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BULLETIN

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BRITISH HERPETOLOGICAL SOCIETY

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Correspondence, membership applications, subscription renewals and purchase orders for the Herpetological Journal and British Herpetological Society Bulletin 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.

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 Bulletin is edited and produced by
John Pickett and Simon Townson

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

FRONT COVER

The type of *Coluber elegantissimus*. From the description by Giinther (1878).

See *Addition of* Coluber sinai *to the Herpetofaunal List of Israel with comments on* C. elegantissimus, by Yehudah L. Werner and Naomi Sivan, p.27.

GENERAL LONDON MEETINGS 1991

Meetings are held in the Lecture Theatre of the Linnean Society of London, Burlington House, Piccadilly, London W1, and start at 7.00 pm, ending at 9.00 pm, unless indicated otherwise.

August 31st	*Care and breeding of amphibians and reptiles.* A special Saturday afternoon open meeting organised by T. Thatcher and S. Townson, to be held at **Birkbeck College, Malet Street, London WC1,** from 2.30 to 7.00 pm. There will be the opportunity for the sale and exchange of members' captive-bred stock and commercial displays of books and vivarium equipment.
October 10th	Dr Michael Lambert (BHS Chairman): Some African herpetofauna and the impact of Tsetse control insecticides on lizards in Zimbabwe.
October 26th	This meeting has had to be cancelled. Hopefully Philippe de Vosjoli will speak to the Society in 1992.
November 20th	Mark Day (Gambian Dwarf Crocodile Rescue Project, University of Bristol): Herpetofaunal wading through West Africa.

PROVISIONAL MINUTES OF THE 44TH ANNUAL GENERAL MEETING OF THE BRITISH HERPETOLOGICAL SOCIETY HELD AT 11.00 AM, SATURDAY, MARCH 23RD 1991 IN BIRKBECK COLLEGE LONDON

The meeting was chaired by Dr M. Lambert. Fifty members and thirteen guests signed the attendance sheet. Written apologies were received from Dr T. Halliday, Dr R. Avery and P. Kirkland.

1. **Minutes of the previous AGM** (See *BHS Bulletin* no. 34: 2-4, Winter 1990). These were accepted *nem. con.*

2. **Matters arising**. none.

3. **Treasurer's report and discussion**. Mrs M. Green reported that there was a cash shortage after 1990's expenditure. Printing of the Winter Bulletin had cost 500 more than expected and postage was up 400. Together with an increase in other expenses, the cash loss was therefore the same as in 1989. Prof. G. Haslewood made the point that care should be taken with the kind and length of articles published in the Bulletin, and Mrs Green indicated that colour plates were very expensive, but felt on financial grounds that nonetheless the plate for the cover should be continued. Dr R. Griffiths proposed, seconded by Dr T Beebee, that the accounts be accepted; *nem. con.*

Subscription increase and two-tier system: the rationale for this proposal was outlined on behalf of Council by B. Banks. He pointed out that not all members wished to receive the Journal and so it was felt that the Journal should be an option. The subsciption for those receiving the Bulletin only should not be as high as those receiving both which may help to attract more members. At the same time, to justify the higher subsciption for those wishing to continue with the Journal, it would become quarterly starting in January 1992 (Vol. 7, no 1). The subscription for those receiving the two quarterly publications would increase to 25 and for the Bulletin only 20. The subscription for Corporate Members, whose interest

was primarily in the Journal, would be raised to 40. Prof. Haslewood pointed that an extra 5 to Ordinary Members was ***very*** good value for the Journal, especially as it can also be sold later. Dr C. Harrison pointed out that its later sale to scientists was of dubious value, however, and Mrs A Seabright wondered whether producing four issues of the Journal would be too heavy a cost for the Society. Dr Lambert replied that the relatively small difference in the subscription levels was to encourage members to continue with the Journal, which for Ordinary Members was a less expensive item anyway becasue nearly 90% of its printing costs were covered by Corporate Members' subscriptions. Moreover, there was a general wish within Council for the Journal to become quarterly, since, as pointed out by Dr. Griffiths , this was more normal for a scientific journal and would thus make it more attractive, especially to Corporate Members. Dr Lambert also pointed out that if this was not done in 1991, the next opportunity would not be until 1997. L. Gillett proposed, seconded by R. Needham, that the subscription increase and two-tier system be adopted. *Nem. Con.*.

4. **Rule change** (see the Rules in BHS Bulletin No. 32: 37-40, Autumn 1990). Proposed change:- Under 6. COUNCIL (a) Composition, after " .... six elected or co-opted Ordinary Members", add "Officers shall serve for a period of five years, at the end of which period they may stand for re-election. Notice of Officer elections inviting candidates will be circulated at least 45 days prior to the AGM at which the election is to be held. Rules of election will be as shows in 6(d) below. Chairmen of Committees and Sections, representatives of Regional Branches and Associations, and Specialist groups, will be exempt from this procedure and elected instead by the appropriate Committee or Regional Group.". Adoption of this Rule change was proposed by Dr Beebee and seconded by V. Taylor. *Nem. con.*.

5. **Policy on animals in captivity, trade and legislation**. The case for this policy was presented on behalf of Council by the Legal Officer, P. Curry. P. Haslewood reiterated the strong views felt by the Conservation Committee on this issue, especially in relation to the ethics of depriving wild animals of their liberty, and in fact the Chariman, W. Whitaker, pointed out that he had to give his casting vote for Committee approval. Dr Harrison felt that in the context of scientific pursuit, one needs to be objective rather than emotional, for animals suffered natural constraints in the wild, although he agreed that ethics should be a natural concern of people. Dr Beebee reported that the Policy was strongly supported by the Conservation Committee, with the singular exception of the sentence about ethics that Prof. Haslewood had drawn special attention to.

P. Curry pointed out that there would be a working group to consider the legal and other aspects relating to this policy, making amendments as necessary. V. Taylor proposed that a member of the Education Committee should be included with this working group in connection with the use of animals for educational purposes, especially in schools. W. Whitaker seconded this proposal and 26 voted for, two abstentions, and so the proposal was accepted.

Dr Harrison asked whether the Policy was a Society policy or recommendation. Dr Lambert replied that the Policy reflected the views of Council, although other than refusing membership there was little that the Society could do if an individual wished to flout the laws of the land. P. Curry added that an individual could be investigated if a breach was brought to the attention of Council. Dr Lamber hoped that the Policy would be accepted as an annex to the Rules. P. Curry proposed, seconded by W. Whitaker, that the Policy be adopted; 37 voted for and three against. The Policy was therefore accepted.

6. **New President**. Dr Lambert announed that Prof. John Cloudsley-Thompson, an Honorary Life Member of the Society since 1983 and Vice-President of the First World Congress of Herpetology (Co-Hosted by the Society), had agreed to replace the Earl of Cranbrook as President. A presentation would be made to Lord Cranbrook.

7. **Election of Officers and Members of Council**. Dr Lambert reported that after circulation before the end of 1990 for nominations from the membership (indicating where vacancis needed to be filled), no alternatives to the nominations accepted by Council had subsequently been received and so recommended that the following candidates be elected *en bloc*:-

Chairman	Dr. T.J.C. Beebee
Membership Secretary and Treasurer	Mrs M. Green
Editor, *the Herpetological Journal*	Dr R.A. Griffiths
Librarian	Mr D.R. Bird
Education Officer (Chairman, Education Committee - Junior Section)	Mr C. Fitzsimmons
Co-Editor (1), *BHS Bulletin*	Mr J. Pickett
Co-Editor (2), *BHS Bulletin*	Dr S. Townson
Chairman, Captive Breeding Committee	
Chairman, Conservation Committee	Mr W.J. Whitaker
Chariman, Research Committee	Dr T.R. Halliday
Scottish Group Representative	Mr A.W. Darby
NW England Group Representative	Mr R. Paul
Ordinary Members (total six)	Mr M. O'Shea (1990)
	Mr P. Curry (1990)
	Mr L.G. Billett
	Dr Mary J.S. Swan
	Mr J.J. Gaughan
	Dr M.R.K. Lambert

Election of these candidates was confirmed *nem. con.*

Beside the new Ordinary Members of Council, L. Gillett, Dr Mary Swan and J. Gaughan, Dr Lambert indictaed that he had stepped down as Chairman and become and Ordinary Member of Council. More importantly, Dr Beebee was replacing him as Chairman, and he in his turn was being replaced as Editor of the Journal by Dr Griffiths. Dr Griffiths announced that with the Journal becoming quarterly, he intended to make use of Research Committee members to form an Editorial Board. For their long tenure in their respective posts, Dr Lambert was given a vote of thanks by Prof. Haslewood and V. Taylor, who had also resigned as Education Officer, by C. Fitzsimmons. Dr Lambert included in his reply that one of his small ambitions on taking on the Chairmanship was that the membership of the Society should reach 1000!

8. **Report of Council (circulated herewith) and discussion.** Other than minor typographical errors, Dr Lambert pointed out three corrections:-
- Under Second World Congress of Herpetology, the first line should read "As voted for during 1990 by the Executive Committee of the World ... "
- Under Finances, the line should read " A full report will be given by the Treasurer at the AGM and accounts distributed beforehand".
- Under Membership, "The number of Junior and Corporate members also increased in 1990." should be deleted.

Mrs Green added that under the figures for membership, Prof. and Mrs Haslewood had transferred from Family to UK Honorary Life Membership. P. Curry, seconded by Dr Harrison, proposed that the report be accepted. *Nem. con.*

9. **Report of Education Officer.** V. Taylor as the retiring incumbent read out a report which would be sent to the Bulletin for publication. He pointed out that with the change in subscriptions a charge was now incurred for J. Herps to receive the Bulletin; this would require a change in the Rules. The report was received with acclamation. C Fitzsimmons proposed, seconded by D. Bird, that the report be accepted. *Nem. con.*

10. **Report of the Conservation Committee.** W. Whitaker gave a general outline of activities during the year and particularly praised the voluntary effort of Committee members. He referred to the close interaction with the Herpetological Conservation Trust (HCT), and said that as well as employing Keith Corbett as Rare Species Conservation Officer, two more BHS members were being offered contracts to be Field Officers for the Weald and Dorset.

He then referred to some of the Committee's "high profile" activities, and said that the Committee considered site purchase as being the best means of ensuring site protection and this was one of the main objectives. He detailed the main successes achieved and also gave details of the worst damage to sites by, for example, fire.

Referring to the 1989-90 report to be published in the Bulletin, he highlighted the fact that 500 man-days effort had been spent managing 500 acres of habitat by members, and recorded his thanks to B. Banks who had compiled the report. B. Banks then showed several slides illustrating one of the Dorset sites and some of the management activities, and took the opportunity to publicise the Committee's leaflets.

W. Whitaker continuing referred to the excellent work of the Natterjack Sub-Committee chaired by Dr Beebee which had produced a complete twenty-year site dossier for *Bufo calamita* for every site in the country. Finally he reported that although the Judge in the High Court had dismissed the joint BHS-World Wide Fund for Nature (UK) (WWF) application for a judicial review in the matter of Poole Borough council's decision to allow house building on the Canford Heath SSSI, the Minister, the Rt Hon. Michael Heseltine, had on further advice intervened and rescinded the permission. W. Whitaker concluded by recording his own appreciation of the Committee's efforts during the year. Following acclamation, D. Bird proposed, seconded by Ms S. Stebbings, that the report be accepted. *Nem. con.*

11. **Report of the Captive Breeding Committee.** P. Curry gave a brief account instead of the Chariman, saying that in 1990/91 it had not been very active. The sale of the Committee's publications provided revenue for further projects.

12. **Research Committee.** In the absence of Dr. Halliday, Dr Griffiths reported that a joint meeting had been held with the Zoological society of London in June and that the Committee could act as an editorial board of the Journal.

13. **Any other business.** Prof. Haslewood raised the issue of the large number of fires started on heathland in Dorset that coincided with the school holidays and enquired whether the Education Committee could assist in this matter. C Fitzsimmons, who is based in Dorset, made a note of the problem.

The business of the AGM concluded at 12.45 am and immediately led on to the next item on the programme, a herpetological quiz organized by Richard Griffiths.

EDUCATION OFFICER'S REPORT FOR YEAR ENDING MARCH 1991

For the Education Committee the last year has been marked by some successes, some failures and some major changes.

The successes include the running of a very successful J. Herp Camp in Dorset and the continued publication of the Junior Newsletter. Plans for Camp 91 in Cumbria are also well in hand. I am also happy to be able to report that we are still solvent as can be seen from our annual financial statement. Our auditor passed very complimentary remarks on the record keeping system devised by Janet Pracy which made auditing the books comparatively simple. A copy of our financial staement follows this report.

Unfortunately, I must report that for the first time in ten years our number of Junior members dropped during the year. This was due to both a greater than normal proportion of juniors reaching their 17th Birthday during the year and, it must be admitted, to a temporary period of problems caused by my not being able to cope with an increasing workload which resulted in a lowering of our overall efficiency and standard of service. I am pleased to report that as a result of our "cabinet reshuffle" this trend is now reversed and that junior membership is slowly recovering although th number of J. Herps is still only about 50% of last years total.

At present the Education Committee does not have an "exhibitionist", which means that we have been unable to commit ourselves to our usual full summer programme of events at public shows etc. Another activity to which we were unable to commit ourselves was the annual New Years Childrens event at London Zoo; however we have retained our contact with the Zoo Education Department and have indicated that we are still interested in organising similar events in future years.

At the last AGM I gave a year's notice that I could no longer carry on as Education Officer and I am very pleased to report that the first major change was a reshuffle of posts within

the Education Committee with Colin Fitzsimmons taking over the reins as Education Officer subject to his election at the AGM. Unfortunately during the year Janet Pracy gave notice that she would need to stand down as Administrative Secretary and in the reshuffle I have taken over from her. The job of Newsletter Editor has moved from me to John Baker and we have used the change of editor and our 10th Anniversary as an excuse to change the size of the Newsletter from A4 to that of the Bulletin and to alter the frequency to a quarterly rather than termly publication. The headaches caused by trying to co-ordinate the distribution of a termly Newsletter and a quarterly Bulletin are therefore now history; all we need to do is to ensure that the publication of the Newsletter coincides with that of the Bulletin.

The second major change is that we have been forced to introduce a two-tier system of Junior Membership entitlement in order to reduce to the Society the cost of Bulletin provision to Juniors. Basic Junior membership remains at £5 per year but does not include provision of the Bulletin. Bulletin membership is £10 a year, the extra £5 per member being forwarded by me direct to Monica Green for the main BHS account. With Bulletins costing about £1.75 per copy to produce it was obvious that we would come under pressure from Council to raise Junior subscriptions but it was the unanimous opinion of the Education Committee that we should retain a £5 option and if necessary "cut our coat according to our cloth". The new two-tier system is not yet fully implemented since some of the juniors are still covered by subscriptions that were paid before the new system came in and so are still entitled to free Bulletins.

A year ago I had serious worries about how things were going but in the past year I have been impressed by the way that all of the Education Committee have rallied round and I am once more confident that the future is rosy and that under the dynamic leadership of Colin Fitzsimmons many more constructive changes will take place over the next ten years.

Members of the Education Committee at present are Colin Fiztsimmons, Vic Taylor, John Baker, Don Freeman, Janet Potter, Paul Edgar, Kath Draper and Jan Clemons. Any members wishing to help with the work of the committee are invited to contact Colin Fitzsimmons at 45 Sycamore Close, Creekmore, Poole, Dorset BH17 7UH Tel. 0202 692378.

BHS POLICY ON ANIMALS IN CAPTIVITY, TRADE AND LEGISLATION

The British Herpetological Society is unequivocal in its support of the law, and illegal activities concerning the capture, trade or keeping of amphibians or reptiles will normally lead to expulsion from the Society. Conviction of any offence relating to herpetology must be declared on application for membership, and such offences can constitute just cause for denial of membership. If situations arise in which BHS disagrees with existing or proposed legislation, changes will be pursued by lobbying in the normal way.

(1) Keeping captive specimens in private and public collections

The ethics of keeping animals in captivity should be the concern of everyone. BHS members who keep captive animals should comply with the law and observe the following provisos:

(a) Inexperienced members are dicouraged from keeping species with limited prospects in captivity, and BHS will prepare, circulate and update regularly a list of such species, this list will also be circulated to dealers with the intention of reducing or eliminating trade in these animals.
(b) Every effort will be made to breed rare and endangered species (CITES Appendix I) in captivity under licence, thus minimising abstraction from wild populations.
c) In keeping any animals certain high standards of care should be observed.
d) Members are encouraged to use animals in their possession for educational, conservation or scientific purposes wherever this is appropriate.
e) The catching of wild reptiles and amphibians should only be carried out with permission of the landowner where this is required.
f) Members should be encouraged to keep captive-bred animals as far as possible.

The BHS is not a trading organisation. As far as trade is concerned the BHS role is one of interested observation and advocation of codes of practice and principles. The BHS supports

sustained utilization of animal populations providing it is in accordance with the World Conservation Strategy, as this involves habitat management and investment as conservation tools. The Society therefore recommends that trade should focus on captive-bred stock and/or animals obtained as part of a sustainable yield. The Society will protest at illegal and inhumane practices wherever they are found.

(3) Farming and ranching of reptiles and amphibians

BHS policy on farming and ranching of animals to provide livestock or animal products follows that laid down by CITES. Providing that (i) CITES recommendations are adhered to, and (ii) no cruelty or illegality is involved, the BHS supports activities of this kind.

(4) Legislation

BHS contributions to advice given to government and other offical bodies will be decided by a Working Group comprising members of the conservation, captive-breeding and research committees.

(5) Action

(a) A code of practice, including a list of animals with limited prospects in captivity, will be prepared, published in the *Bulletin* and circualted to all applicants for membership together with this policy statement.

b) The Legal Officer will ensure that BHS views and policies are disseminated to the appropriate bodies, and actively advocated as circumstances dictate.

FREE INFORMATION LEAFLETS FOR BHS MEMBERS

Members are reminded that the society has published a number of leaflets which are available free to members who send a LARGE stamped-addressed envelope to Geoff Haslewood, 28 Old Fort Road, Shoreham-by-Sea, Sussex, BN4 5RJ (Please state clearly which leaflet(s) you require).

Available titles are:

Garden ponds as amphibian sanctuaries : describes how to encourage native amphibians into your garden. Illustrated with B/W photos.

Surveying for amphibians : describes how to design and carry out a local survey of frogs, toads and newts. Illustrated with B/W photos.

Save our reptiles : A new glossy leaflet which describes how to look for, identify and record snakes and lizards in Britain. Illustrated by B/W and colour photos.

THE STATUS OF WIDESPREAD AMPHIBIANS AND REPTILES IN BRITAIN

Since the early 1980s, the Nature Conservancy Council has awarded a number of research contracts to Leicester Polytechnic to provide information on our native herp species. In 1990, the Polytechnic was contracted to undertake an enquiry on the nine widespread species of amphibians and reptiles. The aims were to determine their status in 1990, and how and why status changed in the 1980s. The enquiry was undertaken by collating information provided by herpetologists from all over Britain.

The Polytechnic's contract report has been edited to provide a straightforward description of the enquiry and its results, which has ben published as volume 131 in NCC's Contract Survey series. Contributors to the enquiry have already received a copy of this volume. BHS members can receive a copy by sending a self-addressed A4 size envelope with 38p of stamps to Dr A S Cooke, NCCE, Northminster House, Peterborough PE1 1UA.

CARAPAX CENTRE VOLUNTEER NATURE CAMP IN TUSCANY (ITALY) 1991

An appeal is made for volunteers experienced in general conservation to work during 1991 towards the conservation of tortoises and turtles in the Carapax Centre Nature Camp, Massa Marittima (Tuscany), Italy. CNSRT (Centro delle Tartarughe) CARAPAX is the national centre for conservation and scientific resarch on tortoises and turtles in Italy. The programmes cover the period April to October 1991. Volunteers are required for a minimum of two weeks to carry out three kinds of work:-

- general management of the CARAPAX Centre
- participation in public awareness programmes
- contribute to the research work wether in the centre or in the field

Volunteers must be over 18 and should have health/medical insurance. They will be trained and supervised in small groups by CARAPAX field leaders cooperating witht he Carapax Centre, RANA Group and other nature conservation societies and local auhtorities. Preference will be given to candidates with experience and linguistic skills. Half of the volunteers will be Italian; half of other nationalities. Volunteers will work in groups of mixed nationalities.

CARAPAX is a non-profit making organization (equivalent in Britain to a Charity) and depends on donations and capital support from the European Community. Remuneration cannot be provided and volunteers will also have to provide theier own travel expenses. Volunteers will have to contribute 15,000 Italian lire per day (approximately £7) towards lodging. They will be accomodated in small chalets, separate for men and women, with simple sanitation, one closed shower cabin and four open showers, and a camp kitchen type LPG. Volunteers must be prepared to live a communal life style.

Volunteers will be expected to work in groups 6 to 7 hours per day, including kitchen work. there will be 6 working days per week and a day off (with group agreement, preferably Monday when the Centre is closed). There will be the opportunity on that day for field or cultural excursions, and visits can be made to the coast or the Accesa Lake for swimming and other recreation. Although work preferences will be taken into account wherever possible, volunteers may have to respond to demanding work and to emergency situations (when, for example, large numbers of anmals arrive at the Centre confiscated by the Italian Customs or from burning in forest fires and other injuries) and changes in work schedule may be required. Priority will always be given to the health and urgent needs of the animals for which the Carapax Centre is responsible!

Those interested should request an application form, preferably by Fax (0566/90.35.30) or telephone (0566/91.54.53) - Italian postal service can be very slow, from CNSRT CARAPAX Centre, C.P. 34, 158024 Massa Marittima (Grosseto), Italy. They should expect a reply within 21 days.

FOSSIL HISTORY OF THE GRASS SNAKE (NATRIX NATRIX) WITH EMPHASIS ON THE BRITISH FOSSIL RECORD

J. ALAN HOLMAN

Michigan State University Museum, East Lansing, Michigan, 48824-1045, U.S.A.

INTRODUCTION

Fossils of the Grass Snake, *Natrix natrix* (Linnaeus), have been reported from more European localities than any other snake (Szyndlar, 1984). They are first known from the uppermost Miocene of Polgardi, Hungary and occur in a few late Pliocene and numerous Pleistocene localities (Szyndlar, 1984). All of the fossil localities where this species has been found occur within its present range.

Fossil *Natrix natrix* have usually been identified on the basis of isolated vertebrae. Trunk vertebrae are often specifically diagnostic (Auffenberg, 1963; Holman, 1979), but cervical and caudal vertebrae pose specific taxonomic problems and are usually not utilized in fossil studies.

Natrix natrix has been identified on the basis of vertebrae (mainly trunk vertebrae) and cranial bones such as frontals, parietals, basiparasphenoids, basioccipitals, quadrates, maxillae, and dentaries. Ribs are not usually considered to be diagnostic for the identification of genera and species of fossil snakes. The present paper will address (1) criteria for the identification of fossil *Natrix natrix* on the basis of isolated trunk vertebrae; (2) the general fossil history of *Natrix natrix* in continental Europe; and (3) a more detailed discussion of the fossil record of the Grass Snake in Britain.

IDENTIFICATION OF FOSSIL *NATRIX NATRIX*

Entire fossil snake skeletons or even skulls are practically non-existent, as the common elements that are usually excavated are vertebrae and broken ribs. The ratio of fossil snake vertebrae to cranial elements is often more than one hundred to one; and most of the cranial elements tend to be fragmentary.

As previously stated, trunk vertebrae are the most reliable ones for identification purposes. Cervical vertebrae of snakes (Fig. 1a) may be distinguished from trunk vertebrae (Fig. 1c) on the basis of being thinner-walled, with longer dorsal and ventral processes, and with proportionally much larger neural canals. Most caudal vertebrae (Fi. 1b) of snakes may be distinguished from trunk verterbrae (Fig. 1c) on the basis of having extra anterior vertebral processes called lymphapophyses.

The trunk vertebrae of *Natrix natrix* (Fig. 1c) may be easily distinguished from those of the European colubrine genera (ie *Coluber, Coronella, Elaphe*) on the basis of having a long ventral hypapophysis, a structure that is lacking in these colubrine genera (Fig. 1d). Trunk vertebrae of Viperidae (Adders) (Fig. 1f) also have hypapophyses; but vertebrae of *Natrix natrix* may be distinguished from the Viperidae in having a more rounded neural arch (as seen in posterior view); the anterior and posterior borders of the neural spine more undercut (as seen in lateral view); and the hypapophysis shorter, less gracile, and less distally pointed (compare Fig. 1c with Fig. 1f).

This leaves only comparisons with the other two *Natrix* species, *Natrix maura* and *N. tessellata.* Syndlar (1984) has provided criteria for distinguishing trunk vertebrae of *Natrix natrix* from these species. *Natrix natrix* tends to have its hypapophysis rounded distally, and its parapophyseal process relatively massive (Fig. 1c). *Natrix maura* and *N. tessellata* tend to have the hypapophyses pointed distally and the parapophyseal process more gracile (Fig. 1e).

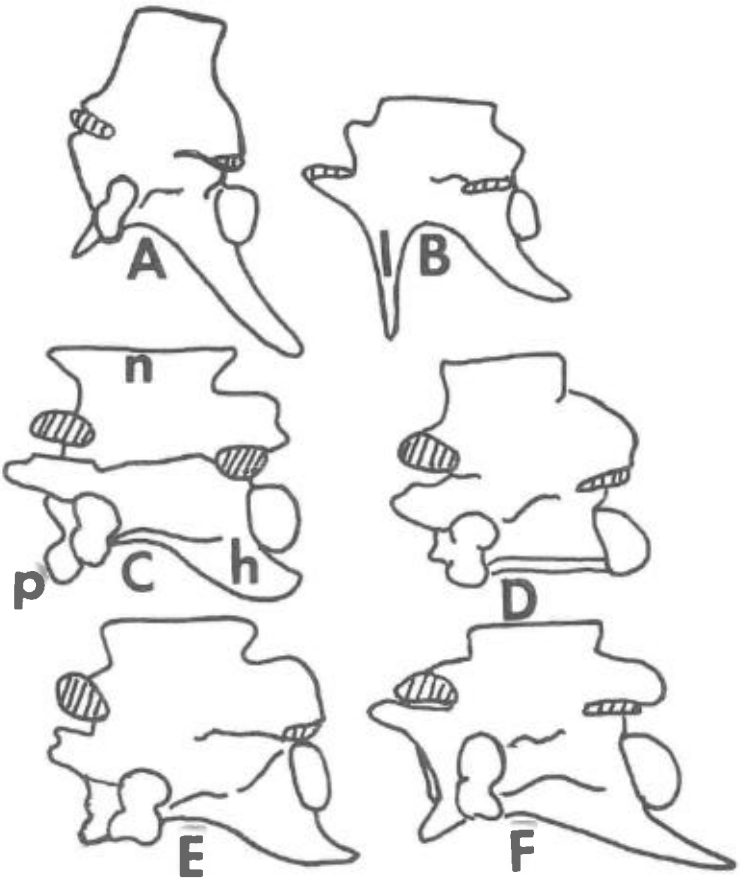

Figure 1. Outline drawings of various snake vertebrae. Capital letters depicting individual vertebrae: A, generalised snake cervical vertebra; B, generalised snake caudal vertebra; C, trunk vertebra of *Natrix natrix*; D, trunk vertebra of *Elaphe longissima*; E, trunk vertebra of *Natrix maura*; F, trunk vertebra of *Vipera berus*. Small letters depicting structures on individual vertebrae: h, hypapophysis; l, lymphapophysis; p, parapophyseal process.

GENERAL FOSSIL HISTORY OF *NATRIX NATRIX* IN CONTINENTAL EUROPE

The following section is arranged chronologically into Miocene, Pliocene, and Pleistocene sections.

Miocene - the earliest record of *Natrix natrix* is from the uppermost Miocene of Polgardi, Hungary (authors cited in Szyndlar, 1984, pp. 50 and 119), but the identification was made on the basis of parietals only. I would feel more comfortable with this record if vertebral remains had been studied as well, for the parietal is somewhat individually variable in natricine snakes.

Natrix tessellata was also reported from the same site (same authors cited in Szyndlar, 1984, pp. 50 and 119) on the basis of basiparasphenoid and compound bones only, both of which are also somewhat individually variable in nafriciues. I would consider the records of both *Natrix natrix* and *N. tessellata* slightly questionable on the basis of individual variability of the bones utilized and on the basis that neither author cited by Szyndlar (1984) figured or gave a diagnostic description of the bones.

Pliocene - the Pliocene record of the Grass Snake is confined to Central Europe. *Natrix natrix* was reported from the Upper Pliocene of Deutsch Altenburg, Austria, by Mais and Rabeder (1977), but these authors did not describe or figure the fossils. Other authors have recorded *Natrix natrix* from the Upper Pliocene of Hungary and Rumania (specific sites are given in Szyndlar, 1984).

It is noteworthy that in the most comprehensive study of Miocene through Pleistocene snakes that has ever been done in a restricted area of Europe (Poland: Szyndlar, 1984), that all of the pre-Pleistocene records of *Natrix* were of extinct species. This might make one curious about the above records of *Natrix natrix* from the Upper Miocene and Pliocene.

Pleistocene - Pleistocene records of *Natrix natrix* are abundant in continental Europe and are usually based on relatively complete individual elements, including many vertebrae and some cranial elements.

The most comprehensive study of Pleistocene fossil Grass Snakes has been done in Poland where 12 of 13 localities studied for herpetological fossils have yielded *Natrix natrix* (Szyndlar, 1984). A total of about 108,700 vertebrae were identified as Grass Snake, including 1068,500 from one locality! The next most abundant bone that was identified was the dentary where 246 were recorded. The ratio of vertebrae to other skeletal elements identified in the Pleistocene of Poland was 179 to 1. Lower, Middle and Upper Pleistocene sites contained Grass Snake fossils.

Countries other than Britain and Poland where *Natrix natrix* has been identified as a Pleistocene fossil include Austria, France, Germany, Hungary, and Rumania where Lower and Middle Pleistocene records of Grass Snakes occur; and Bulgaria and Germany where Upper Pleistocene fossils of Grass Snake occur. A list of locality names and authors for these localities are given in Szyndlar (1984, pp. 120-121).

FOSSIL HISTORY OF *NATRIX NATRIX* IN BRITAIN

The fossil record of *Natrix natrix* in Britain is thus far restricted to the Middle and Upper Pleistocene. All Grass Snake records are from interglacial deposits. In fact, the only cold-stage deposit herptiles known are *Rana* sp., *Bufo* sp., *Rana temporaria*, and *Lacerta vivipara* (Holman, 1990).

British Pleistocene Stages with *Natrix natrix* Fossils

UPPER PLEISTOCENE

Stage	Beginning at:	Estimated Duration
FLANDRIAN POSTGLACIAL	10,000 BP	10,000 yrs.
IPSWICHIAN INTERGLACIAL	120,000 BP (est)	10,000 yrs.

MIDDLE PLEISTOCENE

Stage	Beginning at:	Estimated Duration
HOXNIAN INTERGLACIAL	200-250,000 BP	10,000 yrs. (?)
CROMERIAN INTERGLACIAL	350-500,000 BP	10,000 yrs. (?)

The following accounts are based only on fossils that I have been able to identify myself or that I have been able to re-examine from previous studies. This includes almost all of the Quarternary snake fossils known from Britain.

Middle Pleistocene Sites with *Natrix natrix*

Natrix natrix is known from both of the Middle Pleistocene interglacial stages, the Cromerian and the Hoxnian stages.

Cromerian West Runton Freshwater Bed, Norfolk - Fifty-four Grass Snake vertebrae were recorded from the West Runton site (Holman et al., 1988), and one vertebra was identified from this site by Holman (1989). The scene at this site in the Pleistocene was a slow-flowing river, rich in aquatic vegetation and fringed by fen, as is found in a typical English lowland river today (Holman et al., 1988). The exotic species *Rana arvalis* and *Rana "esculenta"* or *ridibunda* occurred with Grass Snake at this locality.

Hosnian Ingress Vale Site, Swanscombe, Kent - Three Grass Snake vertebrae were identified from this site by Holman (1987a). The fossiliferous sediments of this site consisted of a series of fluviatile gravels, sands, and silts that occupied a broad channel cut by a Pleistocene River Thames (Stuart, 1982). *Natrix natrix* occurred with the exotic species *Emys orbicularis* at this site (Holman, 1987a).

Hoxnian Cudmore Grove Site, Mersea Island, Essex - Eighty-four Grass Snake vertebrae were recorded from this lcoality by Holman et al. (1990). The fossils at this site originated mainly from a detritus mud deposited under lower-energy aquatic conditions. These muds contained mainly freshwater mollusca as well as the herpetological fossils. Several exotic taxa (*Hyla* sp., *Rana arvalis, R. "esculenta"* or *ridibunda, R. lessonae, Emys orbicularis*, and *Elaphe longissima*) occurred with *Natrix natrix* at this important herpetological site.

Hoxnian (? or Ipswichian) Greenlands Pit Site, Purfleet, Essex. - Six vertebrae were reported from this locality as *Natrix* cf. *Natrix natrix* by Holman and Clayden (1988). The bones came from a shell seam in a fluvial deposit that also contained several species of fishes. The Grass Snake occurred with the exotic species *Rana arvalis* at this locality (Holman and Clayden, 1988).

Late Pleistocene Sites with *Natrix natrix*

Natrix natrix is known from both the Ipswichian (last interglacial) and Flandrian (postglacial) stages.

Ipswichian Swanton Morley Site, Norfolk - Four Grass Snake vertebrae were identified from the Swanton Morley Site by Holman (1987b). The fossils and the sediments of this locality indicate a back channel of a meandering river. The exotic species *Rana arvalis* and *Emys orbicularis* occurred with Grass Snake at this site (Holman, 1987b).

Ipswichian Itteringham Gravel Pit Sit, Norfolk - Sixten *Natrix natrix* vertebrae were identified from the Itteringham Site (Hallock et al., 1990). The fossils came from detrital muds and organic sands that indicate deposition in a low energy aquatic situation. The Grass Snake occurred with the exotic taxa *Hyla* sp., *Rana "esculenta"* or *ridibunda*, and *Emys orbicularis* at the Itteringham locality.

Ipswichian Shropham Gravel Pit Site, Norfolk - Sixteen Grass Snake vertebrae were recovered from the Shropham locality (Holman and Clayden, 1990). *Natrix natrix* fossils of this site came from a layer of detritus mud, indicating that the bones were deposited in a low energy aquatic situation. The exotic species *Rana arvalis, Rana* (exotic "water frog" taxon), *Emys orbicularis*, and *Natrix cf. Natrix maura* or *tessellata* occurred with Grass Snake at this locality.

Flandrian Ightham Fissures Site, Sevenoaks Area, Kent - Two hundred seventy-seven vertebrae, five dentaries and 16 other various bones were identified at this site (Holman, 1985) which could represent a time span between a few hundred years ago to about 8,500 years ago. The bones from this site were mainly collected around the turn of the Century. Of interest, is the occurrence of two presently endangered species (*Bufo calamita*, and *Coronella austriaca*) with Grass Snake at this locality relatively near London (Holman, 1985).

Flandrian Dog Holes Site, Warton, Lancashire - One Grass Snake vertebra was identified from a collection of bones donated to the Natural History Museum, London, in 1910 from the Dog Holes Site. It appears that these bones could be as young as only a few hundred

years old. Ninety % of the herptile bones identified from the Dog Holes were *Bufo bufo* and *Rana temporaria*, and the only other herptile remains represented *Anguis fragilis* (Holman, 1987a).

Flandrian Happaway Cave Site, Torquay, Devon - One Grass Snake vertebra was identified from this cave site (Holman, 1987a). These bones came from a collection donated to the Natural History Museum, London, in 1896, and could also represent material only a few hundred years old. The only other herptiles identified from this assemblage were *Bufo bufo* and *Rana temporaria* (Holman, 1987a).

SUMMARY

Grass Snakes have been reported from more Continental European Fossil localities than any other snake and the same is true for Britain where *Natrix natrix* has been reported from 10 localities. Three British Grass Snake sites are from the middle Pleistocene (one Cromerian and two Hoxnian); one is from a "Hoxnian or Ipswichian" site; and six are from the late Pleistocene (three Ipswichian and one Flandrian).

The next most common fossil snake in Britain is *Vipera berus* which has been reported from one middle Pleistocene (Cromerian) and four late Pleistocene (two Ipswichian and one Flandrian) sites. The Smooth Snake (*Coronella austriaca*) has been reported only once from Britain as a fossil, and that was from the Flandrian Ightham Fissure Site near Sevenoaks, Kent.

Characters on individual trunk vertebrae allow one to distinguish fossil *Natrix natrix* from other European snake genera and from *Natrix maura* and *N. tessellata*. But it is quite difficult or perhaps impossible to distinguish the latter two species on the basis of vertebral characters. It has been suggested that vertebrae from one Hoxnian (Cudmore Grove, Essex) and one Ipswichian (Shropham, Norfolk) site represent either *Natrix maura* or *N. tessellata*. A total of 455 vertebrae and 21 other various bones of *Natrix natrix* have been reported from the British Pleistocene sites listed here.

All of the fossil localities of *Natrix natrix* lie within the present range of the species. *Natrix natrix* is first recorded from the uppermost Miocene of Hungary, but the identification was made on the basis of parietal bones which may be individually variable. Fossil Grass Snakes have been reported from Upper Pliocene localities in Austria, Hungary, and Rumania and from Pleistocene sites in Austria, Bulgaria, France, Germany, Hungary and Rumania. In the most comprehensive study of *Natrix* fossils that has ever been done in one area (Poland: Szyndlar, 1984), only extinct species of *Natrix* were found in pre-Pleistocene deposits. *Natrix natrix*, however, was very abundant in the Pleistocene of Poland.

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REFERENCES

Auffenberg, W. (1963). The fossil snakes of Florida. Tulane Studies in Zoology, **10**, 131-216.

Hallock, L.A., Holman, J.A. and Warren, M.R. (1990). Herpetofauna of the Ipswichian interglacial beds (late Pleistocene) of the Itteringham Gravel Pit, Norfolk, England. *Journal of Herpetology* **24**, 33-39.

Holman, J.A. (1979). A review of North American Tertiary snakes. *Publications of the museum, Michigan State University, Paleontological Series* **1**, 200-260.

Holman, J.A. (1985). Herpetofauna of the late Pleistocene fissures near Igtham, Kent. *Herpetological Journal* **1**, 26-32.

Holman, J.A. (1987a). Additional records of British Pleistocene amphibians and reptiles. *British Herpetological Society Bulletin* **19**, 18-20.

Holman, J.A. (1987b). Herpetofauna of the Swanton Morley site (Pleistocene: Ipswichian), Norfolk, *Herptological Journal*, **1**, 199-210.

Holman, J.A. (1989). Additional herpetological records from the Middle Pleistocene (Cromerian interglacial) freshwater bed, West Runton, Norfolk. *British Herpetological Society Bulletin* **27**, 9-12.

Holman, J.A. (1990). New records and comments on Britigh cold-stage amphibians and reptiles. *British Herpetological Society Bulletin* **34**, 39-41.

Holman, J.A. and Clayden, J.D. (1988). Pleistocene interglacial herpetofauna of the Greenlands Pit, Purfleet, Essex. *British Herpetological Society Bulletin* **26**, 26-27.

Holman, J.A. and Clayden, J.D. (1990). A late Pleistocene interglacial herpetofauna near Shropham, Norfolk. *British Herpetological Society Bulletin* **31**, 31-35.

Holman, J.A., Clayden, J.D. and Stuart, A.J. (1988). Herpetofauna of the West Runton Freshwater Bed (Middle Pleistocene:Cromerian Interglacial), West Runton, Norfolk. *Bulletin of the Geological Society of Norfolk* **38**, 1-16.

Holman, J.A., Stuart, A.J. and Clayden, J.D. (1990). A middle Pleistocene herpetofauna from Cudmore Grove, Essex, England, and is paleogeographical and paleoclimatic implications. *Journal of Vertebrate Paleontology* **10**, 86-94.

Mais, K. and Rabeden, G. (1977). Eine weitere pliozane Hohlenfauna aus dem Steinbruck Hollitzer bei Bad Deutsch-Altenburg (Niederosterreich). *Die Hohle* **28**, 84-86.

Stuart, A.J. (1982). Pleistocene Vertebrates in the British Isles. Longman, London and New York.

Szyndlar, Z. (1984). Fossil snakes from Poland. Acta Zoologica *Cracviensa* **28**, 1-156.

A REVIEW OF THE REPTILES AND AMPHIBIANS OT TURKEY, INCLUDING A LITERATURE SURVEY AND SPECIES CHECKLIST

PETER DASZAK

Division of Microbiology & Genetics, School of Science, Polytechnic of East London (P.E.L.), Romford Road, London E15

SHAUN CAWTHRAW

Central Veterinary Labs., M.A.F.F., New Haw, Surrey

INTRODUCTION

Turkey is dominated by the central Anatolian plateau, which merges with the mountains of Kurdistan (bordering Iran and Iraq) in the South-east, and the Caucasus in the North-east. This vast area of steppe/semi-desert, supports a mixture of European and Middle-eastern reptiles. Despite this diversity, most of the recent articles on Turkish herpetofauna have been concerned with the south west Mediterranean coast, presumably due to a vast increase in tourism over the last few years.

We visited the south west coast of Turkey in July 1988, and travelled more extensively during September and October 1989. Reptiles and amphibians were collected from three areas (see Fig. 1), as part of a programme of research into their parasties being conducted at PEL. Animals were re-released the day after capture.

SITE REPORTS AND SPECIES ACCOUNTS

Area 1: Central Turkey (Anatolia) Cappadocia; Nevesehir, Avonos & Kayseri.

The areas we visited are fairly typical of central Turkey (Anatolia), average elevation is c.1000M (3000 ft.), and weather conditions extreme. Summers are hot and dry (about 20°C from May-Sept.), and winters can be harsh (below 10°C November-April). Much of the Anatolian plateau is cultivated, with large, seemingly endless fields of wheat. The natural vegetation is steppe, with extensive semi-desert areas (see plate 1) and true deserts (around Lake Konya).

Ophisops elegans (Snake-eyed Lizard) was exceptionally common on the dry, open steppe land to the South of Avanos. *Lacerta parva* was found in some numbers running through the very hot steppe at Ihlara. We first noticed this species by the roadside seemingly attracted by the insects crawling over a dead dog – picking up this crusty specimen revealed over 20 lizards seeking sanctuary from the midday sun! (see plate 2) *Lacerta parva* is an open steppe lizard – and co-exists with *Ophisops elegans* in many regions.

Collecting at the Ihlara Valley, a rocky, scrub-covered valley cutting through almost semi-desert (Plate 3), produced some interesting species. *Coluber ravergieri* (Ravergier's Whip Snake) was found hiding among rocks at the top of the valley. This snake is locally present in Turkey, and has an Eastern European through Turkish distribution. Moving downstream, *Rana ridibunda* (Marsh Frog) was abundant along the banks of the river. *Coluber najadum* (Dahl's whip snake) was found in rocky areas at the bottom of the valley. The specimen we caught was c 70cm long, and had a distinct blue-tinge to the head and neck. *Agama stellio* was common in the Ihlara region, usually on rocks and often close to human habitation. The males were very noticeable, displaying on large boulders, and staying within a small territory. *A. stellio* proved a difficult lizard to catch, however, making for cover when approached, and jamming fast in rock crevices. Large males tended to be very birghtly coloured in Turkey, with yellow/orange and black stripes, and had the ability to change colour slightly. Small lacertids were seen on the valley walls and larger rocks. We thought these were *Podarcis muralis* but *Lacerta danfordi* is more likely for this region. Unfortunately, we were unable to catch these or see them close up and they remain unidentified.

Figure 1. Map of the region showing the 3 collecting sites : 1. Cappadocia; 2. Mt Ararat; 3. Patara & Dalyan.

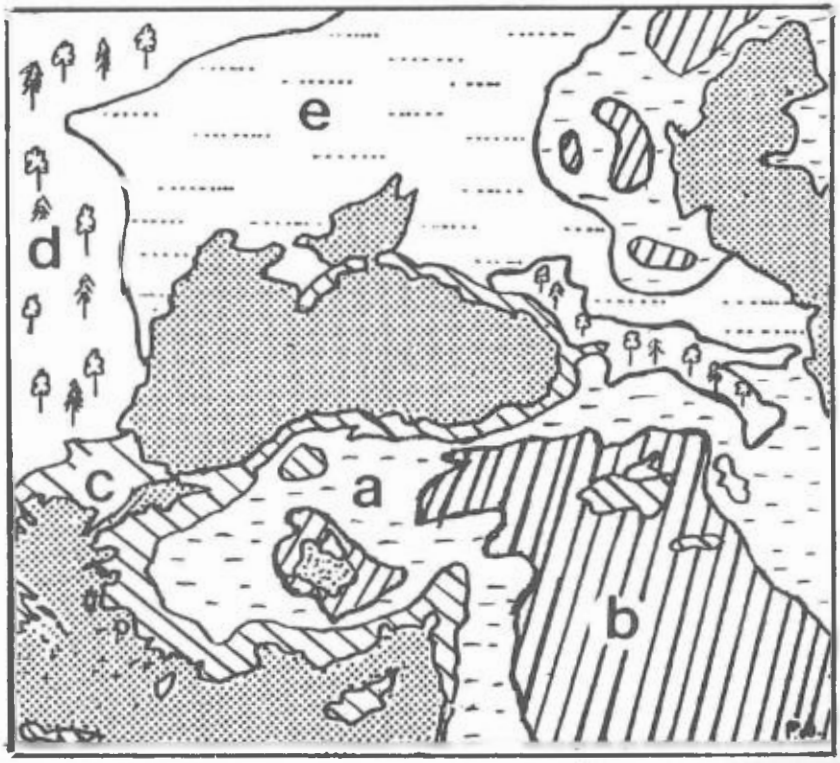

Figure 2. Natural Vegetation : a. steppe, b. salt steppe and semi-desert; c. Mediterranean evergreen (stone pine, myrtle, olive etc.); d. mixed broad-leaved and coniferous woodland; e. grassland.

Plate 1. Dry, rocky steppland, South of Avanos, Capadocia (Area 1), habitat for *Ophisops elegans.*

Plate 2. This carcass provided a bizarre shelter for *Lacerta parva* (area 1).

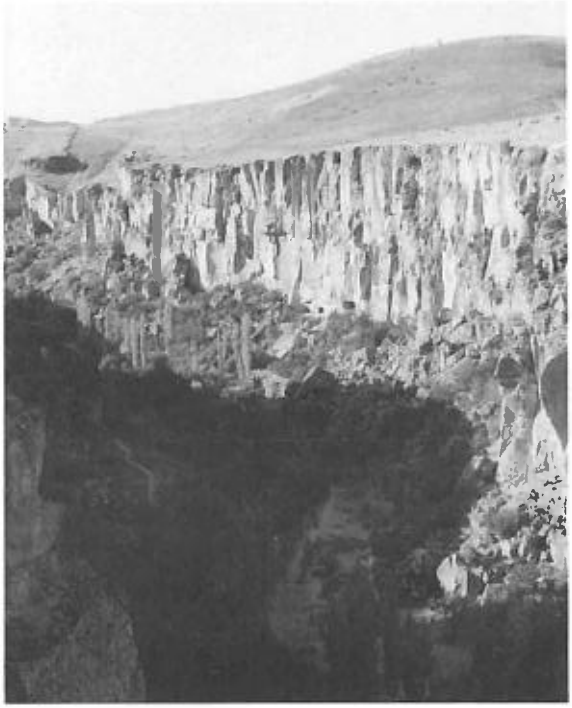

Plate 3. The Ihlara Valley (area 1), habitat for *Coluber ravergieri, Rana ridibunda, Coluber najadum* and *Agama stellio.*

Area 2: Eastern Turkey: Dogubayazit & Mount. Ararat.

Here, the average elevation is slightly higher than the central Turkish plateau – regularly passing the 2000M (6000 ft.) mark. The vegetation is typically Middle-eastern (Note that the latitude is the same as Baghdad), with steppe and semi desert predominant. Large areas of salt-steppe form in Summer from seasonal lakes and rivers. Due to the high elevation, and proximity to the mountains of Armenia and Kurdistan, the winters are long and harsh (below 10°C October-May, snow-bound December-March), and the summers hot, dry and short. (Above 20°C late June-September). These conditions put severe constraints on the reptile fauna.

We arrived at Dogubayazit in late September, just before autumn rains began in earnest. Short spells of very hot sunshine alternated with hard rain and hail storms. These conditions narrowed the scope of reptile species to the more hardy. We saw only 2 species during our stay, both Agamids and both interesting for their Asiatic rather than European derivation. Two kilometers to the east of Dogubayazit, we found *Phrynocephalus helioscopus* (Sun Watcher or Toad-headed Agamid). This small (Adults 10-20 cm incl. tail) agamid has rough, tuberculated dorsal scales, a sandy brown dorsal base colour, with regular chocolate-brown patches. They were easily identified by their rather squat appearance and flattish snouts similar to *Uromastyx hardwickii* (see Plate 4). Two characteristic orange blotches, bordered with blue were found on the Nape of most individuals, and some had large patches of pale orange/yellow on their ventral surface. They also had noticeably elongated claws on their forefeet – this is an adaptation for burrowing to avoid extremes of temperature.

Despite extensive searching, *P. helioscopus* could only be found on the alluvial plains surrounding Mt. Ararat (see Plate 5). These expanses of hard, sun-baked earth were interspersed with dry river beds, which were favoured by the lizards at Dogubayazit. *P. helioscopus* are burrowers, that aestivate through the hottest part of the summer, and hibernate during winter. The active season is rather short, with eggs laid in June, and a possible second clutch in August. (Clark & Clark 1973). We found very young lizards (Length 2 cm S-V) during the first week in

Plate 4. *Phrynocephalus helioscopus*; in Turkey, confined to the plains at the base of Mt. Ararat, (area 2).

October, suggesting that a second clutch does occur. Catching this agamid was easy; we simply chased them away from their burrows and they became rapidly exhausted. On dull days we dug them out of their rather shallow (c.10m deep) burrows). In Turkey, these lizards are undoubtedly a speciality of the Mt. Ararat region. Clark & Clark (1973) found them only at Igdir and Dogubayazit; both are villages at the foot of Ararat. This species is widespread around the Caspian sea, Iran and Arghanistan, and further spread westward is probably prevented by the higher mountain ranges encircling Ararat.

Agama caucasica (Northern Rock Agama), another predominantly eastern species was found close to the *P. helioscopus* site. *A. caucasica* again has a very specific habitat preference in Turkey, being found only on the foothills of Ararat. It can be found on the lower slopes (c 1500M, 45000 ft.) of the small mountains 3km or so east of Dogubayazit (see Plate 5). These are very sparsely vegetated, rocky and dry, with thorny scrub and spurge giving cover for the lizards. *A. caucasica* is easily caught, being far less wary than *A. stellio*, and hides in scrub, rather than rock crevices, when approached. We saw only young specimens (length c.12 cm incl. tail) though the adults may reach 35cm. The juvenile lizards were dark brown with orange stripes on the body and tail. A distinguishing feature is their lack of keeled dorsal scales, and a prominant tympanum. This species is again restricted in Turkey to the Ararat region, although it is widespread in the caucasus and further eastwards.

Area 3: Coastal South-west Turkey; Patara, Dalyan.

The South-west coast of Turkey is typically Mediterranean – temperatures dip only to 15°C in winter, and there is a long, hot summer (above 20°C April-November). Vegetation is evergreen macquis, with olives and Stone Pine, as well as large areas of dry coastal scrub. This region is much richer in terms of species number, and has a Mediterranean/European herpetofauna. Specialities include the very common *Agama stellio* as well as certain important nesting sites for the Loggerhead Turtle *(Carretta carretta)*. The main site we collected was Dalyan (Caunos) which has large areas of rocky scrub, and a lake with a river running down to the sea. A small beach to the west has a Stone Pine wood backing on to it, and a large sand bar forms the main beach to the east of the river mouth; an extensive freshwater delta can be found behind the bar, with a network of channels and reed beds. We also collected at Patara, which

Plate 5. Mt. Ararat, viewed from the foot of Kizil Dag. (area 2). The alluvial plain in the foreground is cultivated, with *Phrynocephalus helioscopus* being confined to the dried-out rocky river beds which cut through it.

Plate 6. Kizil Dag, a 3000m mountain South of Mount Ararat (area 2). The thorny scrub in the foreground (c 1500-1750m) yielded *Agama caucasica*.

is similar to Dalyan, but here the delta has been in-filled with drifting sand – forming a dune system with mud flats and marshes. The beach at Patara is 18km long and slopes up sharply to a rocky scrubland behind.

Chelonia

We found the nest sites of Loggerheads *(Carretta carretta)* by the dried up eggshell remains, even in October. They were most easily found at Patara near the headland at the East on the heaped, sloping sand – but we also found them at Dalyan (Cunos) and Fethiye. All are well known, properly managed sites (see discussion). *Testudo graeca* (Spur-Thighed Tortoise) was found at Dalyan. A large female was found wandering on the small beach, and we were shown some young being reared up by a Turkish family. *Emys orbicularis* (European Pond Terrapin) was abundant in the river and Delta (which the locals call "the Lake") between the town and the sea. These animals are shy, diving into the water at the sound of an approaching boat. We also found young (c. 7cm) specimens in a small stream at Dalyan. *Mauremys caspica* (Stripe-Necked Terrapin) was found in the river 6km to the west of Patara. We watched an adult specimen being washed out to sea; it swam back and eventually surfaced on the beach. According to Arnold, Burton & Ovenden, (1978) this species is known to tolerate brackish water well.

A most intriguing find was that of *Trionyx triunguis* (Nile Softshell turtle) swimming near the surface of the river at Dalyan town harbour. A young specimen was seen c.10cm long, which spent a good half hour basking, and feeding at the water's edge. *Trionyx triunguis* was first described from South-west Turkey by Dr. Basoglu (1973b). In this paper he states that they are common in the lake around Koycegiz – this is further upstream than our sightings. These softshells are known to reach 80cm S-V and some large specimens were seen swimming away from oncoming boats near the river outlet. Their distribution in Turkey is something of an enigma – since they are primarily N. African reaching as far North as Israel. Maybe fishermen brought them to Dalyan in the past as food or pets – certainly it seems unlikely that a turtle could have survived being washed from Israel through the Mediterranean to Turkey.

Amphibia

Rana ridibunda (Marsh Frog) was found behind the small beach at Dalyan. Around twenty individuals were found on the edge of a stagnant pool singing and basking. The pool temperature must have been very high since the sand surrounding it was too hot to walk on barefoot. When approached they dived into the water and hid among the algal mats – the maximum pool depth was about 10cm at this time of year (October). The frogs were varied in colour and markings – but most had a bright green stripe down their backs. *Bufo viridis* (Green Toad) was extremely common at all locations along the coast. This nocturnal species was easily caught in villages, hunting for food around street lamps, rubbish tips etc. Its large size and green-brown blotches on a pale base colour make it unmistakeable. Turkish individuals tend to have a pinkish/sandy ground colour with dark green blotches.

Reptilia

By far the most easily found reptile was *Hemidactylus turcicus turcicus* (Mediterranean Gecko). This species prefers house walls and can usually be found just under the eaves of the roofs. Individuals seemed to have strict territories and could be located in exactly the same location each evening (see Selcer, K.W. 1986). Some specimens lived solely under street lamps and it was interesting to find that these were often higher than their counterparts on the more dimly-lit walls. We do not know if this species can change colour to any extent but it is quite probable and would be a useful adaptation. Young geckoes were found, and some recently vacated eggs (laid in pairs). The young were c. 3cm S-V in length, and very lightly coloured, almost transparent – their viscera were visible through the light pinkish belly; this colouration is obviously a survival strategy for the vulnerable young. *Ophisops elegans* (Snake-Eyed Lizard) was caught at Patara. Here, they seemed to prefer the dried-out marshes and sand dunes behind the beach, where they were very common. This lizard tended to dart between clumps of vegetation when pursued, and was difficult to catch. *Lacerta trilineata* (Balkan Green Lizard) was found in a ditch near a cultivated field on the banks of the large lake 2km upstream from Dalyan town. This large, green lizard had dark markings on the back. *L. trilineata* replaces *L. viridis* over much of Turkey. *Agama stellio* was very common among ruins at both Patara

(between the town and the beach) and Dalyan (at the Caunos ruins, and on hillsides further upstream). The dominant, colourful males were easily found, displaying noticeably on large boulders.

Also seen were *Ophisaurus apodus* (Glass Lizard) at Patara, in rocky scrubland near the ruins. *Lacerta danfordi* was found on rocks behind the small beach at Dalyan. Some specimens had blue-tinged tails, most had cream lines down their chocolate backs. *L. danfordi* is a speciality of the South-West region.

LITERATURE SURVEY

There is no satisfactory field guide for the English speaking visitor to Turkey. Arnold, Burton & Ovenden (1978) covers only the small part of Turkey in mainland Europe. This is geographically correct, but surely the recent upsurge of tourism in Turkey, (also Morocco, Tunisia, Egypt and Israel) points to a gap in the market. The recent French field guide, Matz, G. & Weber, D. (1983) covers the Caspian and Caucasus and is useful for Eastern Turkish species, but again does not actually cover Turkey. We found Engelmann, Fritzsche, Gunther and Obst (1986) invaluable since it includes Turkey, with maps and illustrations for most species. Drawbacks are that the text is in German and it is difficult to obtain. The three volumes by the Turkish authors Basoglu and Baran are useful for reference. Basogulu & Baran (1977), deals with lizards and turtles, has a brief English summary and distribution details. Basoglu (1973a) concerns amphibians and Basoglu & Baran (1980) snakes. These are again difficult to obtain in this country. A recent German guide to European snakes (Gruber, U., 1989) includes N. Africa, Israel and the Caucasus as well as Turkey, with colour photos for most species. Baran (1976) is in Turkish and deals with taxonomy and distribution of Turkish snakes. Steward (1971) covers the snakes of Europe (incl. Asiatic Turkey) but is now largely out of date. Nöhmes 3-volume work covers the Caspian region and European Turkey, but misses out Asiatic Turkey.

Various important collections and surveys of Turkish herpetofauna have been published. Bird (1936) and Bodenheimer & Fritz (1944) although very extensive are a little out of date in

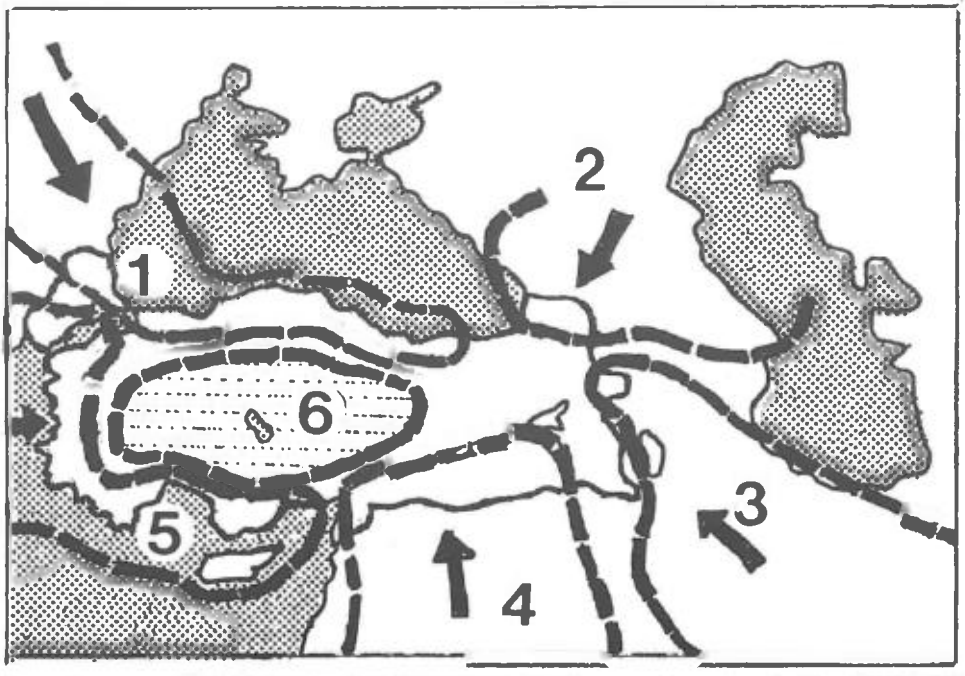

Figure 3. Simplified diagram to show influences on Turkish herpetofauna (see text): 1. Central and Northern European; 2. Caucasus/Caspian; 3. Iranian/Afghani; 4. Middle Eastern; 5. Mediterranean; 6. Central Turkish (endemic region).

some respects; more recent surveys are less confusing in nomenclature. We found Clark & Clark (1973) invaluable since it contains detailed habitat descriptions, notes on behaviour as well as variations within species. Other useful reviews are Andren & Nilson (1976); Mertens, (1952); Lambert (1970); Teynie (1987) and Hingley (1989).

There have been numerous short papers published, many of which are rather specialised (see citations for the more relevant ones). Baran (1978) discusses rare Turkish snakes; Flardh (1983) describes Mt. Ararats' herpetofauna; Sochurek (1984) covers the genus *Elaphe.* An important recent paper by Nilson, Andren and Flardh (1988) reviews Turkish vipers and clears up many taxonomic problems.

SPECIES CHECKLIST

This list has been compiled from the most recent literature, but may not be complete. The areas numbered after the species name refer to those on the map in fig. 3 and suggest the derivation of the animals' distribution.

NOTE: 1. Central and Northern European derivation

2. Caucasian or Caspian

3. Iranian/Afghani

4. Middle Eastern

5. Mediterranean

6. Central Turkish (endemic)

Amphibia

Mertensiella caucasica	2
M. luschani – Southern coastal, localised	
Salamandra salamandra	1
Triturus vulgaris	1
T. cristatus	1
T. vittatus – North coast and Syrian Coast	
Pelobates syriacus	4
Pelodytes caucasicus	2
Bufo bufo	1
Bufo viridis	
Hyla arborea	
H. savignyi	4
Rana macronemus	2
R. ridibunda	5

Chelonia

Caretta caretta	
Chelonia mydas	
Lepidochelys kempi	
Dermochelys coriacea	
Testudo graeca	
T. hermanni	
Emys orbicularis	
Mauremys caspica rivulata	4
Trionyx euphratica	4
T. triunguis	4

Sauria

Cyrtodactylus kotschyi	
C. heterocercus	

Hemidactylus turcicus	5
Phyllodactylus elisae	
Agama caucasia	2
Agama stellio	4
Agama ruderata	4
Phrynocephalus helioscopus	3
Chamaeleo chameleon	4
Anguis fragilis	1
Ophisaurus apodus	
Varanus griseus	4
Acanthodactylus boskianus	
Lacerta viridis	1
L. trilineata	6
L. agilis	
L. saxicola	
L. strigata	
L. cappadocica	
L. raddei	2
L. laevis	
L. rudis	2
L. princeps	
L. armeniaca	2
L. danfordi – *S.W. Med. only; endemic*	
L. praticola	
L. derjugini	2
L. parva	6
L. uzzelli – E. turkey only – Parthenogenetic species	
Podarcis sicula	
P. taurica	
P. muralis	
Ophisops elegans	6
Ablepharus kitaibelli	
Chalcides ocellatus	4
Eumeces schneideri	4
Mabuya aurata	4
M. vittata	4
Ophiomorus punctatissimus – South West coastal	
Blanus strauchi – South West coast – Antakya	
Leptotyphlops macrorhynchus – rare, found near Mardin + Urfa	
Typhlops vermicularis	

Ophidia

Eryx jaculus	
Coluber jugularis	
C. najadum	5
C. ravergieri	2
C. rubiceps	4 coastal
Coronella austriaca	1
Eirenis collaris – found only near Mardin & Urfa	
E. barani	2
E. coronella – *found only near Urfa*	
E. modestus	2
E. rothi	4 rare in Turkey
E. punctatolineatus	2
E. persicus	3 rare in Turkey
Elaphe hohenackeri	6
E. hohenackeri rothi – rare, Taurus Mts. near Antalya	
E. longissima	

E. quatuorlineata	
E. situla	
Malpolon monpessulanus	5
Telescopus fallax	
Rhynchocalamus melanocephalus	2
Natrix natrix	
N. tessellata	
Vipera ursinii anatolica – South-west coast	
V. ursinii eriwanensis	2
V. kaznakovi	2
V. barani – Istanbul region only	
V. ammodytes meridionalis	
V. ammodytes montandoni – European	
V. ammodytes transcaucasiana – Northern	
V. bulgardaghica – Southern Central	
V. wagneri – Western half	
V. raddei raddei	3
V. raddei kurdistanica – localised to the Hakkari region	
V. lebetina obtusa	

DISCUSSION

Turkey is uniquely situated; its inhospitable mountainous terrain lies at the cross roads of European and Eastern fauna. The 'Gateway to the East' cliche of tourist brochures rings true both culturally and herpetologically! Five major influences shape its herpetofauna (see Fig, 3); Mediterranean (eg. *H. turcicus*), Central European *(Coronella austriaca)*, the Caucasus (eg. *Lacerta saxicola*). Iranian/Afghani (eg. *Phrynocephalus helioscopus*) and Middle Eastern (eg. *Eumeces schneideri*). The result is a ring-like zone, rich and varied in species, circling the Anatolian Plateau. This central region is arid, with extremes of temperature, and although poor in terms of species number, yields the true Turkish species, typified by the almost endemic *Ophisops elegans*. This is, possibly, the true East/West meeting point as well as the stronghold of other species with a mainly Turkish distribution; *Lacerta parva* (almost endemic), *L. trilineata* and *Lacerta danfordi* amongst others. The Middle Eastern influence is strong with *Agama stellio* reaching through the southern half of Turkey and just into Europe and *Pelobates syriacus* and *Mabuya aurata* infiltrating well into Southern Turkey. Other typically Middle Eastern species filtering through to Turkey are *Chalcides ocellatus, Mabuya vittata, Chamaeleo chameleon, Agama ruderata, Eirenis* spp, and *Trionyx euphratica*, all reaching the most Northerly and often westerly fringes of their distribution. The European species tend to group around the northern coastal region, a distribution typified by *Anguis fragilis* and *Coronella austriaca*.

Travelling Eastwards one leaves the central plateau and the fauna becomes markedly less European. To the North, species typical of the Caucasus: *Mertensiella caucasica, Pelodytes caucasicus, Rana macronemus, Lacerta armeniaca, L. saxicola, Agama caucasica* and *Vipera kaznakovi* replace their European counterparts. *Phrynocephalus helioscopus*, which is very localised in Turkey, represents the Iranian-Afghani fauna along with the Rock Viper *V. raddei*.

Moving westwards to the Mediterranean coast, the Iraqi and Syrian semi-desert yields to scrub and macquis with a typical Mediterranean fauna *(Hemidactylus turcicus, Coluber najadum, Malpalon monspessulanus)*. Even here differences will be noted; *Podarcis muralis* is rare, *Agama stellio* and *Bufo viridis* very common, and unusual species can be found: *Mertensiella luschani, Lacerta danfordi, Ophiomorus punctatissimus* and *Coluber rubiceps*.

So it seems that Turkey truly acts as a buffer zone between the hot deserts of Syria, Iraq and Iran, the mountains of the Caucasus, and Eastern Europe. The mountains of East Turkey and the harsh winters of Anatolia must act as barriers to further infiltration (cf. *P. helioscopus* which is confined by the ring of Mountains west of Ararat).

POINTS OF NOTICE FOR TRAVELLERS

The best time to visit Turkey is probably late Spring/early Summer – the intense heat of

high summer causes many species to remain hidden. In the central region early morning and evening are the best times to collect. Further east, intermittent rain/sun is good for semi-desert species, since they remain well hidden in the full heat. Ruins are worth checking in all regions for *Agama stellio*, Lacertids and *Coluber* spp. On the hot plateau, any unusual, rugged areas – small stream valleys etc. which give shade, will produce results.

In our opinion it is worth the effort to travel to the east of Turkey – it is surely a good chance to see the Caucasus and Iranian/Iraqi specialities without the need for an Iranian or Russian visa (both difficult to obtain) or Iraqi visa (almost impossible at times!). Travel through Turkey is cheap and efficient – the locals use coaches (1000 km for a tenner!) and internal flights are cheap. Accommodation and food are readily available and inexpensive. No restrictions are placed on tourism, although one is deterred from visiting some South-Eastern (Kurdish) regions, due to separatist action. We managed to travel there without many problems, despite a high army presence on the Iraqi/Iranian borders.

Turkey has a mixed conservation record. Hunting is still a popular hobby, but this is to be expected in a large rural country. The forestry department is well run and modern and seems to take care of conservation. The important turtle-nesting beaches on the Mediterranean coast are patrolled in the spring to ensure that tourists don't camp on the beach. In addition quotas for fishing in the villages near these beaches are strict. Fethiye sums up the tourist problem with loud, well-lit discos packed with tourists in summer and turtles meeting ½ a mile away in the spring.

Recent publicity (notably David Bellamy's programme on the Dalyan delta) has drawn attention to the problem and helped to stop hotels being built on beaches – in fact the conservation angle is being used to sell holidays to some extent, with specialist natural history hotels and tours. So it seems that the Turkish fauna may not necessarily follow the same route as that of most other, tourist-exploited regions of the Med.

ACKNOWLEDGEMENTS

We would like to thank Dr. C.J. McCarthy, British Museum (Natural History) for help in identification of reptiles. We wish to dedicate this article to Dr. David Bellamy for the inspiration to explore Turkey before it becomes too tourist-orientated!

REFERENCES

Andren, C. & Nilson, G. (1976). Observations on the Herpetofauna of Turkey in 1968-1973. *British Journal of Herpetology*, **5** (7), 575-584.

Arnold, E.N., Burton, J.A. & Ovenden, D.W. (1978). *A Field Guide to the Reptiles and Amphibians of Britain and Europe.* Collins. 272pp.

Baran, I. (1976). Turkiye yilanlarinin taksonomik revizyonouve cografi dagilislari – *TBTAK Yaninlari No. 309, T.B.A.G. Seri No. 9, 177pp Ankara.* (In Turkish).

Baran, I. (1978). Some rare species of snakes from Turkey. *Annallen Histor. Museum Wien,* **81**, 261-265.

Basoglu, M. (1973a). Turkiye Amphibilenleri *Ege Univertesi Fen Fakultesi Kitaplar, Series No. 50.* (In Turkish with English summary).

Basoglu, M. (1973b). A preliminary report about a specimen of softshell turtle from South western Anatolia. *Scientific Reports of the Faculty of Science, Ege University,* No. **172**, 3-11.

Basoglu, M. & Baran, I. (1972). A new record of *Trionyx euphraticus* from Turkey. Scientific Reports of the Faculty of Science, Ege University, No. 144: 1-7.

Basoglu, M. & Baran, I. (1977). Turkiye surungenleri, kisim 1 : Kaplumbages ve Kertenkeler. (The Reptiles of Turkey, Part 1 : The Turtles and Lizards). *Ege Univertesi fen Fakultesi Kitaplar Serisi No. 76; 257 pp.* (In Turkish and English).

Basoglu, M. & Baran, I. (1980). Turkiye surungenleri, Kisim II : Yilanlar (The Reptiles of Turkey, Part 2 : The snakes) *Ege Univertesi fen Fakultesi Kitaplar Seris,* Bornova, 81 : 218 pp.

Bird, C.G. (1936). The Distribution of reptiles and amphibians in Asiatic Turkey, with notes on a collection from the villayets of Adana, Gaziantep and Malatya. *Annals of the Magazine of Natural History, London,* **18,** 257-281.

Bodenheimer, F.S. & Fritz (1944). Introduction to the knowledge of the Amphibia and Reptilia of Turkey. *Revue de la Faculte des Sciences de l'Universite d'Istanbul, Series B – Sciences Naturelles.*, T.9 (1), 1-78.

Böhme, W. (1981). *Handbuch der Reptilien und Amphibian Europas.* Band 1. Sauria (Gekkonidae, Agamidae, Amphisbaenidae, Scincidae, Lacertidae). Akademische verlag. Sgesellschast : Wiesbaden.

Böhme, W. (1984). *Handbuch der Reptilien und Amphibien Europas.* Band 2. *Lacerta.* AULA – Verlag : Wiesbaden.

Böhme, W. (1986). *Handbuch der Reptilien und Amphibien Europas.* Band 3. *Podarcis.* AULA – Verlag : Wiesbaden.

Clark, R.J. (1967). Notes on a third collection of reptiles made in Turkey. *British Journal of Herpetology*, **4** (10), 258-262.

Clark, R.J. & Clark, E.D. (1973). Report on a collection of Amphibians and Reptiles from Turkey. *Occasional papers of the California Academy of Sciences* No 104, 62pp.

Engelmann, W-F., Fritzch, J., Günther, R. & Obst, F.T. (1986). Lurch and Kriechtiere Europas. Ferdinand Enke, Stuttgart, 420pp.

Flardh, B. (1983). Herpetofauna pa Mount Ararat, *Snoken*, **13**, 31-38.

Gruber, U. (1989). *Die Schlangen Europas und rund ums Mittelmeer.* Mosmos Naturfuhrer, Stuttgart.

Hingley, K.J. (1989). Notes on some reptiles seen in South west Turkey. *Herptile*, **14**(4), 161-164.

Lambert, M.R.K. (1970). Notes on a collection and observations of Amphibians and Reptiles from South west Turkey. *British Journal of Herpetology*, **4**, 129-134.

Matz & Webber (1983). *Guide des Amphibiens et Reptiles d'Europe.* Neuchatel. Delachaux & Niestle, 292pp.

Mertens, R. (1952a). Amphibien und Reptilien aus der Turkei. *Revue de la Faculte des Sciences de l'Universite d'Islanbul, Series B – Sciences Naturelles*, **17**, 41-75.

Mertens, R. (1952b). Nachtrag zu "Amphibien und Reptilien ausder Turkei". *Revue de la faculté des Sciences de l'Université d'Istanbul, Series B – Sciences Naturelles*, **17**, 353-355.

Mertens, R. & Wermutt, H. (1960). *Die Amphibian und Reptilien Europas.* Verlag Waldemar Kramer. Frankfurt am Main 264pp.

Nilson, G., Andren, C. & Flardh, B. (1988). Die Vipern der Turkei. *Salamandra*, **24**(4), 215-247.

Pritchard, P.C.H. (1966). Notes on Persian turtles. *British Journal of Herpetology*, **3**(11), 271-275.

Selcer, K.W. (1986). Life History of a successful coloniser : the Mediterranean Gecko, *Hemidactylus turcicus*, in Southern Texas. *Copeia* 1986(4) 956-962.

Sochurek, E. (1984). Die Giftschlangen der Turkei-eine Ubersicht. *Elaphe.* Berlin, 1/84, 9-10.

Steward, J.W. (1971). *The Snakes of Europe.* David & Charles, Newton Abbot, 238pp.

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ADDITION OF *COLUBER SINAI* TO THE HERPETOFAUNAL LIST OF ISRAEL WITH COMMENTS ON *C. ELEGANTISSIMUS* [1]

YEHUDAH L. WERNER AND NAOMI SIVAN

Department of Zoology (Sturman Building),
The Hebrew University of Jerusalem, 91904 Jerusalem, Israel

INTRODUCTION

On 28 July 1953 the late Professor Georg Haas at the Hebrew University in Jerusalem (Adler, 1989: 101-102) received a message by telephone from members of Qibbuz̲ 'Ein Ghadian (now Yotvata) near Elat: they found a dead little snake, "greenish with black cross bands", hanging on the wire fence. Haas, delighted, promptly declared that herewith a rare snake, previously known only from two specimens, was added to Israel's herpetofauna: *Coluber elegantissimus.* He requested and received the cadaver (HUJ-R 3666).

Coluber elegantissimus, aptly named for its vivid colouration (Plates 1-2), was described by Günther (1878), then keeper of Zoology at the British Museum (Natural History), London (Adler, 1989: 45-46). Günther had one specimen, collected about 1875 by Sir Richard Burton in the mountains east of El Muwaylah, Midian (NW Arabia). The type (front cover) is in the museum (BM(NH) 1946.1.15.7). Another specimen, collected at Akabah (now in Jordan) in 1883 (Hart, 1891), is in the same museum (BM(NH) 84.6.18.1).

In fact, at least one more specimen preceded the Israeli discovery, unknown to Haas: BM(NH) 1964. 152 from Rumaihiya, central Arabia, collected in 1946 but catalogued in 1964 and published only by Marx (1968).

Neither the original 'Ein Ghadian specimen, nor the several which have since been found in or near the 'Arava Valley, have ever been reported in detail. The species publicly entered Israel's herpetofaunal list through Barash and Hoofien's (1956) Hebrew guide and key to the local reptiles. Although even the few earliest specimens varied greatly in the width and number of the black cross bands, as well as in the presence or absence of a mid-dorsal reddish stripe, the species was simply regarded as variable or polymorphic (Werner, 1966). This attitude was unaffected by Schmidt and Marx' (1956) description of the similarly coloured *Lytorhynchus sinai* from Sinai (Plates 3-4), nor by its later transfer to the genus *Coluber* (Marx, 1968).

Marx (1968:30) and Leviton (1986:444) give useful comparisons of *Coluber elegantissimus* and *C. sinai.* Among other differences, the latter has narrower and more numerous black cross bands than the former, and lacks the mid-dorsal "light" (reddish in life) stripe characterizing the former. Marx had at his disposal seven *C. elegantissimus* and the data from the type, and all three then known specimens of *C. sinai:* one without locality, and the two types from the southern Sinai mountains. Another specimen from the same area, which the Hebrew University received in 1978 (HUJ-R 8780; Werner, 1988) accords with the latter. Actually, Marx's table contains for *C. sinai* an erroneous number of black cross bands on the body, 21-26, whereas the two types (Schmidt and Marx, 1956: Fig. 4 and p. 32) had 50-51. Our specimen has 49.

Marx (1968) explained his including *C. elegantissimus* in a work concerning Egypt: "This species has not been recorded from Egypt. The specimen from Akaba and additional material from southern Israel makes this species occurrence in Sinai almost certain" (sic). In this attitude he had been preceded by Flower (1933) who had given the species' distribution as "Arabia, Palestine, and probably Sinai".

Recently Dr. Yoram Ayal of the Jacob Blaustein Institute for Desert Research, Sede Boqer, photographed in Sinai what evidently was a *Coluber sinai* with a conspicuous red mid-dorsal stripe. Because this stripe had previously been known in *C. elegantissimus* but not in *C. sinai,* these photographs, which Dr. Ayal kindly presented to us, prompted us to examine variation

[1] Dedicated to the memory of Professor Georg Haas, 19.1.1905-13.IX.1981.

in the local material of *C. elegantissimus* and *C. sinai*. We wished to establish their status in Israel and suspected that they might by synonymus. But we found that they are distinct, and that both occur in Israel.

MATERIALS AND METHODS

Coluber elegantissimus (16), localities from north to south (all in Israel): Lotan, TAU-R 13,347; Yotvata (= Ein Ghandian, Ein Radian), HUJ-R 3,666, TAU-R 2,631, 13,230, 13,240, 13,482, 13,749; Samar, HUJ-R 16,202; Biq'at Timna', TAU-R 11,489, Beer Ora, HUJ-R 16,356, TAU-R 4,621, 5,774; Nahal Roded, HUJ-R 8,419; Qibbuz Elqt and its sewage, HUJ-R 16,213, TAU-R 8,676; TAU-R 8,676; Elat, TAU-R 9,288.

Coluber sinai (7), localities from north to south (all but the last in Israel): Nahal 'Arugot (at 'En Gedi), HUJ-R 8,653, 16,230,; Mezada, TAU-R 1,904; Nahal Holit (IG 154 005), HUJ-R 8,947; Nahal Zenifim, TAU-R 2,654; Wadi Redadi (Nahal Roded), TAU-R 2,662; Zuqe Dawid Field School, Sinai (near Saint Catherine's Monastery) HUJ-R 8,780.

These specimens were examined by conventional methods for size and proportions (Goren and Werner, 1987), pholidosis and colour pattern but only selected pertinent results are presented here.

In addition, for several of these and some additional specimens colour photographs, taken from the living (or freshly dead) animals, were available. Most photographs were diapositives on Kodachrome (25 or 64) film; some included beyond a mm ruler, also a scale for colours, comprising a series of pieces of original standard Ostwald colour papers. The snake which stimulated this study was found on the footpath at the entrance to St. Catherine's Monastery on 4.V. 1990 by Y. Ayal and Rina Rosenman.

OBSERVATIONS AND COMMENTS

Distinguishing the species

The two species differed consistently by most of the characters presented by Marx (1968: Table 3) and some others. To facilitate identification, Table 1 compares selected characters among three samples: *C. elegantissimus* from Israel examined by us, *C. sinai* from Israel examined by us, and *C. sinai* from Sinai examined by Schmidt and Marx (1956), Marx (1968) or ourselves. The snake photographed by Dr. Ayal conformed to the latter in all characters that could be analyzed on the prints but is excluded from Table 1.

We may say at this point, that the photographs of *"Coluber elegantissimus"* in Barash and Hoofien (1956: 154 bottom) and Gruber (1989:77) happen to present *C. sinai*. The photograph of "*C. elegantissimus*" in Dor (1987: 204) is altogether of a *Telescopus fallax*, although the colour photograph on the end paper of the same book correctly presents a *C. elegantissimus*.

The data in Table 1 are not segregated by sex, because of sample size and because in the field most users would not know the sex of their individual. However, each of the three samples contained individuals of both sexes; the differences presented are not sexual differences erroneously regarded as interspecific.

Additional differences between the two species may serve to identify incomplete sloughs. The eye is larger in *C. elegantissimus* (17.3-19.4% of head length, n=5) than in *C. sinai* (13.0-15.2%, n=4). In *C. elegantissimus* the upper preocular is in contact with the frontal, whereas in *C. sinai* it is not. In *C. elegantissimus* the 5th upper labial "enters" the eye, whereas in *C. sinai* both the 4th and the 5th do so. In *C. elegantissimus* the posterior chin shields are completely separated by two series of scales, whereas in *C. sinai* they meet or almost meet at their anterior angles, and are properly separated only posteriorly (Fig. 1).

The dorsal scales of *C. elegantissimus* are somewhat slanted sideways, so that the mid-dorsal row stands out straight, whereas in *C. sinai* the dorsals are straight as is usual in *Coluber* (Fig. 2). The dorsals of *C. elegantissimus* are not drawn as oblique in Gasparetti (1988: 224) but this trait is visible in his photograph (Gasparetti 1988: 223).

The tail is usually shorter in *C. elegantissimus* (27.4-34.5 percra[2], n=15) than in *C. sinai* (33.2-38.6 percra, n=7).

[2] Percents of rostrum-anus length (Werner, 1971).

The black bands on the tail of *C. elegantissimus* extend feebly but clearly to the ventral side, whereas the *C. sinai* tail is unmarked ventrally.

In both species the reddish vertebral stripe may be either present or absent. But in *C. elegantissimus* when absent in life or faded in alcohol its location is nevertheless indicated by a stripe lacking melanophores, lighter than the general yellow ground colour. In *C. sinai* the location of the absent reddish stripe is not thus indicated.

Convergence of coloration

Some of the differences between the two species, especially in eye size and in dorsal scutellation, indicate that these species are not closely related. Their being similar in pattern, down to the variable presence of the red stripe, offers no contradiction. Although the ecological significance of this phenomenon is unknown, it is paralleled in other snakes elsewhere. In southwestern North America, both *Chionactis occipitalis annulata* and *Chilomeniscus cinctus*, yellow, black-cross-banded little snakes, show inter- and intra-populational variation in the occurrence of red "secondary saddles". In the latter species these are small, i.e. mid-dorsal, increasing the overall resemblance to the *Coluber* spp. discussed here (Mattison, 1989, presents colour plates). Somewhat similarly, in the polymorphic *Homoroselaps lacteus* (southernmost Africa), some of the morphs are basically coloured black and yellow in broken cross bands, often but not always with a reddish vertebral stripe (Branch, 1988). The pattern of black and yellow crossbands or rings and a mid-dorsal red stripe or band reccurs in other snakes, though we lack data on intraspecific variation of the red band: *Dipsas bicolor* (Costa Rica), *Oxyrohopus leucomelas* (Colombia) and *Scolecophis atrocinctus* (El Salvador) (Campbell and Lamar, 1989).

Georgraphical distribution

The report by Negumi (1949) of a *C. elegantissimus* collected in June 1939 in central Sinai and deposited in "Z.G.M." (presumably the Giza Zoological Museum), predates the description of *C. sinai*. Moreover, this is very probably the same *C. sinai* specimen in the "Giza Museum", without locality data, on which Marx (1968) reported.

The map of locality records (Fig. 3) shows that *C. elegantissimus* is (so far) known only from the southern 'Arava Valley and some intimately connected subsidiaries. This is the northwestern extreme of its general distribution in the Arabian Peninsula (Gasparetti, 1988: 222-234, 367, 408-409, 446), in common with a widespread zoogeographical pattern, of mainly arenicolous reptiles (Werner, 1987). *C. sinai* is (so far) known mainly from wadies, and especially oases in wadies, among the mountains of the extreme desert in southern Sinai and in the southeastern Negev of Israel.

Thus, the two species appear to be parapatric (with contiguous distribution ranges) rather than sympatric (with overlapping ranges). The prediction of both Flower (1933) and Marx (1968), that *C. elegantissimus* would also occur in Sinai, is not supported by the data so far.

Geographical variation

Although sample sizes are inadequate for an analysis of geographical variation, certain phenomena appear indicated (Table 1): In *C. sinai* the number of dark cross bands on the body (not on the tail) is smaller in Israeli than in Sinai specimens. A comparison of Table 1 with Table 3 in Marx (1968) will raise the possibility that in *C. elegantissimus* the number of bands varies similarly between Israel and Arabia. Unfortunately comparisons involving the data in Marx (1968) are weakened by his sample having comprised material from both Arabia and Israel. (The data in Gasparetti (1988) appear to have been derived from Marx (1968)).

On the other hand, in *C. sinai* the average width of the dark cross bands (measured in scale-lengths) is smaller in Israel than in Sinai and the opposite is true of the light interspaces. In this case, data in Marx (1968) indicates that band width in *C. elegantissimus* varies in the opposite direction: the bands are on the average wider in Israel than in Arabia.

It is interesting that the variations in the relative widths of dark and light bands indicated in *C. sinai* and suspected in *C. elegantissimus* would, if validated, be in opposite directions, as if to increase the visual difference where the distribution ranges are in contact.

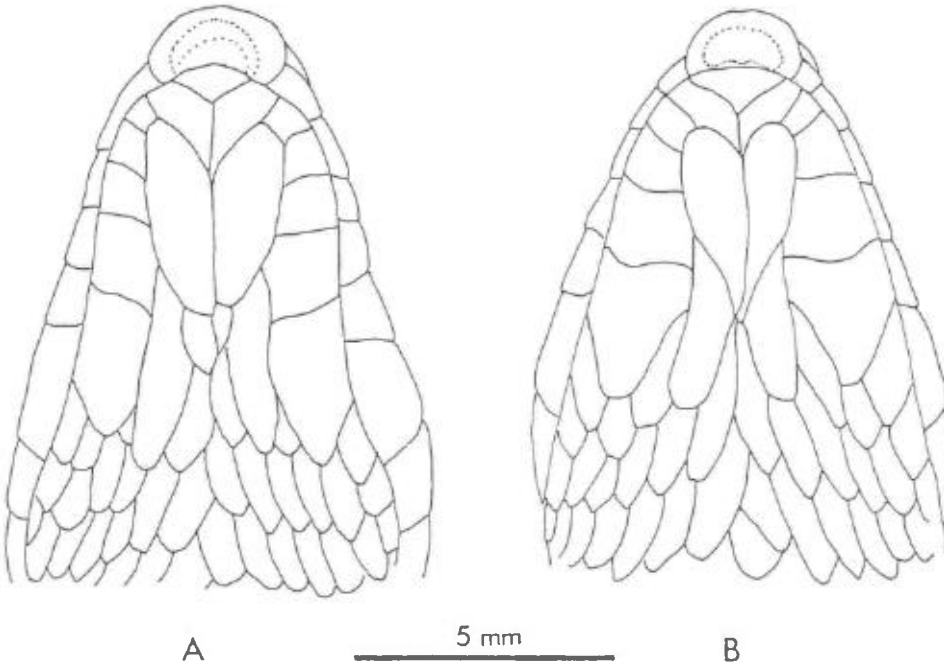

Figure 1. Throat of (A) *Coluber elegantissimus* (HUJ-R 8419), (B) *C. sinai* (HUJ-R 8653).

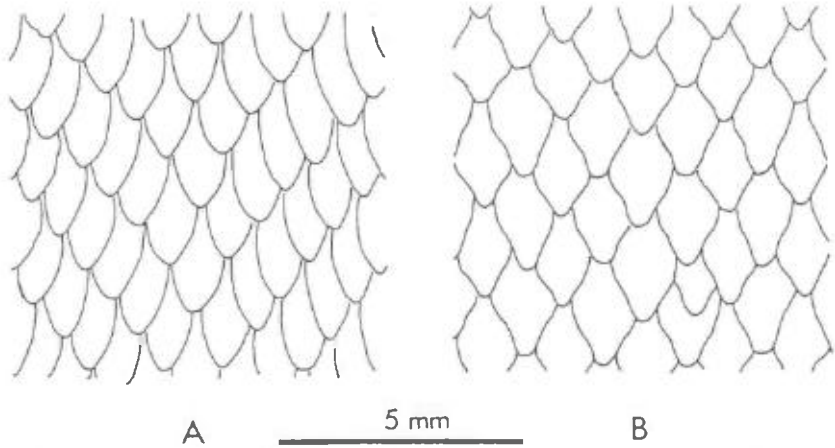

Figure 2. Dorsal scales of (A) *Coluber elegantissimus* (HUJ-R 16356), (B) *C. sinai* (HUJ-R 8653).

CONCLUSIONS

1. In the desert of Israel there occur both of the similar species, *Coluber elegantissimus* which is endemic to the Arabian Peninsula (sensu lato), and *C. sinai* which is endemic to Sinai and southeasternmost Israel.

2. The two species may best be distinguished by *C. elegantissimus* having 19 scale rows at midbody and fewer than 40 dark crossbands in total, whereas *C. sinai* has 17 scale rows at midbody and over 60 dark crossbands in total.

3. Faunistic research requires specimens preserved in a museum and accompanied with accurate collection data. These cannot be replaced by field notes because one cannot always foresee what details would later become necessary; but the deficiency can be partly bridged by photography.

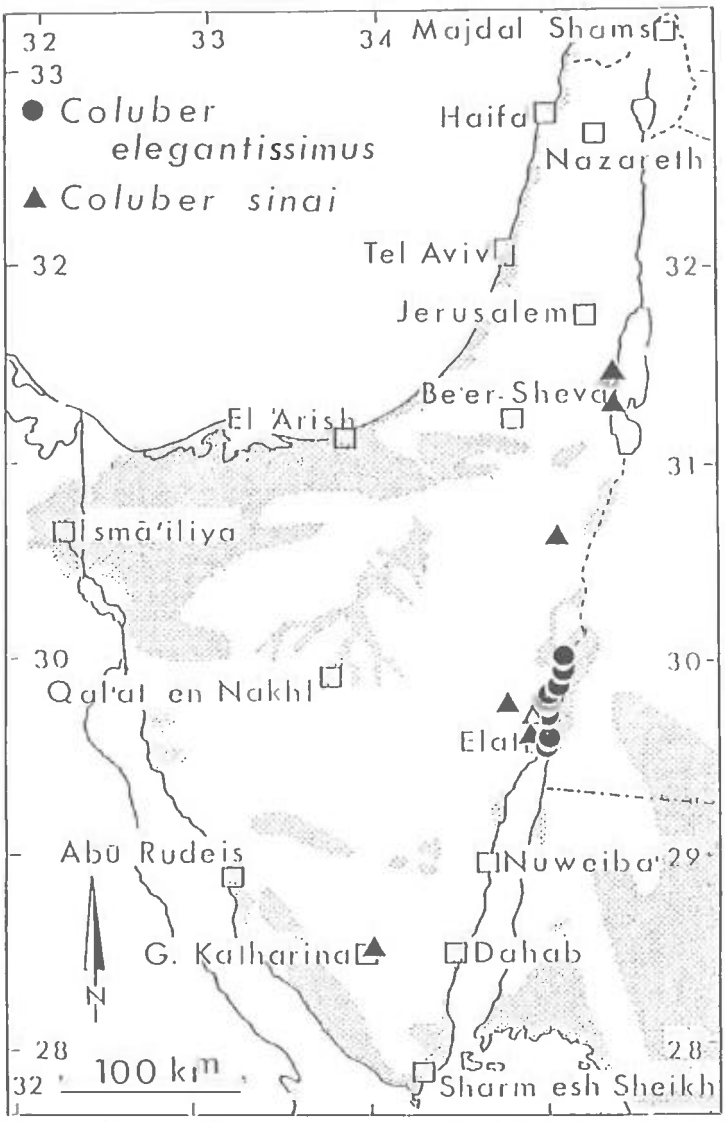

Figure 3. Locality records in the survey area (Werner, 1987, 1988) of Israel and Sinai: circles, *Coluber elegantissimus;* triangles, *C. sinai;* solid symbols, specimens examined; open symbols, other records (some symbols represent more than one individual); stippling, sands.

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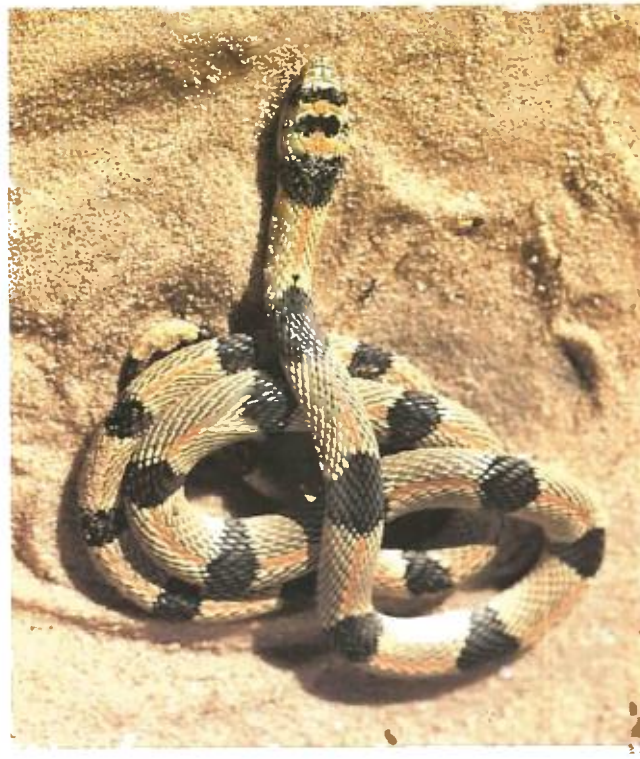

Plate 1. *Coluber elegantissimus* with red vertebral stripe (Courtesy H. Mendelssohn).

Plate 2. *Coluber elegantissimus* juvenile without red vertebral stripe, from Yotvata (photo A. Shuv, Courtesy H. Mendelssohn).

Plate 3. *Coluber sinai* with red vertebral stripe, from Nahal 'Arugot, En Gedi (photo Y.L. Werner).

Plate 4. *Coluber sinai* without red vertebral stripe, from Bir Hindis (= Be'er Ora; courtesy H. Mendelssohn).

of Sciences, for continual helpful correspondence; Mr. G. Perry for free use of the Tel Aviv University material; Dr. Y. Ayal and R. Rosenman for photographs of *C. sinai;* Prof H. Mendelssohn, Tel Aviv University, for permission to publish photographs and Mr. J.H. Hoofien for advice on the manuscript (only some of which we followed).

Table 1. Distinguishing meristic characters of *Coluber elegantissimus and Coluber sinai* (n = number of snakes)

Definition of character	*C. elegantissimus* (Israel)		*C. sinai* (Israel)		*C. sinai* (Sinai)	
	n	range	n	range	n	range
Dorsal scale rows at mid-body	15	19	6	17	4	17
Subcaudals (pairs)	5	65-86	3	91-97	2	94-98
Dark dorsal crossbands, number						
Total	15	29-35	6	69-75	3	74-81
on head and body	15	20-24	6	45.49	3	49-51
on tail	15	7-11	6	22-28	3	24-13
Width of crossbands, in scale lengths						
Dark band, mid-body	15	3-5.5	6	1-2	4	1.5-2
Light interspace, mid body	15	4-7.5	6	2.5-3.5	4	2.3-3
Dark band on nape (3rd)	15	5-8	6	2.5-3.5	4	3-4

REFERENCES

Adler, K. 1989. Herpetologists of the past. In: K. Adler (Ed.), *Contributions to the History of Herpetology,* Society for the Study of Amphibians and Reptiles, pp. 5-141.

Barash, A. and J.H. Hoofien. 1956. *Reptiles of Israel.* Hakibutz Hameuchad, Tel Aviv. (In Hebrew).

Branch, B. 1988. *Field Guide to the Snakes and Other Reptiles of Southern Africa.* Struik, Cape Town.

Campbell, J.A. and W.W. Lamar. 1989. *The Venomous Reptiles of Latin America.* Comstock, London.

Dor, M. 1987. *Zoological Lexicon: Vertebrata,* 3rd ed. 2 vols. Dvir, Tel Aviv. (In Hebrew).

Flower, S.S. 1933. Notes on the recent reptiles and amphibians of Egypt, with a list of the species recorded from that Kingdom. *Proc. Zool. Soc. London* 1933: 735-851. fold. map.

Gasperetti, J. 1988. Snakes of Arabia. *Fauna of Saudi Arabai* 9: 169-456.

Goren, M. and Y.L. Werner, 1987. On measuring head length and on modified caliper rules. In *Abstracts, Joint Annual Meeting SSAR, HL and Com. Herp. Nac.,* Veracruz, Mexico, pp. 82-83.

Gruber, U. 1989. *Die Schlangen Europas und rund ums Mittelmeer.* Kosmos, Stuttgart.

Günther, A. 1878. On reptiles from Midian collected by Major Burton. *Proc. Zool. Soc. London* 1878:977-978, 1 pl (LXII).

Hart, H.C. 1891. *Some account of the Fauna and Flora of Sinai, Petra and Wady 'Araba.* A.P. Watt for the Committee of the Palestine Exploration Fund, London.

Leviton, A.E. 1986. Description of a new species of *Goluber* (Reptilia: Serpentes: Colubridae) from the Southern Tihama of Saudi Arabia, with comments on the biogeography of southwestern Arabia. *Fauna of Saudi Arabia* 8: 436-446.

Marx, H. 1968. *Checklist of the Reptiles and Amphibians of Egypt.* Special Publication, U.S. Naval Med. Res. Unit 3, Cairo.

Mattison, C. 1989. Notes on shovel-nosed and sand snakes, *Chionactis* and *Chilomeniscus. British Herpetol. Soc. Bull.* **28:** 25-30.

Negumi Pasha, H., E.L.A. 1949. List of desert animals seen or collected during the periods shown. *Zool. Soc. Egypt Bull.* **8**: 20-21.

Schmidt, K.P. and H. Marx. 1956. The herpetology of Sinai. *Fieldiana. Zoology* (Chicago Nat. Hist. Mus.) **39:** 21-40.

Werner, Y.L. 1966. *The Reptiles of Israel.* Department of Zoology, The Hebrew University of Jerusalem, Jerusalem. (Mimeo., in Hebrew).

Werner, Y.L. 1971. Some suggestions on the standard expression of measurements. *Syst. Zool.* **20:** 249-252.

Werner, Y.L. 1987. Ecological zoogeography of the Saharo-Arabian, Saharan and Arabian reptiles in the sand deserts of southern Israel. In F. Krupp, W. Schneider and R. Kinzelbach (Eds.), *Proc. Symp. on the Fauna and Zoogeography of the Middle East* (TAVO Beiheft A28), Reichert, Wiesbaden, pp. 272-295.

Werner, Y.L. 1988. Herpetofaunal survey of Israel (1950-85), with comments on Sinai and Jordan and on zoogeographical heterogeneity. In Y. Yom-Tov and E. Tchernov (Eds.) *The Zoogeography of Israel.* Monographiae Biologicae **62,** Junk, Lancaster, pp. 355-388.

A SHORT NOTE ON THE HERPETOFAUNA OF BRITTANY'S CANAL BANKS (OR VERGING ON DISASTER, A CAUTIONARY NOTE ON FRENCH FAUCHAGE)

FRANK D. BOWLES

37 Albany Terrace, Dundee DD3 6HS

INTRODUCTION

Brittany's geographic location as a peninsula jutting out from the north west corner of France into the cool waters of the Atlantic determines her very individual climate. Cooler and wetter in summer and considerably milder in winter than adjacent French provinces, she provides a habitat for an interesting variety of amphibians and reptiles. Although she lies beyond the range of such southern species as the Painted Frog (*Discoglossus pictus*), the Ocellated Lizard (*Lacerta lepida*,) the Aspic Viper (*Vipera aspis*,) and the Western Whip Snake (*Coluber viridiflavus*,) several continental herptiles unknown in Britain can be found there alongside many of our more familiar species in an environment rather reminiscent of the West Wight during the 'forties. We were therefore very pleased to rent a gite this summer twelve miles south east of Dinant, situated in well wooded agricultural country very near the Canal d'Ille et Rance which runs from Rennes to the Rance estuary at St Malo. We were there from 14 July to 3 August and the weather was continuously hot with only a few dull days. When we arrived the banks of the canal were clothed in rich vegetation which provided cover for a variety of herptiles. Between the canal and the little winding river Linon which lay to the north was a strip of boggy, straggly wood, interspersed with several ponds reserved for fishermen.

As the weather was exceptionally hot, reptiles were only to be seen for just a little while after sun rise. By 9.30am BST, everything had retreated from view. Each morning we made a habit of rising about seven and slowly walking east along the south facing bank of the canal and scanning its plant cover for animals. All this came to an abrupt halt on the morning of 27 July when we were greeted by a depressing scene of absolute desolation; "Fauchage" had taken place; a gigantic articulated mowing machine had denuded every bit of vegetation over 5mm high from the whole bank along the total length of the canal. Except for one very mangled reptile corpse, there was nothing left to look at. Even the stones and pieces of wood we had used to mark spots where we had had interesting herptile sightings had disappeared completely. Nothing was seen again at what had proved to have been a very fruitful site and we were forced to look elsewhere at other sites much farther a-field.

SPECIES LIST

BUFONIDAE

Bufo bufo - One averaged sized adult found at 10 pm BST in the main street of the village of Treverien which lies on the south bank of the canal, on 30 July.

RANIDAE

Rana dalmatina - One adult seen jumping with great power through the grass that grew on the base of the south facing bank of the Ille et Rance Canal at 8.15 pm BST on 17 July. Easily distinguished from *Rana temporaria* by its very long rear legs. Another specimen was seen five days later in a village outside Ploermel in central Brittany.

Rana esculenta/lessonae - Colonies of green frogs were to be found in almost all ponds and lakes. Great variety of colour was demonstrated by the frogs; some were almost black whilst other were a billiant pea green with varied dark markings. They were very alert because of the hot weather and very difficult to photograph.

LACERTIDAE

Lacerta vivipara - This was the only lizard species to be seen in the immediate vicinity; before the trimming of the canal verges several could be seen on the banks between sunrise and

9 am BST and also in the late evening. One very green coloured male seen and another male seen running through vegetation at the foot of the north bank of the canal after sunset (7.45 pm BST). Several immature lizards seen frequently on field edges north of the canal and River Linon.

Podarcis muralis - Only two sightings, both male and both on the cliffs west of Dinard. The first, a large well marked animal, was sunning itself in a south facing depression on the cliff below the path, 3 pm BST, on 26 July. The second sighting was at 2.10 pm on 2 August, a day that was abnormally hot by Brittany standards (circa 35 degrees Centigrade). The lizard, which was smaller than the previous one, was sheltering from the sun under an evergreen shrub of the laurel type which formed a hedge at that part of the cliff walk. Although we visited several places inland which looked promising sights for wall lizards, Dinard was the only place where we saw any. Presumably because Brittany, like the Channel Islands, forms the north westerly edge of their European range, they were only to be found in sheltered coastal locations.

COLUBRIDAE

Natrix natrix - We were rather disconcerted to find two mangled corpses (one entombed in a plastic jar) floating in the canal just after we arrived. However we were fortunate to have sightings of three very alive and very alert snakes; two males each just under a metre long on the north bank of the canal near a fishpond on the 21 and the 25 July, and a large female about 120 cm basking on a compost heap at the end of a garden on the other side of the canal on the 29 July. All three animals were seen about 9 am BST.

Coronella austriaca - The day after the verge trimming, the 28 July, I was walking across the road bridge over the River Linon about 11.15 am BST. At the north east corner of the bridge the road surface runs into the stony, *convolvulus* and *eglantine* covered north bank of the river. Here I noticed an oatmeal coloured snake with poorly defined dark markings basking almost fully exposed on a tuft of vegetation. The animal was about seventy cm long, gravid looking, with only its head hidden. The weather was close and overcast and I was surprised that so much unprotected snake was on show. Not being completely sure that it was a Smooth Snake (I wondered whether it could have been a poorly marked viper,) I pulled it gently backwards by the tail until I could see the characteristic small head with its dark triangular marking and tiny eyes. Thus reassured, I picked her up and, as she seemed both lethargic and unaggressive, tried to pose her for a photograph. However, while I was fiddling with my camera, she wound her head through the vegetation and pulled her tail free from my cautious grip and discreetly disappeared. Later that evening, about 7 pm., I returned to the bridge to find her only a yard away from the spot where I had first seen her, twined among some broken concrete blocks. This time though, inclining her head briefly upward, she slid rapidly away. We have only ever seen one other Smooth Snake, a small well marked female less than fifty cms long that we found last year in the German Husnruck. The date was the 2 August, the time 11 am BST and the weather humid and overcast, similar conditions to those prevailing at the Brittany sighting.

VIPERIDAE

Vipera berus - This was the snake most likely to be encountered on the north bank of the canal. Before the atrocious verge trimming we encountered Adders on several mornings: on the 19 July two gravid females; on the 23 July a large gravid female; a half grown red female and full grown black and white male; on the 25 July, two sightings of a large gravid female. A black Adder was also seen north of the River Linon. After the verge trimming the only sign of any reptiles that we discovered there was a badly mutilated female Adder about fifty cms long. Like the Grass Snakes the Adders were very alert, timid and fast moving, presumably due to the very hot weather.

DISCUSSION

The traditionally cultivated countryside of East Brittany, with its pattern of small fields enclosed by hedges and young trees, its oak copses, wetlands and waterways, still provides a rich habitat for an interesting variety of herptiles. In particular the banks of the canal network create a very favourable environment. Unfortunately the recent introduction of highly mechanised

verge trimming equipment is putting it all to risk, annually reducing the numbers of several species of reptiles and amphibians. Perhaps if French environmentalists were aware of our concern, a less destructive policy for canal bank maintenace might be created.

ACKNOWLEDGEMENTS

I would like to express my gratitude to Mr John Fyfe for his skilfully drawn distribution map.

REFERENCES

Arnold, E.N., J.A. & Ovenden, D.W. (1978) *A field guide to the Reptiles and Amphibians of Britain and Europe* London: Collins. 272 pages.

Ballasina, D. (1984) *Amphibians of Europe* London: David and Charles. 132 pages.

Matz, G. & Weber, D. (1983) *Guide des amphibiens et reptiles d'Europe* Neuchatel - Paris: Delachaux & Niestle. 292 pages.

THE CARE AND BREEDING OF THE GRASS SNAKE (*NATRIX NATRIX HELVETICA*) IN CAPTIVITY

David Billings and Marcus Langford[1]

Red House Farm, Brakefield Green, Yaxham, Dereham, Norfolk, NR19 ISB
[1]26 Lower Street, Helens Road, Hedge End, Southampton, SO3 4LW

INTRODUCTION

The Grass Snake (*Natrix natrix helvetica*) is Britain's largest reptile attaining an overall length of up to 2 metres although 110cm - 130cm is a more normal size.

It has the distinction of being our only egg laying snake. Furthermore it is the only sub-species to represent Britain, all the other reptiles and amphibians indigenous to the U.K. are of the nominate form.

Colouration is very variable, general gound colour is greyish brown, olive-grey or greyish green above with dark brown or black spots which form vertical bars along its sides. There are also two rows of smallish black or dark brown spots arranged alternately on its back. The underside is patterned with black or grey and white usually irregular and the throat region is off-white or pale yellow. The main distinguishing feature is the collar marking of various shades of yellow, cream or pale orange behind the head. It is usually interrupted in the centre of the neck and bordered posteriorly by two quite large concentric dark patches. Females grow much larger than males. Any specimen above 95cm will definitely be a female.

The Grass Snake occurs throughout England and Wales but is absent from Ireland and the whole of Scotland with the exception of the border counties. They are very fond of water and in sunny weather they like to bask on sun-warmed vegetation near the water's edge. If surprised or frightened they will slip quietly into the water and swim away with their heads held just above the surface. They are strong swimmers which assists them to catch their main prey of amphibians and fishes.

If cornered or trapped a wild Grass Snake will sometimes rear up and strike at its adversary with its mouth closed, very rarely attempting to bite but hissing loudly and appearing quite aggressive. If these tactics fail it may feign death, rolling over onto its back, becoming flacid with mouth wide open and tongue hanging out limply. If handled it may "come to" suddenly, thrashing about wildly, expelling a foul-smelling fluid from its glands situated near the vent. The fetid odour produced is very strong, persisting for some time on the hands or clothing even after several vigorous attempts to remove it!

Grass Snakes can often be encountered in open country at considerable distances away from the nearest pond, lake or river. Favoured habitats are hedgerows with a dense base, open woodland, heaths, commons, meadows or scrub. Damp habitats are prefered throughout their range; in the south they can be found at altitudes of up to 2,400 metres.

ACCOMMODATION

Grass Snakes are best kept outdoors in surroundings which simulate natural conditions. This will enable their behaviour to be observed at close quarters. A greenhouse or walled enclosure of at least 4 square metres would be suitable; the former should have adequate ventilation to prevent overheating and the latter should have a perimeter wall at least 1 metre high to prevent escape. A cover of stout wire mesh should also be provided to prevent predation by cats and large birds.

Whichever accommodation is chosen it should be positioned to receive the sun's rays for most of the day. The floor should have a covering of fine soil to a depth of at least 45cm to allow the snakes to burrow for winter hibernation. A reasonable sized pond is essential, this should be large enough for the snakes to submerge themselves and swim in, certainly no smaller than 1 square metre in surface area.

The floor can be furnished with some rotten logs half-buried in the soil; these will provide retreats for the inmates to hide under. Ground cover can be provided by planting various ornamental grasses which can be readily obtained from garden centres. The best varieties are those which form good-sized tussocks on which the snakes will bask. Care should be taken not to introduce couch-grass as this looks unsightly, spreads rapidly and is very difficult to eradicate.

An area of deep leaf litter or a small compost heap should be maintained in one corner to provide an egg-laying medium. If the vivarium is open to the elements a dry retreat should be available such as a small wooden box about 20cm x 20cm x 20cm with a 3cm x 3cm entrance hole in the front. This can be filled with hay and raised slightly above ground level to ensure it stays dry. A hinged lid on top allows the hay to be inspected regularly for the presence of mites. If any are discovered a vapona block can be placed in the box for 3 days after the hay has been removed and the entrance hole sealed. The bedding should always be removed when it becomes soiled.

FEEDING

As well as amphibians and fish, which constitute the main diet, wild Grass Snakes will also eat lizards (including Slow Worms), newborn mice and voles; and fledgling birds. In captivity the food should consist mainly of amphibians, especially frogs and newts. Garden colonies of Common Frogs and Smooth Newts can be established and maintained quite easily (Billings 1983 and 1985) so that a ready supply of adults, juveniles and tadpoles are present. Adults of both can be introduced into the snakes' enclosure where they will survive until eaten. Invertebrates such as eathworms, woodlice and slugs can also be introduced for the frogs and newts to feed upon.

A large adult Grass Snake will eat a fully grown frog each week (sometimes more) or half a dozen newts per week in high summer. Small goldfish can be put in the vivarium pond; these will also eventually be captured and eaten but fish should not be the sole diet or vitamin B deficiency (which can be fatal) may result (Mattison 1982). Dead mice can be given occasionally (they can be obtained deep-frozzen from pet shops). It may be necessary to rub the mouse with a dead frog or fish to transfer the scent and encourage it to each such unusual prey. Pieces of fish can also be offered.

As long as amphibians constitute the bulk of the diet in captivity there should be no problems. Non-living food should be dusted with a multi-vitamin powder.

HIBERNATION

Loss of appetite will usually occur during late September and the Grass Snakes will seek their hibernationa quarters during October, re-emerging the following April. Exact dates will vary with the weather conditions. They can be left to hibernate naturally when housed outdoors; on no account should they be disturbed or moved during this period as this may prove fatal. Breeding success depends on a hibernation period.

BREEDING

Mating usually takes place during April or early May, once the weather is warm and sunny and the nights are not frosty. Eggs are produced in late June or during July. In captivity sufficient food must be available for breeding to be successful.

The eggs will be laid deep within the compost heap or leaf litter. They are leathery-shelled and measure approximately 2.5cm long and 1.5cm across when laid. They can be left *in situ* or incubated artificially. The latter option is preferable as the eggs can be inspected regularly and there is no risk of invertebrates damaging them. It is also possible to maintain an adequate temperature to ensure that the eggs do not become chilled, and there is no risk of saturation during a wet summer. This could drown the embryos or affect their development.

Gravid females bulge with eggs; a sudden slimming down will indicate that eggs have been laid.

If artifical incubation is decided upon the eggs should be searched for very carefully by removing the compost by hand until the eggs are exposed. An ice-cream container should be prepared in advance by half-filling it with a mixture of vermiculite and tap water in a ratio of 1:1 by weight. Mixtures of sand and peat can also be used as an incubation medium (Mattison 1982). Egg clutches are usually stuck together but should not be forcibly parted as the pressure exerted may cause damage to the embryos inside. The eggs should be carefully transferred to the vermiculite keeping them the same way up as deposited and they should be buried up to their mid-line to facilitate inspection.

The complete container, including the eggs, should then be weighed on the kitchen scales, the weight recorded and the container re-weighed weekly; in this way it is possible to determine exactly how much water has evaporated from the container during incubation. Tepid water from the tap can then be added plus a little extra to allow for the increase in weight of the eggs as they develop.

The container must be kept at 25°C - 30°C for the full incubation period. This can be achieved inside the airing cupboard or alternatively, a small fish-tank can be used instead of an ice-cream container. This can be heated by a 15 or 25 wattage light bulb connected to an aquarium thermostat and insulated with polystyrene ceiling tiles. In either case temperatures should be carefully monitored using a maximum/minimum thermometer and any necessary adjustments carried out immediately. A close fitting lid with holes for ventilation should be kept in place over the aquarium – this will maintain humidity and prevent escape when the hatchlings emerge. Sometimes reptile eggs develop a coating of mould but this should not do any harm and can be ignored as there is a high degree of resistance to such attacks. Hatching takes place approximately 40 days after laying although up to 47 days is not unusual.

CARE OF HATCHLING SNAKES

The hatchlings should be removed to prevent them from disturbing the remaining eggs and placed in a small vivarium. This should contain a good layer of light soil, plenty of hiding places in the form of pieces of bark and clumps of moss and a small shallow pond (to prevent drowning). The photo period should be about 12 hours per day (8.00 am to 8.00 pm) to encourage rapid growth. Newly hatched youngsters measure about 20cm in overall length and are very secretive during their first few weeks. For this reason they should be disturbed as little as possible initially. Food need not be offered until the first slough (about 14 days after haching).

Small frogs or tadpoles will be readily eaten as will tiny fish such as guppies. In addition new born mice ("pinkies") may be accepted; these should be killed humanely and dusted (Townson, 1990) with vitamin/mineral supplement prior to being offered to the baby snakes. The pinkies may also need rubbing with a piece of raw fish and then waved in front of the snakes to attract their interest.

For anyone not prepared to resort to such measures it is best to release the hatchlings soon after emergence in a suitable site in the wild. In any case the number produced (a female usually lays between 11 and 20 eggs per clutch) will far exceed the time and resources available to most amateur herpetologists so it is best to keep no more than 3 or 4 and concentrate on these.

Baby Grass Snakes will soon learn to take dead prey provided it smells appetising but if any refuse to feed voluntarily, force-feeding should never be attempted as it will probably kill the recipient in the process. It is better to release such invididuals to secure their own prey in the wild. Some baby snakes may commence hibernation without having fed since hatching, particularly where eggs have hatched late in the year.

A thick-sided polystyrene box with a layer of damp foam or moss on the base and filled with polystyrene chippings provides an adequate hibernating medium for baby snakes. The box should have a secure lid and should be placed in a frost-free shed or garage for the duration of the winter. It should be inspected at weekly intervals to ensure the inmates are safe and to allow the entry of fresh air. They can be brought out of hibernation when the first frogspawn becomes available, as spawn brought indoors develops rapidly thereby providing a good food source.

The sexes can be identified as early as six weeks after hatching, females are of larger build and grow more quickly than males. The considerably broader head is also clearly distinguishable from that of the smaller, slimmer male. Sexual maturity may be attained at two years of age under captive conditions but 3 to 4 years is more natural. At the end of their first year young Grass Snakes measure approximately 35cm if kept under artifical conditions and without undergoing hibernation, A hibernation period is only necessary to stimulate reproduction and need only be given when young snakes attain adult proportions.

CONCLUSION

The Grass Snake is a fascinating and rewarding reptile to study. Captive-breeding is a useful method of supporting wild populations but needs to be carried out in conjunction with the maintenance of excess amphibian populations from garden ponds.

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REFERENCES

Appleby, L.G., (1975) *British Snakes.* John Baker, London. pp. 94-99.

Arnold, E.N., Burton J.A., & Ovenden, D.W. (1978). *A Field Guide to the Reptiles & Amphibans of Britain and Europe.* Collins, London.

Billings, D.R. (1983) The Common Frog *(Rana temporaria)* Some notes on its successful husbandry and breeding. *B.H.S. Bulletin* No. **8**, 43-45.

Billings, D.R. (1985). The Care and Breeding of the Common British Reptiles and Amphibans – Part III, The Smooth Newt *(Triturus vulgaris), B.H.S. Bulletin No. 11,* 32-34.

Cook, A.S. & Scorgie, H.R.A. (1983). *The Status of the Commoner Amphibians and Reptiles in Britain.* Nature Conservancy Council Publications.

Frazer, D. (1983). *Reptiles and Amphibians in Britain* Collins, London.

Hellmich, W. (1962) *Reptiles and Amphibians of Europe.* Blandford Press, London.

Knight, M. (1977). *British Amphibians, Reptiles and Pond-Dwellers.* Ian Henry Publications.

Mattison, C. (1982). *The Care of Reptiles and Amphibians in Captivity.* Blandford Press, Poole.

Meek, R. (1982). Notes on the Incubation of the Grass Snake, *Natrix natrix natrix, B.H.S. Bulletin.* No. **6**, 36-38.

Smith, M. (1951), *The British Amphibians and Reptiles* Collins, London.

Spellerberg, I.F. (1975), The Grass Snake in Britain. *Oryx* **13**, 178-183.

Street, D. (1979) *Reptiles of Northern and Central Europe.* Batsford, London.

Townson, S. (1990). Incubation of Grass Snake *(Natrix natrix helvetica)* Eggs. *B.H.S. Bulletin* No. **34**, 13-15.

Tyron, B.W. (1984). Snake Hiberantion and Breeding: In and Out of the Zoo. *B.H.S. Bulletin* No. **10**, 22-29.

A LARGE SCALE LIZARD BREEDING FACILITY IN ALABAMA

BERT LANGERWERF

Agama International Inc., Rt. 2, Box 285,Monterallo, Alabama 35115, USA.

As a small seven year old boy I kept my first lizard, which died within a month. That was forty years ago when I started as the only terrarium keeper in my native Dutch village. Since that time I have learned much about keeping lizards, and after all that time you even end up thinking like a lizard: during a rare thunderstorm on my wide favourite sandbeach in Spain, I dug myself in the sand, with just my nose and eyes sticking out to see people running and to breath, in the manner of *Phrynocephalus mystaceus* or *Phrymosoma* sp.

All my ancestors as far back as the 14th century were farmers and lived in the same region. I studied Physics and Mathematics at the University of Amsterdam, and spent 15 years teaching these subjects. The combination of long term observations on lizards, a farming background, and physics, is the basis of my success in breeding lizards.

About 1970, after my Physics studies, I started keeping lizards on a larger scale inside small greenhouses in the garden. This was at a time when lizard keeping was rare and if people kept them then it was almost always in a dry aquarium in the house. I discovered that lizards need enough space to avoid stress and that they need to thermo-regulate according their own desire instead of at a forced temperature in an evenly heated terrarium.

In the early seventies I made an important discovery, easily solved by my knowledge of physics; if lizards were kept behind glass the eggs never hatched, except eggs, or some of them, from the first clutch only. Lizards kept behind a mesh screen and profiting from full sun did better: almost all eggs hatched. I learned that glass filters the 300mm UV light and that no Vit. D3 can be made by the lizards. The calcium in the food, mainly in the stomach - contents of insects, cannot be absorbed. The first clutch of eggs may hatch, but after that the female will exhaust its store of calcium and the embryos tend to die just before hatching, incapable of opening the eggshell (a helping hand at the right moment could only save a very low percentage of the weak hatchlings). At that time (about 17 years ago) I believed that the whole problem was solved by replacing the 300mm UV light by vitamin D3 "aquosum" in the drinking water, this being by far the cheapest solution - Dutch people always look for the cheapest solution. Other options such as special "plexiglass" or artificial UV lamps were more expensive.

A problem is never as simple as it appears, however: in human beings we know that black people need more UV light in order to form sufficient Vit D3, and this is within one species. Roughly, I discovered that lizards which bask more and-or live further south need more Vit. D3. That is the reason why a lizard like *Eublepharis macularius* is so easy to breed for many people. Another problem is that even "water soluble" Vit. D3 is a kind of a fat and a lizard suffering stress or parasites such as flagelates cannot digest fat well (the base of the tail accumulates sticky faeces) and in addition the embryos will die.

Nobody yet knows the optimal amounts of Vit D3 required by a lizard of a particular species. Roughly I give 5,000-10,000 i.u. per litre of drinking water. I plan to begin a study of this problem by comparing next autumn the requirements of two completely different species, a Basilisk and a Lacerta.

Insects are poor in calcium as they don't need it to build up their own body. Therefore the only calcium to be expected in an insect will be in the food which passes through the stomach and intestines of the insect. The insect will never become richer in calcium content by feeding it a more expensive calcium-rich diet over a long period. It only makes sense to feed the insect a calcium rich diet immediately before it is fed to the lizards. This is what happens in nature, where no-one is "dusting" insects with calcium powder. Kale is a food which many insects like and is rich in calcium. So, my lizards are fed lots of insects at a time, so that the weaker individuals also get a chance, and these insects nibble at night from the waterdishes:

Plate 1: Overall view of some outdoor enclosures for breeding lizards at *Agama International.*

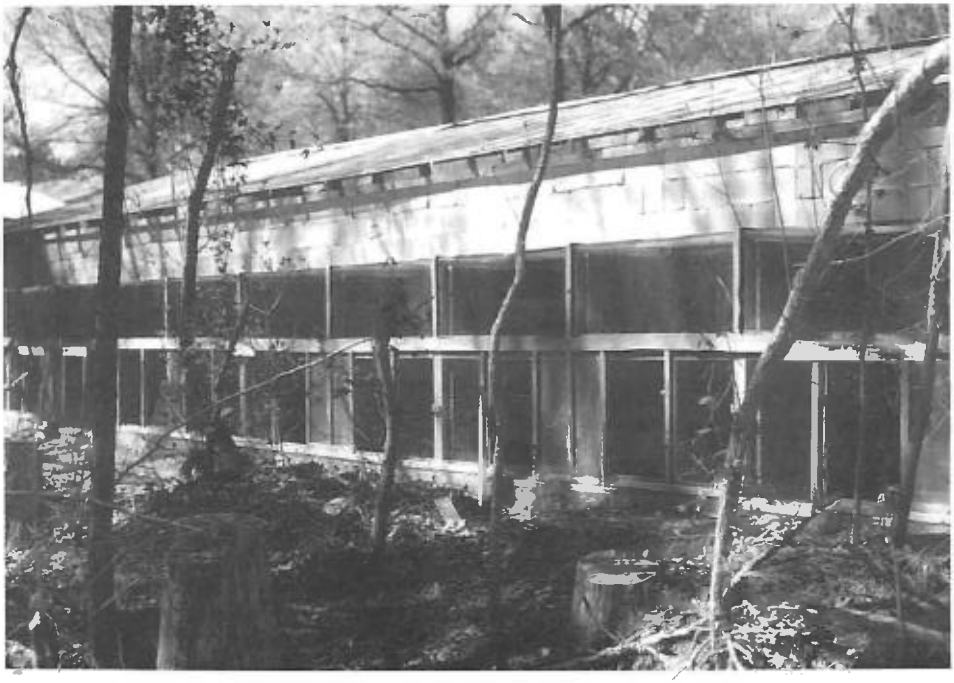

Plate 2: Cages for Basilisks and other large lizards at *Agama International.*

kale leaves. I never need to clean waterdishes, as I put in new kale leaves every second day with the young lizards. This is also faster than cleaning dishes. Now there are several good powders to dust the insects. The important thing is to use readily digestible calcium (as insects tend to contain enough Phosphorus) and Vit D3 (not D2). There is for example in the U.S.A., "Rep-Cal" of the Rep-Cal Research labs in Los Gatos, California, and there is "Formula C/P" of Mardel Laboratories Inc, Glendale Heights, Illinois. Probably there are more kinds of powders available. In the case of both mentioned powders it was hard for me to discover the precise Vitamin D3 content, in International Units. Add to this the fact that different lizards need different amounts of Vit D3 make me only more aware of the fact that we are still guessing and that here a lot of research is still needed.

Like most animals, lizards are also opportunistic. We need to understand what this means in order to reproduce optimal breeding conditions. In nature this means that when there is much space and food available the lizard will reproduce more rapidly and occupy the space before another competitor species takes the opportunity. To breed more lizards we roughly need more space and more food.

The space problem is not simply a matter of cubic metres. Space for lizards means spaces with different temperatures, different humidity, and enough basking spots for all. If we have less cubic metres available it is simply more difficult to create more of such useable space. If one has a nice large terrarium in which 1.2 Basilisks live and reproduce one should *not* expect to double the number of offspring by putting there 1.4 instead. It is even possible that this will produce less offspring and cost more in food. Also, the more places the young lizads have the faster they grow. This all means that lizard-breeding creates lots and lots of hard work in the beginning. One needs to build all these spacious terraria.

The other aspect is food. I discovered that more food will result in more eggs. The food of the insectivorous animals should be good. I worked mainly with crickets (*Gryllus*) and giant mealworms, but also locusts (*Schistocerca and Locusta*), common mealworms (*Tenebrio*), flies (*Musca*), etc. It appeared that it is important to give good food to the insects, especially just before feeding to the lizards. In the early 1980s, about five years before they arrived, with my help, in the U.S., I discovered that the "giant mealworm" was the best food insect to use, as it is easy to breed, the chitin content of the skin is relatively lower than in normal mealworms, and the lizards like them very much. Also it is easy to feed them to the lizards in a dish, unlike crickets (another good food) which jump away and hide. This "giant mealworm" (*Zophobas morio*) is now the bulkfood of my lizards and once such lizards as Basilisks, Lacertas, Sceloporus reach adult size, then it is their only food. Variety is provided only in the form of the varied stomach contents of the insects.

So far, at Agama International I have built about 200 terraria, mostly about 100 ft. sq. (or 10 m. sq.) each. As we have about 80 different species, I built various types of terraria, so as to be able to offer the lizards their most suitable microclimate. A terrarium is for me a room with enough space and enough possibilities for the lizards to chose favourable microclimatic conditions. One can do this indoors with computers etc., but this will be so expensive that the offspring would be impossible to sell. My basic idea is to start with local climatic conditions and adapt these, creating other microclimates according to the species kept. It would take too long to describe all the different types of terraria used.

My personal desire would be to just breed endangered species of lizards, maintaining large breeding groups (over 100 individuals) of such species inside the U.S., as long as their natural habitat abroad remains threatened. Experience has taught me that no one wants to spend a penny doing this, and I have no time to wait another twenty years for thinking to change.

So I choose the other option: we plan to breed non-endangered and mainly common species for the pet trade. If you only casually look around and listen, both in Europe and the U.S., at the way the trade in lizards works, it becomes clear that many lizards from the wild die between capture and sale to the terrarium keeper. So, breeding 1000 lizards for the pet trade will probably save up to 10,000 in the wild. In Europe there is so much public pressure against the trade in wild caught animals that new laws will be introduced very soon. These laws are very dramatic: dealers may no longer keep reptiles in stock; only member of reptile societies may still keep the animals. The result in fact will be that wildcaught animals are no longer

available and the future of terrarium keeping can only be assured by breeding enough animals in captivity - this public pressure, and hence the laws, are mainly caused by bad care of the animals in the countries of origin and also by some irresponsible dealers.

Although we have 80 species now, I believe we will end up with 30-40 speices, which breed most readily here. While I am building terraria I am at the same time expanding my populations. To mention one species as an example: in November 1989 I bought 12 *Basiliscus plumifrons.* Now I have about 150 *Basiliscus plumifrons* (bred from the original 12) (March 1991). By the middle of 1992 I expect to breed about 100 green *Basiliscus* each month.

I don't want to use this space to mention all the species I have, since this can be looked up in Slaven's books.

I want to breed about 500-1000 individuals of each species annually. Within a few years I expect to produce some 10,000 - 20,000 lizards each year. The genera *Basiliscus Eublepharis, Amphibolurus, Lacerta, Sceloporus* and *Physignathus* will make up the bulk of this number.

With the money provided by the sale of these offspring I can return to my first wish: breeding endangered species of the genera *Uromastix, Cordylus, Cyclura, Shinisaurus,* etc.

I hope my work will make it possible for other seven year old boys or girls in future to start their interest in nature by being able to keep a lizard from my captive breeding program. It is for this reason that I started breeding many cheap affordable lizards along with more expensive ones. Such lizards are *Lacerta strigata, Psammodromus algirus, Leiocephalus carinatus, Eublepharis macularius, Basiliscus basiliscus.*

Nature protection in future will be very much strenghthened by the fact that our youth is still able to have direct contact with nature. Either too strict laws, which will forbid the keeping of anything "wild", or the lack of availability of animals for terrarium keeping, will in the long run work against nature protection as a lack of concern arises from ignorance.

BOOK REVIEW

The Snakes of Thailand and Their Husbandry, by Merel J. Cox

Krieger Publishing Company, Malabar, Florida, 1991. U.K. Price: £37.50

The book reviewed here is the first comprehensive treatise on the snakes of Thailand since Taylor's (1965) monograph, which is not widely available today, and it is also the first one to include colour photographs. Few herpetologists are active in that part of the world, so that any new study of the herpetology of south-east Asia fills a major gap. The stated aim of this work is: a) to provide information necessary for the reptile keeper interested in Thai snakes, who wants to offer his/her captives optimum conditions: (b) to provide an up-to-date list of Thai snakes, with their habits and characteristics.

The book is subdivided into two main parts. The first covers a number of preliminary topics, including a thorough description of the geography and climate of Thailand. Various general topics regarding the snakes of Thailand (biology, anatomy, the relationship between the Thai people and snakes, and snakebite) are then covered, followed by a fairly comprehensive section dealing with snake husbandry, and its veterinary aspects.

The second, and major, part of the book consists of descriptions of every single species and subspecies of snake found in Thailand, an impressive total of 161 species from 67 genera. Species accounts follow a standard format, beginning with a description of the external morphology (colour pattern, scalation, size). In the case of some pairs of similar species, tables listing distinguishing characters are given. In addition, brief life history notes, particularly on reproduction, and short hints on husbandry, are provided for species for which information is available.

The nomenclature used is generally up-to-date. The author makes a point of correcting some common misconceptions regarding frequently confused species, especially in the genus *Trimeresurus*. Unresolved problems are pointed out throughout.

No fewer than 11 species are illustrated in the 164 colour plates, of which some are excellent. Most species are illustrated once, but in variable species, a number of different colour forms are shown. In particular, the astonishing degree of variation in the hoood mark of the Monocellate Cobra (*Naja kaouthia*) is illustrated by 9 excellent photographs, which go a long way towards demonstrating why the nomenclature of these snakes was in such a mess until now.

The reference list is up-to-date until 1989, but not particularly comprehensive. This is not in any way surprising: few European or North American workers can imagine the difficulties involved in obtaining literature on the local fauna in Asia. A browse through any Bangkok book shop is far more likely to reveal Arnold & Burton's *Field Guide to the Amphibians and Reptiles of Great Britain and Europe* than any publication on Asian herps. Workers in those countries are therefore almost entirely dependent on the generosity of their western colleagues for literature. In this respect, BHS members should spare no effort in helping our colleagues in the tropics in obtaining literature.

The main section of the book is followed by 10 appendices. These include admirably detailed climatic data for 30 localities scattered throughout Thailand, a comprehensive international list of herpetological societies and organizations, and a list of the vernacular Thai names of the various snake species in Thai script, with their transcription into Latin alphabet, and their English equivalent. This appendix provides a fascinating perspective on the way in which other people view the same animal, and should be useful for fieldworkers seeking information from the local population.

The overall impression ofthe book is very favourable. It is printed on high quality gloss paper, in easy-to-read typeface. The book appears robust, and should survive a fair amount of punishment. While it is a bit large and heavy for field use, it certainly belongs in the glove compartment of any herpetological fieldwork vehicle operating in SE Asia.

There are a few quibbles: a number of colour plates are printed upside-down, due to a publisher's error; Plate 55, stated to depict *Enhydris bocourti*, actually shows *Aipysurus eydouxii*; the line drawings are computer drawn, which is innovative, but hasn't worked: a reasonably competent artist would have done a better job in the traditional manner.

Nevertheless, in summary, this is an impressive book, which finally makes one of the most exciting herpetofaunas of the world accessible to the interested public. This book belongs on the bookshelf of anyone interested in Asian herpetology, or in snakes in general.

Wolfgang Wuster

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* **For sale:** captive bred Boa constrictors *(Constrictor constrictor)* and Emerald Tree Boas *(Corallus canina)*, expected August. Simon Townson, tel. 081 531 1378.
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