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THE BRITISH HERPETOLOGICAL SOCIETY

BULLETIN

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BRITISH HERPETOLOGICAL SOCIETY

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

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

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

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

Publications

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

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

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

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

Meetings

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

Subscriptions

Ordinary Members £15. Junior Members £5. (Junior Members do not receive the British Journal of Herpetology). Institution rates £25 (U.S. $40).
All subscriptions become due on the first day of January each year.

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

The Bulletin is edited and produced by
John Pickett and Mike Matthewson

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

IMPORTANT NOTICE: CHANGE OF MEETING DATE

In December 1984 issue of the Bulletin the date of Professor Kraig Adler's lecture was given as May 13th. Please note that the date has been changed to Wednesday, MAY 15th.

REMAINING MEETINGS 1985

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

APRIL 25th — Mr Brian Banks (Biological Sciences, Univ. Sussex): Breeding ecology of the Natterjack in Britain in relation to conservation.

MAY 15th — Prof. Kraig Adler (Section of Neurobiology and Behavior, Cornell Univ., Ithaca, New York, U.S.A. and Pembroke College, Univ. Cambridge): Sensory basis of amphibian orientation and navigation. A research talk illustrated by North American species.

JUNE 19th — **Amphibians and reptiles Worldwide.* A discussion on care and breeding organized by the Captive Breeding Committee.

SEPTEMBER 26th — (Meeting topic to be arranged by the Captive Breeding Committee).

OCTOBER 23rd — Dr Alan Charig (Chief Curator of Fossil Amphibians, Reptiles and Birds, Dept. Palaeontology, British Museum (Natural History), London): Dinosaurs: myths and misconceptions. (Carried over from 1984).

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

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

MINUTES OF THE FIRST A.G.M. OF THE NORTH-EAST REGIONAL GROUP HELD ON 14th DECEMBER 1984, AT THE ADULT EDUCATION CENTRE, 32 OLD ELVET, DURHAM

1. **The following constitution was approved:**

North East Group Constitution

A. The regional group will hold meetings in the north east of England, with a mix of indoor meetings and field trips. While any BHS member may attend the meetings only members living in the counties of Northumberland, Tyne and Wear, Durham and Cleveland are eligible to vote at local A.G.M.'s and stand for the local committee.

B. An elected committee shall be responsible for organising local meetings. Representatives for this committee are to be elected at the groups A.G.M. The following positions on the committee will be available:—

i) **Chairperson.** To be responsible for organising local committee meetings, and will be responsible for organising local meetings.

ii) **Council representative.** To represent the group on the main Council of the society, and will be able to vote on the running of the society.

iii) **Publicity officer.** The holder of this post will be responsible for advertising society meetings and local recruitment of new members.

Representatives of these three posts will be required to present an annual report at each A.G.M., in person, or in writing.

iv) In addition to the above three posts the committee will contain up to 3 ordinary members.

All committee members must be paid up members of the B.H.S., and may serve on the committee for a maximum period of 3 years, after which time they must stand down for a period of one year before being eligible for election to the committee again. All committee

members should normally be resident in the region except in exceptional circumstances (i.e. in the case of students studying at Universities outside the region).

Local committee meetings will be held twice a year, and minutes and agenda's should be produced and circulated to committee members. Any B.H.S. Council members may attend these meetings.

C. **Meetings.** There should initially be a minimum of 4 local meetings each year, although as membership increases it is hoped to increase the number to a maximum of 10. Meetings will cover all aspects of herpetology including captive husbandry, conservation, scientific aspects etc. Guest speakers should normally be introduced by a member of the local committee. Non members will be welcome to attend meetings free.

D. Amendments to the above constitution must be passed at an A.G.M. with a 55% majority.

Any amendments to the above constitution must be proposed at the meeting. There will then be a vote to ratify the constitution.

2. The following members were elected to form the first regional committee:
Chairperson: Mr D. Race, 15 St Andrews Street, Darlington, Co. Durham, DL1 2HD.
Council Representative: Mr G. Laverick, 32 Humbledon Park, Sunderland, Tyne & Wear.
Publicity Officer: Mr I. Jenkins, 449 North Road, Darlington, Co. Durham, DL1 3BN.
Ordinary Members:
Mr B. Banks, c/o School of Biology, University of Sussex, Falmer, Brighton, E. Sussex.
Mr D. O'Brien, South Lodge, South Road, Durham, DH1 3LE.

3. Mr G. Laverick (Royal Holloway College, London), gave a slide illustrated talk on "A herpetological expedition to the Greek Islands".

The meeting closed at 9.00 p.m.

CONSERVATION OFFICERS REPORT FOR 1984 — A SUMMARY OF WORK CARRIED OUT FOR THE BHS

The post of Conservation Officer was agreed nem. con. at the meeting of the BHS Council on 11th October 1983. However, at the Societies AGM on 13th March 1984, it was decided that this post shuld not be a full Council post, and a rules committee established by Council has agreed that the post should be a non-voting one, whether the post is honorary or salaried. While the post remains honorary, such an officer is eligible for election to, or co-option by Council, in a similar way to any member of the Society. The Conservation Officer is required to work under the terms of reference as agreed by Council.

Education

The educational/conservation "Toads on Roads" campaign was carried out with the Watch Trust for Environmental Education. This was funded by the World Wildlife Fund (WWF) and Nature Conservancy Council (NCC) and resulted in twenty toad crossings with authorised road warning signs across the U.K. Many local groups took part and 20,000 toads were lifted across roads. An estimated 2,000 people were actively involved with handling toads, and publicity for the Society was high, with at least ten regional television programmes covering the event, numerous radio and press articles. The results were sufficiently good for the Department of Transport to authorise the production and positioning of signs in 1984 by the highway authorities, where large numbers of toads are killed. The campaign report is in its final draft, and will be ready in early 1985.

A talk on the Conservation activities of the Society was given to the new North-East England BHS Group, in order to boost the important area of regional group establishment. Four other talks were given to the British Trust for Conservation Volunteers (BTCV), to explain and inform on management techniques to preserve the natural habitats of U.K. herpetofauna.

Management

Support was given over the 83/84 winter in organising and carrying out heathland management tasks (the Conservation Committee also completed the third year of bracken spraying at key reptile sites in southern Britain). New equipment and chemicals were provided following fund raising early in the year, when £4,000 was raised. A new chainsaw was also obtained for heathland and pond management. Facilities for proper training in its use have been made

available, and other aspects of improved task safety are the provision of efficient chemical spray masks, and high quality first-aid kits. An even larger number of tasks for winter 1984/5 has been possible due to funds raised from WWF to employ the BCTV for contract work. This has also been possible for pond work in the Greater London area, and a target of restoring forty ponds this winter is being met.

In Dorset two new sites have been negotiated for habitat management this winter, while a site managed last winter has improved to a stage where three pairs of nightjars nested in the spring. New scrapes were provided at a Norfolk dune reserve, following a site visit. These should help improve conditions for the Natterjack Toad.

Provision of artificial breeding sites for Grass Snakes was investigated with some 'trial dung heaps' and this project is to be expanded in 1985.

Meetings

These were held throughout the year, in order to supplement the need to attend as many important meetings as possible by the Conservation Committee. Regional trips were made to the North West (Cumbria/Lancashire) East Anglia, Kent and the South West (Surrey, Hampshire, Dorset) in order to meet with the NCC, Forestry Commission, County Trusts, County Councils over numerous matters relating to management of habitats. Wildlife Link meetings were attended, and an input to two important reports on the destruction of habitats in the U.K. was possible. The particular need to protect PSSSI's formed the basis of many meetings and these reports. About fifty meetings were attended in total. Three meetings were held by Link with the D.o.E., and aspects of protection for schedule 5 species and aspects of trade in herpetofauna were mentioned. Clarification of government policy on these matters was sought, but little progress made. Two meetings of the Societas Europaea Herpetologica Conservation Committee were attended in Ostende (Belgium).

Projects

A survey of London's 1,500 ponds and lakes was carried out during the spring and summer, funded by a grant raised by the European observer from the GLC. This project was administered by the Fauna & Flora Preservation Society, and has allowed detailed consideration of conservation strategy for amphibian protection in the London area. The project is being followed up by active management by local Councils and management groups, following detailed Borough reports. Many BHS members assisted.

Assistance was given to the Smooth Snake study. Recording booklets were produced, and site monitoring carried out at important sites.

November 1984 T.E.S. Langton

RESIDENTIAL COURSE ON REPTILES AND AMPHIBIANS

Between the 5th and 9th August 1985 Roger Butler, President of the International Herpetological Society, will be directing a short residential course entitled "An Introduction to the Reptiles and Amphibians". It will be based at Slapton Ley Field Centre, which is situated on the South Devon coast between Dartmouth and Kingsbridge.

Surrounding the Field Centre is a Grade 1 SSSI Nature Reserve, which displays a variety of habitats from open maritime shingle ridge to extensive freshwater reed-beds and Slapton Ley — the south-west's largest freshwater lake.

The full cost of the course is £95. If any members are interested, then please contact: The Warden, Slapton Ley Field Centre, Slapton, Kingsbridge, Devon, TQ7 2QP. Tel: Kingsbridge 580466.

BRITISH HERPETOLOGICAL SOCIETY FINANCIAL STATEMENT 1983-84

INCOME AND EXPENDITURE A/C

Income	1984 £	1983 £
Subscriptions	5934.34	5344.80
Sales of Journal	2721.75	3613.29
Deposit a/c interest	32.04	30.45
Donation	100.00	— —
Inland Revenue	389.33	— —
Advert.	35.00	— —
Miscellaneous sales	— —	226.79
	9212.46	9215.33
Expenses		
Printing of Journal & Bulletin	6052.45	7826.47
Postage & Stationery	1201.59	1148.99
Hire of meeting room	313.50	275.00
Conservation Committee	266.15	375.57
Bank charges	77.45	60.02
Advertising	35.85	62.18
General expenses	— —	10.00
	7946.99	9758.23
Excess of expenditure over income	— —	542.90
Excess of income over expenditure	1265.47	— —
ASSETS		
Cash at bank		
current a/c	4859.05	1604.61
deposit a/c	523.73	491.69
	5382.78	2096.30
LIABILITIES		
Pre paid subscriptions	432.76	256.15
Facsimile	640.70	372.65
Pre paid Journal subscriptions	1264.93	— —
Linnean Society	44.00	— —
Postage for Editor of Journal	90.54	
Printing Journal Dec 1984	2000.00	— —
Printing of Bulletin No. 10	1000.00	
Cheques not presented by 1/1/84.	— —	229.65
	5472.93	858.45
Excess of assets over liabilities	— —	1237.87
Excess of liabilities over assets	90.15	— —

Report of the Auditors to the Members of the British Herpetological Society.

We have examined the above balance sheet together with the books of account and certify them, to the best of our knowledge, to be in accordance therewith.

Date: 13/1/1985 Signed: P.A.W. Bennett, S. Rata, Hon. Auditors

REPORT ON THE BERNE CONVENTION

KEITH CORBETT

This December I was able to attend the 2½ day meeting of the Standing Committee of the Berne Convention (The Protection of Wildlife and Natural Habitats in Europe) at the Council of Europe in Strasbourg. This was enabled by generous funding from WWF in support of my 'Observer' status to represent Wildlife Link, as well as BHS and SEH (Societas Europaea Herpetologica).

The meeting was impressively attended by delegations from the W. European governments, as ratifiers, signatories, or observers to the Convention, as well as by many non-governmental organisations such as IUCN, WWF, bird protection and animal welfare agencies, and even hunters!

The original purpose in attending had been to quote appropriately from a Wildlife Link report which highlighted the U.K.'s incomplete ratification of Berne via our Wildlife and Countryside Act — this had particular herp. implications (see below). However, in the event, the meeting's delayed attention to the thorny matter of continued n-g.o. attendance proposed that discretion be the better part of valour!

Many of the governments were positive on their treatment and intention on Berne matters, and I was much encouraged over the potential progress and success of this very welcome and well intended wildlife convention. Amongst the serious situations discussed openly were; spring shooting of birds in Greece; the damming of the Danube near Vienna; and the precarious fate of the Monk Seal.

Two herp. matters were raised; one was the welcome and immediate use of the SEH biogenetic reserve proposals for endangered European herp. species; the other the fate of the well established introductions of the 'strictly protected' Appendix II species. The latter subject will now be debated in full at the next meeting, and was brought up in the knowledge of the U.K. situation whereby our well established colonies of Tree Frog, Midwife Toad, Wall Lizard, etc., currently receive no conservation and in fact quite the opposite. Backing from Berne would change this.

Meanwhile the Wildlife Link report is being revised prior to intended publication in the spring. It main contention surrounds inadequate protection for the Appendix II species of Otter, Corncrake, and Great Crested Newt or of their habitat; and the lack of control of exploitation of Appendix III herps. via their legal killing, collection and sale. Killing of snakes has obvious implications for the Appendix II Smooth Snake via mis-identification.

PROCEEDINGS OF THE 2ND EUROPEAN CHELONIAN SYMPOSIUM, OXFORD 1981

Immediately following-on from the Inaugural Meeting of the IUCN Species Survival Commission Tortoise Group (Chairman: Dr I.R. Swingland, University of Kent, Canterbury), 1-2 October 1981, and organized by Dr M.R.K. Lambert as a member of the Group, the 2nd European Chelonian Symposium (II. Symposium Cheloniologicum Europaeum) was held in the Department of Zoology, University of Oxford, 3-4 October, and was integrated with the first two days of the International Herpetological Congress (3-9 October) organized by John Coborn. Edited by M.R.K. Lambert, the Proceedings of the Chelonian Symposium have now been published in two parts, A and B.

Proceedings A

Published in *Amphibia-Reptilia* **5**(1): 1-80, March 1984, the journal of Societas Europaea Herpetologica (publisher: E.J. Brill, Leiden, The Netherlands).

Contents:

Proceedings B

Published in *Testudo* 2(2): 1-32, 1983, the journal of the British Chelonia Group, Bristol.

Contents:

Orders

Proceedings A may be ordered through any bookseller or direct from the publisher: E.J. Brill, Postbus 9000, 2300 PA Leiden, The Netherlands. Back numbers of *Amphibia-Reptilia* may only be available in complete volumes (price 120 Dutch guilders + 16 Dutch guilders postage and packing).

Proceedings B are available at £1.50 ($3.50) from: Mr G.N. Wallace, Librarian, British Chelonia Group, 36A Wetlands Lane, Portishead, Bristol BS20 8NF, U.K. Cheques, postal orders and international money orders should be made payable to the *British Chelonia Group.*

REPORT ON THE 2ND ORDINARY GENERAL MEETING OF SOCIETAS EUROPAEA HERPETOLOGICA AT LEON, SPAIN, 12-16 SEPTEMBER 1983

The Editors express regret for the delay in publishing this report, because of lack of space in earlier issues.

The 2nd OGM of SEH was held in the Faculty of Biology, University of León, Spain, 12 to 16 September 1983, and was organized by Prof. Alfredo Salvador, Vice-Secretary of SEH. The Meeting was attended by 82 registrants from fourteen countries, including three from the U.S.A.

(2) and Australia. There were two registrants from the U.K.: M.R.K. Lambert (BHS) and Elizabeth A. Pulford (Univ. Coll. North Wales, Bangor); R.A. Avery (Univ. Bristol and BHS) through regrettable circumstances could not attend. J.G.M. Robertson (Swedish Univ. Agric. Sciences, Uppsala), an expatriate formerly at Univ. Aberdeen, also attended. As expected, there was good representation by Spanish herpetologists (34); regrettably, herpetologists from F.R. of Germany (11) and other German speaking countries were not well represented on account of the DGHT's biennial meeting taking place in Zürich (7th-11th September) only during the week before and not allowing even a day between. A report on the meeting will probably also appear in due course in SEH's journal, *Amphibia-Reptilia.*

OPENING CEREMONY. At the start of the Meeting on Monday, 12th September, Dr Josef Eiselt, President of SEH, took the Chair and welcomed the participants, giving special mention to the BHS representative. A welcoming address was then given by Prof. Dr J.-M. Nieto, Dean of the Faculty of Biology at León, followed by an Opening Speech by Dr Marinus S. Hoogmoed, SEH General Secretary.

PROGRAMME. The scientific programme, consisting of 37 papers, was divided into five sessions and included papers contributing to symposia on the 'Biogeography of the western Mediterranean' and 'Biochemical methods in systematics'. A plenary session took place between sessions on the morning of Tuesday, 13th September. Unlike the 1st OGM in Vienna in 1981, all of the papers were volunter except one connected with the symposium on biogeography to which Prof. H. Saint Girons (Paris) was invited to contribute. Being the official language of SEH, English abstracts of all papers were distributed with the Meeting Programme. Spare copies may still be available from Prof. Alfredo Salvador (Departamento de Zoologia, Facultad de Biologia, Universidad de León, León, Spain). Since herpetological work on Continental Europe, where all of the British species occur, is almost certainly to be of interest to British workers and only two from the U.K. attended, all of the paper titles have been given in full with authors' affiliations.

Day 1, Morning Session. Chaired by Dr J.W. Gibbons (Savanna River Ecology Laboratory, Aiken, South Carolina, U.S.A.), six papers were read:—
Agnes S.M. Hemelaar (Catholic Univ., Nijmegen): Age and growth of *Bufo bufo* (L.) from different sites in Europe. A comparative study using 'skeletochronology'.
E. Seva (Fac. Ciencias, Alicante): Resource partitioning between *Acanthodactylus erythrurus* and *Psammodromus algirus* (Sauria: Lacertidae) in a coastal sand area (in Spanish). An ecological study of these two common species in south-eastern Spain.
J. Lescure (Mus. nat. Hist. natur., Paris): The reproductive behaviour of *Dendrobates quinquevittatus* Steindachner (Anura, Dendrobatidae) (in French). A very clear presentation with fine coloured slides of the curious reproduction of this very poisonous S. American frog whose secretions have been used by the Indians for arrowheads.
U. Hiller (Univ. Münster): Comparative morphology of epidermal structures of toes in iguanid and gekkonid lizards. An electron microscopic study in relation to function.
R. Duguy (Mus. Hist., natur., La Rochelle): The leatherback turtle *(Dermochelys coriacea)* in France (read in French by H. Saint Girons). Records on the Atlantic coast were related to dispersal.
U. Hiller, H.J. Dieterich: Morphology of reptilian eyelids. An electron microscopic descriptive study in different lizard species.

Day 1. Afternoon Session. Chaired by Dr J. Eiselt (Naturhistorisches Museum, Vienna) in the absence of Dr R.A. Avery (Univ. Bristol), eight papers were read:—
G. Mancini (Univ. Pisa): Chromosome and C-heterochromatic polymorphism and chromosome evolution in Triturus (Amphibia: Salamandridae). A study on chromosomal arrangement.
C. Andrén, G. Nilson (Univ. Göteborg): The natterjack toad, *Bufo calamita,* at its northern border in Sweden. An ecological study, especially of island populations; probably relevant to British natterjacks.
J.W. Arntzen (Inst. Taxonomic Zoology, Amsterdam): Ecological and genetic isolation in *Triturus cristatus* and *T. marmoratus.* A biogeographical reproductive study in parapatric species.
J.W. Gibbons: Life-history and ecology of freshwater turtles: long term research on long-lived species. A 16-year mark capture-recapture study on over 10,000 animals with descriptions of interesting techniques.

J.G.M. Robertson (formerly Australian Nat. Univ., Canberra): Fighting and fighting assessment in an Australian frog, *Uperoleia rugosa* (Anura: Leptodactylidae). An ecological study on territoriality and phonotaxis involving loudspeaker playback experiments.
D. Dolmen (Univ. Trondheim): Niche separation in the newts *Triturus vulgaris* and *T. cristatus.* An ecological study on behavioural and niche partitioning near the northernmost range; *T. vulgaris* shown to be less specialised.
L.J. Barbadillo, J.L. Sanz (Univ. Autonoma de Madrid): Structural variations in the sacral and presacral regions of the vertebral column in some Spanish Lacertidae *(Lacerta lepida, L. viridis* and *L. schreiberi*) (in Spanish, paper in English circulated). An osteological study on variations in numbers of vertebrae in relation to species.
A. Martínez Castillo (Univ. Zoologica Aplicada, Madrid): Diet of the ocellated lizard *(Lacerta lepida)* in south central Spain (in Spanish, paper in English circulated). A habitat/lizard size class quantitative study to show that the game bird, *Alectoris rufa,* is scarcely attacked so gamekeepers might leave the lizard unmolested.

Day 2. Afternoon Session. Chaired by Prof. H. Saint Girons (Lab. d'Evolution, Univ. Paris), seven papers were read:—
M. Helena Caetano (Fac. Ciencias, Lisbon), J. Castanet (Univ. Paris VII): Age determination of *Triturus marmoratus marmoratus* (Latreille 1800) from the Peneda-Gerês National Park, (Portugal). (In French, paper in English circulated). Skeletochronology used to investigate breeding seasonality.
B. Viertel (Johannes-Gutenberg Univ., Mainz): Stage dependent filtering of central European anuran larvae. A physiological study on filtering rates in relation to structure with superb careful drawings of the buccal cavity.
Pilar Herrero (Univ. Autonoma de Madrid): Chromosome study on *Triturus boscai* (Caudata: Salamandridae) (in Spanish, paper in English circulated). A comparative cytotaxonomic study in reltion to C-banding.
J. Castanet, M. Báez (Univ. La Laguna, Canaries): Data on age structure in *Gallotia galloti* (Reptilia: Lacertidae) (partly in Spanish). Using skeletochronology, longevity, sexuality and altitudinal activity were studied in this endemic Canarian species.
G.Y. Dehlawi, M.M. Ibrahim, Elizabeth A. Pulford, I.G. Wilson (Univ. Coll. North Wales, Bangor): Reproduction in female *Chalcides ocellatus* (Lacertidae: Scincidae): A study using microscopy of vitellogenic and placental tissues.
G. Nilson, G. Andrén: Some taxonomic considerations on the *Elaphe longissima* species-group in the Middle East. A statistical cluster analysis of characters of specimens of three taxa.
J.N. Rafinski, Anna Czaja (Jagellonian Univ., Crakow): Sexual behaviour of the Bosca's newt, *Triturus boscai.* A well described quantitative study of courtship behaviour.

Day 3. Morning Session. The symposium on 'Biogeography of the western Mediterranean' was chaired by Prof. J.A. Valverde (Estación Biológica de Doñana, Seville) on behalf of Dr B. Sanchiz (Mus. Nacional de Ciencias Naturales, Madrid), who read a paper in the session, and seven papers were read:—
Z. Szyndlar (Polish Acad. Sciences, Inst. Systematics and Experimental Zoology, Crakow): Origin of modern snake fauna of Europe. Very interesting work based on recent distribution and fossil bone evidence.
H. Saint Girons: Biogeography of vipers of the Western Mediterranean Region (in French). Lucid work describing the basis of the distribution of four species of *Vipera.*
U. Joger (Univ. Marburg): The evolution and taxonomy of the gekkonid genus *Tarentola.* Thorough, innovative work working out the taxonomy using immunological and morphological characters.
B. Sanchiz: The fossil record of living European amphibians. A most useful stratigraphic study from many cenozoic sites in 14 countries.
J. Detrait (Brunoy): Venoms of *Vipera seoanei* and *V. aspis* (in French, no abstract). A comparison of venom types and activity in the different species *(V. seoanei* has now been separated from *V. berus).*
S.D. Busack (Univ. California, Berkeley, U.S.A.): Biochemical divergence in a Mediterranean herpetofauna: preliminary results in a test of vicariance biogeography (read by Linda R. Maxson). Results of comparative electrophoretic analysis on species separated by Straits of Gibraltar prompted questions from Prof. G. Pasteur (Univ. Montpellier).

Linda R. Maxson (Univ. Illinois, Urbana-Champaign, U.S.A.): Phylogenetic relationships within the Discoglossidae: an albumin perspective. Immunological work to compare albumins indicating that Bombinidae should not be separated. The paper prompted much discussion, Prof. Pasteur contributing again.

Day 3. Afternoon Session. Chaired by Dr Linda R. Maxson, eight papers were read:—
M.R.K. Lambert: Some factors influencing the Moroccan distribution of the western Mediterranean spur-thighed tortoise, *Testudo graeca graeca* L., and those precluding its survival in NW Europe. The paper has since been published in *Zoological Journal of the Linnean Society* **79**(2): 149-178 (October 1983).
Silke Rykena, H.K. Nettman (Univ. Bremen): Egg incubation time as a character for subspecies division in *Lacerta* S. Str. species (in German). Interesting work indicating 'green lizard' incubation rates to be a taxonomic character.
M. King (Australian Nat. Univ., Canberra): Chromosomal and morphometric evolution in Australian geckos of the genus *Gehyra.* A clearly presented work on chromosomal number and karyotype morphology indicating seven races in the widely distributed *G. australis* Gray.
M. Báez, L. López Jurado, J. Cano (Univ. La Laguna, Canaries): Karyological characteristics of the species of the genus *Gallotia* (Reptilia: Lacertidae) (in Spanish). A chromosomal and karyotypic study of this endemic Canarian genus of lizards.
K. Henle (Rutesheim): Comparative studies on the dynamics and ecology of three Yugoslavian populations of the Italian wall lizard *(Podarcis sicula campestris).* Some sound, useful basic biological and ecological data were presented.
Z. Rocek (Charles Univ., Prague): Tooth replacement in amphibians. An interestingly illustrated paper describing the phenomenon.
H.K. Nettman, Sylke Rykena: Comparative description of communicative calls in some gecko species of the genus *Tarentola.* Calls were played to the meeting and variability of sonograms were described from recordings made during the period of mating activity on the Canary Is.
J.P. Durand (CNRS Lab. Souterrain, Moulis/Saint Girons): Adaptation of the Proteidae to a subterranean habitat (in French, abstract in French circulated). An extremely interesting piece of laboratory work on the adaptations of the olm *(Proteus anguinus).*

Unfortunately, several authors were unable to attend the meeting and only abstracts of papers, some very interesting, were circulated. Papers included:
P.F. Keymar (Biozentrum, Univ. Vienna): Systematic status and ecology of *Agama stellio* populations from the Ionian Islands and Chalkidike (Sauria: Agamidae).
Theodora S. Sofianidou (Univ. Thessaloniki): Postmetamorphic growth rates in a natural population of spadefoot toad, *Pelobates syriacus* Boettger.
R.A. Avery: Lizard growth dynamics.
O. Picariello (1st. Mus. Zoologia), G. Ciarcia, F. Angelini (1st. Istologia ed Embriologia, Univ Naples): Morphological and histochemical variations in *Tarentola mauritanica* L. oviduct during the annual reproductive cycle (Reptilia: Gekkonidae).
María V. Vives Balmaña (Barcelona): Biogeography of NE Iberian herpetofauna.
A. Bea (Soc. Ciencias Aranzadi, San Sebastian): The scale surface microornament of *Vipera seoanei* (Reptilia: Viperidae).
A. Antúnez, M. Blasco (Univ. Malaga): Amphibian and reptiles' distribution patterns in a mountain area of southern Spain.

PLENARY SESSION. The chair for the general meeting of SEH was taken by Dr Eiselt on the morning of Day 2 and was well attended. Decisions agreed at this meeting by members will be published in a future issue of *Amphibia-Reptilia,* the Society's journal. In the absence of Prof. Dr H. Hemmer, the Co-Editor, Dr Jan van Gelder, gave a quantified account reporting on the papers published by *A-R* to date. Membership of this Society is still encouraged (there were only 14 members with U.K. addresses at the last count), especially as the official language is English. For further details, please contact Dr Lambert c/o BHS or, preferably direct to: Dr Franz Tiedemann, SEH Vice-Treasurer, Naturhistorisches Museum, Postfach 417, A-1014 Wien, Austria (the new subscription rate is 75 German marks). The venue of the 3rd SEH OGM in 1985, in conjunction with the Herpetological Conference of the Socialist Countries of that year, will be Prague, Czechoslavakia, and the meeting will be organized by Dr Zbynek Rocek (Katedra Paleontologie UK, Albertov 6, 128 43 Praha 2, Czechoslavakia) of Charles University, with the full backing of the Dean of the Faculty of Natural Science. Dr Rocek, who was able to

attend the León meeting, gave an outline of his arrangements, and has subsequently circulated provisional registration forms to all SEH members. The meeting will either take place in an historical building in the centre of Prague or at Karlstein Castle, a short distance away. The meeting will provide an excellent opportunity for the exchanges of scientific thoughts with east European and Soviet herpetologists, and hopefully will be quite well attended by Americans.

OFFICIAL RECEPTION. A midday reception was held for participants by the Mayor of León in the City Hall. The Major made a speech of welcome to participants, followed by drinks and light refreshments.

OFFICIAL DINNER. During the final evening of the scientific sessions, a splendid dinner, with typically Leonese food and local wines, was provided for participants in the traditional 'Sotomayor Restaurant' in the Avenida de Ramón y Cajal. Wine flowed freely in accompaniment with food delicacies to repletion! Some of us ended in a nightclub!

FIELD OUTINGS TO THE CANTABRIAN MOUNTAINS OF LEON PROVINCE*

Lago de Sanabria area (Thursday, 15th September): Led by Alfredo Salvador, a party of about 25 people, including Josef Eiselt and Rinus Hoogmoed, travelled by hired coach south from León on the N630 to Benavente and then west on the C620/N525 to Pueblo de Sanabria, a journey of some 150 km. The coach then forked right and climbed for some 20 minutes on a curling road above the Lago de Sanabria through oak forest and on through San Martin de Castañeda up to a height of ca. 1640 m, where it was misty, cool and overcast. Huddled in windcheaters and anoraks (who said that Spain is always warm?!), the party emerged from the coach and for an hour searched the moorland and streams in this part of the Cantabrian range. Almost immediately, turning apparently every stone and rock slab in the area (an inevitable activity of herpetologists!), and replacing them carefully afterwards, several recently metamorphosed natterjacks *(Bufo calamita)* were found. Continuing further, especially in the vicinity of a stream, several juvenile *Hyla arborea* with their typical bright green were found amongst the heather and grass stems by the stream, and a little later two adults. Two subadult specimens of *Rana iberica* were also found here with rather darker, slaty green-brown colouration than one would perhaps have expected. A juvenile common toad, *Bufo bufo,* was also found, probably of the subspecies *spinosus* of the Iberian Peninsula and North Africa, and also a sub- and an adult of *Rana ridibunda perezi* with fine, rather pale markings. Strewn along the edge of a track were several large stones. Upturning these yielded an adult female natterjack and about five adults and two or three half-grown midwife toads *(Alytes obstetricans);* curious, lightly warted little toads with a purplish, muddy-brown blotched background colour — none of the males bore eggs at this time of year. Under two more stones, about four adult *Lacerta monticola* were caught, the only reptile species seen at this height. Being cool, these lizards of ca. 15 cm length including the tail were scarcely active and easily caught. Several of the party photographed them before releasing them again. By water, under a short, low bridge over a stream, a fine full-grown female specimen of *Triturus marmoratus* was found. This splendid creature typically bore a patchwork of bright green blotches on a grey-black background and an orange vertebral stripe. The underside was a sombre grey. As a policy of the Meeting, the specimen was carefully returned to its habitat after photography and inspection — Spanish Law also prohibits the collection of any specimens. After a short while, having had a chance to dry-off in the coach!, we descended to the Lago de Sanabria at ca. 1000 m and lunched in a small bar in the village of Ribadelago, with rather new and functionally built houses after being ravaged by fire in the 1960s. A fast river flowed through the village to the lake. Replete with fried chicken and chips, and *cerveza* (some of our friends found that a *botella* went down still better!), we made our way in cheerful mood towards the lake across a lightly cultivated area with a patchwork of fields. By the water's edge, several newly metamorphosed *Rana ridibunda perezi* were skulking, adults preferring a clump of reeds where perhaps six were seen by a German member of the group, Klaus Henle. Unfortunately, the still somewhat overcast weather with only diffuse sunshine was scarcely attractive enough for basking by lizards. Near the base of a rocky escarpment, a half-grown slow-worm *(Anguis fragilis)* was quite quickly found. Under a small rock, I found a half-grown viperine snake *(Natrix maura)* and on a clear patch of a moss-covered boulder, an adult male *Podarcis hispanica* was quietly basking in what sunshine was available. After tolerating being photographed for 2 or 3 minutes, it scuttled off into the undergrowth behind the boulder. For some minutes, nothing was found. As a party, we decided to scramble over the rocks making up the base of the escarpment and climb upwards. On reaching the top, several more sub-adult *P. hispanica* were

found under rocks. Suddenly, a large ocellated lizard, *Lacerta lepida,* shot out from under a large rock to the great surprise of the turner. It was quickly caught by our big Dutch friend, Max Sparreborm, and held up — it was a male — for display, the lizard with jaws wide agape and ready to clamp them on anything in front of it. When released, it scuttled off at high speed over the rocks, quickly finding a crack in which to hide. Linda Maxson from Urbana-Champaign in Illinois, U.S.A., soon unearthed a further eyed lizard under a smaller rock. Very shortly afterwards, Max quickly caught a small, shiny greyish-scaled snake under a large stone. Often a montane species, it was the southern smooth snake, *Coronella girondica,* and was expected since we were in the middle of its range. Another slow-worm was found. We were all hoping to see the restricted 'green lizard', *Lacerta schreiberi,* which like the sand lizard has a greenish male and brownish female, and whose range is largely confined to western and northern Portugal and north-west Spain. Upon returning to the village, by which time the sun had been shining for some time, and meeting other Dutch members of the party, including Rinus Hoogmoed, and Jan van Gelder and Agnes Hemelaar, both from Nijmegen; Henke Strijbosch, also there, reported seeing with his sharp eyes a female *L. schreiberi* by the river which had just emerged to bask. The Norwegian, Dag Dolmen, also reported seeing a grass snake *(Natrix natrix)* in a decayed state in the lake and a smooth snake *(Coronella austriaca)* squashed on the road. We had all kept our eyes open for Bocage's wall lizard *(Podarcis bocagei)* during the day, but without success. Returning to León after what had been a good day, many retired to bed early (but not all!) in preparation for the next day.

Puerto de Ventana/Sabinar de Crémenes areas (Friday, 16th September): Again led by Alfredo Salvador and clutching our copies of the Arnold/Burton/Ovenden Field Guide, the coach departed from the hostel of the Colegio Mayor "San Isidoro" at 9.00 am and took the Madrid road N601 in a south-east direction from León. At the village of Villarente (where a fine stork's nest had been built on the church's tower), the coach turned left onto the road for Boñar. We followed the rushing course of the Rio Porma through a partly cultivated region with areas of cork oak *(Quercus suber)* and eventually passed through the typical old village of Boñar. About 4 km north of Boñar, we reached the dam across the river, forming the Embalsa de Porma, a large reservoir whose level at this time of year at the end of summer was low. One of the Spaniards in the party, Eduardo Fillela from Barcelona, remarked that the small island in the middle might provide a good place for an ecological study. Forking right at Pueblo de Lillo, we took the still climbing road to the top of the pass at Las Señales (1475 m) on the border with the Province of Oviedo amidst part of the great range of the Cantabrians forming part of the Reserva de Mampodre where game animals are hunted. The party tumbled out of the coach and Klaus, our German friend, immediately found two or three alpine newts *(Triturus alpestris)* in the water under the low cover of a small stream. The sides of the stream were alive with newly metamorphosed common frogs *(Rana temporaria)* and at the edge of a small, clear lake, newly metamorphosed treefrogs, *Hyla arborea,* tried to bask in what little diffuse sunshine was available. Under one of the inevitably turned rocks, a small sub-adult of *Bufo bufo spinosus* was found with rather pale colouring and spinous warts along the rear edge of the forelimbs, and later a large female, a splendid creature, which drew out the exclamation that sounded like "likkebarden jongen!" from a Dutch female member of the party. Threading our way across the heather-patched ground, a sharp look out was kept for *Vipera seoanei,* occurring in the Cantabrian Alps and recently separated from *Vipera berus* and other species (as we had heard in one of the Meeting's papers) by its venom type. Almost immediately, Dutchmen in our party, Ton Stumpel and Henke Strijbosch, identified a recently hatched juvenile of *Lacerta vivipara* (where there are juveniles, there must be adults!) and soon after an adult male and female in the vicinity. These represented part of the outrider population at the extreme south-west of the species's range. The blueberry, *Vaccinium myrtilis,* was in fruit at this time and provided a light dessert. Much of the party, with Rinus Hoogmoed and Jan van Gelder, followed a steep stream valley down. The ground was alive with newly metamorphosed *Rana temporaria;* also found were two sub-adults, and an unusually and splendidly marked large female fit to be photographed. One or two more *Bufo bufo spinosus* were also found, but little else. A clump of pale-purple flowering *Daboecia cantabrica* reminded Liz Pulford and me of the Lusitanian element in the flora of the West of Ireland, a species I had not seen since botanizing as an undergraduate with my Botany Professor in Connemara, Co. Galway (where I had also seen the British common lizard, *Lacerta vivipara*), in the early 1960s. Nearing time to return to the coach at 1.30 pm, we scrambled up the steep slope back to the road C635 to walk back to the Col. At the side of the road were rocks, which when upturned revealed three or four adult *Lacerta monticola,*

as we had seen the day before. As earlier, turning rocks near the coach area revealed some lizard eggs. One was on the point of hatching, and on exposure proved to be *Lacerta vivipara.* At this extreme southern part of the range, the species deposits eggs rather than retaining them and giving birth viviparously! Under another rock, Jeremy Robertson, our Scotsman of Uppsala, saw the rapidly withdrawn yellow and black head of an adult *Salamandra salamandra.* Further digging in the soil and following a tunnel back did not uncover the wise creature. Only just five minutes before departure did Henke Strijbosch find a specimen of *Vipera seoanei,* basking in a coil on a clump of heather. An aggressive specimen, but calming after a while to enable its photograph to be taken. This was a splendid end to a fascinating morning and the coach made its way back along the C635 through the Puerto de Tarna towards Riaño for luncheon. From the road, numerous buzzards could be seen feeding in the fields, plainly feeding on swarms of newly metamorphosed froglets of *Rana temporaria.* The small village of Riaño (altitude 910 m) was in a rather run-down, albeit attractively unspoilt, condition for few renovations had been carried out in recent years since the whole area was due to be flooded by a new dam that was being built down river across the Rio Esla.

Luncheon, with numerous bottles of readily flowing wine, proved to be a 'relaxing' experience! In a mood of *bonhomie,* the party reboarded the coach and continued about 12 km north of Riaño to a viewpoint near Cuénabres, the Mirador de Piedrasites, amidst deep beechwoods of the Cantabrian northern slopes. Here the view of the Picos de Europa ranging from 2370 to 2596 m and still with snow patches was superb. Returning through Riaño, we proceeded along the Rio Esla valley, passing another dam and the road continued into a long tunnel. Here we met a heavily laden lorry, piled high with hay bales and taking the centre of the road, but fortunately the coach was able to reverse 15 to 20 m and allow the lorry, with several loose bales falling off, to pass by. About 3 km south of the village of Las Salas, still on the road N621, we halted again by the Collado de las Camperas at Sabinar de Crémenes amidst a lightly oak-wooded *(Quercus sylvatica)* area now back on the Cantabrian southern slopes. The inevitable routine of upturning 'all' rocks soon revealed a slow-worm, two or three *Podarcis hispanica,* and then, with a shout, another *Vipera seoanei,* seen as it slid through the grass. A fine, adult specimen of *Coronella austriaca* was also caught while basking on a low *Clematis* bush. Plainly the routine of many herpetologists inspecting the same area at once increases the number of man-hours of searching per unit time and on the law of averages the number of reptiles seen! Ending the field excursion by a short halt in an excellent bar in the village of Cistierna, we proceeded back through the cork oak forests to the main road (N601) at the unusual, walled town of Mansilla de las Mulas (a stage on the Pilgrims' Way to Santiago de Compostella) and north-west back to León.

A memorable two days, entertaining companionship, multinational in character, but all with a common interest in herpetology at heart. Friendships and contacts were made, and sealed in a babel and cacophony of tongues by an hilarious final evening (who said that herpetologists are solemn?!) in the downstairs room (!) of a splendidly typical small restaurant in the old part of León. A toast was drunk to Prague, the venue of the 3rd SEH OGM in 1985, where we would all hope to meet again if not before.

SOME CONCLUSIONS. The León meeting one felt to be most successful, certainly most enjoyable, and congratulations are due to Alfredo Salvador for all the organization involved. Compared to the U.K., 'la vie' in Spain is also, incidentally, very inexpensive while the pound is riding high! A personal view is that with the second meeting, the SEH has become established, although more members are still earnestly sought to make the 500 mark. Hopefully, more herpetologists will join from the U.K., especially since all of our species occur also on Continental Europe. The standard of the papers presented also seemed to be generally higher than the first meeting in Vienna. It was good to have contributors from the U.S.A. and from such Commonwealth countries as far away as Australia! What was regrettable was the relatively poor representation from F.R. of Germany and other German speaking countries, where there are many excellent herpetologists. Although one representative came from Norway, and one each from Poland, Czechoslovakia, Italy and Portugal, no one attended from Switzerland. Hopefully it will be possible in future years for the substantial German society, the DGHT, to avoid the near clashing of dates of their big biennial meetings, which regrettably also take place during the late summer of odd years. The French society held their 1983 annual meeting appropriately in June/July (more normally in May) and so herpetologists from France were well represented at León in neighbouring Spain.

Thanks are due to the Royal Society, London, for approving a Travel Grant from the U.K. Parliamentary Grant-in-Aid for the Chairman of the BHS to represent the Society and read a paper at León.

M.R.K. Lambert

* A useful road map (1:500,000 - 1 cm = 5 km) of NW Spain, no. 1 (C-1), 1982, is published by the Cartographic Section, Firestone Hispania, S.A., and costs 135 pesetas. It is also obtainable from The London Map Centre, 22 Caxton Street, London SW1, but more expensive.

THE HERPETOFAUNA OF VANUATA (PACIFIC OCEAN)

The Earl of Cranbrook (BHS President)

Abstract of a talk given at an Evening Meeting of the BHS on 28th February 1985

The known terrestrial vertebrate fauna of Vanuatu (formerly the New Hebrides — an Anglo-French condominium) consists of sixteen species of mammals (three introduced), excluding domestic stock; 61 species of birds (five introduced), twenty species of reptile (four introduced) and one amphibian (introduced). The indigenous fauna is clearly Indo-Australian in origin, but some species have an exclusively Pacific island distribution and four of the lizards are endemic. On the six islands visited during the Royal Soceity — Percy Sladen Expedition 1971, 95 out of the possible 98 vertebrate species occur. Santo, the largest and most northerly island, supports the richest fauna, but Efate the richest herpetofauna. The comparative impoverishment of more southerly islands is not directly attributable to the progressive increase in isolation and distance from presumptive source area, nor to decrease in island area or maximum height. Most of the native vertebrates, including all endemic species, occur in mature seral or climax forest; relatively few species, all of which are cosmopolitan or wide-ranging in the Indo-Pacific region, are restricted to open habitats. The introduced species are commensal with man or confined to disturbed or open habitats. Forest fauna show altitudinal zonation and vertical stratification under the canopy. The lizards were observed to be extremely common in lowland habitats. All but *Emoia nigromarginata* (known from a single specimen on Pentecost) were recorded during the expedition. The nineteen species of reptile recorded were Gekkonidae: *Gehyra oceanica, G. mutilata, Perochirus guentheri, Lepidodactylus lugubris* and *Cyrtodactylus pelagicus;* Scincidae: *Emoia cyanura, E. werneri, E. speiseri, E. atrocostata, E. cyanogaster, E. sanfordi, E. samoensis, E. aneityumensis, E. nigra, Lipinia noctua, Lampropholis austrocaledonica* and *Cryptoblepharus boutonii;* Typhlopidae: *Typhlops braminus,* and Boidae: *Candoia bibroni.* The two type specimens of *Perochirus guentheri* (saw-tailed gecko) were collected in 1859 or 1860; the third known species was collected from inside a tent on the expedition and therefore without known locality. The ranges of three large skinks *(E. samoensis, E. aneityumensis* and *E. nigra)* are mutually exclusive and may be complementary, and occur with a fourth, the highly arboreal *E. sanfordi* (green skink). The single amphibian, *Litoria aurea,* is a small frog, introduced by planters ostensibly to control mosquitoes.

AMPHIBIAN SOUND RECORDINGS

The British Library of Wildlife Sounds (BLOWS) is a reference library for the communication sounds produced by all kinds of animals, including birds, mammals, amphibians, reptiles, insects and fish. The recordings, held on tapes and discs, including a duplicate of the BBC natural history recordings collection, cover sounds from all over the world. Copies of most recordings in the tape and BBC collection can be supplied for scientific research, or private use, subject to the signing of an agreement limiting use and protecting copyright. They are of special interest to bioacousticians, to field workers identifying species, and in certain animal groups to taxonomists where a particular sound may be characteristic of a species.

BLOWS now has the sounds of over 400 species of amphibian on records and tapes. The recordings are from many countries, the amphibia of North America, South Africa and Australia being well represented on published discs, while the tape collection includes interesting recordings from Papua New Guinea, Sarawak and Trinidad. However, there is a need to build

up the tape collections. Well-documented recordings of any animal species are welcome. We particularly need more recordings of the European frogs and toads, of which we have few recordings except for the Common Toad, Common Frog and Marsh Frog.

If you are willing to contribute, please contact the Curator. You are welcome to use the collection for your studies, either by requesting copies or by coming to listen to the recordings, including the large number of commercially-produced records and cassettes. A discography of amphibian sounds recently published in the journal Recorded Sound, is obtainable.

British Library of Wildlife Sounds, National Sound Archive, 29 Exhibition Road, London, SW7 2AS. Telephone: 01-589 6603.

SSAR GRANTS-IN-HERPETOLOGY

The Society for the Study of Amphibians and Reptiles is pleased to announce that proposals are now being accepted for the 1985 Grants-In-Herpetology Program. This Program is designed to provide financial support to deserving individuals or organizations engaged in research on or conservation of amphibians and reptiles. All applicants (or their advisor or sponsor) must be a member of SSAR. Grant proposals will be considered in the following areas.

1. GRADUATE STUDENT HERPETOLOGICAL RESEARCH.
2. HERPETOLOGY-ORIENTED CONSERVATION.
3. REGIONAL HERPETOLOGICAL SOCIETY PROGRAMS OR PROJECTS.
4. HERPETOLOGICAL RESEARCH IN ZOOS.
5. FIELD WORK (Auto Mileage).

Each proposal must include the following information: A) Abstract, **B) Background and Objectives** of the proposed project, in terms of its relevance to herpetology, C) **Methods** of carrying out the research or conducting the project, **D) Budget for the project,** which should not exceed $430 in each category, and **E) Curriculum Vitae** and **Letter of Support** (if applicable). The proposal must be typed double spaced and must **not** exceed 5 pages, excluding cover page, abstract, budget, curriculum vitae, and bibliography. All proposals must be postmarked no later than **12 April, 1985.** Failure to meet the deadline or follow the guidelines may result in rejection of the proposal.

For additional information on proposals see the December 1984 issue of *Herp Review* or write: Dr James Bacon, Department of Herpetology, Zoological Society of San Diego, P.O. Box 551, San Diego, CA 92112.

LIZARD BREEDING RESULTS, 1984

BERT LANGERWERF

The species and numbers bred in 1984, with the dates of hatching given in brackets, are listed below. Conditions in 1984 were very bad for breeding lizards in the Netherlands, and this is reflected in my results. The weather was bad throughout the summer, with continuously overcast skies, almost no sun, and unusually cold.

Pseudocordylus polylepidotus 1 (6-2)
Gerrhonotus multicarinatus 4 (14-9; 15-9)
Agama stellio 23 (19-7 to 21-9)
Agama caucasia 53 (7-8 to 3-10)
Agama lehmanni 9 (5-9 to 2-10)
Lacerta trilineata trilineata 56 (8-8 to 14-10)
Lacerta trilineata hanschweizeri 15 (6-9 to 1-11)
Lacerta trilineata galatiensis 4 (18-9 to 29-9)
Lacerta pater 241 (including 103 melanic) (8-8 to 7-11)
Lacerta lepida lepida 15 (27-9 to 5-11)
Lacerta jayakeri 12 (13-3 to 24-4)

Lacerta schreiberi 7 (3-7 to 24-7)
Lacerta agilis 58 (9-7 to 8-9)
Lacerta strigata 50 (10-7 to 20-9)
Lacerta praticola pontica 20 (25-7 to 10-9)
Lacerta horvathi 7 (27-7 to 5-8)
Lacerta monticola cyreni 2 (31-7; 1-8)
Lacerta saxicola brauneri 102 (1-8 to 26-9)
Lacerta rudis obscura 25 (1-8 to 26-8)
Lacerta rudis svanetica 6 (27-8 to 12-9)
Lacerta mosorensis 4 (6-8 to 9-8)
Lacerta armeniaca 35 (4-8 to 23-9)
Lacerta unisexualis 11 (25-8 to 5-9)
Lacerta laevis troodica 9 (5-9 to 26-9)
Lacerta raddei 7 (19-9 to 8-10)
Lacerta oxycephala 1 (15-9)
Podarcis lilfordi 1 (12-9)

CONSERVATION OF LOWLAND DRY HEATH

JONATHAN WEBSTER

British Herpetological Society Conservation Committee

Until quite recently, much of lowland England was covered by heathland. From Professor Dimbleby's work, we know that lowland heathland was created about 5,000 years ago as a result of the activities of neolithic man on the original oak and hazel woodlands. During this period, large tracts of land were burnt off for men to hunt wild animals fleeing the blaze as well ass for the grazing of domestic stock. Subsequently, heathland arose on a number of areas where the soil had been leached by consistent rainfall over a long period, leaving an impoverished sandy soil which would only support heathers, gorses and certain grasses. Today, despite the fact that only a few fragments of heath remain from the former miles of purple clad commons, a number of species are virtually confined to this habitat.

Up until the last few years, the ecological value of dry heath has been largely ignored. During the Victorian era, an enthusiastic upsurge in the quest for knowledge of general Natural History arose. However, the majority of the wildlife interest centered around the bird, butterfly and botanical elements, three categories where dry heathland fauna is not well represented, especially in its diversity of species. Consequently, heathland was considered as a barren sterile wasteland and, not surprisingly, therefore, the past few decades have witnessed the final stages of an uncompromising and widespread decline to such an extent that it is now recognisedd both as a national and international endangered habitat.

In Southern England, the loss of heathland has been well recorded. In Dorset, Professor Norman Moore's paper "The Heaths of Dorset and Their Conservation" written in 1960, stated that at the t ime of the first Ordnance Survey maps (1811 Dorset and 1810-1817 Hampshire) within a vast area stretching between Dorchester and Southampton water the heathland area consisted of about 75,000. At that time already about 15,000 acres of mainly peripheral land had already been reclaimed. During the next eighty years, as the population around Bournemouth increased (695 inhabitants in 1851 to 16,000 by 1881) so the heath was reclaimed for development. Even so,, by the turn of the century, the area was still extensive, about 56,000 acres remaining. Urbanization continued and by 1934 approximately 45,000 acres remained. By 1960, the area had reduced to 25,000 acres. Twenty years later the Dorset heaths have demised and now only about 12,000 acres remain.

The area around Bournemouth and Poole was earmarked for light industrial development during the early 1970's. This led to a major residential building programme linked by a network of new roads and by-passes. This has further fragmented the remaining heaths and subjected them to increased pressures by way of recreation which include further hazards such as motor cycle scrambling, horse riding, golf courses and maliciously started fires. Other causes for decline have included agriculture reclamation, mineral extraction, caravan sites and recently one small heath in Dorset was covered by the synthetic clay spoils from a nearby land oil exploration drilling rig.

Nowadays, fires cause and continue to present the most serious threat to our lowland heaths. Firstly, it removes the essential *mature* dry heath stage that takes at least 12 years and often 25 to develop after fire. Some mobile species that survive the initial fire are able to fly away and perhaps later return to their former territories but fires have a catastrophic effect on species such as the Sand Lizard that has a small home range (c. 250 square metres) a relatively short life span (between 5-10 years) and a poor ability for recolonisation. Secondly, fire induces competing (birch and bracken) and sub optimum vegetation which encroaches and directly subrogates the slower growing heather. Birch is rarely able to seed into established dry heath because of physical and chemical inhibitions from the heather. After a fire, however, it is a different story as numbers of equally aged trees are established from the few parent trees and then threaten to swamp the heath within a generation should the same area be burnt again.

Bracken is perhaps the most insiduous of all heathland problems in that it both shades out the heather and enriches the litter. It spreads mainly after fire via dormant and resistant rhizomes, and studies have proved that it has very little wildlife value in Southern England. Originally, the effects of local fires on large blocks of heath would have been less serious than on today's small fragmented areas. Certainly, the encroachment of alien vegetation was kept in abeyance by light grazing of both domestic and wild animals. The reduction in rabbit numbers on heathland in recent years is just one instance that has upset nature's equilibrium.

In consideration of the fauna found on lowland heathland three vertebrate species are totally confined to this habitat, namely the Dartford Warbler *(Sylvia-undata),* Smooth Snakes *(Coronella austriaca)* and the Sand Lizard *(Lacerta agilis).* In addition, dry heaths support significant numbers of Stonechats *(Saxicola torquata),* Nighjars *(Caprimulgus europaeus)* and rareties such as the Red Backed Shrike *(Lanius collurio)* and the magnificent Hobby *(Falco subbuteo).* It is not until one reviews the invertebrate species that the true complexity of the heathland ecosystems is recognised.

In the British Isles we have about three hundred native breeding vertebrates both in freshwater and terrestrial habitats. By comparison there are in excess of 22,450 insects and over 3,130 other invertebrates (excluding protozoa and rotifers) a total of over 25,000 recorded species, although the true figure is likely to be around 30,000. Some heathland sites in the south are known to represent between as many as one fifth and a third or more of many groups of the British Invertebrate fauna. In Surrey one site north of Guildford has 59% of the British Heteropteran bugs (288 species) another site 47% of spiders (300 species) and a total of 50% of the bee and wasp species (236 species). Another site holds 32% of the country's cranefly species (100 species). South of Guildford one common is known to have 66% of British dragonfly species (26 species).

The Surrey heaths were originally more extensive than those in Dorset, running 35 miles north-south from Ascot to Petersfield and from 10-20 miles east-west with three narrower extensions eastwards towards Esher, Reigate and Petworth. These Lowland Heaths are based on the underlying Tertiary sands of the London basin (as in Dorset) and the Lower Greensand. At the time of the first edition Ordnance Survey maps (1822) it is likely that there had already been a contraction of 25% from reclamation inwards via the richer chalk, alluvial and clay surrounds — thus the eastern extensions were already fragmented within the natural geological boundaries. From these maps and consideration of Marshall's Ministry of Agriculture (1794-1804) Survey and contemporary description, it can be shown that there was approximately 110,000 acres of heath. By 1977 this total had contracted to about 10,000 acres. Today, even this has reduced to an estimated 6,000 acres.

There have been several factors that have led to the fragmentation and ultimate destruction of the Southern heaths. It is known that the largest single loss is due to afforestation. Many people are surprised to learn that the present day Scots Pine *(Pinus sylvestris)* is not a native to Southern England. It has been generally accepted that the pine was introduced as a potential crop in the mid 1700's initially by Evelyn in Surrey. Scientifically, a series of paleobotanical researches have also proved that the pine died out in Southern England following the warm era since the last Ice Ages' ice sheets departed. The success on the otherwise unproductive heathland soils for forestry became widespread during the 1920-1930 and 1950-1960 period. Unfortunately, the Forestry Commission were very successful in selecting strains of the original Scots Pine that grew straight and fast and were also able to regenerate prolifically away from the original plantations.

The Sand Lizard is one of only six reptile species native to Britain. It is restricted to sandy areas on the north west coastal dune system as well as the southern heaths. It has suffered a serious decline in recent years which is linked to habitat loss and degradation. It is a most handsome species attaining a length of nine inches when including a complete tail. The basic pattern consists of blended rows of ocellate spots of greys, browns and white, whilst the males adopt a striking livery of vivid greens during spring and early summer. It was first recorded in Britain in 1802 and in 1839 Bell noted that its main habitat was sandy heaths. Thirty years ago Smith observed that it was still quite common in Surrey and Dorset. During the early 1970's Corbett, working on the species, noted that in the Frensham area of Surrey over a twenty year period the

Sand Lizard colonies had been reduced from 56 to 2. Through a fifteen year period in an area of Dorset known colonies had been reduced from 169 to 24. He also confirmed that the species was concentrated on south facing slopes and had an affinity towards local variation in topography, e.g. banks, tumuli, gullies, ridges, steep slopes and bluffs. The most important factor was that Sand Lizards, together with their chief predator, the Smooth Snake, were invariably found in mature heather, i.e. where the stands were in excess of ten years in age and that there was open sand available for the female lizards to deposit their eggs. He recorded that, within this optimum habitat, numbers of lizards could amount to between 230-240 adults per hectare.

The British Herptetological Society Conservation Committee (BHSCC) was set up in 1969. The aims were to assess the status of our native herpetofauna and their habitats. From subsequent monitoring observations combined with Keith Corbett's work on the Sand Lizard, a comprehensive schedule of heathland sites was established. Apart from the fact that all species had declined within their range, scrub encroachment onto the heaths presented the major problem. Against some initial opposition, the BHSCC began a programme of habitat management funded by the World Wildlife Fund on selected sites in Surrey, Hampshire and Dorset. The work in its first stage consists of the removal during winter of pine, birch and other scrub from the mature heath. A few selected trees are left for nesting birds. Where necessary, small sandy areas are exposed to provide breeding sites for Sand Lizards. In dry periods during July and August bracken is sprayed with Azulox, a selective chemical, although several seasons of spraying are required before it is eradicated.

Over the past ten years the Conservation movement has become increasingly aware of the importance of managing lowland dry heath by habitat management. Certainly, it is agreed that retaining a self perpetuating mature heather structure is the most beneficial for all heathland fauna.

However, despite all this work, the future outlook is uncertain. Many smaller sites are owned privately and even though they may have a Site of Speciala Scientific Interest (SSSI) status, under its present form there is no real long term safeguard. Fire is a threat to all sites and it is *imperative* to have adequate firebreaking on larger heaths. Sadly, this is still not the case on a number of sites including some National Nature Reserves even though this has been formally agreed in writing. There is still a backlog of scrub management to be undertaken, especially with regard to bracken control.

These heaths and their indigenous fauna will only survive providing that conservationists are prepared to continue annual habitat management and be ever vigilant about adverse pressures. It would be a tragedy for our future generations not to see the brilliant spectacle of heathland in its full purple bloom during late summer or some of the interesting species confined to this unique ecosystem.

NOTES ON THE NATURAL HISTORY AND REPRODUCTIVE STRATEGY OF THE ISLAND GLASS LIZARD, *OPHISAURUS COMPRESSUS*

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An early spring storm had kept our afternoon sky gray with moisture-laden clouds. Their ranks now breaking, the rifts were painted in reds and golds by the setting sun. In the distance, the eerie fireworks of the lightning still played among the cumuli but now the angry rumbling of the thunder was barely audible to us.

The road upon which we were driving was a short paved spur of restricted access near our new jetport. Barely three miles long, the road cut its way, now arrow-straight, now in sweeping curves, through sandy palmetto/pine scrubland, cypress swamp and open marshes of wire-grass and flags.

To our left, barely clearing the tops of marsh grasses, patrolled a marsh harrier, its white rump patch reflecting like a beacon as it tilted first one way and then the other, effortlessly avoiding the protruding twigs and rushes.

only moments earlier, we had seen America's most distinctive bird of prey, a swallow-tailed kite. Snowy of body and sooty of wing and tail, it soared, serene and graceful, against the background of tumultuous skies. In widening circles the bird drifted westward until it was a mere speck on the horizon. Then it was gone, leaving only a memory of beauty.

In the marsh, a small chorus of frogs had begun their various cadences — little grass frogs tinkling like diminutive sleighbells, Florida chorus frogs ratcheting and southern cricket frogs clicking stridently.

Along the right-of-way bumbled a nine-banded armadillo. Waddling along, completely oblivious to our presence, he would now and then pause to snuffle in the sandy dirt or dig furiously for a moment, then shuffle on his unhurried way.

The skies continued to clear, the fierce storms of the afternoon now, like the kite, only a memory. The sun began its drying job in earnest and soon a wavering haze of condensation was hovering over the tarmac. The relative humidity shouldered its way upward, now near the 100% mark, not an uncommon occurrence in Florida.

Patti and I had been lured to this airport roadway by a friend's report of the finding of America's 'rarest' glass lizard, the prettily marked and dainty-appearing island, *Ophisaurus compressus.* At least I hoped that the report was correct. Our friend had pointed without hesitation to the diagramatic sketches of that species when shown Conant's field guide. But I still harboured some doubts. After all, all three forms (the Eastern, the Slender and the Island) are shown as occurring in SW Florida, and, especially in their juvenile livery, are confusingly similar.

We idled our way along the road, the entire landscape now gilded by the sun which was slowly sinking beyond the horizon. Redwings and meadowlarks began bubbling and warbling their evening serenades from fence and field.

Ah-ha! Something snake-like was moving across the road! We sped up and within moments were staring down upon a beautiful Island Glass Lizard. There was no mistaking it. Our friend had been right!

Ophisaurus compressus, commonly known by the somewhat inappropriate appellation of "Island Glass Lizard", is the smallest of the three species of that genus found in the U.S.A. In contradiction of its common name, it is by no means limited in distribution to insular locations. Rather, this 60- to 65-cm-long creature is widely distributed over most of Florida and the coastal plains of Georgia and southern South Carolina. The reports of the lizard being "uncommon to rare" are quite likely erroneous. It is only with the greatest difficulty that the population statistics of a fossorial species may be determined. The fact that in hardly more than a week of serious looking, I collected eight of these creatures as the nucleus of a breeding colony and observed several others which I did not collect indicates abundance rather than rarity. It is, however, quite likely that *compressus* is both of local distribution and selective of habitat.

With but one exception, all of the *compressus* that were seen were crossing well-defined strips of roadway. Both roadways were cut through the sandy pine/palmetto highlands and were bordered on both sides by marsh lowlands. The single exception, a juvenile, was on a portion of low-lying road between two less extensive swamps.

Our three Glass Lizard species, *O. ventralis, O. attenuatus,* and *O. compressus,* are amazingly alike in appearance. In juvenile livery all are prominently striped. Misidentifications of any one of the three for another are easily possible but confusing *compressus* for *attenuatus* or vice versa is LIKELY (within areas where both are found) unless the specimens are actually in hand.

Our members of the genus *Ophisaurus* are known equally well for two characteristics; firstly they are entirely legless and secondly, in two of the three species, the extreme ease with which the tail is autotomized. Folk tales abound about the "glass snake" or "joint snake", attributing to the creature the remarkable (and erroneous) ability to break apart and reassemble during and after danger respectively.

The ease with which the eastern, *O. ventralis,* and the slender glass lizards, *O. attenuatus,* may autotomize their tails is explained by the presence of fracture planes in the caudal vertebrae. *O. compressus* lacks these. Hence, while the first two are quite capable of losing all or part of their tails under but slight stress, the latter is not nearly so apt to do so. This is clearly reflected in field collected animals, the adults of both *ventralis* and *attenuatus* usually having at least partially regenerated tails while of the 20+ *compressus* that I have now seen tail damage had occurred on but two.

From the highland *attenuatus,* a multi-striped creature with markings both ABOVE and BELOW the lateral groove, *compressus* may be defferentiated by its single dorso-lateral stripe ABOVE the groove and no markings below. From *ventralis,* the common wetland form, which usually lacks ALL traces of a mid-dorsal stripe, *compressus* may be differentiated by the presence of at least a vague mid-dorsal stripe. Other differences exist, most of which are impossible to determine unless the creature is in hand. I refer you to your field guides for listings of these.

The adult *compressus* feed readily upon calcium/vitamin-dusted crickets and will accept certain canned catfoods as well. No interest has been shown in either mealworms or earthworms, the latter being readily ingested by the larger species.

Until our study the reproductive strategies of *O. compressus* were poorly documented. Breeding and subsequent egg deposition are here reported.

Sexual maturity is obviously reached prior to the assumption of adult colouration. Such is attested to by the fact that two females, still in juvenile colouration, produced egg clutches.

Breeding activities began the first week of May. Courtship was virtually non-existant. A male would trail a female about the 120 × 60 cm cage until he finally approached her. Nudging and lapping of the female's cloacal area was occasionally noted. The male would then draw abreast of the female and grasp her by the tympanal area or nape. At this point the female would become quiescent. The male would then arc his body laterally, gently curving the posterior portion under the female and thus juxtaposing cloacae. Actual insertion of a hemipenis was not observed. Copulation was observed, however, lasting up to four hours, during which the male would periodically indulge in a a short series of "shrugs". During copulation both sexes would allow close approach without taking alarm. (At other times, they were among the most cautious of animals, seeking seclusion in their cypress mulch substrate as soon as they discerned human movement in the snake room).

In contrast to the statement in Behler and King (1979), reporting an average clutch of four eggs, two young females at our facility produced eight eggs each on 23 June. Both these females (156 and 162 mm svl) were still in subadult colouration. An adult female, 189 mm svl, had produced a clutch of 18 eggs, a few days prior to the subadults' deposition. Egg size averaged 10 × 15 mm.

All egg clutches were deposited beneath a board which lay atop a layer of finely shredded cypress bark mulch. Beneath the mulch was a thin (10 mm) substrate of lightly moistened sand. Typical of the manner of most egg-laying anguids, the females remained in attendance of the eggs.

Because of the difficulty in maintaining proper conditions of moisture and humidity for a protracted period in the larger cage, the eggs from two clutches were removed and incubated in barely moistened unmilled sphagnum moss. Temperatures were 20.5°C during the night, and 34°C during the day. Incubation lasted 39 days, and the new hatchlings averaged 40 mm svl (136 mm total). The young immediately began accepting calcium-dusted baby crickets.

The clutch left in the larger cage with the female spoiled after 27 days.

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AN UNUSUAL NATTERJACK SITE IN SOUTH WEST CUMBRIA

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It has now become a widely accepted fact that in Britain the Natterjack Toad thrives mainly on sandy habitats such as heathland or dunes (Beebee, 1983). Because of the endangered status of this amphibian the Conservation Committee of this society has spent considerable time surveying such habitats for new colonies of this species. Particular attention has been paid to the coastline of Cumbria, which until recently was only partly surveyed, but which had suffered less from some of the recent developments that have threatened the Natterjack in other regions. The result of this is that we now know that Natterjack colonies occur at intervals over much of the west Cumbrian coastline.

One of the new sites was identified by accident during a survey for little terns, being carried out by a representative of the Nature Conservancy Council. The site, like all Cumbrian Natterjack colonies, is located on the coast, but is unusual in that the substrate is not sand, but compact slag from a disused ironworks.

Many Cumbrian Natterjack sites are to be found in very scenic areas, but the ironworks site must be one of the ugliest in Britain! To the north there is a large slagheap, brooding over a low area of compact slag, with patches of hard clay, and the remnants of demolished buildings. This low area is strewn with large steel sheets, rubber strips, piles of bricks and other rubble, and an assortment of household waste (carpets, old washing machines etc.). It is this unpleasant collection however that provides the refuges for the toads, and large numbers of animals may be found in a short time by sifting through this material.

Another important feature of the site is an extensive shallow pool, which lasts until late summer. The base of the pool is hard, but has a covering of fine silt. There is little aquatic vegetation, apart from filamentous algae, and the pool is unshaded. Consequently the pool becomes very warm during the summer, and this, coupled with the eutrophic character of the water results in excellent conditions for the tadpoles. There are other water bodies, but these are less suitable, two being very ephemeral, and a third being a small deep permanent pool. The main pool regularly produces large numbers of toadlets. Between 1981 and 1983 the site contained water until at least late August and thousands of toadlets emerged each year. The severe drought of 1984 resulted in premature desiccation, killing all the tadpoles before they had developed even hind-limbs. This was an exceptional year, however, and it should not be long before the main pool is productive once more.

Previous reproductive success at the site was obvious in 1984 by the large numbers of juvenile toads that could be found under pieces of rubbish. The adult population also seems to be large, although we lack accurate estimates. However, more than 100 spawn strings were counted in the pools during both 1982 and 1983. These figures probably yield an underestimate of the number of strings laid, (and therefore, the female population) as the site was visited on average only once every two weeks during the spawning season (which lasts from April to early July). As the sex ratios among populations of toads are usually biased in favour of males the adult population is likely to be high (at least hundreds of adults).

Common Frogs are also relatively common, although their tadpoles are mainly found in the small deep permanent pool. It is possible that spawn deposited in the shallow pool is vulnerable to desiccation, but we do not know for certain as the site is not normally monitored until late March, (frogs in this area spawn in February). Smooth Newts are also relatively common, but Common Toads are rather scarce. The appearance of the site would seem to make it an unlikely candidate for conservation. However, the iron works forms part of an important series of Natterjack sites in south west Cumbria, and several other colonies within 10 km have suffered recently from tourist developments, drainage, and, paradoxically, flooding! The iron works population is now probably the largest in the area. For this reason we were alarmed when the local council announced plans to reclaim the site. Although the pool would have been protected,

PLATE 1

View of the iron works, with the main pond in the mid-ground (half full), with the slag-bank behind, and low rubbish strewn area in foreground.

Millom iron works in mid-summer, with the main pond in the mid-ground dessicated to about half of its total flood area. Note the slag-bank in the rear, and the low rubbish strewn area in the foreground.

PLATE 2

New breeding site located in 1984. Tadpoles were found in desiccating puddles under a piece of tin, while numerous adults and juveniles were found under the rubbish also.

PLATE 3

Adult Natterjack. Note the pebble-sized pieces of slag that make up the substrate on the low area. Note also the spare vegetation cover.

the sparsely vegetated soil would have been fertilised to produce a thick turf, and trees were to have been planted in the vicinity of the pool. We feared that this would make the terrestrial habitat more favourable to Common Toads, and lead to greater competition between the tadpoles of the two toad species. Under such circumstances the Natterjack usually comes off worst (Heusser, 1971 and 1972; NCC, 1983). The rubbish was also to have been removed, depriving the Natterjacks of some of their terrestrial refuges.

Fortunately, because of financial constraints, the plan had to be abandoned, and it now looks as if the pool and surrounding flat area are to be scheduled as a site of special scientific interest by the NCC. This should allow conservationists to have a greater influence in the future management of the land, giving the Natterjack population a more secure future.

One moral of this tale is that thriving colonies of Natterjacks are not restricted to sandy terrain (and similar findings have been made by Andren and Nilson in Sweden, where the species thrives on rocky islands). It is therefore worthwhile that any coastal site, no matter how unlikely, should be carefully surveyed if this rare amphibian is known to be in the area. There are at least two other iron works on the Cumbrian coast, and small numbers of Natterjacks have been found very close to one of them. More thorough survey of these areas may yet yield other exciting finds. One problem is that the conservation committee has few representatives who are able to survey this area frequently. We would therefore welcome help from anyone who would be willing to monitor the existing populations and survey for new sites. Willing volunteers should contact the chairman of the Conservation Committee. I responded to a similar advert in 1979, and have been rewarded both by many pleasurable hours in the field, and by making many new contacts in the field of amphibian conservation.

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NOTES ON THE SURVIVAL AND DEVELOPMENT OF PALLID TADPOLES OF THE NATTERJACK TOAD, *BUFO CALAMITA*, (LAURENTI), FROM A CUMBRIAN SALTMARSH POOL

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INTRODUCTION

Pallid and albino tadpoles of *Bufo calamita* have been recorded both from Europe (Flindt and Hemmer, 1969), and various parts of Britain, namely Hampshire (Beebee and Beebee, 1978), Norfolk (J. Buckley, pers comm) and from Cumbria (B. Banks, personal observations). Albino adults have not been recorded (Beebee, 1979), the inference being that pallid toadlets either die, or subsequently develop normal pigmentation.

During 1984 three pallid tadpoles were collected and reared to metamorphosis, allowing observations to be made on the subsequent development of the toadlets.

METHODS

The tadpoles were kept at room temperature and fed on commercial rabbit pellets. Following metamorphosis the toadlets were reared on aphids and later on larger insects. The animals were shielded from sunlight in case the effects of U.V. light were harmful. Observations on the colour of the toadlets were recorded at irregular intervals.

RESULTS

Observations on the colour and stage of development were as follows:

24th June 1984
Three tadpoles (stage 37, Limbaugh and Vulpe, 1957) were collected. Two of the specimens were a greyish white colour, while the third had a slight grey marbling, restricted to about 25% of the body surface.

12th July 1984
All three toadlets metamorphosed and were pale grey in colour. The vertebral stripe, characteristic of the species was not apparent. One of the toadlets died a few days later, a result of its having failed to feed since metamorphosis.

30th July 1984
The two remaining toadlets were 10 and 12mm in length. A pale stripe was just visible on both specimens, as were a number of orange/red markings on the warts. The general body colour was a very pale yellowish white.

30th August 1984
The toadlets now measured 20 and 24mm respectively, and had developed the external morphology characteristic of juvenile and adult natterjacks (Beebee, 1983). The skin was much darker, largely a result of extensive green marbling, reminiscent of that of the green toad *Bufo viridis*. As a result the yellow stripe was now very obvious, while the warts remained an orange colour, and the back-ground colour was a pale buff.

DISCUSSION

These specimens appeared to have a specific inability to produce melanin. The colouration that developed later was due to other pigments:— yellow and orange from lipophores, white from guanophores, and green from bufoviridine (Frazer, 1983). The results also indicate that the only pigment produced by natterjack tadpoles is melanin, the other pigments are not produced until at least a few days after metamorphosis.

Pallid natterjack toadlets are clearly capable of surviving beyond metamorphosis in the absence of natural sunlight. There is evidence that ultraviolet light can cause injury to animals (ie the abdominal cavity of some organisms), and so they shield themselves by dark pigmentation, or seek shaded microhabitats (Burtt, 1979). It still remains to be seen if pallid natterjack toadlets in the field are capable of surviving natural levels of U.V. light in Britain, although the diurnal behaviour of the toadlets would render them vulnerable if there were side-effects. However, if such animals do survive they would not be recognised as pallid specimens, as the animals reared in this study resembled pale normally coloured adults 1½ months after metamorphosis.

The occurrence of dead white spawn has been attributed in the past to senility of the adults (Beebee, Bolwell, Corbett, Griffin, Preston and Webster, 1982), but such white eggs may possibly be produced by younger animals. A string of white spawn was noted this year at a site where natterjacks had only been introduced four years previously, (J. Buckley, pers comm), while I have found wild natterjacks aged 11 and 12 years old (Banks and Beebee, in press). At the introduction site pallid tadpoles had been noted during the first year of the introduction. Some pallid specimens reared in captivity did not survive long after metamorphosis. However, it is possible that some specimens survived in the wild. It may well be that if pallid natterjacks survive in the wild that these animals are responsible for the production of melanin-deficient spawn.

Further research is obviously required to determine if pallid natterjacks do survive the effects of sunlight, and if they lay white eggs. It may well be that the phenomenon of spawn strings consisting of white eggs is less straight-forward than present theories imply.

ACKNOWLEDGEMENTS

The tadpoles and toadlets were handled under license from the Nature Conservancy Council. I was kindly allowed access to Eskmeals Dunes Nature Reserve (where the tadpoles were collected) by the Cumbria Trust for Nature Conservation. Information from John Buckley was most useful in the writing of this report, as were discussions with Dr. Trevor Beebee.

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DAYTIME BREEDING MIGRATION IN TOADS *(BUFO BUFO)*

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It is well known that toads are mainly nocturnal and migrate to breeding sites mainly during the night. In a paper describing the diurnal activity of the Common Toad during a breeding migration Gittins (1983a), however, found that about 8% of males and 28% of females moved to the pond during daylight and suggested that darkness is not an essential requirement for migration to take place. The following account provides further evidence that this is so. Llysdinam Pond, Newbridge-on-wye, Powys, has been surrounded by a drift fence and pitfall traps since 1981, thus enabling the breeding migrations of toads into the pond to be quantified. In 1984, the breeding migration was delayed by cold weather in March, and did not get underway until 6th April. Following this, large captures were made until 12th April. The pitfall traps are normally emptied once daily, at 0900 hrs in the morning, but for two days during the heavy migration period, they were emptied additionally in the early evening (1800 hrs). This enabled the numbers of toads arriving at the pond during daytime to be counted and showed clearly that large numbers of both males and females migrated during full daylight (i.e. from 0900 to 1800). Over the two day period 181 toads migrated to the pond (about one fifth of the breeding population — Gittins 1983b) and of these 52% of males and 59% of females were caught in daytime. This is probably a very unusual situation and may in some way be related to the delayed breeding season in this particular year. It clearly demonstrates, however, that under certain circumstances, toads may abandon their usual nocturnal habit and become very active in daylight.

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BREEDING GREAT CRESTED NEWTS *TRITURUS CRISTATUS CRISTATUS* IN AN OUTDOOR ENCLOSURE

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The Great Crested Newt is now recognised to be the second rarest amphibian in Great Britain, and is apparently absent from extensive areas of the north and west, as well as from the whole of Ireland. It is regarded as a predominantly lowland species, which explains its absence from the more mountainous parts of Wales, Scotland, northern England and Cornwall. The breaching by the sea of the landbridge between what is now the United Kingdom, and Ireland presumably took place after the last Ice Age, and before *Triturus cristatus* could reach and cross it, thus preventing colonisation of the latter land-mass.

In Suffolk, the terrain is comparatively low-lying and flat and, over most of the county, the soils are predominantly clay-based. The landscape was, until fairly recently, a mixture of arable and livestock agriculture, with smaller areas of deciduous woodland, marshes and fens. This did not apply to the Brecklands of the north-west, or the coastal "Sandlings" belt, which consist mainly of sand-based soils, and have their own distinctive range of habitats.

It is likely that, prior to the agricultural revolution which began during the last war, and which continues to accelerate, *Triturus cristatus* was a comparatively abundant species in Suffolk, using the many field and village ponds, farmhouse moats, and dykes as breeding sites. A survey which I am presently conducting to determine the distribution of the county's herpetofauna, suggests that *T. cristatus* is still extensively if somewhat locally distributed across the clay soils, although it is strangely absent from the light sandy soils of the northwest and east. Even today some colonies are quite large, possibly consisting of several hundred individuals. It is reasonable to suppose that, given suitable breeding sites and terrestrial conditions, ailing colonies could be revitalised and new ones established, for example in large garden ponds, or ponds in disused gravel pits.

Although *T. cristatus* is not generally considered to be as adaptable in its choice of breeding sites as *Triturus vulgaris* (which is widespread over most of Suffolk including urban areas, the Brecklands and the Sandlings), I have occasionally encountered it breeding in apparently unsuitable and unlikely surroundings, e.g. in semi-subterranean concrete drainage tunnels alongside the main East Suffolk railway line. In view of the declining status of the species in Suffolk and of possible future opportunities for introductions or re-introductions, particularly in my local area, I have been carrying out a captive-breeding project since 1981.

The original nucleus of my present breeding colony was collected during the autumn of 1980, mainly from a site on a common in Norfolk where the sole remaining pond, in an old marl-pit, had been drying out progressively earlier in the summer for some years. This had a correspondingly disastrous effect on recruitment. A series of personal visits to the sites made between 1976, when I first became aware of it, and 1980 revealed findings which suggested that juvenile newts were rare or absent, with only large adult specimens being encountered, often only after extensive searching. Therefore, when I decided to set up the project, I felt justified in collecting my breeding stock from this apparently declining site.

In the spring of 1981 I had a large outdoor enclosure built to my own design, and specifically intended for the native amphibians of our local area. The soil in my garden is reasonably well-drained, except during prolonged periods of heavy rainfall when it becomes water-logged, and is heavy and clay-based. This has ensured that the enclosure has been eminently suitable for amphibians from a terrestrial aspect. The overall dimensions are 14' × 7' with a wall height of 2 feet, the walls being constructed of 18" × 9" × 4" solid concrete blocks. The enclosure is located in a sheltered but sunny and largely unshaded position. This last consideration is particularly important as, although newts in their terrestrial phase are not at all fond of exposure to sunlight, their breeding-pool needs to receive as much as possible during the spring and summer. I should

add that the walls of my entire reptiliary complex, which comprises three separate enclosures adjoining each other, are all capped with roofing "pin" tiles cemented on crossways, which gives a 3" overhang on each side of every wall. This not only effectively prevents the occupants from climbing out but, in conjunction with nylon fruit netting stretched across the entire complex, helps to prevent access by predators such as cats, rodents and birds.

After the builder had completed the basic structure, I was left with an interior consisting of stamped down, impacted soil, liberally sprinkled with pieces of mortar from the wall construction. The next logical stage was the installation of the pond and, because of the restricted area of the enclosure, and a shortage of time in which to get the project under way, I opted for a pre-moulded fibreglass type (Lotus "Mallard"). By the standards of natural Crested Newt colonies, which are generally considered to favour larger, deeper ponds (Steward, 1969; Smith, 1973) this was tiny, with a length of about 6 feet, a maximum depth of 18 inches and a capacity of 75 gallons. In fact it did turn out to be unsatisfactory, but for a different reason. The terrain around the pond was then planted with a mixture of low-quality turves which were allowed to grow "rough", interspersed with a wide selection of ground-covering plants. The latter included *Pulmonaria sp.;* ornamental dead-nettles; ivies; hardy ferns; *Primula sp.;* phoxes; and *Rubus tricolour,* a rapidly growing thornless bramble originating from Western Asia. Piles of dead bark and a number of pieces of rotten wood placed in the vegetation provided additional refuges, giving damp conditions and shelter from sunlight.

The pond was originally planted with a variety of oxygenating, floating and marginal plants, including a water-lily but, following its subsequent replacement, its successor was planted more selectively.

Ten adult newts (6♀♀; 4♂♂) released into the enclosure pond in mid April 1981, settled in readily and bred successfully. In early August, to ease overcrowding, I collected over 20 well-grown larvae and released them at a local site. At the end of September another 6 metamorphosed juveniles were released at the same site, and during the following year yet another 6 from this first generation.

The severe winter weather of December 1981 left the terrestrially hibernating newts unscathed; by this time I had constructed a brick-built hibernation chamber in the southwest corner of the enclosure and, packed with moss and insulated with hessian sacking draped over the asbestos roof, it was not penetrated by frost. Even so, most newts, in company with frogs, toads and salamanders then occupying the enclosure, chose to hibernate under the larger pieces of wood lying in the vegetation.

The newts which chose to return to the pond to hibernate were less fortunate, and all four died under the thick ice; together with several adult Common Frogs *Rana temporaria.* This aspect of captive *T. cristatus* behaviour interests me because, each winter, a proportion of the colony returns to the pond, and this often includes several juveniles in addition to perhaps 50% of the adults. During mild spells it is noticeable that the males are developing their breeding attire and courtship normally begins in late February when the terrestrial adults also begin to appear in the pool. Adult palmate newts *Triturus helveticus,* recently introduced into the same enclosure, have displayed similar tendencies, but *T. vulgaris* has never been seen to overwinter in either the enclosure pond, or any of my garden ponds.

During 1982, the juvenile Crested Newts retained from the 1981 season grew rapidly, and I decided to release some of the original breeding adults at an existing site. By the spring of 1983 these first generation captive bred newts were sexually mature and were breeding.

The original pond had meanwhile proved to be less than ideal, mainly due to its comparatively small surface area in relation to its depth. Combined with the shading effect of the enclosure walls during early spring, this factor resulted in a pool which maintained low water temperatures until well into the season. Even during the summer the deeper part of the pond was always decidedly cold, and the metamorphosis rate of newt larvae was correspondingly retarded, with some juveniles emerging as late as September or October. In the summer of 1983 I removed this pond and substituted a semi-rigid pvc shape (Remanoid "Tynedale") which although only having a capacity of about 60 gallons and a maximum depth of 15 inches, possessed a proportionately greater surface area. This has proved to be a worthwhile modification, and 1984

was a particularly successful season. Other beneficial changes have been the more rigorous selection and control of water plants, resulting in more open areas in the pond (which Crested Newts seem to prefer), and a strict control on the number of adults in the colony at any given time. The latter consideration is of particular importance when breeding *T. cristatus* in a confined area. A "top-heavy" population of this species in such a small pond will result in heavy predation of their own larvae and will prove to be counterproductive. In the case of an enclosure such as my own, no more than 6-8 adults are necessary or desirable during the breeding season. The sex ratio should be about evenly balanced. Under these conditions it should be quite feasible to have 20-30 fully metamorphosed juveniles to spare at the end of each season, and to be able to release a similar number of larvae at earlier stages in their development, which will also alleviate overcrowding.

Feeding an outdoor colony of newts presents few problems whilst they are in their terrestrial phase; earthworms are abundant in our heavy soil and come to the surface on damp nights, when the newts are most likely to be foraging. However, once the newts have gathered in the water additional food will be necessary, in the form of earthworms, tadpoles, etc. I also provide food, in the form of *Daphnia* and *Cyclops* for the newt larvae during the later stages of their development.

As previously mentioned, plant life in the pond is rigorously controlled and is now limited to oxygenators in the form of Canadian pondweed *Elodea canadensis;* Hornwort *Ceratophyllum demersum;* Water soldier *Stratiotes aloides;* and a foreign variety of water milfoil which I have been unable to identify. All of these species have proved popular as egglaying sites as has the blanketweed *Spyrogyra* which I did not deliberately introduce, but which provides excellent cover for newt larvae.

This artificial environment has also been suitable for Common Newts which have bred alongside their larger relatives in considerable numbers until recently when I began weeding them out and relocating them in the garden ponds in order to make room for a thriving colony of Palmate Newts, moved in from another enclosure. Although Common and, latterly, Palmate Newt larvae have provided additional food for both adult and larval Crested Newts, there is little doubt that the situation is reciprocal, and that adults of the smaller species attack *T. cristatus* larvae.

In conclusion, it seems that, although *T. cristatus* is localised, scarce or even absent in many parts of the country, it is a species which can be bred under captive conditions in an outdoor enclosure. However, it does need a reasonable amount of room, and previous experience with this species in captivity has led me to consider that it is difficult or impossible to breed in the aquarium or in a very small outdoor enclosure. Once the species does establish iteself, it seems to do well and produces significant quantities of offspring. Subspecies such as *Triturus cristatus carnifex* appear to be less fussy in captivity and can be bred in tanks.

Finally, it should be stressed that this species is now protected under the Wildlife and Countryside Act 1981, and a licence is necessary before specimens can be taken from the wild. In most cases it is preferable to obtain captive bred specimens, or those from sites threatened by destruction.

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THE CARE AND BREEDING OF THE COMMON BRITISH REPTILES AND AMPHIBIANS — PART III, THE SMOOTH NEWT *(TRITURUS VULGARIS)*

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DESCRIPTION, DISTRIBUTION AND HABITAT

The Smooth Newt, *(Triturus vulgaris)* is a rather small newt which rarely exceeds 11 cm in overall length. There is little difference in size between the sexes although females are marginally larger than males.

When not in breeding condition the basic body colouration is olive brown or yellow brown; males have circular black spots and are slightly darker in hue than females. The underside of the male is orange with dark brown spots; that of the female is paler orange and the dark spots are smaller.

When in breeding condition the male develops a high crest which commences behind the head and terminates at the tip of the tail where it is developed on both dorsal and ventral edges. The lower edge of the tail is bright orange with a beautiful pale blue streak immediately above it. The toes of the hind feet develop fringes. Apart from a slight intensification of colouration and smooth skin texture the female remains much the same as when out of breeding condition.

The Smooth Newt occurs throughout the British Isles except local areas of Wales and parts of Scotland, it is also widely distributed over Europe but is absent from northern regions of Scandinavia and Russia, southern France, the whole of Iberia, south Italy and the Mediterranean Islands.

It does not appear to favour any particular habitat but avoids areas which are very exposed or thickly forested. It is essentially a lowland species but can be found at altitudes of up to 2,000 metres in the southernmost parts of its range. When out of the water it tends not to stray very far and in daytime can often be found hiding under fallen logs, large stones or other flat objects on the ground.

HUSBANDRY

Courtship/Breeding

Unlike frogs or toads a garden colony of Smooth Newts can become established by the introduction of a pair or more of adults into or near the garden pond, especially during the breeding season which extends from March to May. You don't even need a proper pond for Smooth Newts, an old sink will do as they will utilise even the smallest volumes of water for spawning purposes.

If you have a garden pond containing fish they should not molest the adult newts (except large Orfe or Carp) but they will, of course, catch and eat any newt tadpole they find. However, if the pond has a good growth of underwater plants, the newt tadpoles, being secretive by nature, will keep to the shelter of the plants, thereby avoiding detection by the fish.

Smooth newts emerge from hibernation about the end of February when they enter the water preparatory to breeding. Their winter is spent either under large stones, logs, disused burrows of small mammals or in the water itself, sheltered among detritis at the bottom. The male develops his crest during February and courtship usually commences early in March.

The courtship display is very interesting to watch and it is well worth introducing a pair or more into a well-planted aquarium tank in order to observe the proceedings. Rocks should be placed so as to protrude from the water so that the newts can climb out if they wish to. A tight fitting lid should cover the tank to prevent escape.

Once the introduced newts have settled in their new surroundings the male will begin to pursue the female about the tank nudging her with his snout. Occasionally he will position himself in front of her, curling his tail while making rapid fanning movements with it.

Eventually a small capsule containing spermatozoa — the spermatophore — is released from the male's swollen vent onto the floor of the tank. The female soon locates the spermatophore, picking it up with her hind feet and inserting it into her cloaca where the spermatozoa break out and are then stored until fertilisation takes place.

When the female is ready she will commence laying the eggs, usually during the night; each egg is laid individually on the leaf of an underwater plant to which it adheres. She then carefully curls the leaf round the egg with her hind feet in order to protect it. Plants most favoured for egg laying, at least in captivity, are Water Milfoil, Egeria densa and Canadian Pondweed. Where no plants are present the eggs are laid on stones, gravel or even the sides of the tank.

Rearing the tadpoles

After a fair number of eggs have been laid the adults should be removed as they may eat the eggs. It takes about a month for the eggs to hatch, the newly emergent tadpoles resembling tiny fish barely 1 cm long. They can be readily distinguished from fish by their clearly visible feather-like external gills and minute front legs.

For the first 2 or 3 days the tadpoles can be seen clinging vertically from the underwater plants or sides of the tank before commencing to feed on the minute life forms which constitute their diet at this stage. Newt tadpoles are strictly carnivorous throughout their development; at first they can be fed on infusoria which is best cultured by using "Liquifry No. 2". As they grow larger they will prey on the various types of crustaceans collectively known as "Water Fleas" before graduating to larger creatures such as midge or gnat larvae and bloodworms. They can also be induced to feed on minute scraps of raw meat or fish which they quickly detect in the water with their well-developed sense of smell.

Just before the tadpoles metamorphose, which is about 3 to 4 months after hatching, their external gills rapidly atrophy and the resulting newtlets will desire to leave the water. They will climb out onto the rocks which have been left in the tank when the adults were removed. They will soon climb out of the tank at this stage so the tank should be covered again to prevent this happening.

Rearing the young newts

Once all the newtlets have left the water, their tank can be drained and set up as a normal vivarium which should be kept damp and humid. In the terrestrial stage Smooth Newts are more difficult to feed than they were as tadpoles because they will eat only living prey which they stalk and seize by flicking out their tongues in similar manner to frogs and toads.

Young and adult newts will not eat non-moving prey on land showing total indifference to it and yet under water they will readily scavenge on carrion and can be tempted with pieces of raw meat or fish. A further phenomenon which is exhibited in most species of newts is their insatiable greed when underwater. They will bite each other's limbs and body, threshing about in a frenzy and engaging in a tug-of-war with the food. When behaving thus a large newt can quite easily catch and devour a smaller one. This behaviour is not exhibited when the newts are on land.

The average length of young Smooth Newts on leaving the water is about 25 mm from end of snout to tip of tail, so suitably small prey is required. Whiteworms *(Enchytrae)* are a very good first food being easy to culture in large numbers. A plastic dish or tray is filled to the brim with damp peat and the Whiteworms introduced together with some small pieces of damp bread placed on top of the peat. The dish is then covered with a sheet of glass and the culture placed somewhere dark and warm such as an airing cupboard where it is left for about 4 or 5 days by which time the original worms will have multiplied and many hundreds will be found on the underside of the glass. They can be removed with a small artist's brush and fed to the newts as required. The culture can be kept going indefinitely by occasionally moistening the peat, adding fresh bread every week or so.

Other good foods for very small newts are Aphids, baby Mealworms and small invertebrates captured by hedge-beating or grass-sweeping. As the newts grow, small Earthworms and Slugs can be added to the diet.

Hibernating baby newts

The newtlets should have grown to an overall length of about 40 mm by the end of their first autumn when they will be ready to hibernate. An ideal way to hibernate them successfully is in ice-cream cartons filled halfway with damp earth or peat which is then covered with moss, leaves and small pieces of bark. About six newtlets per carton is the optimum number. Perforate the lid with several small holes for ventilation, replace it and the carton should then remain damp throughout the winter. It should be kept in a frost-proof outbuilding and periodically inspected especially as spring approaches when the young newts become active again. By about mid-March they can be returned to their vivarium.

They can, of course, be kept active or semi-active indoors during the winter, but as problems will arise in obtaining enough live food for them, it is really preferable to hibernate them as described above.

Care of the adults

Readers of my previous articles in this *Bulletin* may have noticed that I am not an advocate of keeping reptiles or amphibians indoors away from the daylight and fresh air as I consider it unnatural, even unkind, to do so. However, smooth newts are an exception because they do not like the sun and are rarely seen abroad in daylight except when breeding.

They can be kept in a vivarium indoors, but this should receive natural daylight, though not direct sunlight; a north or east facing window is an ideal situation. The vivarium can be arranged to look very attractive with growing ferns and mosses, pieces of cork bark and a container of water. The ferns and mosses will thrive in the humid conditions. Three adult pairs of Smooth Newts could be safely housed in a vivarium measuring 60 cm × 30 cm × 30 cm.

The newts will be seen most often at night when they come out of hiding to search for prey. However, they can soon be tempted out during the day by placing a worm or slug in front of their retreat. When on land adult Smooth Newts will eat any type of slow-moving invertebrate small enough to swallow but they seem to be especially fond of earthwoorms and slugs, particularly the small pinkish-grey Slug *(Agrolimax agrestis),* which abounds in gardens. Underwater, Smooth Newts will eat small pieces of raw meat or fish as well as living prey.

Hibernation of the adults can be carried out in the same way as the young ones except 3 per ice-cream carton would be the limit. Alternatively, if the vivarium is kept in an unheated room indoors during the winter the newts need to be fed about once a fortnight and their breeding cycle does not seem to be impaired when this is done.

In the spring they should be transferred to an aquarium set up as described earlier for breeding as even if you do not have a garden pond any offspring produced can be released somewhere suitable or given away to someone else.

CONCLUSION

The Smooth Newt is one of the hardiest of all the European amphibians and will live and breed for many years if provided with adequate care. All surplus tadpoles, young or adults should be introduced to suitable locations thereby assisting this species to continue flourishing in the wild.

In my next article I will outline the care in captivity of our other common British newt, the Palmate Newt, *(Triturus helveticus)* which although similar in size and appearance to the Smooth Newt requires somewhat different conditions for the most successful results.

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TREATMENT OF DERMAL ULCERS IN SALAMANDERS

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Salamanders are sometimes prone to suffer from skin ulcers which, if left untreated, grow into the deeper tissues including the bone, resulting in the death of the animal. The animals I have treated respond very rapidly to a bath of 50mg per litre oxytetracycline — this would suggest that the causative pathogen is a bacterium or actinomycete rather than a fungus (as in the case described by Lambiris — unless he is classifying the actinomycetes with the fungi).

Any part of the body can be affected, but the digits are particularly prone (and can be quickly eaten away by the disease) as well as other parts of the limbs and the lower jaw and snout. The ulcer is surrounded by a black ring which grows out as the ulcer grows. The pathogen survives in the soil and is picked up from there when the salamander crawls over it or when the salamander rubs its snout on it when feeding on worms and other prey.

Because amphibians breathe through the skin the skin is heavily supplied with blood vessels close to the surface. Because of this, antibiotics and other chemicals which can pass through cell membranes are rapidly taken up and distributed throughout the body. This often makes injections or doseage by stomach tube completely unnecessary. Oxytetracycline radically alters the bowel flora, and within a few hours of putting the animal in the bath the bowel will be emptied as diarrhoea. This is nothing to worry about — wait a few hours for the gut to be emptied and replace the bath with fresh oxytetracycline and then change the antibiotic solution every day for a week. Use a small container (eg a 2 or 4 litre ice-cream tub) for the treatment bath and leave the animal in it for the whole treatment period. Put in about ¼" depth of the solution of oxytetracycline.

The original tank where the animal was kept should be emptied and sterilised with household disinfectant or bleach and then the substrate changed for inert ¼" gravel, but hiding places eg slates and readily accessible water should still be provided. It is advantageous if part of the tank can become quite dry — this will be the case if several inches of ¼" gravel is used and the bottom of the tank is not filled with much water.

Making the substrate acid will also control the disease. This can be done in the case of an ordinary soil substrate by mixing in 20-40g of flowers of sulphur per square foot of substrate or watering with sulphuric or hydrochloric acid. The pH should be lowered to 5 but no lower. Altering the soil pH radically alters the soil flora. Actinomycetes are effectively destroyed at pH below 5, bacterial activity is modified at pH below 5 so that acid-specialising bacteria take over from those species active at higher pH. Fungi can survive at all pH values but are out-competed to some degree at higher pH values by bacteria and actinomycetes. Thus reducing the soil pH will often eliminate many bacterial and actinomycete diseases, while increasing it will help control fungal diseases.

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SOME EFFECTS OF THE DANGEROUS WILD ANIMALS ACT 1976 WITH REGARD TO THE BRITISH ADDER *VIPERA BERUS* IN CAPTIVITY

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Having held a licence issued by my Local Authority to enable me to keep up to ten Adders in an outdoor enclosure for three years from 1982 to 1984 inclusive, I feel that fellow BHS members may be interested in learning more about the Act and its implications with regard to the species.

Firstly, the licence can be expensive; in the first year it cost £30 and in 1983 and 1984 it cost £50 annually. If I had renewed it for 1985 the fee would have been £60. I understand that, in comparison with some areas, this is not overly expensive, and I have heard of fees of £150 being exacted. This is not the end of the amtter, as there is a further expense in the form of an insurance policy against liability for possible damage wreaked by any animal kept under the Act. This, too, can vary considerably.

For the reasons of cost alone, many people who might be interested in carrying out conservation and captive-breeding work with *Vipera berus* could well be discouraged. A further obstacle, particularly in built up areas, is the opposition posed by local residents who usually base their arguments on fear, ignorance and misinformation. There are people who will become virtually hysterical once they learn that an application has gone in to the local authority for a licence under the DWA. At a public parish council meeting which arose from my original licence application, I was asked to explain my case for keeping the snakes in a garden enclosure, and to answer questions about them, and I was shocked by the sheer lack of knowledge displayed by most people about Adders and snakes in general. The hostile majority of the audience included a local doctor and a conservation trust member! The local newspapers had a field day and derived considerable mileage from the whole business, which was drawn out for several weeks until the licence was granted.

Conditions of the licence included not only an escape-proof enclosure (which I had already satisfactorily completed and had inspected by a local vet) but also precautions to prevent casual access by trespassers, and a warning sign. I ended up having to construct a barbed wire fence, with a lockable 5' iron gate, round the entire enclosure, which had been built in a previously unfenced part of the garden. Even so, I think that the health and housing department saw these as minimum precautions, and I know they would have preferred a much higher chain-link fence with solid boarding at the base, etc.

Throughout the entire period during which I held the licence, I had recurring trouble with one particular local resident who could never accept the granting of the licence, and who developed an obsession about the snakes and the enclosure. I should add that I believe this to be based on a personal (and mutual) dislike, and it led to the enclosure and its environs being interfered with on a number of occasions, and to the killing of a harmless Slow-Worm (believed to be an escaped 'Adder' from the enclosure) on another. All this added further complications because, as my local (and not unsympathetic) environmental health officer pointed out, anyone keeping animals under the DWA has to preserve a "whiter than white" track record.

Restrictions were also made on the transporting of Adders. In transit, the snakes had to be contained in cloth collection bags, tied and knotted and placed within a strong wooden box with ventilation and a lock. This was to prevent snakes spilling out all over the place in the possible event of a road accident during transit and was, in my view, one of the few sensible aspects of the licence. There were also restrictions on taking the snakes out of the local authority's area without having previously obtained written permission from both it and the recipient local authority concerned. I found this out the hard way when I lent two snakes to George Cansdale, to appear on a "Blue Peter" children's programme in 1982.

As I mentioned previously, the licence is renewable annually and extends over a calendar year. Before each renewal a council-appointed veterinary surgeon inspects the enclosure or cage, and the licensee is also subjected to regular (and unannounced) visits from the environmental health officer. To be fair I consider that my local authority, the Waveney District Council, has taken a reasonably enlightened view of the whole matter, and has been as helpful as possible within the bounds placed upon it by the Act.

For a number of reasons I decided against renewing the licence for 1985, although all the earlier problems had been sorted out and renewal would have been a formality. One major factor was the cost; I simply could not afford the fee, but other considerations included the long term viability of the enclosure due to its small size (8' × 7') and uncertainty about where I might be resident in the future, or whether I would have the time to spend on the project, which involved rearing young Adders with a view to captive breeding from them.

At this point I feel that I should state that, in my opinion, the British Viper should not be included on the DWA schedule and that my experience of the Act in relation to this species leads me to believe that it is impractical for *Vipera berus* to be subject to this law. It seems obvious that the DWA is directed at exotic species and that, in nearly all cases, the schedule specifically excludes native wild animals even though it may include closely related foreign forms. It is a fact that *Vipera berus* is one of the most widely distributed of the British reptiles; indeed there are large colonies on heathland within ten miles of my home. Where it does occur naturally, it often ventures in to adjacent gardens and even houses. This applies to no other animal on the DWA schedule. If someone has Adders in their garden or on their land as part of the wild fauna, and puts some into an enclosure on that same land, are they then breaking the law? By the same token, if a person encloses wild-living Adders by building an escape-proof wall around their land, does that person need a DWA licence? I have a friend who lives on a heath and is letting a paddock next to her house revert to *Calluna* dominated heath. This is becoming attractive to Adders living on the adjacent bracken-invaded areas. By creating such a habitat, either deliberately or unintentionally, in which the snakes flourish, would my friend be liable to prosecution if anyone was bitten on her premises?

In the normal course of matters, anyone injured by an animal held under a DWA licence and which had escaped, would be able to claim damages. In the case of an escaped Adder, who is going to be able to prove whether it, or a wild-living adder, administered the bite, if the incident took place in an area where the snake occurs naturally? Even if the snake was killed and presented as evidence I doubt that the case could be proven, as one Adder often looks much like the other.

The Adder receives no special protection under the Wildlife and Countryside Act 1981, so how does the DWA affect conservation work with the species? Translocations, introductions and rescuing specimens from "doomed" sites ought to be fairly straightforward operations but one wonders where the Act stands with regard to them. The provisions of the Act are designed to cope with animals permanently kept in one place, and transport stipulations seem to be largely at the discretion of the local authority concerned. Is a licence necessary solely to transport wild Adders from one site to another, and what would it cost?

I feel sure that, due to the small number of people who have bothered to apply for licences to keep and study the species, many facets of the Act which relate to it have not been tested and would prove to be unworkable in practice.

There is a further challenge to the validity of the species' inclusion in the DWA schedule. Quite simply, is it dangerous enough to warrant such legislation? My own understanding is that, since the beginning of the present century, only about a dozen people have died of Adder bite in Britain. Several of those deaths have been related to conditions such as previous bad health, and allergy to the anti-venin administered. Although there are Adders in this district, and serum is kept at all the local hospitals, very few cases of Adder-bite occur in Norfolk and Suffolk, and there have been no fatalities. Some doctors, including my own, do not consider Adder bites to be generally serious, and even animals such as dogs can usually be successfully treated if taken to a vet in time.

The vet who inspected my snake enclosure told me that he considered large dogs to be much more dangerous to humans than Adders, and that any dog over a certain size ought to need a special licence. I have been reliably informed that, in this country alone, dogs kill uround ten people every year. Bees and wasps account for a further two or three deaths, and even lightning kills many more people than Adder bite. And as for the chances of being killed in a road accident.....

In conclusion, I would be interested to know firstly, if the Dangerous Wild Animals Act is really intended to apply to the native Adder and, if so, secondly, how and in what respect does it apply. If, upon clarification of the issue, it is obvious that the Act is intended to apply to the Adder I would be pleased to support such moves as can be made to get it removed from the schedule. Such a law can only be negative, impractical and unworkable in this context, and will continue to be a barrier to future conservation work.

LETTERS TO THE EDITORS

Sir,

The Report of the Captive Breeding Committee (*Bulletin,* December 1984, p.12) contains the following last paragraph.

"However, we very much regret to report that Council has refused to fund CBC activities during 1983 and 1984, which has greatly slowed our progress, despite paying large sums of money to the Conservation Committee."

Since January 1st, 1983, the Conservation Committee has received only the following sums from BHS funds:

April 23rd, 1983: £63; Dec. 1983: £182: total for 1983, £245
June 11th, 1984: £200 total for 1984, £200

These monies were for a BHS subscription to Wildlife Link, leases and insurance for *all* BHS members on fieldwork.

G.A.D. Haslewood
Chairman, Conservation Committee

MEMBERS' ADVERTISEMENTS

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

- **Wanted:** *Lacerta vivipara, Chalcides chalcides, Dendrobates auratus, Storeria dekayi, Storeria occipitomaculata,* male *Malacochersus fornieri* (exchange for female), *Bombina bombina, Bombina variegata,* any species of salamander.
  For sale: *Lampropeltis getulus floridana* (female?), *Triturus alpestris.*
  Mr R. Davis, 5 Richards Road, Standish, Wigan, WN6 0QU. Tel: Standish 421942.

- **Wanted:** Newts: European Marbled *(Triturus marmoratus),* Caucasian or Banded *(T. vittatus ophryticus).* Toads: Midwife *(Alytes obstetricans),* Yellow-Bellied *(B. variegata)* or Fire Bellied *(B. bombina).* Tree Frogs *(Hyla arborea)* outdoor bred if possible.
  S.R. Hartley, 22 Kingsfield Roa, Oxhey, Watford, Herts., WD1 4PS. Tel: Watford (0923) 20658.

- **Wanted:** Male and female Green Lizards *(Lacerta viridis)* and Ocellated Lizards *(Lacerta lepida)* for outdoor vivaria. Other lacertids considered.
  Marcus Langford, 30 Redhoave Road, Canford Heath, Poole, Dorset, BH17 9DU. Tel: (0202) 602794.

- **Wanted:** Green Lizards *(Lacerta viridis),* Tree Frogs *(Hyla arborea)* and Leopard Geckos *(Eublepharis macularius).*
  P.J. Thorp, Beresford House, South Hill, Rolleston on Dove, Burton on Trent. Tel: (0283) 812456.

- **Wanted:** Spotted Terrapin, *Clemmys guttata,* Muhlenberg's Terrapin, *Clemmys muhlenbergii,* Wood Terrapin, *Clemmys insculpta,* Radiated Tortoise, *Geochelone radiata* (captive bred). Must be legal specimens.
  M.L. Hine, Chelonia Herpetoculture, York Lodge, The Street, Stowlangtoft, Suffolk, IP31 3JW.

- **For Sale:** Two Tegu Lizards, no longer required in collection. Good feeders.
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- **The Pondlife Company:** A pond can enhance the beauty of a secluded corner or become the focal point of your garden whilst providing an object you will find fascinating to watch. With the right ecological balance of plants and animals you will be introduced to the delights and actions of a small, new world. It will also attract other wildlife to keep you amused and interested. Not only will you be able to enjoy the features of a small part of the natural countryside in your own garden, but you will also be playing an important role in the conservation of the pond habitat, since more and more ponds are being destroyed in both our towns and countryside. We offer a cheerful, friendly service with the following facilities: Pond design and construction with adjacent landscaping as required. Pond stocking with our specialist knowledge for the optimum ecological balance of plants and animals. An aftercare service. Consultancy work on existing ponds and their immediate environment. Ponds, waterfalls, fountains, bogs, rockeries, water lillies, fish, frogs, etc. The list is endless, and we can supply all of these. But, more importantly, our specialist knowledge of ponds will provide you with a habitat that not only looks good, but which is ecologically balanced and fascinating to watch.
  Ring us on 01-653 0494 for more information or write to: Philip F. Andrew, BSc (Hons) Biology; Jane C. Carey, BSc (Hons) Zoology, 29 Wedgwood Way, Beulah Hill, Upper Norwood, London, SE19 3ES.

NEW PUBLICATION

The Bacterial Diseases of Reptiles
By Richard Ross, MD, MPH.

A new contribution to the field of reptile husbandry, this text provides current and accurate information on the epidemiology, recognition, control, diagnosis and treatment the bacterial diseases of reptiles. Identification of simple and resistant forms of the common diseases of reptiles in captivity such as oropharyngeal infections ("mouth rot", or canker), respiratory infections, skin diseases and shell diseases are all included. Selection of correct antibiotics, proper dosage schedules for the new aminoglycoside drugs and other new antibiotics, as well as combination therapy are addressed. A section of colour photographs of the diseases discussed is included. Over 130 pages in length, the text is written for the serious herpetologist. A cross index of antibiotics is included for European herpetologists.

The Bacterial Diseases of Reptiles is currently available for $20.00 per copy, surface mail postage included. Please add $3.00 for first class overseas airmail postage. $18.00 per copy to BHS members ordering 10 or more copies.

Orders to: The Institute for Herpetological Research, PO Box 2227, Stanford, California 94305.

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