REPEATED SUCCESSFUL BREEDING OF THE FLORIDA KINGSNAKE (*LAMPROPELTIS GETULUS FLORIDANA*).

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Since the autumn of 1983 I have kept this stout, handsome snake, the characteristics of which have been described in earlier breeding accounts, by myself and by other authors (d'Hondt & Cherlet, 1984; Steehouder, 1985).

In 1984 I had the first successful breeding with my pair of adult snakes, which are about 1.30 m long. All twelve eggs hatched well. In 1985 the breeding was a failure as all fifteen eggs spoiled after some weeks, though they had been growing well and all proved to have been fertile. The most likely cause of this failure I believe to be the moistness of the sand in which they were buried, combined with a lack of ventilation.

During the winter period the animals were not separated, but they were kept cooler: without a (heat)bulb at temperatures of 16-17^{0}C by day, somewhat cooler during the night. On 23 January, when the lights had been on during daytime for a week, the animals started to mate unexpectedly, late at night. That particular day the lights had been on for about twelve hours, longer than the previous days. It seems to me that this has been a major mating stimulus.

From that day on they mated regularly during the first week, even at night. The female accepted food as usual, the male refused all offered food. On 12 March the female shed, after which she ate a mouse on 16 and 17 March.

I expected her to lay her eggs some ten days after the shedding, which she did not. She remained restless after the tenth day, and from 27 March on-

wards there was a clearly visible tension in the longitudinal musculature of the neck region. The eggs did not move up in the direction of the cloaca, as they had done before. I had the impression that she retained the eggs deliberately because she did not wish to lay in the place I had arranged for her to lay her eggs: a dog's water-bowl with moist peatmoss. On previous occasions she had had a closed plastic box with moist sawdust, with a hole in the lid.
On 29 March, quite unexpectedly, she laid sixteen sound eggs with a diameter of 45x25 mm. They were strikingly far developed: when held against the light, they clearly showed blood vessels all around, with a dark red embryonal mass.
Since I took away each egg when laid, I could lay them separately in moist sand in two containers (*Lampropeltis* eggs are normally adherent), the first having an incubation temperature of about 29°C with a deviation of 1° up or down, the second about 28°C, with the same deviation.
In view with the failure of the preceding year, I took care to ensure the sand would not be too moist, and that there would be sufficient ventilation. One single egg, which was stuck to another one, and so was buried too deep, still spoiled later on: a confirmation of my suspicion that the failure of the previous year had been caused by too much moisture.
All other eggs hatched well: after 51 days, on 19 May, the first hatchlings looked out of their shells, which they left the next day. The young from container 1 hatched first, the last one on 22 May. The young from container 2 hatched from 23 May to 25 May. Even the last hatchling was stout and strong. The sexratio of the hatchlings was as follows: in container 1 3:2 in favour of the males; in container 2 2:3 in favour of the females. This difference is incidental; on the other hand there

might be a difference related to the difference in incubation temperature (Petzold, 1984).

On determining the sex of the young, there appeared to be an obvious difference in tail length: with a total length of about 35 cm the females appeared to have a tail length of about 4 cm, the males of about 5 cm. Sex determination was executed by means of 'popping', the hemipenes being extruded by careful pressure on the tail base.

Some days after the laying of the first series of eggs, the animals started to mate again, over a period of three weeks. On 26 May the female shed again, and two weeks later, on 9 June, she laid fifteen eggs. When I found them, this time indeed in her own trusted plastic salad box, they were stuck together in a cluster. I buried the whole cluster as shallowly as possible in moist sand, and incubated them at an experimental lower temperature of 27 °C, at least during the first half of the incubation period (other eggs being added later on, I raised the incubation temperature during the second period to 29 °C).

When the young hatched, the sex ratio appeared to be in favour of the females: nine females against six males. It may be possible that the lower incubation temperature in the first half of the incubation period has influenced this sex ratio. This is only possible if in that phase the sex chromosome is not (yet) identifiable.

Petzold (1984) points out, that it is known from a large number of reptile species, that the determination of sex is dependant on or influenced by the incubation temperature of the eggs. French embryologists have proved this for a number of tortoises and lizards. From clutches of eggs of *Testudo graeca* and *Emys orbicularis* significantly more females hatched at higher temperatures (30 °C) developed than at lower temperatures (26 °C). With *Agama agama* the reverse occurs.

Temperature effects can be so strong that at certain temperatures only males are produced, at others only females.
I have found no data indicating this also happens with snakes. It would be very interesting to experiment more systematically with some species.
My own observations until now have not been sufficiently systematic.
The young from the second clutch were less uniform in length and weight than those from the first clutch. Their average weight was less than that of the first clutch

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