THE HUSBANDRY AND CAPTIVE PROPAGATION OF THE SOUTHERN ROCK PYTHON, *PYTHON SEBAE NATALENSIS*

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INTRODUCTION

The African Rock Python, *Python sebae* (Fig. 1) is distributed throughout much of sub-Saharan Africa, extending along the Nile valley into Egypt. In southern Africa it is restricted to northern Namibia and Botswana, extending through the northern and eastern Tansvaal, to Natal and the Transkei (Map 1). Pythons were previously found in the eastern Cape Province as far south as Bathurst where it became extinct in 1927 (Broadley, 1983). Branch (1988a) reported on an apparent successful reintroduction of the species into the eastern Cape.

Broadley (1984) recently recognised the southern race (Python sebae natalensis) of the African Rock Python as distinct from the typical race from west and central Africa. The recently described Lesser Rock Python *(P. saxuloides)* from Kenya (Miller & Smith 1979), is treated as a junior synonym of the southern race (Broadley 1983). The African Rock Python is a thick-bodied snake with distinctive markings and size.

As with most "giant" snakes, the size is easily over-exaggerated and most recorded lengths have been of the nominate race. *Python sebae sebae* has been reported to attain a length of 9.8m in the Ivory Coast (Doucet 1963), but full details for this specimen are lacking and cannot now be verified. Arthur Loveridge, whilst collecting in East Africa in 1927, measured a fresh skin of 9.1 metres and even allowing for extensive stretching, it must have been over seven metres long. In southern Africa, *P. s. natalensis* does not appear to exceed 6 metres, and a record of a snake of 5.8 metres from the northern Tansvaal Bushveld is the largest recorded (Branch 1984).

African Pythons normally feed on warm blooded prey such as mammals and birds, but will occasionally eat even Monitor lizards. The size of the prey depends on the size of the snake. Adults often take small Antelope and the largest recorded prey item from any constrictor is that of a 59kg Impala swallowed by a 4.88m python (Rose 1955). Other records include a 6 metre python consuming 6 goats (Taylor 1981), a 5 metre snake ate a pointer watch-dog and puppies (Jensen 1980) and a 4.28m python devouring a six month old female impala (illustrated in Branch 1984). Unusual prey included Baboons (Broadley 1961). Tree squirrels (Kaplan 1992), a Vulture (Verster 1992) and even a Porcupine (Patterson & Bannister 1988). FitzSimons (1930) records pythons even killing Leopards while Halliday & Adler (1986) illustrated a python constricting a crocodile. The African Python is the only snake in Africa large enough to consider humans edible and a number of anecdotal reports exist of human predation by pythons. Loveridge (1931) reported the death of an African woman, found in the coils of a 4.5m snake at Lake Victoria, East Africa. Branch & Haacke (1980) reported on a 13-year old herd-boy that was killed in the northern Transvaal.

Although the species is frequently maintained in captive collections, it is not often bred and is even regarded as notoriously difficult to breed (Ross, 1978; Ross & Marzec 1990). Depending on the size of the female, African pythons lay up to 100 eggs in early summer in Antbear on Warthog burrows (Broadley 1961). Porter (1987) reported an unusual nest site in an open *Panicum* grassland, far from any cover. Mating occurs from May to August and 17-48 eggs are laid in October to November (Branch & Erasmus 1984). These hatch after an incubation period of 62-88 days (Patterson 1974; Scütte 1970).

HABITAT AND STATUS

Pythons have been recorded in a wide variety of habitats, but are most common in moist, rocky, well-wooded valleys (Branch 1988b). They are known to spend long periods in water. Burton (1979) recorded African pythons drowned in fish traps in 2 metres of water in Lake Sibayi, and Haagner (1991a) reported on the aquatic behaviour of a male python in the eastern Transvaal. They are frequently found in and around water, in which they bask and ambush prey. Mainly active during dusk or at night, they may be found basking or occasionally even hunting during the day (pers. obs.). Haacke (1984) and Haacke & Jacobsen (1990) reported the species from the Kalahari sandveld in southern Botswana and northern Cape Province.

Relatively little is known of the wild populations of the African Rock Python. It is well established, and may even be relatively common, in conservation areas, but due to its great size, is easily exterminated. Alexander (1991) reported on the local extinction of the python from municipal Durban. Man is now the python's main predator and threats include collection for skin, 'muti' (African traditional medicine), food, the pet trade and destruction due to its perceived danger to man and livestock. It is known to raid chicken farms, where they are often killed. Natural enemies include crocodiles, honey badgers, mongoose, etc. Pienaar *et al.* (1983) reported a young python in the stomach of a Cape File Snake while Haagner (1991b) reported keratophagous behaviour in a juvenile specimen. Habitat destruction, such as sugar cane farming in Natal, may result in local extinction. Pythons are listed as vulnerable in the South African Red Data Book – Reptiles and Amphibians (Branch 1988b).

THREATS

Due to its size, attractive skin and feeding habits, the python is subject to numerous threats. Dollinger (1982) listed over 300 *Python sebae* skins that were imported into Switzerland while over 10,000 Asian python skins were exported during the same period. Engelmann & Obst (1982) illustrated a village tannery in West Africa processing both African Rock and Ball python (*P. regius*) skins. Many African tribes use python fat and skin in traditional medicines, while it makes a substantial meal as well (Patterson & Bannister 1987).

Pythons control the numbers of cane rats in sugar cane plantations, and for this reason Natal farmers initiated the first efforts to protect the species, leading to the proclamation of the Reptile Protection Ordinance, no. 32 of 1968. It included the Nile crocodile, two monitor lizards, tortoises, terrapins and python (Greig 1984).

ADULT CAPTIVE MAINTENANCE

It is a relatively hardy species in captivity, although wild-caught specimens remain irascible and will often refuse food for periods of a year or more (Broadley 1983). The breeding results achieved at the Manyeleti Reptile Centre and the Port Elizabeth Snake Park are summarised below.

A total of 5 (3:2) adults were maintained for breeding purposes. The largest female was captured in the Manyeleti Game Reserve during December 1986 whilst swallowing a sub-adult Impala ram. She measured 4.7m and weighed 37kg; the Impala weighed 35kg. (see fig 2.). She settled remarkably quickly in captivity but refused food for a period of 14 months. She was offered rats, guinea pigs, cats, rabbits and even a dog. Eventually a newly-born dead Impala calf was offered and immediately taken and swallowed. Subsequently she was fed with sub-adult female Impala every 6-8 weeks. The remainder of the breeding group comprised of 2 captive raised males which were collected as hatchlings while crossing a road. At the time of breeding they were approximately 4 years old. Another two adult females were collected whilst raiding chicken farms in the Giyani district.

The snakes were kept in a large "environmental room" of dimensions 5 x 3.5 x 2.5 metres. A transparent fibre-glass roof allowed the entry of natural sunlight and photoperiod (14 hours

light, 10 hours dark in summer and *vice versa* in winter). The room contained a large drainable pond in which the snakes would often bath for days on end. A louvred window was located on the west facing wall, allowing the pythons to bask in the afternoon sun. Five wooden shelves were attached to the walls at heights ranging from 0.5 to 1.8 m above floor level. This enlarged the surface area of the animals and allowed them to select a "preferred temperature" under the fibreglass roof. A drain in the concrete floor allowed for the room to be hosed clean once a week.

Approximately one quarter of the floor area had thermostatically controlled underfloor heating. On this a large straw-filled hide box (1.5 x 1.2 x 0.5 m) maintained the ambient temperature in the box at 22°C. During a period of extreme cold in 1990, the floor area was covered with a thick layer of straw. Ambient temperatures in the room varied from a minimum of 8°C in winter to a maximum of 37°C in late-summer. Spotlights were installed above the two top shelves to create local "hot-spots" for basking during the winter months when heat penetration through the roof was very low.

Food consisted of dead week-old chicks, rats, guinea pigs and rabbits and was offered every two weeks. Problem or sporadic feeders were stimulated to feed by leaving live guinea pigs in the room overnight. Accurate records were kept of each individual's intake and notes made on shedding, reproductive behaviour, and any noteworthy observation.

During June 1991 several of the first captive bred offspring were transferred from the Manyeleti Reptile Centre to the Port Elizabeth Snake Park. These animals were captive raised from a clutch of 55 laid by the largest female. They were only 25 months old when the two males mated with their sibling sister. She produced her first clutch of viable eggs at 29 months (2.4 years) of age. This female measured 2.73 m and the males 2.22 and 2.46 m respectively. Pitman (1974) reported copulation in captivity of a 6 year old python, measuring 2.43 m. Ross (1978) reported that the youngest female to produce eggs was six years, and the oldest fifteen years.

ACTIVITY

Although observations on the group were only casual, it was clear that the snakes were usually inactive during the day. Greatest activity was normally observed during the early morning, when the snakes moved to the shelves to bask. Observations on wild pythons have shown that the larger adults are nocturnal with movement having been observed as late as 00h30. Juveniles were mostly observed on the roads during the early evening up to 21h00. During January 1987, several newly-hatched pythons were collected in the early morning, and as many as 5 were collected in a single day whilst robbing Spotted-Back Weaver nests. Other than the large female caught while eating the Impala, no active adult pythons have been observed during the day.

Several snakes, however, had regular basking spots where they were regularly observed by staff. These included old termitaria, rocky outcrops and next to antbear holes. These snakes were territorial and during the period 1986-1991, several ventral clipped males returned to the same rocky outcrops every winter.

COURTSHIP

Due to the snakes' nocturnal habits, very few observations have been made on reproductive behaviour. Over a period of 5 years, male combat was never observed, although it appeared that the snakes had established a stable, linear social hierarchy similar to that described for *Python molurus* (Barker *et. al.*, 1979).

Reproductive behaviour normally started in early spring. At the Manyeleti Reptile Centre this was mainly observed in August, whilst at Port Elizabeth Snake Park it occurred from late September to early November. Courtship and mating behaviour follows the triphasic pattern observed in colubrids (Gillingham et al., 1977) with some minor differences. Most noticeable

is the lack of jerky movements and head bobbing by the male. On contact with the female's body, the male lifts his head to her dorsum and begins a dorsal anterior advance with his head adpressed. This movement is slow and invariably terminates before he makes contact with the female's head region. On several occasions the male moved dorsally to just posterior of the female's head and gently nudged her nape with his snout. This is accompanied by rapid tongue-flicking. No use of spurs has been noticed as reported for other boids, e.g. *Sanzinia madagascariensis* (Carpenter *et. al.* 1978) and *Pythong molurus* (Gillingham & Chambers 1982).

After attaining a mounted position the male began to make one or two C-shaped body curves in sliding movements. He slowly advanced in an anterior direction and eventually brought his tail onto the female's dorsum. He then aligned his tail in a ventro-lateral position with that of the female. The female normally responded by lifting her tail slightly. Failure to achieve intromission is normally due to the female's refusal to lift her tail. Gillingham *et al.* (1977) and Gillingham & Chambers (1982) have shown that intromission can only occur when the female voluntarily opens the cloacal orifice to permit male entry. Copulation lasted between 54 and 173 minutes (n=4). Gillingham & Barker (1982) found that the mean copulation time for a group of Burmese pythons was 6 hours 45 minutes.

OVIPOSITION AND INCUBATION

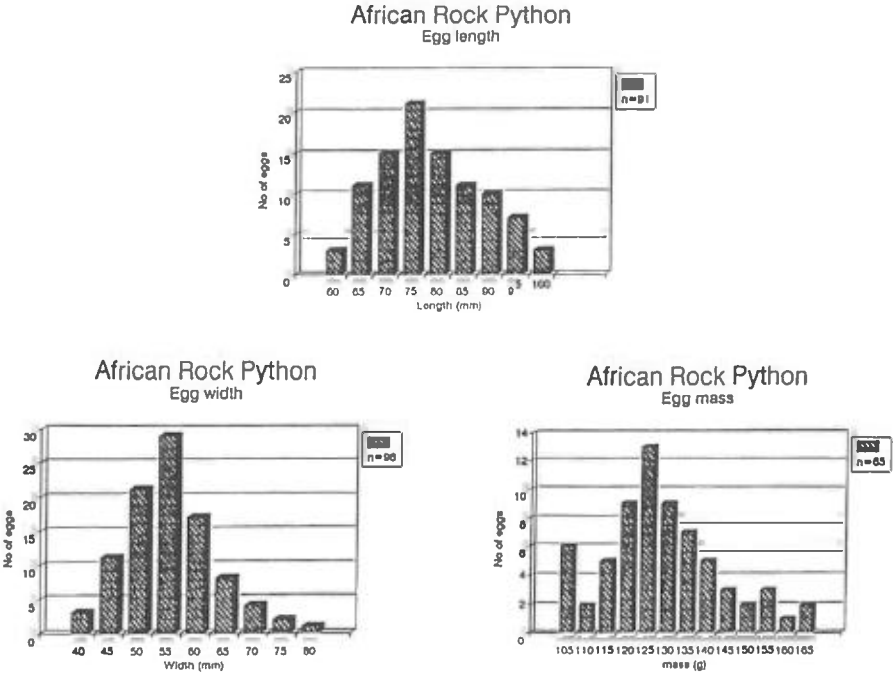
The female bcomes noticeably swollen posteriorly, especially during the latter half of the gestation period when she will refuse food. The eggs are laid after a gestation period of 107-115 days. At the time of oviposition, the female normally becomes increasingly aggressive.

The eggs are normally laid during the night or early morning. One female that was observed took 3 hours 17 minutes to complete a clutch of 55 eggs. Very few documented records exist on the incubation period for the species. Ross (1978) and Ross & Marzec (1990) reported that at 72-106 days, the incubation period in this species is significantly longer than any other python species.

The eggs are smooth, white and moderately adherent. The female remains coiled around the eggs during oviposition, and will remain as such during the incubation period (see Fig. 3.). Even if the eggs are removed, the female will remain coiled in the same position and location for an extended period. In such circumstances, it is advisable that the female is regularly disturbed "brooding" behaviour, to ensure she resumes regular feeding as soon as possible. Females left to brood their eggs have not been observed to move in order to drink or feed during the incubation period. Van Mierop & Besette (1981) reported occasional feeding and even basking behaviour in a brooding Ball python, *P. regius.*

The eggs were removed as soon as detected, separated and full biometrics taken (Fig.'s 1-3, Table 1). It is important to separate the eggs as soon as possible to allow for ease of incubation. The eggs were incubated (3-4 per box) in a substrate of moistened vermiculite in clear sealable containers (35 x 35 x 20cm) as described by *Tryon* (1975) at 30-31°C. The containers are opened two or three times weekly to allow for air circulation. Any infertile or fungus covered eggs are removed. These were inspected to determine fertility and if possible the cause of death of the embryo. Incubation periods under these conditions varied between 79-83 days (n=5). The hatchlings do not fully emerge from the egg until 24-36 hours after the initial slits appear in the egg.

Problems were encountered with the death of embryos just prior to hatching. This syndrome seems relatively common in the captive breeding of pythons (Moran pers. comm.). It appears to be particularly noticeable if large numbers of eggs are incubated in a single container, and may be due to the lack of sufficient oxygen. This may occur if eggs have to be incubated in a clump. It is therefore important to inspect gravid females regularly and to collect the eggs as soon as they have been laid. This allows for easy separation of the eggs. Dunn (1974) reported on the successful hatching of 34 young where the egg mass was incubated in a single container. Unfortunately he did not record the frequency of inspections or the size of the incubation container.



Fig's 1-3. Biometric data on the African Rock Python eggs.

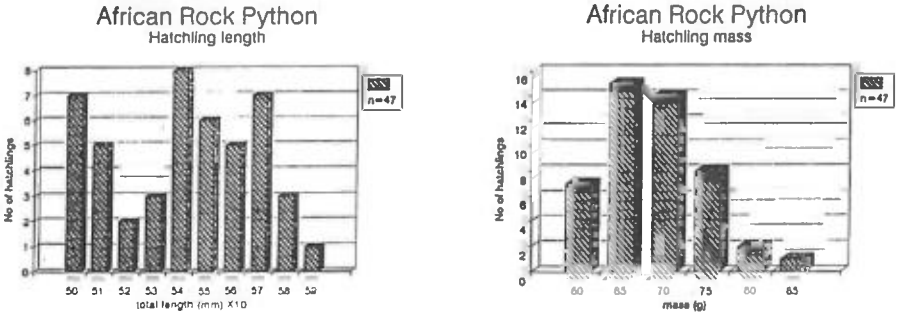


Fig. 4-5. Biometric data on the African Python hatchlings.

CLUTCH SIZE AND FERTILITY

As in most snakes, the number of eggs produced depends on the size and condition of the female. Female and clutch size is positively correlated. Less well understood is the correlation between size of the female and egg size (Ford & Seigel 1989). Large females lay more, not bigger eggs, than smaller females. FitzSimons (1930) noted that large pythons lay greater numbers of eggs than small individuals. Obvious exceptions exist when larger females produce small clutches due to poor health or sperm unviability. FitzSimons (1962) stated that usually 30-50 (exceptionally up to 100) eggs are laid of which as many as 50% may be infertile. Branch & Erasmus (1984) recorded the relationship between the size of the female and clutch and egg size. The mean clutch size for the southern race is 30.5 (range 17-74, n=14). The smallest clutch reported was that of 17 produced by a female of undetermined size after a gestation period of 71 days (Schmidt 1971). The largest clutch recorded is 74 which was discovered in a decomposing haystack. In this case 84% of the eggs hatched and only 10% were infertile (Porter 1987).

Branch & Erasmus (1984) reported a 91% fertility rate in captive bred clutches. At the Manyeleti Reptile Centre, the average fertility rate was 78.4% (range 62-94%, n=5). There is a decline in sperm viability with age, which results in smaller clutches and even an increased deformity rate in the resultant young (Branch & Erasmus 1984). Visser (1985) reported sperm retention in a female that laid a clutch of 33 eggs four years after having been in contact with a male. Only ten of the eggs were fertile.

HATCHLING MAINTENANCE

The hatchlings were immediately weighed and measured (Fig's 4-5) upon emergence. They were individually housed in clear plastic boxes (35 x 35 x 20 cm) with a newspaper substrate, a potplant driptray for water and an inverted driptray for cover. Temperature was maintained at 30-32°C with a static photoperiod of 12/12 hours dark/light.

All hatchlings were highly alert and easily stressed when disturbed. Food (young weaned mice), was offered only after each snake had undergone its first shed, which occurred 7-13 days after emergence. Very few problems were encountered with the initial acceptance of food. Problem feeders were force fed on newborn day-old mice until spontaneous acceptance occurred. Growth was extremely rapid, with a female attaining a total length of 2.1 meters within 18 months.

DISCUSSION

The captive husbandry and reproduction of *Python s. natalensis* is similar in many aspects to that of the more commonly kept *P. molurus*. As in *P. molurus* and other pythons, the female usually stops feeding some weeks after mating and coils around the eggs until they hatch. Pitman (1973) stated that the female African rock python has the "ability to thermoregulate body heat by conspicuous musculature contraction as do *P. regius* and *P. molurus*".

Unfortunately Pitman does not elaborate or give his source. There is no evidence that the female African Rock Pythons became facultative endotherms during incubation. In addition, Van Mierop & Bessette (1981) and Ross & Marzec (1990) found no evidence of such endothermic activity in captive *P. regius*. In the genus *Python*, the production of endogenous heat by means of contractions of the body has only been proven for *P. molurus* (Hatchinson, Dowling & Vineger 1966; Vineger, Hutchinson & Dowling 1970, Van Meriop & Barnard 1978).

The incubation temperature for python eggs appears to be critical. Joshi (1967) stated: "in the tropics, particularly West Africa, laid eggs of *P. sebae* do not need to be incubated by the female. A moist atmosphere and high temperature are sufficient to allow further development of the already advanced embryo, which hatched in about two months". He, however, had low hatchling success (32.3%) when he incubated the eggs at temperatures of 72-94°F (22.2-34.4°C). Vinegar (1973) has shown that a constant temperature of around 30.5°C is required

for development. Eggs kept below this, if they do develop, have a low hatching success (27.5°C) or exhibit no development (25°C). Brooding *P. molurus* maintain a temperature of 30-32°C (Hutchinson *et. al.* 1966) while *P. s. natalensis* an average of 31°C (Branch & Erasmus 1984). Branch & Patterson (1975) reviewed the variation in incubation period and its relationship to the temperature of incubation.

The African Rock Python has been documented to hybridize with the Indian python, *Python molurus bivittatus* (Branch & Erasmus 1984) (see Fig. 4.). The loss of two of the clutches during incubation and the presence of developmental abnormalities in several of the embryos is suggestive of a possible oxygen deficiency in the incubating eggs. Jackson (1981) commented on the high incidence of developmental deformities of reptile eggs deprived of oxygen during incubation.

The average clutch size for the southern python is 30.5 eggs. This is possibly correlated to the relative smaller size of the southern race in comparison to the northern tropical race which attains a much greater length. Unfortunately very little published data exists for reproduction for the nominate race. Pitman (1974) examined several nests but only comments on one clutch of 50 eggs which contained infertile (small, brown, hard and calcarcous) eggs.

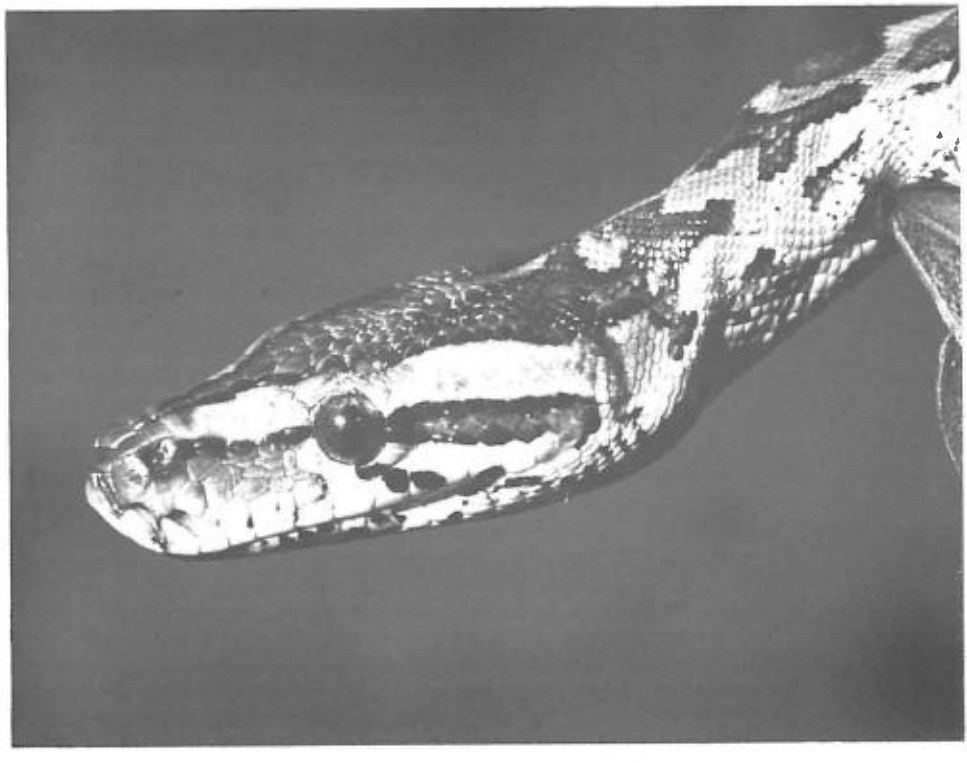
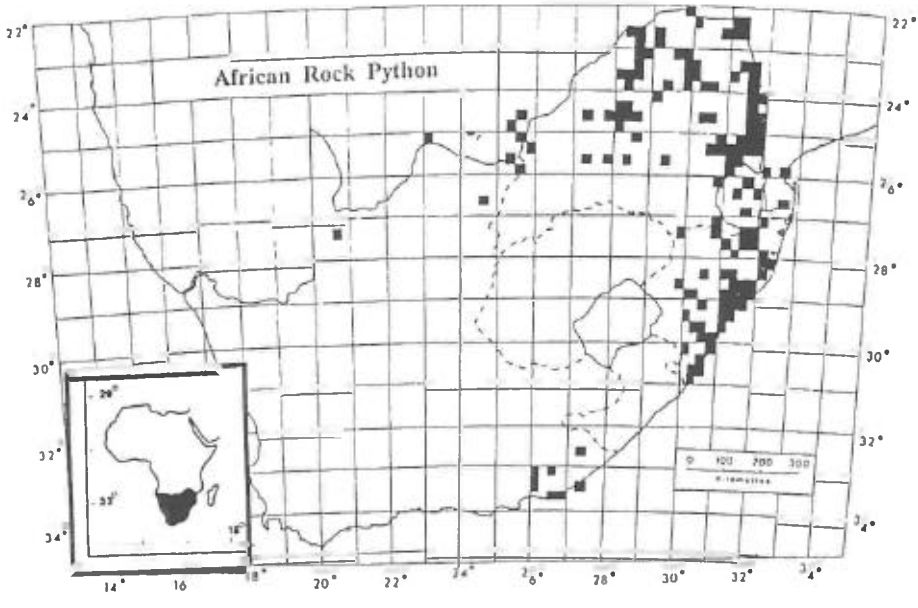


Fig. 1. Juvenile Southern Rock Python

Photograph by Pieter Bos

Fig. 2. Large adult female python caught whilst swallowing the young impala ram. The snake measured 4.7 m and weighed 37 kg while the impala weighed 35 kg

Fig. 3. Captive bred hybrid between the Burmese Python and the Southern Rock Python
Photograph by Bill Branch



Map 1. Distribution of the Southern Rock Python, *Python sebae natalensis* (after Branch 1988b)

Table 1. Summary of reproductive data of *Python sebae natalensis*

Copulation	August – October
Oviposition	November – December
Gestation period	107-115 days
Clutch size	30.5 (23-55) n=5
Egg data	
Mean length	77.23 mm n=91
Range	62.0-92.2 mm
Std. dev.	5.44 mm
Mean width	55.64 mm n=96
Range	52.7-64.2 mm
Std. dev.	5.29 mm
Mean mass	131.75 g n=65
Range	113.9-148.5 g
Std. dev.	9.45 g
Hatchling data	
Incubation period	79-83 days (n=5)
Mean total length	544.97 mm n=47
Range	484-625 mm
Std. dev.	33.11 mm
Mean mass	69.97 g n=47
Range	66.0-77.2 g
Std. dev.	7.75 g

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