

CALABARIA REINHARDTII

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AFRICAN BURROWING PYTHON



Calabaria reinhardtii (Schlegel, 1851) is commonly called the African burrowing python. Other names are frequently used as well (see Table 1), most of them also incorporating the word “python.” However, the relationship of this species to others of the subfamily Pythoninae is currently disputed among herpetologists, as will be discussed later in this article.

In Nigeria, the Efik people, predominant ethnic group in the southeastern region of the country, call this snake *iwod iba*. In pidgin English it is called “snake with two heads,” or sometimes “rainbow snake” (LUISELLI, pers. comm.). In Cameroon, this strange snake is well known, and some people believe it causes young women to become pregnant.

The genus name *Calabaria* derives from Calabar, a town with an active port near where the Calabar River enters the Cross River estuary in southeastern Nigeria, and currently the capital of Cross River State. Historically, Old Calabar was an important trading state and one of the country’s earliest contacts with Europeans, growing during the 19th century as a hub of the palm oil trade.

Description

The African burrowing python is an unusual snake with a cylindrical body, head, and tail, all of fairly uniform diameter. The head is small and not set off from the body,

such that it surprisingly resembles the tail. The eyes are small with vertical pupils, and have the same brown colour as the surrounding scales. The small mouth, not suited to large prey, is inconspicuous. There are no heat-sensitive pits. The scales are glossy and smooth, and a projecting rostral area aids in burrowing. The tail is blunt and very short. The dorsum and flanks are blackish-brown, brown, or reddish-brown, with lighter, reddish or yellowish flecks and irregular blotches; the head and tail are generally darker. The belly is grey or brown, and may have some brown blotches. The African burrowing python can reach a maximum of 80–100 centimetres.

Taxonomy

Calabaria is a monotypic genus whose taxonomic position is currently unresolved. KLUGE (1993) proposed a taxonomic review of *Calabaria reinhardtii*. He believes it is more closely related to members of the subfamily Erycinae, the sand boas, and should be assigned to the genus *Charina* — thus becoming *Charina reinhardtii*, the African burrowing “boa.” But other herpetologists think that many of the characteristics this snake shares with the Erycinae could be simply adaptations to a similar subterranean lifestyle, and therefore the genus name *Calabaria* should be retained. In fact, Kluge’s system has been followed only by McDIARMID et al. (1999).

The CITES Nomenclature Committee does not adopt Kluge’s proposal because it seems to cause more misunderstanding than understanding. Zoogeographically speaking, it is rather strange to have a genus distributed only in California and West Africa (HOOGMOED, 2003).

Finally, an interesting phylogenetic study based on the sequence of portions of two mitochondrial genes (12S and 16S ribosomal RNA) has demonstrated that *Calabaria* could be more closely related to the uropeltid genus *Rhinophis* than to either boa or python genera (HEISE et al., 1995). This suggests that the family Boidae needs a thorough overall revision including molecular analysis. It is evident that the possible relationship between the African burrowing python and the subfamily Erycinae remains to be demonstrated, and most scientists therefore prefer to maintain the old system.

Distribution, habitat, and climate

The African burrowing python is present in western tropical Africa, where it is widespread across the Liberia-Congo rainforest belt. It is found in Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, the Central African Republic, Equatorial Guinea, Gabon, the Congo, and the Democratic Republic of the Congo (Zaire).

It inhabits the leaf-covered ground of tropical rainforests and overgrown cultivated areas with dense undergrowth. In a recent study in southeastern Nigeria, ANGELICI et al. (2000) found *Calabaria* mainly in thick forest, swamp forest, and also in clearings and cultivated areas, especially during the wet season — it burrows into decaying leaves and soil, and also inhabits the burrows of small mammals, seeming to prefer more superficial rather than deep underground galleries. The same study demonstrated that the African burrowing python often takes shelter in termite nests, especially near forested areas and during the dry season. It is also found climbing among small bushes and fallen branches.

The climate in the range of *Calabaria* is characterized by alternating wet and dry seasons, with a corresponding but less notable variation of temperature. Generally, the dry season is from November through April, and the rainy season from May through October. Temperatures rise from October to February, and remain at their highest from March to May. Naturally

Table II. Relationships between reproductive activities and seasons of the year.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet season												
Dry season												
Mate												
Eggs Laid												
Hatch												

Table I. Common names of *Calabaria reinhardtii*.

English	Calabar python, Calabar ground python, West African ground python, burrowing python, West African burrowing python, two-headed python
Spanish	Pitón de Calabar, Pitón ciega
French	Calabare de Reinhardt, Calabaria de Reinhardt
Dutch	Aardpython
German	Erdpython
Italian	Calabaria, pitone di Calabar

there is some variation, and the more northern areas of the range are generally drier than the coastal areas.

Most imported African burrowing pythons come from Togo and Benin. It is therefore useful to know that in northern Benin the main wet season is between June and October, whereas in the south there are two wet seasons: early April to mid-July, and mid-September to late October. In the north, the temperature can reach 46°C (115°F); in the south, it stays between 18 and 35°C (64–95°F). Throughout the country, the hottest months are March to June. Similarly, in Togo, the wet season is from May to October, with a dry interlude in the south between mid-July and mid-September. The hottest period in Togo is from mid-February to mid-April.

Little-known biology

Many aspects of the biology of *Calabaria reinhardtii* are still little known. This subterranean species is shy and elusive, and mostly nocturnal. It burrows under the moist soil, humus, and leaves, where it likes to hide. These factors make it difficult to study the behaviour of the African burrowing python. Nonetheless recent research has probed into many aspects of this snake’s mysterious biology.

In southeastern Nigeria, ANGELICI et al. (2000) used radiotracking to study the African burrowing python, and found the snakes below ground in more than 80% of locations, during both dry and wet seasons. The mean daily movement rate appears to be higher in males than in females, without evident seasonal change. These first examined biological aspects suggest an



Calabaria reinhardtii. Photo: P. Martínez Carrión

interseasonal ecological homogeneity that could be interpreted as an evolutionary response to the relative year-round stability of habitat conditions.

In another study on the ecology of *Calabaria*, LUISELLI et al. (1999) showed that, in southeastern Nigeria, the African burrowing python mates between November and January (dry season), lays eggs from March to April (the end of dry season), and the eggs hatch from June to July (wet season).

These studies also demonstrated that the African burrowing python eats mainly small mammals, especially mice, which it usually takes from their nests. The disposition of the snake to eat small prey could be related to its post-cranial prey transport mechanism. Recent research (KLEY et al., 2002) indicates that cervical compression in *Calabaria reinhardtii* is great because of lacking palatopterygoid teeth, which could be related to its feeding on small prey.

It seems that *Calabaria* kills mice by squashing them against the walls of their burrows. In detailed dietary analysis of regurgitated items and faecal pellets, LUISELLI et al., (2002) have shown that the main prey of the African burrowing python is small mammals, especially rodents: regurgitated items included adult and nestling *Mus musculoides* (mice), young *Rattus rattus* (rats), snake eggs, and *Mabuya* (skink); faecal pellets contained *Rattus* sp., *Mus musculoides*, and *Crociodura* (shrews). According to such studies, those pythons that feed mostly on rodents do not appear to eat shrews, and only occasionally eat lizards or reptile eggs; on the other hand, those that eat shrews do not appear to eat rodents. The analysed wild African burrowing pythons also do not seem to eat earthworms.

Although *Calabaria* is mainly nocturnal, some studies have demonstrated that it can also be active and forage during the day (GARTLAN et al., 1971).

One well-known aspect of the African burrowing python is its defence behaviour. Two techniques have been observed. One is a tail display in which *Calabaria* presents its tail as a false head to distract predators away from more vulnerable parts of its body. When disturbed, the snake freezes and presses its chin to the

ground. Then it lifts its tail and swings it slightly to mimic the head. Many white scales are often present on the tail, which could help attract attention to the false head. The other defence technique is called “balling,” in which the python coils itself into a tight ball when threatened, often keeping its head in the centre and its tail exposed (this behaviour is also seen in other snakes such as *Python regius*). In any case, the African burrowing python is quite docile, and never tries to bite or hiss when handled or disturbed.

Terrarium

The African burrowing python is not a common terrarium subject, and unfortunately the specimens available on the market are almost always wild-caught. Captive-bred specimens are still very rare. Imported snakes should therefore be carefully checked for the usual external and internal parasites.

Although this snake is considered relatively easy to keep, it is important that the *Calabaria* terrarium reproduce its natural living conditions as closely as possible. *Calabaria* requires high humidity, so the enclosure should be made of materials that withstand moisture, such as glass or plastic (rather than wood). The enclosure need not be very large. A cage of 80 x 50 x 60 centimetres is good for one or two specimens. The species can be housed in small groups, but more than three or four pythons in the same tank is not recommended.

The burrowing medium can be a mix of sandy soil, humus, moss, decaying leaves, mulch, and pieces of bark. It should be kept lightly moistened, but there should never be standing water because *Calabaria* is susceptible to fungal infections. The substrate should be deep enough so the python can bury itself (about 10–15 centimetres), and hide boxes are beneficial — these should be cramped enough that the snake touches the sides and feels like it is in an underground tunnel. STAUB (2001) suggests laying a large flat piece of hard plastic over part of the substrate to retain moisture. This gives the snake more choices of degree of moisture and temperature while remaining hidden.

Calabaria occasionally likes to climb a little, so it is good to provide branches in the terrarium. It also needs a large basin of clean water. The temperature should be 26–32°C (79–90°F) during the day, and can drop to 22–24°C (72–75°F) at night. A heating pad can be used to keep one side of the enclosure at 32°C, and a lamp to keep the other side at 26–28°C.

Many keepers cool the pythons down for a few months, often to stimulate breeding, but temperatures can be kept stable year-round without problems, in which case the snakes continue eating. It is advisable to spray with warm water once a week. The humidity should be kept at 75–85 percent. Adequate ventilation should be provided with perforated plastic or metal panels. Keepers suggest never touching these very shy snakes. If properly maintained, the captive African burrowing python can live to more than 20 years of age.

Feeding

As already mentioned, the African burrowing python feeds on small mammals, especially rodents. Wild-caught *Calabaria*, especially when already adult, may not readily accept food in the beginning. The keeper must be patient, and try repeatedly. The best choice of food is rat pinkies and mouse fuzzies, before their eyes open and they become too jumpy. Prey can be offered either alive or pre-killed; sometimes the latter method works best at first.

Not a typical constrictor, this species kills prey by pressing it against the floor or sides of the cage; it is not able to compress prey within its coils as well as other constrictors can. This unusual behaviour has also been noted by LOMAN (2003) in a wild-caught *Calabaria* found 10–20 kilometres north of Kribi (Cameroon) in November 1974. It was collected and kept in captivity for some years. During feeding, it tried to squeeze small mice (sometimes several at once) against the terrarium wall before coiling around them. LOMAN interpreted this as an adaptation to raiding small-mammal nest burrows. For this reason, some keepers believe that the African burrowing python can be stimulated to feed by offering many small prey items at once rather than fewer larger items, to simulate its natural feeding conditions. Thus, it seems that offering a litter of four or five small prey items (no larger than rat or mouse fuzzies) is the best method to successfully feed this python.

In addition, HARRISON (2003) and other herpetologists have described a particular behaviour called “multiple constriction response”: after an African burrowing python has constricted and eaten the first prey

item, the snake is stimulated to eat others when they are gently pressed against its body; the python tries to constrict or press them at once, and then eats all of them. If the python is healthy and adapts well to captivity, it quickly becomes a prodigious eater. Females often seem to be more voracious than males.

Breeding

Recent data indicates that wild *Calabaria* generally have a biennial breeding frequency (LUISELLI et al., 2002), although there are observations that demonstrate an annual breeding cycle, especially in captivity. Captive-born *Calabaria reinhardtii* are rare, and almost always cases where females were already gravid when wild-caught.

The main limiting factors in captive reproduction have been the incubation of eggs and the body weight of the females. Females seem to require a longer acclimation period than males do, probably because of the greater energy expenditure required for egg production (CHERNOFF, 2003).

The sexes can be identified by cloacal probing, although this is not always simple. Males probe to a depth of 10–11 subcaudal scales; females to a depth of about 3 (ROSS et al., 1990).

Breeding activity seems depend on certain environmental and feeding factors. In captivity, the natural western African seasonal cycle should be simulated, alternating between wet and dry periods as already described. In the wild, African burrowing pythons mate during the dry season, specifically between November and January. STAUB (2001) also observed breeding in captivity during these months.



Calabaria reinhardtii with eggs. Photo: P. Martínez Carrión



Calabaria reinhardtii. Photo: P. Martínez Carrión

Another factor is food supply. It has been observed that females ingest a lot of food during the breeding season in order to reach a minimum breeding mass, which should be about 500 grams (STAUB, 2001). Therefore, it seems important to offer a lot of food during the breeding period between November and January. A comprehensive breeding scheme for captive *Calabaria reinhardtii*, is summarized in Table 3.

Other factors which can stimulate a reproductive response include the presence of abundant water in the basin, the presence of many hiding places, and leaving the snakes absolutely undisturbed; also, the male should be left with the female for sufficient time (STAUB, 2001) — I think 8–12 weeks are reasonable. As already mentioned, temperature fluctuation seems to contribute to triggering a reproductive response; the photoperiod, however, does not seem to be determinant.

It is very difficult to observe courtship and copulation. After mating, the female is gravid for 110–114 days, or in some cases as long as 150 days, during which time her

posterior section increases in girth as the eggs develop. The female usually stops eating 1–2 days before laying her eggs. It is advisable to provide a nest box (containing a mix of peat and sphagnum moss), otherwise she will lay her large eggs in a depression in the damp substrate. According to STAUB (2001), the female usually lays eggs between February and June, having invested a substantial amount of energy into the process — typically 35–45 percent of her pre-laying weight.

Although the eggs seem huge at slightly more than 70 grams each, hatchlings weigh only 40–50 percent of the original egg weight, suggesting that much of the egg weight is simply water.

The female lays 1–5 eggs (average 3) measuring 9–11.5 x 3–5 centimetres, and weighing 65–75 grams. The eggs are very flaccid and thin, and are very susceptible to fungus and putrefaction. Maternal care such as coiling around the clutch or body spasms to regulate incubation temperature seems to be absent.

Incubation has been the great problem with captive breeding of the African burrowing python. For artificial incubation, vermiculite, pieces of sponge, or a similar substrate material can be used. Unlike the eggs of other snakes, *Calabaria* eggs require a relatively dry incubation medium. Some keepers suggest a medium-to-water ratio of 2:1, but others consider this too wet. I recommend adding no water to the substrate. Ambient humidity in the incubator (80–95%) already provides enough moisture for the eggs, and if the substrate is wet the eggs will die. The key to successful incubation of *Calabaria* eggs is dry substrate and high ambient humidity. Incubation temperature should be 29–31.5°C (84–89°F) — best results are at temperatures of 30–31°C (86–88°F) — and should never drop below 26°C (79°F).

Under these conditions, the incubation period is generally 40–48 days, although it has occasionally been only 32–34 days. After breaking the shells, babies commonly remain inside the eggs for 18–48 hours, or as long as 96 hours (STAUB, 2001). Hatchlings measure 26–32 centimetres, weigh 18–40 grams, and are more colourful than adults. They soon start to eat live pinkie mice, sometimes within 2 days of hatching, and shed for the first time within 2 weeks. The newborn snakes need to be kept warm with high humidity: they are not as tolerant of dry conditions as the adults. These pythons grow relatively fast and can reach breeding size at 3 years of age.

Table III. Scheme for the captive breeding of *Calabaria reinhardtii*.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Humidity %	LOW	LOW	LOW		HIGH	HIGH	HIGH	HIGH	HIGH		LOW	LOW
Food	MUCH	MUCH								MUCH	MUCH	MUCH
Mate												
Eggs Laid												
Hatch												

Law and protection

Calabaria reinhardtii is regularly imported from West Africa (mainly from Ghana, Benin, and Togo) for the pet trade in Europe, and also often in the United States. The species is listed in CITES Appendix II (reference A-305.004.005.001; date listed, 4 February 1977).

Most marketed species of python are now “ranched,” which is defined by CITES as the rearing in a controlled environment of specimens taken from the wild. Eggs or juveniles are harvested from a wild population, and then raised in captivity until they reach a commercially exploitable size. Most are then exported, but a portion of the captive-raised juveniles are released back into the wild population. The primary objective of ranching is conservation of the local population.

HOOGMOED (2003) explains that the term “ranching” was originally coined for CITES Appendix I species (mainly crocodiles), but is now also used for CITES Appendix II species that are managed in some way. In most cases, the animals exported are wild specimens that have not been bred in captivity, and there is a lot of confusion about the correct use of the term “ranching.” As far as we know, all specimens that are exported from West Africa as “ranching” and “farmed” animals are actually wild-caught specimens, nothing else.

Finally, also the European Council Regulation No. 2724/2000 includes this python in Appendix B (date listed, 18 December 2000). ■

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