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MONITOR LIZARDS

Yellow-spotted Monitor

Varanus panoptes

Varanus panoptes is a powerful, curious ground monitor from northern Australia and southern New Guinea, known for rising up on its hind legs and tail to scout. It is active, clever and greedy, digs deep burrows and grows up to 150 cm long. The species requires a home-built enclosure of several square metres, a deep substrate and an experienced keeper, and it is not an animal for handling.

Family: Varanidae

KEY FACTS

THE ANIMAL

Adult size	**90-150 cm** total length incl. tail
Weight	**3,000-10,000 g**
Lifespan	**15-20 years**
Active	**By day**
Lifestyle	**Terrestrial and burrowing**
Habitat	**Savanna and wetland**
Difficulty	**Experienced**

CARE

Min. enclosure	**240 × 120 × 150 cm** L × W × H for 1 adult
Temperature, day	**24-38 °C**
Basking spot	**46-57 °C**
Temperature, night	**20-25 °C**
Humidity	**70-80%**
Water	**Water dish**
UVB	**Recommended** Ferguson zone 3
Diet	**Insects and vertebrates**
Kept	**Singly or in pairs**

BREEDING

Reproduction	**Egg-laying**
Clutch size	**6-13 eggs**
Incubation	**194-240 days** at 26-30 °C

PROTECTION AND PAPERWORK

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

About the species

Varanus panoptes is a large, terrestrial monitor with a heavy body, strong claws and a compressed tail. The back has transverse rows of large dark spots alternating with rows of small light spots, and the tail tip is banded. The ground colour is brown in *V. p. panoptes* and reddish in *V. p. rubidus* from arid Western Australia. The young are more colourful and more distinctly marked than the adults.

The species has three recognised subspecies: *V. p. panoptes* in northern Australia, *V. p. rubidus* in Western Australia and *V. p. horni* in southern New Guinea. The scientific species name refers to Argus Panoptes, the hundred-eyed guardian of Greek mythology. *V. panoptes* closely resembles *Varanus gouldii* and can probably hybridise with it in a stable zone of overlap, so the two are easily confused. The spots on the back and the banded tail tip are among the features that distinguish them.

Males are markedly larger and heavier than females. Males typically reach 120-150 cm in total length, females about 90 cm and rarely over 105 cm, and the largest animals reach 160 cm. Weight varies greatly: adult females weigh about 3 kg, the heaviest wild animals weigh 7 kg, and large captive males can weigh about 10 kg. Males have very powerful forelimbs. The

species is lean compared with the large monitors of Africa and Asia and does not easily put on fat.

The species is a lifelong commitment. An adult male requires an enclosure of several square metres and a deep substrate, which has to be obtained, carried in and replaced. The cost of food in the form of mice, chicks and insects is high, because the animal is active, fast and always hungry. The animals live 15-20 years in captivity. The young grow quickly, so the space and the finances must be in place before the animal is bought.

Distribution and habitat

Varanus panoptes lives in northern and western Australia and in southern New Guinea. In Australia the species is found in the Northern Territory, northern Queensland, the Kimberley region and onwards through arid Western Australia to the Pilbara and the area to the south. *V. p. rubidus* lives on the arid western plateau and on Dolphin Island in the Dampier Archipelago. *V. p. horni* is found in southern New Guinea, both in the Indonesian part and in Papua New Guinea, and on islands in the Torres Strait. The type locality of the subspecies is Merauke in the Indonesian part of the island. It is *V. p. horni* that is found in the trade, because Australia does not allow the export of wild animals.

> **Native range:** Australia, Papua New Guinea and Indonesia.

HABITAT

Varanus panoptes lives in many kinds of landscape: tropical savanna, open woodland, floodplains and coastal areas. It is tied to water and is often found by permanent watercourses, riverbanks and flooded meadows, but also ventures into arid areas of Western Australia. It also forages in the trees and in the water, where it dives for freshwater mussels in the dry season, for example, and if chased it runs to the nearest tree or burrow.

The animal digs and spends a long time in burrows and can take over existing tunnels. The female digs spiral nest burrows that go down about 2.6 metres on average, the deepest nest burrows known in any vertebrate. Several animals can share the same underground tunnel systems.

The species is a predator that eats almost anything it can overpower: insects, crabs, fish, birds, rodents and other lizards, including smaller monitors. It hunts by sight and smell and follows movement. The introduced, toxic *Rhinella marina* has hit the species hard in northern Australia, because the monitor eats the toads and dies of the poison. The population has fallen by up to 90 % in many areas.

Care

THE ENCLOSURE

Adults should not be kept in an ordinary enclosure. An adult male needs at least 240 × 120 × 150 cm (length × width × height), and a whole room is better. For a small female a floor area of about 100 × 200 cm is an absolute minimum. More space gives a more active and calmer animal. The young can start in a smaller but deep enclosure where they easily find the food, and are moved up quickly, because they grow very fast.

The substrate is the most important thing. The species digs constantly, and a substrate of sandy soil with 25-50 % coconut fibre, at least 30 cm deep and preferably 60 cm, lets the animal make its own tunnels where temperature and humidity are suitable. Use soil without fertiliser and pesticides. Commercial potting compost can irritate the eyes and airways and contaminate the substrate. The deep substrate is heavy, so the load-bearing capacity of the floor must be checked.

Provide many hiding places of varying size. A hide that fits closely around the animal gives security: a board on wooden wedges, cork tubes or cork rolls, preferably several stacked on top of one another under the heat. Fix all heavy items to the wall or floor, so that a digging monitor cannot make them collapse. Live plants do not survive. Branches must be very sturdy, because the animal occasionally climbs.

Use a closed lid with only a few ventilation holes. An open mesh lid dries out the air and draws the heat away. The lid must be lockable, and heat sources must be shielded and out of the animal's reach, because a large monitor can pull down bulbs and burn itself.

Read more: Humidity, misting and ventilation

TEMPERATURE

A large temperature gradient is needed. The air in the terrarium is kept at about 24-38 °C, with cooler areas down at the bottom and warmer towards the basking spot. Under the heat there must be a basking spot where the surface temperature, measured with an IR thermometer, is about 46-57 °C, so that the animal can warm up quickly. Use several halogen spots or heat lamps side by side, so that the whole body of the animal is covered evenly. A single, narrow cone of light can cause burns on a large animal.

It is the surface temperature that counts. Thermometers in the air give different figures. The animal must also be able to cool off in shade or in a burrow, because body temperatures above about 42 °C are fatal. At night the heat is switched off, and the temperature may fall to 20-25 °C. A drop of 10 degrees or more is tolerated when the animal can warm up again the next morning. Brumation is not necessary, not even for breeding: animals kept warm all year round remain active, and the females lay eggs regularly.

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

HUMIDITY AND WATER

The humidity must be moderate to high. In the middle of the terrarium it should be 70-80 %. This is best achieved by keeping the substrate moist a few centimetres down while the surface is relatively dry. The animal can then choose the humidity itself by digging in. Humidity also helps during shedding.

The animal drags a lot of water with it from the bath. If the bath stands in a larger tray, most of the water that would otherwise make the substrate soggy is caught. If the animal lies in the water for many hours, the terrarium is probably too dry, and a hide packed with moist soil or coconut fibre helps.

WATER AND WATER QUALITY

Varanus panoptes likes to bathe, and a large tub is part of the set-up. Use a container in which the whole animal can lie in the water, e.g. a cement mixing tub or a large plastic tub for large animals. Change the water often, because the animal urinates and defecates in it. Place the tub so that it cannot be knocked over by a powerful animal, and make sure there is an easy way in and out.

LIGHTING AND UVB

Keep the light on for about 12 hours a day. *Varanus panoptes* can be kept and bred without UV, with ordinary light and good food of whole prey animals, but UV is recommended all the same for animals that do not get unfiltered sunlight: the skin produces vitamin D3 under UVB, and UVA affects the animal's daily rhythm and behaviour. Use a UVB tube or a combined lamp above the basking spot, so that the animal can choose. Ferguson zone 3 is an estimate for a diurnal species that basks a lot. Mercury vapour bulbs give both heat and UV and show the animal's colours better, but rarely last as long as promised.

Always mount the lamps out of the animal's reach, and replace UV tubes according to the manufacturer's instructions, even if they still light up.

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

FEEDING

Varanus panoptes is an omnivorous predator with a high metabolism, and it quickly learns that the keeper means food. The staple diet is whole prey: thawed mice and rats of suitable size, day-old chicks, fish and crayfish, supplemented with insects such as crickets, mealworms, superworms and large cockroaches. Whole prey covers almost all needs. Strips of meat, eggs and offal from the supermarket have too much phosphorus relative to calcium and should not make up much. Dust the insects with a good mineral supplement several times a week.

Give rodents dead. Even though a monitor almost always kills a mouse without harm, a live mouse can leave deep, easily infected wounds with its incisors. Frozen mice are also cheaper and smell less. Young can be fed daily. Adults are fed 3-4 times a week, adjusted to the animal's condition, and breeding animals can be fed daily, mostly with mice. The species seldom puts on fat, because it is very active and uses a lot of energy on growth and eggs, but the weight should nevertheless be monitored.

Feed animals separately. They are so eager that several together may attack each other in a feeding frenzy. Use tweezers or tongs so that you are not bitten yourself. Gravid females stop eating about a week before laying and are insatiable again afterwards. The species often digs for its food, even when it lies on a hard surface, and this is normal.

Read more: Feeder animals: keeping and breeding

BEHAVIOUR AND HANDLING

Varanus panoptes is active and curious and likes to hiss, but it is not an animal for handling. It rarely becomes calm from being picked up and should be regarded as an animal to look at. When threatened it rises on its hind legs and tail (tripod), inflates its throat and hisses long and deep. If you continue, it can lunge. Some old males become more relaxed, but this cannot be expected.

Bites, claws and tail lashes must be taken seriously, especially in males of 120-150 cm. The species rarely bites out of fear, but most often out of eagerness at feeding, and bites are serious. The teeth are sharp, slightly recurved and cutting, so even a quick bite can cause deep gashes that bleed heavily and heal slowly, and the claws can cause deep lacerations. Heavy leather gloves soften a bite but do not stop it entirely from a large male. Use long tongs for feeding, avoid having your hands in the enclosure when there is food nearby, and let the animal come to you rather than grabbing for it. Taming consists of calm, predictable routines and letting the animal get used to your hand without being held.

Reptiles often carry salmonella. Wash your hands thoroughly after any contact with animals, water, substrate and food. Children should not have contact with animals, substrate or water without supervision.

As a rule keep the animals singly. Females attack each other and can kill each other unless they have been raised together. Males fight for dominance with teeth and claws. A male and a female can work, but the pair must be monitored, and a divider may be necessary. Constant scratching along the walls for more than a week suggests that the enclosure is too small, too dry or lacks hiding places.

Read more: Quarantine and hygiene

Breeding

SEXUAL MATURITY AND SEXING

Males are markedly larger than females and have more powerful forelimbs. Young animals have no reliable sex characteristics, so sexing is best left to a vet with experience in reptiles. The species grows quickly, and animals in the wild can become sexually mature in under a year. The age for breeding in captivity is not known precisely, but females should be fully grown and in good body condition before they are bred, because egg laying drains them of calcium.

MATING

The species is relatively easy to breed. A pair that is allowed to be together mates and lays fertile eggs at regular intervals. A pair can be kept apart by a divider for most of the year and put together for three to four days at a time every two weeks; this prevents fights. Mating goes on with pauses for about four days.

Winter dormancy is not necessary, not even to get the animals to breed. Females that are fed well and kept warm can lay eggs several times a year, even without a male, but then the eggs are unfertilised.

EGG-LAYING AND CLUTCHES

Clutches contain 6-13 eggs, and the female lays them about 40-45 cm down in the substrate. Well-fed females can lay every sixth to eighth week all year round. About a week before egg laying the female stops eating, becomes swollen and digs everywhere. If the substrate is deep enough, she makes a nest burrow herself. Otherwise a nest must be provided.

A nest box can be made from a large plastic container with a fixed lid and a hole in the side, filled with moist coconut fibre material. It can be stressful for the female, so a deep substrate is easier for her. After egg laying the female is very thin and must be fed heavily to recover.

INCUBATION

Place the eggs in a moist medium such as vermiculite or perlite. The medium should feel just barely moist, not wet, because many clutches have been lost to too moist a substrate. Check the eggs often. Use, for example, a closed box with perlite, moistened with equal parts water and perlite by weight, at 29-30 °C by day and 3-4 degrees lower at night, and air the box once a week.

Incubation is long: at these temperatures the eggs hatch after 194-210 days, and in the wild they lie in the ground for about eight months. Some eggs may contain dead, fully developed young with a lot of yolk left, for no known reason. Be patient, and do not discard eggs too early.

Read more: Incubating eggs

REARING THE YOUNG

Newly hatched young are about 25-30 cm long, weigh 32-43 g and grow very fast. For the first days they live off the yolk and do not necessarily eat. After that give small insects and small, thawed mice and follow the growth. Keep the young separate when feeding, because they are aggressive feeders and can injure each other.

The young need a smaller set-up with a deep, moist substrate, a warm basking spot and hiding places. Move them up to larger quarters as they grow. Females raised together from small tolerate each other better than females brought together as adults, but unrest must be expected.

Health and common mistakes

Varanus panoptes is hardy when husbandry is right, and most problems are caused by the set-up and the food. The typical mistakes are:

- Burns from too concentrated or unprotected heat. Large animals can lie under a single spot for a long time. Use several bulbs and shield them.
- Brittle bones (metabolic bone disease) with too little calcium, vitamin D3 and UV, especially in fast-growing young and in females that lay many eggs.
- Overheating. Body temperatures above about 42 °C are dangerous. The animal must be able to cool off in shade or burrows.
- Dehydration and skin problems in an enclosure that is too dry with an open mesh lid. A moist substrate and a large water tub prevent it.
- Bites from live mice, which can cause deep, infected wounds. Give the prey dead.
- Injuries from fights when animals are kept together.
- Parasites and stress in animals caught in the wild. In the trade the animals are typically captive bred, but animals imported from Indonesia should have a faecal sample examined and be given time to settle in. Captive-bred animals normally have fewer parasites.
- Egg-laying problems in females that do not have a suitable place to dig. Contact the vet if the female digs for several days without laying, seems limp or has a swollen hindquarters.

A healthy animal is active, has clear eyes and a full tail base and eats well. See a vet with experience in reptiles if the animal loses weight, does not eat for several weeks, has a swollen jaw or seems limp.

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.