

## OBSERVATIONS ON THE REPRODUCTION OF THE AMERICAN ALLIGATOR (*ALLIGATOR MISSISSIPPIENSIS*) IN CAPTIVITY

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The following account is based on personal experience in the keeping and breeding of alligators (*Alligator Mississippiensis*) in captivity in South Africa.

These observations have not been conducted as scientific experiments, but rather as practical field observations.

### HISTORY

The two alligators with which we have successfully bred, arrived at the Ranch in 1984. They were imported from America. They are a 2.13 metre male (21 years old) and a 1.83 metre female (19 years old). A further female was added to the enclosure, of 1.52 metres (15 years old), however, she was attacked by the larger female and was subsequently moved to another enclosure.

### ENCLOSURE

The physical features of the enclosure in which the breeding pair are kept is as follows.

The pen is 10 metres x 10 metres with the pool being of irregular shape with a service area of 45m<sup>2</sup>, the average depth being 1 metre. The pool is of concrete construction and is drained approximately twice a week, the emphasis being on recreating as natural an environment as possible. At the rear of the enclosure, is a small room which is kept heated in winter; this has a river-sand base, but is not used by the alligators for nest building purposes. The water in the enclosure is not heated.

### TEMPERATURE RANGE

The temperature range in Oudstshoorn is not ideal. However, these alligators have adapted well, as can be seen from their breeding record. As a point of interest, I have listed below Oudstshoorn' temperature and rainfall range as cycling temperature conditions throughout the year may also be crucial in bringing these alligators into breeding conditions. Although photoperiod may play the primary role in activating gonadal activity, this may not be triggered unless temperature conditions are correct. (Bustard 1965).

### OUDSTSHOORN

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Year
MEANMAX°C	18,9	21,3	23,2	25,9	28,2	30,4	32,2	32,3	30,0	26,7	22,5	19,9	26,0
MEANMIN°C	3,4	4,8	7,3	9,9	12,4	13,6	15,3	15,4	14,0	10,7	6,7	3,3	9,7
RAIN mm	19	16	22	21	31	21	10	13	26	21	21	11	232

### DIET

The diet for our alligators is unique and is determined by our locality, being close to the ostrich abattoirs: we have freely available supplies of ostrich meat. The diet for the alligators therefore, consists of ostrich heads and wing-tips, the wing-tips being a red meat with a fairly high flesh content. In the summer we feed approximately 4 times per week.

### BREEDING

The alligators at Cango Crocodile Ranch have laid eggs for 2 years in succession. The eggs in 1986 were laid on the 14 January and in 1987 on the 26 January. In both years, the laying was preceded by heavy bellowing in December. It is surmised from the diagram of the chronology of the reproductive biology in Louisiana of the alligator (from Joanen and McNease 1975) in which they show the courtship beginning on first March with egg-laying occurring from

mid-June to end-June, that our alligators began courtship 6-7 months later than in the States (ie around mid-September). This initial courtship was never observed and therefore possibly took place at night; however, as stated, intense bellowing was observed around mid-December corresponding with the period late in the U.S.A.

In the 1987 laying, 45 eggs were laid in a nest which was built from grass cuttings and leaves from reeds which had been placed in the enclosure. The moment the eggs were laid, the female exhibited aggression. As this was the first time that the alligators had bred, uncertainty existed prior to the laying as to whether she hadn't delayed, and therefore during a period of two weeks prior to the lay, the nest was disturbed 3 times in order to establish whether there were eggs or not. This could have led to stress and therefore retention by her of the eggs, as the eggs, when discovered, had already begun banding. Of the eggs laid, 19 were fertile and these continued to band for a further 14 days and then ceased further development with embryonic regression.

In 1987 the procedure was much the same, and in both years copulation was not observed, therefore probably taking place sometime between 6 pm and 7 am. Bellowing occurred towards the end of December and nest building began in mid January, being completed around the 25 January. This time, however, I waited for a show of aggression by the female before opening the nest. This aggression was observed in the afternoon of the 27 January and the nest was uncovered at 6 pm. The temperatures of the 26th and 27th were noted as 32°C and 33°C respectively. Both were dry, hot days. The 28th however, was cold and wet. This time 49 eggs in total were laid with three being badly damaged, yolk from these had fallen onto some of the undamaged eggs and, although wiped off, when incubated formed a fungus. A further 2 eggs were cracked but were still placed in the incubator. Of the remaining eggs, 28 were fertile and had begun banding. This was evident by a spot on the surface of the eggs at the time of collecting. This caused us to believe that the eggs were laid on the night of the 26th. On the 1 February, on all 28 eggs, the banding had progressed to a thin band extending around the eggs. On the 20th March, 5 eggs were removed as banding had ceased at approximately day 14. These eggs also displayed large air pockets of approximately 30% of the total egg. All had embryo's which compared with those of 14 day embryos. On the 26th March, 40 eggs were removed, in all cases there were large air pockets where the embryo had detached from the shell and in the few fertile ones, embryonic regression was visible. However, one healthy embryo was discovered which seemed to be developing at it's normal rate. At this point, we had 5 eggs left which had banded well and appeared to have a chance of hatching. These also had air spaces of between 20 and 25%. No external cracking on the shell was visible. On the 27th I cracked the outer surfaces of the shells, in the hope of enabling a better gas exchange and also to aid the hatching of the embryo. On the 2nd April, 1 hatchling broke through the membrane with it's head in an upside down position. This occurred at 5.30 pm. By 2 pm on the 3rd, it still had not emerged, I therefore slit the membrane thus allowing the hatchling to free itself. By the 7th, the remaining 4 eggs had shown no sign of hatching. We therefore opened the eggs and found 4 fully formed dead embryos.

The eggs were incubated in a laboratory incubator, kept at a temperature of 31°C. A wet-dry thermometer was placed in the incubator in order to monitor the humidity; the dry bulb registered 90-95% humidity. During incubation, the eggs were placed on racks with no substrate. Distilled water was placed to a depth of 5 centimetres at the bottom of the incubator, with fresh air passing through the water; above the eggs was a tray with a further 3 cm of water. It would appear from the large air-pockets in the eggs that the humidity was not as high as shown by the wet-dry thermometer - the particular model used not being of a very high quality. Further, problems were experienced with the door seal which has since been corrected. I feel that alligator eggs possibly need a higher humidity than those of the Nile crocodile (*Crocodylus niloticus*) as we have successfully hatched these in the same incubator on numerous occasions. There is also possibly a need for a substrate to encourage chemical decomposition of the egg-shell.

#### HATCHLING

The hatchling when born was approximately 2 weeks premature with a largely distended abdomen and a large amount of retained yolk. It has, at time of writing, continued to improve and has absorbed all its yolk, with the stomach closing well. The diet being fed consists of mince,

fish and liver. The length at birth was 233mm and its weight was 35 gms. The average measurement of the eggs was 71 mm long, diameter 39.5 mm with a weight of 66 gms.

#### REFERENCE

- Joanen, T. and McNease, L. (1975). Notes on the reproductive biology and captive propagation of the American Alligator. Proc. Ann. Conf. Southeastern Assoc. Game Fish Comm. 29: 407-15.