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MONITOR LIZARDS

Nile Monitor

Varanus niloticus

Varanus niloticus is one of Africa's largest lizards: up to 2 m long, fond of water, fast and very defensive. As an adult it requires a whole room.

Family: Varanidae Former name: *Varanus ornatus*

KEY FACTS

THE ANIMAL

Adult size	**120-220 cm** total length incl. tail
Weight	**6,000-15,000 g**
Lifespan	**10-20 years**
Active	**By day**
Lifestyle	**Arboreal, burrowing and semi-aquatic**
Habitat	**Savanna and wetland**
Difficulty	**Expert**

CARE

Min. enclosure	**400 × 200 × 150 cm** L × W × H for 1 adult
Temperature, day	**26-32 °C**
Basking spot	**35-45 °C**
Temperature, night	**22-26 °C**
Humidity	**50-70%**
Water	**Water section** depth 30-50 cm
Water temperature	**24-28 °C**
UVB	**Essential** Ferguson zone 3
Diet	**Insects, vertebrates and worms/snails**
Kept	**Singly**

BREEDING

Reproduction	**Egg-laying**
Sexually mature	**24-48 months**
Clutch size	**5-60 eggs**
Clutches per year	**1**
Incubation	**120-300 days** at 27-30 °C

PROTECTION AND PAPERWORK

CITES	**Appendix II**
EU annex	**Annex B**
IUCN	**Least Concern (LC)**

About the species

The species is a large, heavily built monitor with a tall, laterally compressed tail that serves as a rudder in water and as a weapon in defence. Adults are greyish brown to olive green with yellow spots and crossbands on the back, limbs and tail, while the belly and throat are paler with dark crossbands. The head is tall, and in adults the teeth are blunt and suited to crushing snail and crustacean shells. The young are black with yellow crossbands and yellow markings on the head and neck, and are far more colourful than the adults. The sexes look alike.

V. niloticus reaches 120-220 cm including the tail, rarely up to 244 cm. The snout-vent length is about 50 cm in an animal of average size and up to about 80 cm. Large adults weigh 6-15 kg, a few up to 20 kg, while adults in some populations weigh only 1-2 kg. Newly hatched young are 17-30 cm long and weigh about 26 g, and they grow quickly when fed plentifully.

The taxonomy is not settled. *V. niloticus* is traditionally a species complex. Animals from the rainforests of West and Central Africa were formerly treated as *V. ornatus* but are today usually regarded as the same species, and a genetic study has also proposed separating animals from the West African forests and the adjoining savanna as a distinct species, *V. stellatus*. The

broad delimitation is used here.

This is not a species to recommend as a pet. It is strong, fast and can defend itself with bites, claws and tail whips. Small animals are cheap and attractive, which has led to many impulse purchases. The difficulty with the species is not the food, but that it quickly becomes very large, often remains aggressive and is very expensive to house and feed.

Distribution and habitat

Varanus niloticus is found in most of Africa south of the Sahara and is also distributed along the Nile all the way up to Egypt. It is absent from the Sahara deserts, the Kalahari and large parts of the Horn of Africa, but is common along rivers and lakes in the whole rest of the area. The native range includes countries such as South Africa, Botswana, Tanzania, Kenya, Uganda, Ethiopia, Sudan, Egypt, Chad, Nigeria, Mali, Senegal, Ghana and Gabon.

There are introduced populations outside Africa, including in Florida, where animals that have escaped or been released by private keepers have formed breeding populations. They are not included on the map, which shows only the native range. Records outside Africa on the map come from such populations or from animals in captivity.

> **Native range:** South Africa, Eswatini, Lesotho, Namibia, Botswana, Tanzania, Mozambique, Zimbabwe, Zambia, Angola, Malawi, Gabon, Congo - Kinshasa, Kenya, Uganda, Cameroon, Central African Republic, Ethiopia, Eritrea, Somalia, Sudan, South Sudan, Chad, Egypt, Liberia, Côte d'Ivoire, Ghana, Togo, Benin, Burkina Faso, Niger, Nigeria, Mali, Mauritania, Senegal, Gambia, Guinea, Equatorial Guinea, Sierra Leone and Guinea-Bissau.

HABITAT

Varanus niloticus lives in many kinds of landscapes: open woodland, dry savanna, scrub, swamps and mangrove, from sea level up to about 1,600 m. Common to them is almost always water nearby: rivers, lakes, ponds and temporary waterholes. The animals are excellent swimmers and climbers. Young animals often lie on branches over the water and let themselves drop into it if disturbed.

Open, sunlit places are necessary for basking, and the species is regularly seen on roofs and roads. It digs its own burrows in soft, sandy soil or enlarges existing burrows, and it uses crevices and termite mounds as hiding places. In the coldest parts of the range in South Africa it hibernates in large rock crevices or burrows. Eggs are laid in soil or in active termite mounds, where the termites subsequently close the hole and protect the eggs.

The species is diurnal and actively searches for food over large areas.

Care

THE ENCLOSURE

An adult of 150-200 cm needs a facility of a completely different size from an ordinary terrarium: a very large enclosure with trees to climb and a large pool to swim in. One adult needs at least 400 × 200 × 150 cm (length × width × height), and a whole room or a secured outdoor facility is better. The size follows the rule of thumb for ground-dwelling monitors: about 5 × 2 × 2 times the snout-vent length. The species should not be kept with other animals.

Young animals can live in a terrarium of about 120 × 60 × 60 cm for the first months (an estimate, not documented), but they grow quickly and have to be moved up several times. Plan from the start to build an adult facility within 1-2 years.

Furnishing: The substrate must be deep (at least 30-40 cm; an estimate) and consist of a moist mixture of soil and sand in which the animal can dig burrows; in the wild, females dig nests up to 70 cm deep. Provide at least two or three solid hides of stone, pipes or concrete caves that can withstand a strong animal, or use large cork bark tubes. The species is a skilled climber, so fit sturdy branches and shelves that can carry at least 10-15 kg. A permanent water area in which the whole animal can bathe is necessary (see water in the section on humidity).

Construction and security: All doors must be lockable, and the glass must be toughened, or the front made of thick acrylic. Heat sources must be shielded with mesh or mounted in the ceiling so that the animal cannot reach them and burn itself. Electrical installations must be out of reach. Use materials that can be washed down, because such a large animal makes a great deal of mess.

Read more: Humidity, misting and ventilation

TEMPERATURE

Varanus niloticus is a sun lover. By day the background temperature should be 26-32 °C, and the basking spot should have a surface temperature of 35-45 °C, measured with an infrared thermometer at the place where the animal lies. At night 22-26 °C is suitable (an estimate).

The most important thing is a large temperature gradient, so that the animal can choose between a cool and a warm end. Use one or more powerful lamps over a large area of stone or wood and regulate them with a thermostat. All heat sources must be shielded. Watch the animal's behaviour: an animal that lies spread out on the basking spot for hours is too cold, and an animal that stands with its mouth open seeking shade is too hot. Measure the temperature in several places with digital thermometers. In the coldest parts of its range the species undergoes partial brumation, but this is necessary neither in captivity nor to get it to breed.

Read more: Heat and temperature Read more: Brumation and the seasons

HUMIDITY AND WATER

The species is tied to water, and humidity should be around 50-70 %, with a more humid area in the deeper layers of the substrate and a drier one at the basking spot. The humidity figures are an estimate and are not documented for the species in captivity. A moist, deep substrate gives both a burrow to hide in and a place where humidity is kept up, without the whole enclosure becoming wet.

Water: The water section is a permanent part of the enclosure. It must be large enough for the whole animal to lie deep in the water and swim, and as a guideline 30-50 cm deep with an easy entry, so that the animal gets out easily. The water is kept at 24-28 °C (an estimate). Animals of that size make a mess in the water, so it must have a powerful filter or be changed often, in practice often every day. The water section is also the safest way to keep the animal clean and hydrated.

LIGHTING AND UVB

The species is diurnal and basks a lot, and UVB light is necessary. Ferguson zone 3 is a reasonable starting point, i.e. a UV index of about 1.0-2.6 in the sunlit part of the enclosure and up to about 3-7 right at the basking spot, while the animal can retreat into shade. Use powerful UVB tubes or metal halide lamps that cover a large part of the basking area, and replace them according to the manufacturer's instructions, typically after 6-12 months. Precise UV values for the species are not documented, and the figures are borrowed from the practice for related, diurnal monitors.

Keep the light on 12-13 hours a day in summer and 10-11 hours in winter and control it with a timer. At night it must be dark.

Read more: Lighting and UVB

FEEDING

In the wild the species is an opportunistic hunter that eats earthworms, snails, crayfish and crabs, beetles, grasshoppers, spiders, ants, frogs, toads, fish, rodents, lizards, snakes, birds and their eggs, as well as crocodile eggs and hatchlings, and it also eats carrion. Hard-shelled molluscs are an important part of the diet: the powerful skull, the blunt teeth and the arched lower jaw are built to crush them. In young animals the diet consists mostly of insects and other invertebrates, and vertebrates come later.

In captivity the diet must be varied. Young animals get large insects, e.g. crickets, grasshoppers and cockroaches, as well as snails and crayfish. Adults too should have snails, mussels and crustaceans as a regular part of the diet, supplemented with whole prey such as fish, eggs, chicks, mice and rats. Adults do well on one meal a week. Young are fed daily (an estimate).

Obesity is the biggest problem in captivity and is often seen at post-mortem, where the fat lies along the sides of the body; overweight females can even be mistaken for gravid ones. Animals in captivity move far less than in the wild, where they are constantly searching for food or a mate. Keep the diet varied and the amount low, and weigh the animal regularly. Dust the insects with calcium, and give vitamin D3 regularly if the animal does not get enough UVB. Avoid minced beef and dog food as a staple. The food should preferably be given in a separate dish or at a feeding spot so that the animal does not take in substrate. Wash hands and utensils thoroughly after feeding, because raw meat and fish are a source of infection.

Read more: Feeder animals: keeping and breeding Read more: Calcium, vitamins and supplements

BEHAVIOUR AND HANDLING

Safety comes first. *Varanus niloticus* is fast, strong and very defensive. When threatened it rises high on its legs, arches its back, inflates its throat, hisses and lashes with its tail, and as a last resort it bites and releases a foul-smelling fluid from the cloaca. A bite from an adult can cause deep, serious wounds, the claws are as sharp as scalpels and can tear the skin open,

and even a small animal can deliver a tail whip that leaves a burning, red stripe. A large animal that twists in the hands is hard to hold, and the claws can tear even heavy leather gloves to pieces. Young animals use the tail especially in defence.

Many animals do not become tame, even if they have been handled from a young age, and adults in captivity often behave aggressively. Handling should therefore not be a daily routine. Keep the animals calm, move them only when necessary, and always work with two people for a large animal. Use heavy gloves, long sleeves and eye protection. Never grab the tail.

The species is solitary and should be kept alone. Two animals in the same facility fight: even two adult females can come to blows within seconds, and males can fight each other violently. Like all reptiles, the species can carry salmonella in its faeces. Wash hands with soap after any contact with animals, facilities and water, keep animals and utensils away from the kitchen, and do not let children or people with weakened immune systems have contact.

Read more: Quarantine and hygiene

Breeding

SEXUAL MATURITY AND SEXING

The sexes look alike, so reliable sexing requires examination of the vent area, ultrasound or tests by a vet with reptile experience. Sexual maturity varies between populations. In Chad and Mali the females are sexually mature at a snout-vent length of 34-48 cm after about two years, while animals in southern and central Africa are about 120 cm long when they become sexually mature after three to four years. Females must have a good body weight before being put to breed, but more precise weight and age requirements are not documented.

MATING

In the wild the species breeds once a year, with a season from June to October, and mating typically follows the rainy season. Males defend large territories and wrestle with each other, while the mating itself is not as violent as in many other monitors. The species mates with several partners. Breeding in captivity is rare, but it has succeeded in zoos, and brumation is not necessary to get the animals to breed. How best to put the animals together is not documented. Introducing two such large, defensive animals must be done under supervision and with the possibility of separating them immediately.

Parthenogenesis occurs in the rainforest form *V. ornatus*: a female that has never been with a male can lay eggs containing developed embryos. Eggs from females kept alone are therefore not necessarily infertile.

EGG-LAYING AND CLUTCHES

The clutch depends on the size of the female and is 5-60 eggs, on average 25-35. In the wild one clutch is laid a year, about four weeks after mating. The female digs a hole in sandy soil near water, up to 70 cm deep, or in an active termite mound and lays the eggs over two to three days. The eggs are about 6 × 4 cm. In the rainforest form *V. ornatus* the clutches in captivity are 12-21 eggs at intervals of 12-16 months. The female makes trial digs in the days before laying, lays the eggs in a short time and defends them afterwards, but she may also eat some of them if they are not collected.

In captivity the female needs a large nest box or a deep, moist layer of sand and soil in which she can dig, preferably in a quiet place away from onlookers and disturbance. If she lacks a suitable place she may retain the eggs, which is life-threatening. Consult a vet if the female is clearly gravid and does not lay.

INCUBATION

The eggs are moved carefully to an incubator without being turned and placed in moist vermiculite or perlite. At 27-30 °C and about 90 % humidity they hatch after 120-300 days, most often after six to seven months. The warmer, the shorter the time: at 30 °C the eggs hatch after about 120 days. In the wild development takes 6-9 months and sometimes up to a year. The hatching itself takes from 15 minutes to seven hours. In the wild the young sometimes wait for rain, which softens the hard nest, and the young may stay a few days in the termite mound before dispersing.

Read more: Incubating eggs

REARING THE YOUNG

The juveniles are 17-30 cm long (about 13 cm from snout to vent) and weigh about 26 g at hatching. They get small insects and snails, preferably daily (an estimate), dusted with calcium, and grow quickly. Keep them singly, as otherwise they eat or injure each other. Plan in advance what is to happen to them: the animals become large, dangerous and expensive.

Health and common mistakes

The species is hardy in the wild, but animals in captivity typically have problems caused by too little space, wrong heat and light, or too much and too one-sided food. The most important problems are:

- Obesity, especially with rodents as the main food, overfeeding and too little exercise. Obesity is often seen at post-mortem.
- Gout and bacterial infections, which are among the most frequent causes of death in monitors in captivity.
- Bone weakness (metabolic bone disease) from too little UVB, calcium and vitamin D3: soft jaws, bent limbs, tremors.
- Intestinal infections. A six-year-old animal died suddenly of a serious intestinal inflammation with *Pseudomonas aeruginosa*, a bacterium that was resistant to several common antibiotics. Treatment therefore requires a vet and a culture of the bacterium.
- Parasites in the intestine, especially in wild-caught animals, and diseases that arise from stress and wrong heat.
- Difficulty laying eggs in females without a suitable nesting place.
- Burns from unshielded heat sources and injuries from fights or claws and bites.
- Salmonella, which the animal can carry without being ill, and which can infect humans.

Animals in the trade are probably almost always imported, because the species has only been bred a few times in captivity. This means stress and transport injuries, parasites and a risk that the animal is weakened from the start. Most animals bought small never become adult, and those that do often end up with rescue organisations or are released into the wild when they become too large. This is probably part of the explanation for the introduced populations in Florida.

Seek a vet with reptile experience if the animal loses weight, does not eat, has persistent loose faeces, swellings or soft bones. Agree in advance who can help, and how a large animal can be transported safely.

Read more: Common diseases and signs of illness Read more: Buying animals: captive-bred, wild-caught and transport

Always ask someone who knows

This guide is a good place to start, but it cannot replace experience. Animals differ, and much of what matters most is learned from people who have kept the species for years. Talk to a breeder, an experienced keeper or a vet who knows reptiles and amphibians before you get the animal - and again if anything looks wrong.