

THE BREEDING IN CAPTIVITY OF THE PUFF ADDER, *BITIS*
ARIETANS (MERREM, 1820).

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Contents: Introduction - The terrarium - Lighting
- Heating - Humidity - Food - Courtship
- Copulation and birth - Acknowledgements - References.

INTRODUCTION

Bitis arietans is, of the large adders, the most common species of the African continent. The genus includes numerous other species (Pezzano, 1986), including small species as *Bitis peringueyi*. The Puff adder varies in colour of dark brown to grey with crescent-shaped, yellow marking on the back. In size the Puff adder is second to *Bitis gabonica* which often reaches a length of 150 cm and more. It is an animal that is found in a variety of habitats with a preference for savanna with scattered shrubs and clumps of trees. It is also found on forest fringes, where it is sometimes found together with *Bitis gabonica*. The Puff adder is provided with large venom glands which help to make it one of the most-feared venomous snakes of Africa. This snake is perfectly coloured to become practically invisible in its surroundings. The food of the Puff adder consists mainly of small mammals and birds. The Puff adder is ovoviviparous, producing 30-50 young.

THE TERRARIUM

For my three specimens I use a terrarium measuring

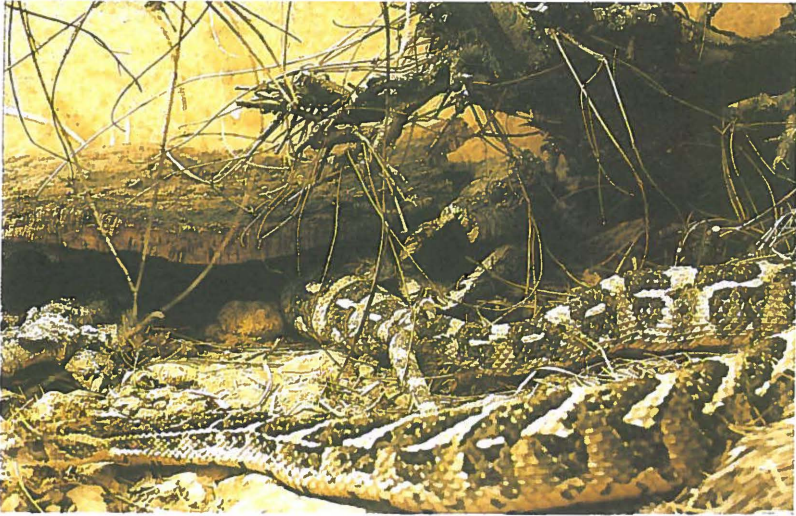


Foto 1. *Bitis arietans*, in copula. Foto: Giancarlo Macchiavelli.

200 x 100 x 75 cm (lxdxh), which can be divided in two halves by a movable zinc partition. The frame is made of wood and eternite. The roof is made of white, non-transparent plexi-glass. The sides are made of glass, as also the front, which consists of two movable panes. The bottom is made of eternite as also the backside which is covered inside with cork. Ventilation is by way of perforated metal plates that run the whole length of the terrarium; one runs along the front (below) and one along the back (above).

The floor is covered with earth. On one side a heating element is built in to heat the terrarium, well isolated with eternite, and covered with earth, to prevent the animals making contact with it. I also made a few hiding places of bark and there is also a stump with climbing branches in the terrarium. As this is not a sterile terrarium it would be possible for the animals to make con-

tact with pathogenic bacteria. To reduce the risk of illness as much as possible I use a fastworking disinfecting expedient (Debat), based on quaternaire ammonium compounds. This has a specific anti-germ-activity for bacteria and moulds. I use this solution in a careful dillution after clearing the terrarium of excrements. The use of it produces no danger for the snakes, neither for the skin or the mucous membranes.

LIGHTING

The light in the terrarium comes from a Philips TL-D-super 80, type 94 of 58 Watt, which produces such a light on a short distance that the colours of the snakes are most beautiful. One single tube turned out to be enough to function as a natural light source. Besides that I also use a light switch KT 110, which imitates artificially the sunrise and sunset. I adjust the illumination in such a way, that the natural sunrise is utilized. As a start I take the period of the first half of January when the rising of the sun takes place much later than in the other months (around 08.00 a.m.). This is intended to make maximum use, during the remaining, of the natural light. Example: in summer the sun rises early, around 04.30 a.m.; when the terrarium light goes on the animals have already had $3\frac{1}{2}$ hours of natural light. In this way one attains a minimum of 12 hours day light, slowly extending to 16 hours in the summer season. Furthermore the programming of sunrise and sunset are especially useful during the winter-months to prevent a sudden change from light to dark.

HEATING

The temperature in the terrarium is dependent of

the outside temperature. During colder periods the heating is on for about 12 hours, so that the average day temperature is 24 to 27°C (in the immediate vicinity of the heating elements in the bottom the temperature reaches 35°C). A thermostat underneath the bottom is adjusted to 37°C. During the night the temperature fluctuates between 17 and 20°C. When the outside temperature rises I turn off the heating until the end of the summer season.

Table 1. Temperature and humidity of the air in the terrarium.

	Temperature in °C		Relative humidity of the air
	at day	at night	
January	24-26	17-19	40-60
February	24-26	17-19	40-60
March	24-26	18-20	50-60
April	25-27	18-20	50-60
May	25-27	18-20	45-60
June	26-28	20-22	50-70
July	27-30	22-24	60-80
August	27-30	22-24	60-80
September	26-29	20-23	60-80
October	25-27	19-21	50-60
November	24-27	18-21	45-55
December	24-26	18-20	45-55

In summer the loss of heat is limited to a minimum so to bring down the night temperature I place a fan in the room, which is also used during the day, when the temperature gets too high (30°C or higher).

HUMIDITY

The spraying of water in the terrarium is of special importance. The main purpose of the spraying is to maintain a certain degree of humidity. It is useful to create artificially a climate that imitates the rainseason typical of tropical areas. During the autumn and winter periods I spray on average once a month, in spring two times and in summer three to four times a month. When the snake leaves its hidingplace and seeks water, that is a sign that you can spray abundantly; when the animal stays in its hidingcorner, the moistening should be limited. There always has to be a drinking trough in the terrarium.

FOOD

The food given to the snakes consist solely of captive bred mice, hamsters, rats, quails, young cocks and guinea-pigs, that I offer with vitamins, minerals and calcium. In the first two years of life I feed the snakes once per ten days; in the third and fourth year once per thirteen to eighteen days and from the fifth year once per eighteen to twenty-three days. Is goes without saying that I take into account a fasting time when the snakes have to slough.



Foto 2. *Bitis arietans*, geboorte van een jong /
birth of a young. Foto: Giancarlo Macchiavelli.



Foto 3. *Bitis arietans*, geboorte van een jong /
birth of a young. Foto: Giancarlo Macchiavelli.

COURTSHIP

Observation of courtship in my three specimens produced some interesting data. The ritual of the courtship lasted longer than one hour. The male followed the female while trying to bring his body close to hers. As he was making convulsing movements, he tried to lift the tail of the female with his tail, so he could make contact with her cloaca. He continuously kept rubbing his head over the body of the female, while he palpated her with his tongue. The female gave the impression that she was not very willing, although she also rubbed her head and neck over the ground. The most spectacular, however, was the unusual undulation of the tails of both reptiles, especially in the case of the female.

COPULATION AND BIRTH

My snakes, which came from Ghana, were born in March 1983 and I had them in the terrarium since September 1983. They were probably mature at an age of two years and three months. The male started to copulate with one of the females on 16 June 1985. The first copulation lasted one hour and thirty-five minutes, preceded by a ritual courtship of about one hour. The temperature during the ritual was 26°C and the relative humidity of the air was about 62%.

The confinement of the first female took place on 21 November 1985. She started on 2.15 p.m. and ended on 3.20 p.m. The pregnancy had lasted 159 days. There were 41 young and they were all born alive. There were 20 males and 21 females. They saw the light two or three at a time with varying intervals of three to ten minutes between every group. The birth was interrupted by the expulsion of unfertilized eggs (18 pieces), which had a diameter that varied from 28 to 32 mm, with a weight

of about 10 g per piece.

In the first hour after birth they all became lively. Their length varied from 23.5 to 25.5 cm; the males were clearly distinct from the females by the difference in tail length (see photo 5): that of the males was 20-22 mm, that of the females 13-15 mm. Their weight varied from 14 to 25 g. The mother snake has eaten three times during her pregnancy:

11 July 1985	1 guinea-pig of 315 g
1 August 1985	1 guinea-pig of 300 g
22 August 1985	1 guinea-pig of 520 g

After this she refused all food until the birth of the young.

The copulation of the male with the second female took place on 27 June. It started on 3.30 p.m. and lasted until 5.20 p.m. The temperature was 27°C and the relative humidity of the air was 70%.

The birth took place on 19 November 1985, after a period of 136 days. Unfortunately I was not able to control the precise duration of the confinement. The second female gave birth to 30 living young; 14 of them were male and 16 were female. The number of unfertilized eggs was 13. The weight of the young was 15-19 g.

The second female had also eaten during her pregnancy:

11 July 1985	1 guinea-pig of 320 g
1 August 1985	1 guinea-pig of 310 g
22 August 1985	1 guinea-pig of 500 g
7 November 1985	1 quail of 110 g

During the months September and October both females refused food, although the second female ate a quail some days before the confinement.

The degree of humidity of the air was kept at the same level as noted before; nevertheless both females drank more often, especially during the last

two months of their pregnancy.

Table 2. Weight and length of the three specimens just before the copulation period in 1985.

	Weight	Length
Male	2950 g	125 cm
Female 1	2400 g	110 cm
Female 2	1950 g	98 cm

Table 3. Length, sloughings and amount of food of the male.

Date of the sloughing	Length of the male	Days since preceding sloughing	Total weight of preys in that period
27-12-1983	52 cm	-	-
11- 3-1984	69 cm	75	180 g
9- 5-1984	78 cm	59	240 g
6- 8-1984	97 cm	99	515 g
15-11-1984	110 cm	101	800 g
6- 5-1985	128 cm	172	1150 g
15- 3-1986	131 cm	313	5540 g
5- 3-1987	153 cm	355	6130 g

Table 4. Length, sloughings and amount of food of female 1.

Date of the sloughing	Length of female 1	Days since preceding sloughing	Total weight of preys in that period
29-10-1983	41 cm	-	-
7- 1-1984	61 cm	70	250 g
16- 3-1984	68 cm	69	305 g
13- 5-1984	85 cm	58	380 g
15-11-1984	101 cm	186	1275 g
7- 5-1985	113 cm	173	1350 g
25- 4-1986	122 cm	353	4670 g
7- 2-1987	139 cm	288	4070 g

ACKNOWLEDGEMENTS

Herewith I want to thank Giancarlo Macchiavelli for his help with the maintenance of the animals.

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Translation: J. Kooy, J.H. Kooy and Fons Sleijpen.



Foto 4. *Bitis arietans*, pasgeboren jong / newborn young. Foto: Giancarlo Macchiavelli.

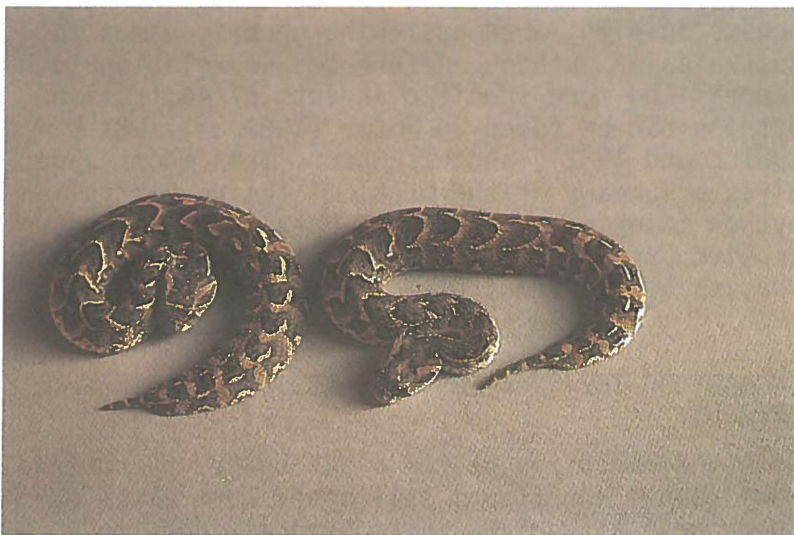


Foto 5. *Bitis arietans*, geslachtsonderscheid van de jongen: links een vrouwtje, rechts een mannetje/ left a female, right a male. Foto: G. Macchiavelli.