

Preliminary Studies on the Breeding Biology of *Crocodylus porosus* and *Crocodylus n. novaguineae* on the Middle Sepik (Papua New Guinea)

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From September 12th 1979 to January 31th 1980 I had the opportunity to investigate some nesting sites of *C. porosus* and *C. n. novaguineae*.

9 nests were made by *C. n. novaguineae*, 1 by *C. porosus*, 3 could not be attributed to one of both species. All nesting sites had been well known for years by the village people. The collecting of crocodile eggs on the Sepik has spread; it provides an additional protein source for the local people.

Determination of the Nesting Period

The age of the nests and reports of the local people indicate the main nesting period of the crocodiles on the Sepik for the months July to November, i. e. the dry season. However there are hints that either both species or at least *C. porosus* nest during the rainy season (January—April) too. 3 *C. Porosus* hatchlings, caught during a night census on June 11th 1979 were not older than 2 months. In the opinion of local people only huge females make nests during the rainy season. With this in mind, regional differences cannot be disregarded. WEBB, MESSEL, and MAGNUSSON (1977) report that *C. porosus* nests in Northern Australia during the rainy season (November—May). It seems that there is no difference for the Sepik area concerning *C. porosus* only.

Habitat

12 of 13 nests were built under shade trees or palms. Only one nest was fully exposed to the sun. 2 nests lay at the edge of an oxbow lake of the Sepik, respectively at the edge of a small watercourse. All other nests were built on floating grass under which the water

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could reach a respectable depth (4m and more). 6 nests lay under single shade trees and 6 others inside or at the edge of small isolated sago and pandanus swamps. One of those nests was built in a very cool and shady place under a sago palm, where the sun hardly reached the ground.

Measurements and Construction of the Nests

Only some measurements of 10 nests gave satisfactory results. 3 were either too old (one year and more) or were destroyed by local people. Measurements were taken from the height, base diameter and, if in good condition, the size of the egg chamber.

Table 1: Nest measurements

	Base diameter of nest (cm)	Height of nest (cm)	Height of egg chamber (cm)	Width of egg chamber (cm)	Egg number	Temperature (°C) in chamber
<i>C.n. novaguinae</i>	133 ¹	44	28	22	—	—
	128	65	—	—	—	—
	150	60	—	—	38	—
	150 ²	62	—	—	45	—
	125	55	—	—	27	30.5
	160	57	31	25	34	34.0
	160	55	25	22	36	—
<i>C. porosus</i>	192	63	30	28	75	31.0
<i>C. sp.</i>	120	46	25	20	—	—
	140	55	—	—	48	—

¹) fig. 1

²) fig. 2

The egg chamber was always in the centre of the nest. Leaves, sticks and mould never covered the eggs more than 20 cm in *C. novaguinae* and 25 cm in *C. porosus*. The nests were always built using materials found in the close surroundings. A nest in a sago and pandanus swamp was built with the leaves of those two plants. Another nest, on floating grass under a shade tree, consisted of this grass and leaves of the tree. In all nests mould was used for construction. There was water under all nests except two.

Distance to the next Waterhole

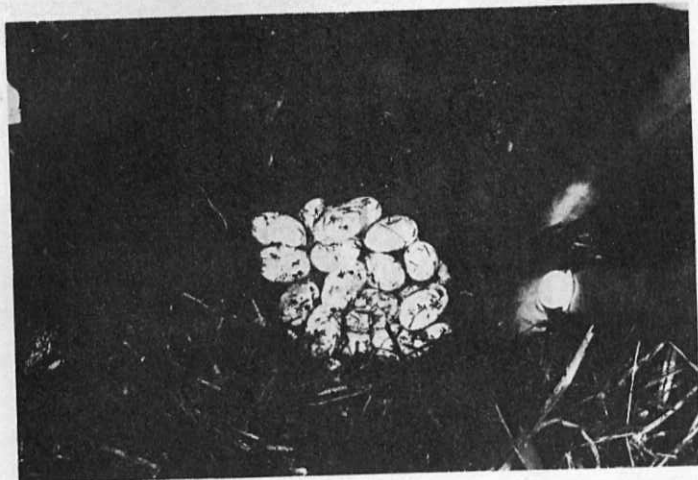
A nest of unknown species had an actual distance of 10 m to a little lake. This nest was at least one month old and no regard was paid to alterations of the water level in this lake. The distance to the next waterhole at the only *C. porosus* nest was 8 m. The average distance nest-waterhole of all *C. novaguinae* nesting sites was 165 cm, the longest distance being 2 m, the shortest 0.5 m.



Fig 1, Fig 2 Nests of *Crocodylus n. novaguinae*

The Eggs

The clutch size is known from only 7 nests. An unequivocal correlation between nest size and number of eggs cannot be made because of too few data, but obviously the bigger the nest the more eggs are laid inside.



On January 30 I investigated a *C. porosus* nest with 75 eggs. The eggs on top, that is the last laid eggs, looked completely different than those on the bottom. The latter (total 45) had a calcareous shell and showed a typical white band around the lateral axis. The eggs on the top had only a slightly calcareous shell, were longer and did not have a white band, I broke two eggs of each type. The eggs at the bottom had well developed embryos (4 cm length). The eggs at the top did not yet show an embryo but had well developed blood vessels. The possibility of a correlation between size and age of a female and size of the eggs and the clutch cannot be ignored.

Table 2. Egg measurements

	lateral axis (in mm) mean (min-max)	longitudinal axis in mm mean (min-max)	Number of eggs measured
<i>C. p.</i> , farm animal	46 (45-47)	76 (74-79)	12
<i>C. p.</i> , hard shelled	54 (53-57)	78 (75-80)	15
<i>C. p.</i> , soft shelled	53 (51-55)	83 (82-87)	30
<i>C. n. n.</i>	43 (40-45)	72 (69-80)	18

Behaviour of the Nesting Female

At only two nests of *C. novaguineae* the female was present. Both reptiles disappeared immediately when we approached the nest and did not show any defensive behaviour.

One reason might be that both sites had been regularly visited by the land owners to collect the eggs. The hunting pressure on both species in all investigated areas is very strong. The crocodiles seemed to have adapted themselves to those circumstances by flight behaviour. One of those two nests was still under construction and the eggs had not yet been laid. The female, which had a total length less than 2 m, abandoned her nesting site after our investigations as proved by another visit six weeks later.

The *C. porosus* female, whose nest was visited by us at the end of January showed defensive behaviour. During our stay at the nesting site (appr. 30 min.) the reptile was always present at a distance of about 20 meters. It gradually approached its nest in a semicircular movement. We detected this by the hissing and grumbling noises. Our local companions advised us to depart quickly as they feared an attack so we were not able to measure the whole clutch.

Old Nests

In two cases two old nests (not included in the total number of 13 nests) were sited close to those which were investigated. Local people who had known the nesting sites for years pretend that the nests are found each year at the same place or at least close by.

General Observations

From all investigated sites two were threatened by highwater because they were not built, as the others had been, on floating grass which follows alternations of the water level. Other threats for nesting sites of both crocodile species are bush fires, regularly caused by local people during the dry season, and the collecting of crocodile eggs. Besides these threats there are a lot of egg predated animals like monitor lizards, birds and small mammals.

As the prizes paid for crocodile skins are high, people do not even stop killing breeding females near their nests. The government of Papua New Guinea has set up a limit for the size of skins which are allowed to be bought and exported. This limit is 20 inches (appr. 50 cm) belly width¹. 3. It means no real protection for breeding size crocodiles, as many breeders are much smaller than expected. A *C. novaguineae* female which people had brought to our farm had 30 eggs.

The belly width of this reptile was 34 cm and the total length 177 cm.

For the preservation of both crocodile species occurring in Papua New Guinea it is very important that the government enacts more efficient protecting laws in the future.

¹ We measured the belly width from the outside scute of the third backscute row behind the shoulder underneath the crocodile to the outside scute on the other side. When the crocodile is skinned the size of the skin is the same as the measurement taken of the live crocodile.

References

- BIGALKE, R. (1931): Note on the egg of the Nile crocodile (*Crocodylus niloticus*). Proc. Zool. Soc. London, 1931 Part 2: 557-559
- COTT, H. B. (1961): Scientific results of an inquiry into the ecology and economic status of the Nile crocodile (*Crocodylus niloticus*) in Uganda and Northern Rhodesia.-Trans. Zool. Soc. London, 29 (4): 211-356
- POOLEY, A. C. (1969): Preliminary studies on the breeding of the Nile crocodile (*Crocodylus niloticus*) in Zululand.-Lammergeyer 3 (10): 22-44.
- RYAN, P. (1971): Encyclopedia of Papua and New Guinea, Volume 1. P. 221-222
- WEBB, G. J. W., MESSEL, H., MAGNUSSON, W. (1977): The nesting of *Crocodylus porosus* in Arnhem Land, Northern Australia.-Copeia, 1977: 238-249