PART 2:
CAPTIVE BREEDING

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Snakes of the colubrid genus *Psammophis*, the sand racers, are not often kept in captivity, and unfortunately practically all of the specimens available on the market are wild caught. It is quite difficult (not to say impossible) to find captive-bred snakes of this genus, and wild-caught specimens are often under stress, susceptible to disease, and not easy to adapt to captivity. For these reasons, there is not a very large demand for sand racers.

Snakes of the genus *Psammophis* are opisthoglyphs, having small fixed, grooved, venom fangs situated at the back of the mouth. Their venom, produced by the Duvernoy's glands, is secreted slowly while the snake is chewing, helping to immobilize prey and make swallowing easier. The paralyzing effect of the venom is practically immediate, although death comes only after a few minutes. Sand sakes are not dangerous to humans, but their bite can cause unpleasant symptoms including intense pain, swelling, itching, bleeding, and nausea.

These snakes are very nervous and fast, and when grasped by the tail are good at lurching with such force that they jerk free. This makes cage maintenance tricky.

For all of these reasons, snakes of the genus *Psammophis* should be acquired only by herpetologists and terrarium keepers with a certain amount of experience, never by beginners.

In this article we discuss the most commonly available and therefore most commonly kept African species of *Psammophis*.

African species on the market

It is common to find many species of *Psammophis* on the market in the United States and Europe. Those mainly imported from Egypt include *Psammophis aegyptius*, *Psammophis punctulatus*, *Psammophis schokari*, and *Psammophis sibilans*; those imported mainly from Tanzania include *Psammophis biseriatus*, *Psammophis mossambicus*, *Psammophis orientalis*, *Psammophis punctulatus*, *Psammophis sudanensis*, and *Psammophis tanganicus*.

Some of these snakes originate in the countries from which they are exported to the United States and Europe; others are captured in other countries (e.g., in western Africa), and then bought and sold along local commercial routes before export. This makes it difficult to determine exactly where a given specimen is really from.

These snakes almost always reach the market in precarious health (dehydrated, diseased, stressed, etc.), and mortality rates are unfortunately high. When purchasing a sand racer it is important to inspect the snake carefully for external parasites (mites and ticks), injuries such as scratches or scrapes on the body or snout, secretions from the mouth or nose, or inflammation of the eyes. The responsiveness of the snake, muscle tone, and the ability to retract the tongue correctly should also be checked.

Once at home in its new terrarium, if the snake regurgitates its food or has soft or poorly formed feces, it should be checked for intestinal parasites

THE SNAKES OF THE GENUS *PSAMMOPHIS*

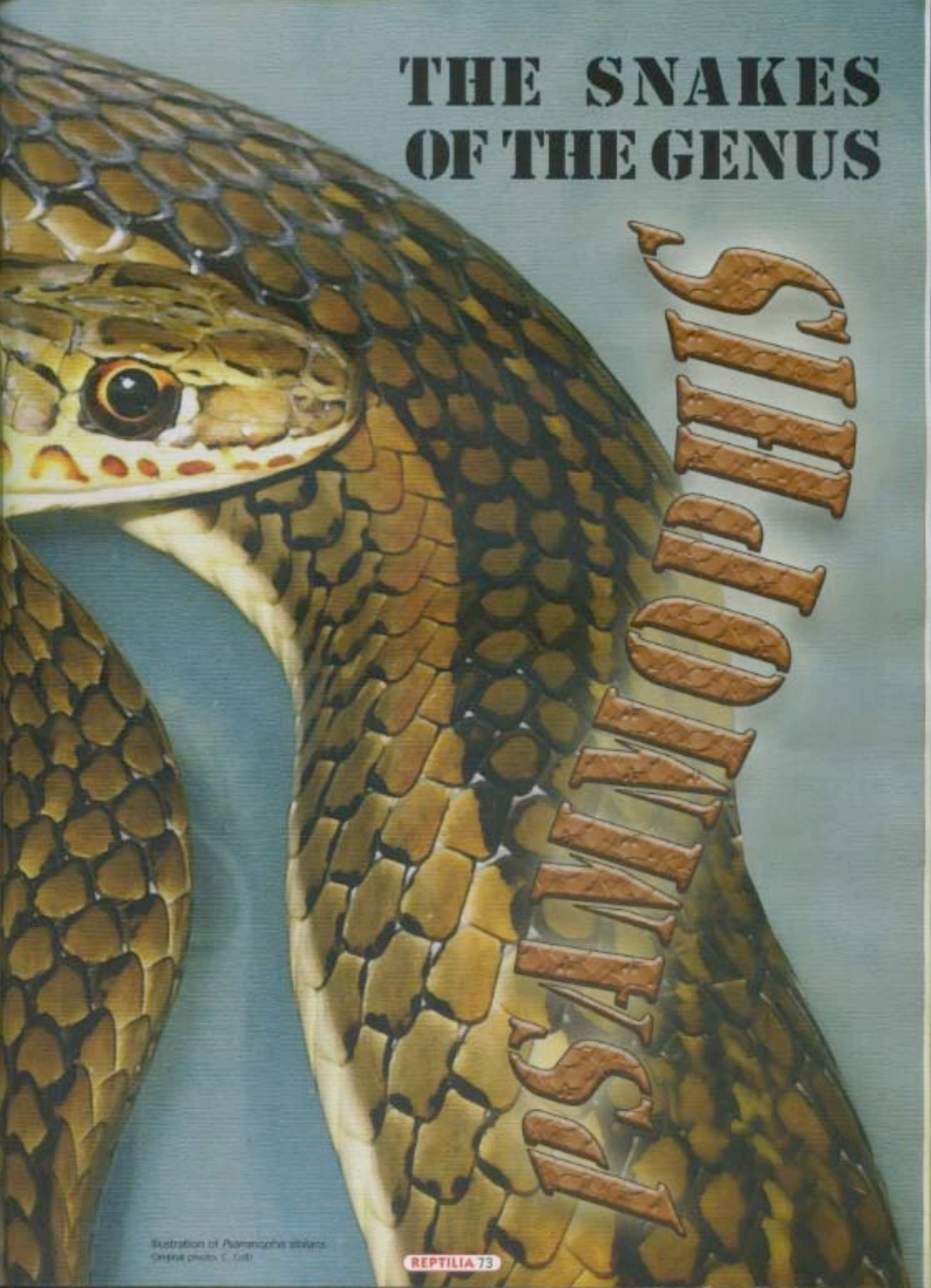


Illustration of *Psammophis sibilans*.
Original photo: C. Gibb

Psammophis sibilans. Photo: F. Martínez Carrión

Psammophis sibilans. Photo: F. Martínez Carrión

Psammophis tanganicus. Photo: C. Conradi

Psammophis schokari. Photo: F. Martínez Carrión

Psammophis tanganicus. Photo: C. Conradi

by fecal analysis. If parasites are present, the snake should be treated for them.

Our *Psammophis* experience is mainly with four species: *Psammophis orientalis, P. schokari, P. sibilans,* and *P. tanganicus,* which we describe briefly here (for more information see Part 1 of this article in *Reptilia* number 55).

Psammophis orientalis is a medium-sized snake with a cylindrical body and a tapered tail of moderate length. This species reaches 122 centimeters in length, and apparently can grow longer than that. The head is elongate, clearly set off from the body at the neck, and has a long pointed snout.

In the wild this species inhabits savanna and flatland jungle at elevations of up to 1,300 meters above sea level. It is diurnal, ground-dwelling, agile, and very fast. It often climbs in search of prey. This species feeds mainly on lizards, rodents and other small mammals, and occasionally on other snakes.

Psammophis schokari is a medium-sized snake with a cylindrical body and a long tail. It can grow to 150 centimeters in length, but usually does not reach more than 90 centimeters. The head is elongate and clearly set off from the body at the neck. The snout is fairly long with an angular chin.

In the wild, this species lives in arid and semiarid regions where water is available, including deserts with sparse vegetation, oases, steppe, foothills, and high plains, at elevations of up to about 1,800 meters above sea level. This ground-dwelling species is generally diurnal, but during the hottest months it tends to hunt at night.

Psammophis schokari is an agile snake, and, like the others of the genus, immobilizes prey with venom. Normally harmless, it flees quickly when startled. It often hides under rocks and in abandoned rodent holes. It often climbs into shrubs and small trees, but if threatened, it always tries to escape on the ground. This species feeds mainly on lizards, but also eats rodents, frogs, and small birds.

Psammophis sibilans is a medium-sized to large snake with a cylindrical and fairly slender body and a long tapered tail. It can grow to 183 centimeters in length, but usually measures about 100 centimeters. The head is elongate, narrow, concave, and clearly set off from the body at the neck.

In the wild, this species occupies a wide variety of habitats including arid and rocky savanna, woodland with moderate vegetation, and mountain plateaus and grassland at elevations of up to 2,500 meters above sea level. The species is rarely found in primary tropical jungle, but is often found in agricultural plantations and near water. A diurnal ground-dwelling snake, it is shy, active, and fast. It hides if it feels threatened. Juveniles feed mainly on lizards and frogs; adults feed mainly on small mammals and birds.

Psammophis tanganicus is a medium-sized snake with a slender cylindrical body and a tail of moderate length. It can reach 141 centimeters in length, but the average adult

length is 70 centimeters. The head is slightly elongate and clearly set off from the body at the neck.

In the wild, this species occurs in dry grassy savanna, woodland, and low mountain meadows at elevations of up to 1,300 meters above sea level. This snake is diurnal, ground dwelling, and fast. It feeds mainly on lizards and small mammals.

The terrarium

The information that follows is useful for captive maintenance of the species just mentioned, and also other species of *Psammophis* available on the market (e.g., *P. mossambicus*, *P. sudanensis*, and *P. aegyptius*).

The majority of these snakes do not grow to large sizes, with the exception of *P. mossambicus*, which reaches lengths of nearly 200 centimeters. Average adult lengths of the other species vary from 40 to 100 centimeters.

Taking into account that these snakes are shy, active, and fast, the terrarium should be set up with plenty of space so they can move freely, and also hiding places so they feel secure. Reduced space or lack of hiding places would lead to stress and continuous nervous searching for a way to escape. Also, due to the irascible nature of these snakes, handling should be kept to a minimum, only when really necessary, and always wearing protective leather gloves.

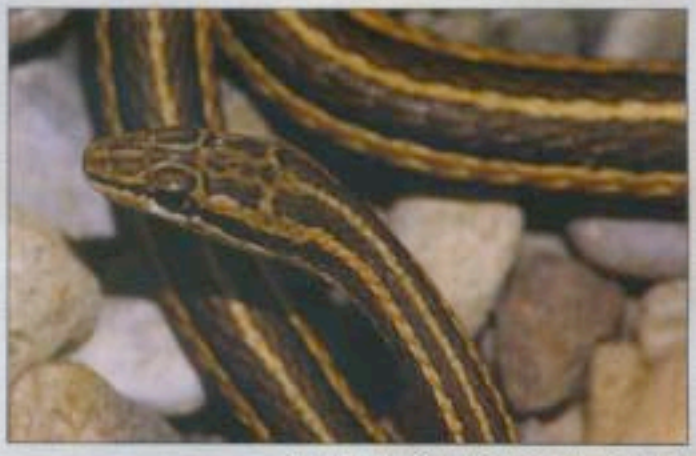
According to the limited literature on the subject, terrarium size for a single adult specimen of *Psammophis* should be no less than 70 x 40 x 40 centimeters (LxWxH) — and ideally, the terrarium should be much larger, measuring at least 100 x 50 x 50 centimeters. For housing a pair together, the size of the terrarium should be increased by at least 20–30 percent. Even more room than that is recommended given that cannibalism has been documented in these snakes.

Wood and glass are fine for terrarium construction. The opening should be at the top because of how fast the snakes are. Species from arid habitat can be housed with a substrate of newspaper, wood chips, or sand. Species that require a higher level of moisture can be housed with a substrate of artificial turf, peat, or sterilized soil. A variety of other substrates are available in specialized stores, suited to species from different habitat origins.

Hiding places can be made with pieces of bark, rocks, or flowerpots. In the wild these snakes are quick to flee to shelter when startled, and should have this opportunity in captivity as well. It is also recommendable to provide branches on which the snakes are likely to climb during the day. A dish of fresh water is necessary, and should always be available.

Temperature is another important factor in captive maintenance of *Psammophis*. These snakes need general daytime temperatures of 27–28°C (81–82°F) and nighttime temperatures of 21–23°C (70–73°F). These temperatures can be achieved with heat cables, eat mats, or ceramic heat lamps. It is also necessary to provide a warmer basking spot at temperatures of 32–34°C (90–93°F), which the snakes will use to thermoregulate.

Psammophis sibilans. Photo: F. Martínez Cantón



Psammophis trigrammus. Photo: F. Martínez Cantón

If they cannot maintain ideal body temperatures, the snakes lose their characteristic vitality, and become less active.

Suitable relative humidity depends on the particular geographic origin of the species. Species from arid regions do best with a relative humidity of 40–50 percent; for species from moister environments, relative humidity should reach 65–70 percent. The enclosure should have vent panels covered with metal screen to ensure proper air circulation.

The photoperiod should be 12–13 hours of light year round. Lighting should provide adequate UV radiation. These are diurnal snakes that would naturally be exposed to sunshine, so UV lamps should be used for captives.

Feeding

In the wild, snakes of the genus *Psammophis* feed mainly on small mammals and lizards, and also eat other snakes, birds, and amphibians. In captivity, these snakes can be fed mice (*Mus musculus*), which they usually accept readily; lizards can also be given occasionally. The snake searches for prey by raising its head and anterior part of the body like a periscope to look for signs of movement. Indeed it is the movement of the prey that triggers the snake to lunge. After a quick chase, the snake grasps the prey firmly with is jaws and front teeth. The prey is then "chewed" and carried to a protected place where the snake can swallow its meal in peace — this is another reason hiding

Psammophis orientalis. Photo: F. Martínez Cerón

Psammophis tanganicus. Photo: C. Corrazzi

places in the terrarium are very important.

The captive snakes should be offered prey that is relatively small. We have seen a captive *Psammophis sibilans* measuring 120 centimeters in length usually being fed rodents of 25 grams, and only occasionally on larger prey (of about 55 grams). *Psammophis orientalis* often refuses prey of more than 20 grams.

Especially captive *Psammophis sibilans* can stop eating for periods of several months without any change in environmental conditions.

AKANI et al., (2003) lists the following prey items eaten by *Psammophis phillipsi* in southern Nigeria: insects of the order Mantodea (mantids); small mammals including shrews of the genus *Crocidura*, black rats (*Rattus rattus*), African pygmy mice (*Mus minutoides*), striped grass mice (*Lemniscomys striatus*), an unidentified adult rodent, and an unidentified newborn rodent; other snakes including baby sand racers of its own species, and colubrids of the genus *Natriciteres*; and lizards including skinks (*Mabuya* sp., and *Mochlus fernandi*) and agamas (*Agama agama*).

Captive breeding

To date, relatively little information is available about the reproduction of sand racers, whether in the wild or in captivity. The few existing reports on *Psammophis* reproduction include one on *P. brevirostris* and *P. crucifer* in South Africa (HAAGNER, 1988), one on *P. elegans* in Ghana (SPAWLS, 1980), one on *P. phillipsi* in tropical Africa (BUTLER, 1993), one on *P. phillipsi* in Nigeria (AKANI et al., 2002), and one on *P. leightoni*, *P. crucifer*, and *P. notostictus* in South Africa (FLEMMING, 1994).

Unlike most snakes, which have barbed hemipenes that lock into place during copulation, the *Psammophis* male has thin vestigial tubular hemipenes. Thus, if a threat arises during copulation, the male can separate quickly from the female, facilitating escape.

All species of *Psammophis* are oviparous. They are characteristically not very prolific, usually laying clutches of less than 10 eggs. In the wild, eggs are usually buried in burrows, such as those abandoned by rodents. At temperatures of 28–32°C (82–90°F) the incubation period is about 60 days (BRANCH, 2005).

Psammophis hatchlings are long and thin and look like miniature adults. During their first year of life they feed mainly on lizards. Later they begin feeding on the other prey already mentioned.

The relatively low number of eggs produced by the female could be due to the limited space in her slender body cavity (SEIGEL and FITCH, 1984; SHINE, 1992), or because of her need to remain quick and agile, even when gravid, for hunting and escaping predators. *Psammophis* females continue eating while they are gravid, at least in the case of *P. phillipsi* (AKANI et al., 2002).

An experience reported by a Dutch breeder (STEEHOUDER, 1984) provides data on a female *P. subtaeniatus* that laid a clutch of eggs equivalent to 62 percent of her body weight, and lined up in a row measuring a third of her total length.

Hybrids of *Psammophis* species are well known, making exact identification of specimens difficult. For example, hybridization between *P. jallae* and *P. subtaeniatus* is known in the wild (BROADLEY et al., 2003), and hybridization between *P. sibilans* and *P. subtaeniatus* is known in captivity (STEEHOUDER, 1992).

Conservation

It their countries of origin many of these species are still fairly easy to find, but their habitats are diminishing and becoming fragmented due to human activities.

Data bases of the UNEP-WCMC (World Conservation Monitoring Centre) list all species of the genus, although current conservation status and level of protection are not indicated. The species are not included in CITES appendixes or IUCN Red Data Books. This current lack of conservation guidelines means that international trade in these species is not sufficiently regulated. We hope that protective measures will be adopted in the near future. ■

Acknowledgments

We would like to express our deep gratitude to Emanuele Cimatti for his exhaustive revision of the manuscript and his valuable contribution to the conservation, captive care, and availability of *Psammophis*.

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