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MONITOR LIZARDS

Savannah Monitor

Varanus exanthematicus

A powerful, ground-dwelling monitor from the savannas of West and Central Africa that digs deep burrows and lives on snails, millipedes and other invertebrates. *Varanus exanthematicus* is the most traded monitor in the world, but also one of those that most often dies in the hands of new keepers. It grows to 60-100 cm, needs a large, hot enclosure with a deep substrate and does best on a varied, moderate diet.

Family: Varanidae

KEY FACTS

THE ANIMAL

Adult size	**60-100 cm** total length incl. tail
Weight	**750-3,600 g**
Lifespan	**10-15 years**
Active	**By day**
Lifestyle	**Terrestrial and burrowing**
Habitat	**Semi-desert and savanna**
Difficulty	**Experienced**

CARE

Min. enclosure	**200 × 100 × 80 cm** L × W × H for 1 adult
Temperature, day	**26-34 °C**
Basking spot	**50-57 °C**
Temperature, night	**24-29 °C**
Humidity	**40-70%**
Water	**Water dish**
UVB	**Essential** Ferguson zone 3
Diet	**Insects and worms/snails**
Kept	**Singly or in pairs**

BREEDING

Reproduction	**Egg-laying**
Clutch size	**15-50 eggs**
Clutches per year	**1-3**
Incubation	**150-180 days** at 30-31 °C

PROTECTION AND PAPERWORK

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

About the species

Varanus exanthematicus is a compact, heavily built monitor with a broad head, short neck, short legs and strong digging claws. The teeth are short and blunt, because the species cracks snails, crabs and hard-shelled insects. The body is grey to brown with rows of pale spots ringed in dark, and the tongue is blue and forked. The scales on the back and neck are large and bead-shaped. The species name comes from the Greek word for a rash and probably refers to the pale spots on the knobbly scales.

The species was described in 1792 by Louis Bosc from an animal from the Senegal River. For about 200 years it was treated together with *Varanus albigularis* as subspecies of the same species, and only in the 1990s were they separated again. The confusion lives on in the trade. *V. albigularis* grows larger, and the two species also differ in scales, pattern and the position of the nostrils: in *V. exanthematicus* the nostrils sit midway between the eye and the tip of the snout. The name *V. ocellatus* is an older synonym.

The species is smaller than many people think. Wild adults average about 64 cm including the tail, with a snout-vent length of about 33 cm, and typically weigh 750 g. Even the largest wild animals weigh under 2 kg. In captivity the animals often grow larger, because food is always available. They typically reach no more than 100 cm, and a few animals approach 120 cm. Hatchlings are about 13 cm long and weigh 6-13 g. A male in captivity can reach 61 cm and 3.6 kg as early as one year old, several times the weight of a wild adult. The species becomes fat very easily.

The species is often kept as a small, cheap monitor, but it is a lifelong commitment of at least a decade. Lifespan is 11-13 years, and many animals die much earlier. As an adult it needs a large, heated enclosure or a whole room, food for many years, light and heat all year round and daily attention. Adults that have become too large or too fussy often end up as unwanted pets. Nearly all animals in the trade are wild-caught or so-called ranched, and they are stressed, heavily parasitised and often emaciated when they reach a new keeper. Captive breeding rarely succeeds. All in all, the species is not a beginner's choice, even though it is often sold as one.

Read more: Buying animals: captive-bred, wild-caught and transport

Distribution and habitat

Varanus exanthematicus has a very large range in Africa south of the Sahara. It is found from Mauritania, Senegal and Gambia in the west through Guinea-Bissau, Guinea, Sierra Leone, Liberia, Mali, Ivory Coast, Burkina Faso, Ghana, Togo, Benin, Niger and Nigeria to Chad, Cameroon and the Central African Republic. Further east it lives in Sudan, South Sudan, Ethiopia and Eritrea, and to the south in northern Congo (DR Congo), Uganda and Kenya. The type locality is the Senegal River.

To the south and east it is replaced by *V. albigularis*, and the boundary between the two species is poorly mapped. Records on the map may therefore be misidentifications in the border zone. Introduced populations outside Africa, for example in Florida, are not counted in the native range. Most animals in the trade come from Ghana, Togo and Benin, where they are collected in large numbers.

> **Native range:** Mauritania, Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Mali, Côte d'Ivoire, Burkina Faso, Ghana, Togo, Benin, Niger, Nigeria, Chad, Cameroon, Central African Republic, Sudan, South Sudan, Ethiopia, Eritrea, Kenya, Uganda and Congo - Kinshasa.

HABITAT

The species lives in open savanna, scrub and light woodland and in dry, stony areas with sparse vegetation. It is not found in rainforest or in true desert. It is diurnal and spends much of its time in burrows that it digs itself or takes over from other animals. The youngest animals on Ghana's coastal plains live in and around the burrows of ground-dwelling large crickets, where they find shelter.

Life follows the rainy season. In the wet season there is plenty of prey, and the animals eat most and mate. In the long dry season, which can last 3-6 months, there is almost no prey, and the animals have to fast. In captivity there is food all year, and that is an important reason why the animals so easily become too fat.

In the wild the diet consists almost entirely of invertebrates: snails, millipedes, scorpions, crickets, grasshoppers, ground beetles, beetles and crabs, and also frogs and the occasional lizard egg. In young animals in Ghana it is small crickets, later scorpions and toads, and in adults in Senegal millipedes are the most common food. Larger vertebrates only rarely appear in the diet.

Read more: Feeder animals: keeping and breeding

Care

THE ENCLOSURE

An adult *Varanus exanthematicus* needs a large, ground-based enclosure of at least 200 × 100 × 80 cm (length × width × height), and more is better. A pair needs about 210 × 150 × 120 cm with 40 cm of substrate. An enclosure of 180 × 45 cm only leaves room to lie still. The enclosure is often built at home from wooden boards with a glass front, or set up as a whole room.

Juveniles start in a small plastic box of about 50 × 25 × 30 cm with ventilation holes, damp kitchen paper and hides for the first four months. They are then moved to an enclosure of about 140 × 50 × 95 cm with 10 cm of substrate, and after that the enclosure grows with the animal. Buying small enclosures several times costs more than building one large one for adult

life.

The substrate is the most important part. The species digs, and adults need about 40 cm of deep substrate made from a mixture of fine sand, coarse gravel, unfertilised garden soil and coconut fibre or bark, so that it can make tunnels and burrows. For the youngest animals about 10 cm is enough. Loose substrate can be swallowed by accident and cause constipation, so feed on a flat stone or in a dish, and keep an eye on the droppings. Provide hides at both ends of the temperature gradient, for example boxes, half pipes and wooden boxes, built larger as the animal grows. Flat stones and a few sturdy branches are used for climbing and basking.

The species is strong and persistent and constantly searches for weak points. The claws tear through mesh and wire, so use solid walls, a heavy, secured door and a locked room. Floor, walls and ceiling must be firmly fixed together. Heat lamps and heating elements must sit behind mesh or a grille, so that the animal cannot dig or climb in to them and burn itself. The enclosure must be cleaned often, because the animal eats a lot and defecates wherever it likes.

Read more: Heat and temperature

TEMPERATURE

Varanus exanthematicus comes from warm, open areas and needs a clear temperature gradient. By day the air temperature in the enclosure should be 29-34 °C, with a cooler end of 26-28 °C. Under the basking spot the surface should be 50-57 °C. That is the surface temperature at the basking spot itself, measured with an IR thermometer, and not the air. Measure the air temperature at the same time with a digital thermometer. At night the air falls to 24-29 °C. Do not use white light for night heating, but for example ceramic heaters or heating cables.

The heat comes from one or more powerful spot lamps or heat lamps over the basking spot, possibly supplemented with heating cables under part of the substrate, all controlled by thermostats. Heat rocks are not used, because they can get too hot and burn the animal. The basking spot should be positioned so that the animal can get right in under the lamp, but can also retreat down into the cool, deep substrate.

Before mating, the air temperature can be lowered from 34 to about 31 °C for a period, and the day made 5 hours shorter. Otherwise the temperature is kept stable all year round. In the southern part of the range the animals may enter a short rest when it turns cold, but it should not be induced. If the animal is sluggish and does not eat, the temperature is too low.

HUMIDITY AND WATER

Varanus exanthematicus comes from dry savannas, but burrows and deep substrate probably hold a higher humidity than the surface. The enclosure should therefore be dry on the surface and moist deep down. Juveniles can be kept at about 70 % in the first months, so that they shed cleanly and grow well. For adults, about 40-70 % is suitable. It is a mistake to create a rainforest environment with constantly wet air and substrate. That leads to fungus, mould and skin problems.

Before mating, a rainy season can be imitated with short, heavy sprayings from a garden sprayer: two short sprayings every other day for five weeks, so that the humidity reaches about 90 %. After that the enclosure is kept dry again.

Always provide a large, stable water bowl or tub that the animal can lie down in completely. The species likes to bathe and can stay under water for a long time. The water is changed at least once a day, because the animal drinks and defecates in it. The animals easily tip over light bowls, so use a heavy, stable dish.

Read more: Humidity, misting and ventilation

LIGHTING AND UVB

As a diurnal sun-basker, *Varanus exanthematicus* needs strong light and UVB radiation. UVB is necessary for calcium metabolism. Give it Ferguson zone 3, so that the UV index at the basking spot is about 3-7 and decreases towards the shady end. The zone matches other diurnal, basking monitors; precise measurements for the species do not exist. Use a powerful UVB tube (T5 HO) over the full length of the basking spot or a combined mercury vapour lamp with UVB. Bulbs and tubes must be replaced according to the manufacturer's instructions, typically after 6-12 months, because the UV output drops long before the light goes out.

The light is switched on 12-13 hours a day in summer and slightly shorter in winter, controlled by a timer. Time outdoors in a secured aviary with shade is a great benefit, because the sunlight there is not filtered by glass or plastic. The animal must never be able to escape, and it must always be able to reach shade.

Read more: Lighting and UVB Read more: Calcium, vitamins and supplements

FEEDING

In the wild *Varanus exanthematicus* feeds on invertebrates, and in captivity the diet should resemble this. The staple is varied insects and other invertebrates: crickets, grasshoppers, dubia roaches, cockroaches, superworms, snails and earthworms. The insects are dusted with calcium, and occasionally with a vitamin and mineral supplement. Do not use only crickets and mealworms, because adults often ignore them. Wild-caught snails can carry parasites and pollutants, so use farmed ones. Offer a small mouse or an egg only now and then as a supplement.

Overfeeding is the most common mistake. Rodents are rich in fat, and a monitor that gets mice every other day and little exercise quickly becomes fat. Obesity is a far too common husbandry error in this species, and fatty liver (hepatic lipidosis) is a serious consequence.

Juveniles get crickets and mealworms dusted with calcium and vitamins twice a day, and a small newborn mouse every third day. They grow about 2 g a week in the first months. After six months, switch to larger insects, cockroaches and small mice. Adults are fed about twice a week in amounts that keep the animal lean. Weigh the animal every month and adjust the amount according to weight and appearance: a healthy monitor has a clear waist and is active. For juveniles, the insects must be no longer than two thirds of the length of the head.

BEHAVIOUR AND HANDLING

Varanus exanthematicus is not tame by nature. Newly caught animals puff themselves up, hiss, lash with the tail and bite. The animals are strong and have powerful jaws. Deep bites may need stitches and antibiotics. The claws are sharp and can tear the skin during handling. The tail is used as a whip. Never put bare hands in the enclosure when the animal is stressed, and preferably have an extra person with you when handling large animals.

Taming takes time in the first year. Give a new animal several days in peace, and let it eat undisturbed before you start to touch it. Some animals never become tame. Use calm, low movements, support the body under the animal and avoid grabbing from above. Short, regular sessions of a few minutes are better than infrequent, long ones. Animals that are used to a routine with fixed times for feeding and cleaning do best, and many do not like changes.

All reptiles can carry Salmonella without being ill, and among lizards 84 % may be carriers. Always wash your hands after handling the animal, substrate and water, and use equipment that is used only for the enclosure. Small children, pregnant women and people with weakened health should not have contact with the animal.

Males are territorial and can seriously injure each other, so keep them apart. A pair can be kept together in a very large enclosure, but the female can be aggressive after mating and must be able to get away. As a rule the animals are kept singly. Even single animals spend time every day looking for a way out.

Read more: Quarantine and hygiene

Breeding

SEXUAL MATURITY AND SEXING

The sex is hard to tell in *Varanus exanthematicus*, but some differences can be seen, even in hatchlings. The male has a stronger head with a more pronounced bulge on the snout, while the female has a more sloping and pointed snout. In the male there is a distinct groove under the tail base, which in sexually mature animals lies between two hemipenal bulges, while the female has a flatter tail base. The male's colours are also lighter and more golden yellow, the female's darker and more dull brown. The differences are based on few animals and are not certain.

The male can have distinct hemipenal bulges after just one year. The animals can mate at just under two and a half years, and the female can lay her first eggs at just under three years. The female should be fully grown and in good condition before she is used for breeding.

MATING

Breeding *Varanus exanthematicus* rarely succeeds. A pair needs a very large enclosure of about 210 × 150 × 120 cm with 40 cm of substrate. Before mating, the air temperature is lowered from 34 to about 31 °C with a cooler end of about 27 °C, while the basking spot is kept at 50-55 °C. The day is made 5 hours shorter, and feeding is reduced to three times a week. In October a rainy season with short sprayings is introduced, so that the humidity stays at about 90 % for five weeks.

Mating begins at the end of November. The male bobs his head, nuzzles his snout against the female's neck and scratches her back and tail base until she raises her tail. A mating lasts from 25 minutes to 4 hours, and the male alternates between his two hemipenes. The pair mates every week from November to March. The female can get scratches from the claws. When mating stops, the female can become aggressive towards the male, and he must then be moved. Temperature and day length are then set back.

EGG-LAYING AND CLUTCHES

The female of *Varanus exanthematicus* lays large clutches of 15-50 eggs. She can lay three clutches in one season: the second about 32 days and the third about 55 days after the first, with 20-30 eggs in each. After mating she needs whole prey animals twice a day for four weeks, and hard-boiled eggs and calcium-dusted insects every other day.

About 16 days after the last mating the belly becomes clearly distended, and the female withdraws to a corner of the enclosure. She stops eating about four days before laying. She digs a hole about 20 cm deep, backs in over the opening and lays eggs that measure about 5 × 3 cm and weigh 12 g. Afterwards she covers the hole with soil. Laying takes place about 36 days after the last mating, and the female can gain 450 g in two weeks once she starts eating again.

The enclosure must therefore have deep, loose substrate where the female can dig her hole in peace.

INCUBATION

The eggs of *Varanus exanthematicus* are removed from the nest the same day and half buried in a moist medium of vermiculite and perlite in a 2:1 ratio, mixed with water 1:1 by weight. They are incubated in a plastic box of about 50 × 30 × 25 cm in an incubator at 30-31 °C, and the lid is opened every fifth day to change the air. After about 21 days, candling shows whether the eggs are fertile.

The eggs hatch after 156-160 days at 30 °C, and all the young in a clutch can be out within a day. A few young can die fully developed in the egg. Temperature-dependent sex determination is not known.

Read more: Incubating eggs

REARING THE YOUNG

Hatchlings of *Varanus exanthematicus* weigh 7-13 g, on average 9 g, and measure about 8 cm from snout to vent. They can be kept in groups of three in small plastic boxes and start eating about 12 days after hatching, three days after the yolk in the gut is used up. Newly bought juveniles should be quarantined and checked for parasites by a vet.

The boxes should have moist kitchen paper as substrate and about 70 % humidity, so that the juveniles can shed and grow. Heat comes from a heat cable under the boxes, and the juveniles get small crickets and mealworms with calcium and vitamins twice a day and a newborn mouse every third day. They gain about 2 g a week. After four months they can move to a larger enclosure, and from then on the enclosure and the substrate must grow with the animal. Juveniles should only be sold once they have eaten steadily for three weeks.

Captive-bred juveniles are stronger than wild-caught ones, but they are rare. Keep them apart if some become too dominant or bite each other.

Health and common mistakes

Varanus exanthematicus is regarded as one of the monitors that most often dies in the hands of new keepers. The causes are almost always the same:

- Obesity and fatty liver. The animal gets too much and too fatty food, especially rodents, and too little exercise. It causes a heavy body, lethargy and eventually liver failure.
- Too low a temperature. The animal eats poorly, digests poorly and becomes more susceptible to disease. Check the surface temperature of the basking spot with an IR thermometer.
- Calcium deficiency and bone disease when UVB and calcium are lacking. It causes soft jaws, bent legs and tremors.
- Digestive stoppage from ingested particle substrate. Recognised by lack of droppings and a swollen belly.
- Parasites: intestinal worms and amoebae, and also ticks and mites on wild-caught animals. Tongue worms (pentastomids) have also been described. New animals must be quarantined and have a faecal test at a vet.
- Mouth rot (stomatitis) with red spots and a yellow coating in the mouth.
- Dehydration and skin problems if the humidity is completely wrong.

- Burns from unshielded heat lamps.

Animals in the trade are almost all wild-caught or farmed. They are often emaciated, dehydrated and full of parasites. Choose an alert, inquisitive animal with a full body, clear eyes, a clean vent, a pink mouth and no ticks, mites or wounds. Animals with a dirty vent, coatings in the mouth, a runny nose or emaciation should be avoided. An animal that does not eat is ill and must go to a vet experienced with reptiles. Let new animals settle in for several days before they are handled.

Read more: Common diseases and signs of illness

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.