

**THE BRITISH  
HERPETOLOGICAL SOCIETY**

**BULLETIN**

**No. 8 December 1983**

## BRITISH HERPETOLOGICAL SOCIETY

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

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

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

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

### **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 £3.00. Applications to purchase should be made to the Chairman of the Captive Breeding Committee.

### **Meetings**

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

### **Subscriptions**

Ordinary Members £10. Junior Members £3.00 (Junior Members do not receive the British Journal of Herpetology). Institution rate £17.

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

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

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

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

## MEETINGS 1984

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

|                          |   |
|--------------------------|---|
| <del>FEBRUARY 29th</del> | <del>Mr. Brian Banks (Biological Sciences, Univ. Sussex): Breeding ecology of the natterjack in Britain in relation to conservation</del>   |
| MARCH 13th               | Annual General Meeting followed by Dr. Alan Charig (Chief Curator of Fossil Amphibians, Reptiles and Birds, Dept. Palaeontology, British Museum (Natural History), London): Dinosaurs: myths and misconceptions. Mention will be made of the Surrey Dinosaur. |
| APRIL 25th               | Dr. J. Riley (Dept. Biological Sciences, Univ. Dundee): Relationship of parasitic pentastomid behaviour with reptiles. Reptiles can be infested by 'lungworms'.   |
| MAY 17th                 | Mr. C.A. Snell: Garden breeding and a wasteland reserve for herpetofauna in SE London.  |
| JUNE 20th                | * <i>Amphibians and Reptiles Worldwide</i> . A discussion on care and breeding organized by the Captive Breeding Committee.   |
| SEPTEMBER 29th           | A joint Saturday meeting (date to be confirmed). A colloquium on amphibian and reptile husbandry organized by the Captive Breeding Committee (details in <i>BHS Bulletin</i> later).  |
| OCTOBER 26th             | Mr. C.J. Raxworthy (Dept. Zoology, Bedford and Royal Holloway Colleges, Univ. London, Egham, Surrey): Herpetofauna of SW Morocco — results of a University of London Union Natural History Society Expedition 1983.   |
| NOVEMBER 21st            | Mr. M.P. Simmonds (Dept. Zoology, Westfield College, Univ. London): Ecology of the feral African clawed toad ( <i>Xenopus laevis</i> ) in Britain.  |

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

## DR. EDWARD ELKAN (1895-1983)

Dr. Edward Elkan, who was recognised internationally for his work on the pathology and diseases of reptiles and amphibians, died at the age of 88 on 4th July 1983.

A fund in memory of Dr. Elkan has been established and will be used to perpetuate his name and work. A number of commemorative ventures have been proposed and will be considered in due course. The most pressing requirement, however, is to ensure that Dr. Elkan's unique collection of microscope slides and other pathological specimens is properly collated, mounted and maintained. Much of the material is already housed at the Royal College of Surgeons: Dr. Elkan passed it on to me before he died and was anxious that it should remain intact and serve as a working collection. This will be supplemented with a number of Dr. Elkan's drawings, reprints and reference books. It is our intention that the "Edward Elkan Reference Collection of Lower Vertebrate Pathology" should be widely used for study by herpetologists, pathologists and research workers from a range of disciplines.

All colleagues, friends and admirers of Dr. Elkan are invited to contribute to this Appeal. Cheques should be made payable to "The Edward Elkan Memorial Fund" and forwarded to the address below. Comments or suggestions concerning the Fund will be welcomed. In order to minimise expenditure an acknowledgement will only be sent if specifically requested. However, a full list of subscribers will be compiled and affixed to the Collection. Reports of the Fund's progress will also appear regularly in the herpetological literature.

J.E. Cooper,  
Royal College of Surgeons of England, 35-43 Lincoln's Inn Fields,  
London WC2A 3PN, England

## MEMBERSHIP SECRETARY/TREASURER CHANGES IN 1983

During 1983, there have been some changes in the BHS Council Members undertaking the functions of Membership and Treasurer. After Mr. Dudley Lucas's resignation as Treasurer just before the A.G.M., Mr. Graham Sharpe, an accountant with the Civil Service and husband of Janet Ridout Sharpe (then Membership Secretary), very kindly agreed to take on this onerous responsibility in an *ex officio* capacity and organize the Society's accounts (reports for 1981 and 1982 are appearing the Bulletin). As many of you will be pleased to hear, Janet gave birth to a little girl earlier this year. As a result of the extra domestic commitments involved(!), Janet and Graham felt they could not responsibly continue their duties as Membership Secretary and give full justice to the work required. With their (and our) regrets, they tendered their resignation. I am sure members of the Society would like to have their gratitude expressed here on their behalf for all the hard and conscientious work Janet put into her tasks as Membership Secretary since 1981 and Graham since the A.G.M. this year.

At the same time, we greet Mrs. Monica Green back as Membership Secretary and Treasurer. Monica is very familiar with these tasks from the time she undertook them before for many years from 1957 until 1976! The Society expressed its indebtedness to Monica for past services as long ago as 1960 when she was elected an Honorary Member. We welcome Monica back to the fold and wish her every success in the all-too-familiar duties she is undertaking once again with her change of personal circumstances.

## MEMBERSHIP LIST PROPOSED

It is intended, at some time in the future, to publish a full list of members and their addresses in the Bulletin. This is common practise in other Societies, and it is felt that such a list would be useful to members. However, it is realised that some people may object to the publication of their address. If anyone has such an objection, and would prefer their address to be omitted from the published list, please write accordingly to the Society's Chairman, Dr. M. Lambert, Flat 2, 34 Queen's Gate Terrace, London SW7 5PH.

## JUNIOR NEWSLETTER

The Education Committee has received several queries from ex J. Herps. who are now ordinary members of the Society but who would still like to be sent the Junior Newsletter.

In response to this demand it has been decided to introduce a junior Newsletter only subscription of £2 a year. Any person, whether a member of the Society or not, will, for a payment of £2, be sent the next three issues of this ten page publication.

This subscription does not entitle the payer to Junior Section membership or to any of the advantages of membership other than the receipt of the Newsletter.

Cheques should be made payable to the British Herpetological Society and sent to: Miss J. Pracy, 27 Clifton Gardens, Enfield, Middlesex. In all cases a receipt will be issued which will list the issue numbers which the subscriber will be sent.

## ESTABLISHMENT OF BHS REGIONAL GROUPS

Council wishes that the Society should extend its activities more widely across Britain, and that this should be stimulated by promoting the establishment of Regional Groups.

We therefore urge existing members of the Society, or others who may wish to become involved, and who live in areas distant from London, to help us initiate such a programme. Broadly speaking we have the following plans in mind:

- (1) To establish local Groups in regions such as south-west England, Wales, Scotland, north-west and north-east England and perhaps elsewhere. We would hope that such Groups could grow and ultimately make major contributions to the membership and activities of the Society.
- (2) Such Groups would elect their own chairpersons, and those people would have seats on the BHS Council.

- (3) Members of the Groups would be full members of the BHS and receive all BHS publications. In addition, the Society would hope to make financial contributions towards the hire of local meeting rooms and to assist with arrangements for speakers etc.
- (4) Articles of local interest to the various Groups would be encouraged for inclusion in the *Bulletin*.
- (5) As such Groups become established, the BHS Annual General Meeting would become mobile and convene in different regions from year to year.

Council views these plans as a method for promoting fuller participation in and enjoyment of all aspects of Herpetology throughout the country. We therefore ask anyone interested in helping to organise such a Group to contact: Dr. Trevor Beebee, 434 Falmer Road, Woodingdean, Brighton, Sussex. (Telephone Brighton 35634, evenings/weekends).

### **FACSIMILE OF *BRITISH JOURNAL OF HERPETOLOGY* VOLUME ONE 1948-55**

The *British Journal of Herpetology* is published by the British Herpetological Society. The first eight numbers of Volume One, 1948-53, were edited by Prof. Angus Bellairs. Just thirty years since being the editor and on the occasion of his retirement, the Society wishes to honour Prof. Bellairs's contribution to herpetology and announces that *hard-bound* facsimile copies of Volume One of the *British Journal of Herpetology* were made available at the end of 1983. At twelve numbers per volume (two yearly), Volume One consists of 228 pages. The facsimile will be approximately A5 in size. (Back numbers of the journal are at present sold at £3.00 (\$5.50) each).

Copies will be available at a special pre-publication prices of £7.50 (\$11.50) to non-members of the British Herpetological Society and £5.00 (\$8.00) to members. After 30 April, 1984, the price will be £12.50 (\$19.00) to non-members and £10.00 (\$15.50) to members. Prices do not include £0.50 (\$1.00) surface postage and packing. Should pre-publication requests be insufficient to cover production costs and the project fails, subscribers will be returned their contributions. But every effort will be made to avoid this.

The British Herpetological Society (founded 1947) is probably the first nationally formed society for the study of amphibians and reptiles in Europe, as well as in the Commonwealth. The *British Journal of Herpetology*, presently edited by Dr. R.A. Avery, is now in its sixth volume. The first volume, besides recording aspects of the early development of the society and herpetology in Britain, includes some classical papers and others of historical interest. The first distribution maps of the herpetofauna of Britain and Ireland compiled by vice-counties by Col. R.H.R. Taylor (1948) make up the first number. Subsequent numbers include a paper on hybridization between the 'green frogs' *Rana esculenta* and *R. ridibunda* by L.C. Mandeville and Helen Spurway, phenological reports on frog (*Rana temporaria*) and toad (*Bufo bufo*) breeding in Britain and a note on the distribution of herpetofauna in the Channel Islands by Dr. J.F.D. Frazer (BHS President 1955-81), a review of snake limbs by Prof. A. d'A. Bellairs, a paper on the influence of the climate of Britain and Ireland on the habits and distribution of the herpetofauna and various notes by the Society's founding President, Dr. Malcolm Smith, and a pioneer paper on toad (*Bufo bufo*) migration by H.J. Moore at Clayesmore School, Dorset.

**Orders, with payment** (cheques, postal orders and international money orders payable to 'British Herpetological Society' are acceptable), should be sent to:—

British Herpetological Society, c/o Zoological Society of London, Regent's Park, London, NW1 4RY, U.K.

### **SECOND INTERNATIONAL COLLOQUIUM ON THE PATHOLOGY OF REPTILES AND AMPHIBIANS:**

**University of Nottingham, England, 17-21 September 1984**

The first, highly successful Colloquium on the Pathology of Reptiles and Amphibians was held at the University of Angers, France, in September 1982. Preliminary arrangements have been made for the second at the University of Nottingham in September 1984. A draft programme will be issued in March 1984 and will include sessions on tumours, parasitic infections, developmental abnormalities and immune responses. There will also probably be sessions on spontaneous diseases and anaesthesia.

The organizers of the Second Colloquium are Dr. Michael Balls and Dr. Richard Clothier, both of the University of Nottingham. For further details, if possible before 31st January 1984, please contact:— Dr. R. Clothier, Department of Human Morphology, University of Nottingham Medical School, Nottingham, NG7 2UH, U.K. Telephone: Nottingham (0602) 700111.

## **1984 AUSTRALIAN HERPETOLOGICAL CONFERENCE** **28-31 August 1984, The Australian Museum, Sydney, Australia**

Sponsors: Royal Zoological Society of New South Wales; Australian Society of Herpetologists; The Australian Museum.

Participation in the conference is welcomed from both professional and amateur herpetologists. Publication of the Proceedings is planned.

### **Tentative Programme**

Optional tours — Sydney Harbour, Opera House, City, Herpetological laboratories.  
Evening: Registration, Pre-conference get-together.

#### **Wednesday, 29 August 1984**

Opening and Welcome.

Symposium **ECOLOGICAL BIOGEOGRAPHY OF THE AUSTRALASIAN  
HERPETOFAUNA** (Chairman: H.G. Cogger).

Symposium **PHYSIOLOGICAL ECOLOGY OF AQUATIC REPTILES** (Chairman:  
C.G. Grigg).

Session **CONTRIBUTED PAPERS.**

Evening **Photographic show, with explanation of the proposed National Photographic  
Index of Australian Frogs and Reptiles.**

#### **Thursday, 30 August 1984**

Symposium **RARE AND ENDANGERED AUSTRALASIAN FROGS AND REPTILES**  
(Chairman: M.J. Tyler).

Symposium **POPULATION ECOLOGY OF FROGS AND REPTILES** (Chairman:  
H. Heatwole).

Workshop **HUSBANDRY AND CAPTIVE BREEDING** (at Taronga Zoo, organisers  
C.B. Banks and T. Boylan).

Evening **Taronga Zoo walk and visit to Reptile House.**

**CONFERENCE DINNER** (Safari Room, Taronga Zoo) with an  
Herpetological Diversion in music and poetry, devised by Ted Smith.

#### **Friday, 31 August 1984**

Symposium **REPRODUCTION AND DEVELOPMENT OF FROGS AND REPTILES**  
(Chairman: C. Limpus).

Symposium **PHYLOGENY OF AUSTRALIAN ELAPID SNAKES** (Chairman:  
T.D. Schwaner).

Symposium **CHROMOSOMES AND EVOLUTION OF AUSTRALASIAN FROGS AND  
REPTILES** (Chairman: M. King).

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Registration Fee \$50.00, Conference Dinner \$25.00 (estimates only).

For further information, write to The Organising Committee, 1984 Australasian Herpetological Conference, Zoology A.08, University of Sydney, N.S.W. 2006, Australia.

# AN ANNOTATED BIBLIOGRAPHY ON INDIAN CROCODILIANS

prepared by

Dr. H.R. Bustard & Dr. L.A.K. Singh

India: Crocodile Breeding and Management Project, Food and Agriculture Organisation of the United Nations, Rome, 1982.

This 54 page booklet can be obtained free from:

Dr. J.B. Sale, FAO Project, Wildlife Institute of India, FRI Campus, PO New Forest, Dehra Dun-248 006, U.P., India, or  
FOWR, Forestry Department, FAO, Via delle Terme di Caracalla, 00100-Rome, Italy.

## ENGLISH TRANSLATIONS OF HERPETOLOGICAL WORKS IN OTHER LANGUAGES

Having a common linguistic bond with North America, BHS members may be interested to know that the Society for the Study of Amphibians and Reptiles (SSAR) in the U.S.A. is developing a project in which English translations of articles and scientific papers and other works in herpetology will be made available. Without any special funding for the translation of articles, reliance is made on contributions from specialists who have already had translations made or whom have themselves made translations from papers in other languages. If an English translation is required of an important paper, which could appeal to a significant section of the herpetological community, then it may also be possible to undertake this. Volunteers willing to give their time to translating articles, indicating their language proficiency, are earnestly sought. Please write to Dr. Robert D. Aldridge, SSAR Translations Project Editor, Department of Biology, Saint Louis University, St. Louis, Missouri 63013, U.S.A.

A full list of translations at present available to SSAR members is given in *SSAR's Herpetological Review* 13(4): 111-112, December 1982.

Meanwhile, if BHS members and other herpetologists in Britain, the Commonwealth and English-speaking countries elsewhere already have translations of articles/scientific papers and are willing to contribute to this scheme, then please send a photocopy of the translation and copy of the original work to Dr. M.R.K. Lambert, BHS Chairman, c/o TDRI, College House, Wrights Lane, London, W8 5SJ, U.K., for forwarding to Dr. Aldridge, or (preferably) to Dr. Aldridge direct (address above).

M.R.K.L.

## SSAR GRANTS-IN-HERPETOLOGY

The Society for the Study of Amphibians and Reptiles is pleased to announce that proposals are now being accepted for the 1984 Grants-In-Herpetology Program. This Program is designed to provide financial support to deserving individuals or organizations engaged in research on or conservation of amphibians and reptiles. All applicants (or their advisor or sponsor) must be a member of SSAR. Grant proposals will be considered in the following areas:

1. Graduate student herpetological research.
2. Herpetology-oriented conservation.
3. Regional herpetological society programs or projects.
4. Herpetological research in zoos.
5. Field work (Auto Mileage). (2 awards of \$215).

Each proposal should include the following information: A) *Background & Objectives* of the proposed project, in terms of its relevance to herpetology, B) *Methods* of carrying out the research or conducting the project, C) *Budget for the project*, which should not exceed \$430 in each category, and D) *Curriculum Vitae* and *Letter of Support* (if applicable). The proposal must be typed double spaced and must *not* exceed 5 pages, excluding cover page, abstract, budget, curriculum vitae, and bibliography. All proposals are due no later than *13 April, 1984*.

For additional information on proposals see the December 1983 issue of *Herp Review* or write: Dr. Linda Maxson, Department of Genetics and Development, University of Illinois, 515 Morrill Hall, 505 S. Goodwin Avenue, Urbana, IL 61801.



## COUNCILS FOR THE CONSERVATION OF THE TORTOISES OF U.S.A. AND MEXICO

There are four species of tortoise in the southern U.S.A. and Mexico:—

*Gopherus agassizii* – the Desert Tortoise of SW U.S.A. (Arizona, California, Nevada, Utah) and NW Mexico.

*Gopherus berlandieri* – Berlandier's or the Texas tortoise of S Texas and NE Mexico.

*Gopherus polyphemus* – the Gopher Tortoise of the hot, humid SE U.S.A. (Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina), and

*Gopherus flavomarginatus* – the Bolson Tortoise of the arid highlands of central Mexico.

The survival of all species is threatened by the reductions of their remaining habitats and populations by the usual human activities, which include agriculture and housing development, off-road vehicle usage, collection as pets, use as food and mortality on roads. A North American Tortoise Council may be developed to assist in conservation and research on all four species of *Gopherus*, and to provide a forum for the exchange of information and ideas to promote their conservation (Bury, 1982). Such organisation of effort in the U.S.A. should be borne in mind and even act as a precedent in relation to the coordination of effort in conserving the Mediterranean and other Western Palearctic species of *Testudo* (Risch & Lambert, 1981; Brushko & Kubykin, 1981). There are at present in the U.S.A. the Desert Tortoise Council, California, and the Gopher Tortoise Council, Florida.

*The Desert Tortoise Council* (1975). The Council's Goal is "to assure the continued survival of viable populations of the desert tortoise throughout its existing range". Symposia are held annually which are published in yearly *Proceedings*, the first being in 1976. The founding Chairman of Council was Charles W. Marshall of the California Department of Fish and Game, Leader of an interim Recovery Team of the seven States' Colorado River Wildlife Council. *Applications for Membership* (\$8.00): Desert Tortoise Council, 5319 Cerritos Avenue, Long Beach, California 90805, U.S.A.

*The Gopher Tortoise Council* (1978). At the 1978 All-Florida Herpetology Conference held in the Florida State Museum, Gainesville, Dr. Walter Auffenberg proposed the formation of a conservation group to focus on the problems of the gopher tortoise as the result of surveys by him and Richard Franz in the early 1970s. A small group of people subsequently met and formed the Gopher Tortoise Council. Concerned with the decline of the species, their goal was to work for the wiser management and perpetuation of this animal. Some objectives are "1. to offer professional advice for management, conservation, and protection of gopher tortoises; 2. to encourage the study of the life history, biology, physiology, and management of the species; 3. to conduct active public information and conservation education programmes, and 4. to seek protection of gopher tortoises on public lands." The Gopher Tortoise Council has held annual meetings since 1979 which are published as yearly *Proceedings*, the first being for the 1980 meeting entitled 'The dilemma of the gopher tortoise — Is there a solution?'. To join the Gopher Tortoise Council, contact Richard Franz (tel. (904) 392-1721) or write to Gopher Tortoise Council, Florida State Museum, University of Florida, Gainesville, FL 32611, U.S.A.

*The Conservacion Consejo de Tortuga Grande*. This Consejo is being planned to protect the Bolson Tortoise in Mexico. For further details, write to Dr. R. Bruce Bury, U.S. Fish and Wildlife Service, Denver Wildlife Research Center, 1300 Blue Spruce Drive, Fort Collins, Colorado 80524, U.S.A.

*The North American Tortoise Council*. For further information, write to Dr. R. Bruce Bury (address above).

### REFERENCES

- Brushko, Z.K. & Kubykin, R.A. (1981). Horsfield's tortoise (*Agrionemys horsfieldii* Gray, 1844) and its rational utilization in Kazakhstan. Paper read at the first Herpetological Conference of the Socialist Countries, Budapest 1981. *Vertebrata hungarica*, in press.
- Bury, R.B. (1982). An overview. In North American tortoises: conservation and ecology, v-vii. Bury, R.B. (Ed.). Wildlife Research Report 12. Washington, D.C.: U.S. Department of the Interior Fish and Wildlife Service.



Risch, J.-P. & Lambert, M.R.K. (1981). L'étude et la conservation des chéloniens en Europe: problèmes et perspectives. In *I. Symposium Cheloniologicum Europaeum*, Proceedings of the first European Chelonian Symposium (Nancy, 15-16 May 1980), 44-46. Risch, J.-P. (Ed.). *Bulletin de la Société herpétologique de France*. 19: 2-46.

M.R.K. Lambert

## GRASS SNAKE EGG-LAYING SITE REGISTER

In an attempt to assess the current status of grass snakes in Britain, I am collecting records made in the last five years, of sites where successful egg incubation is known to have occurred. I would be very pleased if anyone who has recorded eggs, or large numbers of young snakes could let me know at the address below, and I will send them recording cards. Also of value are records where the species is known to occur, even if the exact breeding location/s are not known.

Mr. T. Langton, 12 Millfield Lane, Highgate, London, N6. 01-348 3003.

## GREAT CRESTED NEWT RECORDS FROM THE G.L.C. AREAS

I am carrying out a survey of ponds in the Greater London area, in order to assess the distribution of amphibians, particularly *Triturus cristatus*. If anybody has carried out a survey of their local borough, I would be very pleased if they might contact me at the following address: Mr. T. Langton, 12 Millfield Lane, Highgate, London, N6. (01-348 3003).

## IS THE CRESTED (WARTY) NEWT AN ENDANGERED SPECIES?

A national breeding site survey on the crested (warty) newt, a protected species, is currently being undertaken on behalf of the Nature Conservancy Council to provide information as a basis for conservation policy. In Spring 1984 correspondents will be asked for contributions varying from records of sightings to quite detailed pond descriptions, for which questionnaires will be provided.

Further details are available from Mark Nicholson, School of Life Sciences, Leicester Polytechnic, P.O. Box 143, Leicester.

## EUROPEAN CRESTED NEWTS AND THEIR CHROMOSOMES: A STUDY IN EVOLUTION, DEVELOPMENT AND MOLECULAR BIOLOGY

*Abstract of lecture given to the BHS on April 14th 1983.*

There are 9 species of European newt belonging to the genus *Triturus*. These animals are a colourful and long established component of the European freshwater fauna, and they have been the focus of many studies in cytology, development, behaviour, speciation and evolution. About 25 years ago, crested newts (*T. cristatus*) were found to be particularly valuable for the study of the giant "lampbrush" chromosomes that are characteristic of early meiotic prophase in the growing oocytes of most animals. Lampbrushology quickly developed into a major branch of chromosome investigation, with *T. cristatus* at the centre of every programme. Much is now known about the chromosomes of crested newts. One of our most recent findings is of special significance in relation to certain aspects of evolution and development. In both *T. cristatus* and *T. marmoratus* all adult males and females are strikingly heteromorphic throughout the long arm of the longest chromosome in their set. Embryos that are homomorphic for this chromosome arm arrest and die at an early stage in development. The arrangement of DNA sequences in the heteromorphic region is quite extraordinary and provides valuable clues as to the kinds of molecular events that take place in the evolution of chromosome form.

Professor Herbert C. Macgregor, Mrs. Heather Horner and Mr. Simon Sims  
(The Department of Zoology, University of Leicester)

## **DIRECTORY OF COMMERCIAL BREEDING, FARMING AND RANCHING TO INCLUDE WILD AMPHIBIANS AND REPTILES**

Supported by the CITES Secretariat, a survey (to be completed by January 1984) is being carried out on the international status of wildlife farming and ranching.

A directory will result and form a useful basis for decisions on which operations may legitimately trade as farms or ranches under the terms of CITES Resolutions. The survey is, however, to include non-CITES party States and listed species. The work will provide an information source and be of use to conservationists, researchers into the farming/ranching of wild animals, governments, companies and private individuals. The farming of Crocodylia for skins is to be included, for example, but not intensively reared animals e.g. mink.

Information, so far largely limited to literature searches, is required on the existence of farming/ranching operations. Contact is requested with field workers in countries where operations exist; farmers/ranchers of wild animals, their trade associations and dealers who trade in their products; individuals with some knowledge in this field, and sources of obscurely published or unpublished information.

BHS members who can help in any way are asked to make contact with: Mr. Jonathan Barzdo, Consultant, Wildlife Trade Monitoring Unit, IUCN Conservation Monitoring Centre, 219(c) Huntingdon Road, Cambridge, CB3 0DL. Tel: (0223) 277427.

*The following two items are reprinted from the Marine Turtle Newsletter with kind permission of the Editor.*

### **CAYMAN TURTLE FARM SOLD**

The Cayman Turtle Farm has been sold for about \$1.5 million (U.S.A.) to the government of the Cayman Islands. It is believed that the main reason for the sale is that the previous owners, Dr. Heinz Mittag and Dr. Judith Mittag, wished to reduce their commitments and responsibilities. They were also disenchanted with the lack of support from the conservation community for what they considered an imaginative and valid combination of conservation and commerce.

Nicholas Mrosovsky

### **REPORT FROM BOTSWANA**

Botswana is a nation without coastlines, without sea turtles. But decisions taken there at the 4th meeting of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), held in Gaborone 19-30 April, were important for the conservation of turtles. There were proposals from France and from Suriname to permit products from ranched turtles to enter into international trade; technically this can be done by moving a particular population of a species from Appendix I to Appendix II of the convention. There was also a resolution on the captive breeding of long-maturing species; this had implications for the Cayman Turtle Farm.

**Ranching proposal from France for the Réunion turtle ranch.** Many green turtles nest on Tromelin and Europa. These islands in the Indian Ocean are part of France so that selling turtle products in Paris or Marseille is not a matter for CITES. However to export to other CITES countries it would first be necessary to have the ranching proposal approved.

At the Botswana meeting it was pointed out that only in the order of 2% of the hatchlings were taken for the ranch and that these were anyhow from daylight emergences liable to heavy natural predation. Other hatchlings emerging by day were saved from predators and released at night. In addition adult females that had become wedged in among rocks as the tide receded were extracted and returned to the sea and so saved from overheating. Nevertheless the proposal ran into opposition: the hatchlings released at night might not survive and there might be an irresistible temptation to release only the weaker smaller turtles and retain the robust ones for the ranch. More telling was that the proposal was not well supported by the presentation of

scientific data. Although population estimates in these areas had been made, the full results were not readily available for scrutiny. Also the reports of a scientific mission to Réunion Island, carried out by Servan, Fretey and Bonnet in 1982, had not been made available to the CITES secretariat. Evidently this report had been presented in 2 parts because members could not agree.

Taking note of these criticisms, France withdrew the proposal at the committee stage, so that it never went to the plenary sessions for a formal vote. It is expected that a revised proposal will be submitted at the next CITES meeting (1985). Members of the French delegation expressed the desire for cooperation with the international scientific and conservation community.

**Suriname ranching proposal.** This was better received than the French proposal. The number of turtle nests in Suriname has been monitored for 15 years, poaching over this period has been minimal, much data has been published, the population of green turtles is holding level or possibly increasing slightly, and the existence of doomed eggs (eggs destroyed by high tides) is accepted as a real phenomenon (see Dutton & Whitmore, 1983, *Marine Turtle Newsletter* 24, 8-10). However the proposal did not explain how products from the ranch were to be marked in a distinguishable way. Unfortunately the Suriname delegation was not present to clarify the matter. Recalling that Suriname had tried to have its turtle ranch sanctioned in 1979 at the Costa Rica CITES meeting, and had been partly responsible for the adoption of criteria for ranching operations at the 1981 New Delhi meeting, some people feared that repeatedly turning down the Surinamese might be detrimental to conservation of its sea turtles. A small country with need for foreign exchange should be able to benefit from conservation of its resources, otherwise its programme might collapse. There was some discussion of whether sale of eggs within Suriname was sufficient or not to support the costs of the turtle programme. Some present hoped that money could be found to assist the Surinamese till a more fully thought through marking system was proposed.

After this debate in the committee stage, the matter was referred to the plenary sessions for voting. The problem of a drain on the Surinamese green turtles resulting from incidental catch by shrimping trawlers was raised. Others felt this was not relevant to CITES which was concerned with threats from trade. Only a small percentage of the eggs in Suriname went to the ranch. It was suggested that the Surinamese ranch should be considered in the context of the much larger trade in turtle products, some of it by CITES nations. Many nations praised the conservation achievements of Suriname. The UK introduced a motion that the Surinamese proposal be supported, except for the part on marking of the products. The UK recommended that Suriname should submit a full description of marking methods to the Technical Committee. They would comment on this and the complete proposal would then be submitted to a postal vote. The UK's suggestion was carried, 43 in favour, 3 against.

**Ranching in general.** Some further points on ranching emerged from the Botswana conference. Transfer of a population or species from Appendix I to II for ranching is harder than transfer for other reasons. This is because of strict ranching criteria drawn up at the New Delhi meeting. It is somewhat paradoxical that if populations of a particular species become abundant in one area and are transferred from Appendix I to II for culling, a less extensive set of criteria have to be met than if the population is transferred for ranching. Nevertheless the Botswana CITES meeting broke new ground in that at least one ranching proposal was approved. The Zimbabwe crocodile ranching proposal was applauded by delegates. So there is now both a model and a precedent for ranching under CITES.

**Captive Breeding of long-maturing species.** A UK draft resolution proposed that national CITES management authorities should be able to permit trade from captive breeding operations when the species concerned took 3 or more years to reach sexual maturity. Basically this proposal was a way of circumventing the resolution on the definition of "bred in captivity" that had been adopted in 1979. That resolution had said that trade would be acceptable only if the captive breeding stock was "managed in a manner which has been demonstrated to be capable of reliably producing second-generation offspring in a controlled environment". Although the Cayman Turtle Farm was not specifically mentioned in the 1979 recommendations, or in the Botswana draft resolution, it was widely recognized that the wording of both documents had been influenced by its existence. At Botswana delegates from many different nations opposed any changes in the definition of bred in captivity which had been so laboriously arrived at in Costa Rica. The Federal Republic of Germany's arguments on this point were particularly

cogent and greeted with applause. Nevertheless, Germany pointed out that there still was an unresolved problem about long-maturing species. The decision of the plenary session was to refer these problems to the Technical Committee for further discussions.

Afterwards "pro-farming" groups were despondent, and some felt that they had been ill-advised to adopt the strategy of trying to circumvent the "bred in captivity" definition. Rather it would have been better to stress the retrospective nature of the definition. The Cayman Turtle Farm, and its predecessor Mariculture Ltd., were established before CITES.

"Anti-farming" groups were pleased and there is no doubt that the decision poses difficulties for the Cayman Turtle Farm and its new owners, the Cayman Government (see above). The farm is a major tourist attraction; even if only a small percentage of the visitors stay an extra day on the Cayman Islands to visit the farm, it generates considerable income. However, without markets, and some surplus stock on hand, to keep the enterprise going is a financial strain. Various options are being considered. At one end of the continuum is bulldozing the tanks and selling the land for real estate. That would leave the problem of what to do with the present stock, including the Kemp's ridleys (see Wood, 1982, *Marine Turtle Newsletter* 20, 7-9). At the other end of the continuum would be to persist and take a long term view: although second generation animals have not been produced yet, given the long maturation period they could only be expected in the mid 1980s. Even if second generation turtles were produced, it is anticipated that a battle could develop over what is meant by "reliably producing" such offspring. Various in between options are being considered.

I have tried to report the main decisions and views expressed at the Botswana CITES meeting rather than to evaluate whether they assisted or set back conservation of sea turtles. In the case of the Suriname proposal, that would be especially difficult because of the evolving political situation there and the possibility that their conservation policies may alter. Flexibility by decision makers may be appropriate.

Nicholas Mrosovsky

## THE BRITISH HERPETOLOGICAL SOCIETY — A REMINISCENCE

DERYK FRAZER

I became a member of the Society a few months after it was founded. Founder members included a very strong body of naturalists and scientists — not only Malcolm Smith himself. Those who are still with us include Dr. L. Harrison Matthews, F.R.S., and Dr. Maxwell Savage, both of whose names will be familiar to members. There were also H.W. Parker (from the Natural History Museum), Louis Lantz, Professor Jack Haldane, Maxwell Knight (an early broadcaster and writer on wildlife), Oliver Hook (a very fine amateur naturalist) and Jack Lester (Curator of Reptiles at the London Zoo). J.D. Romer had agreed to become the first Secretary of the Society, but then accepted a post in Hong Kong, so gave place to Alfred Leutscher (who was then at the Museum). We found that Gerald Leighton, whose books on British Lizards and British Serpents were 40 years old, was still alive and he became our first honorary member.

When the Society was formed, our herpetological knowledge was scanty: both field and laboratory techniques were still in a primitive state. Malcolm Smith's book was not published until three or four years later, and it was appropriate that the first number of the journal comprised Colonel Taylor's paper on the distribution of species in the British Isles. Much of our information was passed on by word of mouth — meetings were held quarterly, at the London Zoo on Saturday afternoons, usually with one or more speakers on a set theme, and were followed by a visit to the Reptile House, and especially to Jack Lester's private quarters there, where he cared for a number of species which were not normally considered easy to keep in captivity. In this he was helped by his secretary, Margaret Southwick. It was here that I first met David Attenborough before his first Zoo Quest expedition with Jack, and also Gerald Durrell before his first collecting trip to Africa.

At this time, parties of members used to go to see the Edible Frogs at Ham gravel pits and the Marsh Frogs in Romney Marsh. One particular group which contained Malcolm Smith, Max Knight, Jack Lester and Dr. (later Professor) E.C. Amoroso, used to have an annual trip to the Marsh to see how the frogs were getting on, which so far as I can gather was a glorified pubcrawl in which Marsh Frogs were included. One or two other expeditions were laid on by the coachload — I went on one to the New Forest, organised by Oliver Hook and led by one of the keepers who I believe was a brother of Alfred Leutscher. The weather was cloudy and dull, and three of us

decided that thirty-plus people under these conditions were not likely to see many reptiles, so we went off on our own: at least we found three adders in different spots on the lee sides of bushes. But we had a long wait at the rendezvous for tea, since despite their guide the others had found themselves on the wrong side of a small river. They had seen a buzzard, but no reptiles.

Malcolm Smith was the driving force behind the Society. His obituaries in the Journal portray the man and his part to perfection. He was already aged 72 when he became our founding president, but his years sat lightly on him. When I went to the Channel Isles and sought his help over the species there, commenting that I could find no paper on them, he firmly instructed me to write it myself. He once told me that Jack Lester seldom had time to put his mass of knowledge on paper, so that when Jack told him something new, he would himself send it to the Journal over Jack's name.

In our search for knowledge, we sent out questionnaires on the first date of appearance of frog and toad spawn, seeking details also about the weather, ponds, depth of water, etc. This was done for three or four years. For my sins I was left to cope with the sending out of the forms and their collection and collation. I soon learnt that for every hundred people approached, only about a dozen would reply: one member who particularly asked for 25 forms never returned a single one. But if one later spoke personally to people and suggested that they could surely provide the facts, they'd invariably say "Oh, is that all you want?" and fill in the form. Yet I'd only repeated what I'd said (or written) when they originally took the form .....

Wartime controls were still active in the early years, and animals could not be imported without a licence from the Board of Trade. To help members import foreign stock, the Society itself held such a licence. As travel improved, members made their own efforts — I remember Angus Bellairs arriving unexpectedly in my flat with a collection of amphisbaenids that he'd just brought from North Africa, letting them wander about, on the bathroom floor. An Austrian physiologist, Franz Wohlzogen, came over and worked with me for a year, when we managed to import giant toads from South America through the help of the British Council. These were said to be *Bufo marinus* but eventually my suspicions were aroused and I went to the British Museum to check whether or not they might be *Bufo arenarum*, but the experts there had no knowledge of any species of that name. Eventually we found a bottle containing toads identical with mine, labelled as *marinus*, but with this crossed out and *arenarum* substituted — in handwriting which was recognised as that of a South American herpetologist who had spent some time there, a few months earlier. We were carrying out human pregnancy tests with these toads, using the technique developed in South America and amending this to use our *B. bufo* instead. When comparing the results in these on other tests of human pregnancy, I first became aware of the work of Dr. Edward Elkan in the breeding and maintenance of *Xenopus* at Shrodells Hospital. You will be aware how this has since led him to a vast variety of research on diseases of both amphibians and reptiles.

Both London and Northern Groups of the Society were formed, the Northern one disappearing after a few months; while the London one, meeting monthly at the Linnean Society, found its meetings eventually superseding those of the Society which were held less frequently at the Zoo. At one of the London Group meetings, a member was taking round a Gila Monster and demonstrating its mouth when he got bitten. Fortunately the creature didn't have time to chew, and in fact I now think that probably no poison was injected. As a precaution we took the victim to hospital, via the Zoo library, where the officer on call (a BHS member) had been alerted and looked up the Gila Monster bite in the only two appropriate books that he could find — one said that the bite was always fatal and the other that it never was. After that, I had an interesting time telling the hospital's duty officer that her patient had been bitten by a venomous lizard and passing on any other advice that I could.

Older members started to disappear: Malcolm Smith had died in 1958 and Jack Lester in 1956, unexpectedly early, after his second Zoo Quest with David Attenborough in South America. At Max Knight's suggestion, the Society hired the Festival Hall for a programme in his memory, where the speakers were Max himself, David Attenborough and Peter Scott. Part of the proceeds were used to put up the bronze plate which you can see in the entrance to the Reptile House.

Let me stress again that in these early days our herpetological techniques were still in a very primitive state. In the laboratory we had not developed chromatography, the use of



posome squashes, dark ground microscopy and the electron microscope, which were only arriving, as was the use of the sound spectrogram for analysing the calls of amphibia.

He took up a few aspects of herpetology. I remember a scientific meeting of the Zoological Society, where their secretary Lord Chaplin gave a paper on the European and Mediterranean frogs (i.e. *Hyla arborea*, *meridionalis* and *savignyi*) where he covered their distribution and viable areas of origin, appearance — including differences in profile of nose and mouth which can only be seen in living individuals, and recordings of the mating calls. His conclusions were inescapable, that they were two distinct species, one of which was separated into two species. One learned zoologist then rose to his feet and said that he was not prepared to accept because you could not distinguish dead individuals from one another ..... Nowadays we have the added weapons of sound spectrogram, chromosome picture and the results of hybridisation, for a start.

At the changes since Colonel Taylor published his two sets of distribution maps of the British herptiles. Just over twenty years ago, the Botanical Society of the British Isles published distribution maps of our flora, and it was subsequently decided to transfer the editor and his office to Monks Wood, rather than lose a very useful team. The outcome has been the British Biological Records Centre, with its countryside network for gathering the basic information and a power to produce an instant printout for any species at will.

Now, let me consider fieldwork in herpetology. Before the BHS was formed, this was mainly national, though at an early date there was collation of breeding records of amphibians (usually the earliest frogspawn seen in each area) among the annual phenological reports published by the Royal Meteorological Society: in these they also collected the dates of first flight of migratory birds and certain butterflies, with first flowering of plants. The first fuller survey was that of Maxwell Savage carried out on the frog in the 1930s, in an area now overrun by the urban sprawl of London. The BHS recording scheme produced some data on requirements for breeding: its results have recently been surveyed by Arnold Cooke. Maxwell Savage combined the data from the Royal Meteorological Society phenological reports with his findings in the field and in captivity, so that he covered the ecology of the frog. A few of us, including the late H.J. Moore and Keith Neal, were inspired by the then lack of knowledge to start breeding colonies of toads, while the data about toads breeding 15 feet deep in the mire were resurrected as a result of seeing a chance published remark about the perch there.

The first major fieldwork in Britain on the Adder was by Ian Prestt, who carried it out while he was working in Dorset for the Nature Conservancy. The data obtained at that time (over 20 years on other species, notably the grass snake, still await publication).

In the late 1950s, there was a rise in the number of candidates working for higher degrees in zoology and ecology, with an increase in the funds available to subsidise this work. As a result, research in the field and laboratory has now covered most of our native species — only aliens such as the Midwife Toad, the Water Frogs, Green Treefrog and Wall Lizard remain ignored. More recently still, the Wildlife and Countryside Act has stimulated research based on the need to have accurate knowledge which is up-to-date on the current status of our British species and their habits. On the laboratory side we can already see the major work undertaken by the Captive Breeding Committee.

Dr. J.F.D. Frazer was BHS President for 26 years, succeeding Dr. Malcolm Smith in 1976. This article is based on the talk given by Dr. Frazer at the meeting held in honour of the late Dr. Howard Elkan on 14th September 1982 and organised by Mr. J.E. Cooper, MRCVS at the College of Surgeons of England, London.

## FUTURE ROLE OF THE BHS IN THE COMMONWEALTH

EARL OF CRANBROOK (President) and M.R.K. LAMBERT (Chairman)

Since being founded in 1947, the British Herpetological Society (BHS) has had to establish itself as a national society in the U.K. The Society has also quite rightly had a heavy commitment to the conservation of the three rarest of Britain's four endangered species of herpetofauna and

their habitats (since being recognised as a serious matter in 1969) in liaison with the U.K. Government's Statutory Body, the Nature Conservancy Council. The Natterjack, Sand Lizard and Smooth Snake became protected through the 1975 Wild Creatures and Wild Plants Act, and the Crested Newt through the superceding 1981 Wildlife and Countryside Act. This latter Act also partly supercedes the 1978 Endangered Species (Import and Export) Act, which constituted the U.K.'s ratification of the 1973 Washington Convention on Trade in Endangered Species of Wild Fauna and Flora (CITES), and hence the importance of the captive breeding of exotic species in Britain and elsewhere. Fortunately, all four of Britain's endangered species, together with eight other indigenous species, occur also on the Continent of Europe (a further three occur on the Channel Islands — offshore islands of Normandy in France). Biogeographically, Britain and Ireland are offshore NW European islands, and, indeed, so effectively has conservation work been carried out in Britain that the experience is being put to use on the continental mainland. A founding member of the BHS Conservation Committee, Keith Corbett, has become Chairman of the Conservation Committee (founded 1981) of *Societas Europaea Herpetologica*, formed in 1979 and officially registered in Bonn, F.R. of Germany.

Given the pace of events in Britain and Europe, it is perhaps not surprising that herpetological activity in other countries of the Commonwealth, Crown Colonies and Associated States (listed in full in *Whitaker's Almanack*) have been somewhat neglected by the BHS in recent years. This is unfortunate, considering the richness and diversity of the herpetofauna, especially of the tropical member states, and of the former connections of the BHS with the tropics through its founding President, Dr. Malcolm Smith.

In his personal capacity, for much of his professional career he was Medical Officer with the British Legation in Bangkok, Malcolm Smith also served as Consulting Physician to the Court of Siam. In *Country Life*, in 1947, he later described his experiences, which represented a phase in the life of the Siamese Court that afterwards was popularised by the musical comedy, 'The King and I'. In 1913, Malcolm Smith co-founded the Natural History Society of Siam, subsequently editing its *Journal* (in which he wrote papers on the herpetofauna of Siam, Burma and the Malay Peninsula), and becoming President in 1922. This Society, formed 34 years earlier in a part of the tropical world far from Britain, can perhaps be recognised as the precursor of the British Herpetological Society! Returning to England in 1925 at the age of 50, Malcolm Smith devoted the rest of his life to herpetology. Perhaps his most significant contributions were the reptile volumes I-III (1931-'35 and '43) in the *Fauna of British India, including Ceylon and Burma* (published by Taylor & Francis, London) and subsequently the standard textbook on the British herpetofauna *The British Amphibians and Reptiles* (1951). The BHS's immediate past President, Dr. J.F.D. Frazer, who succeeded Malcolm Smith in 1955, has just rewritten (1983) Malcolm Smith's book in the Collins' New Naturalist Series. For further details about Malcolm Smith's work, see *British Journal of Herpetology* 2: 136-142 and 186-187 (an Appreciation by HRH Prince Chula of Thailand).

At the personal level, many present BHS members have well established professional connections with tropical countries of the Commonwealth. For instance Dr. H.R. Bustard, Prof. J.L. Cloudsley-Thompson and Dr. I.R. Swingland. The current President, Lord Cranbrook, has worked in the Malaysian rain forests with Miss A.G.C. Grandison of the Amphibian and Reptile Section in the British Museum (Natural History), and with A.G. Marshall (University of Aberdeen) in the islands of Vanuatu, SW Pacific (Medway and Marshall, 1975), and the Chairman, M.R.K. Lambert, in eastern Africa.

In a recent Keynote Address to the Royal Society of Arts, the Science Adviser, Commonwealth Secretariat, stressed the continued importance of the expertise of the industrialised, former metropolitan nations to the developing, former colonies. He said (Furtado, 1983) "The United Kingdom has the capacity to man and develop international environmental and natural resources programmes, as demonstrated by professional scientists in the International Biological Programme. It is ten years since this Programme terminated, and it is perhaps timely to consider new ventures in research and development, particularly pertaining to environmental and natural resources management."

In a discussion of the United Kingdom response to the World Conservation Strategy, Sandbrook (1983a) has emphasised ways in which the special relationships involved with



common membership of the Commonwealth can facilitate scientific and technical exchange. He wrote: "The Commonwealth can and should become a major focus for the technical assistance effort called for by the Strategy ..... Fundamental to the argument is the Commonwealth's demonstrated ability rapidly to mount truly expert multinational groups to advise on particularly urgent problems and their sustained ability to transfer expertise within a framework of 'informality, frankness and trust' ". At the Royal Society of Arts' conference on technical assistance overseas and the environment held in London on 16 November 1982, Sandbrook (1983b) developed these ideas, again stressing the Commonwealth as an appropriate framework for the U.K. contribution.

In the larger Commonwealth countries, such as Australia, New Zealand, Canada and India, there are now well established centres of excellence for herpetological studies, and strong local societies to support amateur initiatives. The situation is less satisfactory in other Commonwealth Countries and Crown Colonies, especially those in the tropics. In some countries, no more than one or two experienced herpetologists carry the entire burden of research and training. In others, herpetological science has developed no further than the reports on collections of individual specialists on field trips (often of expatriate researchers from Britain, continental Europe or North America). In these countries, the vast potential of herpetology as a biological discipline remains untapped. The range and variety of adaptations of the herpetofauna to the tropical environment remains scarcely known. Most importantly, the scale and seriousness of environmental impacts of development, impinging on the often unique and invariably interesting herpetofauna (themselves usually indicator species of habitat condition!), remain totally unconsidered in official thinking in most tropical Commonwealth nations.

The BHS should resolve to play a positive role in the transfer of expertise from U.K. to tropical countries, through the medium of the Commonwealth. The BHS should develop and strengthen ties with herpetologists in the Commonwealth and British Crown Colonies, including developing countries, with the aim of raising the level of activity and encouraging the herpetological community as a whole to become more involved. Through the common medium of the English language, the *British Journal of Herpetology* (for original research papers) and the *BHS Bulletin* (for more general accounts of interest) are immediately accessible to all Commonwealth nationals. The BHS is already equipped to make a distinctive contribution; it is to be hoped that the members will respond.

Thanks are due to Prof. J.D.R.I. Furtado, Science Adviser to the Commonwealth Secretariat, for reading an original draft of this article. In doing so (7.ix.1983), he added that "science knows no national boundaries and hence the responsibility of scientists is international. Societies like the BHS can do much to strengthen scientific capability in the Commonwealth, as they have done so in the past."

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## THE STATUS OF THE COMMONER AMPHIBIANS AND REPTILES IN BRITAIN

In 1982 the Nature Conservancy Council undertook an enquiry in which members participated. The aims were to determine (i) status of each of the nine "commoner" species of amphibians and reptiles, (ii) recent changes in status and (iii) reasons for changes in status. A 50 page report has been published and has been sent to all contributors. Copies of the report can be purchased from the Interpretative Branch of NCC, Attingham Park, Shrewsbury for £3.50 (this price includes postage and packing). The conclusions of the enquiry are as follows.

Among the amphibians, the warty newt is the least common species and suffered the most serious decreases in the 1970s. The larger breeding sites favoured by this species are frequently lost to development of various types, and the warty newt appears not so well adapted as other amphibians, such as the smooth newt or common frog, to take advantage of the creation of garden ponds. The other amphibians experienced loss of traditional breeding sites throughout the period under review, but such losses were compensated to varying degrees by newly-created garden ponds. The frog benefited greatly from this garden conservation and in many areas is now more numerous in suburbia rather than in rural habitats. Overall the level of the British frog population probably changed little during the 1970s. But while the decline in the frog population appears to have been halted, the previous decade or two had seen a marked decrease in frogs, especially in areas of high human population density. There is therefore room for improvement, especially in heavily populated areas, which hopefully will benefit most from the creation of garden ponds followed by the deliberate or unintentional conservation of amphibians. The other three amphibian species have experienced fortunes between the extremes noted for the warty newt and the frog, depending largely on the relative influences of habitat loss and garden conservation. The more rural palmate newt has felt the influence of both factors less than the smooth newt and the common toad. Although these three species may be decreasing less than in the late 1960s, they are nevertheless still suffering some declines.

The four reptile species all decreased in the 1970s as a consequence of loss of suitable habitat. This was most severe in the south east of England and became progressively less serious moving north or west. There has so far been little active conservation aimed at these species, although they will have profited from the establishment of various types of reserves, eg National Nature Reserves on heathland.

Arnold Cooke

## A REVIEW OF HERPETOLOGY IN NEW ZEALAND

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New Zealand is not blessed with the wealth of herptiles that its close neighbour, Australia, can boast. Instead it possesses a small number of endemic lizards, frogs and the tuatara, many of which are very unique in their biology, indicating the extent of the isolation this country has experienced.

The fauna consists of three species of native frog, three species of introduced frog, the tuatara, about eighteen species of native skinks and a similar number of native geckos. There are also a small number of exotic lizards that have become established with varying success. This article will deal mainly with the native lizards as the native frogs and tuatara are justifiably protected beyond the reach of the amateur herpetologist.

Despite the low number of species, New Zealand herpetology, and especially taxonomy, has followed a slow but chaotic road since its inception in the early nineteenth century. The discovery of a group of islands containing a multitude of ecosystems, most with a series of unique plants and animals, provided an open invitation to a plethora of scientists to catalogue these species.

The problems arose because most of these scientific pioneers were working independently of the others, each producing names and descriptions for the same species. This has been further

confounded by type specimens being housed in overseas institutions, often unattainable to New Zealand taxonomists. Locality records were often vague, some types were often labelled as "New Zealand", with no further details on the capture site. Consequently taxonomical herpetology in New Zealand has passed through a state of immense disorder and confusion until the last thirty years.

Charles McCann initiated the new interest in native herpetology with his vast work published in 1955. This paper categorised the New Zealand skinks and geckos sufficiently accurately to provide a base-work for the scientific studies carried out over the next twenty-five years.

It was during the last quarter century that New Zealand herpetology came of age. High quality works on ecology, physiology, genetics, anatomy, behaviour, biogeography and of course taxonomy have been produced using native lizards as their subjects. Some of the more important of these are listed in the bibliography at the end of this article.

Undoubtedly the highlight of this renewed concern was the Herpetological Symposium held in Wellington in 1980. Here New Zealand and overseas scientists gathered to give papers and to discuss numerous aspects of the tuatara, native and introduced frogs and native lizards (Newman, 1982).

This blossoming also launched the amateur herpetologist. The New Zealand Herpetological Society was formed in Wellington in 1969 by a group of scientists and hobbyists. This was followed by the birth of an Auckland branch in 1971. Unfortunately a difference in outlook between members of the Wellington group caused the dissolution of the Society's headquarters and its transfer to Auckland in 1974. Since that time the Society has passed through a purely pet-keeping club to its current maturity of a fine balance between scientific research and the hobbyist.

The scientific side of the Society's work has been greatly enhanced by a close liaison with the Ecology Division of the Department of Scientific and Industrial Research, the Universities and more especially the Wildlife Service. Thanks to the cooperation of Don Newman and, more recently, Dave Towns, both scientists with the Wildlife Service, the N.Z.H.S. has participated in several research programmes. The first of these was a trip to Lady Alice Island, off the north-east coast of the North Island of New Zealand in December 1980. On this trip a study of the tuatara was initiated and some lizard surveys were carried out (Porter, 1981 & 1982).

More recently a long term joint project has been started concerning the status of the skink *Leiopisma homolanotum* on its sole refuge, Great Barrier Island. The N.Z.H.S. side of this project being coordinated by John West. Little is known about this species so the aim is to collect as much basic biological information as possible to ensure a realistic and efficient conservation strategy can be implemented. On a trip to the northern block of the island in January 1983 the Wildlife Service and N.Z.H.S. participants succeeded in finding further specimens of the skink and also produced new locality records for two other species.

Future projects include long term joint surveys of several Auckland sites in conjunction with the Ornithological, Entomological and Forest and Bird Societies. Here many aspects of the biology of a single area will be examined over a period of three to five years.

A further step forward for the N.Z.H.S. was made in 1978 when the Society became a member of the Australasian Affiliation of Herpetological Societies. This involves close contact with societies across the Tasman Sea including exchange of literature and receipt of the A.A.H.S. came in 1981 when the convention was held in Auckland. This included a series of papers on Australian and New Zealand herpetology as well as the usual affiliation business. Australian and local members alike were then treated to a rare glimpse of the tuatara in its natural habitat thanks to the help of the Wildlife Service in organising the field trip. Members are now looking forward to the next convention to be held in Sydney, Australia in August 1984.

New Zealand herpetology is currently in a much brighter situation than even five years ago. A national awareness of how important these small, inconspicuous animals are has grown, especially since the introduction of protective legislation which covers all but four of the endemic lizards. Although the government departments are doing all they can to increase our herpetological knowledge, understaffing and a low level of financial support means progress is

still slow. However, the rise of the amateur and his enthusiasm to become involved in serious scientific research could indicate that the future for New Zealand's herptiles will continue to improve so its unusual and beautiful subjects will be preserved for future generations.

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## HERPETOLOGY IN INDIA

ROMULUS & ZAI WHITAKER

*Madras Snake Park and Madras Crocodile Bank Trust, Raj Bhavan P.O., Madras-600 022, India*

### INTRODUCTION

Herpetology has always ranked a poor fourth or fifth in natural history interests in India. Since the days of Frank Wall and Malcolm Smith in the early part of this century, amazingly little has been added to our knowledge of Indian herpetology. However the last few years has seen an upsurge in herpetological work: laboratory, ecological and captive breeding. This paper summarizes activities in this field over the past decade. Where data is available, information on other countries of the sub-continent is included.

### ORGANIZATIONS

The Zoological Survey of India (ZSI) (founded in 1916) is the Government's official agency for herpetological studies, survey and collection. It functions under the new Department of Environment in the Ministry of Science and Technology and publishes the prestigious records of the Zoological Survey of India and Bulletin of the ZSI. Based in Calcutta, ZSI has a network of substations throughout the country. ZSI herpetologists (see Table 1) are active mainly in the fields of survey and taxonomy. Since 1970 twelve amphibians and two snakes new to science have been described and surveys in endangered habitats such as Silent Valley in Kerala have been undertaken. ZSI is the Government's Scientific Authority under the Convention on International Trade in Endangered Species (CITES). The ZSI maintains one of the two large collections of preserved material in India.

The National Museum of Natural History in New Delhi which also functions under the Department of Environment and was started in the mid-1970's is in the process of organizing its own herpetological collection and staff.

The Bombay Natural History Society (BNHS) which was founded in 1883 is involved mainly in ornithological work but has a full-time herpetologist, a significant preserved collection and the Journal's "Miscellaneous Notes" invariably contain something on reptiles and amphibians. A majority of publications on Indian herpetology (including most of Frank Wall's work) have appeared in the Journal of the Bombay Natural History Society. The Curator is shortly publishing an illustrated book on reptiles and the Society is engaged in an important project to assess the implications of India's massive frog leg industry (an estimated 70 million frogs were killed in 1981).

The Madras Snake Park Trust (MSPT), is a private reptile research and public education centre. Since 1970 when World Wildlife Fund-India provided seed money to establish it, the Trustees initiated important surveys and conservation programmes for endangered reptiles. Initial crocodile and gharial surveys in 1972 and 1973 helped instigate the Government of India to start the well known crocodile project. Sea turtle surveys, a hatchery and head starting begun by the Trust has evolved into an extensive government effort to conserve sea turtles. Pythons captive bred at the park are being released in protected forests. A sister project of the MSPT, the Madras Crocodile Bank Trust (MCBT) has supplied 500 captive bred young mugger (*Crocodylus palustris*) to State run crocodile rehabilitation projects since its beginning in 1975. The Crocodile Bank has a freshwater turtle breeding programme with 21 species and is now internationalizing its scope to establish groups of crocodilians from other parts of the world. Besides indoctrinating the million and a half annual visitors to the Snake Park and Crocodile Bank, MSPT staff publish popular and scientific articles, have helped make several reptile films, give lectures and demonstrations throughout the country and have produced a field guide to snakes: "Common Snakes of India". The Trust publishes a newsletter "Hamadryad", maintains a reference collection of preserved specimens and has an extensive herpetological library. MSPT is the office of the Chairman of the Snake Specialist Group of the IUCN which held its first meeting in November, 1982.

The Central Crocodile Breeding and Management Training Institute in Hyderabad is the first government agency concerned solely with reptile conservation and management. It was set up with FAO/UNDP assistance and its main function is to train Forest Department personnel. Nearby, in the Nehru Zoological Park, hundreds of gharial (*Gavialis gangeticus*) and mugger are reared for release. Uttar Pradesh, Madhya Pradesh, Orissa, Bengal, Tamil Nadu and the Andamans also have crocodile rearing projects. Another Government project, to study and conserve the Pacific Ridley sea turtle (*Lepidochelys olivacea*) is based at Gahirmatha beach in Orissa where one of the world's largest mass nestings (arribada) takes place each February (300,000 nested in 3 nights on 8 kilometers of beach in February 1983).

Herpetology at the University level is disappointingly scarce; there are till now less than 10 Indians with herpetological Ph.D's. Snake chromosome work has been done at Calcutta University, studies on diurnal rhythm of lizards at Tirupati and some work on physiology in the past at Varanasi Hindu University, and significant amphibian studies at Utkal University, Orissa. Zoology professors sometimes assign herpetological projects to undergraduates but as choices of studies are oriented to the very sparse job market it is not surprising that interest in this field is highly exceptional.

World Wildlife Fund-India has been deeply involved with reptile conservation since its beginning. They have produced a slide programme on snakes and sponsored surveys of endangered reptiles, and educational snake exhibitions around the country.

The Calcutta Snake Park, Sundarvan at Ahmedabad and the reptile sections of several Indian zoos such as: Nandankannan Biological Park in Orissa, Trivandrum Zoo, Ahmedabad Zoo, Delhi Zoo and Hyderabad Zoo educate millions of visitors with their reptile displays. Only Sundarvan has an educational programme and reptile care and housing have definite problems at some zoos. The Department of Environment is being urged to address zoo improvement to develop them more specifically as educational tools and captive breeding centers.

The Central Government's Department of Environment has a Director of Wildlife in New Delhi who has four regional Asst. Directors each with a small staff in Delhi, Calcutta, Bombay and Madras. They work together with the Wildlife Wing of the State Forest Department to enforce the Wildlife Act. Many herpetological infringements go undetected though an occasional seizure of several thousand skins is made. In most areas of crocodile occurrence (except the Andamans) protection is effective and the gharial and mugger in particular are making a dramatic comeback.

#### Foreign inputs:

A number of eminent herpetologists from other countries have come and worked on herpetology of the Indian subcontinent since the 1960's including: 1. Sherman A. Minton (Pakistan) — checklist and key; 2. Carl Gans (India, Sri Lanka) — uropeltids; 3. Robert Bustard (India) — crocodilians, sea turtles; 4. Walter Auffenberg (India) — monitors; 5. Yoshio Sawai (India, Sri Lanka, Burma) — snakebite; 6. Robert Inger (India) — museums, Kerala rain forest; 7. Edward O. Moll (India) — freshwater turtles.

### AMATEUR HERPETOLOGY

Amateur herpetology is practically non-existent. Though the occasional tortoise is a long term household pet, parental stigmas about reptiles (even geckos and skinks are considered poisonous) are probably the main reason for the lack of amateur involvement. The lack of illustrated guides to the reptiles and amphibians also detracts from potential amateur interest. Madras Snake Park Trust has a "volunteer" programme that has helped several students accumulate data and experience for further academic or vocational work. At present two of these young herpetologists are employed fulltime, one (J. Vijaya) on captive breeding and field studies of freshwater turtles and the other (Shekar Dattatri) on captive breeding and field surveys of two taxa under pressure, the python (*Python molurus*) and king cobra (*Ophiophagus hannah*).

Because of public and religious interest in snakes, several men have been setting up displays in various parts of the country in which they sit in a room full of snakes for weeks at a time. Advertised as "yagnas" (religious experience) they attract lucrative crowds but end up with hundreds of starved snakes. Two of these showmen have died from snakebite in the last two years; the wildlife authorities have now banned yagnas in many states.



## TRIBALS AND COMMERCIAL HERPETOLOGY

Tribal people such as the Irulas of Tamil Nadu have long been the main suppliers of a wasteful reptile skin export trade which though now banned, still flourishes illegally in some areas, notably Madras and Calcutta. Thousands of snake catchers thus now have no legitimate cash income, and being nomadic tribals, no crops. The Irula Snake-catchers Cooperative Society was established in 1978 and now with Government permission, Irula tribals catch 5000 snakes per year, extract venom and release them back to the wild. This sustained use of snakes for a valuable resource is the kind of self-help economically deprived tribals need. They are highly skilled snake-catchers, and indeed had their own comprehensive reptile taxonomy long before our Linnean classification. The Cooperative is busy collecting data on scat contents from hundreds of snakes and is beginning to accumulate recapture data on the marked, released snakes.

Tribals also account for the killing of perhaps 70 million frogs per year for the frog leg export trade, most to the United States. Moves to regulate the industry (which earned India US \$12,000,000 in 1981) have been only partly successful while workers at BNHS and Utkal University in Orissa have undertaken studies on factors affecting frog survival and their ecological value.

## SNAKEBITE

In 1972 the senior author was associated with a snakebite survey undertaken by Dr. Yoshio Sawai of the Japan Snake Center. The results provided the first reliable statistics on snakebite and mortality (Sawai and Honma, *The Snake*, 1976). Haffkine Institute, Bombay is the main producer of antivenom serum in the country but deaths from snakebite remain high (about 10,000 per year) because of lack of adequate distribution and publicity. Village people believe in old folk remedies (usually herbs and chanting) which date from pre-antivenom days, and usually come to hospital when all else fails (and the unfortunate patient may be beyond recovery).

Workers at the Safdarjang Hospital in New Delhi have done pioneering research on use of other drugs like neostigmine in snakebite treatment. A snakebite symposium, sponsored by the Department of Pharmacology, Madras Medical College and Madras Snake Park Trust was held on 12 August 1977 in Madras.

## NEIGHBOURING COUNTRIES

Aside from Sherman Minton's work in Pakistan little herpetological action has been heard from there in recent years though M.S. Khan has contributed updated checklists to "Hamadryad" in recent years.

Nepal and Bhutan have remained herpetologically blank with only a few notes from visiting workers to the former country and a brief crocodilian survey by Bustard (FAO 1980) in the latter.

The latest herpetological work in Burma has been snakebite studies by Dr. Sawai (in litt, 1982), a crocodile survey by Graeme Caughley (FAO, 1980) and an updated checklist of Burmese reptiles by G.H. Hundley (Forest Department, Rangoon, 1964).

Bangladesh has had some recent work done on snake distribution (Rashid, S.M.A., *Snakes of Bangladesh*, M.Sc. Thesis, Dacca University, 1975) under the guidance of Dr. M.A. Reza Khan, Dacca University. A survey of the crocodile resource was made by the senior author (Whitaker, ITC/UNCTAD, 1982).

Sri Lanka has seen considerably more herpetological activity than India's other neighbours. The Colombo Museum recently published a book on Sir Lankan snakes and Loris, the journal of the Nature Protection Society, often has notes on reptiles and amphibians. Snakebite studies were recently carried out (Ada Silva, *The Snake*, 1981) and it seems that there is a semi-official approval of snakebite "clinics" which employ several strange "remedies" including snakestones and magic stone bathtubs. The authors carried out a crocodile survey on the island in 1977 (Whitaker and Whitaker, JBNHS, 76:1, 1979). The massive injection of foreign aid to Sri Lanka in recent years is unfortunately killing off forest and wildlife more effectively than have human activities in the past hundred years. Rain forest species and relict hill taxa like the lizards *Cophotes*, *Lyriocephalus* and *Ceratophora* may soon be in danger of extinction.



## LEGISLATIVE AND FIELD PROTECTION OF AMPHIBIANS AND REPTILES: A FEAST/FAMINE PROBLEM

Twenty species of amphibians and reptiles are protected under Schedule I of the Wildlife (Protection) Act, 1972, affording them complete protection from exploitation. Many of the rest are on Schedule IV under which licensed trade is permitted. The export of most reptiles and amphibians is strictly controlled even for legitimate scientific work. Predictably, the laws are not enforced with great success in the field and massive exploitation, particularly of some snakes, the monitors and many of the turtles, goes on. The most effective control has been the export ban.

The frog harvest remains more or less out of control, some reptiles have unpopular habits and habitat loss is becoming critical for many hill forest taxa. But somehow there are still an abundance of herps to be seen in most parts of the country, particularly if you are with an Irula tribal.

The prospects of undertaking some serious studies on reptile population dynamics and their ecological value on this sub-continent were recently enhanced when Bangladesh became interested in the role of varanid lizards in crop pest control (Whitaker, FAO, 1982). We are always telling people how valuable reptiles are ecologically — how nice it would be to have the data!

### ACKNOWLEDGEMENTS

The authors thank the Madras Snake Park Trust and Madras Crocodile Bank Trust for facilities and support. We also thank Brenda Bhaskar for typing the drafts of this paper.

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Table 1. Directory of herpetological workers in the Indian region\*

| S.No. | Name                 | Address  | Speciality   |
|-------|----------------------|--|--|
| 1.    | L.N. Acharjyo        | Nandankanan Zoo<br>P.O. Barang<br>Dist. Cuttack<br>Orissa — 754 005  | Veterinary Officer,<br>captive breeding  |
| 2.    | Dr. R.N. Banerji     | Consultant in Medicine &<br>Chief of the Department of<br>Haematology & Nuclear Medicine<br>Safdarjang Hospital<br>New Delhi 110 016 | Snakebite  |
| 3.    | Satish Bhaskar       | c/o, Madras Snake Park Trust<br>Raj Bhavan P.O.<br>Madras — 600 022  | Sea Turtles  |
| 4.    | Basanta Kumar Behura | c/o, Post-Graduate Dept. of Zoology<br>Utkal University<br>Ravenshaw College<br>Cuttack — 3<br>Orissa                                | Post-Graduate Professor<br>of Zoology  |
| 5.    | S. Biswas            | c/o, Reptiles Section<br>Zoological Survey of India<br>27 Chowringhee Road<br>Calcutta — 13  | Survey, taxonomy, Curator  |
| 6.    | B.C. Choudhury       | c/o Nehru Zoological Park<br>Hyderabad — 500 264<br>Andhra Pradesh   | Field studies, teaching and<br>captive husbandry of<br>crocodilians — mainly mugger    |
| 7.    | J.C. Daniel          | Bombay Natural History Society<br>Hornbill House<br>Shahid Bhagat Singh Road<br>Bombay — 400 023                                     | Survey, taxonomy, Curator  |
| 8.    | Shekar Dattatri      | c/o Madras Snake Park<br>Raj Bhavan P.O.<br>Madras — 600 022   | Survey, general herpetology<br>popular articles, herp<br>photography, captive breeding |
| 9.    | P.J. Deoras          | c/o Haffkine Institute<br>Parel<br>Bombay  | Venoms, book   |

|                        |  |  |
|------------------------|--|--|
| 10. S. Kar             | Saltwater Crocodile Research/<br>Conservation Unit<br>AT/PO Dangmal<br>Via Rajkanika, Cuttack Dist.<br>Orissa                      | Field studies, teaching and<br>captive husbandry of<br>crocodilians              |
| 11. C.S. Kar           | Gahirmata Marine Turtle Reserve<br>& Conservation Centre<br>Post Via State Bhaya<br>Rajanagen District<br>Cuttack-754225<br>Orissa | Field studies on breeding<br>biology of the olive ridleys<br>sea turtles         |
| 12. M.S. Khan          | Department of Zoology<br>Talimul Islam College<br>Rabwah<br>Pakistan   | General herpetology  |
| 13. M.A. Reza Khan     | Asst. Professor<br>Dept. of Zoology<br>University of Dhaka<br>Dhaka<br>Bangladesh  | Survey and general herpetology   |
| 14. A.G. Sekar         | Bombay Natural History Society<br>Hornhill House<br>S.B. Singh Road<br>Bombay-400 023  | Collection, taxonomy, ecology,<br>distribution of amphibians                     |
| 15. S. Maharana        | Manager<br>Damodar Valley Corporation<br>Soil Conservation Department<br>(Crocodile Farm)<br>Hazaribagh<br>Bihar                   | Crocodile biology and<br>captive breeding  |
| 16. P. Mohanty-Hejmadi | Utkal University<br>Vani Vihar<br>Bhubaneswar 751 004<br>Orissa  | Life cycles of Indian<br>frogs and toads   |
| 17. R.S. Pillai        | Zoological Survey of India<br>(Southern Regional Office)<br>Santhome<br>Madras — 600 004   | Survey, taxonomy of<br>Indian amphibians   |
| 18. Tej Prakash Vyas   | c/o Dr. S.C. Shivale<br>72 Baniya Wadi<br>Dhar 454 001<br>Madhya Pradesh   | General herpetology  |
| 19. M.V. Subba Rao     | Dept. of Environmental Sciences<br>Andhra University<br>Visakhapatnam<br>Andhra Pradesh  | Lizards, crocodiles,<br>thermodynamics, general<br>herpetology, popular articles |
| 20. M.V. Rajendran     | 3i Davaloga Street<br>Palayamkottai<br>Tirunelveli-627 002   | General herpetology,<br>public education,<br>uropeltids                          |
| 21. C. Sharma          | Superintending Zoologist<br>Desert Regional Station<br>Patodi House<br>Poata Lines, B. Road<br>Jodhipur<br>Rajasthan-342 006       |  |
| 22. B.D. Sharma        | Mountain Eco-conservation<br>and wildlife<br>Society of India<br>P.O. Box 18<br>Jammu 180 001<br>Jammu & Kashmir                   | General herpetology of<br>northeastern India<br>Professor & Secretary            |
| 23. Anslem da Silva    | Faculty of Medicine<br>University of Sri Lanka<br>Peradeniya Campus<br>Sri Lanka   | Snakebite, taxonomy and<br>distribution of snakes                                |
| 24. L. Singh           | Calcutta University<br>Calcutta  | Chromosome karyotyping of<br>snakes and crocodilians                             |

|  |  |  |
|--|--|--|
| 25. Ranil Senayanake   | 41 Gregory's Road<br>Colombo-7<br>Sri Lanka  | General herpetology,<br>amphibians   |
| 26. L.A.K. Singh   | Central Crocodile Breeding<br>and Management Training<br>Institute<br>Bahadurpura<br>Hyderabad — 500 264       | Field studies, teaching<br>captive husbandry of<br>crocodilians, mainly<br>gharial |
| 27. S.K. Talukdar  | Zoological Survey of India<br>Indian Museum<br>27 Chowringhee Road<br>Calcutta 700 013                         | Survey, taxonomy   |
| 28. N.E. Vad   | Block No. 15, 4th Floor<br>(KSA Building)<br>Shrinivas Building<br>Bhavanishankar Road<br>Dadar<br>Bombay — 28 | Venoms, work on <i>Echis<br/>carinatus</i>   |
| 29. J. Vijaya  | Madras Crocodile Bank Trust<br>Vadanemmel Village<br>Mahabalipuram Road, Perur P.O.                            | Freshwater turtles,<br>tortoises: survey, field study,<br>captive breeding         |
| 30. Romulus Whitaker   | Madras Snake Park &<br>Madras Crocodile Bank Trust<br>Raj Bhavan P.O.<br>Madras — 600 022                      | Survey, general herpetology,<br>public education,<br>captive breeding              |
| 31. Zai Whitaker   | Madras Snake Park &<br>Madras Crocodile Bank Trust<br>Raj Bhavan P.O.<br>Madras — 600 022                      | Survey, crocodilian<br>behaviour, popular articles<br>editor: Hamadryad            |
| 32. Inula Snake Catcher's<br>Cooperative Society<br>(50 members) | c/o Madras Snake Park<br>Raj Bhavan P.O.<br>Madras — 600 022   | Venoms, general field<br>herpetology   |
| 33. T.S.N. Murthy  | Zoological Survey of India<br>Santhome<br>Madras 600004  | Herpetological survey,<br>uropeltids, popular<br>articles                          |
| 34. Dipak Mitra  | Calcutta Snake Park<br>35 Hindustan Park<br>Calcutta   | Exhibition, venom<br>extraction  |
| 35. Neelimkumar Khaire   | Poona Serpentarium<br>Poona-Satara Road<br>Poona 411009  | Exhibition   |
| 36. B.K. Saha  | c/o Dr. S.G. Saha<br>Raidighi Rural Hospital<br>P.O. Raidighi<br>West Bengal 743383                            | Snake distribution and<br>status in W. Bengal                                      |

\*Based on biodata received by us, this list may not be complete; the authors invite any corrections and additions to the list.

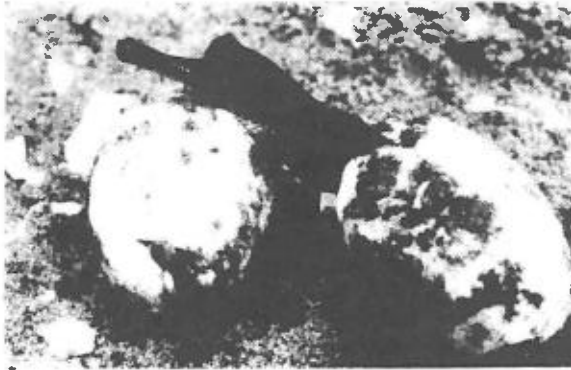
Table 2. Publications of herpetological interest in the Indian region

| A. Newsletters/Journals  | Address   | Annual overseas<br>subscription  |
|--|---|----------------------------------|
| 1. Journal of the Bombay<br>Natural History Society<br>(regular herpetological<br>notes and articles)              | Hornbill House<br>Shahid Bhagat Singh Road<br>Bombay — 400 023<br>India | £6.50                            |
| 2. Hamadryad, Newsletter of<br>the Madras Snake Part Trust<br>(herpetology only)                                   | c/o Raj Bhavan P.O.<br>Madras — 600 022<br>India                        | US\$ 4 airmail<br>US\$ 2 seamail |
| 3. Makara, Newsletter of the<br>Central Crocodile Breeding<br>& Management Training<br>Institute (crocodiles only) | Hyderabad — 500264<br>India   | information not<br>available     |

|  |   |   |
|--|---|---|
| 4. Cheetal, Journal of the Wildlife Preservation Soc. of India (occasional non-technical herpetological articles)            | 7 Astley Hall<br>Dehra Dun<br><i>India</i>  | information not available   |
| 5. Indian Forester (occasional technical herpetological articles)  | c/o The Business Manager<br>Indian Forester<br>P.O. New Forest<br>Dehra Dun, U.P.<br><i>India</i>   | US\$ 18.00<br>US\$ 9.00   |
| 6. Journal of the Zoological Society of India (herpetological notes and articles)  | Plot No. 300, Unit III<br>Kharavela Nagar<br>Bhubaneswar — 751 001<br>Orissa<br><i>India</i>  | \$15.00<br>(Half-yearly)  |
| 7. Loris, Journal of the Wildlife and Nature Protection Society of Sri Lanka (occasional non-technical herpetological notes) | Chaitiya Road<br>Marine Drive<br>Fort<br>Colombo-I<br><i>Sri Lanka</i>  | information not available   |
| <b>B. Books</b>  | <b>Address</b>  | <b>Price</b>  |
| 1. Snakes of India (by P.J. Deoras) 1965, 1970, 1978, 1981   | National Book Trust-India<br>A-5, Green Park<br>New Delhi — 110 016<br><i>India</i>   | Indian rupees<br>13.25  |
| 2. Common Snakes of India- A Field Guide (by Romulus Whitaker) 1978, 1982  | The Macmillian Company of India Ltd<br>4 Community Centre<br>Naraina Industrial Area<br>Phase I<br>New Delhi 110 028<br><i>India</i>  | Indian rupees<br>16.00  |
| 3. Snake Fauna of Sri Lanka (by P.H.D.H. De Silva) A Publication of the National Museum of Sri Lanka                         | Department of Government Printing<br>Colombo<br><i>Sri Lanka</i>  | Information not available   |
| 4. The Book of Indian Reptiles (by J.C. Daniel) In press — 1983  | Bombay Natural History Society<br>Hornbill House<br>Shahid Bhagat Singh Road<br>Bombay — 400 023<br><i>India</i>  |   |
| 5. Fauna of British India (by M.A. Smith)  | Vol. I Turtles, tortoises, crocodilians<br>Vol. II Lizards<br><br>Wildlife Publications<br>520 N. Dixie Highway<br>Hollywood, Florida 33020<br>USA<br><br>Vol. III (Reprinted 1981)<br>Today & Tomorrow's Printers and Publishers<br>24B/5 Deshbandhu Gupta Road<br>New Delhi 110 005<br><i>India</i> | \$16.00<br>\$23.50<br><br><br><br><br><br><br><br><br><br>\$50.00 |

# THE CARE AND BREEDING OF CAPTIVE REPTILES

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



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## BREEDING AND GROWTH OF THE PLUMED BASILISK (*BASILISCUS PLUMIFRONS*) AT THE ROYAL MELBOURNE ZOO

CHRIS B. BANKS

Keeper-in-Charge (Reptiles), Royal Melbourne Zoo, P.O. Box 74, Parkville, Victoria 3052,  
Australia

### INTRODUCTION

The Plumed or Green crested basilisk (*Basiliscus plumifrons*) is an attractive iguanid species inhabiting tropical, wet, evergreen forests of Costa Rica, Central America (Heyer, 1967).

The first specimens to be exhibited at Melbourne were received from Brookfield Zoo, Chicago in November, 1976. Unfortunately the female did not survive the journey and we were left with a solitary male until February, 1980 when two females arrived from Rotterdam Zoo.

### ACCOMMODATION

Soon after arrival the male was transferred to a large exhibit, measuring 2x2x1.8m high, which also housed a small group of Star tortoises (*Geochelone elegans*). As with all our reptile enclosures, the interior walls and floor are of simulated rock, with numerous resting ledges. The heated floor maintains a temperature of 24-31°C, higher in summer than in winter due to the influence of outside weather conditions. It is also covered with a thick layer of coarse sand and contains a centrally-located plant pocket which presently holds two *Ficus lyrata*. A palm, *Kuntea* sp., is situated to the rear of the exhibit. These plants, together with an open network of branches in the upper areas, provide adequate cover and perching sites for the lizards.

To one side of the enclosure is a 0.5m<sup>2</sup> shallow pond which is used extensively by tortoises and lizards alike. Clear perspex sheets in the roof above the wire-topped exhibits result in natural lighting and seasonal photoperiod changes. The enclosure is also lit by a 40W "True-lite" fluorescent tube which is switched on from 0810-1650 hours daily.

The females were introduced to this exhibit soon after their arrival in 1980 and settled in well with the resident male.

### ADULT DIET

For the most part, the adults in this report were fed small mice, locusts (*Locusta migratoria*) and Northern field crickets (*Teleogryllus oceanicus*), the latter two usually being dusted with a mixture of bone flour and "Petvite" prior to feeding. On occasions the male will also take pieces of tomato and fruit from the tortoise's food tray. This is a similar feeding regime to that noted by Bloxam (1980) for this species at the Jersey Wildlife Preservation Trust, but contrasts with the more fruit/vegetable oriented diet offered at the Brookfield Zoo (Pawley, 1972).

### BREEDING

The two females were placed on display with the male 10 days after their arrival in late February 1980, and commenced feeding the next day. They were designated female 2 and female 3. Female 2 laid two eggs whilst in transit and No. 3 laid four infertile eggs eight days after arrival. The latter female was also observed digging in the enclosure floor on 22nd and 28th March but no eggs were laid. The male was seen attempting to mate female 3 from 9-16 April and 10 eggs were laid on 19th May but again all were infertile (see Table 1).

Female 2 was removed from the exhibit on 1st May due to her dominance by female 3 and on no further occasion were the two females placed together. Female 3 laid a further 13 eggs on 15th September and 7 on 27th November during a brief period of display. Female 2 laid 4 eggs on 30th October. None of these 24 eggs were fertile.

In 1981, female 3 was seen digging in mid-January but it was not until 22nd July that she oviposited. During the week prior to laying the female appeared to present herself to the male — she positioned herself about 0.5m from the male, lowered her forebody to the sand and raised her pelvic region and tail. This behaviour has not been observed at any other time.

A total of 14 eggs was laid 150mm below the surface and next to a large branch. The tortoises had been removed from the exhibit to prevent them disturbing the lizard and laying took place from 1300-1400 ours. The eggs were immediately removed for artificial incubation. After being weighed and measured they were placed in a container of moist Vermiculite which was positioned in an incubator set at 28°C. Five infertile eggs were discarded after 15 days and a further two after 28 days. The remaining seven eggs were carefully measured after 35 days and were found to have increased in size (see Table 1). All seven eggs split on 26th September with a healthy lizard emerging from each the next day after an incubation period of 67 days. At hatching they averaged 43mm S.V. (41-44), 135mm total length (126-143) and 2.06g (2.01-2.12).

Table 1. Ovipositional data for *B. plumifrons* at the Royal Melbourne Zoo

| Clutch laid (No. eggs) | No. eggs fertile | Mean egg weight at laying (g) | Mean egg length at laying (mm) | Mean egg width at laying (mm) |
|------------------------|------------------|-------------------------------|--------------------------------|-------------------------------|
| 22 Feb, 1980 (4)       | 0                | Not                           | recorded                       |                               |
| 19 May, 1980 (10)      | 0                | Not                           | recorded                       |                               |
| 15 Sept, 1980 (3)      | 0                | 1.8                           | 22.3                           | 11.6                          |
| 20 Oct, 1980 (4)       | 0                | Not                           | recorded                       |                               |
| 27 Nov, 1980 (7)       | 0                | Eggs                          | dehydrated when found          |                               |
| 22 July, 1981 (4)      | 7                | 2.3                           | 22(25*)                        | 14 (19.5*)                    |

\* size after 35 days

### GROWTH OF YOUNG

Hatchling *B. plumifrons* have been adequately described by Pawley (1972) and Bloxam (1980) and suffice to say that these individuals showed no appreciable differences. They were placed in an all glass aquarium measuring 1.0 x 0.4 x 0.5m high. The floor was covered with a layer of coarse sand, and leaves were provided for cover. A pot plant, *Stromanthe sanguinea*, and small branches running the length of the tank were included for resting and climbing. A 200W heat lamp was suspended over the wire top, producing a maximum temperature of 32-36°C on the uppermost leaves and branches. The lizards spent most of their time in these areas. As the tank was situated on a heated table, floor temperature did not drop below 24°C. A 40W fluorescent "True-lite" was also placed above the tank enabling the lizards to bask within 200mm of the tube. As with the display enclosure this was switched on from 0810-1650 hours daily.

The lizards were sprayed each morning with a fine mist spray and always drank readily from droplets on the vegetation. A shallow bowl of water was also present at all times. Feeding commenced the day after hatching with small meal-worms being accepted without hesitation. Growth was very slow over the first month and two deaths occurred after 21 and 28 days respectively. Overheating was thought to be the cause and consequently the maximum temperature was reduced to 33°C. This may have been only part of the problem as further deaths occurred 54 and 69 days after hatching. In order to make servicing of the tank less traumatic for the lizards and to enable the tank to be carried to a sunny, off-limit area outside the Reptile House each day, the lizards were transferred to a small tank (600 x 300 x 300mm high) in late November. In early December, as feeding still consisted solely of small crickets and mealworms dusted with boneflour and Petvite, it was decided to attempt careful force-feeding of small pieces of fruit and hard-boiled egg. Although this was carried out on four occasions over a two-week period, it did not appear to reduce the lizards' reluctance to accept such food and the practice was discontinued.

After overcoming the initial difficulties, the two remaining lizards grew steadily and by the end of the sixth month, the larger individual began to develop the large crests which are characteristic of the male *B. plumifrons*. A further seven months elapsed before the smaller lizard exhibited similar development. Although the lizards still accept live crickets with relish since the 14th month they have taken increasing amounts of chopped fruit, pieces of hard-boiled egg and moistened Puppy Chow.



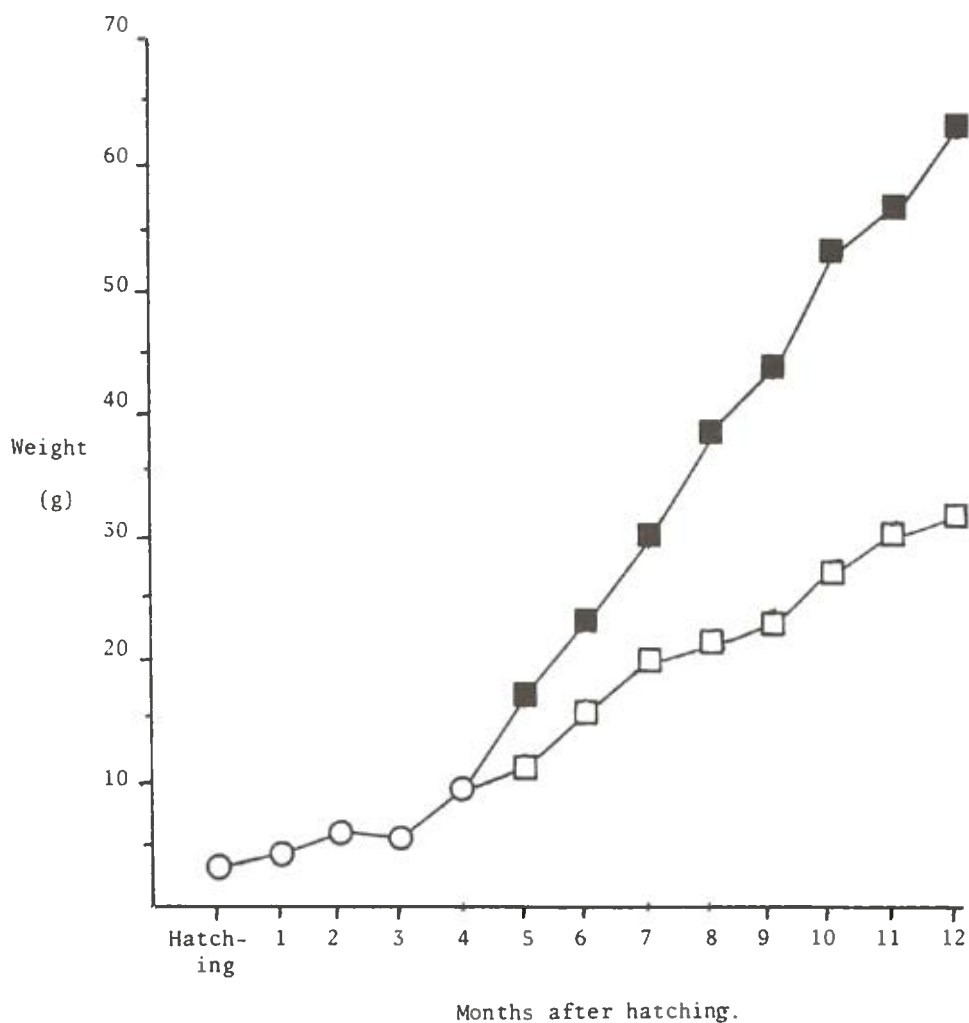
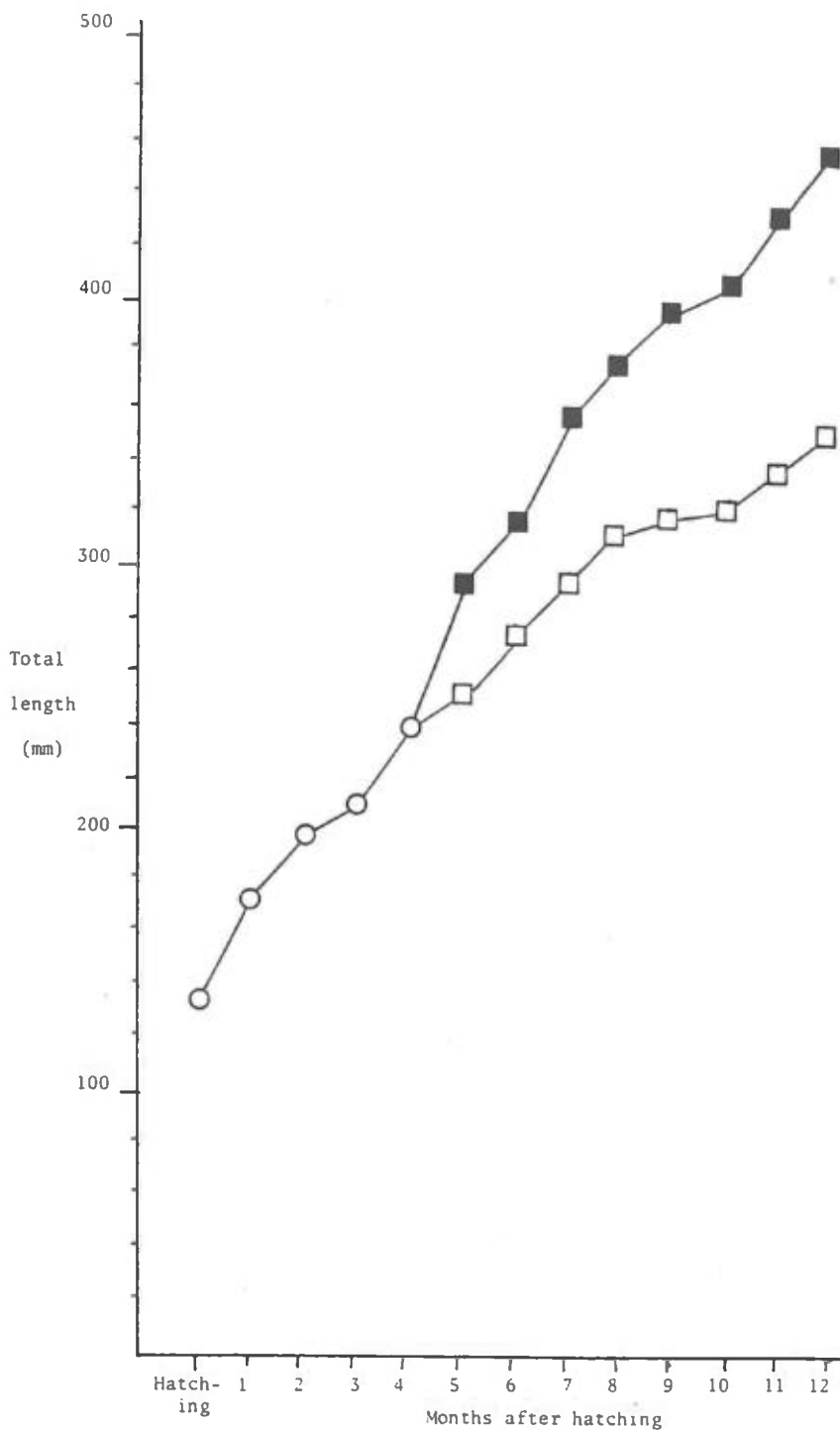


Figure 1. Weight increase in grams from hatching to 12 months of age for *B. plumifrons* at the Royal Melbourne Zoo. ○ - mean; ■ - male 1; □ - male 2.



**Figure 2.** Increase in total length in millimetres from hatching to 12 months of age for *B. plumifrons* at the Royal Melbourne Zoo. ○ - mean; ■ - male 1; □ - male 2.

## DISCUSSION

The two previously published accounts of captive breeding of *B. plumifrons* (Bloxam, 1980; Pawley, 1972) differ in the breeding seasons shown by the respective animals. Those at Jersey (Bloxam, 1980) oviposited from November-July while those at Brookfield (Pawley, 1972) oviposited from May-September, with corresponding differences in times of hatching. Both are northern hemisphere collections, but in both instances the period from which data was drawn did not extend into the second breeding season and it may well be that long term studies will reveal a more specific breeding regime. Indeed the ovipositional data in this report show elements of both previous accounts and are only from one season, as both females died in late 1981.

However, egg dimensions at laying and after 35 days incubation (Table 1) were similar to those previously recorded under similar incubation conditions. Incubation length also showed a similar correlation. Unlike the previously reported breedings, no humidity problems were experienced during incubation as the eggs were maintained at 90-93%.

As can be seen from Figures 1 and 2, the individual which first showed itself to be a male (male 1) grew at a faster rate than its sibling, from the point at which individual recordings commenced. This is despite no shortage of available food, space, or cover. It is also of interest to note the differing growth rates between these individuals and the Jersey animals; after about 200 days the latter weighed almost 40g while the Melbourne specimens averaged 24g (18-30g). The weight at hatching was very similar for both groups; from 2-3g. Mean snout-vent length as a percentage of total length varied very slightly over the first 12 months — from 30.2% at 1 month to 26.1% at 12 months. That for the remaining adult male is very similar: 26.9%.

At the time of writing, both lizards are still very shy and it will be some time before they are introduced to the exhibit still occupied by the adult male after six years. As these are the only *B. plumifrons* in Australia at the present time, every consideration must be taken to ensure further successful reproduction.

### Products mentioned in the text

True-lite (Vita-lite)

Duro-test International, 17-10 Willow Street, Fair Lawn, New Jersey 07410, U.S.A.

Petvite

I.G.Y. Manufacturing Pty. Ltd., 20 O'Briens Road, Hurstville, N.S.W. 2220, Australia.

Puppy Chow

Robert Harper & Co. Ltd., 5 Dunlop Road, Mulgrave, Vic., Australia.

## ACKNOWLEDGEMENTS

I am grateful for Roy Dunn's review of this paper, drafts of which were typed by Meg Braden.

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## AN UNUSUAL POPULATION OF TOADS

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Studies of breeding populations of the common toad, *Bufo bufo*, have concentrated on aggregations consisting of hundreds or even thousands of individuals, despite the fact that most populations consist of less than 100 members (Cooke, 1975). Such studies have revealed that the number of males at a breeding site greatly exceeds the number of females, by as much as 4:1, and that the toads remain in the water for about 2 weeks (e.g. Davies & Halliday, 1979; Gittins, 1983). In this brief report, I describe a rather unusual toad population, in which the adult sex ratio was only mildly skewed towards an excess of males and in which the time spent in the water was months, rather than weeks.

This population breeds at a farmland pond in Buckinghamshire, England. From 28 February, 1983, this pond was surrounded with a drift fence and pitfall traps. Toads were collected from the traps and adjacent ground every 2 or 3 days; they were then released onto the opposite side of the fence to which they were caught after snout-urostyle length was measured.

Adult toads, greater than 50mm in length (Gittins, 1983) were first caught attempting to enter the pond on 12 March; 89% of all toads had entered the water by 2 May. As Fig. 1 shows, males tended to arrive before females; 50% of males had entered the water by 19 March, 50% of females by 12 April. Nearly 65% of females caught entering were already in amplexus, and males in amplexus were significantly longer than unpaired males. Thirty five males and 23 females migrated to the pond, giving an overall sex ratio of 1.52:1. However, the sex ratio showed week-to-week fluctuations; for example, in the first 5 weeks of the study period, males outnumbered females by as many as 3.5:1.

When in the water, the toads were unusually secretive, and were seldom seen. Details of spawning could not be collected; however, the first spawn strings were seen on 25 March.

The outward migration of adult toads began on 6 May and continued irregularly until 21 September. Only 51% of the number of males and 26% of females entering the pond were captured leaving. No tadpoles or newly-metamorphosed toadlets were seen, although juveniles estimated to be at least 1 year of age moved to and from the pond between 6 May and 3 October.

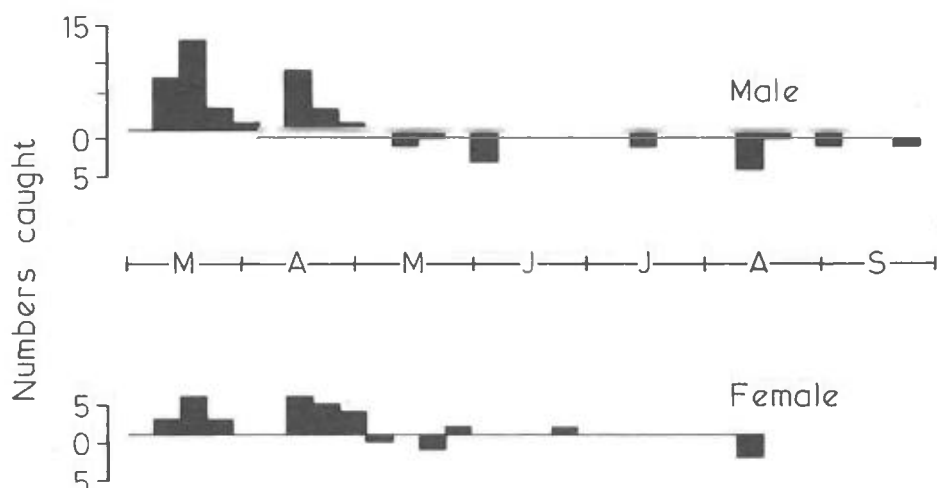


Fig. 1. Numbers of males and females caught each week. Above axis — toads entering; below axis — toads leaving. Time course runs from the beginning of March to the end of September.

The male-skewed sex ratio so typical of common toads is thought to result from the fact that males reach sexual maturity before females, females suffer higher rates of mortality and may not breed every year (Gittins, 1983). The sex ratio reported in this paper is only mildly skewed towards an excess of males, but the reason for this is not clear.

Similarly, it is difficult to account for the unusually long time spent in the water by the toads described here. Despite the fact that individuals remained in the water for months, rather than weeks, they may not have been reproductively active for the whole time. They may have remained in the water to feed, or because the long hot and dry spells in the summer delayed their migration. This latter explanation does not account for the movements of juvenile toads during the summer months.

In summary, my toads displayed a number of features in 1983 which are not usually associated with this species. Whether these features were peculiar to 1983 (e.g. climatic conditions) or are characteristic of relatively small populations is a question for further investigation.

I would like to thank Marion Hall, Julie Roberts, Chris Tucker and Tim Halliday for their help during the course of this study; financial support was provided by the Open University Research Committee.

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## TREATMENT OF PARASITIC INFESTATIONS IN REPTILES

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Ticks and mites both suck blood from the host reptile, this causes irritation, anaemia in the case of heavy infestations and the possible transmission of septicaemic bacterial disease (Camin 1948).

Ticks are usually only found on freshly imported reptiles, they are large, easily seen and relatively immobile. If they are manually removed care must be taken to remove the whole tick and not to leave the mouthparts *in situ*, where they can act as a nidus of infection. The tick's mouthparts can be caused to loosen by applying liquid paraffin or a parasitocidal wash to the abdomen before any removal attempt. The site of attachment is cleansed with a suitable disinfectant such as Pevidene (Berk Pharmaceuticals).

Mites are often a cause for greater concern with their ability to travel up to 15 feet per day facilitating their spread through a reptile collection. The life history of the *Ophionyssus* sp. of reptile mite has been dealt with by Palumbo (1971). Whilst bathing snakes in a parasitocidal wash such as 0.2% Alugan (Hoechst U.K. Ltd) is effective, the treatment of choice is dichlorvos in the form of a Vapona (Shellstar Consumer Products U.K.) strip. The directions on the packet must be followed and an appropriate sized portion of the strip placed in the vivarium, ensuring that the reptile can not come into direct contact with it. Jackson (1977) recommends a treatment schedule of 3 to 4 days although Rosenfeld (1975) found periods of up to 3 weeks proved necessary to effectively control mites in certain species of lizards. Whilst Rosenfeld (1975) described no toxic side-effects in the lizards so treated, Marcus (1977) described the symptoms of ascending paralysis in the anole (*Anolis carolinensis*) after only 4 days of therapy. The paralysis proved reversible on the removal of the vapona strip. Infested vivaria should be vacated, scrubbed clean, all furnishings sterilised or burned and a Vapona suspended in it for at least 10 to 14 days to kill any larval mites which subsequently hatch from the resistant eggs. Mite infestations should be taken seriously and careful inspection of all newly acquired stock for mites, during the quarantine period should be undertaken.

Roundworm infestations are common in reptiles, but the number of worm eggs in a faecal sample is probably unrelated to the degree of infestation, at least in tortoises (Claussen and Forstner 1981). The majority of roundworm infestations rarely appear to be pathogenic, even when large numbers of worms are present (Cooper 1974), although Ippen (1971) reported a 40% mortality rate due to parasites in a series of 1100 post-mortem examinations on reptiles. Complications are rare and usually show themselves as symptoms of gut impaction (Kane, Corwin and Beaver 1976). Tapeworms have been implicated as a cause of weight loss and death in small snakes apparently feeding normally (Jackson and Muller 1976) with both Kutzer and Grunberg (1965) and Frank and Loos-Frank (1977) reporting deaths in snakes caused by tapeworms. The main danger with internal parasites is the build up of infective larvae in the captive reptile's environment leading to self reinfestation and a rapid build up of parasite numbers. Faecal worm egg counts can be undertaken regularly to give a guide to the correct timing of anthelmintic administration, in many ways it is preferable to demonstrate the presence of a parasite before treatment. Techniques of faecal examination are described by Needham (1981). The treatment of internal parasites is relatively easy and most modern anthelmintics are considered relatively non-toxic. Piperazine salts should be avoided even in healthy reptiles because the therapeutic index is low and these salts have a low degree of efficacy (Jackson 1974 1976). All the drugs should be administered suspended in water via a stomach tube. The technique of stomach tubing snakes is described by Jackson (1974) and tortoises by Holt, Cooper and Needham (1979). Special care must be taken when thiabendazole is used in the treatment of roundworms because this drug is hygroscopic. If it is mixed with insufficient water prior to dosing, it will absorb water from the patient's tissues and could exacerbate the condition of a dehydrated patient (Holt, 1981).

### Anthelmintics for use against roundworms in reptiles

|  |   |
|--|---|
| <i>Levamisole</i> . ("Nilverm" or "Nemecide", ICI Ltd).<br>(Zwart and Ham 1972; Frank 1976)    | 50 mg/kg by injection.<br>200 mg/kg orally.   |
| <i>Thiabendazole</i> ("Equizole", Merk Sharp Ltd).<br>(Frye 1973; Bush 1974)                   | 100 to 400 mg/kg orally.  |
| <i>Fenbendazole</i> ("Panacur", Hoeschst UK Ltd).<br>(Tiefenbach 1977; Holt and Lawrence 1982) | 50 mg/kg by stomach tube.<br>100 mg/kg if mixed with food.                                      |
| <i>Mebendazole</i> ("Telmin KH", Crown Chemicals o Ltd).<br>(Claussen and Forstner 1981)       | 100 to 200 mg/kg every five days, on four occasions.<br>400 mg/kg, twice at ten daily interval. |
| <i>Albendazole</i> ("Valbazen", Smithkline)<br>(Lawrence and Jackson 1983)                     | 50 mg/kg orally.  |

### Anthelmintics for use against tapeworms in reptiles.

|  |                             |
|--|-----------------------------|
| <i>Bunamide hydrochloride</i> ("Scoloban", The Wellcome Foundation Ltd) (Jackson 1974) | 25 mg/kg orally.            |
| <i>Dichlorophen</i> ("Dicestol", May and Baker) (Jackson 1974)                         | 200 mg/kg orally.           |
| <i>Niclosamide</i> ("Yomesan", Bayer UK Ltd).<br>(Jackson 1974)                        | 150 mg/kg orally.           |
| <i>Praziquantel</i> ("Droncit", Bayer UK Ltd).   | 3.5 mg/kg by S/C injection. |

When fendendazole and mebendazole have been used to treat mixed round and tapeworm infestations they both appear to be effective against mammalian tapeworms, but their use for the treatment of reptilian tapeworms must be speculative (Tiefenbach 1977; Holt and Lawrence 1982).

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## ON THE MERITS OF CAPTIVE BREEDING

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Many people have stated opposition to attempts of captive breeding of scarce & difficult species by private individuals on conservation grounds.

I would like to point out that, in my opinion, this opposition may be misplaced.

Application of simple mathematics and ecological principles are necessary to this argument.

I take the Natterjack toad as an example. Let us firstly suppose that *after* reaching maturity a pair of toads (though long lived) can expect two more years of life and two strings of spawn are produced.

I have been unable to find figures for the number of eggs per string for natterjacks on average, but a figure given for the closely related Green toad (*Bufo viridis*) is 7,000 to 12,000 per string. Remaining conservative let us assume 5,000 for Natterjack toad (*Bufo calamita*) and therefore 10,000 over the 2 years.

For natural populations to remain stable two adult toads need to be produced from the total ova produced in a pair's lifetime; in this case two toads from 10,000 ova, i.e. one in 5,000 needs to be successful.

Mortality can occur at several stages. Ova and tadpoles of the Natterjack Toad suffer badly from the drying out of the shallow water bodies they prefer to spawn in. Also, in the pond, predation by newts, water birds, insects (dragon fly and beetle larvae, etc.) and parasites further reduces numbers.

When leaving the pond further predation occurs (by birds, etc.).

In a sensible captive breeding project most of these problems can be removed. Water levels and temperatures can be maintained, the water can be kept predator free and garden netting can be used to prevent bird or mammal predation (I assume all breeding attempts would be outside in large vivaria).

From my own experience in breeding amphibia, 75-95% success from egg to metamorphosed young is realizable.

The foregoing assumes that a potential operator of captive breeding first gets his toads to breed. This is clearly not the case, some will have success and many (at first) will not (I know of 2 successes for 1983 out of a handful of attempts).

To complete our comparison let us assume that two strings of spawn are taken from the wild. From our previous discussion we could expect (in the wild) that this would lead to one pair of toads (or less as wild populations are declining).

If with proper husbandry only 50% are brought through to metamorphosis (as opposed to my suggestion of 75-95%). This would produce 5,000 toadlets. Further suppose that this number was distributed in groups of 10 to persons with the interest and facility to captive breed. This should lead to 500 captive colonies. Of these suppose that only a low figure of 1 in 50 colonies successfully spawns. This would lead (at least) to 10 strings and assuming 50% successful rearing this would mean 50,000 toadlets. Assume only 50% of these grow to breeding maturity under captive conditions (large outside vivaria). (A very conservative figure from my experience). This would mean 25,000 mature toads. In the wild this second generation should also lead to 2 mature toads. Thus, with proper husbandry the captive breeding could be at least 12,500 times more successful! With a transfer of information from the successful to the less successful breeders, success could be increased. Surplus numbers could be used for re-release/ introduction schemes and further the number of captive colonies.

## TWO GENERATIONS OF CAPTIVE-BRED *TESTUDO GRAECA*

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In the B.H.S. Newsletter No. 20 July 1979, there is a short article written by myself, entitled "Breeding Mediterranean Tortoises in an English Garden", at the end, I express the hope that one day, it may be possible to breed a second generation from our own captive-bred tortoises. Under the column "Wanted" at the back of the Newsletter, I asked if anyone had a mature captive-bred female *T. Graeca* which would prove a suitable mate for my own twelve-year old males.

Now, four years later, I am delighted to report that there is a sequel to this story. In 1981 I was able to meet someone who had a captive-bred female *T. graeca* aged 20 years. This tortoise had twice produced eggs after mating with imported males, and just one hatchling was at that time being reared.

In the Spring of 1982 "Trixie" the female was loaned to me. I fenced off one large area of my garden, and here I kept my own captive-bred males aged sixteen and "Trixie" completely separate from all the other tortoises. They appeared compatible and mating took place fairly frequently but sadly no eggs were produced that year. All three tortoises hibernated in the Winter of 1982. The next Spring, they were once again kept together. During the very hot Summer months, the males appeared much more sexually active and again mating took place frequently.

At the beginning of July, Trixie became restless and started to dig trial nests in various parts of the garden. Then, on July 4th, late in the afternoon, I was delighted to find her digging in earnest. She took about two hours to complete the nest, then proceeded to lay six eggs. These were immediately retrieved and placed in the incubator which I have always used, buried in sand to the depth of 3cm and thereafter kept at a temperature of approximately 29°C.

On October 1st, I noticed the first signs of movement in the sand and twenty four hours later, on October 2nd, after 90 days, a fine healthy baby tortoise hatched unaided. Of the other eggs, two were infertile and sadly the remaining three all contained formed, dead baby tortoises.

"Alpha" is now seven weeks old and weighs 26gm. Shape and colour are good and appetite excellent. Of all the many baby tortoises I have hatched over the past twenty three years, this must surely be the most important!!

As breeding tortoises is becoming less of a rarity, perhaps we can look on this as just a beginning.

**Editors note. Congratulations Pat!**

## HIBERNATION OF THE SAND LIZARD (*LACERTA AGILIS*)

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I refer to the letter from C.A. Snell in the June 1983 Bulletin wherein he enquired whether a Sand Lizard that entered hibernation regularly during the first week in September is unusually early. Perhaps I could put forward the following observations gained by myself and other colleagues from the Conservation Committee.

From data received with reference to field monitoring in late September, it has become noticeable that there is a dearth of adult Sand Lizards (i.e. specimens of age in excess of three seasons) on known colony sites. By the third week in September, the majority of Lizards observed are juveniles (i.e. from one to three seasons in age) as well as the newly born hatchlings. Juveniles are regularly seen until the end of September, whilst hatchlings are active under suitable weather conditions until mid October and, in the extreme south of their range, have been seen in early November.

During the last five or six years, several Committee Members have constructed outdoor reptiliaries for the purpose of retaining a captive breeding stock of Lizards. Subsequently, much detailed information has been acquired. These outdoor enclosures vary in size, on average measuring 120 square feet. They are based on local heathland sand and planted with heathers (Ling, *Calluna vulgaris* and Bell Heather, *Erica cinerea*). Obviously, being outside, they are open to the natural elements so that the daily and annual life cycle of the Lizards is comparative to those in the wild state. These captive Lizards have confirmed our field data regarding the time when Lizards retire to hibernation.

In my reptiliary this year were nine adult Lizards. One female was not seen after August 14th; six were not sighted after August 24th; one after September 4th and the remaining specimen active until the following weekend. Keith Corbett confirmed that, of twelve adults, only two were seen after the first week in September. However, with a relatively warm dry summer, this year was an exception to average years and, as with the 1976 summer, early hibernation has followed. Assessing field data from past years, it is clear that the number of adult Lizards seen decreases in number through the weeks in September. If one drew a graph, it would show that hibernation for adults usually commences during the third week in August, the peak being the second week in September then dropping by the third week in September and tailing off by the fourth week.

There are two clear indications as to when one can tell that the Lizards are ready to enter winter dormancy. Firstly, Lizards spend some time digging hibernation burrows and small piles of excavated sand can be seen. Secondly, Lizards cease feeding some days before entering these burrows, allowing their gut to be completely empty.

It may be interesting to note some observations of Lizards emerging from hibernation. Generally, in the wildstate adult males are the first to appear. On mild spring days in early March, the first males are visible. The bulk of males should be out of hibernation by the third week in March. In my reptiliary this year, the first male was seen on March 3rd, the last on March 20th. Adult females tend to appear during the first week in April, the climax by the second week. During prolonged periods of bad weather this may be delayed until late April. One female in my reptiliary was actually observed digging her way out of her burrow on May 14th.

Naturally, there are exceptions. Occasionally, adults have been observed earlier, sometimes later. Dorset reptiles tend to emerge from hibernation some days before those in Surrey and generally retire later too. What is also apparent is that Lizards that come out of hibernation early tend to enter their burrows early and those that exit late return to hibernation later in the season.

There may be several reasons as to why adult Lizards disappear relatively early. One theory is that it is a balancing factor between the adults and the newly born hatchlings. Certainly, adults will predate on their young. This has been observed in the wild state. A female Lizard caught near Bourmemouth some years ago actually regurgitated a medium sized male *Lacerta vivipara*! The mortality rate amongst hatchling Lizards is high and survival to breeding condition is estimated at 5%. Consequently, there would probably be an uneven balance in age ratio with the obvious predatory factor unless some of the adults retired early.

## LARGE *LACERTA AGILIS* DISCOVERED

JOHN WEBSTER

*for B.H.S. Conservation Committee, 29 Send Barns Lane, Send, Surrey*

On May 9th, 1982, an overcast but warm day, we encountered an extraordinarily large specimen of male Sand Lizard (*Lacerta agilis*). My colleagues and I from the BHSCC were out on one of our many field trips when we observed the Lizard hunting in a small sandy gap within an area of dense old heather.

The Lizard was carefully noosed and immediately measured. Its total length was 223 millimetres snout to tail (83 millimetres snout to vent). When checked, it was confirmed that this specimen was the largest male yet recorded by the BHSCC, although an adult female caught at Studland Bay in Dorset several years ago measured 225 millimetres.

It is difficult to ascertain the precise age of this animal, but we have detailed knowledge of the history of the site where the lizard was found and it is therefore possible to estimate its maximum age. The site is near Farnham in Surrey owned by the Surrey County Council and managed by the BHSCC.

Although now isolated from the main heathland block, the site was originally part of a large continuous tract of heath inhabited by known Sand Lizard and Smooth Snake colonies. The area is known to have had a fire in the 1940's which was probably the cause of the extinction of the native Sand Lizards. The heather habitat recovered slowly. However, this site soon began to suffer the heavy influx of regenerative pine seedlings blown from nearby plantations, a fate shared by many other heathland sites. The BHS located the site in early 1970 and, after initial monitoring for reptiles, it was agreed that the area could become an excellent reintroduction site. The owners consented to clearance of the pine and birch as well as spraying of bracken to allow the heather vegetation to dominate.

The following summer, twenty pairs of Sand Lizards were caught from "doomed" areas in Dorset and translocated to this Surrey site. The Lizards were toe-clipped so that they could be easily identified in future monitoring surveys. Thus, from simple deduction, the maximum age of the captured Sand Lizard, if it had been a first year offspring from the initial releases, could only be ten years.

In the wild state, the average life-span of the Sand Lizard has been estimated to average five to six years, although they have survived in outdoor reptilia for eleven years. This Lizard has obviously found a successful niche in the reintroduction site. As a matter of interest, it is worth noting that, through our improved habitat management, this site now has all six native reptile species breeding on it. It is hoped "Smooth Snakes willing", that we will be fortunate enough to catch another glimpse of this magnificent specimen since we all agreed that the sighting of this Sand Lizard on our reintroduction site made all our conservation efforts well worthwhile.

## FAVOURED HAUNTS OF NATIVE REPTILES

CHARLES SNELL

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The previously reported observations on the preference of the Wall Lizard (*P. muralis*) for high and dry sunny habitats prompted me to consider the preferences of the Common Lizards in colonies I knew of, or know of, in N.W. Kent.

The same pattern of raised or sloping habitats continues. One is on raised hillocks in the Dartford Heath area (gravel/sand soil), 2 colonies on south facing road cutting banks (near Farningham Woods and a railway bank site (chalk) at Stone Crossing.

The coincidence continues. In the book "Hedges" in the New Naturalist Series (by E. Pollard, M. Hooper and N. Moore) I found the following information: studies show that hedgerow removal by agriculture does seem to have a deleterious effect on reptile populations as they are dependent on them for hibernation — for the most part using bank vole and woodmouse tunnels. Overall, "they seem to prefer hedges with banks". "Sandy banks, either with or without a hedge, provide suitable places for the Sand Lizard".

The work goes on ..... "A study of these species in the Dorset heathlands, the Egdon Heath of Thomas Hardy's novels, showed that banks of all kinds whether they were old quarries, railway embankments, edges of bomb craters or field boundary embankments, were important to the species".

This book aside, consideration of the Sand Lizard and its favoured sites shows that, according to some reports, it was commoner in pre-myxomatosis times and favoured sites of rabbit warrens.

Rabbits themselves, from common observation, prefer sloping or banked sites for their excavations and, as they create sunnier "hotspots" by creating raised mounds of dug-out spoil and by removing patches of vegetation in their feeding, give the sun a greater chance to reach and warm the ground plus any underlying eggs or reptiles.

"Hedges" also makes this point in relation to the Common Lizard, "..... since the arrival of myxomatosis in 1953 the Common Lizards appear much less common than hitherto".

Another rich site for lizards, including the Sand Lizard (and Natterjack Toad) are sand dunes. These could also be seen as a mixture of banks, hillocks and ditches over a large area.

Flat, clay underlain topography supports few Common Lizards; I personally do not know any but I am told of a banked site at Hither Green, S.E. London, which I have not yet investigated.

Once again the book "Hedges" makes a similar point, "Banked hedges are relatively rare in the clay lands and the Common Lizard is relatively rare in the clay country of the Midlands".

This has apparently always been the case, for John Morton, writing in 1712, noted that the "Swift Efts", (Common Lizard) "..... are still more rare: I have never seen them but in Sandy Closes at Thorp-Malsor, upon some Banks underneath the hedges there".

That banks are a preferred haunt for hibernation is commonly shown. The slow-worms (mentioned in a previous article) were all found in the upper part of a bank facing approximately W.S.W. Another study mentions that hedge banks are, "commonly used by Grass Snakes and Vipers (using mammal burrows) often in the company of frogs and toads". An obvious advantage to reptiles would be an unshaded bank that faced south which should, as a result, be warmer and drier.

Ian Prestt, in a study of Adders on the Isle of Purbeck, Dorset, marked 166 by clipping different combinations of ventral scales. Most observations were made in fields near marshes of the River Frome. Field boundaries were hedges on sandy banks, some accompanied by ditches. Most

banks ran North to South but one 600 yard stretch ran East to West. This of course gave it a South facing aspect. In winter all Vipers could be found on a 100 yard stretch of this bank. In the summer they migrated back to the marshes and were "never seen far from the ditches". Migration to this area was via the banked hedges and ditches. To undergo such to and fro migration, the South facing bank must have been important to their ecology.

What possible conclusion can be made from these observations? Certainly they infer that raised areas, and especially unshaded, sunny areas, are a critical factor in deciding population levels in native reptiles.

In flat ill-drained clay areas even Common Lizards seem scarcer.

I would greatly welcome any details of reptile sightings (Britain or abroad) with details of numbers (even single sightings), general topography and soil (e.g. sandy slope, flat loam area, etc.) and time of year. (If you are not sure of soil types just a note of whether the area was uniformly flat or "sloping", "on a bank", etc.) I hope to give details of any response in the next "Bulletin".

It would seem crucial to discover why banked, sloped and sandy areas seem so important.

Lack of tree shading, low vegetation (to allow the sun to reach and warm the ground) and south facing aspect are obvious enough factors in the case of cold blooded animals; some of which also require warm ground temperatures to hatch their eggs.

But why slopes? Or why sand?

I can think of many suggestions. I would like to list these and would like to receive comments and criticisms on these from readers as well as other ideas on this subject.

- (i) An obvious difference between clay and sand is that the latter is faster draining. The same is true of flat ground versus a slope irrespective of soil. The latter is far faster draining.
- (ii) Sand and dry soil have far more air spaces between the grains, than has wet or finely particulate soil (e.g. clay). Air spaces in the soil could serve two functions beneficial to reptiles.

Air spaces — as any double glazing expert will tell you — have fine insulating properties against cold.

- (iii) Hibernating creatures or incubating eggs under the soil require oxygen. Air spaces would allow for sufficient diffusion of  $O_2$  to reach underground as it was being depleted by the organism. If the air spaces were to become filled with water diffusion would be considerably slowed down and the organism could suffocate. At the extreme, if the organism was surrounded by water it would drown.

Clearly, for these reasons alone, fast drainage via a slope or by large grain size offer advantages to reptiles; suggesting that banked sand would be the overall best habitat, grading down to flat clay at the other extreme. This would seem to be borne out by the observations so far listed as to populations in practise.

Another advantage of fast drainage is that it does not allow for luxuriant plant growth (note the apparent decline of Common Lizards after rabbit grazing declined and vegetation became more luxuriant, mentioned earlier).

Vegetation at the top of a bank is normally quite stunted in relation to that at the base or in a ditch. This allows for greater penetration of the sun to basking or hibernating reptiles, or their incubating eggs. An extreme case of sparse vegetation is that of some heath or dune land. Both are rich in reptiles.

As the sun in temperate regions of the world is never vertically overhead slopes offer better absorbing surfaces for solar heat as they are nearer to the normal from the direction of radiation. Put more simply they face the sun more directly. This is especially true in the autumn, winter and spring as the sun is at a lower angle.

I think these suggestions worthy of appraisal on conservation grounds. "Mini-topography" is a factor that may have been somewhat under regarded as an important factor in the ecology of our native reptile species.



Certainly, if these implications can be accepted, many simple conservation suggestions can be given.

Man made (or in some cases, rabbit made) structures seem to offer fine habitats — often preferred to naturally occurring, undisturbed sites: e.g. the previously mentioned preference for banked hedges, bomb craters, boundary ditches and banks, railway banks, quarries and the disturbed soil and vegetation of rabbit warrens.

A practical application here is obvious: the construction of East to West running banked ditches on sites with reptiles should increase their survival and breeding success rate. If the site is without reptiles such a habitat creation may encourage them on, or, make introductions worthwhile. If the local water table is high enough the ditches as well as the banks might prove an asset by giving breeding sites for amphibians. Even a ditch and dyke of a few yards may prove a boost for herpetile populations if suitably sited.

This information might usefully be applied by conservation minded readers who have land of their own, work on the land or can influence decisions about work on agricultural or conservation land, especially in the siting and construction of drainage ditches and dykes. A useful configuration would be to place the spoil on the northern bank, so making the sunny slope larger.

#### **Supplementary note**

While searching for herpetiles in Austria, in 1982, most reptiles were found on East, South or West facing slopes. Very few were found on flat areas even though a search was made. Perhaps the slope preference extends to Europe.

As I have already mentioned drier soils should be advantageous and waterlogged soils disadvantageous for reptiles. Perhaps Britain's rainfall, being for the most part higher than in parts of Europe is also in part a contributing or major factor to our sparse populations of reptiles (especially the Sand Lizard for instance) as well as our lower average sunshine hours. It certainly would offer a possible reason as to why the sand is of such strange importance in Britain to our scarcer herpetiles as sand, *per se*, has no special importance in their ecology; the importance must lie with associated properties.

## THE COMMON FROG *RANA TEMPORARIA*: SOME NOTES ON ITS SUCCESSFUL HUSBANDRY AND BREEDING

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### INTRODUCTION

I suppose most of us acquired our initial interest in herptiles at a very early age with the collection of that first clump of Common Frog spawn from the local pond and the pleasure derived from watching the development through to tiny froglets.

The Common Frog is nearly always the first British Anuran to emerge from hibernation, sometimes arriving at its breeding grounds as early as mid-January in the south-west of England. Even in the more northern and eastern counties spawning does not often take place later than early April. Actual spawning dates vary with the mildness or severity of the spring weather. The earliest and latest spawning dates I have for East Anglia (based on personal observations over the last 12 years) are 12th and 31st March respectively.

The males usually arrive at the breeding sites first where they soon commence their familiar whirring mating-call. The females arrive a few days later but are seldom seen in the water except when actually in amplexus with a male. The males, on the other hand, are much in evidence as they swim excitedly about looking for a female. Amplexus is axillary and can last for several days or even weeks as spawn is not laid until there is sufficient algal growth in the water for the tadpoles to feed upon. A sudden cold spell after the frogs have coupled will prolong amplexus and retard disposition of spawn.

Spawning usually takes place at night but can occur during the day, especially early morning. The frogs leave the water soon afterwards although males quite often remain in the pond for some time, calling to attract another female.

### DISTRIBUTION & HABITAT

The Common Frog is still such a familiar and commonplace creature that I will not attempt a detailed description in this article. Indeed, it is the most widespread European amphibian, extending from North Scandinavia to northern Spain and the northernmost tip of Italy. Eastwards it occurs throughout central Russia but is absent in central and southern Iberia, most of Italy and the Balkans. It is also found in central Siberia, northern China and north Japan.

Frequenting a variety of habitats this frog thrives even at high altitudes; in the more southern parts of its range it is virtually confined to mountainous regions because of its intolerance of heat. Habitats most favoured are those which provide a measure of moisture and shade such as woods, field-margins, meadows, marshland, hedgerows or gardens. The sites usually chosen for spawning are smaller bodies of water, ponds, ditches, disused canals or garden pools.

Although the Common Frog is still fairly numerous throughout its range it has suffered a severe decline in status over the last thirty years due to the insidious but systematic destruction of its habitat by urbanisation and agricultural "improvement". These two factors have contributed to a shrinking countryside increasingly devoid of trees, hedgerows, ponds and ditches resulting in a barren, featureless landscape completely hostile to frogs and many other forms of wildlife. The increased use of herbicides and pesticides has accelerated the decline of frogs in rural areas, depriving them of food and contaminating the few remaining ponds or ditches in which they breed.

The picture is not universally bleak however, as the boom in garden pond ownership during recent years has provided the Common Frog with a new spawning medium while the garden itself has proved to be a most satisfactory sanctuary where natural enemies are at a minimum. A recent nationwide survey of Britain indicated that 69% of breeding sites used by Common Frogs

were garden ponds. A similar survey conducted in Norfolk during 1982 produced a figure of 60%. Thus it can be seen how important garden ponds are becoming for the future survival of this species.

### HUSBANDRY & BREEDING

The ease in which a breeding colony of Common Frogs can be established, even with the smallest garden pond, renders it unnecessary to keep any adults in permanent confinement unless for scientific study or some other special reason. Personally, I have not found this species to be an ideal vivarium inhabitant as by nature it is rather secretive. It is also intolerant of dry conditions or high temperatures and does not seem to breed so readily in captivity as other species of the genus *Rana* such as *R. esculenta*, *R. ridibunda* or *R. dalmatina*. Its strong migratory instincts in the spring usually condemn it to fruitless attempts at escape from the vivarium, the pond of which will be used only as a last resort.

In my opinion it is far better to establish a colony of wild frogs in the garden than to subject them to confinement; the vivarium can then be used to accommodate more amenable species while a programme of practical conservation is embarked upon in the form of a viable, garden population of Common Frogs. Equal success is likely whether the garden is situated in an urban, suburban or rural area provided the conditions therein are to the frogs liking.

I wish to emphasize at this juncture that the indiscriminate release of adult frogs in the hope that they will remain in the same vicinity is almost certainly doomed to failure, (unless the garden is walled completely and therefore escape-proof). If the frogs do not disappear without trace immediately (which is highly probable) they will definitely do so at breeding time when they try to find their original spawning grounds.

Newly metamorphosed froglets released in damp vegetation at the pondside will usually settle well, but fairly large numbers would need to be released in order to ensure that a few ultimately reach maturity. The best time to release froglets is late evening or during rain when the herbage is damp, this will prevent dehydration resulting in the rapid death of the unfortunate creatures.

By far the most successful way of starting a colony is to begin with frogspawn; this should not be collected from the wild unless the source is contaminated or threatened with imminent destruction. Spawn can always be obtained from B.H.S. members by placing an advertisement in the "Wanted" section of the Bulletin or by contacting the local country Naturalist Society. Once the spawn has been obtained it should be placed in the garden pond without delay because if left in a small container a large proportion will perish due to lack of oxygen in the water.

With the advent of moulded fibreglass pools and butyl plastic liners a pond can be installed quickly, easily and relatively cheaply without the backbreaking labour required for the construction of a cement one. The design and size of the pond is largely a matter of personal choice, but of course, the larger it is the more satisfactory in every respect. Remember to site the pond in a position which receives a fair amount of sunlight away from overhanging trees, this will ensure a good growth of underwater plants and algae.

Pond fish of any description are not compatible with frog tadpoles as they will consider the tadpoles a welcome addition to their menu. I usually overcome this problem by dividing the pond with very fine meshed netting (obtainable from garden centres) while the tadpoles are developing. In a tiny pond it is advisable to remove the fish altogether, replacing them after the tadpoles have metamorphosed.

It is surprising just how many tadpoles can result from a fairly small clump of spawn and overcrowding must be strictly avoided or the tadpoles will fail to develop properly. I have found the optimum number is about 12 tadpoles per square foot of water surface; it is far better to rear a comparatively few healthy tadpoles to metamorphosis than to have vast numbers of sickly, undeveloped individuals of which most will fail to develop at all. If it is discovered that there are too many tadpoles present for the size of the pond which do not appear to be growing normally, the surplus can always be used to populate nearby natural ponds or given to other garden pond owners.

In larger ponds the tadpoles will find their own food; in smaller ones their diet can be supplemented with goldfish flakes/pellets and raw or cooked fish and meat. Complete metamorphosis from egg to froglet generally takes about 12 weeks, so the main time of emergence from the water is during the month of June. Ensure there is adequate cover at the pondside in the form of low growing vegetation to minimise predation by blackbirds and thrushes, both of which are arch-villains where baby frogs are concerned. The vegetation can be allowed to trail over the edge of the pond into the water, this will assist the emergent froglets to gain egress onto dry land.

Although the froglets rapidly scatter far and wide on leaving the water, a few should take up residence in the garden; most neighbours will probably welcome the "overspill" frogs into their own gardens. Lawns should be kept short otherwise the froglets will seek food and shelter in the long grass where they are likely to be chopped to pieces by the mower when the grass is eventually cut. A garden can be kept neat and tidy while still proving hospitable to frogs, there is usually enough invertebrate food and cover among the herbaceous borders, shrubberies or vegetable plots. The frogs will help to keep insect and other garden pests under control without recourse to insecticide sprays, slug pellets and suchlike which could ultimately poison them as well as the pests they feed upon.

Common Frogs appear to require two years to reach maturity, by which time the first adult pairs will probably start arriving at the pond to spawn. If not, fresh spawn can be introduced into the pond each year until success is achieved.

The table below shows the results in setting up a common frog colony in a garden pond in Essex which measured 8ft x 5ft x 1½ft deep

| Year:   | 1976 | 1977 | 1978           | 1979           | 1980           |
|---|------|------|----------------|----------------|----------------|
| Approximate amount of spawn (eggs) introduced         | 250  | 300  | 500            | —              | —              |
| Amount of spawn                                       | —    | —    | 2              | 4              | 7              |
| Approximate number of tadpoles reaching metamorphosis | 210  | 250  | •<br>not known | •<br>not known | •<br>not known |
| Number of adult frogs returning to spawn              | —    | —    | 60 20          | 80 40          | 150 70         |

\*Numbers involved were too large for even a rough approximation to be given.

It can be seen from the above table that results can be achieved from very small beginnings; by 1979 my pond had reached "saturation point" and tadpoles were transferred to a suitable pond nearby which was, at the time, devoid of tadpoles.

When we moved to our present address in 1980 we were fortunate enough to "inherit" a farmyard pond which despite being overshadowed by trees and heavily polluted with effluent from a septic tank overflow nonetheless had Common Frogs visiting it to breed. This meant I was unable to start from "scratch" to compare with the results shown in the table; however, after the trees around the pond had been thinned and the pollution stopped there was a remarkable transformation in water quality and plant growth. The following year a far greater number of tadpoles were seen in the pond and the overall population of adult frogs has increased by almost 300% since 1980.

We can all help to swell the depleted ranks of the Common Frog by establishing a colony in our garden thereby helping to ensure its continuing existence in an increasingly hostile world.

## LIBRARY

In recent years the library has been administered by the Linnean Society Librarian, to allow access to members during normal weekday office hours. Because of the open location of the collection there were, in the past, serious problems of security, and several books have disappeared, presumed stolen. An additional problem has been the failure of members to return books; this is made more difficult by a transient membership and changes of address. As nearly all books are irreplaceable, and some are of considerable value and scarcity, the library has been moved to the locked galleries of the main Linnean Society Library. For the time being it is *reference only*. Members can use the library from Monday-Friday 10am-5pm (closed for lunch), on request to the Linnean Society Librarian, who will unlock the gallery where the book collection is held. As the Librarian is occasionally out on business, members should telephone first to ensure that someone will be there when they call. (*Linnean Society Library, Burlington House, Piccadilly, London W1. Tel: 01-434 4479 or 01-734 1040*).

### NEW LIBRARY LISTS AND SERVICES

**Journals and other publications received from foreign societies and institutes**

a) Publications devoted wholly to herpetology, with contents of issues recently received.

*Photocopies of papers can be obtained from the BHS Librarian at a cost of 5p per page plus 30p postage and packing per paper. Delivery may take up to one month.*

#### **Lacerta**

Journal of the Dutch Society for herpetology and vivarium keeping (Nederlandse vereniging voor herpetologie en terrariumkunde). Published monthly. A beautifully produced Journal, well illustrated, often with colour photographs. The majority of papers concern the keeping and breeding of reptiles and amphibians in captivity. There are also monthly reports on society news, local group activities, advertisements, etc. In Dutch, usually with brief English summaries.

Contents of last issue received, May, 1983:

*Huisvesting en verzorging van waterschildpadden.* Hans Netten Ferry Zuurmond. Accommodation and general care of terrapins. 8 pages.

*Nederlandse namen van de inheemse amfibieën reptielen.* M. Sparreboom. 5 pages.

*Lekvrij voedselinsecten overbreugen naar het terrarium.* A. Grigoletto. 1 page.

*Allium als antiwormmiddel bij slangen.* J.W. Verkerk. Use of Allium to treat nematode infections of snakes. 2 pages.

*Filtermaterial voor wasemkappen.* Joost Nieuwenhuizen. 1 page.

*Verslag Het 1e Internationale Colloquium over Pathologie van Reptielen en Amfibien, Augers (Frankrijk), 29 Sept.-2 Oct., 1982.* P. Zwart. 3 pages.

#### **Bulletin de La Société Herpétologique de France.**

Quarterly. An excellent publication with papers on all aspects of herpetology, news items, reports, announcements.

Contents of last issue received, No. 25, 1er Trimestre 1983:

*Systematique: Liote des espèces d'Urodèles avec quelques notions de classification.* J. Raffaelli. 8 pages.

*Reintroduction: Le projet de réintroduction de la Ciotude d'Europe (Emys orbicularis) en Haute-Savoie. Methodologie de l'enquête préalable.* G.H. Pareut. 10 pages.

*Eco-Ethologie. Remarque sur un Triton récemment importé de Chine, le Paramesotriton caudipunctatus (Liu et Hu, 1973).* R. Thorn. 3 pages.

*Protection: A propos de protection.* B. Drucker. 4 pages.

*Élevage: Les problèmes éthologiques liés à la reproduction des chéloniens en captivité.* Vincent Bels. 5 pages.

*Bibliographie: Bibliographie de l'Herpétofauna Française de G.H. Parent.* Analyse de J. Lesure. 2 pages.

*Plus news, notes, reviews.* Total 71 pages.

#### **Bulleti de la Societat Catalana d'Ictiologia: Herpetologica.**

A new publication. A small but interesting journal concentrating on the Iberian fauna. Catalan, English summaries.

Contents of last issue received, no. 3, June 1983 (herpetological subjects only):

*Contribucio al coneixement de la distribucio del ratbufi (Euproctus asper, Duges 1852) a Catalunya.* Josef Navarro, Lluís Solé. 1 page.

*Notes sobre el comportament de Triturus marmoratus marmoratus (Latreille) 1800 (Amphibia, caudata). Conducta sexual.* Nati Horta. 5 pages.

*Aportacio per la unificacio de criteris per a la catalogacio de la fauna.* Nati Horta and Xavier Fontanet. 4 pages.

*Plus news and notes.* Total of 15 pages.

#### **Elaphe**

Journal of the East German terrarium/herpetological society. Publishes articles and notes mostly on the care of reptiles, amphibians and small mammals in captivity, plus some general articles on the Natural History of reptiles and amphibians. In German. Quarterly.

Contents of the last two issues received, nos 3 and 4, 1983.

3-83:

*Die strahlennatter – Elaphe radiata (Schlegel).* D. Schmidt. Care and breeding of *Elaphe radiata*. 4 pages.

*Etwas über das Verhalten von Landschildkröten.* Jens Jungnickel. 1 page.

*Meine Erfahrungen mit Platysaurus guttatus.* Wolfgang Freitag. 2 pages.

*Fund einer seltenen Zeichnungsvarietät bei Lacerta agilis agilis – Linnaeus, 1758.* Jörg Plötner. 2 pages.

*Aquatile Amphibien. Gigantismus oder Neotenie.* W.R. Grosse. 4 pages.

*Zur Haltung and Vermehrung von Bombina maxima im Terrarium.* R. Bech. 3 pages.

*Zum Brutverhalten von Aneides lugubris, dem Alligatoren – Salamander.* E. Wiesner. 1 page.

*Plus literature reviews and notes on society activities.* Total 49 pages.

4-83:

*Die gelungene Vermehrung einer australischen Gecko-Art, Gehyra australis (Gray, 1842).* H. Rosler. 3 pages.

*Zur Haltung von Sandrasselottern.* E. Sochurek. 2 pages.

*Beobachtungen bei Python regius.* R. Siegert. 3 pages.

*Beobachtungen zur Fütterung des Thailändischen Hausgeckos (Cosymbotus platyrus).* L. Gödicke. 2 pages.

*Aufzucht von jungen Testudo h. hermanni.* J. Jungnickel. 2 pages.

*Wir überwintern wir unsere Schildkröten?* P. Streckenbach. 1 page.

*Pflanzen für Terrarien.* R. Weissbach. 4 pages.

*Beobachtungen bes der Haltung des Goldbaumsteigerfrosches.* G. Haeusch. 2 pages.

*Plus reviews and notes on society activities.* Total 65 pages.

**Snoken: journal of the National Swedish Herpetological Association (Sveriges Herpetologiska Riksförening).**

Quarterly. A fairly substantial publication continuing articles on all aspects of herpetology, news and notes. Swedish.

Contents of last issue received, no 3, årgång 13, 1983:

*Statusrapport för Galapagos jättesköldpadda Geochelone elephantopus, med anmärkningar om G.e. ephippium på Duncan.* Auders G.J. Rhodin, Peter C.H. Pritchard and Robert P. Reynolds. 6 pages.

*Några råd angående skötsel av Bombina orientalis.* Berut Nilsson. 2 pages.

*Olding av husfluga.* Mats Sandqvist. 1 page.

*Undvik att bli biten.* Christer Nordin. 1 page.

*Ett litet men effektivt tvångsmatningstips.* Janne Bergin. 1 page.

*Några synpunkter på frågan om UV-ljus.* Berut Nilsson. 1 page.

*Håmndlystna grannar, myndigheter och innehavsförbud.* Peter Martinelle. 2 pages.

*Hur farlig är huggormen?* Hans Persson. 2 pages.

*Plus news, notes.* Total 23 pages.

#### **Japanese Journal of Herpetology**

Published by the Herpetological Society of Japan. A formal scientific journal with an emphasis on Japanese fauna.

Contents of the last issue received, June 1983, Vol. 10 No. 1:

*Heart rate - temperature relationship in a Japanese rat snake (Elaphe climacophora).* Hajime Fukuda. 6 pages.

*Reproductive traits of the Rana nigromaculata - brevipoda complex in Japan. I. Growth and egg-laying in Tatsuda and Saya, Aichi Prefecture.* Takako Serizawa. 13 pages.

*Plus notes and reviews.* Total of 26 pages.

#### **The Snake**

Journal of the Japan Snake Institute. A formal scientific journal with an emphasis on the snake fauna of Japan, plus notes, news, book reviews, etc.

Contents of the last issue received, December 1982, Vol. 14 No. 2:

*The Use of Enzyme Linked Immunosorbent Assay (ELISA) in Detection of Russell's Viper Venom in Body Fluid.* Khin Ohn Lwin and Aye Aye Myint. 6 pages.

*Functional Morphology of the Mid-mandibular Articulation in Oligodon arnensis (Shaw) (Serpentes: Colubridae).* U. Kiran. 8 pages.

*Scanning Electronmicroscopy of the Scale and Pit Organ of Japanese Snakes. 3. Agkistrodon caliginosus (Gloyd) and Trimeresurus flavoviridis (Hallowell).* S. Kikuchi, Y. Sawai and Y. Okuyama. 10 pages.

*Epidemiology and Clinical Study of Snakebite in Kasempa District of Northwestern Zambia.* M. P. Simbotwe. 4 pages.

*Study on Effectiveness of Arginine Lipidase on Cerebral Thrombosis.* W.-X. Hao, D.-L. Xu, Y.-L. Chang, W.-Z. Li, X.-Y. Zhang, W.-X. Li, F.-X. Han, P.-G. Zou, M. Ge and J.-P. Ding. 3 pages.

*Lysine Modification in Snake Venom Phospholipase A2.* C.C. Yang, K. King, T.P. Sun and W.S. Hseu. 9 pages.

*An Illustrated Field Guide to the Rough Tailed Snakes of India.* T.S.N. Murthy. 17 pages.



*Activities and Food Habits of Amphiesma vibakari (Boie) and Rhabdophis tigrinus (Boie).* H. Moriguchi and S. Naito. 7 pages.

*A Case of Mild Envenomation by the Hime-habu, Trimeresurus okinavenis Boulenger.* H. Sugano and Y. Sawai. 2 pages.

*Observation on Egg-laying in the Taiwan-habu, Trimeresurus mucrosquamatus.* E. Nakamoto and Y. Sawai. 2 pages.

*Plus news and notes.* Total of 58 pages.

#### **Journal of the Herpetological Association of Africa**

Publishes papers, notes, news items, etc., on all aspects of herpetology, chiefly relating to African species. Publication irregular.

Contents of last issue received, October 1983, No. 29:

*Recent African Herpetological Literature 4.* W.R. Branch. An authoritative listing. 6 pages.

*A note on the effect of fire on a population of angulate tortoises, Chersina angulata (Cryptodira Testudinidae), with an estimate of biomass.* C.L. Stuart and P. Meakin. 2 pages.

*Notes on the Cape Terrapin, Pelomedusa subrufa (Pleurodira: Pelomedusidae) in the Eastern Robertson Karoo.* C.L. Stuart and P. Meakin. 3 pages.

*Reproduction in the Cape File Snake, Mehelya capensis (Serpentes: Colubridae).* S. Krzystyniak and R. Pewtress. 1 page.

*Lacerta australis: additional material.* A.L. de Villiers, E. Baard and W.R. Branch. 2 pages.

*Octopus predation on the hawksbill turtle, Eretmochelys imbricata (Cryptodira: Cheloniidae).* C. Buxton and W.R. Branch. 2 pages.

*A report on scholiosis in the diurnal gecko Lygodactylus chobiensis FitzSimons 1932 inhabiting Lochnivar National Park, Zambia.* Malumo P. Simbtowe. 1 page.

*A record of Albinism in the Olive House Snake Lamprophis inornatus (Serpentes: Colubridae).* A.L. de Villiers. 2 pages.

*Plus book reviews and Editorial.*

#### **Notes from Noah**

The newsletter of the Northern Ohio Association of Herpetologists. Monthly. An excellent informal and informative collection of news items, articles on keeping animals in captivity, reviews, political comment, advertisements, etc. Invaluable for keeping in touch with herpetological events in North America.

Contents of last two issues received, October 25 and November 22, 1983.

October 25:

*A call of the wild.* R.D. Bartlett.

An attractively written, informal account of some amphibians of the Berkshire Hills, Massachusetts. 3 pages.

*Blackman's Head.* Dava Sobel.

About the use of a species of tree to produce a snake venom antidote. 1 page.

*Survival Advice, Courtesy of the U.S. Army.* Ellen Nicol. Condensation of official Army advice to its personnel on coping with venomous or dangerous reptiles, and the use of reptiles and amphibians as food. 3 pages.

*Some Fascinating Reptilian Beliefs.* Patrick Van Dijk. On folklore relating to reptiles and amphibians in Mexico. 3 pages.

*Fear and the Gaboon Viper.* Joseph A. Butler. Handling the Gaboon Viper. 4 pages.

*Earthwatch plans third Leatherback Expedition.*

Announcement. 1 page.

*Comments on Snake Evolution.* T.M. Cox.

Notes on scalation of snakes with comments on their evolution. 2 pages.

*"Bo-Constrictor" captured in Palm Beach – a sequel.* Carl D. May.

Capture of a Reticulated Python in South Florida. 2 pages.

*Plus various small announcements, advertisements, etc.* Total number of pages in newsletter: 24.

November 22:

Bert Langerwerf — *The Lacerta King.* R.D. Bartlett. An informal account of the remarkable achievements of Bert Langerwerf in breeding lizards in captivity. 4 pages.

*Handling Poisonous Snakes.* Scott Bastian. 2 pages.

*Herpetology: a Sanctuary for the Living Dead?* Martin J. Rosenberg.

On the use of *Bufo marinus* toxins in Voodoo, Haiti. 1 page.

*G.T., the Subterranean.* Janet Rodekohr.

An account of a private sanctuary for the Gopher Tortoise in Georgia, and the work of Rod Berger in the conservation of the tortoise. 4 pages.

*An attempt to keep Mexican Cat-Eyed Snakes.* Donna Waitkus.

Note on *Leptodeira annulata* in captivity. 1 page.

*Plus various sundry small announcements, advertisements, etc.* Total number of pages in newsletter: 22

#### **Bulletin of the Maryland Herpetological Society**

A fairly substantial quarterly publication, usually containing one or two major papers, and news notes, book reviews, etc.

Contents of last issue received, June 1983, Vol. 19, No. 2.

*New herpetological records from the state of México.* J. Luis Camarillo Rangel. 8 pages.

*A new frog of the genus Colostethus from the island of Tobago, West Indies (Anura: Dendrobatidae)* Jerry D. Hardy, Jr. 11 pages.

*Frogs and toads of stormwater management basins in Columbia, Maryland.* J.J. Bascietto and L.W. Adams. 3 pages.

*Plus various news items and notes.* Total of 33 pages.

#### **Voice of the Turtle**

Monthly newsletter of the San Diego Turtle and Tortoise Society.

#### **Northern California Herpetological Society Newsletter.**

News, notes, etc. Frequent issue.

#### **Texas Herpetological Society Newsletter.**

News, notes, etc.

#### **Chicago Herpetological Society Newsletter.**

News, notes, etc. Frequent issue.

#### **Marine Turtle Newsletter**

An international newsletter with news items and miscellaneous articles on sea turtles. Privately published by Prof. Nicholas Mrosovsky.

Contents of last issue received, July 1983, No. 25:

*Editorial on campaign to stop slaughter of Olive Ridleys in India.* N. Mrosovsky.

*Update on the Olive Ridley on the east coast of India.* E.O. Moll, S. Bhaskar and J. Vijaya. 2 pages.

*S.O.S. from sea turtles from Orissa.* P. Mohanty-Hejmudi. 1 page.

*Notes on marine turtles in Audhra Pradesh coast, India.* C.S. Kar. 3 pages.

*Report from Botswana (4th meeting of CITES)*. N. Mrosovsky. 4 pages.

*Age estimates of Cumberland Island Loggerhead Sea Turtles*. C. Ruckdeschel. 3 pages.

*Tag locations reserved*. D. Bowman. 2 pages.

*List of recent papers*. 2 pages.

*Plus other small news items*. Total 14 pages.

**b) Non-Herpetological Journals, Overseas**

Many of these journals frequently publish articles/papers on herpetology, these will be listed when they appear.

## INDIA

*Zoologiana*. Published by the Zoological Survey of India. Contains general papers on zoology, including applied zoology and conservation. Received irregularly.

*Bulletin of the Zoological Society of India*. A general, scientific zoological journal.

*Records of the Zoological Survey of India*. "A Journal of Indian Zoology". Occasional herpetological papers. About 2 issues per year.

## MALAYSIA

*Sarawak Museum Journal*. A substantial journal containing papers on a wide range of subjects: Natural History, Language, Archaeology, Social Science. 1 or 2 issues per year; occasional herpetological papers.

## SPAIN

*Vida Silvestre*. Published by the Instituto Nacional para la Conservacion de la Naturaleza (ICONA). A magnificently produced journal of general public interest on all aspects of Spanish Natural History and conservation. Beautifully illustrated with colour photographs. Quarterly.

*Boletin de la Estacion Central de Ecologia*. Published by ICONA. A beautifully produced scientific journal, publishing material on the Natural History of Spain. Colour photographs. Semi-annual.

*Miscel-lania Zoologica*. Published by the Museu de Zoologia, Barcelona. A scientific journal with papers on Spanish Zoology.

*Treballs del Museu de Zoologia*. Published by the Museu de Zoologia, Barcelona. A series of monographs on Spanish Zoology.

## ITALY

*Il Naturalista Siciliano*. Published by the Società Siciliana di Scienze Naturali. Publishes papers on the Natural History of Sicily.

## FINLAND

*Annales Zoologici Fennici*. Published jointly by the Finnish Academy of Sciences, Societas Scientiarum Fennica, Societas pro Fauna et Flora Fennica and Societas Biologica Fennica Vanamo. A scientific journal containing papers on all aspects of Finnish Zoology. English language.

## EAST GERMANY

*Aquarien Terrarien*. A monthly fish-keeping magazine, usually with articles on reptiles and amphibians.

*Zoologische Abhandlungen*. Publication of the Staatliches Museum für Tierkunde, Dresden. Scientific papers on zoological subjects. Herpetological papers in last issue received, Band 38 Heft 2 (1982):

*Zur Kenntnis der Schlangengutting Vipera (Reptilia, Serpentes, Viperidae)* F.J. Obst. 7 pages

*Intermediäre und abnorme Sandvipern aus der Herpetologischen Sammlung des Staatlichen Museums für Tierkunde Dresden (Reptilia, Serpentes, Viperidae).* H.J. Biella. 9 pages.

*Beitrag zur Kenntnis der Landschildkröten – Gattung Manouria Gray, 1852. (Reptilia, Testudines, Testudinidae).* F.J. Obst. 10 pages.

*Morphometrisch – ökologische Untersuchungen an ostasiatischen Wassermolchen der Gattungen Paramesotriton, Cynops und Hyselosotriton unter Berücksichtigung von Pachytriton. (Amphibia, Caudata, Salamandridae).* G.E. Freytag and Helga Beutel. 19 pages.

**Books: provisional list for December 1983. Some titles to be added.**

ADLER, E. (Ed.) (1978). *Early Herpetological Studies and Surveys in the Eastern United States.* New York: Arno Press.

ADLER, K. (Ed.) (1978). *Herpetological Exploration of the Great American West. 1 & 2.* New York: Arno Press.

ANDERSON, J. (1896). *A Contribution to the Herpetology of Arabia, with a Preliminary List of the Reptiles and Batrachians of Egypt.* London: R.H. Porter\*.

ANDERSON, J. (1898). *Zoology of Egypt. Volume First Reptilia and Batrachia.* London: B.Quaritch\*.

ANON. (Undated). *Ophiolatreta: An Account of the Rites and Mysteries connected with the Origin, Rise and Development of Serpent Worship.* Private Printing\*.

APPLEBY, L.G. (1971). *British Snakes.* London: John Baker.

AUFFENBERG, W. (1981). *The Behavioral Ecology of the Komodo Monitor.* Gainesville: University of Florida.

AXELROD, H.R. (1958). *Frogs and Toads as Pets.* Jersey City: TFH.

AXELROD, H.R. (1958). *Salamanders and Newts.* Jersey City: TFH.

BELLAIRS, A. d'A. (1957). *Reptiles.* London: Hutchinson\*.

BOGERT, C.M. & DEL CAMPO, R.M. (1956). *The Gila Monster and its Allies. The Relationships, Habits, and Behaviour of the Lizards of the Family Helodermatidae.* New York: Bulletin of the American Museum of Natural History. Vol. 109, Art. 1.

BÖHME, W. (Ed.) (1981). *Handbuch der Reptilien und Amphibien Europas.* Band 1. Echsen (Sauria) I. Wiesbaden: Akademische Verlagsgesellschaft.

BOULENGER, A.G. (1893, 1894, 1896). *Catalogue of Snakes in the British Museum (Natural History), Vol. 1-3.* London: British Museum (Natural History)\*.

BOULENGER, A.G. (1913). *The Snakes of Europe.* London: Methuen\*.

BOULENGER, G.A. (1913). *A Collection of Batrachians and Reptiles made by Dr. H.G.F. Spurrell, F.Z.S., in the Choco, Colombia.* London: Proceedings of the Zoological Society of London.

BREHM, A. (1912). *Die Lurche und Kriechtiere (2 Vols).* Leipzig.

BUCKLEY, E.E. & PORGES, N. (Eds.) (1956). *Venoms: papers presented at the first International Conference on Venoms, Dec. 27-30, 1954, Berkeley, California.* Washington D.C.: American Association for the Advancement of Science.

BUSTARD, H.R. & SINGH, L.A.K. (1982). *An Annotated Bibliography on Indian Crocodilians.* Rome: Food and Agriculture Organisation of the United Nations.

CALMETE, A. (1908). *Venoms, Venomous Animals and Autivenomous Serum-Therapeutics.* London: John Bale Sons & Danielssou\*.

CARNOCHAN, F.G. & ADAMSON, H.C. (1935). *The Empire of the Snakes.* London: Hutchinson\*.

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- CHRISTENSEN, P.A. (1955). *South African Snake Venoms and Antivenoms*. Johannesburg: South African Institute for Medical Research\*.
- CLOUDSLEY-THOMPSON, J.L. (1976). *Dietary Adaptations in Animals*. Durham: Meadowfield Press.
- CLOUDSLEY-THOMPSON, J.L. (1976). *Evolutionary Trends in the mating of Arthropoda*. Durham: Meadowfield Press.
- CLOUDSLEY-THOMPSON, J.L. (1977). *The Size of Animals*. Durham: Meadowfield Press.
- CLOUDSLEY-THOMPSON, J.L. (1978). *Form and Function in Animals*. Durham: Meadowfield Press.
- CLOUDSLEY-THOMPSON, J.L. (1978). *Why the Dinosaurs became Extinct*. Durham: Meadowfield Press.
- CONANT, R. (1958). *A Field Guide to Reptiles and Amphibians of the United States and Canada East of the 100th Meridian*. Boston: Houghton Mifflin.
- COOKE, A.S. & SCORGE, H.R.A. (1983). *The status of the Commoner Amphibians and Reptiles in Britain*. Huntingdon: Nature Conservancy Council.
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- FAYRER, J. (1872). *The Thanatophidia of India*. London: Churchill\*.
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John Pickett, Librarian

### Advertisement

## 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.

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## LETTERS TO THE EDITORS

### GANDHI — AN ERROR

Dear Sirs,

Re your reprinting of the Editorial from the Marine Turtle Newsletter (p.49, Bulletin No. 7) it is most unfortunate, when calling for 'respectfully worded' letters to the Prime Minister of India, that none of three signatories were able to spell the Prime Minister's name correctly. The same spelling mistake occurs again further down the Editorial.

The correct spelling of this (in India) highly emotive surname — because of the Mahatma — is GANDHI.

Robert Bustard,  
Airlie Brae, Alyth, Perthshire, PH11 8AX, Scotland.

\*\*\*\*\*

### INTRODUCED FROGS ON THE ISLE OF SHEPPEY

Dear Sirs,

Last summer I spent a week in Leysdown, Isle of Sheppey, Kent.

The area contained a few freshwater ponds, large expanses of marsh fleet and salt pools. Some pools were brackish and others very salty (the hot dry summer had condensed the salt levels). However, some pools (fresh, brackish and salt) contained a species of European green frog (these were calling with the two lateral vocal sacs).

Could any reader throw light on the origin and species of same?

Even though on some pools the frogs were numerous, some pools were in desperate need of conservation measures to remove holidaymaker's junk and litter. Could any member in or near Sheppey bring this to the notice of Sheppey District Council or any relevant wildlife/conservation groups concerned with the area. Particularly good ponds were:

- (i) A freshwater pond off the end and left of "Happy Valley Chalet Site" Warden Bay, Nr. Leysdown. Pond had many herp spp. but badly needs piles of junk pulled out.
- (ii) Salt and brackish pools landward of the sea wall when proceeding from Warden Bay toward Leysdown. Once more these needed cleaning of litter and junk from holiday-makers.
- (iii) Salt and brackish pools on "The Swale" an R.S.P.B. Nature Reserve. Clean, no conservation measures required.

Charles A. Snell,  
76 Birdbrook Road, Kidbrooke, London, SE3 9QP.

\*\*\*\*\*

### PREDATION ON TORTOISES BY ANTELOPES:

Angolan legends regarding *Kinixys belliana*

Dear Sirs,

In a discussion of the Yellow-backed Duiker, *Cephalophus sylvicultor* (Afzelius), Machado (1969:198) described the following under the section on folklore:

There is a widely held belief among Quiocos that *C. sylvicultor* has the custom of devouring turtles, at least those of the species *Kinixys belliana*, "Swangongo". The antelope blows into one side of the carapace of the turtle whose body comes out the other side. The truth of this is substantiated by the fact that at the sites frequented by antelopes one always finds empty carapaces of swangongo. The exhalation of this duiker is also said to be so bad that people on whom it breathes are killed.

In a recent review of carnivory in hoofed mammals Ganslosser (1981) made no mention of this or other instances of eating chelonians or other reptiles. The common name "Swangongo" does not appear in Loveridge and Williams (1957) for Bell's Hinged-tortoise or any other cryptodire chelonian in Africa. The Angolan legend may stem from observations of the duikers putting their noses close to empty shells of tortoises, perhaps in olfactory investigation.

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- Karl Kranz and Jack Frazier,  
Department of Zoological Research, National Zoological Park, Smithsonian Institution,  
Washington, D.C. 20008

## BOOK REVIEW

PARENT, G.H. (1983). *Animaux menacés en Wallonie. Protégeons nos Batraciens et Reptiles*. Duculot: Wallone. 171pp, 28 plates (all colour). No price given.

This is a nicely produced little book, the main aim of which is to outline the status of amphibians and reptiles in the southern (French-speaking) part of Belgium. In my view this aim is admirably fulfilled. A preface by the Belgian government is followed by a general introduction relating Wallone to the rest of Belgium; the substance of the book then follows in 3 sections. The first, and largest, section deals with species individually including discussions of habitats, background to present status, risk factors, conservation measures and bibliography in each case. Distribution maps are also provided here. The second section discusses causes of decline, and the third possible remedies including legislation, the use of nature reserves etc. There is also a useful glossary. The 28 colour plates of both species and habitats are of very good quality. Text is in French throughout.

I cannot find any serious point of criticism in relation to this production, except perhaps to express my regret that it could not have been extended to cover the entire country. Text is neat, clear and precise and the bibliographies comprehensively international; photographs are excellent, and illuminating among other things for their revelations about heathland conditions comparable with those found in the U.K. Professor Parent is to be congratulated, and it is to be hoped that his contribution is read attentively by those able to effect conservation measures in Belgium as well as the broader herpetological fraternity. Although it is difficult to recommend a book unreservedly without knowing its cost(!), it most certainly deserves a wide readership.

Trevor Beebee

## MEMBERS ADVERTISEMENTS

- **Wanted:** colour slides of "poison arrow" frogs, *Deudobates histrionicus*. Bill Isbester, 1006 Redbird Road, Augusta, Georgia 30904, U.S.A.
- **Contact and information wanted:** for two years I have been working on a research project concerning the conservation of sea turtles in South America. I would be interested in contacting other biologists working in this field.  
Clare Whitmore, c/o Prof. N. Mrosovsky, Dept. of Zoology, University of Toronto, 25 Harbord Street, Toronto M5S 1A1, Canada.
- **Wanted:** female Large Whip Snake, *Coluber jugularis*, female Kenyan Sand Boa, *Eryx colubrinus lovridgei*, female European Sand Boa, *Eryx jaculus*. Other species of sand boa will be considered. All the above are needed to make up pairs for a captive breeding program.  
Kim Leaver, Nowers Nurseries, Wellington, Somerset, TA21 9NN. Tel: Wellington 2169.
- **Wanted:** mature male *Natrix maura* to complete breeding stock.  
Murray Wright, 6 Kingsley Road, Loughton, Essex. Tel: 01-502 0484.
- **For disposal:** three Russell's vipers (*Vipera russelli*), one male and two females, with obvious breeding potential, are available.  
Dr. Lionel Kelleway, Hilltop, Oxwich Green, Gower, Swansea, SA3 1LU. Tel: Swansea (0792) 390625.
- **For Sale:** captive bred Treefrogs (*Hyla arborea*) and Caucasian Green Lizards (*Lacerta strigata*). Also rats and mice available.  
Simon Townson. Tel: 01-556 3373.
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