS CORNALIA)

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INTRODUCTION

Pelobates fuscus insubricus is a subspecies of Pelobates fuscus, which has a distribution extending from France to the Urals and North Balkans. P. f. insubricus is an endemic race of the Po Plain; recent research indicates that it is extinct in its former range in southern Switzerland. In Italy its area of distribution includes Piedmont, Lombardy, Venetia and Emilia. The Common Spadefoot is a specialised amphibian; it is nocturnal, hiding itself underground during the day. It therefore prefers environments with a sandy soil rather than dry. Such an ambient is heath, and in Italy this habitat was born after the destruction of ancient forests. In recent years P. f. insubricus has disappeared from many places where at one time it was common, a process generated by continuous human pollution. Because of this it was decided to start a program of captive breeding and subsequent reintroduction, using tadpoles and adult animals, in a locality where it is certain that the species was at one time widespread.

CAPTURE

The specimens were found near Novara (North West Italy) in May. I decided to search for the animals in this place after having been told of their presence by a friend. The entire area is subject to a gradual but continuous process of drainage which will in the near future kill all amphibian populations. The taking of specimens from this place has no contra-indication, I being careful also to capture only a few of them. The hunt was conducted during a cold night, as Spadefoots are totally nocturnal and fossorial, and only in the breeding period is it possible to find them in sunlight. I used a powerful torch to light up the little brooks running alongside the country roads.

The first Spadefoot to be found was a male trying to mate with a Green Frog (*Rana esculenta*). I think that the male didn't hear the right answer from the frog and so it "thought" that this was a female of its own species. Similar behaviour is common in the males of several other anurans like, for example, the Common Toad (*Bufo bufo*), often seen embracing any kind of object, from submerged roots to the hands of a man touching it.

The other Spadefoots were picked up along a fence surrounding a little artificial pool. The animals, three males and five females, were attracted by the presence of the water. Capture is relatively simple since these anurans don't try to escape when exposed under torch light, and so it is possible to easily pick them up by hand. When caught several Spadefoots released a sharp smell, very similar to that of garlic. In fact the German name of *Pelobates* is Knocker Kröte, Garlic Toad.

All nine animals were put into a plastic box with moss and fresh leaves.

GENERAL CARE

Husbandry of the Common Spadefoot is relatively simple. I put the animals in all glass terrarium with a surface of 60cm x 40cm and a height of 30cm, but this last dimension is not too important for breeding success since they are fossorial amphibians and don't climb. The floor of the terrarium was covered with a mixture of sand and clay to a depth of 10cm to allow the animals to cover themselves with sand. On one side of the terrarium I put a little basin full of water. Then I tried to feed the animals with living insects which they immediately accepted, eating them with a quick movement of the head.

SPAWNING

The Spadefoots, obviously in breeding condition, went immediately into the water and started to mate. Males, like Common Toads, tried to embrace the females but, since they outnumbered the females (6/3), there were some bachelors which wanted to dislodge a couple of males. All the males emitted a plaintive call, similar to "clock-clock"; the females also emitted a similar sound, but more acute. Amplexus in *Pelobatidae* is lumbar, as in other primitive anurans, unlike the families *Ranidae* and *Bufonidae* which have an axillar amplexus. The function of the strange humeral gland, distinctive in males, is unknown, but it may be useful in copulation. Coupled males defended themselves by kicking out with strength, but, since their hind legs have a hornlike spur, they often wound the "bachelors", or the embraced female.

Two females, obviously with eggs, accepted embrace, while the third one refused to mate. The two pairs, in order to avoid injury and tiresome interference, were separated and put in an aquarium $120 \times 40 \times 50$ cm, one third full of water with some stones to provide the animals with a dry retreat. The water temperature was about 16°C. After being in amplexus for 24 hours the animals laid short strings of spawn, wound around submerged objects. The two couples spawned at different times: one pair at 9 a.m., the other at 12 noon.

The spawn strings were about 10cm in length. The eggs, grey in colour with the inferior pole white, had a diameter of about 3mm and were distributed irregularly in the jelly. They hatched in one week.

The tadpoles were very small (3mm) and remained attached to the spawn jelly for several days using a particular glandular structure. After this period they moved and suspended themselves on the sides of the aquarium. After five days they started to swim freely in the water with wave motions, feeding actively on the algae growing on the sides and bottom of the tank. At this point I filled the aquarium with water with the same characteristics and the same temperature. In addition to the natural growing algae I gave the tadpoles goldfish flaked food and boiled leaves. They grow very slowly. Some, after four months, have reached a length of 50mm, while others are only 20mm. They can reach a maximum length of about 180mm. Now, at this point, I would like to put a great number of these tadpoles in the mentioned pool, and I will keep in the aquarium only a small number in order to photograph the metamorphosis.

I will follow the progress of this new population and I hope to put the progeny of future spawnings in this new place. I will report results in this Bulletin.

Sex	Length, in millimetres	Weight, in grams
male	45	15
	44	12
	45	12
	42	9
"	42	10
	39	7
emale	45	15
99	51	15
**	54	16

Table 1.

Dimensions of the Common Spadefoots (Pelobates fuscus insubricus) referred to in the text.

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OBSERVATIONS OF SNAKE-EATING BY CAPTIVE AFRICAN BULLFROGS (PYXIE CEPHALUS ADSPERSUS)

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Although the African Bullfrog or Giant Pyxie (*Pyxiecephalus adspersus*) is known to eat snakes (Rose, 1962; Branch, 1976), published observations are lacking on the behavior involved. We describe here six observations of three captive frogs eating eastern garter snakes (*Thamnophis sirtalis*). All frogs were purchased from a commercial dealer and maintained on a diet of laboratory rats, mice and leopard frogs (*Rana*). Frogs were housed in individual 75.7 liter aquaria containing sand and a water bowl. All feeding trials involved a single frog and were conducted in the aquarium in which the frog was housed. Feeding trials were conducted between 14 July 1978 and 17 July 1979.

Snakes were introduced into the aquaria on 13 occasions. Few details were recorded for the first observation. Five detailed observations are summarized in Table 1. In all cases except the sixth trial, the snake was captured near the head. Generally, the frogs held the intermittently struggling snake for a period of time and then began actively feeding by pushing the snake away from the mouth with one or both forelegs, straightening and centering the snake, and lunging forward with rapid release and regripping of the snake allowing swallowing. When pushing the snake, the foreleg or forelegs were held with the palms forward and digits pointing inward with one or two digits beneath the snake's body and the others arching over the snake. The largest frog (number 1) tended to maintain a grip with both forelegs more than the other two frogs. The sixth observation was unusual in that the snake was eaten backwards and occurred with more vigorous activity by the frog which was responding to being bitten. In several cases the snake bit the frog causing the frog to brush the snake's head loose. While actively feeding, the frogs intermittently had rapid ventilations, apparently due to difficulty in breathing.

These observations are interesting in several respects. First, very few anurans are known to use their digits extensively as aids in feeding. While some anurans are known to use their forelegs for brief prey orientation while swallowing, the typical anuran feeding behavior consists of using the tongue and mouth to capture prey. Exceptions include certain aquatic anurans in the family Pipidae that are known to use their digits and forelimbs while feeding underwater (Noble, 1931; Sokol, 1969; Frye and Avila, 1979). In these species, however, prey items are generally not held with the digits but are scooped into the mouth (Avila and Frye, 1977). These observations are of further interest in view of the size of the snakes eaten, indicating an unexpected potential food source in the wild. Table 1. Data for five observations of three *Pyxiecephalus adspersus* eating *Thamnophis sirtalis*. "Wait time" was the period of time after capture before feeding began. "Feeding time" was the period of time required to swallow the snake after feeding began.

No.	Frog Snout-vent Length mm	Head Width at Jaw mm	Snake Length mm	Wait Time min.	Feeding Time min.
1	150	60	590	20	14
1	170	70	760	42	19
2	115	40	510	5	28
3	130	70	520	3	17
3	130	70	520	0	12

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LIMB DEGENERATION IN TWO SPECIES OF ASIAN NEWT PATRICK J. WISNIEWSKI

Senior Education Officer, The Wildfowl Trust, Martin Mere, Burscough, Nr. Ormskirk, Lancashire

Reichenbach-Klinke & Elkan (1965) describe degeneration of the limbs and tail in newts and provide photographs of an afflicted *Pleurodeles waltl*. The skin on the toes degenerates and then the bones, until the foot and finally the leg disappears. They concluded that the disease may be connected with diet and not due to parasites or external causes.

I have recently had the misfortune to observe the progress of the disease in two Asian newts *Paramesotriton chinensis* and *Cynops ensicauda popei*. In the first species, three out of a group of four individuals (2 pairs) died as a result of the disease. One month after arrival, both females had areas of degeneration on their bodies. One female arrived with one foot missing and lost toes from another front foot whilst the face of the second appeared to be rotting away, an indentation having appeared in the upper and lower jaws. The skin around the afflicated area had become pallid and evidence of *Saprolegnia* could be seen around the foot of the individual that had lost several toes. Both females had previously fed well on earthworm and beef-heart dusted with vitamin supplement. The affected individuals shed their skins much more often than normal and their bodies developed a slimy texture and a strong scent, resembling that of Witch Hazel. Both females died shortly afterwards, the one with the rotten mouth going into convulsions before it did so. Both animals had been kept in a 0.4% NaCl solution since the onset of the disease. Two months later, one of the males developed foot degeneration, the joints of the digits swelling, shortly before they disappeared. In this animal the foot finally degenerated completely and one side of the hip became white and ulcerated before death.

Of six Cynops ensicauda popei, received from the same source as the P. chinensis, three individuals (a female and two males) showed limb degeneration, some toes having totally disappeared, others swollen at the joints. As with the previous species, ecdysis was much more frequent in the sick animals. However, they continued to feed well and their limbs received a regular wash with the disinfectant Hibitane. The 5% Hibitane concentrate was diluted 1ml in 99ml of water (Lawrence, 1982) and applied to the legs with cotton wool, twice a week. After 1 month of treatment, the progress of the disease appears to have been halted, the joints are no longer swollen and there appears to have been some regeneration of toes, though whether the cure was due to the Hibitane treatment awaits further study.

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OBSERVATIONS ON THE BIRDBROOKE SITE, LONDON S.E.3

CHARLES SNELL

76 Birdbrooke Road, London SE3 9QP

This small urban nature reserve contains, as many B.H.S. members are aware, colonies of European reptile and amphibian species as well as native. These include European Tree Frog (Hyla arborea), Edible Frog (Rana esculenta) and European Wall Lizard (Podarcis muralis).

Observation over the years has revealed a great deal of information not available in the books that I have, as yet, referred to.

TREE FROG (HYLA ARBOREA)

Tree frogs do not appear, on the site, to like trees. Although the site has a roughly equal mix of trees & bramble scrub, bramble not growing in the open in full sun is not used. From my observations they have a preferred situation of between one and four feet above ground level. I have yet to find (or hear) a tree frog higher than this or in a tree. Perhaps their English name has misled those enthusiasts, who tried many introductions during the later part of last and early part of this century, to release the frogs in unsuitable sites (i.e. ponds in woodland).

The British colony of *Hyla arborea* in the New Forest is in fact also centred around a pond which is surrounded by scrub, in an open situation.

The choice of scrub and especially thorny scrub may have many advantages. One, of course, is that the breeding pond temperature will not be reduced by shading by trees. The inducement of breeding behaviour, the speed of tadpole growth and metamorphosis is very dependent on water temperature (i.e. warmer the better 18° — 28° seeming optimal). A second advantage may be a lack of predation. Only smaller carnivorous birds (e.g. whitethroats, wren, dunnock) use the brambles as a habitat. Larger birds that might eat the frogs, such as thrushes, blackbirds, starlings, jays, magpies, crows, etc. show a preference for trees. In my opinion, the ideal sites in Britain for this species would have relatively infertile soil to encourage scrub growth and not trees, and should contain a shallow, unshaded pond (or the potential for creating such or modifying an existing pond). A heathland site might be ideal.

Spawning this year started in mid-April; calling started mid-March.

EDIBLE FROG (RANA ESCULENTA)

A colony of edible frogs now exist on the Kidbrooke site. These must have derived from tadpoles that metamorphosed in my garden pond, which adjoins the site, and subsequently found the pond on site. They have been in evidence since 1980 and have bred from 1981 onwards. I have had fears for the safety of the much smaller tree frogs. At night calling tree frogs will sit in the pond alongside edible frogs, so far edible frogs have not been seen to take them. Should they be partial to tree frogs they could by now have caused their extinction from the site, so hopefully, they should co-exist.

Unlike tree frogs, the edible frogs call by day as well as night and are active on the pond surface. For this reason many male edible frogs have fallen prey to a heron.

Calling started at the end of April and the first spawn was found (in 1984) on the 4th June (tree frogs were much earlier at mid-March and mid-April respectively).

The numbers of young tree frogs and edible frogs coming out of hibernation after the winter of 1983-4 did not seem as high as in 1982-83 when the winter was far more severe. This confirms my past observations, that survival of herps during winter is better during a consistently cold winter than our usual relatively mild and variable winters. Note also that Sweden, for instance, has a greater herp variety than Britain although winters are more severe. This is also true, of course, of mainland Europe of like latitude.

It would seem logical to suppose that, as tissue respiration in herps is related to environmental temperatures, body fat would be used up quicker in milder winters and put the animals at greater risk of not surviving through.

WALL LIZARD (PODARCIS MURALIS)

The colony is still healthy and breeding. In 1983 young of the year could be seen alongside one year old individuals and mature adults. Observations of the part of the colony that uses the garden indicates that they can breed before reaching one year old. Hatching occurs in July, August or September, depending on weather and time of egg laying. Hatchlings in their following year, while still undersized and without mature green colouration, can become gravid from late June onwards. Mature females lay two clutches about 5-6 weeks apart.

Pair bonding is very strong. The females will stay close to their mate. The males, however, often go on "long walk abouts" leaving the female on the pair's territory. Occasionally the males have more than one female but still show a preference for one — usually the original female — with whom they will consort more often. This preferred female often shows aggression towards the other females which seem to accept her higher status and give her the choice of the best basking places, etc. Occasionally an aggressive female may usurp the preferred female, but from my observations so far, this is not too common. Adults will share their basking places with very young lizards without quarrel. The males show territorial behaviour but disputes normally amount only to the trespasser running off when confronted by the male in territorial possession. I have repeatedly seen much larger and stronger males run away from smaller males in cases where the smaller was in possession. It would appear that, as with many other animal species, the territory owner has a "psychological" advantage. A correspondent tells me that this is not the case, in his opinion, with some other species (e.g. Lacerta agilis). I would welcome any personal observations from members on territorial behaviour in other free living colonies of other (or the same) species. In captive colonies, where the males cannot escape each other, behaviour is very different and can lead to deaths. Their main predators are cats: in spite of this they are increasing and expanding their range.

Their preferred habitats are:

(i) walls or fences with vegetation below (herbage, brambles, etc. but not tightly mown grass) or cracks and crevices into which they can run.

(ii) tree stumps that are unshaded and surrounded by vegetation but at the same time protrude above the vegetation in the sun.

(iii) gardens. Especially those with rockeries and not frquented by cats.

(iv) sunny banks with basking areas, e.g. tree stumps, areas bare of vegetation, concrete, rocks, etc.

(v) builders rubble. Piles of bricks, slate, concrete etc. especially when surrounded by vegetation.

The site has recently improved for herps by emplacing brick rubble on a south facing bank or in piles on flat ground and then covered in one to two inches of soil to mask their appearance and encourage vegetation. Both banks and mounds were seeded after construction with seeds of species tolerant of dry conditions. These are successfully establishing.

Hibernation. Wall lizards do not seem to hibernate in the true sense and can occasionally be found basking in mid-winter on a suitably sunny day.

LETTERS TO THE EDITORS

GRASS SNAKE FEEDING BEHAVIOUR

Dear Sirs,

The defensive posture adopted by toads when approached by snakes has been interpreted as a way of presenting the largest possible surface area to the snake, effectively making the toad appear more of a mouthful to the snake than it really is. Snakes are more vulnerable when feeding, so there is some advantage in a snake accurately assessing whether or not it can manage its prospective meal, before beginning to swallow. If it decides the food item, e.g. a toad, is too large, then it may forego its meal and the toad may live to see another day. However, an adult Grass Snake (*Natrix natrix*), in my possession for a few weeks before re-release, did not behave in a way which conforms with this idea.

Whenever presented with a toad (Bufo bufo), the snake's reactions depended on the behaviour of the toad rather than its size. If the snake could see the toad when it was first offered, it only attacked if the toad, probably unaware of the snake initially, hopped or walked immediately. If the introduced toad sat quietly when the snake first approached, it invariably adopted the defensive posture, its final attitude depending on the direction of approach by the snake. Whenever this occurred, the snake did not attack but instead showed great interest in the toad, investigating it with constant tongue flicking. Often it would burrow under the toad with its head, or burrow into the gravel beneath the toad, in either case dislodging the toad, but never finally attacking it. This happened irrespective of the size of the toad, i.e. even immature toads (snout-vent length 2-3cm) were refused if they adopted the defensive posture, while adults (snout-vent length 4-5cm) were attacked and eaten if they behaved as described above.

This behaviour suggests that the snake refused a toad whenever the defensive posture was presented, but without any size assessment by the snake. I think that it would be easier for the snake brain to house a blanket inhibition of the feeding response when presented with a defensive posture, than to have mechanisms allowing solutions to the problem — "is this toad to big for me to eat?" Why the snake burrowed under defensive toads is difficult to answer. Perhaps this was a 'displacement activity' resulting from a conflict between wishing to eat, and the inhibition of the feeding response by the toad's posture.

Graham Walters 6 Avon Road, Walthamstow, London E17 3RD

AGGRESSIVE SALAMANDERS

Dear Sirs,

Amphibians are not renowned for their aggressive tendencies. Larger male frogs and toads apparently intimidate their smaller rivals during courtship and pairing by having deeper voices, and certain frog tadpoles sometimes like to eat their smaller brothers and sisters. But this seems to be about the extent of their aggressive behaviour, discounting feeding in adults where every meal might be considered an aggressive act! Perhaps there are more instances, serving much the same functions as aggression does in other animals.

I had a small collection of Fire Salamanders, *Salamandra salamandra*. Occasionally, when they were fed on slugs, movement of one salamander would attract another, who would approach. This initiated a response in the first salamander to feed, who would use its head in a rapid forward and upward butting movement against the intruder, repeating several times until the second salamander retreated. Sometimes the first would lunge at the second in a manner similar to that when taking a slug, usually resulting in a rapid retreat. Without having carried out any tests to put some weight to the idea, head butting in my salamanders certainly appeared to help increase the chance of one eating the food that it originally intended to eat, while in the presence of other salamanders.

I wonder if anyone else has witnessed similar happenings. Perhaps the damp twilight world of salamanders on the forest floor is not quite so peaceful and serene as their measured steps, long periods of inactivity and retiring habits in the vivarium would suggest.

Graham Walters 6 Avon Road, Walthamstow, London E17 3RB

OVERWINTERING IN BOMBINA ORIENTALIS (ORIENTAL FIRE BELLIED TOAD) IN ENGLAND

Dear Sirs,

I was warned from many sources that *B. orientalis* would not hibernate successfully if left outside in Britain. I now have a thriving colony, the adult pair from which it is descended having now successfully hibernated and bred outside for a period of five years.

> Charles Snell 76 Birdbrooke Road, London SE3 9QP

EGG LAYING SITE FOR THE WALL LIZARD

Dear Sirs,

Many people have asked me where I think the Wall Lizards (*Podarcis muralis*) on the Kidbrooke site (London SE3) lay their eggs. Up until now I have not had a clue. However, this weekend (11-12th August, 1984) two small boys brought me some strange white objects dug out of an ants' nest. They were Wall Lizard eggs. Upon reflection, it is known that ants provide ideal conditions in their mounds for their own eggs, e.g. temperature, humidity, air circulation, etc., so such a choice for egg laying might be ideal assuming the ants do not attack the eggs or emerging young. Has any reader noticed a similar phenomenon at home or abroad?

Charles Snell 76 Birdbrooke Road, London SE3 9QP

INFORMATION SOUGHT BY ITALIAN PUBLICATION

Dear Sirs,

I am compiling information for a directory of Herpetological and Ichthyological Societies, that will be published by the Italian monthly magazine "Acquario" (Olimpia Ed.). The aim is to acquaint all Italian amateur acquariologists and herpetologists with these Institutions that are, unfortunately, completely or for the most unknown in Italy.

In this country only a few acquariologist groups are born, but there aren't herpetological Societies yet.

All Institutions (Societies, Groups, etc.), worldwide, publishing journals, circulars, magazines etc. dealing with fishes, reptiles and amphibians are asked to submit information.

Can you help? Please respond with:

- * Name and address of the Institution
- * Brief history and purpose
- * Publications (if possible send a copy)
- * Membership and subscription (for Italy)

Private individuals are also welcomed if they can give any information about Institutions they are associated with.

There is no deadline for receipt of information, but the sooner it is in the Editor's hands the sooner it will be published in the magazine.

Please write to Ettore R. Peyrot, C.so Regina Margherita 194, 10152 TORINO, ITALY.

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TO ORDER

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Send orders to Dr. Douglas H. Taylor, Department of Zoology, Miami University, Oxford, Ohio 45056, USA Please make checks payable to "SSAR" All USA orders are postpaid: shipments outside the USA will be charged only the additional shipping costs in excess of domestic rates Overseas customers must pay in USA funds or by International Money Order, or may charge to MasterCard or VISA (give account number and expiration date). A complete hist of Society publications and membership information can be obtained from Di Taylor. The Society publishes Journal of Herpetology, Eacsimile Reprints in Herpetology, Herpetological Review, Herpetological Circulars, Catalogue of American Amphibians and Reptiles, Contributions to Herpetology, and Recent Herpetological Literature.

SOCIETY FOR THE STUDY OF AMPHIBIANS AND REPTILES



THE TURTLES OF VENEZUELA

by Peter C. H. Pritchard and Pedro Trebbau

This book is the first in-depth treatment of a major South American turtle fauna II covers all turtles known from Venezuela mcluding the matamata and other sidenecks (11 species), torioses (2 species), pond and land turtles (5 species) and subspecies), and the sea turtles (5 species), together comprising half of the turtle species described from the South American continent , There is an extensive discussion of the distribution and zoogeography of South American turtles and a key to species (in both English and Spanish). Each species account consists of a synonymy followed by a diagnosis; a detailed description (including shell, soft parts, color, and sexual dimorph ism); and sections on size and growth, distribution, geographic variation, habitat, (eeding, reproduction, economic importance, and vernacular names. The family accounts give a detailed review of the fossil history and present distribution of all genera, worldwide, but with emphasis on South America , There is also a comprehensive bibliography and a list of locality records from throughout the entire continent for all Venezuelan taxa.

The book is beautifully illustrated. There are 48 full-page plates in color, 26 of which are original watercolors and the remainder a collection of 165 photographs of both turtles and their habitats. In addition, there are two distribution maps for each species: a spot map showing the detailed Venezuelan distribution and another map showing the continent wide range.

The book is 414 pages, 8½ × 11 inches (21.5 × 28 cm), bound in buckram, price US \$45 A special leatherbound patron's edition, in two volumes, is US \$300. A four-page ad with sample color plates was published in the December 1982 issue of *Herperological Review*, and copies may be obtained on request from Dr. Douglas H. Taylor, Department of Zoology, Miami University, Oxford, Ohio 45056, USA.

Orders may be placed with Dr. Taylor. Please make checks payable to "SSAR" All USA orders are postpad; shipments outside the USA will be charged only the additional shipping costs in excess of domestic rates. Overseas customers must pay in USA hunds or by International Money Order, or may charge to MasterCard or VISA (give account number and expiration date). A complete list of Society publications and membership information can be obtained from Dr. Taylor. The Society publishes Journal of Herpetological Circulars, Catalogue of American Amphibians and Reptiles, Contributions to Herpetology, and Recent Herpetological Literature

SOCIETY FOR THE STUDY OF AMPHIBIANS AND REPTILES

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Advertisements for livestock are accepted on the understanding that the animals in question are legally obtained.

- Wanted: Male or female Garter Snakes, Thamnophis sirtalis infernalis, T.s. fitchi, T.s. concinnus, or T.s. parietalis.
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 P. Bryce, 96 Shenstone Avenue, Stourbridge, West Midlands. Tel: Stourbridge 379157.
- Wanted: Male Testudo graeca and female Testudo hermanni to complete pairs for home breeding. Will
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 Mrs. T.S. Stone, 33 Kensington Square, London W8 5HH. Tel: 01-937 2822.
- Wanted: Male Marginated Tortoise, Testudo marginata to complete breeding pair. Buy, exchange or loan.
 Peter Waring, 18 Northcote Road, Southsea, Hampshire PO4 0LH, Tel: 0705 733216.
- Wanted: Newts: Great Crested, adult pairs, larvae or eggs for establishing garden breeding colony. Marbled (T. marmoratus), Alpine (T. alpestris) and Caucasian (T. vittatus ophryticus) adults, pairs where available, for breeding. Toads: Midwife, Yellow-Bellied (Bombina variegata) or Fire Bellied (B. bombina), adults if possible. Fire Salamanders (S. salamandra), red and yellow spotted south-west European variety preferred, adult pair for breeding. Simon Hartley, 22 Kingsfield Road, Oxhey, Watford, Herts WD1 4DS. Tel: Watford 20658.
- For Sale: Captive bred Hyla arborea sarda, Alytes obstetricians, Eurproctus asper. A.W. Read, 14 Nursery Place, Chipstead, Sevenoaks, Kent TN13 2RH.
- Correspondence on venomous snakes: Correspondence desired on the care, food, feeding, activity, behaviour, breeding and venoms of cobras, vipers and kraits in captivity. Please write to: Dr Md Sohrab Uddin Sarker, Associate Professor, Department of Zoology, University of Dhaka, Dhaka-2, Bangladesh.
- Homes needed for tortoises: I am now registered with the Ministry of Agriculture as a sanctuary for injured and unhealthy tortoises newly imported into this country. After treatment, homes will be required. Interested people should write to: Mrs Pauline Christian, 11 Beagle Close, Abingdon, Oxon OX14 2NU. Tel: Abingdon 28223.
- The Leicester Tortoise Society has recently been formed. The Society meets once a month and has regular Newsletters. Our aim is to help each other learn more about these animals and possibly form breeding groups. Full details from: Mrs J.C. Hearnshaw (Chairman), 3 Braemar Close, Mountsorrel, Loughborough, Leicestershire LE12 7ES.

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Articles, news items, notes and letters on any aspect of herpetology are needed for the Bulletin. Contributions should, if possible, be typed. Handwritten items should be clear and legible. All contributions should be double spaced and on one wherever possible to follow the "Instructions to Authors" printed on the inside back cover of the British Journal of Herpetology. Titles, headings and sub-headings should be in block capital letters, but not underlined. Only latin names should be underlined. The name and address of the author should immediately follow the main heading, except in letters. Photographs can be reproduced only from good quality black and white prints. Reprints of articles can be supplied to authors. These must be requested from the Editors before the Bulletin goes to press.

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