

**THE BRITISH
HERPETOLOGICAL SOCIETY**

BULLETIN

No. 2, December 1980

BRITISH HERPETOLOGICAL SOCIETY

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

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 £1.50 (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.

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

Contributions and correspondence arising from the Bulletin should be sent to:

John Pickett, 84 Pyrles Lane, Loughton, Essex IG10 2NW

EVENING MEETINGS 1981

All meetings start at 7 pm and are held in the Lecture Theatre of the Linnean Society of London, Burlington House, Piccadilly, London, W1., unless otherwise stated.

- FEBRUARY 24th Mr D. Street. The Reptiles of Eastern Europe with special reference to Hungary.
- MARCH 25th A.G.M. followed by a talk by Dr M.R.K. Lambert, Mr D. Stubbs (London University Natural History Society Expedition to N.E. Greece 1980) and Mr M.L. Hine on the conservation of Mediterranean tortoises: *Testudo graeca*, *T. hermanni* and *T. marginata*.
- APRIL 22nd A joint meeting with the Fauna & Flora Preservation Society, London, on the international trade in amphibians and reptiles. Mr J.A. Burton (FFPS Executive Secretary and Chairman IUCN/SSC TRAFFIC group) on the extent of trade, and Mr T.P. Inskipp (Head of Research, TRAFFIC) on the trade in reptile skins from India. Talks will be followed by a film and panel discussion. The time for this meeting will be extended.
- MAY 19th Mr R.H. Bridson (Nature Conservancy Council S.W. Scotland Region). Natterjacks at their north-western limit in Scotland.
- JUNE 24th Care and breeding of amphibians and reptiles from the New World. An open meeting and discussion to which members are encouraged to contribute. Live animals and slides welcome.
- JULY 8th Visit to the London Zoo. An informal meeting organised by the Captive Breeding Committee, held during a Members' Evening Meeting of the Zoological Society of London. BHS members should meet at the Fellows' Entrance in the Outer Circle of Regents Park at 7 pm. If the party has already entered the Gardens, please tell the gateman that you are with Mr Simon Townson or Mr Peter Bennett.
- SEPTEMBER 23rd Care and breeding of amphibians and reptiles of the Old World. An open meeting and discussion to which members are encouraged to contribute. Live animals and slides welcome.
- OCTOBER 27th A joint meeting with the Jersey Wildlife Preservation Trust. It is hoped that Mr Gerald Durrell, the Trust's Chairman, will give an introductory talk on the Trust's work, followed by Mr J. Hartley (Assistant to Gerald Durrell) on the captive breeding of rare reptiles and their conservation on Round Island (Mauritius), Indian Ocean.
- NOVEMBER 25th Dr S.P.A. Gittins (Dept. of Applied Biology, University of Wales I.S.T., Cardiff). Migration of the Common Toad (*Bufo bufo*) in Wales.

IMPORTANT NOTICE FROM THE MEMBERSHIP SECRETARY SUBSCRIPTION REMINDERS

Some confusion has arisen in the past over the late payment of subscriptions. Since the Society's finances depend on prompt payment of annual subscriptions, it has been felt the following points should be laid down as guidelines.

Annual subscriptions (currently £10 for Ordinary members) are automatically due on 1st January each year. Late subscribers will receive a reminder at the end of the taxation year in the beginning of April.

A final reminder will be sent out instead of the Summer's issue of the Journal and Bulletin. These will be forwarded upon receipt of the subscription fee.

It is always possible to pay your subscriptions to the Membership Secretary or through a member of the Committee at the end of the Evening Meetings held in the Linnean Society of London.

It is regretted that more definite measures over subscription payments will have to be adopted in future. With the ever increasing numbers of new members and journal subscribers, especially from abroad, it has been found necessary to lay down some kind of stipulation. The Committee appeal to members' forbearance in this respect and hope that the expense in sending out subscription reminders can be obviated.

THE SOCIETY WOULD LIKE TO THANK MR G. BERNAU for his generous donation to the Society's funds; this is greatly appreciated in a time of particular financial difficulty for the Society.

NEW JUNIOR SECTION OF THE BRITISH HERPETOLOGICAL SOCIETY

Founded in 1947 the British Herpetological Society is the oldest and largest herpetological society in Britain, its members being actively involved in the conservation of our native reptiles and amphibians and in the captive breeding of species from overseas. Until recently membership of the B.H.S. was restricted to persons over the age of 17 but now a Junior Section has been formed, nicknamed the "J Herps", which gives children a chance to take an active interest in the work of the society.

If you are between the ages of 9 and 17 and are seriously interested in the study and conservation of reptiles and amphibians then you are eligible to join. Membership of the J Herps, which costs £1.50 per year, brings the following advantages:

J Herps receive the B.H.S. Bulletin which contains interesting articles and letters on various aspects of herpetology – although published for the adult members of the society much of the content of The Bulletin is of interest to J Herps.

J Herps receive their own Junior Newsletter three times a year which contains news, information and competitions.

J Herps DO NOT receive the Journal of Herpetology which contains scientific papers and is not suitable for children. Junior members can purchase copies of the Journal from the B.H.S. if required.

The Junior Section runs an S.A.E. Advisory Service for its members in order to provide expert advice on any specific problems that they may have.

In the future it is hoped to organise special meetings, film shows, lectures, etc. for members of the Junior Section.

Applications for membership of the Junior Section should be made to:

The Education Officer
British Herpetological Society
82 Nags Head Road
Enfield, Middlesex.

CAPTIVE BREEDING COMMITTEE REPORT 1980

1980 has been a most interesting year in the field of captive breeding; there has been a great increase in the number of species bred by our members with a corresponding fuller understanding of the reproductive biology of these animals. Some of the recent successes are described in our new publication entitled "The Care and Breeding of Captive Reptiles" (see later).

Listed below are the names and addresses of present members of the Captive Breeding Committee, with their special areas of interests (in brackets). Members of the B.H.S. with any herpetological queries are encouraged to write to Committee members at the addresses below, and we will do our best to help.

Simon Townson (Chairman), 23 Fladgate Road, London, E11 1LX. Tel: 01- 989 9570.
(Reptiles and amphibians in general, particularly snakes).

Dr A. Milwood, 8 Whiteshott, Basildon, Essex. (Amphibians).

Bryan Makin, 64 Abbey Avenue, Wembley, Middlesex. (Amphibians).

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

Dudley Lucas, 13 De Bohun Avenue, Southgate, London, N.14.
(Reptiles and amphibians in general, particularly snakes, including venomous species).

Peter Bennett, 45 Holdenhurst Avenue, Finchley, London, N.12. (Amphibians).

Nick Millichamp, MRCVS, 24 Paddock Way, Chedburgh, Suffolk
(Reptiles, particularly veterinary aspects).

SATURDAY MEETINGS

The meeting held at the London Zoo on 23rd August 1980 proved to be a great success. The meeting was well attended and the three speakers, Mr B.A.W.A. Langerwerf, Dr Anthony Millwood and Mr Simon Townson, were well received. We would particularly like to thank Mr Langerwerf who came from Holland at his own expense to speak to the Society. He must be congratulated on his tremendous success in breeding large numbers of lizards (over 900 per annum) from temperate regions, and it is clear that his techniques could play an important role in the conservation of some species, such as the British Sand Lizard, *Lacerta agilis*.

The Committee hopes to organise a similar Saturday meeting towards the end of 1981; details will be circulated beforehand.

SPECIES BRED BY BHS MEMBERS

1980 has been a good year; many new species have been bred by our members, some of them for the first time in captivity. The following list includes species we know have been bred successfully, and we would like to hear from members who have bred species which are not listed.

Amphibians

Alytes obstetricans, *Bombina orientalis*, *Bombina variegata*, *Discoglossus pictus*,
Bufo bufo, *Bufo calamita*, *Bufo viridis*, *Rana temporaria*, *Rana esculenta*,
Xenopus clivii, *Xenopus borealis*, *Xenopus tropicalis*, *Xenopus laevis*,
Ambystoma mexicanum, *Xenopus vestitus*, *Salamandra salamandra*,
Pleurodeles waltl, *Triturus marmoratus*, *Triturus alpestris*, *Triturus vulgaris*,
Triturus vittatus, *Triturus cristatus*, *Triturus helveticus*, *Triturus (Cynops)*
pyrrhogaster.

Reptiles

Testudo graeca, *Testudo hermanni*, *Testudo pardalis*, *Lacerta viridis*,
Lacerta agilis agilis, *Lacerta agilis exigua*, *Lacerta lepida pater*,
Lacerta vivipara, *Lacerta caucasica caucasica*, *Lacerta praticola pontica*,
Lacerta armeniaca, *Lacerta schreiberi*, *Lacerta rudis obscura*,
Lacerta rudis svanetica, *Lacerta strigata*, *Lacerta peloponesiaca*,
Lacerta laevis laevis, *Lacerta laevis troodica*, *Lacerta horvathi*,
Lacerta erhardii, *Lacerta trilineata hansschweizeri*, *Lacerta danfordi anatolica*,
Lacerta bedriagae paesleri, *Lacerta monticola cyreni*, *Lacerta pityusensis*,
Gallotia stehlini, *Agama sanguinolenta*, *Agama stellio*, *Agama caucasia*,
Agama lehmanni, *Anguis fragilis*, *Acanthodactylus schreiberi*,
Sauromalus obesus, *Tiliqua scincoides*, *Eublepharis macularius*,
Phelsuma laticauda, *Phelsuma madagascariensis*, *Phelsuma guentheri*,
Iguana iguana, *Thamnophis sirtalis sirtalis*, *Thamnophis sirtalis infernalis*,
Thamnophis radix, *Thamnophis sauritus*, *Thamnophis elegans*, *Natrix sipedon*,
Natrix maura, *Natrix natrix*, *Elaphe obsoleta obsoleta*, *Elaphe obsoleta*
quadrivittata, *Elaphe obsoleta lindheimeri*, *Elaphe guttata*, *Elaphe situla*,
Pituophis melanoleucus melanoleucus, *Drymarchon corais couperi*, *Lampropeltis*
getulus californiae, *Lampropeltis getulus florida*, *Lampropeltis calligaster*,
Lampropeltis pyromelana, *Lampropeltis mexicana*, *Lampropeltis triangulum nelsoni*,
Lampropeltis getulus niger, *Boaedon fuliginosus*, *Constrictor constrictor*,
Epicrates striatus striatus, *Python molurus bivittatus*, *Python molurus bivittatus*
X Python molurus molurus, *Eunectes notaeus*, *Vipera berus*, *Vipera ammodytes*,
Crotalus atrox, *Crotalus viridis*, *Bitis arietans*, *Bitis gabonica*.

PUBLICATIONS

- (i) The BHS publication entitled "The Care and Breeding of Captive Reptiles" is now available (see advertisement).
- (ii) Information sheets. Members are reminded that information sheets on the care of reptiles and amphibians in captivity are available from the Chairman of the Captive Breeding Committee, Mr Simon Townson, 23 Fladgate Road, Leytonstone, London, E11 1LX. Please enclose a large stamped addressed envelope. Subjects at present covered are listed below:

1. Tortoises
2. Terrapins
3. Yellow and Fire Bellied Toads (*Bombina* sp.)
4. Clawed Frogs (*Xenopus* sp.)
5. Salamanders (mainly *Salamandra salamandra*)
6. Treefrogs (*Hyla cinerea* and *arborea*)
7. European Lizards (mainly *Lacertids*)
8. Iguanas (*Iguana iguana*)
9. Garter snakes (*Thamnophis* sp.)
10. Pythons and Boas
11. Rat and King Snakes (N. American *Elaphe* and *Lampropeltis*)
12. Venomous Reptiles and the Dangerous Wild Animals Act 1976.
(This deals with legal aspects only and not care)
13. Painted Frogs (*Discoglossus pictus*)
14. Axolotls (*Ambystoma mexicanum*)

JOINT PROJECT BETWEEN THE BHS CAPTIVE BREEDING COMMITTEE AND THE JERSEY WILDLIFE PRESERVATION TRUST

The Jersey Wildlife Preservation Trust has deposited six Jamaican Boas (*Epicrates subflavus*) with the BHS on breeding loan. These six specimens (four female, two male) were bred in captivity by the Trust three years ago, and it is hoped that when these specimens become sexually mature in two to three years time they will produce a second generation. It is our intention to help the Trust in establishing strong captive breeding populations of this threatened species to prevent its final extinction and to provide captive bred specimens for possible reintroduction programmes.

For many years the Jamaican Boa has been considered endangered and is now very rare. Its decline is almost entirely due to predation by the introduced mongoose and feral cats. We are very pleased to have the opportunity to take part in a captive breeding project which is directly part of a conservation programme.

GOOD NEWS FOR THE CAYMAN IGUANA

The Cayman Island Iguana (*Cyclura nubila caymanensis*) is threatened in its last stronghold on Little Cayman by the intention of the Cayman Island Government to allow a huge oil terminal to be built there. However, it now appears that the project has not progressed past the surveying stage and that building has been temporarily postponed – for how long we do not know. Apparently we can thank the world economic slump for this respite.

FINANCES

Input:	£130	carried over from 1979
	100	from BHS main Society
	115	donations towards the costs of publishing "The Care and Breeding of Captive Reptiles"
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Total:	£345	
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Outlay:	23	Postage, stationery, photocopying, etc.
	131	Air freight, packaging, handling, customs clearance, VAT, and accommodation for 6 Jamaican Boas from the Jersey Wildlife Preservation Trust.
	1400	Printing costs for "The Care and Breeding of Captive Reptiles"
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Total:	£1554	
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The Captive Breeding Committee starts 1981 with a deficit of £1,209. Mr Simon Townson and Dr Anthony Millwood have loaned the Society this amount of money to ensure that "The Care and Breeding of Captive Reptiles" was published. It is hoped that the money will be recovered from sales of this volume.

Simon Townson (Chairman)

FRANCO-SPANISH HERPETOLOGICAL COLLOQUIUM 1981

The French herpetological society (Société Herpétologique de France – SHF) announces (30th July 1980) that a Colloquium is to take place at Jaca (Huesca), North Spain, on 25th–31st May 1981 on the evolution, biology, ecology, biogeography and conservation of amphibians and reptiles of southern Europe and the Mediterranean Basin. The arranger is Dr E. Balcells (Centro Pirenaico de Biología Experimental) and the meeting is effectively a sequel to the SHF European Herpetological Congress held at Toulouse, 1st–6th September 1975.

It is important that herpetologists who have worked in the south of France and southern Europe as a whole should try and attend.

Those interested, giving the title of any communication or paper they would like to present, should make contact as soon as possible with the SHF Vice-President:

Dr J Lescure
Laboratoire des Reptiles
Museum national d' Histoire naturelle
57 rue Cuvier
75005 Paris.

INTERNATIONAL STRATEGY FOR CONSERVATION OF EUROPEAN HERPETOFAUNA

With the increasing pressures on all species of European herpetofauna the time for a concerted and unified European initiative by those most active in the field or herpetological conservation and field research has arrived. (This proposal was agreed by the Delegates to the 1980 European Herpetological Symposium, Oxford, England.)

The intention is to present in the near future, a single succinct plan for the conservation of European herpetofauna which incorporates the ideas, data, information, criticisms and suggestions put forward by those European bodies capable of offering substantial funds.

Contributions are welcomed by all individual herpetologists regardless of their nationality or their affiliation to any society. We are not proposing a new society nor do we seek anything other than the rapid completion of a plan of action written and agreed by those individuals most involved with herpetology. In order to expedite this intent we propose that Mr John Coborn, Cotswold Wild Life Park, Burford, Oxfordshire, England will act as co-ordinator, receiving plans and reports and disseminating these to other herpetologists for comment.

Signed: J. Coborn, D. Dolmen, P. van den Elzen, K. Grossenbacher, T. Hagström,
R. Honegger, M. Lambert, R. Needham, R. Podloucky, A. Stumpel, I. Swingland.

Oxford, 1 April 1980

RARE MEDITERRANEAN SPECIES THREATENED BY MASS TOURISM

Reports on a conference in *The Observer* (12th October 1980) and *The Times* (14th October 1980).

Sponsored by the United Nations Environment Programme (UNEP) following their success with agreements over pollution of the Mediterranean Sea, a conference, with papers drawn up by the International Union for the Conservation of Nature and Natural Resources (IUCN), consisting of experts from the 18 Mediterranean Countries was held in Athens the week of 13th–17th October to agree on the creation of reserves where vulnerable species will be able to survive.

Apart from grave concern for the monk seal in scattered Aegean localities and for egg-laying beaches by turtles, as well as threatened coastal and marine plants, concern was also expressed about the status of other species which include some herpetofauna: the spectacled salamander (*Salmandrina terdigitata*), Iberian midwife toad (*Alytes cisternasi*), Israel painted frog (*Discoglossus sp.*), common chameleon (*Chamaeleo chamaeleon*) and Mediterranean spur-thighed tortoise (*Testudo graeca*).

Tourists proliferate over once-isolated beaches and wildlife habitats. Marinas and hotels often destroy the very beauty of the lands for which the Mediterranean Countries should justly feel proud. More than 100 million tourists visit the Mediterranean region each year and this figure is expected to double by the end of the Century. Urban spread, industrialisation and overfishing are further threats.

The Conference seeks agreement over technical guidelines for the selection, establishment and management of protected areas. Such areas for mammals and birds, the specialists have suggested would be of benefit to amphibians, reptiles and plants!

The Mediterranean wildlife specialists will meet again in Cannes (France) next March with the first draft of an agreement for consideration.

FISHMONGERS PROHIBITED FROM SELLING LIVE TORTOISES IN FRANCE

Tortoises are sometimes sold as food in France and have been imported in large numbers. Requests to import 700,000 were made in 1979.

The *Bulletin de la Société Herpétologique de France*, No. 14 (1980) reported that Society representation to control the importation of tortoises was made at a meeting with the French Ministry of the Environment and 'Cadre de Vie' (6th March 1979). The risks to health through the spread of salmonellosis from the excrement of live tortoises placed next to fish by fishmongers was discussed. Another meeting on 21st March 1979 was held at the Ministry of Agriculture with the head of the Fish Products Section of the Veterinary Department for Food Hygiene and the Director of the Veterinary Department and further evidence presented. It was felt that a Circular for wide circulation strongly pointing out the unhygienic nature of stocking live tortoises with fish was necessary to end such practices in future.

The circular pointed out that *Salmonella* bacteria in tortoises' digestive tracts, in particular *S. arizona*, can cause intestinal disorders and poisoning in humans. In 56 *Testudo graeca* from the Tangiers region of Morocco in 1960, 96% of those from fields and 64% from the town (mainly from their feeding habits) were infested by salmonellosis. (In the U.S.A., 14% of the two million cases of salmonellosis annually are caused by tortoises or terrapins.)

The excrement of tortoises can be a risk to children playing with them. This should be understood by parents before buying tortoises as pets.

A DISTRIBUTION ATLAS FOR THE EUROPEAN AMPHIBIANS AND REPTILES

Since the 1973 Provisional Atlas of the Amphibians and Reptiles of the British Isles (H.R. Arnold Ed., Biological Records Centre, Monks Wood Experimental Station, Abbots Ripton, Huntingdon, PE17 2LS.) was produced, provisional atlases have been prepared by several other European countries. Members of the national herpetological societies have assisted in this: in France, the Societe Herpetologique de France; in West Germany, the Deutsche Gesellschaft fur Herpetologie und Terrarienkunde; in the Netherlands, the Nederlandse Vereniging voor Herpetologie en Terrariumkunde, and in Italy, the Unione Erpetologica Italiana. The newly founded 'Societas Europaea Herpetologica' may be able to play a co-ordinating role in this work in the future and Dr R. Feldman has been involved with this in West Germany. It would now seem that BHS members should be able to help their colleagues on the continent by providing any information they have to hand on species observed during past visits to the continent.

At the European Herpetological Symposium recently held at Oxford University a resolution was passed proposing an international strategy for the conservation of the European Herpetofauna. Many species are declining drastically for they are often closely restricted by habitat types which are rapidly being destroyed in highly developed industrial Europe, and have limited powers of recolonization by dispersal. A manifesto proposes a unified and concerted effort to conserve the European Herpetofauna. For conservation purposes, the distribution of viable habitats for species is of greater importance than the distribution of species themselves, for information on the latter is often based on the sighting of a single individual. Nevertheless, a conservation strategy in the absence of information on species occurrence in a region is difficult to devise!

Many gaps appear on current distribution maps through lack of species records over much of Europe, especially Southern Europe, where most of the species occur. An appeal is therefore made here to all BHS members for locality records for species of herpetofauna observed while on visits to the continent. Many members must take their spring and summer holidays in Europe and presumably observe species in their natural habitats while there. Proper identification is now facilitated by reference to A Field Guide to the Reptiles and Amphibians of Britain and Europe (1978) by E.N. Arnold, J.A. Burton and D.W. Ovenden (Collins, London) which provides identification keys, together with very accurate illustrations of all the species to be found. No field herpetologist in Europe should be without this book!

The information required for species recorded is:—

1. Country
2. Exact locality: distance and compass bearing from nearest large town, with latitude and longitude if possible.
3. Date (day, month, year).
4. Number of individuals seen.

If the following additional information is available, it will be useful:

5. Time of day (and time zone, i.e. GMT, BST, CET, etc.).
6. Altitude.
7. Air temperature.
8. Weather; general description of the day.
9. Other species in the vicinity.

Information from past years is useful, particularly if it provides evidence of species or habitat declines (or increases!).

Records should be sent direct to: H.R. Arnold, Biological Records Centre, Monks Wood Experimental Station, Abbots Ripton, Huntingdon, PE17 2LS, or via the BHS secretary or Committee members.

DISTRIBUTION SURVEY IN WILTSHIRE: APPEAL FOR HELP

The Wiltshire Archaeological & Natural History Society is conducting a survey of the distribution of the reptiles and amphibians of Wiltshire. The results will be published in book form by the Society in conjunction with the County Library and Museum Service. Will anyone who can be of assistance, with information on the past or present status of the Wiltshire fauna, please contact the County Recorder for Reptiles and Amphibians: Mrs Marion Browne, Latimer Lodge, West Kington, Chippenham, Wiltshire.

DAY COURSE ON THE REPTILES AND AMPHIBIANS OF WILTSHIRE

A one day course on the reptiles and amphibians of Wiltshire is being organised by the University of Bristol Department of Extra-Mural Studies. The course will take place on Saturday, 11th April 1981 at Urchfont Manor, Devizes, Wilts., from 10 am – 5 pm. The tutors will be Dr R. Avery, P.J. Dillon and J. Sims. The course will examine aspects of the biology and ecology of the British species in the context of their distribution in a county of contrasting habitats. Reptile behaviour will be discussed in terms of physiological adaptations shown by British Lizards and the breeding biology of amphibians will be studied in the field. There will also be a discussion on recent changes of distribution and status of the Wiltshire fauna. Tickets (£2.40, half-fee for State Pensioners) are available from the Administrative Assistant, Extra-Mural Department, University of Bristol, 32 Tyndall's Park Road, Bristol BS8 1HR.

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THE HERPETOLOGICAL ASSOCIATION OF AFRICA

The Herpetological Association of Africa is now 15 years old, but can trace its genealogy back a further 7 years to the birth of its parent Society – the Herpetological Association of Rhodesia. During this long period the Association's Journal has been, and remains, the only publication dealing specifically with African herpetology.

The Journal (3-4 issues a year) is well illustrated and caters for both the professional and amateur herpetologist. Membership is open to all interested persons (R4.00 or \$ 6.00 per annum) and details can be obtained from the Secretary, Dr W.R. Branch, Port Elizabeth Museum, Box 13147, Humewood 6013, Port Elizabeth, South Africa.

WILDLIFE & COUNTRYSIDE BILL: DAFT EDITION

At the time of writing, this bill – due to become law in summer 1981 – contains a provision which would make illegal the release of European species such as the edible frog, wall lizard, etc. in the U.K. Readers may be interested to know the details of the first test case of this new legislation, a transcript of which fell into the hands of a herpetological mole and is reproduced below in full

Magistrate: The case now before us involves charges of a most grievous and serious nature. I call upon Mr Uriah Proctus, counsel for the prosecution, to open these proceedings.

U. Proctus: Sirs, it is my intention to prove that on the morning of April 1st 1981 the accused, one Chris Tatus, did willingly and with malice aforethought release one entire Edible Frog into his garden pond at No. 2 Bogpool Gardens, Wigan.

Magistrate: Mr Tatus, how do you plead, guilty or more guilty?

Chris Tatus: Yes m'lud.

Magistrate: Mr Proctus, your first witness.

– call M's Sally Mandra.

U. Proctus: Mrs Mandra, will you tell the court in your own words what you observed on the morning of April 1st?

Sally Mandra (sobbing): Oh what a terrible, terrible day yer honour. About 11 o'clock it was, I'd just caught some fresh bluebottles for the eccles cake. I happened to look out the winder an' there 'e was, wavin' it about. Horrible.

Magistrate: Waving it? The frog?

Court usher: Excuse m'lud, there seems to have been a mistake. Mrs Mandra is a witness in the python case, not this one.

– next witnesses. Call Sam O'Drommus and Phil O'Dactylus.

Proctus: Will you tell the court what you saw in Mr Tatus's garden on the morning of April 1st?

O'Drommus: To be sure, there we were sittin' in the hedge, when up the garden, cheeky as you like, comes dis fella Tatus. No attempt at concealment, nuthin'. Gets to the pond with this plastic box, see. Lid opens, and out pops the frog. Blatant as you like, straight into the pond. Stunned we were.

Magistrate: What exactly were you doing in Mr Tatus's garden?

O'Dactylus: Looking for our stray cat Zenn m'lud. That Mr Tatus, he must have heard us. "Zenn, O' pus" we was calling, all the time.

Proctus: Next witness, m'lud. is detective inspector Algy Roides of Wigan CID Anuran offences division.

A. Rhoides (reading from April 1 notebook): Arrived at 2 Bogpool gardens in response to 999 call from Mr O'Dactylus. On entering premises observed the accused in act of feeding axolotls – a disgusting practice but still legal for consenting adults in private. Seized piece of equipment – 1 sandwich box, exhibit 'A', from kitchen table. Moving out to garden pond, I observed the said frog swimming in a northerly direction. Took immediate action and applied 2 strokes of truncheon; frog was then retrieved (exhibit 'B'). Gave Mr Tatus usual caution and made arrest.

Magistrate: A commendable effort inspector. But tell me, why does the frog appear to be legless?

Roides: We noticed that too m'lud, but unfortunately no suitable breathalyser was available.

Magistrate: Is that all?

Roides: Not quite m'lud. On revisiting the garden of the accused, I did then notice two tadpoles swimming freely and without restraint in said pond. Frogman Al Ytes was summoned and made three dives, but only one tadpole was apprehended.

Magistrate: Why is this exhibit not before us?

Roides: Not much left after the harpoon gunning m'lud. I think the explosive warhead was the main problem. I'm afraid I have to report that frogperson Ytes failed to surface after the third dive; it was a very weedy pond

Magistrate: You mean

Roides: Yes, at least one tadpole is still at large. However, action is in hand. Pond blocks have been set up all round Wigan and no frog can enter or leave without a Nature Conservancy license. It can only be a matter of time.

Proctus: Thank you inspector. My last witness is Dr Tess Tudo of the Institute of Herpetological Law. Dr Tudo, you have examined exhibit 'B' and in addition made a life's work of the study of frog trafficking in Europe. Your comments please.

Tess Tudo: A most interesting case. Careful examination of spot patterns, knee lengths and eye joints together with the detachable legs labelled "pour manger" lead me to conclude that this frog may possibly perhaps be of French origin. A co-operative investigation with Interpol Herpetologique has filled in the history of this whole sad affair. The animal almost certainly originated in a place called "The Wild", a breeding ground for amphibians of many types that politicians and developers of all nations have dedicated themselves to eliminate at the earliest possible opportunity. Then there seems to be an Arabian connection, since the name El Aphe appears again and again in regard to reptile and amphibian trafficking. Almost certainly the frog was sold to Mr Tatus in this country by one of the so-called "aquarist" shops which are so often a front for this distasteful business.

Magistrate: Chris Tatus, you have heard the evidence. Is there anything you wish to say before I pass sentence?

Tatus (snoring): Pardon?

Magistrate: You are clearly guilty of one of the most unpleasant acts it has been my misfortune to judge. Thanks to you, no British frog will be safe to swim the ponds at night. I therefore feel obliged to make an example of you; you will be taken from this place and sent to work for the Nature Conservancy Council for a period of 6 months or until confirmation of brain death, whichever is the sooner. May the Lord have mercy on your axolotls.

POSTSCRIPT: Herpetologists will no doubt be pleased to hear that this ruling was overturned on appeal to the House of Lords. By a 2:1 majority it was decided that the rights of the individual frog should have priority since under EEC regulations 19/63192/D all member countries are obliged to permit the entry of EEC nationals irrespective of skin texture. Furthermore the impounding of frogs legs even when still on the hoof could lead to more reprisals against British lamb, sand lizard cutlets etc. Unfortunately the ruling came too late for Chris Tatus, who suffered a coronellary and total brain atrophy after 3 weeks with the NCC. In the best traditions of that organisation he was thus declared extinct and elevated to the most senior position available.

Trevor Beebee
Vivarium Punishment Block
Reptile Offenders Wing
Strangeways.

December 1981.

ARE SEA TURTLES THREATENED BY SOME CONSERVATIONISTS ?

JOHN PICKETT and SIMON TOWNSON

*British Herpetological Society,
c/o Zoological Society of London, Regent's Park, London, NW1.*

In this issue of the Bulletin we have given a large amount of space to the subject of Sea Turtle farming and conservation. This is because there have been recent developments of a political nature which are of unusual importance for sea turtle conservation and farming: developments which may have far reaching consequences not only for the future of sea turtles but for the future integrity of the conservation movement and for the principles of the breeding of any wild animal for any purpose in captivity.

Certain individuals and conservation organisations have been actively and vociferously campaigning against the existence of the Cayman Island Turtle Farm; few measures have been spared in the attempt to ensure the commercial failure and eventual closure of the farm. An account of the Farm and its political problems was given in the last issue of the Bulletin (No. 1, June 1980: see *Observations and Notes on the Captive Breeding of the Green Sea Turtle, Chelonia mydas, on Grand Cayman, British West Indies*, by Simon Townson and *Political Problems for the Cayman Turtle Farm: Which Way Conservation?* by John Pickett and Simon Townson). More substantial detail is given in two papers in this issue: *Cayman Turtle Farm Ltd., the Crock of Gold* by W.A. Johnson and *Turtle Farms and Ranching* by Professor L.D. Brongersma.

The arguments used against turtle farming are hard to understand, and very disturbing; their nature is wholly negative and their effect, it seems to us, will be to do grievous harm to turtle populations by making impossible the application of rational conservation measures. The articles in this issue give ample illustration of the critical problems facing turtle conservation, and indicate the sensible balance of measures which would achieve success. They show well that a constructive and positive line can be taken. However, the people who propose these constructive measures are in a minority, and because at present the more negative ideas prevail, and obtain most publicity, their chances of application are slim. Influential bodies such as the Fauna and Flora Preservation Society, Friends of the Earth, and TRAFFIC wish to see a moratorium on all trade in turtle products, to include those produced in genuine farms. This would be most inappropriate, because existing international controls allow for trade in farmed or ranched products and the governments and people of the countries concerned have a real vested interest in the survival of sea turtles; there is incentive for effective protection and conservation of remaining populations, as exemplified by the ranching operation in Surinam and the Cayman Turtle Farm. This has been shown to work. If such operations are not permitted to exist, then the future for sea turtles is plain. Real incentives for national protection would be removed; thereafter conservation would depend only on ethics or moral principle. In the difficult human circumstances current in the areas in question – political instability, weakness of government control and law enforcement, pressure for commercial development of beach areas, general impoverishment – reliance on human virtue alone is extremely unlikely to work. The strongest protection that can be given by the most exceptionally determined governments is that of armed soldiers patrolling nesting beaches. The only instance when such a measure has been taken is in Mexico. This has been ineffective. Archie Carr, in a report in the Marine Turtle Newsletter (*Encounter at Escobilla*, Marine Turtle Newsletter No. 13, Nov., 1979) states that the armed protection by marines of the laying beaches of the Olive Ridley in Oaxaca has become lax, and in some cases the marines assigned to the work had not been effective. It can be expected that this most extreme form of protection will be given to turtles only in rare instances. Local predation will effectively be unchecked: nominal conservation laws in countries where people have little motivation for obeying them, and national controls are weak, have little chance of success. Most of the countries concerned will be preoccupied with other more pressing affairs. Finance is lacking. The international conservation organisations,

both voluntary and official, are unlikely themselves to be able to fund the measures which would be necessary on such an extensive a scale. An international trade moratorium, stringently and effectively enforced by the Customs authorities of the rich importing nations would not be sufficient: local consumption in the countries of origin, so difficult to prevent, is enough alone to bring extinction. So how will the turtles then be saved?

Farming and ranching seems, plainly, the best hope of encouraging real and meaningful protection of turtles and, if given the chance, will grow to dominate trade because of the predictability of supply and the quality and standardised nature of its products. As Professor Brongersma points out, we are here dealing with a domesticated animal. Probably, never in all History could the domestication of an animal have met with such opposition. Fortunately, on the subject of farming we are not working in the dark. Besides the remarkable achievement of Cayman Turtle Farm in the establishment of a self-sustaining captive breeding colony of the Green Turtle, we have the example of Crocodile farming: within a period of a few years it has become phenomenally successful, and shows what can be done when constructive policies are applied. Young crocodilians have been produced in abundance for restocking programmes (the Gharial has been brought back from the edge of extinction), leather is produced for the demands of trade, employment is created, and the public is educated. The farming of Crocodiles has shown that it can be done without indirectly harming wild populations by stimulating an increased trade in illicit crocodile products, which is one of the chief fears and strongest arguments of the opponents of turtle farming. The breeding of turtles is in a broad way not dissimilar to breeding crocodiles; both are long lived and prolific, both are critically endangered, crocodiles perhaps the more immediately so; both are important in trade, and both have shown themselves to be amenable to management in captivity. However, crocodile farms have been able to establish themselves without the intense opposition which has done so much harm to the Cayman Turtle Farm and which, if continued, will retard progress, or worse, in the conservation of marine turtles.

An argument repeatedly used by the opponents of turtle farming is that there is no hope of farms meeting the world demand for turtle products in the foreseeable future, and that by the time they could do so some species may be beyond recall. They say that as the farms cannot achieve the point of supplying 100% of world demand soon enough, and that their continued existence would make it difficult to control illegitimate trade, they should be outlawed. In fact, the Cayman Turtle Farm supplies 10% of world demand – a significant proportion for a single farm. It would seem quite possible, in view of this, if a concentrated effort is made, to establish new farms modelled on Cayman Turtle Farm to reach the desired level of supply. As it is an emergency for the turtles, the Convention on International Trade on Endangered Species could make special exception, for a limited time, to the new definition of “captive bred”, to allow new farms to sell first generation stock (CITES at present only allows trading of captive bred stock of a population shown to be capable of producing second generation offspring).

These new enterprises could be overseen by international conservation bodies to avoid any risk of false accusation, or of abuse. Because of Cayman Turtle Farm's success in developing the technology of breeding turtles in captivity, the time needed for the establishment of new farms would be much shorter than that taken by itself. It surely cannot be too difficult for means to be found to correctly identify farm produce at international ports, and ensure that illegal wild-caught turtle products are not smuggled, or at least reduce illegal produce to an insignificant fraction, as with all contraband in international commerce. An influential section of the conservation movement has lost much time and consumed a great deal of energy in its illogical harassment of Cayman Turtle Farm. This energy could have been applied, and can be still, to the encouragement and enlargement of farming and other rational conservation measures. The issue is urgent; boldness and imagination are required. If this line is taken, there is a certain future for marine turtles, and it may yet bring back “the fleets which Columbus found”, a return which Archie Carr so eloquently longed for in his book “The Windward Road”.

It seems to us that the alternative to this policy is hopeless, such a long shot as to be beyond consideration by sensible men. The broader implications for conservation are also bad. In the sad story of the campaign against the Cayman Turtle Farm we have seen the wilful suppression of facts and distortion of truth: this is a disgrace to science and puts in danger the integrity of conservationists in general. This is not the path of progress. Also, if the same irrational principles are applied to other conservation fields, are we to see the dismantling of farms for all kinds of other animals? Will the captive breeding of any wild animal be steadily outlawed? This may, now, seem incredible, but the logical extension of the principles now prevailing would be so. This is a bad omen for the future.

TURTLE FARMING AND RANCHING

L. D. BRONGERSMA

*Rijksmuseum Van Natuurlijke Historie, Postbus 9517,
2300 RA Leiden, Netherlands*

From of old, marine turtles have been exploited by man. Probably, wherever man reached coasts where turtles were abundant, and where these came to lay eggs, man will have used the meat and/or eggs as food. Diodorus of Sicily (Oldfather, 1935: 140-145) and Pliny (Plinius (died A.D. 79), 1561: 256) refer to the tribe of the Chelonophagi, the turtle eaters, who lived in Carmania, a region bordering on the Strait of Hormuz (forming part of the Iran of today); besides eating the meat of the turtles, they used the carapaces to cover their huts. According to Schenkl (1897: 3-4), the Greeks and Romans of antiquity did not eat turtle meat, although they may have used parts of turtles for medicinal purposes. However, they did use tortoise-shell. Pliny (Plinius, 1560: 13; Schenkl, 1897: 10) mentions Carvillius Pollio as having introduced the use of tortoise-shell to embellish beds, sofas and cabinets. In later centuries the Loggerhead served as a food animal in the central and western Mediterranean. Schoepff (1793: 79) states that in Italy the monks were very partial to Loggerhead meat. In more recent times, Vella (in Davidson, 1976: 387), and Kouki (n.d.: 187, 193) give recipes for preparing turtle meat and turtle stew.

The seafarers that crossed to the Caribbean, and those that went to the East Indies, learned to know and appreciate marine turtles as a source of good and wholesome food. In the first place this concerned the Green Turtle (*Chelonia mydas* (L.)). They found turtles to be hardy animals, which one could keep alive on board for extended periods, and which thus could serve as a supply of fresh meat during long voyages. As the fame of the Green Turtle reached Europe, live turtles began to be shipped from the Antilles and from the island of Ascension to England. In the middle of the 18th century the arrival in London of Green Turtles was still a fact worthy of notice (Gentlemen's Magazine, 1753: 441, 489). These shipments often sustained heavy losses. Alexander (1837: 300) refers to a shipment of 200 turtles, of which but four survived, and Hornell (1927: 46) considered a loss of fifty per cent not infrequent. Of course, steamships reduced the duration of the ocean crossings, and hence lowered the risks of having to jettison large numbers of turtles during the voyage. After World War II, ships with freezing plants made it possible to import, without any loss, dead and eviscerated turtles, not only from American Atlantic and Caribbean waters, but also from countries bordering on the Gulf of Aden, the Persian Gulf, and from the Indian Ocean. In the past, real turtle soup may have ranked as an article of luxury; gradually it became a product that came within the reach of people of more moderate means. The high standard of living of the last decennia resulted in a greater demand, and this gave a boost to trade. In the USA not only real turtle soup but also turtle steak and turtle burgers came into demand, and these products became available in many supermarkets.

It is not the exploitation for food alone that threatens the survival of marine turtles. There are several other factors that form as great a danger, if not an even stronger threat. In many areas, the sandy beaches suitable for nesting are now lost to recreation, building, construction of highways, etc. (e.g. E coast of Southern Florida; the Mediterranean). It is by now a well-established fact that beach erosion may account for a considerable loss in eggs (Fowler, 1979: 948, 954, tables 1, 3 : Tortuguero, Costa Rica; Fretley & Lescure, 1979: 30: French Guiana; Schulz, 1975: 127, tables XXV, XXVI: Surinam). The surf may wash out the eggs and the contact with salt water prevents their further development. Schulz (1975, table XXV) states that in Surinam within a four year period (1970-1973) some 1,387,000 Green Turtle eggs and (table XXVI) in the years 1971-1973 about 55,000 eggs of the Leathery Turtle (*Dermochelys coriacea* (L.)) and 47,500 eggs of the Olive Ridley (*Lepidochelys olivacea* (Eschscholtz)) were "doomed" eggs (doomed not to

develop). Part of these could be used locally for human consumption, part could be transferred to a hatchery where they are protected from predators, and part could be used for supplying eggs to turtle ranches and turtle farms. A turtle ranch is an enterprise wholly dependent on obtaining eggs from natural beaches, which are hatched on the ranch to be raised until they are of a sufficient size for slaughtering. Such an enterprise is to be found in Surinam, where a number of raised turtles are released into the sea. Another ranch is to be found on the island of Réunion in the Indian Ocean; it obtains its eggs from Europa Island (in the Mozambique Channel) and from Tromelin Island (North of Mauritius). A turtle farm is an enterprise keeping turtles in captivity and where these turtles breed. At the start such a farm will have to import adult turtles and/or eggs to build up a breeding stock, but in due course the farm becomes independent from the populations living in the wild.

Attempts to keep Green Turtles and have them breed in captivity have been made already in the beginning of the present century, but without success, on Great Inagua Island in the Bahamas in 1903-1906 (Churchill, 1904: 12; 1905: 14; Bennet, 1906: 14; Boeke, 1907: 126-127) and in Curaçao, Netherlands Antilles in 1905-1907, 1908-1915 (Fock, 1906: 22; 1907: 25; Boeke, 1907: 125-133; Van Breemen, 1910-1914; Pleyte, 1915: 4-5). Creeks or parts of bays were fenced off in such a way that circulation of the water remained possible. It was assumed that in these fenced-off creeks there would be an ample supply of food (sea-grass, algae, etc.). After some years, it proved in Curaçao (1913) that in a fenced-off part of the "Spaanse Water", the not very numerous turtles had become emaciated, there was no tendency to reproduction at all, and the experiment ended in 1915 (Pleyte, 1915: 4-5).

At one time Professor A. F. Carr (Gainesville, Florida) pleaded for the farming of turtles (inter alia: Carr, 1967, 1968: 238; 1973: 255), and in this connection he also thought of fencing-off creeks. He ends the chapter dedicated to this subject with the following sentences: "Turtle ranchers of the future will have to get their hatchlings from nests on artificial beaches. The nests will be made by female turtles that have mated with males living behind fences", and "A technology of green turtle husbandry will have to be developed. Once that is worked out it will be a double blessing: people will be fed and species will be saved". In 1968 a turtle farm was founded on Grand Cayman Island (B.W.I.), and although Professor Carr was not its founder, it may be said that he stood at its cradle, and his writings on farming will certainly have stimulated the founders of Mariculture Ltd. One was faced with great problems, for there were many unknown factors, e.g. the age at which a turtle becomes mature, etc. After some years Mariculture Ltd. came into financial difficulties; the farm was taken over by a new company, Cayman Turtle Farm Ltd. (CTF). Mariculture was an enterprise that in the first place aimed at making profits as speedily as possible. Of course, CTF also aims at a situation in which the costs will be covered, a situation that has not yet been reached. In 1974 a task force of the Survival Service Commission met a Miami, and some of its members went to Cayman for discussions with Mariculture Ltd., and this resulted in the adopting by IUCN of the "Principles and Recommendations" with regard to turtle farms and ranches. CTF has proceeded strictly along the lines of these Principles and Recommendations.

The farm had to acquire adult turtles to serve as a breeding stock, and these came from various sources: Ascension Id., Surinam, Costa Rica, Nicaragua, and Mexico. They also purchased eggs (inter alia from Surinam). In 1973 the first eggs were laid on the farm, and in 1978 the stage was reached that so many eggs were laid on the farm's artificial beaches that there was no further necessity for importing eggs from natural beaches. Besides, in 1978, females that had hatched on the farm had started laying. Thus CTF became self-sufficient. It has been shown that a long migration to and from the nesting beaches with intervals of two or three years, such as occurs in nature, is not necessary. In captivity females may lay in consecutive years, and in various parts of the year. Thus, in fact the turtles on the farm have become domesticated.

In March 1979, the countries that signed and ratified the Washington Convention on the International Trade in Endangered animal and plant Species (CITES) accepted a

definition of "bred in captivity"; only those animals meet this definition that have originated from parents that themselves have been generated and born in captivity, i.e. they must belong to a second generation born in captivity. Only when agreeing with this new definition, permits for the import and transit of, and for the trade in such animals, may be obtained. Such a definition does not cause much trouble with regard to species of which the generations rapidly succeed one another, and which allow of production within one or two years. In the case of marine turtles matters are different. In these animals a period of more than 10 years may elapse between the hatching from the egg to the reaching of maturity. CTF (and its predecessor Mariculture Ltd.) came into existence at a time when completely different rules were in force, and the company, having always kept to the Principles and Recommendations of 1975, might expect that no drastic changes would be made, without at least establishing an ample period of transition. The demand of "bred in captivity", as now defined, may be made for the offspring of the first farm-bred generation, but one cannot make such a demand for animals that years ago were hatched from legally imported eggs and which have been raised at the farm. In so far as such animals are not used for breeding, there must be a possibility to slaughter them and to trade the products, to give the farm some income. The number of this group of animals will decrease rapidly, for eggs are no longer imported.

The new definition of "bred in captivity" will be disastrous to the project in Surinam, where eggs are collected from the natural nesting beaches, watched in a protected hatchery, and raised in captivity, a method by which meat is produced without having the heavy expense of a farm. The restricted level of exploitation which has been taking place in Surinam for years already, is financially favourable to conservation, as the proceeds are used in part for the protection of marine turtles. By making existence impossible for bonafide farms and ranches, one will not save the turtles.

Sometimes it is said that the marketing of turtle products by CTF will stimulate the demand, and that this will lead to an increase of poaching, but this is merely an allegation without any factual foundation. The demand for turtle products existed long before the farm was founded, and the capture of marine turtles, allowed in a number of countries, also existed already for a long time. In 1974 the question was put to Mariculture Ltd. whether it felt that it could satisfy the world demand for turtle products. This was an unreasonable question. A farm just started will need time to arrive at full production and one farm alone will not be able to supply the whole world with turtle products; it is just as unreasonable to expect that with his live-stock a single farmer could provide all the meat for a whole country. When the technology of turtle farming has been fully developed and mastered by CTF, and this is the case at present, it will be possible to establish turtle farms (and ranches) in other parts of the world, each to use breeding stock (or eggs) from the population naturally occurring in the region. Then, a product of a good and stable quality can be supplied in sufficient quantities; the demand for turtle products obtained from poachers, which products will be of a less stable quality, will decrease and eventually it will cease.

In the past many parts of turtles taken in the wild, for preparing turtle soup, were thrown away. At the farm everything is used: meat, liver, skin (leather), oil, scutes, etc. Thus, besides being a source of good quality meat (with little fat), the farmed turtles are a source of numerous other products. A process has been developed by CTF to use the scutes of the Green Turtle in arts and crafts, and this may well help to decrease the demand for tortoise-shell from the Hawksbill (*Eretmochelys imbricata* (L.)). The production of turtle products by turtle farms (and well-controlled turtle ranches) may lessen the pressure on the populations in the wild. It is worth mentioning that two renowned specialists on turtle conservation, Dr. G. R. Hughes (Natal) and Dr. J. P. Schulz (Surinam), realize fully the importance of CTF. When developing the technology of turtle breeding one must be aware that one is working with living materials, of which much is still unknown. One must give such projects time to develop the desired techniques and to put them to the test, but one must not try and make the development of turtle farming impossible on the basis of slight grounds and unfounded suppositions. The possibility should not be excluded

that in the long run farms will be the only place where one can watch turtles in abundance.

Besides lessening the pressure on natural populations CTF is also beneficial to conservation by the research done at the farm by Drs. Jim and Fern Wood, as well as by the opportunities it offers to other scientists. The farm disposes of an almost unlimited supply of materials for research. Being a taxonomist and anatomist, the present author in the first place thinks of the possibilities for research in these fields. The question as to how many subspecies can be recognized within the species *Chelonia mydas* (L.) has not yet been answered. A first attempt at studying the difference between the various populations could be made at CTF where adult turtles from various populations are available. There, one could make a detailed comparison, e.g., of turtles from Surinam as compared to those from Ascension Is., from Costa Rica, Nicaragua, and from Mexico. The results of such a study may show in what direction further studies in other parts of the world may be undertaken. Much is still to be learned about the processes taking place in the living turtle, and here again the farm could assist. Of course, some of the results may have to be checked by research on specimens in natural populations, but working with the turtles in the farm may be a welcome opportunity to develop methods and techniques.

It is to be hoped that the authorities in various countries (and in the first place in the USA) may soon come to the conclusion that CTF does a good job, that the ban on turtle products from this farm should be lifted, and that in fact at the farm one has to deal with domestic animals to which the CITES limitations should not be applied.

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CAYMAN TURTLE FARM LTD. THE CROCK OF GOLD

W. A. JOHNSON

*Chief Executive, Cayman Turtle Farm Ltd.,
P.O. Box 645, Grand Cayman, Cayman Islands, British West Indies*

Many people have heard the apochryphal story about the examination for a finals Economics Degree, when it was drawn to the attention of the examiner that the questions were identical to those set the previous year. "Quite true" replied the examiner, "but this year the answers are different". We are reminded of these changing standards when looking at the battle Cayman Turtle Farm Ltd. has had with the U.S. Departments of Interior and Commerce over their decision to ban farmed turtle products.

One of the very strong reasons put forward by the Departments for the ban is their reluctance to believe that the Farm is self-sufficient in eggs – that is, all the eggs required by the Farm are laid on the Farm and none are brought in from the wild. In other words, that our turtles are bred in captivity. Accepting this fact, then sales of our farmed turtle products are legal in every country that has signed the Convention on International Trade in Endangered Species (CITES). (And of course, in every country which has not.)

Now, the U.S. Departments could very simply have come to the Farm and verified what we say is true, but that would be too easy. They feel it is much better to rely on the opinions and statements made by experts, both within and without the Departments. How valid are these opinions? And it is here we come to the changing standards.

When the Turtle Farm first started its operations it collected mature turtles to act as its future breeders and on which it relied to produce its own farm-laid eggs. The Farm also brought in wild eggs to make up the required numbers. These were carefully collected with due regard for the preservation of the turtle in the wild. The eggs were hatched on the Farm to make up the necessary complement of turtles. It took some three to four years for the breeding animals to acclimatise themselves to captive conditions, and it was not until 1973 that the first crop of eggs was laid. Prior to this time, pessimistic predictions were floating around that turtles would never breed in captivity, as no-one had succeeded in producing hatchlings this way.

Coincidentally, in March 1973, a large number of nations met in Washington and drew up the provisions of the Convention (CITES) for the protection of sea turtles (amongst other species). In the rules laid down, as previously said, only animals "bred in captivity for commercial purposes" could be traded.

It could be that this phrase was carefully thought out to preclude the Turtle Farm, as it was known in March 1973 no mating and egg laying on the Farm had as yet taken place, and it would be expected that turtles hatched from wild eggs would not qualify under CITES.

Alas, as is so often with the drafting of bills, the wording was not precise enough. As anyone knows from the phrase "born and bred", a perusal of a good dictionary will show that to "breed" means to "raise" so turtles from wild eggs would qualify. In fact, this is made doubly clear if one looks at the French translation of CITES, where one sees the phrase "raised in captivity" for "bred". Ah, say the scientists who are all knowledgeable in languages as well as science – the French have mis-translated the word. Unfortunately for this argument there are six accepted official languages for CITES – English, French, German, Spanish, Russian and Chinese. In each language the meaning for "breed" can be translated as "to raise" – as from an egg.

Meanwhile the scientists were pouring in to the Departments their conclusions regarding

the possibility of breeding turtles in captivity and the achievements of the Turtle Farm. One leading biologist, head of the Biology Department of a famous American University, said in 1975 in a letter to the Department of Interior, when a proposed regulation was published suggesting that farming of turtles should be recognised if the Farm could be self-sufficient in eggs in two years –

“The prospects for raising sea turtles in captivity ‘from a completely self-sustaining stock’ in two years are, even by admission of those involved in the industry, nil. Therefore this two-year grace period although perhaps politically expedient, constitutes nothing more than legal sanction of a heavy and unnecessary drain on a threatened species. Since, in my professional judgement, there is virtually no possibility that commercial mariculture of green turtles will ever be carried out with “self-sustaining stock”, and since I know of no evidence that “significant progress” is currently being made towards that biologically and economically dubious goal, I suggest: that the Department refuse to consider weaker regulations or longer grace periods, should they be suggested by the mariculture industry.”

And the same gentleman in early 1976 wrote:

“I estimate that the chances that mariculture will be producing its own eggs in significant quantities in two years are zero. I am also perfectly prepared, as a scientist intimately familiar with this problem, to state that the chances that they will be self-sufficient in five years are also zero. I will go further: based on the known biology of the green turtle, *Chelonia mydas*, and on the evidence supplied by mariculture, itself, the probability of their being self-sufficient in eggs at any time in the foreseeable future is vanishingly small.”

In 1978 the Farm announced it was self-sufficient in eggs.

Meanwhile, the breeding in captivity was progressing at a steady rate and the results were freely circulated to these critical scientists. Another one, analysing the results, came out with the picayune theory that they were not really breeding on the farm. To quote him –

“All of these specimens were bred in the wild. They stored sperm in the spermatheca of the cloaca which reptiles can do. They can breed one year and store it up to seven years in snakes at least, and expend much of that sperm to fertilize each clutch of eggs. In other words, they are not breeding in that lagoon. That is to say, they are not producing the eggs from breeding in that lagoon.”

The facts that (a) there was no evidence whatever that turtles can store sperm up to seven years, (b) that some of our older turtles have been in the lagoon for twelve years and (c) that eggs and young turtles had been produced regularly each year since 1975 from mating turtles which themselves had been hatched from eggs on the Farm and had never seen the wild, did not appear to upset him.

Nothing is heard of this theory now – but the damage has been done. There has been no retraction, and a gullible Department accepted one further piece of “evidence”.

Let us continue the “bred in captivity” debate. It was gradually becoming clearer that turtles at Cayman Turtle Farm were breeding in captivity, the evidence was accumulating at such a rate it could not be ignored. The next campaign was mounted to persuade the Departments that the dictionary interpretation of the phrase was not what the original Committee of CITES meant when it drew up the wording. Seven members of the Committee (is it coincidence that they were all Americans?) swore affidavits to say that the intention “was to afford an exemption only for those specimens that were conceived and born in captivity and that there was no intention to afford an exemption for breeding programmes that were in any way dependent on wild stocks of wildlife.” That, they thought, would put a stop to the Farm, as it immediately made illegal under CITES turtle products bred from wild eggs and would preclude the importation of further wild eggs. (CITES makes it perfectly clear that if a specimen was acquired from the wild before the provisions of the Convention applied, it could be legally traded. This, of course, gives a field day for the

lawyers to argue at which date the Convention applied). But the affidavit swearers had not kept abreast of the enormous strides the Farm had made in its breeding programme, so much so that it declared self-sufficiency in 1978, the last year in which eggs were collected.

Was there a joyous reaction from the critics? In no way! Having declared by affidavit what everyone understood by “bred in captivity” they then realised this was not sufficiently restrictive for the stage of development the Farm had reached. Fortunately, there was a meeting scheduled for March 1979 of all countries which had signed the Convention, so shortly before that meeting, our scientific friends got to work on the Department of Interior to get them to modify the affidavit interpretation of bred in captivity and agree that the U.S. delegation to the CITES meeting would re-interpret the phrase with the addition “A parental breeding stock shall be considered to be managed in a manner designed to maintain the breeding stock indefinitely only if it is managed in a manner which has been demonstrated to be capable of reliably producing second generation offspring in a controlled environment.”

As turtles in captivity take ten to twelve years to mature and as the first animals “bred on the Farm”, according to the “affidavit interpretation” were born in 1973, that should bury the question until 1983 or 1985. And at that time, we can always impose the necessity for a third generation.

It should be explained that although this interpretation was agreed at the CITES meeting in 1979, delegates other than the U.S. agreed that Cayman Turtle Farm was to be regarded as a true farm and its products are legally exported to signatory countries. The results of the meeting, without mentioning the above proviso, were rapidly sent to the Judge of the District Court trying the case to decide the legality of the Department’s ban, and reading his judgement it is clear that he was affected by this.

Thus it can be seen that as rapidly as the Farm makes progress to meet the criteria or criticisms laid down, the standards change – like chasing the end of a rainbow.

Just to round off the tale of the fight the Farm has had on the scientific front, mention should be made of the pernicious, slanderous and libellous attacks that have been made on its ethics – both in newspaper articles and at scientific meetings. It has been widely stated that Cayman Turtle Farm imports wild turtle products that are repacked, labelled with the Farm emblem and resold. (Why the Farm should do this when it has 50,000 turtles swimming around in its tanks eating their heads off on expensive feed, no-one has stopped to ponder). In other words, the Farm is accused of “laundering” turtle meat – an emotive word when used about a Cayman Island operation. The accusations are made without foundation, and when tracked down are subsequently withdrawn, but the damage has been done – the old adage “There is no smoke without fire” is still persuasive. Particularly is this so when officials of the Departments have started such rumours.

It would be more to the point if Departmental officials and decision makers were to stop splitting hairs on the meanings of words, cease to engage in polemics, and concentrate on the main issue – the protection of turtles in the wild. If only they could be convinced that we are not taking wild turtles some glimmer of commonsense may shine through. If also the pathological mistrust of the Farm could be overcome it might be possible to sit down and discuss calmly how the Farm might help in preserving the turtle.

The following two articles have been reprinted from the IUCN/SSC Marine Turtle Newsletter No. 13, November 1979, with the kind permission of the Editor, Professor N. Mrosovsky

EDITORIAL FROM THE MARINE TURTLE NEWSLETTER No. 13, NOVEMBER 1979

A conference on turtles, titled the "World Conference on Sea Turtle Conservation" is soon to open in Washington. Far from Washington, out in the Indian Ocean, lie a group of small islands, the Seychelles. Only 50–100 thousand people live on these islands and their views are not likely to be heard in Washington. But the history of recent efforts there to conserve sea turtles is an instructive one for participants to ponder.

In 1968 the Seychelles proclaimed a complete ban on taking green turtles. The intent was to give time for assessment of stocks and for devising a management plan that would enable exploitation of this resource without endangering it. Assistance was sought from IUCN. Unfortunately nothing materialized, letters from the Seychelles went unanswered, momentum was lost (see Salm, 1976; Frazier, in press). During this time there was considerable poaching and pressure to lift the ban increased. The Seychellois resented being told they could not eat turtle when it was an important and traditional source of meat. After resisting these pressures for a while, in 1976 the government, disillusioned, as one high official put it, by the apparent unwillingness of the international conservation movement to do anything for the green turtles of Seychelles, other than wring their hands in dismay at any proposal to modify the ban, rescinded it in favour of less complete restrictions.

The predicament of the Seychelles government is not unique. It exemplifies problems facing many countries with sea turtles. The political realities are often such that conservation is not possible unless governments are making, and are seen to be making, turtles available to local people as a source of food or income. Bans and sanctuaries have their place but more effort and imagination should be devoted to management plans.

But how can rational plans be devised when there are so many gaps in our understanding of turtle biology? In an imperfectly known world some risks have to be taken. Conservationists have not shrunk from other risks. They have flown turtles around the Caribbean, they have flown them around the Gulf of Mexico. They have raised them for many months in artificial conditions, fed them food that may not be abundantly available in the wild, and released them in places unfrequented by turtles of that age class. Thousands of eggs have been incubated in plastic boxes above ground at unnatural temperatures, possibly masculinizing the population (Mrosovsky, 1976). Plenty of risks have been taken. We do not imply such risks are unjustified. These are matters for debate in Washington. It will probably be impossible to obtain much agreement, only to be informed and flexible; if things turn out well, a risk is justified, even if the grounds for taking it were not especially strong.

At least with the risk-taking in making recommendations for harvesting, there are a few simple points that provide some guidance. If a turtle population is to remain stable, then each animal will have to be replaced. Assuming an equal sex ratio, hatchlings from 2 eggs from each female on average will have to survive to maturity. Since turtles lay many eggs in their lifetime, often several hundred, sometimes many more, depending on the species and population, protection at the vulnerable egg stage should be able to compensate for harvesting (see Hirth and Schaffer, 1974, for additional points). Such protection does not need special technology. Much can be achieved by patrols to reduce human interference and by wire netting to reduce animal predation. The difficulties arise in determining just what size quotas should be; it must not be forgotten that predation continues beyond the egg stage. Recommendations should only be made with an appreciation of local environmental and social conditions and of the likelihood that protective measures will be enforced. But despite unknowns and problems, we still feel that controlled use of turtle resources is not just some-

thing for the future; there are places, such as the Seychelles, where it is appropriate now.

In facing such problems, it may be worth recalling some cases where use and protection are being combined. At Trengganu, Malaysia, most of the eggs laid by leatherbacks are taken, as they have been for decades. However, for a number of years now a small percentage have been protected and the hatchlings later released. The State authorities in Trengganu sell rights to collect eggs on particular stretches of beach. The fees received from the licenced egg collectors go towards running the hatchery and looking after eggs on part of the beach set aside for conservation and tourists. People making their living collecting eggs obviously want the turtles to be undisturbed while nesting and they are not, therefore, especially enthusiastic about sightseers. They also have an interest in the success of conservation. However, although the leatherbacks at Trengganu appear to be holding their own despite many years of intensive egg harvesting, some biologists consider the number of eggs set aside for the hatchery, about 20%, to be too low. They fear that a population crash from over exploitation in the past has only been delayed by the longevity of the adults. Unfortunately, although many data have been collected, lack of full published accounts prevents informed evaluation. But if it was felt wise to increase the numbers protected, either as an insurance against disaster or as a chance of boosting populations to higher levels, it would only require adjustment to the controls, not a dismantling of the whole social machinery. The latter is excellent: Malaysians themselves eat most of the eggs and have a stake in the success of conservation and biologists from the Fisheries Department are able to exert, if not total control, at least a major influence on events at the rookery.

Use of turtle resources is also contemplated in South Africa. It is said that once the number of loggerheads nesting there reaches a certain present target, the regulations giving complete protection on the Tongaland beaches will be replaced by others permitting limited cropping. If after years of protection turtles have increased in numbers and a system for monitoring the population established, this development should in principle be applauded. The details of implementation have not been made available yet.

Conservation combined with consumption of green turtle eggs has been practiced for the last few years in Surinam. Prior to 1964, most turtle eggs in Surinam were taken and adults were also being killed. Gradually the main beaches were declared nature reserves and extensive tagging and other studies were carried out. Later complete protection was relaxed and eggs were sent to the market place in Paramaribo. The proceeds helped pay for the programme (Schulz, 1975). Although initially there was some discontent among Carib Indians who previously made money by selling eggs (Kloos, 1971), this was ameliorated by employing some of them on the reserves. Together with former poachers, using their knowledge of the environment and the animals, they contributed greatly. Where formerly predation was at a devastating level, now the turtles in Surinam receive a large measure of protection, at least some employment is provided, protein is made available in the market at reasonable prices, a partial safeguard against political changes, and because monitoring of the numbers nesting continues, the quotas can be adjusted if appropriate, hopefully after awhile toward a greater take of eggs.

Most important, in the examples of the Trengganu and the Surinam programmes, both government and people are involved. This gives conservation roots in the cultural matrix and makes it robust. By contrast there are examples of fragile conservation schemes – schemes that may be appropriate in the circumstances but are nevertheless fragile in that they are not well embedded into the workings of the society. What would happen at Tortuguero, Costa Rica, if biologists from the United States stopped going there? Without the foresight of one man, the President of Costa Rica, the park boundaries at Tortuguero would have been gravely diminished this year. And what of the conservation through the military in Mexico? It might seem the strongest conservation of all not simply to have regulations but to have them enforced by marines with automatic weapons. This may indeed be an essential interim measure to prevent collapse of certain turtle populations there, but in the long run guns may not be as effective as giving people a hand in managing their own resources for their good.

The Seychelles ban was an example of fragile conservation because it was socially unacceptable, politically impossible. Robust conservation must take account of the political realities in many of the countries with turtles still left and of their wishes for management programmes.

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CONSERVATION, UTILIZATION, ANTELOPES AND TURTLES

G. R. HUGHES

P.O. Box 662, Pietermaritzburg, South Africa

Broad generalizations about the conservation status of animal species are often made and enlarged upon by the popular press. One's personal concern about a species or group often makes it difficult to assess its status in objective comparison with the status of other species or groups. A case in point is a comment in a recent report which stated that sea turtles cannot withstand intensive exploitation. Taken to mean maximum exploitation, viz., every animal that one can lay hands on, then, of course, *no* community, neither animal nor plant, can withstand this. If, however, this infers a *degree* of exploitations in other words, it is stated as a suggestion that no turtle population should be exploited because it is likely to disappear rapidly, then it is a highly misleading statement.

There is every indication that sea turtle populations are extremely resilient. In the Caribbean turtles have been ruthlessly and totally persecuted for 500 years. This was no idle casual relationship but intensive in the full meaning of the word. Despite the disappearance of many individual populations there are still sea turtles in the area. Even the Nicaraguan turtle factory came and went and there are still turtles in Tortuguero. To me it is a source of great wonder that there are any sea turtles at all in the central Americas, the Seychelles, and in Madagascar the presence of hawksbills is indicative that sea turtles are proven survivors against incredible odds (see Hughes, 1973, *Biological Conservation*, 5, 114-118).

This is not to suggest, of course, that sea turtle populations can, or ought to be exploited, but it is not in my opinion factually correct to infer that they are particularly vulnerable to exploitation of any sort. It one really wishes to see vulnerable animal populations, one need not leave Africa, where Antelope populations numbering hundreds of thousands, if not millions, have been nearly wiped off the face of the earth in less than 100 years. Smaller antelope populations have been totally extirpated. If protection was lifted from some antelope species, they would disappear in a year and some of them are not even listed as endangered by IUCN.

The survival of many antelope species is directly attributable to the rational commercial use thereof; springbok, blesbok, eland, etc., are all safeguarded because of a vigorous campaign involving the farmer and his game to the profit of both. In many parts of the world the survival of the sea turtle may depend upon the same tolerant view being pursued. The sea turtle record indicates that a turtle population could be exceedingly tolerant of rational exploitation and prove an enduring asset. As in every walk of life, broad generalisations can be highly misleading and every turtle population should be considered individually. Where total protection is feasible, let us have it; where not, let us not close the door to survival by ignoring a valid conservation technique – utilization.

THE ARMENIAN WALL LIZARD, *LACERTA ARMENIACA*,
MEHELY 1909, WITH NOTES ON ITS
CARE AND REPRODUCTION IN CAPTIVITY

BERT LANGERWERF

Beneden Kerkstraat 36A, NL5165CC Waspik, Netherlands

INTRODUCTION

In the Caucasus there are five species of lizards which are known to be parthenogenic:

Lacerta dahli, Darevsky 1957
Lacerta rostombekovi, Darevsky 1957
Lacerta unisexualis, Darevsky 1966
Lacerta armeniaca, Mehely 1909
Lacerta uzzeli, Darevsky & Danieljan 1977

All of these species are rock lizards, and are closely related to other species with similar habits, such as *Lacerta raddei*, *Lacerta valentini*, and *Lacerta saxicola*.

The fact, alone, that these five species can reproduce themselves without the presence of a male makes them very interesting. They are particularly interesting for the terrarium keeper because it is possible to breed them from only one individual.

PARTIAL DESCRIPTION*

Length: 73mm. The basic colour of the body, on the dorsum, is brownish green, dirty green, greenish yellow or olive yellow; the green colouration is more clearly developed on the anterior third of the body. A dorsal stripe is formed by small black or brown spots concentrated in a transverse manner along the centre of the back, not covering its entire width. Broad lateral stripes are formed by the merging together of dark irregularly shaped rings with light eye spots, one or two of which by the forelegs are blue. On the upper margin of the lateral stripes there is usually a row of clearly defined whitish spots. The venter is pale lemon yellow with alternating blue and small black spots along the edges of the ventral scales. The underparts of the head and the throat are white.

DISTRIBUTION*

The interior mountains of Armenia, within the borders of N.E. Turkey, Adzhar, southern Georgia, and northern Armenia, from where it extends into the adjacent mountainous parts of N.W. Azerbaijan.

ECOLOGY*

Lacerta armeniaca occurs in rocky areas, in stone piles, stony fields, and the sides of ravines in the wood and mountain-steppe zones at an altitude of 1700-2200m. In the mountain-steppe zone it may also be found amongst vegetation a great distance from stony or rocky areas. Up to 200 or more individuals have been observed on a walk of 1km. In Armenia the food consists chiefly of insects. Of the stomachs examined, membrane-winged insects were found in 45%, ants in 22%, beetles in 27%, orthopterans 26%, flies 33%, butterflies 19%, and spiders 11%. Also found were centipedes, earthworms and snails.

The population of this parthenogenic species is composed of females, which multiply without insemination. The number of eggs in one clutch is 2-5, most often 3-4; these measure, on average, 7.5-11mm and are laid from mid-June to the middle of July. The incubation period is about 55 days. The young ones appear towards the end of July or early in August. At the time of hatching they measure 24.5-26.5mm; by the following spring they reach 32-36mm; by the end of the summer 45-48mm; in the second spring, at a length of 47-49mm they reach maturity. The maximum length of 65-73mm is reached in the fourth year of life.

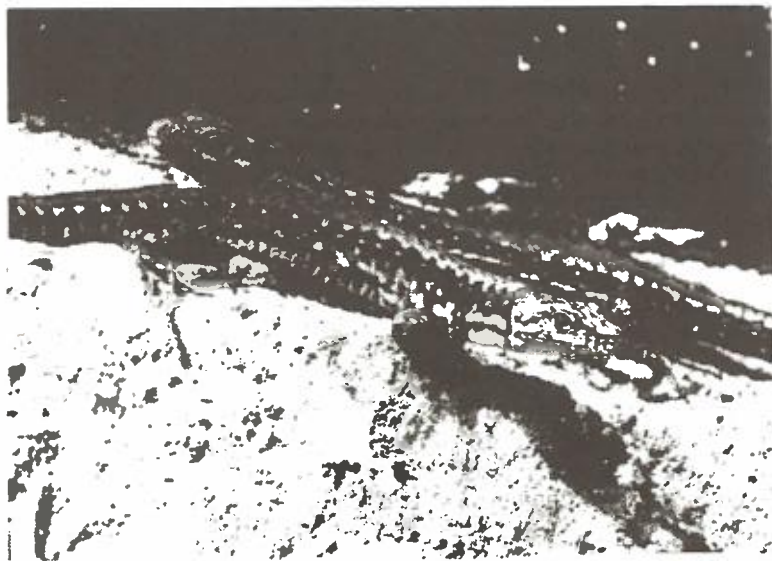


Plate 1. *Lacerta armeniaca*

Lacerta armeniaca in captivity

I have kept this interesting species successfully for many years in my garden terraria. This species lives in nature in areas very similar to those inhabited by *Lacerta muralis* in the West, and can be kept in the same way that *L. muralis* can be kept. I have had success in both glass and gauze covered terraria. A rather small terrarium of 70 x 50cm is sufficient to house about five individuals, because as there are no males (in nature there is said to be a ratio of one male to every thousand females) there is no fighting. The terrarium must always afford a frost-proof retreat in the winter and cool hiding places in summer. I provide these retreats with old roofing tiles inserted obliquely into the ground to a depth of about one foot. A layer of hay or leaves improves the situation. If kept under glass a dietary supplement of vitamin D3 is needed (see my article on *Lacerta strigata* in the BHS Bulletin No. 1, June 1980, for further details).

Kept in these terraria, the lizards have only a short hibernation: they may remain active until the end of November, and may emerge again early in February, depending on the severity or mildness of the winter. After hibernation there is of course no copulation, but the females become more beautiful in colour: the green and the small blue spots intensify. Then eggs begin to develop, each female usually laying two clutches between the middle of May and the middle of June. When the eggs are kept at a temperature of 30°C the length of incubation is about 40 days; the young emerge from the beginning to the end of July. The juveniles have blue tails with small black spots. After only one month the blue colour disappears; if kept warm and fed well they reach maturity in about one year.

Like *Lacerta strigata*, this is an interesting lizard which can be kept here in Western Europe without extra energy costs. In the next Bulletin I hope to be able to discuss another lizard with the same qualities. By the time this article appears I will be the happy owner of some 10 *Lacerta unisexualis*, one of the other parthenogenic species, received from friends in the Soviet Union. Perhaps after some years I will also be able to write about this species.

* These sections are translated from the Russian, taken from the book: "The Amphibians and Reptiles of the Soviet Union" by A.G. Bannikov, I.S. Darevsky, V.G. Ishchenko, A.K. Rustanov, N.N. Cherbak. Moscow 1977. This is an excellent book of over 400 pages, comprehensively describing 400 species and subspecies of the Soviet herpetofauna. The book contains many illustrations, mainly in colour, and 135 maps.

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NOTES ON THE LEOPARD SNAKE, *ELAPHE SITULA*, WITH COMMENTS ON THE MAINTENANCE OF THIS SPECIES IN CAPTIVITY

KEITH WERB

17 Drury Road, Colchester, Essex

Though it is without doubt the most attractive of the European Ratsnakes, the Leopard Snake has been seldom imported into this country over the last few years.

The colour pattern of both the young and adult snake consists of numerous black spots on a grey background with a series of brownish-red blotches or saddles along the spine. A more uncommon pattern also exists, in which the red blotches join together to form two longitudinal stripes. Maximum length is about 90 cms, but average adult size is nearer to 75 cms.

The range of this slender snake includes Southern Italy, Sicily, Malta, Yugoslavia, Greece, Turkey and parts of Russia (Steward 1971), where it inhabits dry stony or grassy areas, often near to human habitation (Clark 1967). In Yugoslavia, I have found it basking on top of, or near to the many stone-walls intersecting dry, overgrown fields, probably seeking refuge from the numerous Glass Lizards, *Ophisaurus apodus*, inhabiting these areas and which certainly include it in their diet, should the opportunity arise.

Temperament is said to vary, but I have found that the Leopard Snake always bites when handled and remains somewhat nervous, even after a long period in captivity. In spite of this fact, provided feeding commences from the start and undue disturbance is kept to a minimum, the snake will adapt readily to captive conditions. In my experience, specimens that do not commence feeding immediately fast until death and force-feeding appears only to hasten the end and is certainly not recommended.

Food appears to consist solely of mice and numerous attempts to tempt different individuals with rats, small birds and lizards have all ended in failure.

Longevity records for this species are unavailable, but I have had one specimen in my collection for the past three years and it was of adult size when first obtained.

For housing I use standard aquarium tanks with one 5-8w standard bulb providing lighting and heating. Newspaper is used on the floor and a hide-box, branch and water-dish complete the cage. I keep all of my specimens on a light-cycle varying from 15 hours daylight in summer to 9 hours in winter and under this regime, winter-fasting normally occurs from the end of August until early April, perhaps indicating a lengthy hibernation period under natural conditions. Temperatures in the cage vary from 56°F in winter to 90°F in summer. The snakes often immerse themselves in their water-bowls when the temperature exceeds 85°F, but it would appear to do them no harm. Bathing also frequently occurs before sloughing.

On June 15th 1980, I purchased a wild-caught adult female of the more unusual 'striped-phase' and this snake was subsequently found to be gravid. It was housed in the manner previously described and a plastic box containing sphagnum moss was also added to the cage.

The pre-laying slough occurred on July 1st and 14 days later, on the evening of July 15th, the female laid first one egg in the water-bowl and then a further three in the sphagnum moss. The four eggs were removed from the cage and placed in damp vermiculite in an incubator set at 79°F.

Unfortunately, the female did not commence feeding after laying and died on July 24th of an unknown cause.

Owing to excessive intake of water, the first egg was abnormally large when laid and it was found to be bad six days later. Details of the eggs and results are given in the following table:—

Egg Number	Size (mms)	Hatch date	Incubation (days)	Sex	Colour Pattern	Length (mms)
1	60 x 19	Failed 21-7-80	—	—	—	—
2	51 x 15	19.9.80	66	♂	Spotted	332
3	46 x 18	22.9.80	68	♀	Spotted	321
4	48 x 16	23.9.80	69	♀	Striped	326

Much to my surprise, the first baby ate one pink mouse the morning after hatching. Sloughing occurred 12 days later and feeding recommenced the next day.

After much difficulty, I have finally obtained another female which is approaching maturity and it is hoped that 1981 might see my first serious attempt at breeding this beautiful snake in captivity.

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KEEPING AND BREEDING THE EUROPEAN GREEN TOAD (*BUFO VIRIDIS*)

DAVID BILLINGS

Red House Farm, Brakefield Green, Yaxham, East Dereham, Norfolk

INTRODUCTION

The three Green Toads I originally obtained several years ago shared an (unheated) greenhouse with three pairs of Edible Frogs (*Rana esculenta*), two pairs of Common Toads (*Bufo bufo*) and a pair of Green Lizards (*Lacerta viridis*). Last year I purchased three more male Green Toads and another female, so I now have four males and three females of this species.

The floor covering of the greenhouse consisted of a mixture of clay, sand and peat in which various rockery plants and ferns were planted to provide cover for the inmates and for decorative effect. Rocks, pieces of cork bark and other bark were also placed in various positions as hiding and basking places for the toads and lizards. The plants grew and spread among the rocks producing a pleasing overall appearance. A small area of bare soil was left into which the toads could burrow. This proved very popular with the Green Toads which would bury themselves for long periods, with only their eyes and nostrils exposed. I have found that Green Toads, unlike many other amphibians, tend to avoid very thick, dense vegetation.

In one corner of the greenhouse, a moulded fibreglass tank was sunk, the dimensions of which were 75cm x 45cm. It was 15cm at its deepest, one end containing a shallow ledge about 6cm deep. More rocks were placed around the perimeter of the pond in order to conceal the rim, and I planted some marginal plants such as Japanese Striped Rush (*Acorus calamus variegatus*) and Water Forget-me-not (*Myosotis palustris*) in pots at the "shallow end" of the pond.

GENERAL CARE

Green Toads inhabit the warmer regions of Europe and Asia, those usually offered for sale by dealers originating from countries bordering the Mediterranean, where winters are of much shorter duration than those experienced in the U.K. I would therefore hesitate to recommend over-wintering them in an open air outdoor vivarium, particularly if situated in Northern England or Scotland.

Green Toads can be over-wintered far more successfully if allowed to hibernate naturally in a greenhouse or cold frame. I have over-wintered all my own Green Toads without any losses in such accommodation for several years, including the severe winter of 1978-79. It is, of course, essential to allow them to hibernate if an attempt is to be made at breeding them. If the above points are borne in mind, the Green Toad is an excellent inmate for a "community" vivarium, being hardy, long-lived and neither aggressive towards other inmates nor unduly timid.

Feeding presents no problems; Green Toads will accept anything that moves and is small enough to swallow. Mine are fed on as varied a diet as possible, which includes earthworms, crickets, leatherjackets, slugs, moths, caterpillars and mealworms (by far their favourite food).

BREEDING

I could never induce my Green Toads to spawn in the set-up mentioned above, and one reason was probably the small size of the pond. However, earlier this year we moved house, and on the evening of 13th June all my reptiles and amphibians were moved to a bigger greenhouse (260cm x 260cm) at the new house. The layout of this greenhouse was along similar lines to those of the old one, but the pond provided was much larger and deeper. It consisted of plastic sheeting 155cm x 95cm, and was 60cm at its deepest, having a

shallow margin one end about 5 cm deep, sloping gently to the deeper end. I had filled the pond with ordinary tap-water a week previously.

The weather the following day was appreciably warmer, and during the early evening my attention was directed to a strange melodic "trill" which at first I took to be the call of a bird, possibly a warbler. On closer investigation I found the sound was emanating from the direction of the greenhouse, and on approaching it I could see the largest of the male Green Toads sitting, half submerged in the water at the margin of the pond calling vigorously. The note produced lasted for about five or six seconds, being repeated after a pause of about the same duration. It continued calling throughout the night and early morning of the next day.

Later that morning it was attempting amplexus with one of the females in the pond. The female however, seemingly bored with these attentions, left the pond with the male still attached and proceeded to wander around, walking into as many obstacles as possible apparently attempting to dislodge the stubbornly-resisting male. I did not have the opportunity to observe them again until the early evening when the pair were back in the pond and still in amplexus. The other three males were also in the pond but were showing no signs of sexual behaviour, merely sitting passively at the water's edge. These three are not yet fully grown however, and may not be sexually mature as their nuptial pads are not very conspicuous yet.

When I entered the greenhouse later in the evening (about 9.00 p.m.) the pair had separated and I was delighted to find several strings of spawn, wound around the submerged water plants (Canadian Pondweed and Hornwort). I removed all the spawn I could find and placed it in a 90cm x 38cm aquarium tank heated to around 75°F and placed so as to receive maximum sunlight to encourage a good growth of algae. A layer of gravel had been placed on the floor of the tank.

REARING THE TADPOLES

I subsequently found that providing heating for the tadpoles was unnecessary since several dozen were later discovered swimming around in the greenhouse pond and these were growing well. The spawn in the heated tank took about three days to hatch and within another two days the tadpoles were free-swimming, feeding actively on the algae growing on the sides and bottom of the tank. I soon found it necessary to drastically reduce the many hundreds of tadpoles in this tank, the surplus being removed to alternative accommodation (in the form of old kitchen sinks). In addition to the naturally growing algae, I supplemented the tadpoles' diet with goldfish flake-food and pond-pellets; they grew rapidly and only two weeks after hatching, those tadpoles in the heated tank had visible rear legs.

The main difficulties will, no doubt, arise when metamorphosis is complete and I am faced with the prospect of finding enough aphids and other tiny insects on which to feed the toadlets. I will obviously attempt to hand-rear only a small number and will report on my success (or otherwise) in a later issue of the Bulletin.

CONCLUSION

It would appear that the breeding of my Green Toads was stimulated by one (or a combination of) the following factors:—

- a) a change of environment
- b) the provision of a more suitable pond
- c) a fairly rapid change in weather conditions.

- It is an established fact that goldfish and other pond-fish can often be induced to spawn after being transferred from one pond to another. They will also often commence spawning after a sudden change in the weather.

I would welcome any comments from other members on their own observations on amphibian breeding successes particularly as a result of any of the above factors.

CARE AND CAPTIVE BREEDING OF THE NORTHERN PINE SNAKE *PITUOPHIS M. MELANOLEUCUS*

RAYMOND A. HINE

34 Mafeking Avenue, Newbury Park, Ilford, Essex

DESCRIPTION AND RANGE

The Northern Pine Snake is one of the U.S.A.'s most impressive serpents, both in size and colour. The record length is 83" (210.8cm), with an average of over 60" (152cm).

The background colour ranges from a light buff to a dirty or almost pure white. This is overlaid with dark brown or jet black saddles, to give a very striking effect. The scales are keeled.

Youngsters are similar to adults, but have more of an orangey or pinkish tinge to the background colour and the saddles are brown, thus giving it an appearance which could mistake it for its western cousins, the bull and gopher snakes.

The range of this species is S. New Jersey (where it is a protected species), W. Virginia, S. Kentucky, Tennessee, N. Alabama, N. Georgia, S.W. and S.E. N. Carolina and S. Carolina.

HABITAT AND HABITS

It is found mostly in dry flat sandy areas, or dry mountain ridges in or near to pine woods. Being so large and diurnal one would think it would be a common sight to herpetologists in its range, but this is not so. Probably because of its feeding habits it is rarely seen. Being an avid rodent eater it no doubt spends most of its active life down rodent burrows searching for food. Birds, nestlings and eggs are also eaten and for this prey item the Pine snake will climb trees. In hot weather the snake may be encountered at dusk.

CARE IN CAPTIVITY

Housing

The cage should be quite roomy, 36" (91.4cm) x 18" (46cm) x 18" (46cm), being a minimum for one adult. The furnishings should be simple; a hide box, a sturdy branch and a water pot. The floor should be kept clean and dry; newspaper is excellent, although some people use wood shavings, pine needles, pea gravel, heavy aquarium gravel or bracken.

The cage should have good air circulation and a bulb at one end to give a heat gradient. Two hide boxes can be used, one at each end, to give the snake a choice of temperatures.

Feeding

Adults, if of a good body weight, should be fed once a week on two mice. Males in breeding condition will not feed and gravid females will not feed until after the eggs have been laid; nor will either sex feed during the winter 'cool off' period (which, if your aim is to breed Pines, is essential). Adults will also eat day old chicks and smallish fresh farm eggs. However, if fed solely on these, their faeces become very runny and smelly.

There are no hard and fast rules on how much an individual should be fed, as it will depend entirely on the condition of the specimen at that particular time. A female that has just laid eggs obviously needs feeding up before the winter 'cool off' period (which can last up to 5 months in my collection). Females will also need larger meals after the cooling period and before being mated by a male in the spring.

Hatchling Pines will generally eat baby mice from the start, so are very easy to rear. They do, however, tend to gorge themselves if the opportunity arises (as do most species of *Pituophis*). This should be avoided as they may regurgitate and this cannot do the snake any good.

REARING HATCHLINGS

I obtained my 5 specimens (2 males and 3 females) as hatchlings in autumn 1977. For their first winter they were kept in individual sandwich boxes with nylon mesh fronts. These boxes, in which I house all my hatchling snakes, were stacked three high in a 36" aquarium. The two 40 watt bulbs, fitted in the lid, were left on for 16 hours a day and a heat pad under the tank assured the temperature would not fall below 75°F (24°C) even on the coldest nights.

The youngsters fed throughout their first winter and it was not until their second winter that I allowed them a cooling off period. By this time all the youngsters had grown to between 42" (107cm) and 48" (122 cm), and were living in 36" cages. The bulbs in the cages were wired up to an automatic timer, which switches on and off at pre-set times. The photo-period I use is governed by the natural day-lengths outside. I simply set the timer to come on about 30 minutes after sunrise, and go off about 30 minutes before sunset. This normally gives about 16 hours of daylight in the height of the summer, and 8 hours in the winter.

The room has no additional heat source, but as the house is centrally heated, and the room is an upstairs bedroom, a certain amount of heat is retained; even on the coldest winter nights temperatures never fall below 12°C.

The snakes stopped feeding about the end of September 1978, the males having fed for a couple of weeks longer than the females. Although feeding had stopped and temperatures were quite low, the snakes were still very active. My thoughts were that if the cage prowling activity carried on through the fasting period, a lot of energy and body fat would be used up before spring. At this point I changed all the 25w bulbs for 15w. This seemed to do the trick and they remained relatively inactive for the rest of the winter.

The snakes started feeding again in March 1979 and fed well until the middle of September. They were all in the region of 60" (152cm) when they stopped feeding, and it was hoped large enough to breed the following spring.

BREEDING

They all saw the winter through without any problems and commenced feeding about the first week in February, a fast of 4½ months. The first sign of unusual behaviour was when the two males stopped feeding at the beginning of March. They both seemed very restless, continually nosing the corners of their cages and moving around both day and night. After a few days of this I put the larger male (M1) in the cage of the smaller male (M2). There was a very hostile reaction from both snakes and they spent the next 20 minutes arching their bodies and twining around each other, obviously in some sort of combat ritual. I separated them and a week later put them together again. After 30 minutes of combat they were separated and put with the two largest females.

Both males attempted to mate their respective females, but their approach was totally different. The larger male (M1), rubbed its chin slowly up and down the female's back, while trying to position itself for copulation. The second male (M2) grabbed the female in its jaws and they both flew around the cage at high speed, knocking everything upside down. After a couple of hours, they had all lost interest and were separated. On the 28th March they were reintroduced, this time the females were switched. The same approach by both males took place as before. M2 was separated after a few hours, but M1 was left with his mate. Mating activity continued through the night, but copulation was not observed on the various inspections I made through the evening.

These introductions and separations continued until 10th April, but unfortunately copulation was not witnessed. However on the 16th April a mouse was offered and refused by the largest female, up until then a very greedy feeder. Further mice were refused over the next few days, and the body of the snake began to look swollen. It was confirmed that she was gravid when I ran the snake through my hands and felt several large lumps halfway along her body.

On the 28th April she shed her skin, and by this time she was very triangular in shape and extremely heavy bodied. A receptacle, in the form of a hand basin, was introduced a couple of days later for egg laying purposes. This was filled with damp sphagnum moss, and covered with some cardboard for added security.

Unfortunately, I had a holiday booked at this time, so I left a friend with instructions to look in a couple of times a week and remove any eggs should they be laid.

On the 15th May my friend found the female straining to pass her final egg. She had already laid five, two in the receptacle and the other three around the cage. Being an experienced herpetologist, he had seen females retain eggs before, so he left her overnight and returned to help her the next day. Unfortunately she was dead, with the two final eggs still inside her. She was probably so weak from laying the first five eggs, which were very large and probably overdue, that she had no strength left for the last two. (Never book holidays at egg laying time!).

The eggs were incubated in a sandwich box half filled with slightly dampened vermiculite. The box was placed on a shelf in my home made incubator and the temperature fluctuated between 26^o and 31^oC.

Three of the eggs discoloured and went off within ten days of laying. The largest two looked good for about three weeks, until a thick mould grew over one of them. This mould was scraped off now and again, but still grew back. However, both eggs hatched on the 8th July, an incubation period of 55 days.

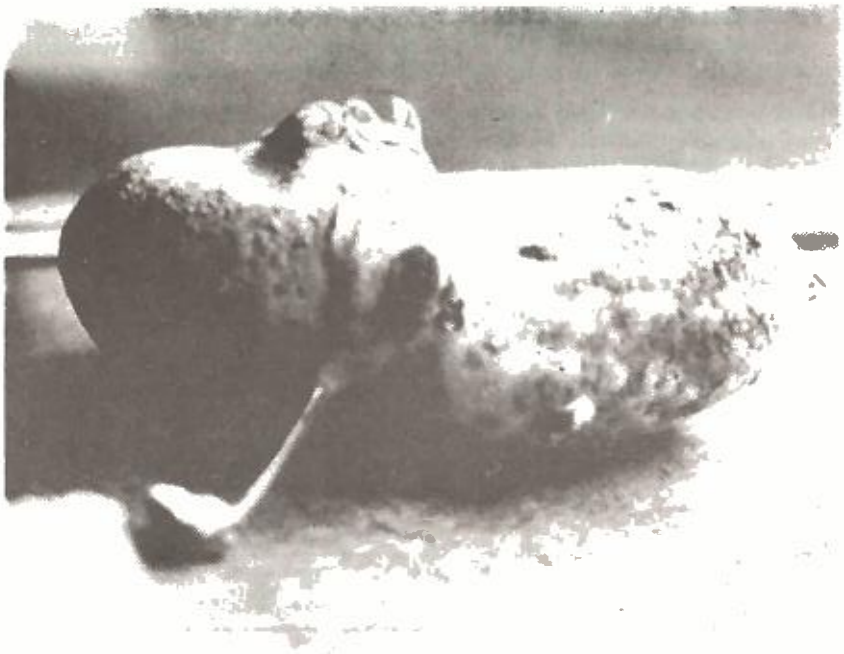


Plate 1. A hatching Pine Snake from an egg covered in mould.

The young (both females) measured 18" (46cm) long, were very plump, and when picked up hissed and struck repeatedly. They were house in the same sandwich boxes as their parents had been three years previously. On the 21st July both snakes shed, and each ate a baby mouse the following day.

It is hoped that some males can be bred next year for future captive breeding.

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NOTES ON THE REPRODUCTION OF *PSAMMOPHIS ELEGANS*

STEPHEN SPAWLS

Wa Secondary School, Wa, Upper Region, Ghana

On the 9th of December 1979 at Wa, Upper Region, northern Ghana (10° 03'N: 2° 30'W), two specimens of *Psammophis elegans* were captured. The snakes were observed lying coiled together in the branches of a small tree on the slopes of a rocky hill some 3km south-east of Wa town, at about 3 p.m. The snakes were lying intertwined in a large coil, with tails twisted together, and it seems probable that they had been copulating. The larger snake, a 1469mm male, was sent to Barry Hughes at the University of Ghana. The smaller snake, a 1321 (809 + 512) mm female, was kept in captivity. Her weight at capture was 59.02g. During captivity, she fed freely on lizards, mostly *Hemidactylus brooki* and small *Agama agama*.

By mid-January, this female was noticeably gravid and weighed 81.4g on the 17th of January. On the morning of the 25th of January she began laying eggs. Between 7.10 a.m. and 8.30 a.m. two eggs were laid. A third was laid at 9.05 a.m., a fourth at 10.35 a.m., a fifth at 10.42 a.m. and a sixth at 12.20 p.m. The eggs were removed from the cage and numbered 1-6 (using an indelible crayon) in order of appearance. The first egg was irregular in shape, tapering sharply from a wide blunt end. The remaining five were regular in shape, being cylindrical with hemispherical ends. The dimensions of the eggs at oviposition are shown in Table 1, column 2. The weight of the female after oviposition was 38.7g. The eggs were placed on damp paper towels in a plastic jar and kept in the author's bedroom. The temperature in this room varied between 26 - 33°C.

On the 3rd of March, the eggs were noted to have increased in size. Their new dimensions (Table 1, column 3) and weights (Table 1, column 4) were noted.

Hatching occurred between 1st and 2nd April, 1980. The lengths and weights of the hatchlings (measured on the 12th of April) are shown in Table 1, columns 5 and 6 respectively. The young snakes were fed on small *Hemidactylus brooki*. All fed readily.

On 1st of May, 1980, hatchlings 1 - 3 were chloroformed, preserved and deposited in the University of Ghana collection. Their lengths and weights at death are shown in Table 2, columns 2 and 3. (Hatchling numbers correspond to egg numbers). Hatchlings 4 - 6 were released. The mother was released on the 10th July, 1980. Her weight at release was 58.0g.

TABLE 1

Egg number	Egg dimensions on 25th Jan 1980 (mm)	Egg dimensions on 3rd March 1980 (mm)	Egg weight on 3rd March 1980 (g)	Length of hatchlings on 12th April 1980 (mm)	Weight of hatchlings on 12th April 1980 (g)
1	40.0 x 15.1 (unde ind)	41.2 x 15.3	0.52	187 (251 + 13n)	4.24
2	38.3 x 15.6	38.3 x 17.4	0.65	198 (251 + 15)	4.4
3	38.3 x 15.6	38.3 x 17.2	0.54	176 (251 + 2)	4.6
4	40.2 x 15.2	40.2 x 17.1	0.60	405 (260 + 14)	4.8
5	40.2 x 15.2	40.2 x 17.0	0.62	195 (260 + 13)	4.8
6	40.2 x 15.0	40.2 x 16.2	0.60	195 (258 + 13)	4.5

TABLE 2

Hatchling number	Length on 1st May 1980 (mm)	Weight on 1st May 1980 (g)	Sex
1	402 (260 + 142)	4.54	Female
2	414 (269 + 145)	4.65	Male
3	400 (262 + 138)	4.71	Female

Acknowledgements

I would like to thank Anneka and Christoph Kessler, who looked after the eggs while I was in Upper Volta, Barry Hughes, of the Zoology Department, University of Ghana, for professional advice and Nicholas Harman for his assistance in the field.

HERPETOLOGY AT LEEDS UNIVERSITY

A. S. JAYES

*Department of Pure and Applied Zoology,
University of Leeds, Leeds, LS2 9JT*

The herpetological activities of the Department of Zoology at Leeds have developed over the last few years as an extension of the research carried out by R. McN. Alexander and A.S. Jayes on the mechanics of animal locomotion. The work is aimed at investigating the mechanical design of animal movement using the approach of the engineer.

Most of the animals so far studied have been mammals, both quadrupeds and bipeds, but we are slowly turning our attention to the reptiles, a technically more challenging group of animals. Mammals and birds place their feet on the ground below their bodies. The forces they exert during locomotion have components mainly in the vertical and longitudinal directions and so, for certain problems, can be treated as two-dimensional animals. Reptiles and amphibia place their feet more laterally and transverse components of force are an essential part of their style of locomotion. This requires the development of three-dimensional analysis techniques.

Our main research effort has been a study of the mechanics of walking of chelonians. It is based on force platform records, films and mathematical models. The only model of low speed quadrupedal locomotion in the literature is the constant stability walking model (McGhee and Frank, 1968). Here the animal moves each foot individually so as to ensure that at least three feet remain on the ground at all times to support its weight. The animal being always in a stable equilibrium. However, walking at very low speeds imposes severe balancing problems, slight fluctuations in forces exerted against the ground can give rise to excessive pitching and rolling movements of the body. The slow muscles of chelonians are not capable of producing the abrupt force changes for the constant stability walk of McGhee. Our models show that the trot-like walk used by chelonians minimises pitching and rolling movements and is the only feasible gait at very low speeds (Jayes and Alexander 1980).

Further work on chelonians is in progress. Johan Van Leeuwen from Wageningen, Holland, took time off from fish feeding to spend six months at Leeds. Together we worked at trying to estimate the stresses in *Testudo* muscle during locomotion. A technique was devised which produced three-dimensional X-rays of tortoises during locomotion and together with force platform records we are able to estimate the stresses in the limb muscles. This is the first time that locomotory forces and stresses have been analysed for a reptile. Work is also planned on investigating limb bone design and head retraction in *Testudo*.

The other group of reptiles we are studying is the quadrupedal lizards. Work has already commenced on two species of monitor lizard (*Varanus bengalensis nebulosus* and *Varanus salvator*). We are particularly interested in limb and back musculature and will be looking for possible locomotory elastic storage mechanisms.

R. McN. Alexander has also been working on the locomotion of dinosaurs. Using fossil remains and foot prints he has estimated such things as the speed of these animals (1976) and stresses in limb bones and neck vertebrae. Unfortunately due to a scarcity of live specimens this work is rather limited.

Undergraduates at Leeds are involved in short biomechanical research projects and some work has been done on allometry of reptilian limb bones and kinesis of reptilian skulls during feeding.

Our research efforts have led to a collection of reptile species and it was decided to display these in the department. In collaboration with Roger Meek, a herpetologist residing in the Leeds area, we designed and built a series of cages. Tru-light fluorescent tubes were installed in order to produce as near natural lighting conditions as possible. A heat gradient

was set up in each cage using localised infra-red heating elements and air conditioning was installed. The heating, lighting and ventilation are controlled by time circuits and so photoperiod, temperature and to some extent humidity levels can be varied.

In addition to display we are also attempting to breed reptiles. We have had some success with the European Green Lizard (*Lacerta viridis*) and the African Five-lined Skink (*Mabuya quinquetaeniata*). At present we are simulating the rainy season for the benefit of the Boa constrictors and Indian pythons.

The display of reptiles at Leeds and the breeding programme we are trying to set up is intended to promote interest in herpetology, both internally and externally, in addition to providing a reservoir of animals for research purposes.

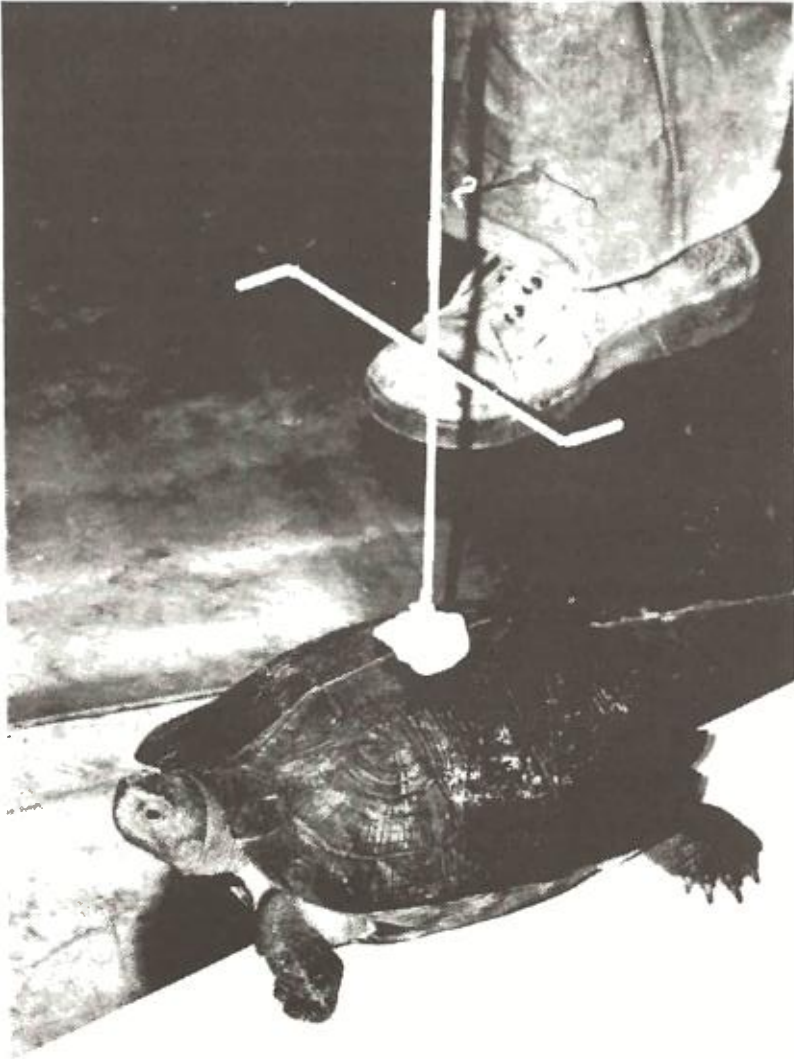


Plate 1. *Geoemyda grandis* (weight = 8 kg).
The aerial mounted on the carapace was used to measure the angular movements of the carapace during locomotion experiments.

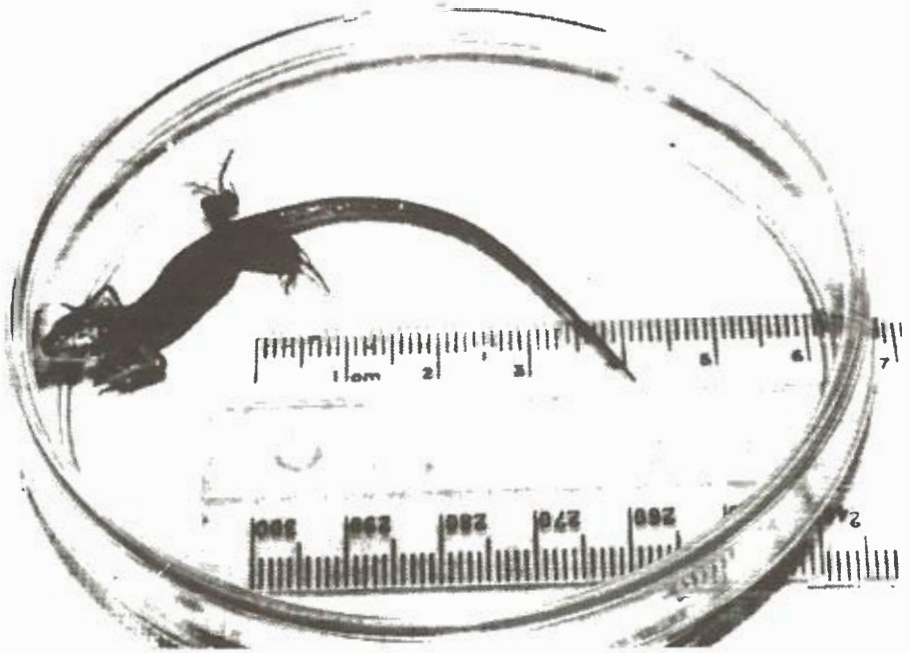


Plate 2. A *Lacerta viridis* hatchling shown 2 hours after emerging from the egg. We incubated these and *Algroides nigropunctatus* eggs in the insect room which had a temperature variation of 26 – 30°C.

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**REPORT TO THE CONSERVATION COMMITTEE ON
NATTERJACK TOADS, *BUFO CALAMITA*, IN NORFOLK:
OBSERVATIONS MADE DURING 1980**

JOHN BUCKLEY

14 Burlington Road, Polygon, Southampton SO1 2FQ

Coastal Site 1, Areas "A" and "B". 17th May 1980 – At the Area "A" scrape 3 males were heard calling. The pH of the water at the edge of the scrape was 6.4-6.7. 20+ strings of spawn (¾ covered with fungus) were found in the main scrape at Area "B". Two sizes of tadpole were noticed. The pH of the water was 8.6-8.9. 10+ strings of spawn were seen in the square pits just north of the main scrape. The new scrape had a pH of 4.1-4.3 and contained no tadpoles or spawn.

26th June 1980 – At the main scrape at Area "B" there were two freshly laid spawn strings and a third string was just hatching. The larger tadpoles in the scrape and the square pits had hind legs. Only 3 tadpoles were seen in the whole of the new scrape.

Coastal Site 2. A brief visit was made on the 3rd May to this site. 8 strings were seen in the ponds, one string had just hatched and a second was well developed. No spawn was found in the relict creeks. 12 more strings were laid between 29th May and 3rd June and the first toadlets emerged in large numbers on the 12th June.

Inland Site 1. The Norfolk Naturalists Trust have begun management work at the common and a considerable amount of birch scrub and gorse has been removed from heathery areas near the scrapes. In April a 40 foot wide fire-break was cut along the roadside boundary of the reserve.

Visits

- 1st Jan. Scrapes dry. Two areas of common burned in late '79, little heather lost.
- 18th Feb. Some puddles of water at southern end of main scrape.
- 22nd Mar. Both scrapes full of water.
- 11th Apr. Single male (47mm) found on land after dusk.
- 13th Apr. Vast quantities of Common Toad spawn laid in ponds and flooded track. Several netfulls removed from scrapes.
- 16th Apr. Males induced to call by tape recording.
- 19th Apr. Extensive fire on area of common NE of minor road to village.
- 23rd Apr. Small toad (3cm) seen emerging from disused rabbit's burrow.
- 29th Apr./
- 1st May About 30 males calling in main breeding area.
- 3rd May 9 spawn strings + 1 gravid female found in shallow water near track and main scrape.
- 4th May No more spawn.
- May Spawn laid in "hopeless" areas transferred to the scrapes.
- 18th May The pH values obtained on this visit were: scrapes 8.3-8.9, track 6.8-7.0, ponds 7.3-9.0. Only one male natterjack was seen.
- 5th June No adult toads seen. About 200 tadpoles were transferred from puddles on the track to the scrapes.
- 15th June A few toadlets were seen by the scrapes, 10 males calling and 3 other individuals also seen.
- 15th June "Mass of spawn about to hatch" in pond 4 (north of common). Spawn laid on or about 9th June.

21st June 1,000+ natterjack tadpoles 7-8mm long in pond 4. Pond had reduced in area to one eighth its size in one week. Some tadpoles were later transferred. A single adult toad was seen and a recently metamorphosed toadlet was found by the smaller scrape. A small area of the common had burned since my last visit, only scrub had been lost.

Early August 20-30 toadlets seen; breeding success judged to be moderate to poor. Motor-cyclists now a post-breeding season problem.

Introduction at Inland Site 2.

4th May The equivalent to one spawn string was collected from Inland Site 1 and transferred to the pond at Inland Site 2.

10/11th May Tadpoles hatched.

18th May About 2,000 tadpoles, 1cm long. pH of water 8.0.

5th June About 1,400 tadpoles, hind legs appearing.

12th June Toadlets emerging in large numbers.

Thanks are due to the respective Nature Reserve Wardens and others who made many of these observations.

MEMBERS' ADVERTISEMENTS

- * **Wanted:** adult females or pairs of *Bombina variegata*.
Andrew Quayle, 54 Joyce Street, Moston, Manchester M10 8HA. Tel: 061-681 7500.
- * **Wanted:** *Ceratophrys* sp., *Pseudotriton ruber*, and *Triturus marmoratus*.
A.K. Healey, 59 Aldwyn Park Road, Audenshaw, Manchester M34 5NZ.
- * **Wanted:** to complete a set of tape recordings of European anurans, a recording of the voice of the Western Spadefoot *Pelobates cultripes*; or live male specimens which might be induced to call; or addresses of persons in Iberia who might help in the procuring of recordings or live specimens.
Jeffery Boswall, Birdswell, Wraxall, Bristol BS19 1JZ. Tel: 0272 853418.
- * **Wanted:** captive bred male *Lacerta viridis* and female *Anguis fragilis* for breeding programme at Theobalds Field Study Centre.
Vic Taylor, Capel Manor Institute of Horticulture and Field Studies, Bullsmoor Lane, Waltham Cross, Hertfordshire.
- * **For Sale** (due to forthcoming move): Common Boas, 6ft male, 2 females 3½ft and 4ft, 1 juvenile; Grass Snake, Dice Snake, South American Water Snake, pair American Bullfrogs, pair Colorado River Toads, pair Cuban Tree Frogs, Fire Salamanders, Tiger Salamanders, European Tree Frogs, Green Toads, Glass Lizard, young Common Iguana, young Haitian Iguana.
Richard Saunders, 3 Highfield House, Arundel Gardens, Winchmore Hill, London, N.21. Tel: 01-886 1693.
- * **Contact wanted** to exchange letters, experience and literature.
Jiri Kulich, Sevcikova 25, Horazdovice, Czechoslovakia 34101.
- * **Home Wanted** for Fire Salamanders.
Jonathan Andrews, 12 Glebeland Close, Coychurch, Bridgend, Mid Glamorgan CF35 5HE.
- * **Home Wanted** for Bell's Tortoise, *K. belliana*. Male, length approx. 7", weight 1lb.
Deidre F. Randell, 153 Colwyn Road, Northampton, NN1 3PU.
- * **For Sale.** surplus Axolotls about 1" in length.
Sue Cooper, 98 Ewart Street, Brighton BN2 2UQ.
- * **For Sale:** one pair of captive bred baby Yellow Anacondas (born 30/8/80). Also one pair young adult Sinaloan Milk Snakes, *Lampropeltis t. sinaloae*, long term captives. Good home wanted for four Wolf Snakes.
Simon Townson. Tel: 01-989 9570.

LETTERS TO THE EDITORS

THE POP-EYED FROG: AN ERROR

It appears that we made an unfortunate blunder in the last issue of the Bulletin (No. 1, June 1980), in reprinting the humorous piece describing *Rana magnaocularis* as a new species of frog. In fact, our correspondents pointed out, the name *Rana magnaocularis* had already been legitimately given to a very real anuran, a form of Leopard Frog from Mexico described by J.S. Frost and J.T. Bagnara in 1976. We here apologise to these authors for any offence inadvertently caused by our ignorance.

The chastising letters, serious or not so serious, are printed below.

Dear Sirs,

Everyone enjoys a joke, especially a good one, but your recent parody by "Rank Fross" seems inappropriate for two reasons.

These are:

- 1) By proposing a new name in Latin even as a joke, you have contributed a confusion to nomenclatorial stability since *Rana magnaocularis* is the name proposed in 1976 (Copeia, No.2) by Bagnara and Frost for a valid Mexican species.
- 2) It hardly seems proper to use your positions as editors of at least a semi-serious scientific publication for this purpose; it certainly will prove confusing to any person not well-versed in English.

Sincerely,

Jay M. Savage,
Professor of Biology,
Associate Director,
Allan Hancock Foundation (University of Southern California), University Park, Los Angeles
California 90007, USA.

Dear Sirs,

With reference to the article on page 34 of Bulletin number 1, please bring to the attention of Dr Fross the fact that *Rana magnaocularis* is an occupied name. It was used by J.S. Frost and J.T. Bagnara for a leopard frog from northwestern Mexico (Copeia, 1976(2): 332-338, May 1976). Possibly Dr Fross could be persuaded to publish a replacement name in the next issue of the Bulletin. One suggestion is *Rana volans*, the sail frog, in view of the fact that when launched manually they sail very well (better than sail snakes and almost as well as sail cats).

Respectfully

Warren G. Wonka
Stanford University Natural History Museum.

Dear Sir,

I read with interest and excitement the report in the Bulletin on *Rana magnaocularis* since the discovery of this new anuran species adds weight to a theory on which I have been working for a number of years. My theory concerns vertebrate evolution and sets out to disprove the current hypothesis that the class Mammalia evolved from the class Reptilia some 190 million years ago. I would argue that in fact mammals are much older in origin and date back to early amphibians.

My first clue to this revolutionary idea came, as so often happens in the scientific world, by chance when I was visiting the palaeontology galleries at the British Museum. I noticed that a skeleton of the extinct amphibian *Leptorophus tener* somewhat resembled my father minus his false teeth; from this rather light hearted observation I was to become entangled in a web of more serious research. *Rana magnaocularis* could be the missing link for which I have been searching since it bears some uncanny morphological similarities to a mammal which has been observed at Theobalds Field Study Centre. The animal concerned is a sub-species of *Erinaceus europaeus* which has very similar habits to *Rana magnaocularis*.

If Rank Fross would like to send me a specimen of the Pop Eyed Frog I will send him an example of the Hertfordshire Pop Eyed Hedgehog although I should warn him that there will be some delay since, like its close relative the Pop Eyed Frog, it hibernates over winter.

I am,

yours sincerely,

A. P. Nutta (Alias Vic Taylor)

ANTIBIOTICS AND CHELONIANS IN CAPTIVITY

Dear Sir,

A fairly recent paper in "Applied and Environmental Microbiology" (1979) may be of relevance to herpetologists who keep chelonians in captivity.

The paper is entitled "Symbiotic cellulose degradation in green turtles, *Chelonia mydas* L", and the authors describe their studies on the gut contents of a green turtle captured in 1977. They were able to show that plant tissue is broken down in the intestine of the turtle by the action of micro-organisms. The process appears to be similar to that in the rumen of the cow and both bacteria and protozoa are probably involved.

These results may be relevant to the care and treatment of captive chelonians. For example, the prolonged oral administration of broad spectrum antibiotics to these animals has been discouraged by many zoologists and veterinary surgeons in this country, mainly on the grounds that it might encourage bacterial resistance. The findings in the green turtle suggest that such use of antibiotics is also undesirable because the agents may destroy organisms in the gut which are beneficial to the animal.

The other point that emerges from the study concerns the breakdown of ingesta in the intestine. My colleague, Dr Oliphant Jackson, has frequently warned that tortoises should not be hibernated within a few days of eating a meal and has also suggested that "chilling" such species — for transportation, for example — may result in a potentially dangerous build-up of gases in the gut. The results in the paper add weight to these arguments in that they confirm the existence of a fermentation process, at least in the green turtle.

The paper in question deals only with one, relatively specialised species and it is possible that the data presented are not relevant to other turtles, terrapins or tortoises. Nevertheless, at the very least the work may encourage further research into this relatively little understood aspect of chelonian biology.

Yours faithfully,

J. E. Cooper

The Royal College of Surgeons of England
35-45 Lincoln's Inn Fields, London WC2A 3PN.

Reference

Fenchel, T.M., McRoy, C.P., Ogden, J.C., Parker, P. and Rainey, W.E. (1979) *Applied and Environmental Microbiology*, 37 (2), 348-55.

BREEDING GARTER SNAKES

Dear Sir,

I have a pair of Plains Garter Snakes, *Thamnophis radix radix*, which I bred myself. I first bought a pair a few years ago; after three years in my possession they produced 18 young, two of which were dead at birth, on 24.12.77. I had not seen them mate. Also, they had never hibernated while in my care. Two or three of the juveniles died, but most were sold or given away; I kept one pair. A few weeks ago I had a suspicion that the female of this pair was pregnant, but now I am not sure. These young were first fed on worms, but after a few days were transferred to a diet of chopped Sand Eels and pieces of beef dipped in "Vionate" multi-vitamin/mineral powder. They are now about two feet in length.

In July 1980 I purchased a pair of the Coast Garter Snake, *T. elegans terrestris*, and on the 25th August the female gave birth to 5 young, only 2 of which survived. These are thriving on a diet of chopped Sand Eels dipped in "Vionate". The adult male also eats Sand Eels, but the female will only eat Herring. A pair of *T. sirtalis parietalis* purchased in October 1980 also feed well on Sand Eels and pieces of beef, again dipped in "Vionate"

Yours sincerely,

Jim Wright

"Tremeneth", Shrubberies Hill, Porthleven, Helston, Cornwall TR13 9BJ.

SAND LIZARDS

Dear Sirs,

On reading Mr Charles Snell's letter (Bulletin No. 1, June 1980) about the supposed inferiority of British Sand Lizards, it seemed to me that he has confused two modes of island colonisation.

Oceanic Islands, such as the Azores, well out of reach, geologically speaking, of land bridges, are colonised by relatively few individuals. As such, oceanic island populations do not reflect the complete gene pool of mainland populations. Mr Snell has suggested that Britain was colonised by "relatively few individuals". However, the British Islands are not oceanic, being firmly fixed to the European Continental Shelf and, following the last glaciation, colonisation across the land bridge would have been by expanding populations, not a few individuals. Also, it is well to remember that *Lacerta agilis* may not always have been on the edge of its range here. Two thousand years ago the climate was on average 2°C warmer. This may not seem much, but a rise of 2°C at the present time would give southern England a climate more like that of present day Central France. Furthermore, the Sand Lizards of southern England are very similar to those of north-western Europe, which is what one would expect if colonisation by many lizards had taken place.

In support of his theory, Mr Snell gives examples of non-dependance on bare sand in the Black Forest and Sweden. However, on the North German Plain the Sand Lizard is said to inhabit sandy soil almost exclusively, while in Holland, where the climate more closely resembles that of England than it does the climates of Sweden and southern Germany, the Sand Lizard is confined to sand dunes and sandy areas (Street). So it seems that dependence on bare sand for successful incubation is not exclusive to British Lizards.

I believe that the English Sand Lizard is in no way inferior to its Continental counterpart and is confined to its specialised habitat only by the less favourable climate of England.

Incidentally, Mr Snell's phrase "better egg retention and incubation mechanism" led me to wonder why oviparity, in northern reptiles at least, does not gradually become ovo-viviparity by shortening the incubation time at the expense of a longer internal incubation period inside the females' oviducts. According to Smith, the development of the Sand Lizard embryo has already begun when the egg is laid, so is this trend towards ovo-viviparity

already occurring? If so, can we one day expect to find the Sand Lizard in Norway or Scotland, or the Green Lizard in Denmark?

Yours sincerely,

Andrew Quayle
54 Joyce Street, Moston, Manchester M10 8HA

References

Smith, M.A. (1973) *The British Amphibians and Reptiles*.
Street, D. *Reptiles of Northern and Central Europe*.

DIAMONDBACK TERRAPINS IN CAPTIVITY

Dear Sirs,

I find that people who keep Diamondback Terrapins, *Malaclemys terrapin*, in aquaria often argue as to whether to keep them in salt or fresh water. In my opinion, I do not think it necessary to keep them in salt or brackish water. I have kept this species for three years, always in clean fresh tapwater heated to 75°F, and with a dry basking area. In this time, none of my Terrapins have developed fungus or suffered from any other ailments. I would like to hear from other members who would like to exchange views on this subject, or about the care of any other species of terrapins.

Nigel A. Stevens,
5 Delmaine House, Maroon Street, Poplar, London, E14 79J.

COUNCIL FORCES MEMBER TO DISPOSE OF SNAKES

Dear Sirs,

I have been obliged to give away my small stock of three Boas and a Python, due to Council short-sightedness, and, I suspect, to some inbred fear of snakes of any kind by the majority of non-initiated members of the public. It is a great pity that whilst cats, dogs, etc., with all their faults as well as their virtues, are tolerated by most members of the public, a caged, silent and basically unobtrusive reptile is looked upon mainly with disgust and horror. In addition, though you may feel it is becoming a very popular hobby, a herpetologist is generally considered an oddity by his fellow man. It is naturally my intention to re-start my hobby at the earliest opportunity, but the way things are progressing this may not be for a few years yet. In the meantime it is to be hoped that enforcers of council rules and regulations extend their "blind eye" to include this aspect of pet-keeping, as I know of at least one person living very close to me who is in the same situation but has not been found out yet.

A.E. Watts,
47 Andrew Reed House, Linstead Way, Wandsworth, London, SW18 5QD.

LIZARD-SKIN CAMERAS

Dear Sirs,

Photographers with an interest in either Herpetology or Conservation will be interested in the latest sales gimmick of Leitz, manufacturers of the Leica camera. The Leica R3 and M4-2 are now available in 24 carat gold plate and Reptile Skin Trim. So rapidly did these rather tasteless items sell that Rollei, greedy for a share of the status market, have produced a gold-plated 35S camera (limited edition, naturally) with lizard-skin trim to commemorate

the 60th anniversary of their company.

Yours,

D. Blatchford

Information source: "Practical Photography", August 1980.

FROGS DISAPPEARING IN CORNWALL ?

Dear Sir,

For some time now I have been puzzled by the almost total disappearance of the Common Frog in Cornwall, and until yesterday I had not seen one single frog since 1967. At one time they were common almost everywhere in Cornwall and in considerable numbers, then they all disappeared. Yesterday for the first time since 1967 I was delighted to find one in my small pond. It was a large frog, but where it had come from I know not as I live in a very new bungalow and have only recently tried to make a garden. Now I've seen plenty of toads and toad tadpoles, which I had by the hundreds when I lived in Gweek. There used to be a place on the Goonhilly Downs where one could see ponds black with frog tadpoles, but of recent years not one single one. I rather gather that this is now becoming a common thing in other places.

As far as I know there have been no extensive drainage schemes, so where have all the frogs gone?

I would be interested to know if anyone can tell me why frogs seem to have almost died out, even where there have been no vast drainage schemes.

Yours faithfully,

G.W.M. Bernau
"Bosula", Housel Bay Road, The Lizard, Cornwall TR12 7PF.

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relations)
Centre for Overseas Pest Research,
College House, Wrights Lane,
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ext. 205
- Treasurer:** Mr D.G.D. Lucas
(society finances, mem-
bership numbers)
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- Editor, *British Journal*** Dr M. Peaker
of Herpetology
The Hannah Research Institute,
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PE18 6BU
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Tel. 0227 66822 ext. 7648
- Mr J Webster (2nd yr)
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Tel. 01-390 2368

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