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THE SUCCESSFUL BREEDING OF THE SUNBEAM SNAKE *XENOPELTIS UNICOLOR* REINWARDT, 1826 AT CHESTER ZOO

ISOLDE McGEORGE

North of England Zoological Society, Upton, Chester CH2 1LH

ABSTRACT

Relatively little information has previously been published regarding the Sunbeam Snake *Xenopeltis unicolor* in a captive environment. This is an account of the reproductive husbandry of *X. unicolor* spanning a six year period from 1988-1994.

INTRODUCTION

The family Xenopeltidae is represented by only one species, the Sunbeam Snake, also known as the Rainbow Snake and Iridescent Earth Snake. The name *Xenopeltis unicolor* originates from a combination of Greek and Latin, the former referring to the generic epithet *Xeno* with *pelta* meaning 'strange skin' and the latter referring to the specific name *unicolor*, being 'of one colour', whether it be black, dark brown or tan. The highly polished scales, when reflected in the light, give the snake a glossy purple-blue iridescence. The Sunbeam Snake is commonly found throughout South-East Asia from Burma to Southern China, extending to the Indonesian Islands. It is a shy, secretive animal of nocturnal habit. It is well adapted to its fossorial existence with its cylindrical body, flat, shovel-shaped head, strongly rounded jaws and small eyes.

There is relatively little published information on the Sunbeam Snake but herpetological notes have been provided by Hindley (1987), Tiwari (1992), Cox (1993) and Beardsley (1994).

This is the first full account of the successful maintenance and breeding of this species in a zoo.

Housing and Maintenance

On 22 December, 1985 a wild-caught male *X. unicolor*, approximately 1.0m in length, arrived in the collection. He was housed off-show in an enclosure measuring 91.5 x 30.5 x 38 cm with a front sliding glass door which allowed natural, although subdued, daylight to filter through. This tank was kept in a space-heated environment where the temperature remained fairly constant throughout the spring and summer, fluctuating in any one 24 hour period from the mean daily temperature by no more than -2°C at night. A standard 25W incandescent luminaire was used as a source of light and supplementary heat. A temperature of 28-30°C was achieved between the light bulb and the coldest spot in the enclosure. In the autumn and winter, the temperature gradient dropped down slightly to 24-26°C. A high humidity is not considered to be a critical maintenance requirement and the enclosure was maintained at *ca* 50% RH. A plastic open-topped container filled with moist sphagnum moss was placed at one end of the enclosure for the male to burrow into. Water was provided in a shallow dish, 17cm diameter x 2cm deep. However, drinking was observed on only one occasion in the early evening. There

appear to be no other published observations on the drinking habits of this secretive species. The male fed readily on freshly-killed adult mice which were offered once weekly.

Mating

On 21 December, 1988 a wild-caught female *X. unicolor* was presented to the collection by another zoological institution. The female was held in isolation and routinely checked for internal and external parasitic infection, but none were diagnosed. She was maintained separately under the same conditions as the male. After eight weeks (during which time she accepted freshly killed adult mice offered each week) she was introduced to the male. She was slightly shorter in length and girth than the male and his dorsal surface was a strong chocolate brown versus her reddish tan coloration. Both snakes had the characteristic highly-polished white ventral scales.

On 15 February, 1989 the male (which had spent a solitary existence for the previous three years) responded immediately to the stimulus of the female presented before him. The male, when routinely handled, often moved in a jerky springy action, sometimes flinging his head from side to side. His reaction to the female showed a similar motion but was greatly accentuated. Thereafter, handling the male at any time would provoke a mating response. Handling evidently duplicates in some way the sexual stimulation provided by the female (although there remains the possibility that handling triggers a sexual response through stimulating a memory of an earlier encounter with a female).

As well as jerking, his whole body would shudder and a lot of intermittent body contact was initially observed between them. They then retired into the sphagnum moss hide-box and it is assumed that copulation took place out of sight. Periodically the snakes were separated and reintroduced to promote sexual activity. An additional sphagnum moss container was provided but both snakes preferred to share one box.

Oviposition

In February, 1990 the female refused food and was rarely seen out of the hide-box. On 13 April a hard, round yellow egg was discarded by the female which was identified as an infertile or 'slug' egg. The egg measured *ca* 2.7 x 1.4cm. The male was immediately removed and on 20 April – the day after the female shed her skin – she laid twelve white oval-shaped eggs in the centre of the sphagnum moss box, each weighing between 10 and 13g. Four days after oviposition, the female resumed feeding.

Eggs and Incubation

There was a considerable variation in the physical dimensions of the eggs. The smallest of the eggs measured 3.8 x 2.5cm and the largest egg measured 4.3 x 2.9cm. All of the eggs were placed in a well-ventilated plastic box measuring 44.5 x 28 x 12.5cm with a transparent lid so their progress could be monitored without disturbance to the eggs. The box, after sterilisation with 'Pevidine' (a proprietary brand of iodine-based antibacterial solution), was half-filled with medium grade vermiculite mixed in a 1:1 ratio by weight with tepid water. The box was pre-incubated without the eggs to bring it up to the required temperature (see below). Each egg was then placed in an indentation made in the vermiculite to allow proper air circulation around each of the eggs. A hygrometer was placed in the centre of the box to check humidity levels. Humidity remained fairly constant throughout the incubation period at 95-100% RH. When humidity dropped to 95%, additional water at incubation temperature was added to the four corners of the box, remote from the eggs; but this was only necessary once, near the end of the incubation period.

To minimise the risk of loss through interference, only one egg was selected to be weighed throughout incubation to see how much weight was gained or lost. This egg was weighed at 19.00 hours once per week and on the same day, or as close to this schedule as was practicable.

The box was then placed on a shelf in a space-heated room where the temperature fluctuated between 28-30°C and the room was lit artificially by a 2m long white fluorescent tube of domestic specification. General experience indicates that light is not a controlling factor in egg development, although one assumes that natural light would normally be largely excluded.

Hatching

On 5 July, after seventy-six days incubation, one egg was split and the neonate emerged later that day. Two more youngsters emerged on 6 July, by which time all the eggs were pipping. Four emerged on the 7 July, four on the 8 July and the last one was on the 9 July. The total success rate in terms of hatching was therefore 100%. The neonates, on emerging, immediately buried themselves into the substrate.

On hatching, the young have a distinct pink colour which gradually fades over the following weeks. By six weeks, the neck collar has undergone a full ontogenetic change to the adults' natural coloration.

All of the neonates were weighed and measured, the average length being 23cm and average weight 8.5g. There was very little embryonic residue left in the discarded eggshells which weighed between 1 and 3g each. The neonates were housed individually in small plastic boxes with a dry newspaper substrate for the young to burrow under and a heavy drinking pot to prevent spillage during the young snakes' burrowing activities.

Post Oviposition

The female was kept isolated from the male from the time the eggs were laid in April until October, 1990. By the time she had fed sufficiently and, upon superficial observation, had regained all of the body weight she had lost during the gestation period.

Further Matings

Apart from the male's initial excitement at the presence of the female in his territory, no copulation was observed on subsequent introductions. The familiar regime of introduction and withdrawal of the female to the male was followed as before. It was not until January, 1992 that the female refused to feed again and was visibly gaining in girth. The female was removed from the enclosure and on 5 April she laid thirteen eggs in the sphagnum moss box. Two days after oviposition, the female resumed feeding. This second batch of eggs was incubated with the same general protocol as used for the previous clutch. Although an attempt was made to maintain the same temperature regime, due to a higher than previous external ambient temperature, there occurred a corresponding elevation in incubator temperature. As a result temperatures ranged between 29-31°C. The smallest egg measured 3.5 x 2.3cm and the largest egg measured 4.6 x 2.1cm and weighed between 12.5 and 15g.

On 7 June, after only 63 days incubation, the first youngster started to emerge. Nine more were out by the 9 June and all 13 were successfully hatched by 10 June. By the end of October the female had gained sufficient weight to be returned to the male's enclosure. Again, apart from his initial behavioural response to the return of the female, no copulation was observed.

Plate 1 - Captive hatchling of *Xenopeltis unicolor*
Photo Stephen Von Peltz

Plate 2 – Hatchling *Xenopeltis unicolor.*
Photo Stephen Von Peltz

In February, 1994, the female refused food and was removed from the enclosure. She remained in good condition, gained weight rapidly and looked much heavier than in her earlier gestation periods. On 12 April she laid 16 eggs in the sphagnum moss box and accepted a meal that same evening. Eight of the eggs were aggregated in strongly adhered groups of three, three and two. Separation was not attempted for fear of damaging the shells.

The smallest egg measured 2.0 x 1.3cm and the largest 3.0 x 1.1cm. The weights ranged between 6.5 and 12g. On this occasion, because of a shortage of incubator space, the eggs were placed in the same substrate but split into two groups in plastic boxes, approximately half the size of the original incubating box. The temperature was kept at 29-30°C. Within two weeks, half of the eggs were spoiled by the presence of fungal growth on the eggshell. These eggs were removed and on 10 June, after only 60 days incubation, the first Sunbeam snake hatched. Three more emerged on the 11 June, two on the 13 June and the 14 June, and the last one on the 15 June. The discarded eggshells weighed between 3 and 5g. Inside, a large amount of residue, including the remains of the neonate yolk sac, was found. All of the neonates were much smaller, thinner and consequently lighter in weight than their predecessors, averaging only 6.2g. This occurrence is attributed to variation in incubation conditions and temperature regime.

In conclusion, it appears from these results that *Xenopeltis unicolor* is a species which may exhibit a biennial reproductive cycle.

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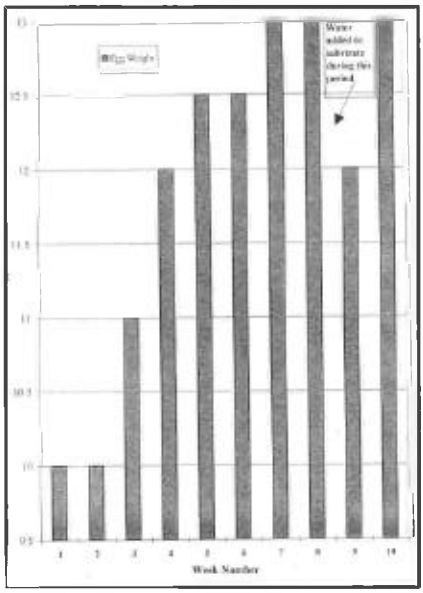

Fig. 1: Egg weight of *Xenopeltis unicolor* during incubation