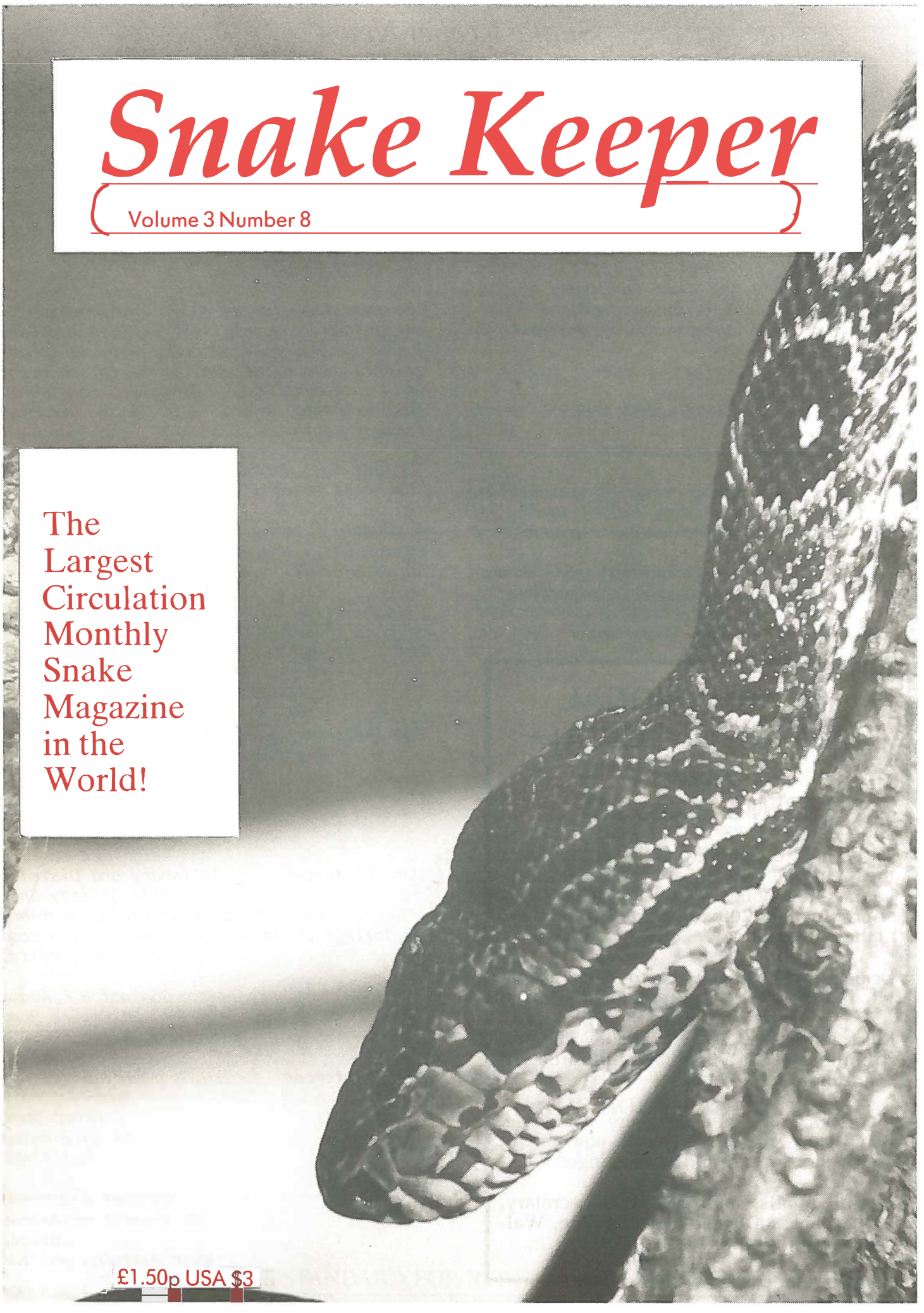
Snake Keeper

Volume 3 Number 8

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Snake Keeper News

DUTCH SNAKE SOCIETY SNAKE DAY 1989

The Dutch Snake Society have announced that their Snake Day will be held on the 21st October this year. As yet the venue has not been officially confirmed but the University of Utrecht has been mentioned as a possibility.

We hope to announce details of our planned trip to the Snake Day soon. If you would like to receive details and have not yet contacted us please do so immediately.

*****

SNAKE KEEPER READER'S OFFER

Idaho's Amphibians and Reptiles

A 12 page full colour pamphlet describing the amphibians and reptiles of Idaho is now available to Snake Keeper readers.

Produced by Idaho's Department of Fish and Game, the A4 pamphlet covers salamanders, frogs, toads, lizards, turtles and snakes found in the state; the snake section includes The Striped Whipsnake, Gopher Snake, Rubber Boa, Western Terrestrial Garter Snake, Western Ground Snake, Racer, Longnose Snake, Ringneck Snake, Night Snake, Common Garter Snake and Western Rattlesnake.

Each animal is described, shown in full colour (4cmx3cm) and its habitat and range is also included.

The pamphlet also gives an introduction to amphibians and reptiles, offers suggestions on how to find and observe them, briefly describes what to do in the event of snakebite and finally recommends further reading and lists Idaho herpetological contacts.

Price: UK and Europe £1.50p per copy
Overseas (airmail) £2.50 or US$4 per copy

Available from Snake Keeper Magazine (Pamphlet), 159 Stanley Hill, Amersham, Bucks HP7 9EY.

(Please allow up to 28 days for delivery.)

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FORTHCOMING EVENTS

2nd September — *Zoologica '89*
South of England Showground
Ardingley, Sussex

Contact C H Keeling
Telephone (0483) 37547

10th September — *Salisbury and District Aquatic Society Show*
(inc. Reptile/Amphibian section)
College of Technology, Southampton Road
Salisbury, Wilts.

Contact R F Adams
26 Empire Road
Salisbury, Wilts SP2 9DF

17th September — *I.H.S. Open & Sales Day*
Memorial Hall
Great Barr
Nr Birmingham
(Jnct 7/M6)

Contact A J Mobbs
65 Broadstone Avenue
Walsall
West Midlands WS3 1JA

INTERNATIONAL HERPETOLOGICAL SOCIETY
OPEN & SALES DAY

To be held on Sunday 17th September at the Memorial Hall, Great Barr, Nr Birmingham, commencing at 11.00am. The hall is approximately 200 yards from Junction 7 of the M6 motorway.

Dealers in all things Herpetological are invited to apply for stand space/tables.

Refreshments will be available all day. Admittance £1 adult; 50p children 16 years and under.

Members and non-members welcome. Bring your surplus livestock, equipment, books, etc., for sale and or exchange.

For full details, send s.a.e. to the Secretary, **A.J. Mobbs, 65 Broadstone Avenue, Walsall, West Midlands WS3 1JA.**

Snake Keeper

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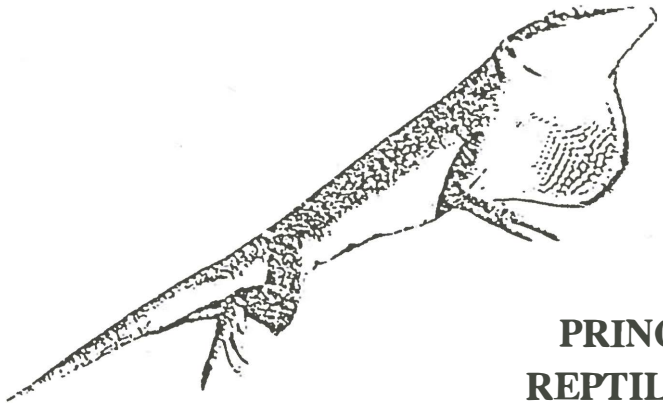
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Photograph by Michael Connolley

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Not Quite the 'Orinoco Flow' or 'Where is Hog Island?'

by Mark O'Shea

I haven't been subscribing on a regular basis to Snake Keeper due to overseas commitments but I pick up a copy from time to time. I recently purchased Volume 3, Nos 1 & 6 and read Colin Clark's articles on 'Hog Island Boas'. (I missed Vol. 2, No. 3) This 'enigma' also interests me as I am familiar with the neotropical herpetofaunas having worked in Belize, Honduras, Venezuela and Brazil but apart from my research side, I look after the reptile house at the West Midlands Safari Park where we have two supposed Hog Islanders, both females. I have been researching around the subject for some time, partly because I want to label correctly our boas, which are currently and incorrectly labelled as Dominican clouded boas, due to their superficial resemblance to the clouded boa and their apparent similarity to typical dark Central American Imperial boas, and partly because I enjoy identifying obscure snakes.

I do not wish to impose on Clark's valuable scale count work so I will confine my comments to biogeographical discussion and theories based on a good understanding of neotropical herpetology.

For a while I considered that the name Hog Island was a trade name to disguise boas illicitly imported into Honduras from elsewhere and then legally transhipped to the UK and US. The wildlife and conservation agency in Honduras, RENARE, are not very effective in their policing, largely due to lack of finance and political teeth. If this were the case the favoured locality for the boa's origin might have been Dominica in the Lesser Antilles and they could belong to the subspecies Boa constrictor nebulosa to which they do bear a striking resemblance. I think many people have followed this route of thinking, swayed I'm sure by the photo of the Dominican boa in Mehrtens (1987) and it was this which prompted us at the Park to initially label our snakes as Dominican clouded boa in disbelief that Hog Island really existed. I know now that Hog Island does exist, in the Honduran Islas de Bahia, but before I deal with the true locality of these boas I want to lay to rest any suggestion that they could have originated from the Bahamas.

I appreciate that there might be an island called Hog Island in the Bahamas but several people have suggested that this area might be the collection locality for these boas. It is completely inconceivable that the genus Boa could have reached these islands. It is important to appreciate the size and scale of the Caribbean. It is true that reptiles can radiate across considerable oceanic distances but to postulate such movements it is necessary to take into consideration the prevailing marine currents, fossil records and potential populations on suitable intervening islands. Consideration of these factors was necessary to explain the presence and probable origin of the Fijian iguanas and Pacific boas (O'Shea 1987; 1989) in the southwest Pacific when their apparently closest relatives were in the Caribbean. The mechanisms by which the ancestors of these reptiles achieved their present, disjunct southwestern Pacific distributions could only be understood by looking at the state of the Central American isthmus, which was fragmented at the time of their radiation, and understanding the workings of the Southern Equatorial Current which travels west just south of the equator and thereby misses out most of the intervening Polynesian Islands before turning south towards Western Samoa, Fiji and Tonga.

The Bahamas are situated in the far north of the Caribbean, 700 - 1100 miles (1120 - 1760km) from the nearest known population of the genus Boa. How could the ancestor of a Bahaman Boa constrictor have reached these islands and avoided all intervening islands without leaving even a fossil or folklore record assuming that the oceanic currents were favourable? It should also be considered that the Bahamas are located near to Florida, snake keeping has been popular in the US for many years and the islands are fairly well colonised so it would have been impossible for such a relatively large snake to escape detection for so long. Floridian collectors would have 'blitzed' the area years ago. Besides, Schwartz and Sheplan fail to mention a Bahaman Boa constrictor ssp. either in their West Indian Checklist (1975) or their first supplement (1978).

My main reason for dismissing the Bahamas is based on the distribution of the genus

Boa. Eight (or nine) subspecies are recognised with constrictor, amarali, ortonii, occidentalis, and the suspect melanogaster, confined to South America and the continental islands of Trinidad and Tobago. Central America and its continental islands possess imperator and sabogae and the Lesser Antilles, nebulosa and orophias. (It should be noted that Boa constrictor nebulosa does not occur on the Dominican Republic which is an entirely different country from the island of Dominica.) Subspecies of Boa constrictor occur in the Caribbean on St. Lucia and Dominica and the assumption is made that they could occur on other Caribbean islands. They could, but only on other Lesser Antillian islands. Whereas the continental island populations represent extensions of the mainland populations these two more isolated populations are more likely the result of development of an island form from an ancestral precursor carried out from South America by the outflowing currents of the powerful Orinoco. This situation is mirrored by the Caribbean distribution of the venomous Bothrops, the only species present on Caribbean oceanic islands being located on St. Lucia (Bothrops caribbaeus) and Martinique (Bothrops lanceolata), again in the Lesser Antilles. It is likely that other members of the Antillian floras and faunas reached the islands by the same route. However, not even the Orinoco is powerful enough to exert its effect on the fauna of the Bahamas.

Returning to the Islas de Bahia, Honduras, I spent a short time on the island of Roatan in 1985 but alas did not see any boas. The island was suffering badly from human interaction and destruction of habitat and the iguanas were in severe danger, being chased and hunted down by boys with dogs. However, Wilson and Hahn (1973) do record Boa constrictor imperator as present, if uncommon, on several islands in the group; Roatan, Santa Elena and Guanaja, but not from Barbareta, Morat or isolated Utila. Interestingly there is actually a small island or cay to the southeast of Guanaja called Hog Cay. This does not quite agree with Clark's map reference of 17° N 86° W, which is actually a point considerably further out into the Caribbean and even misses Roatan. A more correct reference would be 16° 25'N 85° 55'W, approximately 71 miles (114km) - not 22 miles (35km) NNE of La Ceiba. There is also a small group of cays which are approximately 22 miles NNE of La Ceiba called the Cayos Cochinos (15° 58'N 86° 32'W). Wilson and Meyer's second edition of Snakes of Honduras (1985) includes a photograph of a very pale specimen, unlike the standard dark mainland B. c. imperator which I saw and captured on several occasions in Honduras, from the Cayos Cochinos. It now seems likely that original Hog Island boas may have come from Hog Cay or Guanaja but subsequent collections are likely to have been from other localities in the Islas de Bahia such as the Cayos Cochinos. It seems unlikely that a small cay could provide the number of boas that have been appearing on the lists over the last few years even excluding the American market. Therefore, perhaps the more general name 'Islas de Bahia boas' would be more accurate.

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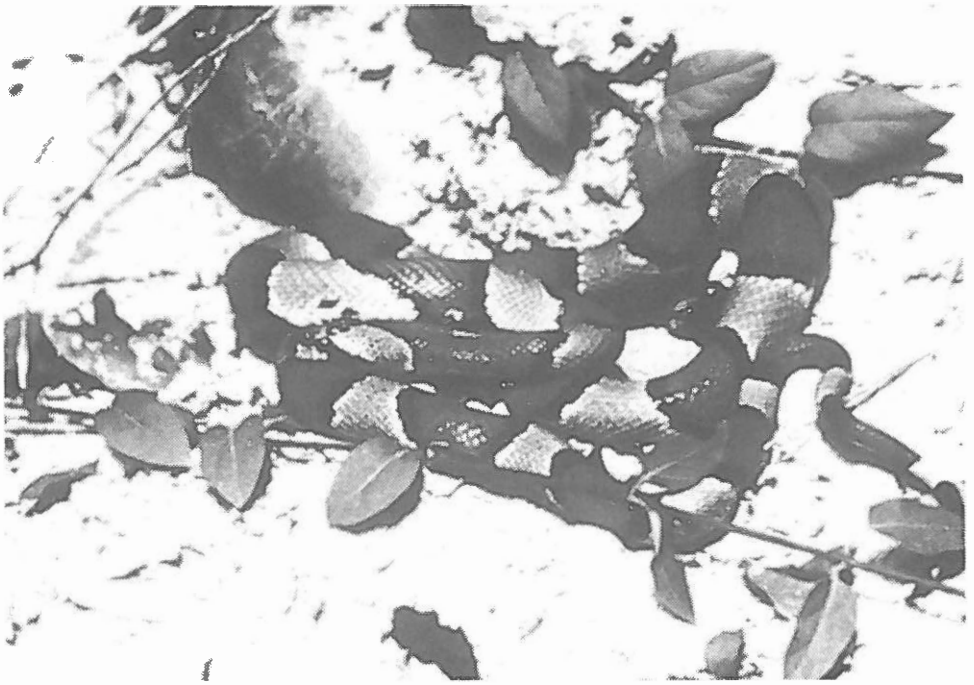
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Snake Keeper Volume Three Number Six
Hog Island Boa Scale Counts by Colin Clark
Amendment: Specimen No 5 (female) should read 58 and not 68 as shown.

Lampropeltis – Kingsnakes from the U.S.A.

by Uwe Peters

In this short article I would like to introduce some of the less well-known forms of the beautiful species of North American snakes Lampropeltis. Lampropeltis mexicana alterna occurs in three subspecies. In South-west Texas and northern Mexico the variety L. m. blairi is found. This variant differs completely from the nominate form in pattern (see photograph 1). I do not keep this variety and have only seen it once in captivity. Presumably its husbandry does not differ from that of the nominate form. Its habitat is similar to that of L. mexicana and its subspecies, ie. mosquito-creosote-bush deserts and rocky hills, predominantly in semi-moist mountainous regions.



L. m. blairi *Photo: Uwe Peters*

Another Lampropeltis, a number of which I have kept over the past twenty years and which I have been able to observe in the wild on a number of occasions is the very beautiful and colourful Californian Mountain Kingsnake, Lampropeltis zonata. It is widely distributed in California on the western slopes of the Sierra Nevada mountain chain, south-west to Oregon and individual colonies in the south of the Baja Mountains. The habitat of this snake is the pine forests of the Sierra Nevada belt, coastal mountain chains and redwood forests. The maximum length is given as 101.6cm. The length of the specimens which I kept varied between 60 and 85cm. From the dozens of L. zonata which I have seen over the course of many years, not one animal reached one metre or longer. Reproduction is by means of three to eight eggs which are laid in July in decaying tree trunks. During the course of twenty years I kept seven examples of this species but unfortunately only individual animals. The longest specimen which I received at a length of 85cm lived the longest - eight years.

The substrate of the vivarium for this snake was always a peat/moss/sand mixture. The snakes liked to burrow in the substrate and used large clumps of moss as hiding places. A few climbing branches and a small water bowl complete the furnishings. The temperature can fluctuate between 15 and 28 degrees C. Partly because of shortages and partly because of nature conservancy laws, I was unable to feed my Californian Mountain Kingsnakes on their natural diet of small lizards and snakes. They were fed on new-born and newly-furred mice which they accepted readily and greedily. (Having just mentioned nature conservancy laws, I would like to clarify this statement somewhat. Apart from the numerous present day conservancy laws I think every herpetologist or reptile lover would agree that he gets an uncomfortable feeling when he has to feed a lizard or snake to another animal, irrespective of whether it be another reptile, a bird or a mammal.)

Although Lampropeltis zonata is a ground dwelling species it enjoys climbing in branches and often coils up in them to rest. It is a really wonderful sight to see one of these beautiful snakes coiled

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Lampropeltis zonata Photo: Uwe Peters

up resting amongst the branches.

These snakes have in the meantime been bred frequently but I am unable to give exact details of mating or incubation because I have retired from working in zoological gardens. The young were between 16 and 18cm long and, because of their small size, feeding was not exactly easy.

*****

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Australia

This previously unpublished article was kindly made available to us by the Editor of the West German magazine 'Das Aquarium'. Translation by John Hackworth.

Is Everything All White?

by Chris and Marcia Martin

When we first started keeping snakes (15 years ago) we decided that we would build a vivarium out of wood instead of using a fish tank so we used white melamine covered chipboard for the floor, back and sides. The unit was fitted with a glass front and access was gained through the top of the vivarium which was covered with a 6mm (1/4") plywood lid.

When the vivarium was equipped with a heating and lighting system we went to our local pet shop and purchased our first snake, a baby Common Boa Constrictor.

A few months later we decided to obtain a different species of snake and we decided on a baby Burmese Python. First, we had to build another vivarium. It was then that I made a simple statement that had profound consequences. The statement was "the new snake will really stand out in his new vivarium". What I had suddenly realised was that the new snake was a dark brown colour and we were going to put him in a pure white vivarium. So he, or she, would stand out like a sore thumb. So what? you may ask. Just remember this - a snake is a wild animal and it has numerous enemies in the wild that will eat it if they can see it. Therefore if the brown snake is sitting against a white background, imagine the stress the snake will be under. All its natural instincts will be telling it to hide or find somewhere it can blend in. That is why all our future vivariums were made out of wood and the original vivarium was rebuilt with dark brown plywood.

If you have any problems (excluding veterinary) you are more than welcome to write to us (please enclose an s.a.e.) or telephone us.

*****

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Telephone (0242) 573477

Sending Your Snakes by Road or Rail

by Malcolm Carruthers

It has been my experience when replying to advertisements for the sale of snakes that the owners of these animals have little or no idea of how to parcel up and send the animal they are selling. Indeed it comes as a bit of a shock to some sellers when you ask them about transportation. After you have spent about ten minutes on a long distance call ensuring that what is on offer is what you want, they ask, "Oh! can't you collect?" and the deal normally falls apart at this point. The strangest of excuses are usually spluttered out on the other end of the phone, such as "Well, we would prefer to sell locally." What was the point in advertising in a national and international magazine like Snake Keeper?

The following information may be helpful if you are considering sending an animal over a long distance.

After you have agreed on the price of the snake and it is to be transported you have the choice of Red Star rail or a multitude of next-day delivery firms. Some of these collect and deliver door to door one such firm being Interlink UK. Depending on the weight of the parcel the cost will rarely exceed £10.50 to £11.00p.

Prepare the animal for transportation by not feeding it prior to packing and if possible send it with an empty gut so that it does not lie in its own waste during the journey.

A suitably sized box will be required appropriate to the number and size of the snakes being sent. It must be reasonably strong to avoid being crushed. A shoe box or a food container box with air holes (again of the appropriate size) should suffice). A cotton bag or a pillow slip cut down to size and strongly stitched is ideal to put your snake into. For hatchling and small snakes put some crumpled kitchen towel into the bag with the snake to give it something to coil around. The neck of the bag should be tied firmly using string or Sellotape. Double over the neck of the bag at the point where you have tied it and tie again to make it doubly secure.

Some insulation and cushioning material will be required to fill the space under, over and around the snake when it is placed in the box. Expanded polystyrene chips, shredded paper, straw or foam can be used for this purpose.

Now that the snake is in the bag in the box and covered with insulation, place the lid on the box and secure it with strong tape. Seal all around the edges then over the top and bottom at each end. A length of tape can be put around the middle if you think it is necessary.

All that is required now is the consignee's address printed boldy on the top of the box. (Make sure you don't stick any labels over the air holes.) The sender's name and address should be printed on the side of the box and finally, preferably in red letters, print

LIVE ANIMAL THIS WAY UP!

As you can see it is a very simple task and very cheap. With a little common sense and imagination all the materials mentioned can be picked up from shop trash bins.

One final word; never send or accept a snake from anyone who proposes to send it by post. It is without doubt stupid, and is, in fact, against the law. It is also potentially fatal to the animal, either by being crushed in the sorting office or battered to death by ignorant postmen when the poor snake wriggles out of its battered and torn box.

*****

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Spinal Lumps on a Corn Snake

by Ivor Henderson

On the 26th December 1988 I took possession of a male Corn Snake (Elaphe guttata guttata) aged approximately six weeks. On acquiring the snake it appeared normal and it commenced feeding on the same night.

In January this year the snake began to move in an unusual manner, giving the impression of being double-jointed. Other uncharacteristic behaviour would be the snake falling from the branches and logs in its vivarium.

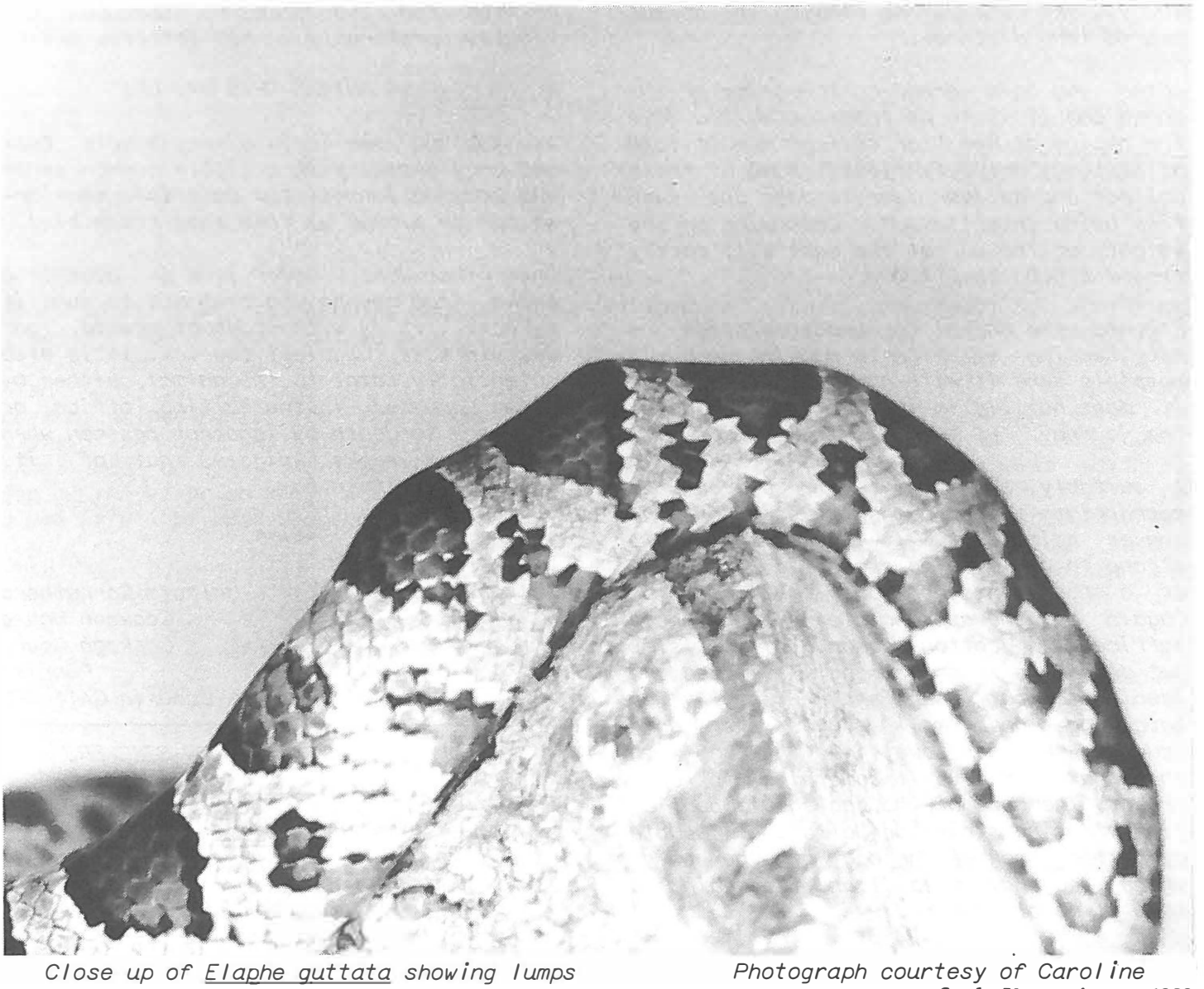
A few days later lumps started to appear on the snake's spine at its tail. These lumps have become more prominent and have now spread from the tail towards the head. (The snake is approximately 45cm (18") long and the lumps cover some 38cm (15").

The snake does not appear to be in any pain and seems to enjoy being handled. It feeds well and sloughs without any problems.

I would be interested to hear from any snake keeper who has a snake with a similar ailment or anyone who could diagnose this condition.

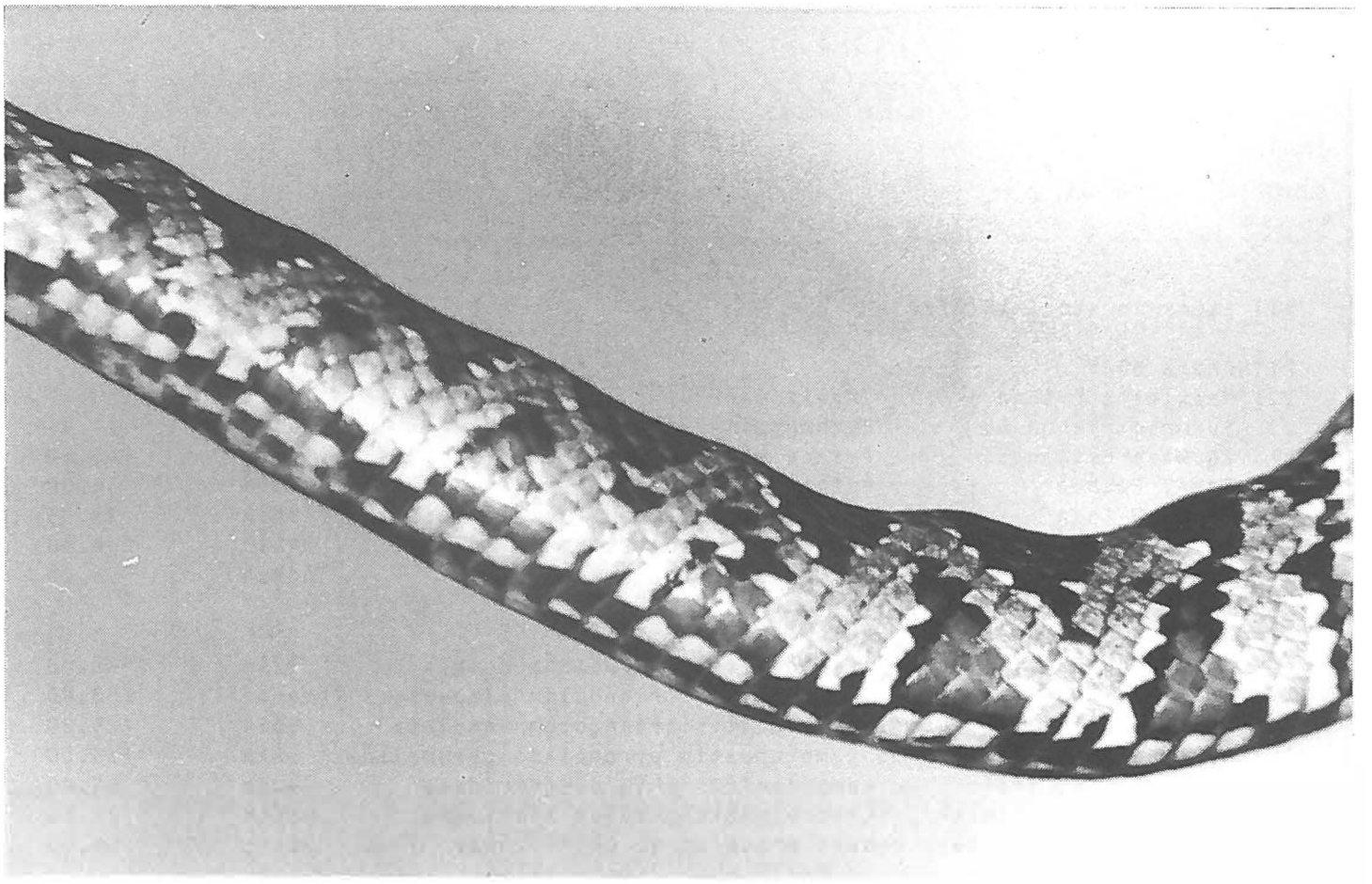
*****

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Close up of Elaphe guttata showing lumps

Photograph courtesy of Caroline



Close up of Elaphe guttata showing lumps *Photograph courtesy of Caroline*

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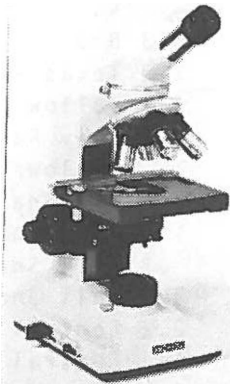
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5.5	California King Snake	Desert phase L. g. californiae	hatch	55.00
OTHER SPECIES				
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4.	Leopard Snake	Elaphe situla	from 15in	99.00
1.	Aesculapian Snake	Elaphe longissima	from 15in	55.00
1	Ladder Snake Cr	Elaphe scalaris	12in	68.50
6.6	Corn Snake	Elaphe guttata guttata	from 28in	39.95
5.5	Carolina Corn Snake Cb	Elaphe guttata guttata	48in	68.50
1.	Erythristic Corn Snake Cb	Elaphe guttata guttata	36in	65.00
40	Chinese Corn Snake	Elaphe bimaculata	from 12in	18.50
4	Russian Rat Snake	Elaphe schrenckii anata	48in	48.50
3.3	Black Rat Snake	Elaphe obsoleta obsoleta	48in	55.00
1.2	Texas Rat Snake	Elaphe obsoleta lindheimeri	48in	42.50
2.2	Yellow Rat Snake	Elaphe obsoleta quadrivittata	from 30in	35.50
5.3	Grey Rat Snake	Elaphe obsoleta spiloides	48in	48.50
1	Yellow/Black Cross Cb	Elaphe obsoleta thingamajig	15in	32.50
4.4	Fox Snakes	Elaphe vulpina	40in	48.50
1.	Bull Snake Cb	Pituophis melanoleucus sayi	from 5ft	95.50
.2	Bull Snake Cb	Pituophis melanoleucus sayi	18in	48.50
3.	Bull Snake	Pituophis melanoleucus sayi	from 40in	48.50
2.2	Central Am. Indigo Cr	Drymarchon corais melanurus	from 48in	75.00
1	Central Am. Indigo Cb	Drymarchon corais melanurus	hatch	65.00
4.4	Florida Garter Snake	Thamnophis sirtalis similis	hatch	12.50
2.2	Florida Garter Snake	Thamnophis sirtalis similis	30in	22.50
4	Red-sided Garter Snake	Thamnophis sirtalis parietalis	from 12in	12.50
2	Florida Water Snake	Nerodia fasciata	from 12in	12.95
20	Grass Snake	Natrix natrix	from 12in	11.50
20	Dice Snake	Natrix tessallata	from 12in	11.50
VENOMOUS SNAKES (licence holders only)				
1	Trans-Pecos Copperhead	Agkistrodon contortrix pictigaster	24in	55.00
1.2	E. African Gaboon Viper	Bitis gabonica gabonica	from 15in	165.00
2.2	Rhino Horned Viper	Bitis nasicornis	hatch	150.00
1	Pygmy Rattlesnake	Sistrurus miliarius barbouri	12in	28.50

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10	Green Iguana	Iguana iguana iguana		9in	28.50
4	Green Iguana	Iguana iguana iguana (1 Cr £65.00)		40in	55.00
8	Spiny Tail Iguana	Stenosaura similis		12in	18.50
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.2	Plumed Basilisk Cr	Basiliscus plumifrons		26in	95.00
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5	Hernandez Forest Cham.	Corytophanes hernandesi		8in	24.95
10	Forest Chameleon	Corytophanes christatus		8in	18.50
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50	Chile Speckled Lizard	Liolaemus nigromaculatus kuhlmani		6in	8.95
50	Chile Swift	Liolaemus nitidus		6in	6.95
30	Leopard Gecko	Eublepharus macularius		hatch	14.95
25	Flying Gecko	Ptychozoon kuhli		6in	9.95
22	Bibrons Gecko	Pachydactylus bibroni		5in	9.95
8	Turnip Tail Gecko	Pheladalpylus rapticaudus		7in	16.50
85	House Gecko	Hemidactylus frenatus		5in	1.95
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50	Jewel Lizard	Liolaemus tenius		4in	5.95
55	Giant Legless Lizard	Ophisaurus apodus 30in £28.50	pr.26.50	2p	24.50
35	Giant Day Gecko	Phelsuma madagascariensis		8in	29.95
50	Lined Day Gecko	Phelsuma lineata		4in	14.95
25	Oscillated Day Gecko	Phelsuma oscillatus		4in	14.95

AMPHIBIA

20	Cranwells Horned Frog	Ceratophrys cranwelli	2in	16.50
150	Fire Bellied Toad	Bombina orientalis	2in	4.50
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14	Striped Fire Salamander	Salamandra terrestris	6in	16.50

Key: 2.3 = 2 males & 3 females
25 = 25 specimens unsexed
Cb = Captive bred
Cr = Captive raised

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My Wife and Snakes

by Kelvin Waltho

My first experience with snakes was with grass snakes at school; the science teacher was a snake buff. After asking him many questions I visited his house and, after seeing his collection of snakes including boas and a pair of Burmese Pythons, (both over four metres long) that was it; I had been bitten by the bug.

After a lot of searching I found a one metre long Burmese Python which I brought home after setting up his vivarium. Five years later he had increased in length to four metres.

I spent many hours handling him while watching television. All was bliss until my aunt visited as she had a major fear of snakes. She passed out in the living room and this gave my dad the excuse to make me get rid of the snake (he was frightened of it as well).

Years passed without snakes until one day I visited Chester Zoo with my wife and children. In the tropical house my love for these creatures was rekindled. My wife (who had never seen a snake before) was amazed but wary. While she and the kids sat outside, I spent three or four hours pressed against the windows staring at the snakes. I spent the next few days explaining how snakes fed, how they were kept and every other fact I could think of. I finally got her to agree to keep one at home but first I had to get permission from the Council as they said that keeping a python in the house would infringe my rental agreement.

I scoured the pet shops and eventually found a 1.1 metre Burmese Python. I set up a vivarium and 24 hours later I brought him home. During the week many pairs of eyes eagerly scanned his vivarium; people in our street visited every day wanting to see the snake and to find out how he was getting on.

My wife had to put up with all this as well as the fact that the freezer was taken over by mice and rats (now with mice, rats, hamsters and rabbits) amongst the burgers and chips. She has conquered her initial fear and now owns her own 2.1 metre Burmese Python. My 1.1 metre Burmese Python is now nearly three years old and measures over three metres.

The snake keeping bug has also bitten the kids; they own a family of Common Garter Snakes. During the time I've had my own snake, I have visited a couple of local schools to show the snake to the children; my wife has accompanied me on these visits. She has learned as much as, if not more than, me. I must thank her for putting up with losing half her freezer and the odd room to vivariums and occupants. I would also like to thank Chris Martin for answering my many questions. I hope to buy more snakes in the future as my finances permit. As is often said - snake keeping is a bug that keeps on biting.

*****

Report on a Royal Python

by Allison McNeill

In June of 1988, we received a call from a veterinarian in Stoneham, Massachusetts, trying to find a home for a Royal Python that was not eating. My husband Dave agreed to take the snake. When he arrived at the owner's house, he found out that the snake had not eaten in a year. The animal's owners had tried live and dead mice, coloured mice and gerbils. The snake had a hide box and various temperatures had been tried. The snake's owners appeared to be doing everything right except for one thing; they were handling the snake every day.

Monty (named by the original owner) was in very good shape for a snake who hadn't eaten in a year. She was still plump and had some irridescence. She was obviously very shy. She hissed very loudly and flinched when being removed from the snake bag. I placed her in a 20 gallon fish tank with a large souffle dish for a water container and a small cardboard box to

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hide in. The tank had a metal mesh lid that clipped on securely. I decided that she needed to be left alone so I put her in my mouse room. This room is shut off from the rest of our apartment and I only enter it about once a day.

I did not try to feed Monty for a week. On July 10th she refused a dead mouse. On July 11th she refused a live mouse. I tried again on the 24th of July with fuzzy mice which were also refused. On July 31st she took a dead medium-sized rat. From then on she ate steadily; two medium rats a week. At the end of the summer I moved her into our living room where the temperature was better. (The mouse room gets cold in winter.) Her cage was placed under a table to give her more privacy. I placed a heating pad under one end of the cage.

Monty is a gentle snake but she definitely does not like to be handled; I do so only when necessary. I hope to breed her and keep one of the hatchlings. I feel that a Royal Python raised in captivity would adapt better and tolerate handling much better than a wild caught adult.

*****

Editor's note: Following last month's article from Alaska by A & D Fleming we are pleased to include the above article from U.S.A reader, Allison McNeill of Massachusetts. Allison promises further contributions during the year.

Hopeful Python regius breeders may like to know that the April edition of the excellent Dutch Snake Society publication, Litteratura Serpentium, included an article about successful Royal Python breeding. Paul Klein-Kiskamp of Utrecht describes how his pythons mated and produced five eggs which hatched successfully.

Hibernating Hatchlings

by Andrzej Kowalew

The captive breeding of reptiles can hardly be regarded as a scientific discipline. First of all it lacks an experimental approach which is essential for any science. For instance, I have read in a number of publications that a given species needs ultra-violet light and yet for another species the light spectrum does not matter. I have not found, however, any information about experimental evidence. The same could be said about hibernating hatchlings. The young have to hibernate in the wild as they are offered no option. That is why I read with great interest an article by Stankowski in 'herpetofauna' 42 (1986).

The author describes his methods of breeding Elaphe obsoleta and raising the young. All the young which had not fed willingly were not force-fed; instead they were hibernated. After they emerged from hibernation they voluntarily accepted pink mice.

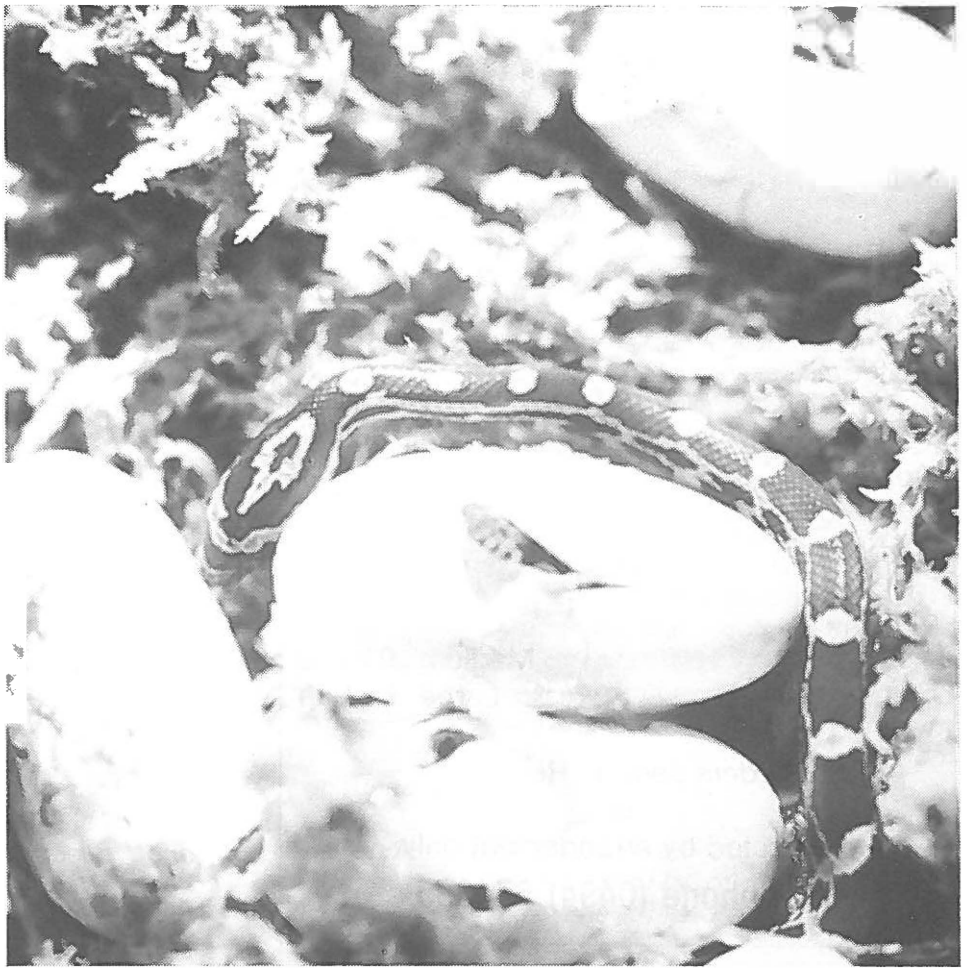
For three years Stankowski had not experienced any losses. This article encouraged me to undertake an experiment with Corn Snakes.

On the 18th and 19th of September 1988 14 eggs hatched (out of a total of 16 laid) by a three year old Elaphe guttata

guttata. Of the 14 hatchlings, 11 were 26cm long, one was 25cm long and two were 27cm long. Eight days later all of the hatchlings slough-ed. I separated six of them and prepared them for hibernation in the same way that my adult Corn Snakes are prepared for the winter rest.

The preparation took four weeks and on the 24th of October the hatchlings were placed in a refrigerator where they remained for three months at a temperature of 8 degrees C (36 degrees F).

They emerged from hibernation over a period of two weeks. On the 11th of February the snakes were offered new-born mice. They fed greedily. Six weeks later they measured 31.5cm on average. The hatchlings which had been kept warm through the winter were 30cm long on average after six weeks of feeding. The difference is noticeable although it is not great.



Corn Snakes hatching Photo:A Kowalew

Conclusion

The number of hibernated snakes is too small and the time of observation too short to make any definite conclusions. Still both Mr Stankowski's experiences and mine could serve as a caution against anyone issuing authoritative statements that only adult snakes can be hibernated.

*****

Author's address: Andrzej Kowalew
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00-891 Warszawa
Poland

LETTERS

Dear Editors,

I have subscribed to Snake Keeper since its birth and I now feel that the Letters section has been a 'battlefield' for the ceramic heater/light bulb saga long enough - enough is enough! (I personally use several of both, all of which are protected to prevent injury to my stock.)

Perhaps the following snippet of information will cause some constructive discussion. At a recent herpetological meeting in London it was suggested that 'the powers that be' were considering the banning of the importation of livestock by commercial importers and private individuals alike. This ban would apply not only to wild caught specimens but to captive bred stock as well. What do Snake Keeper readers think of that?

Colin Clark
Herts

******

Dear Snake Keeper,

Re recent controversy over Chris and Marcia Martins' letter (Snake Keeper 3/5).

Expensive heaters, thermostats, cables, pads, lightbulbs, tubes - honestly! If the snakes are feeding, breeding and perfectly healthy, does it have to worry others how individuals choose to heat their cages? (Sorry - vivariums!)

It strikes me that enough hot air is produced on this matter to solve the problem altogether.

As regards the Martins' somewhat confusing view on hide boxes and their tale of a snake which died in one and was not discovered until it started to smell - I was horrified! Is it too much trouble to check on a pet from time to time?

I've always used hides but make sure that if one of my 'wriggly people' has not been seen for more than two days, I carefully check to see that all is well.

My snakes are a love of mine, not an unusual ornament or status symbol so I don't need to see them all the time. If they are happy and well, then so am I.

Like most keepers, I welcome advice and suggestion but resent dictation and bigotry. Could someone now please change the subject.

Yours sincerely,

R Mather
East Sussex

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Snake Breeding and Genetics

by Paul Hobson

Introduction

The breeding of snakes has taken a remarkable turn in the last ten years or so. Instead of taking pot luck with wild caught specimens, many herpetologists now only consider captive bred stock. This is due to great advances in techniques and ideas and has led to many species being bred on a large scale. This has gone so far as to produce a number of colour varieties of certain species, notably the Corn Snake, Elaphe guttata guttata. Here the breeding of snakes is starting to parallel the breeding of many types of rodents, for example mice, gerbils, hamsters and rats.

There are a number of factors that control the life of a snake; two of these are of fundamental importance, namely the genes the snake possesses and the environmental conditions under which the snake lives. Much has been written about the latter eg. heating regimes, feeding, humidity, daylength and so on. Therefore, I don't propose to dwell on these but to concentrate on the genetic angle.

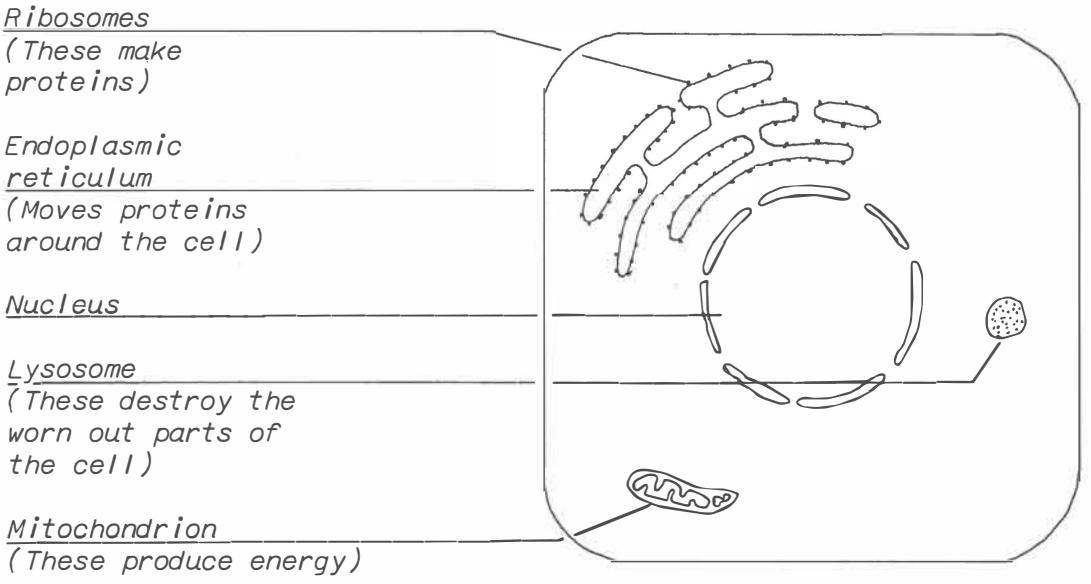
A vast amount has been written about genetics but it is usually restricted to biological texts or journals and rarely appears in popular books. The study of genetics is a complicated science but it is possible to obtain an easy and basic understanding of the subject. My main aim in this article is to try to do this and discuss a few potential problems of a genetic nature with some suggested solutions.

I apologise to those readers who have a wide understanding of the subject and hope that those who don't will read through and feel that at least some light has been shed on the subject.

The Basic Idea of Genetics

All organisms are made of cells in which there is usually a small body called a nucleus. In the nucleus there are a specific number of threads of a chemical called DNA; each of these threads is called a chromosome. A small portion of the DNA which causes the cell to produce a certain chemical is called a gene. There are thousands of genes on one chromosome and therefore millions of genes in one

Diagram A A Typical Animal Cell



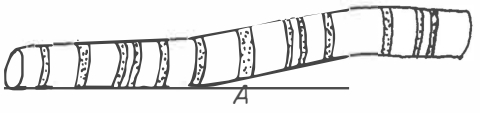


Diagram B

A drawing of part of a chromosome, this is known as a chromosome map as it shows the position of the known genes. Note the genes are not all the same length and are split up by non-gene parts of the chromosome. The bands are the position of the genes and the one labelled A might be the one that controls skin colour.

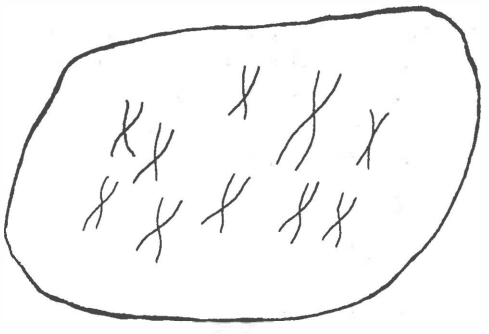


Diagram C

Chromosomes can only be seen under the microscope at certain times. This diagram shows ten chromosomes in a nucleus seen under a microscope when the cell is dividing.

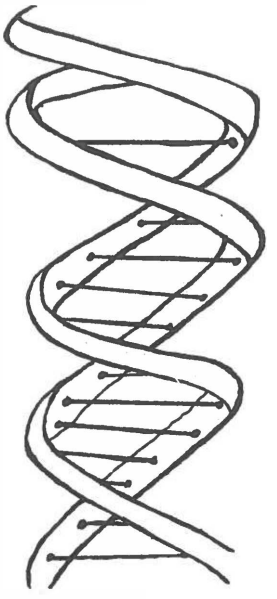


Diagram D

A diagram of part of the chemical structure of a chromosome, that is D.N.A. This chemical is described as a double helix as it is made of two strands held together by cross struts. The part shown is very small and one gene would be hundreds to thousands of times longer than this.

Diagrams by Paul Hobson

cell. The collective working of all of these genes causes the cell to work correctly and thus the animal to function normally. They also determine the visual characteristics of the animal, for instance its body shape and colour. There are other things that can alter the physical shape and well being of a snake, for instance, how much it eats will decide how fast it grows, though it is mainly the genes which control this.

Using Genes to Predict the Offspring

In some cases two genes control just one factor such as the production of a certain colour eg. black or red. These genes may even stop the production of any colour (known as an albino). If two genes control one factor they will be found on one pair of chromosomes, each gene on one chromosome. In wild populations it is not common to find two genes alone controlling one factor. The situation is much more complex with many genes controlling a combination of factors. However, there are some nice simple cases in captive snakes of one pair controlling one colour. Examples of this are where one pair of genes control if the snake has colour or not (albinism), whether the snake has black or not (amelanism) and if it is red or not (anerythristic). The gene that stops the production of the colour is quite rare in wild populations but has been selected by breeders so that it is now common in captive stock (mainly for the Corn Snake but there are albinos now of a variety of species eg. Indian Pythons, Black Rat Snakes, and a few different King Snakes.

How Does This System Work?

In each case there are two different genes, one gene causing the production of the colour and the other stopping it being produced. The snake will have either both of one type or two different genes. What happens in each case? To make matters simpler I shall call the gene that causes the production of the colour 'C' and the gene that stops the production of the colour 'c'. The snake will then have either one of the three following combinations.

CC, Cc or cc

Let's say the gene either causes the production of black colour (a normal coloured snake) = C, or it stops the production of black (an amelanistic snake) = c.

What does the snake look like in each of these three cases?

If it is CC this snake will have normal black colour.

If it is Cc this snake will also have normal black colour even though it has one gene for no black.

If it is cc this snake will have no black (it will be amelanistic).

It can be seen from the above that the C gene can exert its influence even in the presence of the c gene whilst the c gene can only exert its influence when there are two of them. Because of this the C is said to be dominant over the c gene, which is known as recessive. Think of it as the dominant gene being stronger and overshadowing the recessive gene.

A Few Terms

If the two genes are the same in the snake eg. CC or cc, then that individual is called homozygous. If the two genes are different eg. Cc then that individual is said to be heterozygous.

If you buy a heterozygous amelanistic Corn Snake you are buying a snake that will look normal but carries the gene for amelanism. The same applies for anerythristic and albino snakes.

Breeding Heterozygous Snakes
(Or how to predict what type and proportion of offspring you will get)

In sexual reproduction a sperm from the male snake will fuse with an egg from the female snake. In every sperm and egg there are half the number of chromosomes so that when they fuse the normal number will be restored. In a case of a pair of genes each sperm or egg will only contain one gene from that pair. If the snake is homozygous then all the sperm or eggs will have the same gene (eg. if it is CC then the sperm or eggs can only have C in them, the same applies if it is cc). If the snake is heterozygous then half the sperm or eggs will have C and half will have c.

What happens when you cross a heterozygous amelanistic Corn Snake with another heterozygous amelanistic Corn Snake? If half the sperm contains C or c and half the eggs contain C or c then it will depend if a C sperm fuses with a C egg or a C sperm fuses with a c egg and so on.

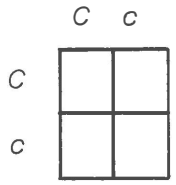
You will
get a combination of;

CC, a normal Corn Snake

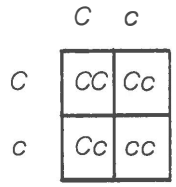
Cc, a heterozygous Corn Snake

cc an amelanistic Corn Snake

If your female snake lays ten eggs how many of each type will you get? How do you predict the proportion of each type? A simple trick is to use a square called a Punnet square. Write the genes of one adult on one side of the square and the genes of the other adult on the other side as indicated below.



Now read across and up and down and fill the square in thus.



This tells you that 25% are CC (normal), 50% are Cc (heterozygous, look normal) and 25% are cc (amelanistic).

Therefore, if you cross two heterozygous Corn Snakes you will on average get 25% or one quarter amelanistic offspring. Herein lies one problem. The rest of the snakes look normal yet some of them are heterozygous and others are not. In fact the only way, as yet, of finding out is to raise them up and breed them and look at the youngsters.

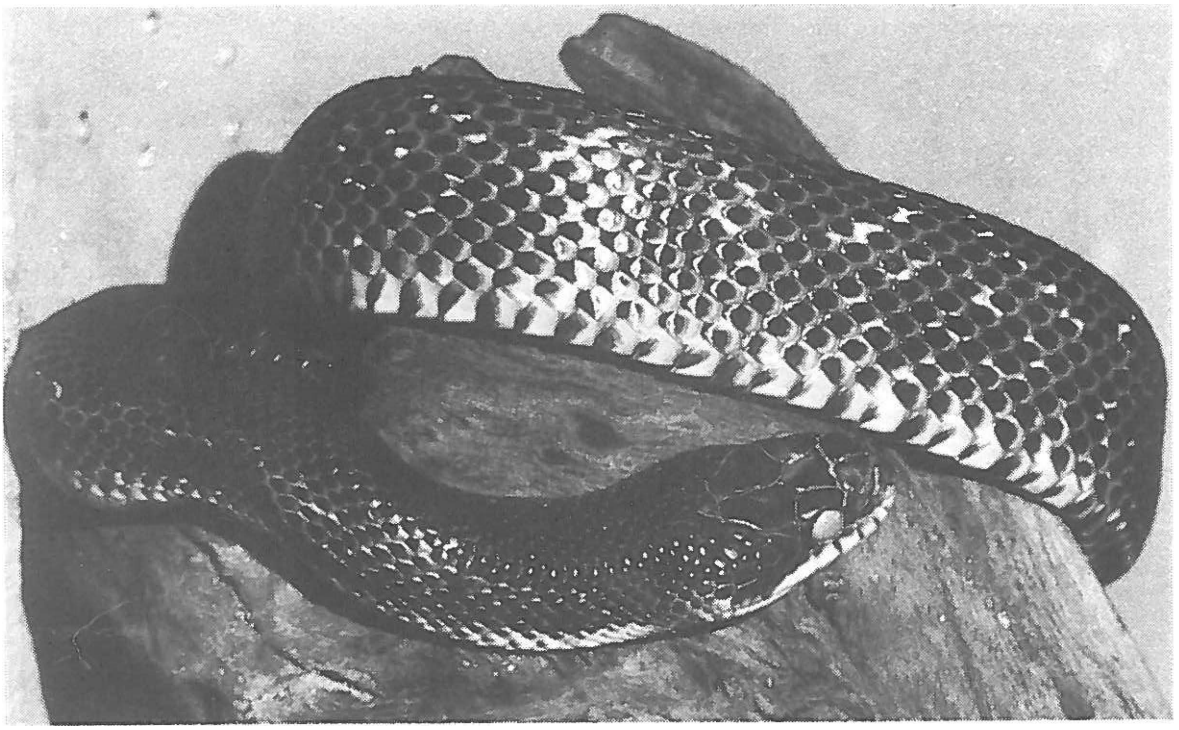
With the same principles you can work out the probability of the offspring of other crosses. You can even use the same principle to work out crosses between different colour varieties. This is more complicated because of the much greater number of possible offspring and would take up a lot more space to explain. If you want to follow this up and learn more about genetics then you should consult a standard biological text such as Roberts' A-Level Biology.

The offspring of the first breeding are known as the F1 generation; the parents of such offspring should be unrelated. If you breed within the F1 generation the offspring are known as the F2 generation and so on. And now a little bit of history. This form of inheritance is known as Mendelian Inheritance, named after a monk called Gregor Mendel who first worked it out and described it. It is rather sad to say that at the time he did his extensive experiments and wrote up his work none of the eminent scientists of the day thought much of it. Mendel's results were published in 1866 based upon the planting of 21,000 plants. Mendel died in 1884, unrecognized for his great work. In fact his work was not discovered until 1900 by a Dutch scientist who found it on a dusty shelf of a library and realised its great importance.

Populations and Genetics

A population is a group of animals or plants of the same species. There are usually limits to the population. These limits are usually physical such as mountains or water. Sometimes, because of these limits, the population is quite small; for instance many species of ground dwelling boas on islands. In other cases the population may be very large such as the Black Rat Snake (Elaphe obsoleta obsoleta) of North America.

Within a population there will be a set number of genes many of which will be recessive and may only show themselves rarely or when the environment changes; however they are there. Most of the genes that manifest themselves are the dominant ones. It is worth dwelling on this point for a minute. A number of these recessive genes are for colour change, for instance albinism. Because the gene is recessive it is rare for two to come together so albinos are usually rare. In wild populations these colour changes, when they do occur, usually leave the animal at a disadvantage. For instance an albino Black Rat Snake is easy for predators to see, so they usually die and don't pass on their genes.



Normal Elaphe obsoleta obsoleta

Photo: Paul Hobson

The opposite is true for captive populations of snakes. Here, if an albino snake is produced or one is caught in the wild it is carefully nurtured and bred. All its offspring will receive careful treatment so that the number of albinos in the captive population rises. (The fact that they are worth far more also helps! A hatchling normal Black Rat Snake costs £15 to £20 whilst an albino Black Rat Snake costs £70 upwards, that is if you can find a pair available.)

In a large population there will be a large number of genes whilst a small population will have correspondingly less genes. (This does mean that recessive genes are more likely to occur because there are less genes overall.) The number of genes in a population is called a gene pool. Why are there far more genes in a population than appear to be needed? The more genes there are the more potential variety there will be in that species. This means that if the environment changes in some way there is more chance that one of the varieties of the snake will survive. This is called evolution.

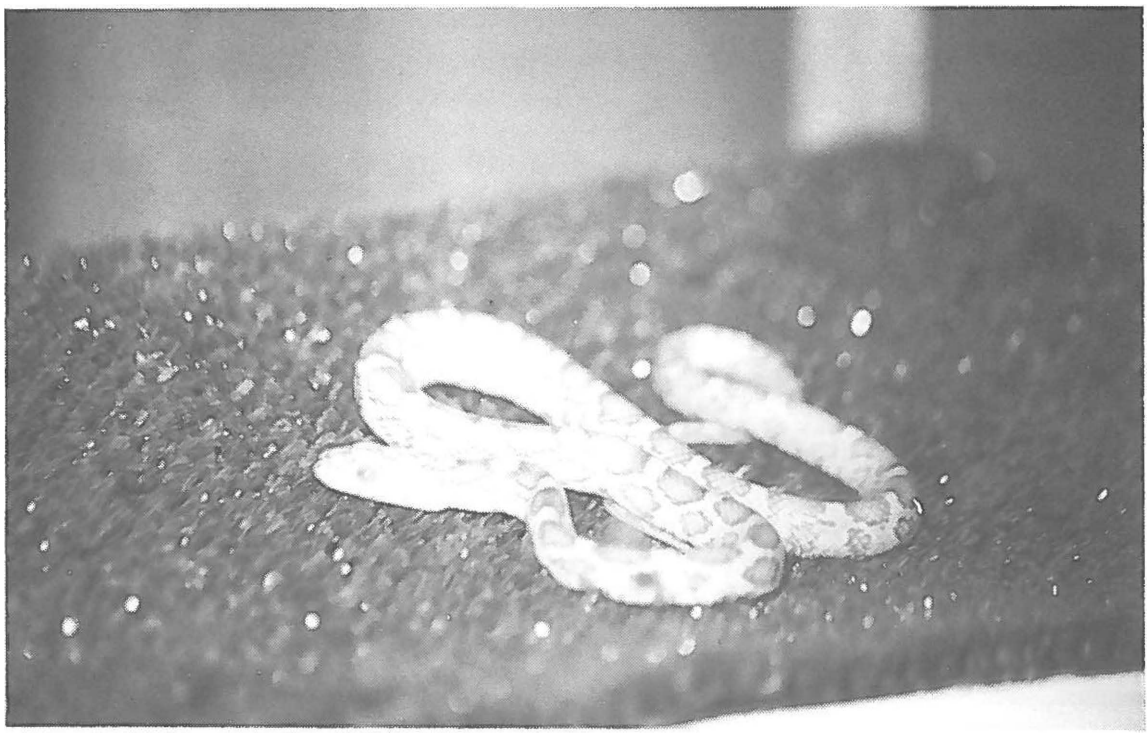
This is also helpful for the breeder because they can artificially select out those varieties and produce differently coloured snakes of one species, such as the Corn Snake. The potential is there for all species to some degree; obviously the more they are bred the more chance for success.

The Gene Pool and Population Size

As mentioned earlier, the smaller the population the less different genes there are in the gene pool. Certain problems can occur when a gene pool becomes too small. One of these problems is that there is not enough variety within the population. This means that if a disease arrives or the environment changes, the whole poulation is in danger of becoming extinct. A further problem is lethal genes or lethal gene combinations. These genes are usually recessive and rare but if they manifest themselves they cause the death of the individual in some way. Lethal gene combinations are combinations that, on their own, are harmless but when they occur together they cause the death of an individual. In small gene pools the chances of these appearing is increased.

These problems can also be amplified when the population is so small that the majority of the members are related to each other. When members of a population are constantly breeding with relatives many often become weak, fail to breed successfully and may even start to show deformities. This is known as inbreeding depression and is of great importance to snake breeders.

I must point out, though, that this must occur for at least seven to eight generations so it is safe to breed brothers and sisters or back-breed



Albino hatchling Elaphe obsoleta obsoleta

Photo: Paul Hobson

siblings with their parents for a few times with no problems at all.

Problems will occur, though, in captive populations where a whole population of snakes has been produced from one original pair. In these cases inbreeding depression is almost certainly going to occur sooner or later. There are one or two well-documented cases of captive snake populations showing inbreeding depression. Other cases where this may occur is in the breeding of colour varieties of common species such as the Corn Snake. However, this is easily avoided by crossing the colour variety with a normal one to produce heterozygous animals which now have fresh genes. The next step is to cross two of these animals to get the colour variety back. This snake now has fresh genes and the gene pool has now been increased. As long as this is done every six or seven generations there should be no cases of inbreeding depression.

Another way to decrease the risk of this is to monitor all individuals of rare/valuable species and their parents so that accurate records are kept of the genes. This will allow close monitoring of all breedings and accurate crosses can be made so that inbreeding is kept to a minimum and the gene pool is kept as large as possible. This should also encompass other countries so the available number of potential snakes and genes is at a maximum. One further method is to increase the gene pool by the introduction of selected wild caught snakes. Often the restrictions to this are legal and the possible solution may be a relaxation of laws for this express purpose. This would be in the interest of many countries as many snakes are threatened in their natural habitats and could possibly become extinct. Their future reintroduction may well depend on captive stock and the success of such could depend on the viability of the gene pool.

The last case where inbreeding depression may become a problem is in small fragmented natural populations of snakes. Many small islands have indigenous species (native) that are under threat due to loss of habitat or increased competition from introduced animals such as cats, rats or goats. There are quite a few ground-dwelling boas in this situation eg. Round Island Boas, Bolyeria multicarinata and Casarea dussumieri.

One example much nearer home is the fragmentation of the Dorset heathland due to increased agricultural pressure and new housing. The once vast heathland is now restricted to ever smaller and smaller plots which are being cut off from each other. The snake at risk here is the Smooth Snake (Coronella austriaca). In many of these fragmented heaths the population of this beautiful animal is reaching perilously low levels and the population may become unviable. This situation needs close monitoring and conservation (which requires much money) if the Smooth Snake is to remain a British species.

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Paul has been keeping snakes for 15 years and is specifically interested in rat-snakes and kingsnakes. Trained as an environmentalist, he taught in a large comprehensive school for a number of years and is now a college lecturer in biology and environmental science. His interests include bird watching and 'green issues'.

CLASSIFIED ADVERTISEMENTS
(continued from page 24)

FOR SALE

Pair of Common Boas (5'-6'). Captive-bred, superb condition and colour. Both feeding on dead rats, etc. £250 o.n.o. the pair. (Will not separate.) Reason for sale - snakes too large as the collection increases. Phone (0742) 680000 (Yorks).

Beautiful example of a Florida Kingsnake. Male, 5'7", good feeder. Including his vivarium and home comforts. He is very tame. Serious offers over £100 to take both. Phone Tony on (01) 771 7473.

1989 offspring. Elaphe bimaculata, helena, obsoleta bairdi, subocularis, taeniura frisei, guttata, vulpina. Lampropeltis getulus holbrooki, nigritus, splendida. Lampropeltis triangulum annulata, hondurensis, campbelli, sinaloae. Lampropeltis zonata parrirubra. Pituophis melanoleucus desertícola, P. m. annectans (heterozygous). Write or call for prices or free list. Holger Bartz, Cyriaksring 54, 3300 Braunschweig, West Germany. Telephone 0531 81841.

Please mention Snake Keeper when replying to adverts. Thank you.

Butterfly Agama Lizard £8.50p. Leopard Lizard £8.50p. Both for £15. Large black Emperor Scorpions £10. Vivarium, 49" x 26" x 18". All glass in wooden surround. Nice showpiece £40 Phone (0742) 645332 (Yorks).

Captive-bred snakes/lizards for sale. Also black bush crickets £1.90 per 100 and General Electric ultra-violet black lights. Ring (01) 524 2522 after 6pm.

WANTED

Kingsnakes, Milk Snakes and Boas. Preferably captive-bred adults. Contact Pete Blake on (0752) 263659 (Plymouth).

Female Black Rat Snake, 4'6" plus. Tel: (0452) 307845 evenings or weekends.

Epicrates cenchria maurus, adult female for breeding in 1990. Will buy or exchange for snakes. Telephone Les on Stevenage 354309.

Indian Python, male, 10'+. Must be light phase. Required for breeding. Contact Mr Bryson on (0429) 838145 (Durham).

Large tame Iguana, 3' plus. Must be in good condition. Also female Reticulated Python, 12' plus. Phone (0742) 645332.

Good healthy female Boa for breeding. 5' to 7' long, 4+ years old. Must have attractive saddle markings. Telephone Mike on (0962) 60918 day or 51707 evenings.

EXCHANGE

Healthy, female Python molurus bivittatus (8') for male of same size. Contact Snake Keeper Magazine on (0494) 722769.

BOOKS

100's of books on fish, reptiles and amphibians, cats, dogs, birds, birdwatching and poultry. Free catalogue. Bures and Son, PO Box 377, Coulsdon, Surrey CR3 1YU. Telephone (0737) 556139.

POSTCARDS

Colour Postcards featuring photographs by Chris Mattison. No. 1 Western Diamondback Rattlesnake. No. 2 Emerald Tree Boa. Pack of 10 (five of each card). UK & Europe £2 including p&p. Overseas (airmail) £3.00 or US$4.80. Snake Keeper Magazine (Postcards), 159 Stanley Hill, Amersham, Bucks HP7 9EY.

Classified Advertisements

Rates: Private advertisements (not exceeding 40 words) are printed without charge. Trade advertisements 10p a word. Deadline 20th day of the month. Private advertisements are accepted by telephone.

FOR SALE

Burmese Indian Python. Female, 6'6". Feeding well. £120 o.n.o. Telephone (0452) 307845, evenings or weekends.

Adult pair of Northern Pine Snakes, captive-bred, £160 pair. Sub-adult pair Mexican Black Kingsnakes, captive-bred, £150 pair. Trio of sub-adult African House Snakes, captive-bred, £35 each. Male Elaphe taeniura taeniura, imperfect - tail tip missing, £35. Female Cook's Tree Boa, £60. Contact Mark Wooten on (0634) 44926 (Kent).

Captive-bred snakes. Kingsnakes, Rat Snakes and others. Northern Pine Snakes and Florida Kingsnakes already available. Also some adults, yearlings, lizards and tarantulas. For full list ring Ann Clegg or Kim Loader on (01) 555 3548.

Captive-bred California Kingsnake. Tame and feeding well, 20" long, £40. Phone Ryan on Northwich (0606) 891561.

200 Red worms £2.40p plus 60p 1st class postage. David Silvester, 188 Wrens Hill Road, Wrens Nest Estate, Dudley, West Midlands DY1 3SF.

Corn Snakes - anerythristic/amelanistic/snow (first British breeding?) £30 - £65. California Kingsnakes, banded/striped/aberrant, £35. European Tree Frogs £6. Whites Tree Frogs £15. Horned Frogs £18+. Pair Pink Tongued Skinks £130. Male Trans-Pecos Ratsnake £100. Leopard Geckos £7. Fire Salamanders '89, £5 each. Trio Eyed Lizards, first bred this year, £110 - babies £15. Pair Bearded Dragons £100. Tiliqua scincoides £200. Male Hognose Snakes £50-£70. Pinkie pumps (useful tool but not necessary with my stock). Heat tapes 22-24W @ 2.6 & 2.4m. Heat pads 7W/12W. Blacklights. Hatchling boxes - five sizes. Thermometers - wall and digital. Feeding tongs. Vitamins. Cage hooks. Grab tongs. Sexing probes. Some books and some copies of 'The Vivarium', North America's new herpetological magazine - excellent, £6 each. For more information call Jerry Cole on (0305) 62311 after 18th August.

FOR SALE

Second generation British bred baby Burmese Pythons (Python molurus bivittatus), £42.50p each. Also Great Plains Rat Snake (Elaphe guttata emoryi) x Corn Snake (Elaphe guttata guttata) intergrades, £17.50 each. Chris and Marcia Martin, 18 Ballinode Close, Cheltenham, Glos GL50 4SQ. Telephone Cheltenham (0242) 573477.

Hatchling Corn Snakes (Elaphe guttata guttata). Due 24th July. Telephone Alexander Marlow-Mann on (0702) 78346.

Burmese Python, 7', £100. Bosc Monitor, £40. Paradise Tree Snake with 4' corner vivarium, £80. Pair of breeding Slow Worms plus vivarium, £40. Pair of Garter Snakes and Ribbon Snake plus vivarium, £40. All accessories included in vivariums. Telephone (061) 702 8007 (Manchester).

Grey Rat Snake hatchlings (Elaphe obsoleta spiloides). £20 each. Telephone Roger Grenville on (08444) 6867.

Blood Pythons, all males, 3.5'-4.5'. Fully wormed. £135-£150. Telephone (0245) 466503 (Essex).

Royal Python, 3', eats anything (mice, birds, etc.). Well made laminate cage, 5' x 2' x 2', glass sliding doors, ceramic heater and thermostat, light fitting. Both £100. Phone Martin on Sheffield (0742) 305547.

Classified adverts continue on page 23.

Snake Keeper Magazine

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