The HERPETOLOGICAL BULLETIN

Number 74 – Winter 2000

BHS membership survey results • Herpetological notes on the Dodecanese Islands, Greece • Natural History of Blanding's Tree Snake • Monitoring a population of Common Toads • Parental care in crocodilians • Occurrence of *Mabuya bistriata* in French Guiana • Distribution of the Banded Newt in southeastern Turkey • The African snake *Bothrophthalmus lineatus*

THE HERPETOLOGICAL BULLETIN

The **Herpetological Bulletin** (formerly the British Herpetological Society Bulletin) is produced quarterly and publishes, in English, a range of features concerned with herpetology. These include full-length papers of mostly a semi-technical nature, book reviews, letters from readers, society news, and other items of general herpetological interest. Emphasis is placed on natural history, conservation, captive breeding and husbandry, veterinary and behavioural aspects. Articles reporting the results of experimental research, descriptions of new taxa, or taxonomic revisions should be submitted to The Herpetological Journal (see inside back cover for Editor's address).

ISSN 1473-0928

Printed by Metloc Printers Limited, Old Station Road, Loughton, Essex.

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5. The significance and importance of some articles may be such that the Editor will offer the author a year's free subscription to the Society for their work.
6. The Editor is keenly aware that contributors may find some of these instructions difficult to comply with and is anxious that the pages of the Bulletin should remain open to as wide a range of correspondents as possible. Therefore, if an author has concerns about the suitability of a manuscript, or would like help in preparing it, please contact the Editor to discuss.

The views expressed by the contributors to the Bulletin are not necessarily those of the Editor or the British Herpetological Society.

All submissions and correspondence arising from the Bulletin should be sent to the Editor, Peter Stafford, c/o Dept. of Botany, The Natural History Museum, Cromwell Road, London, SW7 5BD. *E-mail: pjs@nhm.ac.uk*

Front cover illustration
Fiji Island Iguana (*Brachylophus fasciatus*), from an original lithographed plate in *Proceedings of the Zoological Society of London*, 1862. Reproduction courtesy of the Zoological Society of London.

BHS MEMBERSHIP SURVEY – 1999

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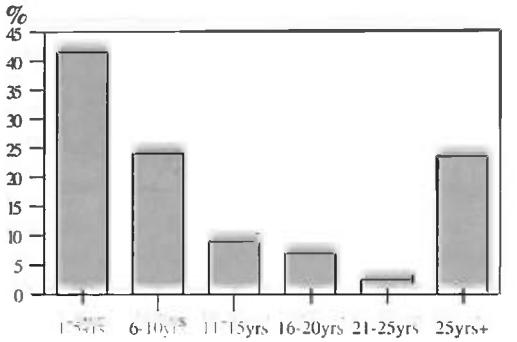
FIRSTLY, thanks to all members who returned completed survey forms. A total of 204 forms were returned, a response rate of about 30% - extremely good for this type of exercise where response rates of 5% or less are considered the norm. More would have been even better of course, but many members may be content to just receive the Society publications and not wish for greater engagement. I apologise to all those who responded for the delay in producing this article - although some momentum may have been lost, I believe the results remain fully valid and can usefully inform future Society strategy.

After collating the data, I produced a series of overhead transparencies for a presentation at this year's AGM - these are reproduced here. This was the first such survey carried out in any systematic way in the Society's history. The Society exists to facilitate herpetological study for members, but in the past, understanding of what the membership's expectations and wishes are has been limited. The survey was intended to go some way towards rectifying this. Some of the results are surprising, some worrying, but all are interesting. Where a percentage is included, this is percentage of the total returns unless otherwise stated. Let's run through them.

1. Length of membership: the relatively high percentage of members who have been with the Society between one and five years is encouraging - recruitment of new members has not generally been a problem over the last few years. In fact, 27 forms were received from people with membership of a year or less; this level of interest from members with such a short

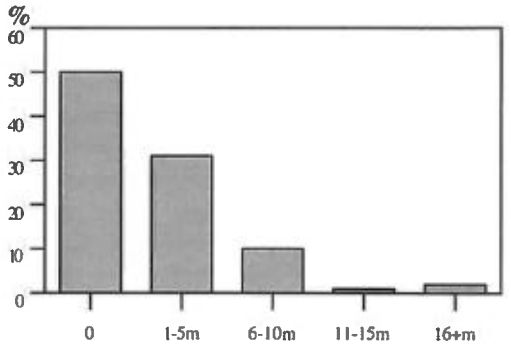
Length of Membership



acquaintance with the Society is good news for the future. This figure was only beaten by the 31 responses received from members who had been with the BHS for 10 years. The drop-off between 6 and 25 years is as would be expected for any number of reasons, but does highlight the fact that membership retention is as much, if not more, of an issue for Council to address as recruitment. The late peak of 25 years plus is worth noting, with no less than 10 forms received from members who have notched up more than 40 years with the Society, a level of loyalty which can only be applauded.

2. Contact with other members: this is worrying. That 50% of the sample report little or no contact with other members shows a failing on the part of the Society and Council. Our administration systems have not to date included any register of member's interests, contact details, etc. This needs to change and we are proposing to set up such a database - but only of course for those members who wish to be included. Most members who returned survey forms didn't register a problem with the idea of some of the information being included on a computerised database, so we have a start with the info we already have. The more information the better of course, so if you like this idea and want to be included (but didn't return a survey form), keep an eye on the Natterjack for details of how, when and

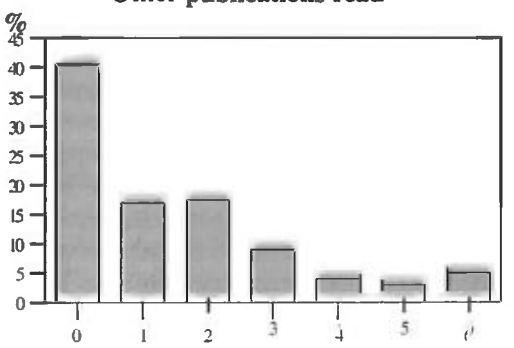
Contact with other members



where to send it (depending on publication dates, these may in fact have appeared before you read this). Equally important of course is what the Society does with such information to facilitate contact between members - and again, once we've worked out the likely mechanics, we'll announce the system in the Natterjack. Security is obviously a concern, particularly if the Internet plays a part, and this will be given due consideration.

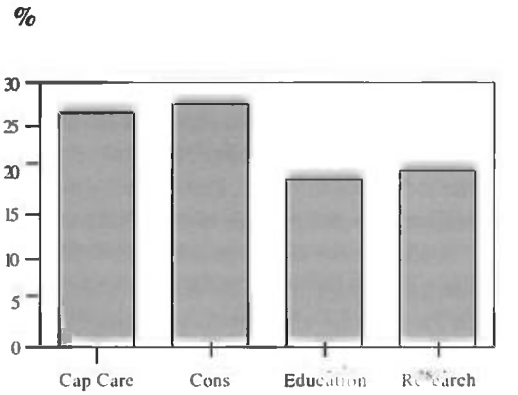
3. Other herp publications read: this is both surprising and a little worrying. More than 40% of respondents reported that they didn't read any other herp publications. Can this be right? Perhaps the lack of other readily available herp publications in the UK is a factor here. Whilst imported magazines, journals etc are around, they have to be tracked down and most require a subscription, being unavailable on any other basis. And this of course includes the only UK produced magazines as well. On the other hand, perhaps it's an indication of the general quality of BHS publications (this certainly applies to the *Journal*) that many members don't feel the need to take other periodicals on a regular basis.

Other publications read



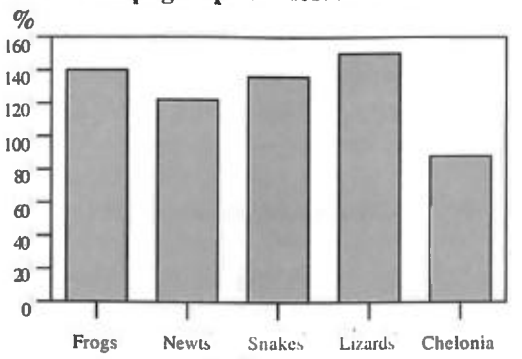
4. Areas of main herpetological interest: respondents were asked to rate areas of interest via a score system, depending on their level of interest/involvement; the vertical scale therefore represents percentage of the total score accrued by all four options, *not* percentage of the sample. The result clearly demonstrates the broad interest range of the BHS membership; it's unlikely that any other UK herpetological group would have recorded results like these and this alone clearly differentiates the Society from other groups.

Main areas of interest

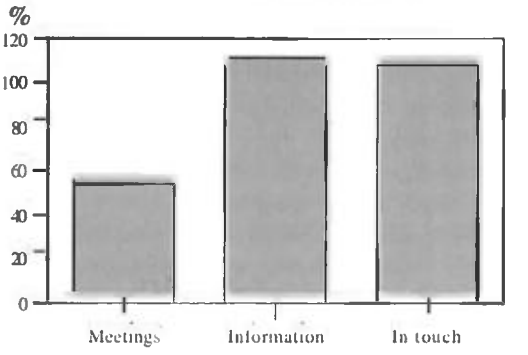


5. Herp groups of most interest: this section generated some confusion among respondents. What I was after was just a tick against 'groups of interest' but some members scored them using the scale from the previous question. My fault, the two questions weren't clearly separated, hence the misunderstandings. I took any medium/high score as a tick against that group and the chart shows the straightforward resultant score (i.e. total number of ticks) for each group. No great surprises, although I would have expected snakes to come out on top if anything, but again, broad interest is clearly shown with amphibians in particular scoring pleasingly highly. Another point of differentiation, I suspect, from other societies.

Herp. groups of most interest

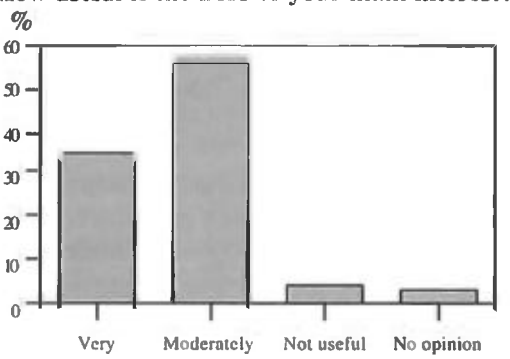


How could it be more useful?



6. Usefulness of BHS: answers will depend on a number of factors, so the result is perhaps of questionable value. Sample bias might intrude here - perhaps members who found the Society not very useful would be unlikely to return survey forms at all. Not a cause for complacency, then. Nonetheless, the low percentage of respondents indicating 'not useful' is reassuring to some degree.

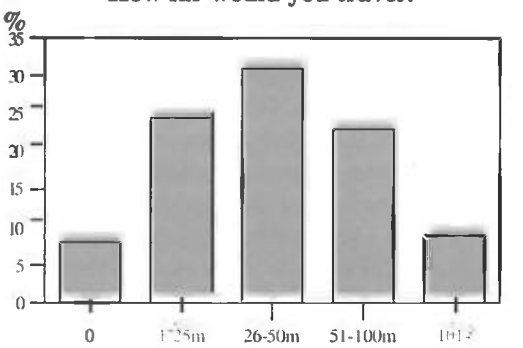
How useful is the BHS to your main interest?



7. How could the Society be more useful? again, the vertical scale shows total score (ticks), for each option. The high number of respondents (around 50% of the sample) who indicated that putting them in touch with other members would be useful should come as no surprise after the findings in (2) above. If we can get this sorted, it should go some way to answering the call for more information as well. The amount of knowledge and expertise residing within the Society - on all aspects of herpetology - must be enormous. We must find a way of liberating this and making it more available. Meetings are of course excellent forums for information exchange, which leads us neatly on to..

8. Potential travel distance to meetings: general poor attendance at many BHS meetings is a long-standing issue within Council and is often debated. Knowing this, I'm reluctant to draw too many conclusions from the results to this question. Clearly, ease of access, public transport, parking, etc. are all factors which will influence members' attendance as well as distance. On reflection, this was perhaps a missed opportunity. A more detailed question asking what members wanted from meetings and preferred location and type of venue would probably have yielded more useful information - although there was of course space on the form for additional comments about any issue. However, the excellent attendance (50+) at the recent Captive Breeding Committee meeting at Birkbeck suggests that adequate advertising (outside the Society) may be the key. Barry and

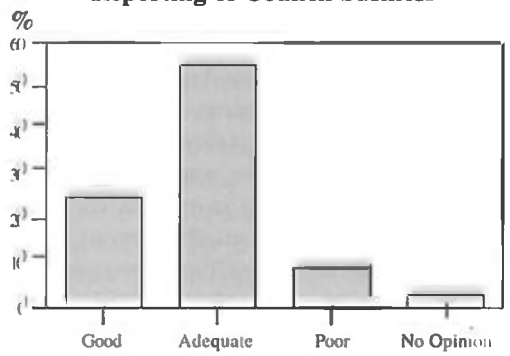
How far would you travel?



Pat Pomfret deserve credit for this success. Hopefully it will be the start of a new trend.

9. Reporting of Council business: this has been an issue in time past, but has I think improved significantly with the development of the Natterjack - a suitable forum for such reporting. The majority of respondents rated Council reporting as good or at least adequate, which means we're probably getting it about right. Bureaucratic minutiae isn't everyone's turn-on and indeed one honest gentleman replied that he didn't know as he never read those bits..and I suspect he's not the only one. Fair enough, but it's important that members at least have the opportunity to hear about what Council is doing on their behalf - transparency of Society administration has not been a Council strength in the past with the resulting danger of appearing remote to members. Hopefully Council will continue to improve reporting further, but with the proviso of course that it's not what members want to read about most.

Reporting of Council business



Involvement in UK herp conservation: The percentage of members (who returned forms) involved in UK herp conservation in some way was creditably high - 43%. This slide gives the score results of that involvement - *not* percentages as some people of course could and did tick several options. To find that, out of a *total* sample return of 204, 44 members - almost 25% - are involved in Great Crested Newt conservation in some way is surely a credit to the society. Higher numbers would be even better of course, and hopefully we will be able to facilitate and encourage that in the future. Members with more direct and up to date knowledge of the UK conservation scene than myself may be able to comment further on these results.

Breakdown of involvement

- G crested newts – 44
- Natterjack toads – 11
- Other Amphibs – 50
- Reptiles – 48
- Prac voluntary – 69
- Prac professional – 19
- Campaigning – 20
- Research – 21

Publications rating: Members were also asked to rate the content interest of the three main publications. They scored as follows:

	High	Medium	Low
Natterjack	95	98	11
Bulletin	98	85	9
Journal	69	62	42

The scores for the Natterjack and Bulletin are very encouraging. I'm sure the new editors of both will be keen to improve the rating even further, but of course they can only work with the material they receive. The Journal's score is not unexpected - it's a specialist scientific publication, which by its very nature will be of high interest to some members and low to others. All credit to the Journal's editors that, despite being a publication produced by essentially voluntary effort, it is rated so highly in its field.

The survey forms contained space for additional comments and around half of the respondents took this opportunity to add to the information they'd already supplied on the rest of the form. I had intended to include some sort of summary of the comments in this article but the range and diversity of the views and ideas

expressed defied any meaningful summation. This must be a good thing and is not altogether surprising. The BHS covers a very broad field of interest, including some possibly opposing interests. A wide range of opinions and expectations could therefore be expected from the membership.

The comments, ideas and criticisms have added very usefully to the feedback received from the survey. A list of all the main issues raised has been circulated to all council members and I would be happy to supply a copy on request to any other members who would like to see it. Thanks to all who took the trouble to add their views.

CONCLUSION

When first suggested, the idea of a postal survey met with understandable scepticism from some Council members, concerns about typically low response rates for such exercises being uppermost and entirely valid. Others (John Spence in particular) were wholly supportive, on the grounds that even a small return would give Council a greater understanding of member's expectations than it ever had before. The success has shown however that, given the opportunity to engage with the Society, a significant number of members are willing to contribute information and views. The challenge for Council is now to build on this and where possible, to incorporate the expectations and wishes expressed into a strategy for the Society's future. Feedback from members need not stop here of course. The Natterjack provides an ideal forum for views and comments that are intended for general circulation; Council members will be happy to receive any that aren't.

ARTICLES

HERPETOLOGICAL NOTES ON THE ISLANDS OF LIPSI AND AGATHONISI, DODECANESE, GREECE

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THE islands of Lipsi and Agathonisi were visited in the period June 15th to July 12th 1998. I can find little published herpetological literature on the former island and none at all about the latter. Chondropoulos (1989) lists *Coluber nummifer* and *Vipera xanthina* from Lipsi. The same author in his 1986 checklist of the Greek lizards makes no mention of any species from this island.

LOCALITY DESCRIPTIONS

Lipsi lies 12 km east of Patmos and 11 km north of Leros and has an area of 16 km². The island is hilly with a maximum altitude of 277 m. There is limited cultivation, mostly fields of barley and wheat with some olive groves and private vineyards. The landscape is dry and stony with typical low Mediterranean scrub. Although Lipsi receives plenty of visitors in high season, tourist development is low-key with only limited environmental disturbance in the vicinity of the port, the island's only village.

Agathonisi is the most northerly of the Dodecanese situated about 15 km north east of Lipsi. It is an example of 'unspoilt Greece' with no tourist development, although the harbour is a good anchorage and consequently utilised by yachts in the summer. However the island has now become attractive as a day trip destination from Samos. A concrete road connects the harbour with Megalo Chorio, the island capital, and continues further to the abandoned village of Katholika. There is also a road from the port to Mikro Chorio, a distance of about 500 m. Otherwise there are stony paths and goat tracks. There is little cultivation and the islanders earn a living from livestock husbandry, mostly goats, and fishing. Near Katholika there are two fish-rearing complexes.

LIPSI

During my stay on this island I met Paul Perry, an Australian amateur herpetologist, who had also visited Lipsi. Without any prompting he described Lipsi as 'an island without lizards'. This was the remarkable impression I got. Despite long walks and much hard searching I failed to find any lizards at all. The ubiquitous Dodecanese species, the Starred Agama *Agama stellio*, and the Snake-eyed Lizard, *Ophisops elegans*, appeared absent. It would be unwise to exclude these species from the herpetofauna but if they occur they must be rare or very localised. The Green Toad, *Bufo viridis*, was found around Lipsi village, one adult and several juveniles, all as road kills. A single newly metamorphosed juvenile was seen alive on the margin of an artificial rain catchment system.

On my first morning at 07:30 I found a 72 cm-long *Vipera xanthina* lying dead on a stone wall by a path, Fig.1. The snake was still showing signs of movement and could not have been killed more than a short time before. A villager who was passing told me that this species is common, but despite this assertion I failed to find any more. Andren & Nilsen (1986), in their monograph on Middle Eastern mountain vipers, refer to one specimen from Lipsi amongst the material they examined.

As stated in the introduction, *C. nummifer* is recorded from this island, but I found no evidence of this species.

Vipera xanthina from Lipsi, Dodecanese.
Photograph by author.

AGATHONISI

A good deal of the island was investigated on foot, distances being small. More concentrated searching was done in the vicinity of the port and the villages of Megalo- and Mikro Chorio. *A. stellio* was found everywhere, mainly on stone walls and rock piles and occasionally on open ground. Though less common, *O. elegans* was also evident in some numbers though it tended to be colonial and occasionally solitary. The Turkish Gecko, *Hemidactylus turcicus*, was found after dark. Two specimens were seen on a stone wall in a dry gully near the harbour and also on stone blocks under streetlights on the steep road up to Megalo Chorio. The owner of the pension where we stayed told me that this species used to be found on the walls there 'but not now'.

The locals assured me that there are no poisonous snakes on Agathonisi. The only snake species I found was *C. jugularis caspius*. A small individual was caught on open hillside in the vicinity of Katholika - total length 66 cm, tail 11 cm. A larger example was seen crossing the road above the harbour: estimated at around 130 cm. In the same area a tourist saw another and Paul Perry found a cast skin nearby. In the gully behind the harbour one was seen by a local. Near Mikro Chorio an unidentified snake was briefly glimpsed as it slipped into a stone wall. People told me that *Coluber j. caspius* was the only snake on the island. It was not feared and is recognised as beneficial because of its rodent-feeding habits. The local name was given as Pondikalos or Pondikali. 'Pondikos' is the Greek for mouse. I was also told that this species is difficult to find, although on the basis of the number of specimens observed during my stay, either personally or by others, and taken into consideration the season it seems that this snake is probably common.

SUMMARY

The above report indicates an impoverished herpetofauna on both islands. However, Summer is not the best season for investigations and there are probably more species awaiting documentation. It is worth noting that the herpetofauna of both Patmos and Leros is richer. There are many small satellite islands in the neighbourhood of Lipsi and Agathonisi and these should make a rewarding study. A few days were also spent on Samos at the end of the trip but little was found. Reptiles and amphibians identified were *Rana ridibunda, Lacerta trilineata, Agama stellio, Ophisaurus apodus* and *Coluber jugularis caspius*.

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POLYMORPHISM, SEX, SIZE AND OTHER ASPECTS OF THE AFRICAN SNAKE, *BOIGA BLANDINGI* (HALLOWELL, 1844)

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BLANDING'S Tree Snake was described by Hallowell (1844c: 170) from a Liberian specimen (ANSP 10083) sent him by Dr. Blanding. In the type the throat, jaws and 'underparts' of the body were said to be light yellow and each side marked with 'leaden blotches'. Schmidt (1923:103) had 20 specimens from seven 'localities in the forest' and noticed that 'colouration is very variable, with two distinct phases' four black, rest, 'brownish, with more of less distinct wide dark cross-bars, -' and only five with divided 'anal' - cf. my Ugandan data. Pitman (1938: 136) also recognised the existence two colour forms - on the one hand black, on the other brown, but only later did he (Pitman 1974: 127) recognise that adult males are black whilst females are brown, and he asserted that Ionides and Leakey had found the same. Lawson (1993: 65), in the light of five specimens from Cameroon, has echoed these claims.

A recent study of 50 Nigerian specimens by Luiselli et al. (1999a) led to no original observations on colouration, information of this being quoted from Pitman (1974). Coborn (1991: 371) has felt able to write, '*Adults* almost uniformly black, juveniles brown with dark cross bands' [my ital.] and Cansdale (1961: 43, 1973: 43), 'Both colour forms are distinct *at all ages* and do not begin the same, - -' [my ital.].

In the light of these claims and ambiguities, an examination was undertaken of all specimens in the Natural History Museum, London (BMNH, 34 male, 27 female) and the results combined with my records (C3B) of 102 specimens from Ghana.

COLOURATION AND SEX

First, my Ghana records: Juveniles (11 male, 10 female: many were not sexed or details are missing and the specimens no longer accessible) possess a distinctively bright and contrasting pattern of chocolate brown blotches (see Pitman's 1974, Plate V, fig. 5 at p. 122) which has often led to museum specimens being misidentified as *B. pulverulenta*. All but one (female, C3B92, 840+236 = 1076 mm) are less than one metre in total length. Otherwise adults are defined as over one metre in length and all males (36) are black and females (17) are khaki-brown and blotched (see photograph of Cameroon female, 1340 mm s-v length in Lawson 1993, fig. 39), with the following exceptional males, arranged in order of increasing snout-vent length [colour notes inadequate for remaining specimens]:

1.	C3B42	791 + 217 = 1006 mm
2.	C3B119	890 + 254 = 1144 mm
3.	C3B3	]230 + 353+ = 1583+ mm
4.	C3B43	]358 + 411 = 1769 mm
5.	C3B95	]430 + 377 = 1807 mm
6.	C3B116	]590 + 432 = 2022 mm
7.	C3B24	]760 + 515+ = 2275+ mm

All these - with one exception, possess a blotched pattern increasingly obfuscated by deposition of melanin such that the pattern could be overlooked in nos. 5 - 7. The one exception (4 above) is of large size but shows no sign of darkening. This may be an example of delayed onset of melanisation or the exceptional 'transvestite' which is not unexpected after studying sexual dimorphism in *Dispholidus typus* (Hughes, unpubl. obs.). The process of darkening would seem to occur at a wide range of size and presumed age but is almost inevitable. Laurent (1964: 109) had two male specimens from Dundo, Angola and remarked that one was black but implied that the larger (1858+394 = 2252 mm)

was not! No such change occurs in females and black females are known.

Vogel (2000: 40) has recently shown that *Boiga dendrophila gemmicincta* of Sulawesi darkens to black with age but without any restriction as to sex. Two specimens of *Boiga cynodon* (var. B of Boulenger 1896d: 79, specimen a, now BMNH 86.12.28.23 and specimen c, now 66.4.24.1) appear to be darkening, as though undergoing a process similar to the darkening of *Boiga blandingi* males.

The sex ratio is equal amongst juveniles but amongst adults there are twice as many males as females! This may reflect a greater activity of males making them more likely to be encountered and caught. Cansdale's (1955) claim that the black form is found in clearings, the brown in forest, may reflect the greater activity of the male or it may reflect the greater visibility of a black snake in an open space or, as Cansdale himself suggests, this may simply be an accident - of small sampling one may add!

SIZE

Pitman (1938: 136) had no specimens exceeding Sternfeld's (1910: 25) maximum of 2500 m yet by 1974 (Pitman 1974: 126) he could write of specimens of 2438 mm (= 8 ft) being common and those of 2743 mm (= 9 ft) not rare! Our maximum sized male is 1710+485 = 2195 mm (C3B124, Legon Hill, collected 25 May, 1986 by James Cofie) and female 1820+530 = 2350 mm (C3B123, Legon Hill, collected by Godfrey Prah, early Nov. 1984). The largest male in the BMNH collection (73.4.24.1, from Gabon) is 1700+543 = 2243 mm, largest female (BMNH 1957.1.4.29, from Njala, Sierra Leone) is 1730+450 = 2180 mm. Goodman (1985a) had a Ugandan female of total length 2525 mm.

PREY

In Nigeria, Luiselli et al. (1998b: 127, table 3) had six records of bird-eating (*Nectarinia sp.*) in a sample of seven, whereas Luiselli et al. (1998a: 432) with a sample of 52 found specimens less than 1300 mm total length to include only one mammal amongst 11 prey items which were otherwise reptilian, and specimens exceeding 1300 mm in total length to have ingested eight birds and three rodents but no reptiles. The outcome may well depend upon sample size, an earlier study (op. cit. 1998b) including but two records of *Mehelya* and so missing the well-know ophiophagy of species of this genus. Analysis of my Ghana records along the same lines as Luiselli et al. (op. cit.) provides the following:

500+130 = 630 mm	skink
577+165 = 742 mm	*Agama*
712+188 = 900 mm	*Agama*
955+275 = 1230 mm	mouse
e1005+335 = 1340 mm	bird
e1017+338 = 1355 mm	bird
1120+344 = 1464 mm	*Agama*
1130+285+ = 1415+ mm	bird, fledgling

1300 mm snout-vent length is the 'break' point of Luiselli et al. 1998b.

[1]315+345 = 1660 mm	bird, Bulbul
[1]318+365+ = 1683 mm	Agama
[1]333+390+ = 1723 mm	Agama
[1]450+455 = 1905 mm	bird, ?weaver
[1]480+46 = 1943 mm	bird, dove
[1]508+232+ = 1740+ mm	bird, as feathers
[1]510+354+ = 1864+ mm	Agama
[1]645+470 = 2115 mm	Agama
[1]650+? = ? mm	bird, fledgling weaver + *Agama*
[1]760 + 515+ = 2275 mm	bird, as feathers

This shows how agamids remain an important component in the diet of large individuals and this may well depend on the availability of large specimens as prey rather than a supposed ontogenetic change in prey preference. Johnsen (1962: 120) found a bird in the mouth of a juvenile female (880 mm total length) from Liberia. Laurent (1964: 109) too, writing on specimens from Dundo, Angola, mentions a juvenile which contained the remains of a bird. Similarly, Groves (1973: 107) found that five young (660 - 690 mm total length) in captivity refused lizards and frogs offered them and took

Fig. 1 Black specimen of *Boiga blandingi* from Ghana, assumed to be male, sent alive to USA.

only 'small mice'. This contradicts Green's (1989: 201) neat but misleading categorization.

Cansdale (1961: 44) mentions that in Ghana this species is known by the same Twi (typo as 'tree' !) name as the Egg-eating Snake (*D. fasciata*) in the forest zone. When in Ghana I came across complaints of this species taking eggs from poultry (eg. C3B29, 85, 91), but the Black Cobra (*Naja melanoleuca*) reaches a similarly large size and is also known to sometimes exhibit the same habits.

HABITAT

'This snake appears to be associated directly with forest away from which it is never found', says Pitman (1938: 137) and later (Pitman, 1974: 125) gives its range as 'Equatorial Rain Forest species' and marks it (Table II, at p. 171) as 'forest' only. This supposed restriction to forest is repeated by eg Witte (1941: 210), Roux-Estève (1969: 116), Chippaux (1999: 142). Similarly, I have listed this species as of the rain

Fig. 2. Brown-blotched female *Boiga blandingi* from Kakamega, Kenya (Photograph courtesy of Stephen Spawls).

forest (Hughes 1983: 342) but have for long been aware of records from outside the forest zone and far removed from gallery forest eg. at Binaparba (09.14N 00.46E, Hulselmans et al., 1970: 316) in part of Togo contributing to the 'Dahomey Gap' in West African rain forest; at Zonkwa (O0.47N 08.17E) in Nigerian savanna; at Golokuati (07.00N 00.26E) in Ghana (Leston 1970: 143); and on the University of Ghana campus, Legon. When mapped, there is an association with the forest zone but this is a tree snake and will occur where there is enough tree cover, its principal food appearing to be birds, roosting or nesting.

GEOGRAPHIC RANGE

Loveridge (1957c: 269) gives the geographic range as from Guinea in the west to Uganda and Angola in the east and south. Pitman (1974: 125) notes occurrences in Zambia and Angola as well as Uganda; Angel (1933e: 756) and Villiers (1950b: 92, 1975: 127) gives a range of Senegal to Uganda. The source of the Senegal record seems to be Rochebrune (1884a: 180) or Boulenger (1896d: 78) who writes, '- - from the Senegal to the Congo; -' which I read as referring to the Senegal River, not the country by that name. More discerningly Chippaux (1999: 141) gives the range as from Guinea to Kenya. Rasmussen (1997b: 97) has published a reliable, one-degree-square map of

the geographic distribution of *Boiga blandingi* which excludes Senegal from the range.

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MONITORING A BREEDING POPULATION OF COMMON TOADS (*BUFO BUFO*) IN A HOUSING DEVELOPMENT

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DURING the 1990s the subject of surveying and monitoring populations of the British amphibian species generated considerable interest (eg. see discussion about techniques in Griffiths & Raper, 1994; Griffiths, Raper & Brady, 1996; Griffiths & Inns, 1998). Authors have generally agreed that populations of the Common Toad (*Bufo bufo*) can best be surveyed by counting heads at night at peak breeding season. One problem encountered with toads is, however, that they often breed in large deep sites that present logistical or safety problems for the surveyor, especially at night. Partly as a consequence, day counting, spawn string estimation and road casualty counts have also been used (eg. Cooke, 1995; Cooke & Oldham, 1995).

An opportunity arose at the end of the 1980s to undertake an annual suite of observations on a toad population breeding in a pond in Cambridgeshire. The main aim as regards monitoring was to determine the usefulness of certain variables other than total night count. This exercise also provided the opportunity to determine whether retention of a breeding pond within housing could prove successful for a toad population, as it had for a population of Crested Newts, *Triturus cristatus* (Cooke, 1997).

SITE AND METHODS

In the mid 1980s, toads bred in three washing lagoons behind a vegetable packing plant in Bury, Cambridgeshire (grid reference TL 282843). Neighbouring housing had been built in the mid 1980s, in the 1970s and more than 30 years ago. The plant itself was pulled down and replaced by housing during 1988 and 1989. Part of the largest lagoon was safeguarded as a toad breeding pond within the new housing development, and was managed by the local Wildlife Trust. By 1989, however, this pond was totally surrounded by housing.

Final dimensions of the pond were about 25x15 m, with a terrestrial margin of about 5 m.

Site of breeding pond within housing development at Bury, Cambridgeshire. Photograph by A.S. Cooke.

Water level has remained fairly stable with the pond being recharged by run-off, but having an overflow pipe to the drainage system. Toadlet production occurs every summer but is variable. The whole site amounts to only about 0.1 ha, but toads migrate in to breed over distances of 500 m or more despite the constraints to movement posed by the new houses, roads, kerbs, fences, walls etc. The two nearest toad colonies to the site are more than 1 km away in the neighbouring town of Ramsey.

The modest size of the pond, that there was ready access around the edge and that the water was reasonably clear meant it was an ideal situation to visit regularly each spring to record the following peak counts: daytime and night-time counts for pairs and total numbers; road casualties on a circuit of 1.6 km including a 500 m length of the B1040. It should be stressed that the counts are not estimates of total numbers in the population, which remain unstudied; total numbers may be at least an order of magnitude higher than the counts (eg see Cooke & Oldham, 1995). A spawn string index was estimated for each year (Cooke & Oldham, 1995). This index was derived by probing the water's edge with a cane and counting what were considered to be individual strings or groups; the technique is intended to be used in a comparative manner and does not represent an absolute measure. Counts were also made of spawn clumps for the Common Frog (*Rana temporaria*).

RESULTS AND DISCUSSION

Results are summarised in Table 1. Initial data collected were casualty counts on the B1040 (toads on the rest of the circuit of roads were counted from 1990). Observations on the toads in the water began as development of housing started in 1988. Over the ten year post-development period, 1990-1999, few observations were missed. In some years spawn index was recorded as a range; in those cases the mid point of the range is given in Table 1. Finite estimates of toad spawn index were not available in 1991 (when visits later in the season were lacking) and 1992 (when some toads spawned in vegetation in the centre of the pond). The figure for spawn in 1992 was used in the ranking analysis below as it was the highest recorded; but that for 1991 was discarded. Illness prevented visits at night in 1999.

Spearman rank correlation coefficients (r_s) were calculated on pairs of variables considered to be ecologically meaningful; particular emphasis was given to peak total day counts which are most readily undertaken. Each of the first seven variables listed in Table 1 may reflect the true population trend over time and significant positive relationships between total day count and other variables would support its use alone to monitor population fluctuations:

Total day count vs casualties on the B1040, 1988-1999, $r_s = 0.745$ ($P<0.01$); vs casualties on other roads, 1989-1999, $r_s = 0.530$ (NS); vs casualties on all roads, 1989-1999, $r_s = 0.636$ ($P<0.05$); vs day pair count, 1988-1999, $r_s = 0.589$ ($P<0.05$); vs spawn index, 1988-1999, $r_s = 0.548$ ($P<0.05$); vs total night count, 1989-1998, $r_s = 0.806$ ($P<0.01$); vs night pair count, 1989-1998, $r_s = 0.567$ ($P<0.05$).

Day totals were positively related to a range of other variables and can clearly be used for monitoring. However, night-time totals tended to be higher (paired t test, $P<0.05$).

Casualty numbers on the two lengths of road were related to one another ($r_s = 0.806$, $P<0.01$), and casualties on all roads were related to total night counts ($r_s = 0.825$, $P<0.01$). Previously I have been cautious about using data on

casualties to indicate population trends in another local breeding pond (Cooke, 1995), but at this site road casualties reflected numbers seen alive in the breeding pond. Spawn index was related to total day count, but was not significantly related to total night count or to day or night counts of pairs (P>0.05). However, it can be a valuable addition to day counts in sites that are difficult or unsafe to survey at night (Cooke & Oldham, 1995).

Turning to whether toad numbers have changed over time, the two longest data sets were for casualties on the B1040 and for total day counts. There was a significant negative relationship between the former and years (r_s = -0.779, P<0.01), but not for the latter (r_s = -0.420). A number of the data sets revealed highest numbers in 1991 after comparatively low numbers when the houses were being built in 1988 and 1989. Therefore examining data post-development seems a reasonable approach. Total day counts showed a significant negative relationship with time, 1990-1999 (r_s = -0.685, P<0.05); and a similar relationship existed for casualties on all roads (r_s = -0.867, P<0.01). Thus a decline in population level was confirmed for the 1990s. Regression analysis for total day counts and for casualties on all roads, each individually expressed as log (y + 1) against year, predicted that numbers will decline to zero in 2003 (SE, 2 years) or 2006 (4 years) respectively. So this toad population may become extinct midway through the current decade, a fact which has been drawn to the attention of the site managers.

In contrast, the frog population increased significantly during the post development period (r_s = 0.900, P<0.001). The increase in frogs and the decrease in toads were related (r_s = -0.693, P<0.05), suggesting that competition from frogs may be a factor in the decline in the toad population. However, other factors may also be implicated. The immediate area has changed dramatically in recent decades from a mixed rural and suburban landscape to a predominantly suburban one with relatively high density housing. Death on the new estate roads will have increased spring-time mortality. Construction of houses, fences and walls will have impeded movement to and from the pond;

Year	Dead B1040	Dead other roads	Total day count	Day pair count	Spawn string index	Total night count	Night pair count	Peak date	Frog spawn clumps
1986	33								
1987	18								
1988	8		43	2	25			108	0
1989	48		106	6	37	252	14	90	0
1990	26	72	145	11	50	240	12	72	12
1991	26	119	262	47	>15	434	75	73	1
1992	24	30	210	23	>70	184	25	82	10
1993	9	16	108	2	63	120	10	77	12
1994	8	18	29	8	55	83	9	68	17
1995	9	11	116	15	48	104	9	91	28
1996	1	6	60	5	35	98	6	105	13
1997	2	9	34	4	12	32	3	75	52
1998	1	16	30	8	25	59	16	67	32
1999	4	8	63	8	22			75	96

Table 1. Peak season counts for the toad colony, and cumulative spawn index for toads and number of frog spawn clumps, 1986-1999. The peak date is the day of the year when the highest count of live toads was made. Gaps indicate no data.

and may have caused increased isolation of the toads at this site and loss of genetic diversity (Hitchings & Beebee, 1998). Carrying capacity has presumably decreased as a consequence of the habitat changes; difficulty of access to suitable terrestrial habitat may be a greater problem than lack of habitat. While a reduction in carrying capacity may, in the short term, lead to a lower level of population, the probability of extinction is increased in the longer term (Halley, Oldham & Arntzen, 1996).

Dates of peak counts are given for toads in Table 1. These dates did not change significantly over the years 1988-1999 (r_s = -0.313), but they were negatively related to mean March temperature recorded at Monks Wood about 10km away (r = -0.782, P<0.01). At one of the other two local colonies, where road casualties have now been counted for 26 years, peak migration activity occurred earlier in the year in the 1990s and date was negatively related to temperature at Monks Wood (Cooke, 1995 and unpublished observations). One consequence of the toad season becoming earlier is that the gap between breeding by frogs and toads may be reduced, so increasing competition. Mixed mating pairs consisting of a frog and a toad were first recorded at the main study site in 1990, and then again in 1998 and 1999; in all three of these years, peak activity occurred relatively early in March. If male frogs mate with female toads, the reproductive potential of the latter will be lost for that year.

CONCLUSIONS

This study has shown that monitoring a toad population can be undertaken by recording a number of different variables, total numbers seen during the day at peak breeding season being as useful as any. At this particular site, toad numbers decreased despite part of the main breeding pond being safeguarded within a housing development. An increase in competition from frogs and changes in the terrestrial environment may be implicated in this decline.

ACKNOWLEDGEMENTS

I am grateful to T. Sparks for statistical advice and to Prof. R. S. Oldham and Dr. R. Griffiths for commenting on a draft script. I have also benefited from regular discussions with the site warden, G. Dean.

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WHO WAS THE FIRST TO OBSERVE PARENTAL CARE IN CROCODILES?

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ONE of the most interesting features of reproductive behaviour in crocodilians is the guarding of nests, eggs and hatchlings by parent females, including mouth transport performed by the latter to transport their young safely to water. Currently known from a considerable number of species representing all extant families (gharials being uncapable of mouth transport due to the peculiar shape of their snout; see e.g. Magnusson et al., 1989; Trutnau, 1994), this particular aspect of behaviour had first been observed in southern African Nile Crocodiles (Pooley, 1974, 1977) - 'first' used here in the context of modern zoological literature only. It is true that some early authors (e.g. Bartram, 1792) had reported already on such behavioural traits almost 200 years previously; however, these reports were mostly regarded as myths, legends or even premeditated deceptions. It was primarily Neill (1971) who ultimately disregarded the observations of Bartram and other early writers, over three chapters in his influential monogaph on crocodiles.

In 1977, one of us (WB) discovered another 200 year-old source describing the mouth transport behavior of *Alligator mississippiensis* in some detail (Böhme, 1977): the anonymous author of this work, entitled a 'Natural History of the best writers' wrote in one of its chapters, 'Das Krokodill' (see Fig. 1: 'Crocodyll'), 'Esquemeling assures in his "History of the Buccaneers of America" that the young are swallowed by their mothers when these become aware of a menace, and that he himself was eye-witness when they played around her mother, but that after he had thrown a stone among them, they crawled into their mother's mouth and appeared back only after some time' (Anonymus, 1774; translation from German original: WB).

Following the recent rediscovery of Nile Crocodiles in the southern Sahara of Mauritania (Shine et al., 2000, see Fig. 2) we searched for all available records and other indications of the (former) existence of *Crocodylus niloticus* in the Sahara. The first report on surviving desert crocodiles was published by Duveyrier (1864), from the Tassili n'Ajjer, southern Algeria, and from Lake Mihero, Akkakus Mts. in southwesternmost Libya. Fresh crocodile tracks had been found at Lake Mihero by Erwin von

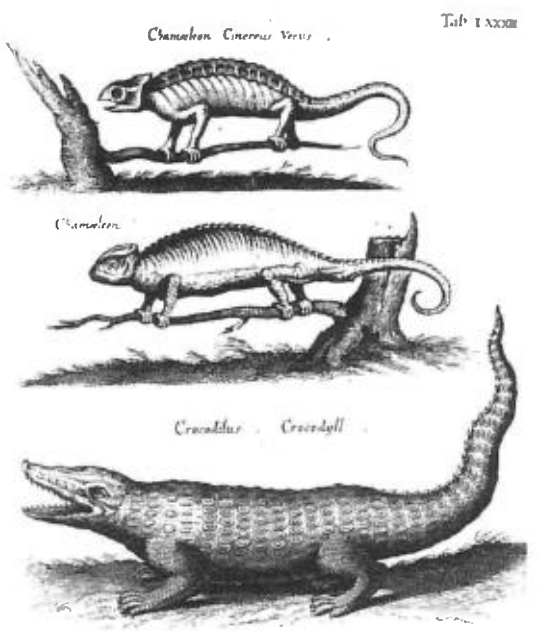

Fig. 1. Copperplate of the crocodile by Matthaeuss von Merian (father of Sibylla von Merian), figured in 'Natural History of the best writers' (Anonymus, 1774).

Fig. 2. Subadult Nile Crocodile basking at a puddle in the desert near Ayoun el-Atrouss, SE Mauritania, documenting the survival of this species in the southern Sahara. In the foreground are 2 Laughing Doves *(Streptopelia senegalensis).*

Bary in October 1876 (de Bary, 1977). These discoveries were regarded as the most important and convincing evidence of the climatic history of the Sahara as a very young desert that had been a largely green and moist savanna only 10,000 years ago. The discovery of these relict crocodiles in the central Sahara (extirpated in Algeria in the 1920s: Joleaud, 1933; Lhote, 1961) further corroborated the authenticity of the famous rock engravings and paintings by the Neolithic inhabitants of this area, who had figured not only various large mammals (lions, giraffes, hippos etc.; see Coulson, 1999), but also crocodiles. The famous life-size crocodile of Wadi Mathendus (Fezzan, Libya: Fig. 3), described by Coulson (1999) as 'dramatic evidence of a wetter climate and the life that once basked on the banks of northern African rivers', is judged to be 9,000 years old; some of its grooves are more than 2 inches deep (Coulson, op. cit.). However, this author did not refer to a most important detail of this impressive rock picture, viz. a juvenile crocodile following the adult one (Fig. 3)! In contrast, the German naturalist Staudinger (1929) was already aware of the parent-offspring relationship of the two Wadi Mathendus crocodiles, but commented on them according to the extent of knowledge available at the time; observations on social

Fig. 3. The famous rock engraving of the two crocodiles from Wadi Mathendus, Fezzan, Libya. Photograph by Hemmo Nickel, drawing (bottom) by Ursula Bott.

behaviour and parental care having apparently been ignored, and evidence of the archosaurian relationships with birds not yet having emerged. In consequence, it may be assumed that he would have been unable to explain or make sense of the depiction of a juvenile crocodile following an adult one because, as was the belief at that time, all reptiles were simply egg-layers that having deposited their eggs in the ground, showed no further interest in them.

In the light of our current knowledge, indicated by several forgotten literature references from about 200 years ago, we may, however, assume that even the Neolithic inhabitants of the Sahara may have been already aware of special relationships between crocodiles and their young. The Wadi Mathendus rock picture shows that crocodilian parental care was obviously known to humans at least 10,000 years ago.

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THE OCCURRENCE OF *MABUYA BISTRIATA* (SPIX, 1825) (SAURIA: SCINCIDAE) IN FRENCH GUIANA

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IN some relatively recent papers (Gasc, 1976, 1981, 1990; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Hoogmoed, 1979), the scincid lizards of French Guiana were named as *Mabuya mabouia* (La Cepède, 1788). This species was considered to be the most common skink in Amazonia (Dunn, 1936), reaching Mexico and the Lesser Antilles (Peters & Donoso-Barros, 1970). Rebouças-Spieker (1981a) resurrected the name *M. bistriata* to designate the common skink of Amazonia and described a new species (1981b), *M. ficta* from Amazonia; she indicated that this new species is widespread through Amazonia and sympatric with *M. bistriata.* Subsequent authors (e.g. Hoogmoed & Gruber, 1983; Cunha et al., 1985; Nascimento, Avila-Pires & Cunha, 1988; Hoogmoed & Avila-Pires, 1990, 1991) adopted these new views and used the name *M. bistriata* to designate, for example, the skinks of French Guiana (Hoogmoed & Avila-Pires, 1990, 1991). Later, Avila-Pires (1995) indicated that in fact *M. ficta* is a junior synonym of *M. bistriata* (after seeing the lectotype specimen of *M. bistriata* RMNH 2512), so that the proper name to apply for the specimens previously called *M. bistriata* is *M. nigropunctata* (Spix, 1825). This situation partially explains the confusion still existing in French Guiana over the naming of these lizards; indeed, the name *M. bistriata* is still erroneously used for the Mabuyas of French Guiana (Born, 1996; Ringuet et al., 1998; Massary, 1999) and in other countries (e.g. Murphy, 1997 for Trinidad and Tobago; Gorzula & Señaris, 1999 for the Venezuelan Guayana) that are in fact *M. nigropunctata.*

Five specimens collected by JPG from areas in the southern French Guiana were recently studied. Morever, during an ecological study led by JCDM at the Saint-Eugène field station (Courcibo River) of the Muséum national d'Histoire naturelle, Paris (MNHN), thirteen further specimens were collected and deposited at the MNHN; a further specimen was recently caught near the coast by MB, and was also deposited at the MNHN. This new material was compared with those specimens from French Guiana already available in the MNHN collections. After a thorough examination, it is clear that both *M. bistriata* and *M. nigropuncata* occur in French Guiana. We provide some characters based on the French Guianan specimens only, which allow separation of these two closely related species. In addition, the distribution map for both *M. nigropunctata* and *M. bistriata* in French Guiana is presented.

MATERIAL AND METHODS

The following characters were noted for all French Guianan Mabuyas available in the MNHN collection as well as the new material collected (for details, see Appendix 1): the snout-vent length as the linear distance from snout to cloacal vent; the number of supralabials; the number of infralabials; the number of scale rows around midbody; the number of lamellae occurring under the fourth toe; the number of supraciliaries; the contact between the parietals; the occurrence of keeled scales on the back. The specimens were also classified according to their colouration pattern.

Figures were made using colour pictures. The distribution map was made only using data for which the identifications were unambiguous. We systematically rejected the localities in French Guiana from which *Mabuya* is recorded in those cases where no picture or voucher specimen was available. Neither did we include localities from which no accurate description, allowing identification of the species, was available.

RESULTS

The examination of the Mabuyas from French Guiana, clearly shows that two species occur in this country; *M. bistriata* and *M. nigropunctata.* These species can easily be separated. First, the most practical way to do this in the field is by coloration pattern which can be readily used to separate the species visually, without the need for systematic collection of specimens. *M. bistriata* (Plate 1) is a light brown lizard with a dark brown lateral band at each side ; this band is bordered by two light well defined stripes. The upper one is sometime incomplete and may only occur in the anterior part of the body; this upper light stripe is bordered by a small brown stripe in the anterior part of the body ; the back is bronze, either with no dark spots or some weakly marked one. The background coloration of *M. nigropunctata* (Plate 2) is darker than that of *M. bistriata.* Like *M. bistriata, M. nigropunctata* has a dark brown band at each side, often with irregular limits. There are generally no light stripes bordering this lateral dark band, but sometimes (apparently often in juveniles), one more or less ill-defined ventral light stripe occurs. Often, the lower part of the flanks presents a mixture of dark and light spots. The back is bronze, with some dark spots dispersed on its surface sometimes forming incomplete transverse or longitudinal stripes; sometimes those spots do not occur or are hardly noticeable.

Alternatively, there are some distinct scalation characters which enable those two species to be distinguished. Two of them are useful because they allow a clear identification in every single case. (1) The parietals are mostly well separated in *M. nigropunctata* (Fig. 1a) or just with a sharp point contact (Fig. 1b) whereas they are distinctly in contact in *M. bistriata* (Fig. 1c). (2) In *M. nigropunctata*, the dorsal scales are

Characters	*Mabuya bistriata*	*Mabuya nigropunctata*
Contact between the 2 parietals	yes, distinctly	no, or hardly in a sharp point
Dorsal scales tricarinate	no	yes (weakly marked in juveniles)
Number of supraciliaries	often 4 (73%), rarely 5 or 6, the	4 to 6, often 5 subequal (82,8%)
Number of supralabials	6 or 7	7 to 9, often 8 (91,7%)
Number of infralabials	6 to 8, mostly 5 (59%)	7 to 9 (rarely 7)
Maximum snout-vent-length	83 mm	123 mm
Occurrence of a lateral dark band delimited by two distinct light stripes (at least in the anterior part for the dorsal one) at each side; the dorsal one is itself bordered partially by a dark stripe	yes	no

Table 1. Table comparing characters for *Mabuya bistriata* and *Mabuya nigropunctata* in French Guiana.

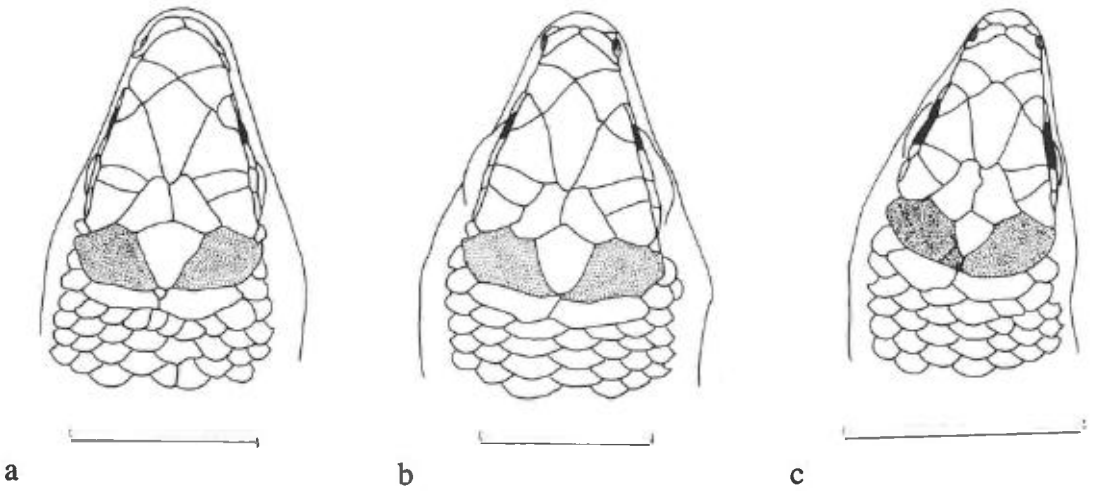

Fig. 1. Dorsal view of the head in *M. nigropunctata* MNHN 1997.2211 (a) and MNHN 1997.2213 (b), and in *M. bistriata* MNHN 1902-266 (c). Note the clear contact between the parietals in *M. bistriata* whereas this condition seems not to occur in *M. nigropunctata* in French Guiana. The second supraciliary is black coloured. Scale bars = 1cm.

tricarinate, especially in males; this character is more marked in subadult and adult males than in females; the keels are nearly invisible in juveniles. In contrast, *M. bistriata* never has keeled scales on the back, whatever its sex and maturity.

Three other characters are different for the two species, but with some degree of overlap. Seven to 6 or 7 (6.50 ± 0.51, n = 17) supralabials occur in *M. bistriata* against 7 to 9, often 8 (8.04 ± 0.34, n = 26) in *M. nigropunctata*; 6-7, rarely 8 (6.65 ± 0.86, n = 17) infralabials occur in *M. bistriata* against 7 to 9, often 8 (8.23 ± 0.59, n = 26) in *M. nigropunctata*; likewise, there are 4 to 6 subequal supraciliaries, must often 5 (77%) in *M. nigropunctata* (Fig. 1a-b) and 4 to 5, must often 4 (76%) in *M. bistriata*, with the second one at least twice as long as the others (Fig. 1c). The number of scale rows around midbody is of little interest because both species have 29-30, rarely 32 (*M. bistriata*: 29.67 ± 1.00, n = 9 and *M. nigropunctata*: 29.85 ± 0.9, n = 13). Lamellae under the fourth toe number 15 to 18 (17.44 ± 1.67, n = 16) and 15 to 19 (16.69 ± 0.93, n = 26) in *M. bistriata* and *M. nigropunctata*, respectively.

The maximum SVL's are very different in *M. bistriata* and *M. nigropunctata*. *Mabuya bistriata* is a medium sized lizard reaching 49 mm in a female (MNHN 1902.272) and 83 mm in a male (MNHN 1902.265); Avila-Pires (1995:567) indicated also 83 mm as maximum SVL for a female (MPEG 14534). *M. nigropunctata* is more stout and clearly larger than *M. bistriata* reaching a SVL of 101 mm in females (MNHN 1997.2213, 103 mm when alive) and 123 mm in males (specimens released). These data agree well with the maximum SVL indicated by Avila-Pires (1995) in Brazilian Amazonia (107 mm in males and 113 mm in females), except the (released) male with SVL 123 mm is the maximum SVL recorded for this species.

Table 1 summarises the characters allowing an easy identification of both *M. bistriata* and *M. nigropunctata* in French Guiana. Figure 2 provides the actual known range of these two species in French Guiana.

DISCUSSION AND CONCLUSION

Through the examination of new material from French Guiana, this study reveals that both *M.*

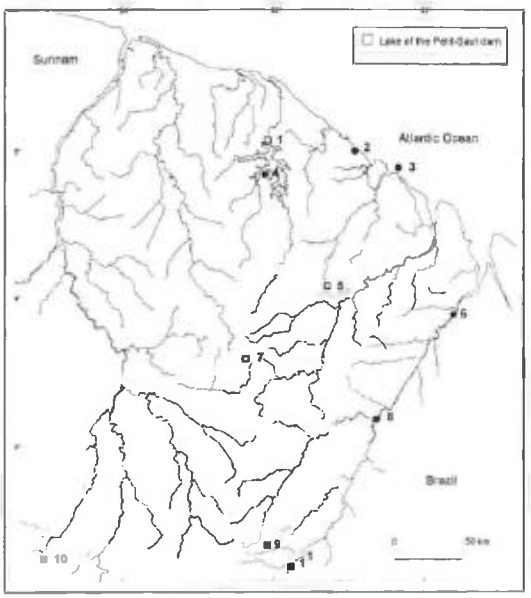

Fig. 2. Distribution map of *Mabuya bistriata* (circles) and *Mabuya nigropunctata* (squares), in French Guiana. Closed symbols = material studied; open symbols = data from literature (Hoogmoed & Avila-Pires, 1990, 1991; Born, 1996) and observations with photos (Gaucher, 1999 ; Haxaire, 1999). 1, Petit-Saut. 2, Macouria. 3, La Mère Islet. 4, Saint-Eugène field station. 5, field station of the Nouragues. 6, Vicinity of Saint-Georges. 7, Saül. 8, Camopi. 9, Saint-Marcel Mount. 10, Mitaraca. 11, Trois Sauts.

bistriata and *M. nigropunctata* occur there. The two species of *Mabuya* can easily be identified according to the characters given above or by using the key provided by Avila-Pires (1995) for the lizards of Brazilian Amazonia. The characters given by this author for these two species are matched very well by the Mabuyas of French Guiana, including the problematic specimens mentioned by Avila-Pires as potential *M. bistriata*. In fact, unlike Avila-Pires (1995), we did not find that the supraciliaries are so variable as she did. Indeed, the second supracilliar always is at least twice as long as the other supraciliaries, which agrees with what she indicated when describing *M. bistriata*. The difficulty very probably arose from the eventual subdivision that may occur in the last supraciliaries (e.g. MNHN 1902.268).

The present data suggest that *M. bistriata* is confined to the eastern part of French Guiana whereas *M. nigropunctata* is widespread throughout the country (Fig. 2). To date, there is no evidence that these two species are found in sympatry in French Guiana, though this is highly likely since this situation is known in Brazil (see Avila-Pires, 1995). During his trip in the eastern part of French Guiana between 1899 and 1901, F. Geay collected the two species. It is very interesting to note that among the six Mabuyas he collected, only one specimen was *M. nigropunctata*. Unfortunately, the exact locality of this specimen is unknown and thus, we cannot be sure that it was found sympatrically with *M. bistriata*. Because this is an old record, we could question the specimen's origin, the more so as the borders of French Guiana at the time of Geay's collecting encompassed the northeastern part of present day Brazil. However, we analysed Geay's hand-written manuscript (1901) which is kept in the library of the reptiles and amphibians laboratory of the MNHN; the indications he gave are accurate and he also provided a detailed colour map which indicates the route he took. Moreover, we have no doubt concerning the origin of his specimens. Two specimens collected by Leprieur are said to come from 'Cayenne' but we cannot check the accuracy of this data. We recently received a specimen of *M. bistriata* (MNHN 1999.8349) caught at Macouria in French Guiana by MB. This new record constitutes further strong proof of the occurrence of *M. bistriata* in French Guiana. Before the new material was collected by the authors, the number of *M. nigropunctata* in the MNHN collections had been very small despite the fact that it is more widely distributed than *M. bistriata* in French Guiana. Added to the nomenclatural problems, this situation explains the frequent misuse of the name *M. bistriata* to designate all skinks of French Guiana.

Until the present study, *M. bistriata* was not recorded from the Guianas (except erroneously). Avila-Pires (1995:573) mentioned the possible

Plate 1. *Mabuya bistriata* (Spix, 1825), in a garden, Macouria, French Guiana. Photograph by M. Blanc.

Plate 2. *Mabuya nigropunctata* (Spix, 1825), in primary forest, MNHN Saint-Eugène field station, French Guiana. Photograph by J.-C. de Massary.

existence of *M. bistriata* in Surinam, but her data is based on 'a half-grown specimen with no exact locality data, [...] preserved for more than 100 years'.

The occurrence of *M. bistriata* in the eastern part of French Guiana extends somewhat the northern limit of the known range for the species. This is interesting because we can envisage that other Brazilian species not yet recorded in French Guiana, and having a similar distribution pattern throughout Amazonia, could be expected to occur in this country.

As for the other lizard species in French Guiana, the range of those two species remains very poorly known and should encourage further herpetological investigations in this country, particularly in its eastern parts which remains underprospected. Moreover, both *M. bistriata* as *M. nigropunctata* show large ranges throughout Amazonia. A thorough revision of these two species, with the inclusion of new material from the Guianan region is necessary to determine whether the current understanding of their systematics accurately reflects biological reality.

ACKNOWLEDGEMENTS

The authors are very grateful to Teresa Avila-Pires, Richard Davies, A. Dubois, M. S. Hoogmoed, I. Ineich, and J. Lescure for reviewing the original version of the paper. Thanks are also due to le Ministère de l'Environnement, Direction de la Nature et des Paysages, for granting the collecting permit (n° 307/96). The research work led by JCDM in French Guyana has been supported by Electricité de France (EDF) (convention EDF/MNHN GP7531).

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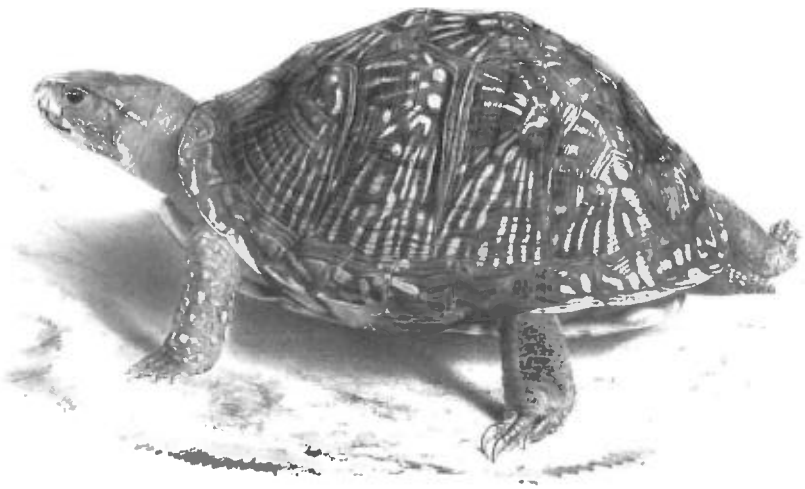
Appendix 1. List of the French Guianan skinks examined from Jean-Pierre Gasc's collection (JPG) and at the Muséum national d'Histoire naturelle, Paris (MNHN). The data in parenthesis correspond to either the date or period of collection (abbreviation: ind. for indeterminate sex; juv. for juvenile; leg. for legacy).

Mabuya bistriata

FRENCH GUIANA (9 specimens): **without locality**: 2 ind. MNHN 735 and 735A (2 syntypes of [Gongylus] (Eumeces) Spixii Duméril & Bibron, 1839: 642), leg. F. Leuprieur; 1 ind. MNHN 1997.2264 (1992), leg . C. Marty; 1 ♂ MNHN 1902.266 (ix.1899-ii.1901), leg. F. Geay; *Camopi*: 1 ♀ MNHN 1902.272 (1900), leg. F. Geay; **Vicinity of Saint-Georges**: 2 ♂♂ MNHN 1902.267-268 (1900), leg. F. Geay; **La Mère Islet**: 1 ind. MNHN 1903.22 (iv.1902), leg. F. Geay; **Macouria**: 1 ♂ MNHN 1999.8349 (27.xi.1999), leg. M. Blanc.

Mabuya nigropunctata

FRENCH GUIANA (19 specimens): **without locality**: 1♂ MNHN 1902.265 (ix.1899-ii.1901), leg. F. Geay; 1♂ GRH 81 (1972-1976), leg. J.-P. Gasc; **Mitaraca**: 1♂ JPG 72.120 (16.viii.1972), leg. J.-P. Gasc; **Trois Sauts**: 2♂♂ JPG 467-468 (2.iv.1976), leg. J.-P. Gasc; **Saint-Eugène field station**: 1 ♂ MNHN 1996.4572 (1.xii.1995), leg. G. Dubost; 1♂ MNHN 1996.4570 (15.ix.1993), 1♂ MNHN 1996.4630 (24.ix.1993), leg. I. Ineich; 1♀ MNHN 1996.4571 (24.xi.1995), 1♀ MNHN 1997.2206 (10.xi.1996), 1 juv. MNHN 1997.2207 (8.xi.1996), 1♀ MNHN 1997.2208 (5.xi.1996), 1♂ MNHN 1997.2209 (24.x.1996), 1♂ MNHN 1997.2210 (7.xi.1996), 1♂ MNHN 1997.2211 (31.x.1996), 1♂ MNHN 1997.2212 (25.xi.1996), 1♀ MNHN 1997.2213 (7.xi.1996), leg. J.-C. de Massary; **Saint-Marcel Mount**: 1♀ JPG 422 (18.iii.1976), leg. J.-P. Gasc, 1♂ JPG 469 (2.iv.1976), leg. J.-P. Gasc.



Mexican Box Turtle (*Terrapene carolina mexicana*), from an original lithographed plate in *Proceedings of the Zoological Society of London*, 1848. Reproduction courtesy of the Zoological Society of London.

A DISTRIBUTION RECORD OF THE BANDED NEWT, *TRITURUS VITTATUS*, FROM THE MESOPOTAMIAN PLAIN, SOUTHEASTERN TURKEY

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THE distribution of the two southern subspecies of the Banded Newt, *Triturus vittatus vittatus* and *T. v. cilicensis*, in Turkey has recently been summarzied by Franzen & Schmidtler (2000). The authors showed that the species' currently known easternmost localities in southeastern Turkey are near Gölbası (Adıyaman province, 37°41'N 37°32'E: *T. v. cilicensis*) and west of Kilis (Kilis province, 36°49'N 36°53'E: *T. v.* cf. *cilicensis*). However, Kennedy (1937) published a far more eastern locality in extreme northern Iraq, close to the Turkish border (spring Kuni Sheikh Omar near Berisa village in Kurdistan, 36°56'N 44°17'E). This record is somewhat uncertain since it is unclear, if Kennedy himself had specimens at hand, as he thanks a Dr. Macfadyen for his observation. Subsequently, the locality has not been confirmed by other workers, neither in northern Iraq nor in directly adjoining southeastern Turkey. Perhaps for reasons of reliability, the Iraq record has not been mentioned by some recent authors (Engelmann, Fritzsche, Günther & Obst, 1993; Griffiths, 1996; Arntzen & Olgun, 2000), while others refer to the species distribution in northern Iraq (Schmidtler & Schmidtler, 1967; Olgun, Tok, Arntzen & Türkozan, 1997; Borkin, 1999).

I surprisingly collected four specimens of *Triturus vittatus* on 21 April 2000, from the recently dried out riverbed of the Habur cayı, approximately 5 km northwest of Ceyıanplnar, Sanlıurfa province, southeastern Turkey (36°52'N 40°00'E) (Fig. 1). Two juveniles (ZSM 921/2000 [22 mm snout-vent length], 922/2000 [24 mm SVL]) and remains of two adults (ZSM 919/2000 [mummified] and 920/2000 [skull and vertebral column]) were collected from under stones along small patches where humidity remained. The locality lies within an extensive area of heavily overgrazed steppe, mainly on limestone with numerous scattered, small stones. With the exception of small bushes along the riverbed any higher vegetation was lacking (Fig. 2). The Ceyıanplnar area is one of the driest regions in Turkey, receiving only 300-400 mm annual precipitation (Hütteroth, 1982). Other amphibians and reptiles collected or observed near the locality are *Pelobates syriacus* (tadpoles) and lake frogs (*Rana bedriagae* or *R. ridibunda*) in nearby rock pools, and *Mabuya aurata* and *Leptotyphlops macrorhynchus* on a dry, rocky slope. In addition, the locality and its immediate surrondings are known to feature some thermophilous, desert-dwelling reptile species (*Varanus griseus*: Eiselt, 1970; *Coluber ventromaculatus*: Baran, 1982).

The Ceyıanplnar record extends the southern range of *T. vittatus* in Turkey some 280 km to the east (as measured from the Kilis record) and nearly halves the distance between the Mediterranean distribution area and the Iraqi record. Previously it appeared that the ranges of *T. v. vittatus* and *T. v. cilicensis* were restricted to the zone of Mediterranean and Submediterranean winter rains with Mediterranean hard-leaf forest (mean annual precipitation 600-2000 mm: Hütteroth, 1982). The Ceyıanplnar population is the first discovered within the climatic zone of the semihumid steppe forest with Mesopotamian Artemisia steppe (Mayer & Aksoy, 1986) and suggests a more extensive distribution in the upper Mesopotamian plain and along the southern slopes of the eastern Taurus mountains.

The two juvenile specimens have distinctly interrupted lower dark lateral bands (6/5 [left/right] and 5/2 interruptions between limbs), a

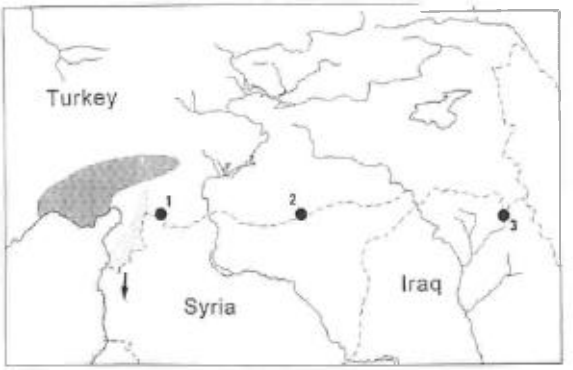

Fig. 1. Distribution of *Triturus vittatus* subspecies in southeastern Turkey and northern Iraq. Dark hatching: *T. v. cilicensis;* light hatching: *T. v. vittatus* (see Franzen & Schmidtler, 2000 for a comprehensive list of localities). 1 - W Kilis *(T. v.* cf. *cilicensis*; Franzen & Schmidtler, 2000). **2** - Ceyıanplnar (*T. v.* cf. *cilicensis*, this work). **3** - Berisa, Iraq (*T. v.* ssp.; Kennedy, 1937).

Fig. 2. Habitat of *Triturus vittatus* cf. *cilicensis* northwest of Ceyıanplnar (Yanlıurfa province, Turkey).

condition which is rather typical for *T. v. cilicensis* (Schmidtler & Schmidtler, 1967; Atatür, 1974; Olgun et al., 1997; Franzen & Schmidtler, 2000). 26 specimens of *T. v. cilicensis* from the Adana-Mersin area and Gölbasl examined by Franzen & Schmidtler (2000) showed a mean of 4.5 interruptions (mean of left and right body side; SD: 1.62; min. 2.5, max. 9), while 18 specimens of *T. v. vittatus* from the Syrian Rift Valley had only a mean of 1.0 interruptions (SD: 1.1; min. 0, max. 4.5). However, since other characters important for a subspecific attribution (e.g. upper dark lateral band, tail bands: Olgun et al., 1997; Franzen & Schmidtler, 2000) could not be examined in newly collected specimens due to the non-breeding condition, I only provisionally attribute them to *T. v. cilicensis.* Franzen & Schmidtler (2000) reported on a single specimen of *T. vittatus* from west of Kilis (now ZSM 68/1999) which they compared to *Triturus vittatus cilicensis*, too. The subspecific attribution of this subadult specimen was based on the broadly interrupted lower lateral bands with 3/5 interruptions. However, since the Kilis locality lies very close to the *T. v. vittatus* populations of the Syrian Rift Valley and identification of single specimens is problematic, the authors referred the specimen to *T. v.* cf. *cilicensis*, too. Due to the unknown morphological variation of the Mesopotamian plain populations, even a distinct subspecific status should be considered.

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THE AFRICAN SNAKE *BOTHROPHTHALMUS LINEATUS* (PETERS, 1863)

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THE sacredness of Calcutta cows is well known, but their public service function in scavenging rubbish from the streets is not so widely appreciated. The late Prof. J.B.S. Haldane was fond of comparing himself to one of these cows because, he said, in later life he spent much of his time scavenging and re-working the scientific results of others. Apart from the proximity of our names in an alphabetical sequence, scavaging is about all I can claim to have in common with Haldane. The work which has evoked this comparison is by Luiselli et al. (1999) on the '- - natural history of *Bothrophthalmus lineatus* (Colubridae) from the Port Harcourt region of Nigeria'.

The authors provide hard data derived from a total of 37 specimens from seven localities along the Orashi River (ne04.06d4 quarter degree square) in the eastern part of the Niger Delta, very near the main course of the Niger through its delta. They remark that the species is not recorded from further north at Nsukka or Lokoja or from further east in the well-studied Calabar area. The range of *B. lineatus* is correctly given as from Guinea in the west to Uganda in the east but no mention is made of the fact that in Cameroon this species is represented by a unicoloured form, *brunneus* (Günther 1869: 356), treated as a variety by Boulenger (1893: 324), as subspecies by eg. Schmidt (1923) whom Luiselli et al. cite, but often given species status by others (eg. Trape, 1985; Meirte, 1993). One might expect a Cameroonian form to extend westward into Nigeria as far as the Niger River, as happens with eg. *Cephalophis monticola* (Happold 1996). The form studied by Luiselli et al. 'is easily recognised by its splendid colouration: the dorsal livery is bright brown or black, with one to five yellow to red longitudinal lines, - -': therefore it is typical *lineatus*.

As the authors of this recent paper point out, there is little data on *B. lineatus* from anywhere and one of the few comparisons they are able to make is with the maximum size of their specimens from Nigeria with the maximum known from elsewhere. They give the latter as an unsexed specimen of 1280 mm (Pitman '1938', in fact 1974: 74) from Uganda. However, my own notes of 63 specimens of *lineatus* sensu stricto from throughout the range of the genus include 14 (22%) exceeding a total length of

1000 mm, and all are female! The overall sex ratio, however, is 2 females to each male, and the largest male (BMNH 1911.5.29.8) was collected in 'Gold Coast', now Ghana, by Dr. H.J. Spurrell. On the other hand, of 85 specimens of *brunneus*, all but two from Cameroon, only three exceed a total estimated (because of postmortem twisting) length of 1000 mm and these are female. The sex ratio is 1.58 females to each male. The smaller size of the *lineatus* described by Luiselli et al. (1999) resembles my data on *brunneus* rather than mine on *lineatus*.

Luiselli et al. (1999) claim that *lineatus* is unknown from northern and western areas of the Niger Delta but Boulenger's (1893) catalogue of the Natural History Museum (then British Museum, Natural History), collections listed three Nigerian specimens: from Lagos (BMNH 99.6.30.1), Akassa (BMNH 92.6.23.12) and 'Oil River' (BMNH 88.2.29.13), the last two being in the Niger Delta. The Ankassa (neO4.06a3) specimen was presented, **not** collected. by Dr J.W. Crosse, that from 'Oil River' similarly presented by Mr H.H. Johnston so that their precise sources must be in doubt. Other Nigerian specimens are in London (BMNH) from Nko (ne06.08a1) and Ibadan (ne07.03b4) and in Pittsburgh (CM) from Ibadan (Butler & Reid 1990:24).

The geographic reality is that typical, lined *lineatus* are known from Guinea to Nigeria and from Boukoko (ne03.17d4) in CAR (Loveridge 1937:271; Roux-Estève 1965:58) to Uganda but in between, in Cameroon, only *brunneus* is known. I've not been able to detect any differences between *lineatus* from the west - source of the type, and those of the east. If *brunneus* is a different species, it disrupts the geographic range of *lineatus*; if it is considered a subspecies - as might be because of its geographic restriction, we have the anomaly of the nominate subspecies occurring disjunctly!

For these reasons it would be useful to have access to specimens collected by Luiselli et al. (1999) but no mention is made of voucher specimens or of tissue samples kept for possible DNA analysis.

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BOOK REVIEWS

A Field Guide to the Amphibians and Reptiles of the Maya World; the lowlands of Mexico, northern Guatemala, and Belize

By Julian C. Lee.
Cornell University Press, Ithaca, NY 14850.
ISBN 0-8014-8587-8

xi + 402 pages illustrated with numerous drawings, maps, monochromes, and colour photographs. £38.95 (cloth), £22.95 (paper).

THIS book provides a detailed account of the taxonomy, distribution and natural history of all known species of amphibians and reptiles in the Yucatan peninsular. Julian Lee is without question the leading authority on the herpetology of the region, and this volume provides a much welcomed and revised field version of his 1996 masterpiece (Lee 1996). The excellent opening sections relating the species to their environment and habitats raise it above many more standard faunas. Of special note is the inclusion of a preliminary section on the conservation of amphibians and reptiles, drawing the reader's attention in particular to the global plight of amphibian populations.

Species accounts are given for the 188 amphibians and reptiles known (or presumed to occur) in the Yucatan peninsular. Each account is split into sections on; identification, similar species, distribution, and natural history. Lee's intimate knowledge of these diverse groups is clearly shown in the morphological descriptions of each species. The avoidance of scientific jargon wherever possible (without sacrificing the authoritative nature of the book) will be received gratefully by many - not to mention allowing it to be accessed by a wide audience. Where the use of taxonomic nomenclature is unavoidable the reader can refer to a comprehensive glossary in the back of the book. In the case of the amphibians, equal attention is paid to describing the tadpoles, with each account being accompanied by a detailed line drawing. The only one criticism is the loss of the excellent systematic keys from his earlier volume, however having had the opportunity to field test it this summer, positive identification proved to be largely unproblematic from just the description and photograph. Where relevant the characteristic vocalisation of the species is described both phonetically, and by outlining calling patterns and frequency parameters (especially useful in identification within a chorus). Clear maps of the peninsular easily assess the distribution of each species. A natural history section outlines the regional abundance of the species, alongside its habitat requirements, common diet, and mode of reproduction (if known). Most species are illustrated in a series of beautiful photographs, accompanying which are nearly 180 line drawings by the author, many serving to highlight important or confusing morphological features.

During the last ten years the Yucatan has seen a number of new additions to its herpetofauna, and all of them are included in the book. For the more interested reader, references are made to the original literature for each species. In summary this book is a must for any professional ecologist, conservationist, amateur or traveller who harbours an interest in amphibians and reptiles of this remarkable region.

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TOBY GARDNER, Edinburgh University, Flat 2/1, 6 Orwell Terrace, Edinburgh, EH11 2DZ

Reptile Keepers Handbook

By Susan M Barnard
Krieger Publishing Company, Krieger Drive,
Malabar, Florida 32950, USA. 1996.
ISBN 0-89464-933-7

252 pages illustrated in monochrome and with line drawings. £52.50

THERE are a great number of books on the market which offer advice to the beginner but very few can provide, with the same ease of access, the detailed information that either the dedicated amateur or the committed professional requires. Although this is not one of the most beautiful books to appear in recent years it is probably the most useful. The author has succeeded in amassing a colossal amount of information that will be of immediate benefit to the practical keeper of reptiles and collating it into a readily accessible form. I appreciate that there are already many texts on husbandry and veterinary care but the former inevitably tend to repetition and the latter to copious text; this is a succinct and encompassing book

The introductory chapters (covering almost 100 pages) give a basic guide to the reptiles and cover nomenclature, taxonomy, handling, transportation and aspects of the captive environment. The latter information is not just anecdotal, or even 'guidelines', but is in detailed, tabulated form according to taxa and origins. Consequently it will be of immediate benefit to those who require specific information on cage dimensions (how many times have you been asked what size cage an adult Carpet Python requires?), temperature and lighting. Some of the information is rather dated for example there is a heavy reliance on incandescent light bulbs for heating and lighting although the importance of full spectrum lighting is briefly explained.

A chapter is dedicated to nutrition and feeding disorders. This is full of sensible advice and detailed information on food requirements is listed in the expansive appendices (see below). The dangers of overdosing with vitamin D are highlighted; this is important advice in a book such as this as it will be used by people who may not question the wisdom of liberally supplementing the diets of captive reptiles with such a potent substance. There is a good section on non-feeding which is written as an expanded list with advice on force-feeding. Paradoxically, no mention is made of 'pinky-pump' devices, arguably the most useful tool to have been developed for the snake breeder in recent years.

There is a comprehensive section for health care covering all aspects from disinfectants to necropsy dissection of a snake; the latter is illustrated with a series of monograph photographs but would have benefited from line drawings to augment the plates. The former makes no mention of the new nonionic detergents that have found much favour in animal health care.

Finally a chapter on reproduction summarises the variety of strategies employed by the various taxa and includes some basic advice on egg incubation.

The remainder of the book is given over to nine, extensive appendices. The most impressive being a 42 page list tabulating the climate, habits, habitats and approximate adult size of the reptiles of the world. A prodigious effort must have been invested in this compilation. A list of the abbreviations used is placed at the end of the list not at the more useful beginning.

The composition of various food stuffs is listed in the ensuing five appendices; in addition the preferred foods of reptiles is given in a table that spans 14 pages. There is a brief chapter on the culture of food insect colonies and includes mealworms, wax moths and crickets .

A list of poisonous plants and those capable of causing mechanical injury is provided although this is primarily of relevance to North American readers; however it also include exotics that may find their way into the vivarium via the garden centre e.g. *Dicentra, Dieffenbachia.*

Finally there are three appendices covering therapeutics used to treat nutritional deficiencies and miscellaneous medications used in reptiles. A list is also provided of products mentioned in text but again this is intended for the USA.

There is a measurement conversion chart, an extensive glossary and a vast list of over three hundred references; these tend to be to older literature and there is a disappointing lack of more contemporary titles. Finally there are two indices one to scientific names and another to common names.

This is a very valuable book and it should find its way onto the shelves of every herpetological institution. It not only offers a fund of information to all who have a serious interest in herpetoculture but will also appeal to those professionals, with little or no knowledge of reptiles, who are faced with the prospect of handling these animals. At the time of writing this review, the television schedules appear to offer an abundance of candidates.

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THE HERPETOLOGICAL BULLETIN

Number 74, Winter 2000

BRITISH HERPETOLOGICAL SOCIETY

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