herpy

MONITOR LIZARDS

Mitchell's water monitor

Varanus mitchelli

Varanus mitchelli is a slender, semi-aquatic monitor from northern Australia, typically 60-70 cm and at most about 1 m long with a laterally compressed swimming tail. The species is shy, almost unknown in the hobby and assessed as critically endangered, because the poison of the introduced toad *Rhinella marina* has decimated populations. There is little care experience, and it belongs with the very experienced.

Family: Varanidae

KEY FACTS

THE ANIMAL

Adult size	**60-96 cm** total length incl. tail
Lifespan	**10-15 years**
Active	**By day**
Lifestyle	**Arboreal and semi-aquatic**
Habitat	**Savanna and wetland**
Difficulty	**Expert**

CARE

Min. enclosure	**200 × 100 × 150 cm** L × W × H for 1 adult
Temperature, day	**28-32 °C**
Basking spot	**40-50 °C**
Temperature, night	**22-25 °C**
Humidity	**50-80%**
Water	**Water section** depth 20-30 cm
UVB	**Recommended** Ferguson zone 3
Diet	**Insects and vertebrates**
Kept	**Singly**

BREEDING

Reproduction	**Egg-laying**
Clutch size	**7-27 eggs**
Clutches per year	**2-6**
Incubation	**90-289 days** at 26-31 °C

PROTECTION AND PAPERWORK

CITES	**Appendix II**
EU annex	**Annex B**
IUCN	**Critically Endangered (CR)**

About the species

Varanus mitchelli is a small to medium-sized monitor from the subgenus *Odatria*. It is smooth and slender, and the tail is 1.7-2.1 times as long as the body and strongly compressed from the side on everything but the base. The compressed tail goes with a life in water. The species is distinguished from *V. mertensi* by smaller size, a tail that is not quite as strongly compressed, fewer scale rows at midbody and a darker underside with a heavily cross-banded throat and a dark underside of the tail. In *V. mertensi* both the throat and the underside of the tail are light.

The species was described in 1958 by Robert Mertens from an animal collected at Oenpelli in the Northern Territory. It is shy and secretive in its behaviour and is rarely seen in the wild. It is both semi-aquatic and semi-arboreal: it swims, hunts by the water and climbs in trees and bushes along the bank.

Adults are typically 60-70 cm and at most 96 cm in total length, and snout-vent length reaches up to 35 cm. The weight of adults is not documented. Newly hatched juveniles are 14-18 cm in total, of which the body is 5-7 cm, and weigh 2.6-4.5 g.

The greatest threat is the cane toad *Rhinella marina*, which has been introduced to Australia. When the monitors eat the poisonous toads, they die, and after the toads' arrival severe population declines and local extinctions have been seen. The species is now assessed as critically endangered on the IUCN Red List.

Distribution and habitat

Varanus mitchelli is found only in northern Australia: in northern Western Australia and in the Northern Territory, and it reaches just into north-western Queensland. The type locality lies about 8 km west of Oenpelli in Arnhem Land in the Northern Territory. The species does not occur outside Australia.

The distribution is not precisely delimited, and the species is so secretive that records are sparse. The map's frame is an estimate, and the records on the map give the best picture of where it has been recorded.

> **Native range:** Australia.

HABITAT

Varanus mitchelli is regarded as a species that belongs by fresh water: streams, banks and wetlands in the tropical north, where there is a distinct wet season and dry season. It is semi-aquatic and semi-arboreal and seeks cover in bankside vegetation and trees by the water. It sleeps under loose bark, in rock crevices, in hollow trees and on branches over the water.

More recent observations from Darwin show that the species also lives in brackish and salty surroundings, including in mangrove and other coastal habitats, so its niche is broader than was previously thought. Activity varies with the season, and the species is very hard to spot. Precise figures for temperature and humidity in the animal's habitats are not documented. The climate in the tropical north is warm all year, and the wet season and dry season govern when there is water.

Read more: Humidity, misting and ventilation

Care

THE ENCLOSURE

There is almost no experience of keeping *Varanus mitchelli*, so the care is based on the related *V. acanthurus*, on a single breeding of the species and on its life in the wild.

An adult needs an enclosure of at least 200 × 100 × 150 cm (length × width × height) with deep substrate and at least a third of the floor as water. Larger is always better. The size follows the rule of thumb for climbing monitors (5 × 2 × 4 times the snout-vent length) with extra space for the water section. It is a home-built enclosure or a small room and not something you buy ready-made. Juveniles can be placed in the same enclosure if they have dense cover and it is easy for them to find food; otherwise they start in a smaller box for some months.

Furnish with a fixed, secure water section with a gradual entrance or stones, so that the animal easily gets out, and the water must be changeable and kept clean. Provide sloping branches, roots and cork for climbing and basking over and beside the water, many hides (cork tubes, hollow roots, stones) and a damp substrate of soil and coconut coir where the animal can dig. Keep the air moving with mesh sections. All doors must have secure fastenings, because monitors are strong and persistent. All heat lamps and heat sources must be shielded, so that the animal cannot burn itself on them.

TEMPERATURE

By day the enclosure must be 28-32 °C, and the basking spot must reach 40-50 °C measured as surface temperature with an IR thermometer. At night the heat is switched off and the temperature falls to 22-25 °C. The species warms up at the basking spot and seeks shade and water when it gets too hot, so a large temperature gradient is important.

Use several halogen bulbs or other heat sources side by side, so that the whole body is heated evenly, and control them with a thermostat. Keep the water moderately warm and free of cold draughts.

Read more: Heat and temperature

HUMIDITY AND WATER

Humidity must be 50-80 %: slightly higher at night and by the water, drier at the basking spot.

The water section and a damp substrate keep humidity up. Air movement must be good, so that the substrate does not turn sour or mouldy, and the skin and claws must not be left standing in wet substrate. A damp hide box for shedding helps.

WATER AND WATER QUALITY

The species is semi-aquatic, so a fixed water section is part of the enclosure and not merely a drinking bowl. Make the water large enough for the animal to swim, and deep enough for it to dive, but with a gradual entrance or stones, so that it can always get out. The water must be 20-30 cm deep at the deepest point.

Monitors often defecate in the water, so it must be changed often and have powerful filtration or a drain-off option. Keep the water clean, so that the skin and mucous membranes are not attacked by bacteria, and wash your hands after every contact with the water.

LIGHTING AND UVB

The species is diurnal and basks and needs UVB corresponding to Ferguson zone 3. Mount a T5 tube (10-12 %) or a powerful combination lamp over the basking spot, so that the animal can get close and move out into shade.

UVB tubes must be replaced according to the manufacturer's instructions, typically after 12 months, and the UV index should be checked with a meter. Keep the light on about 12 hours a day, slightly longer in summer and slightly shorter in winter, and control it with a timer. The basking spot must be the brightest place in the enclosure, because monitors associate light with warmth.

Read more: Lighting and UVB

FEEDING

In the wild the species eats mainly grasshoppers, spiders and fish, but also other invertebrates, amphibians, reptiles and their eggs, small mammals and birds. Insects are therefore a good basis, supplemented with small fish. Give well-fed crickets, grasshoppers, dubia roaches, discoid roaches and similar, preferably about the size of the animal's head or slightly smaller. Small monitors need food daily, and adults a few times a week in small meals, so that they do not become too fat. Hang the food up high, or give small, whole fish in the water, so that the animal gets to hunt.

Dust the insects with calcium and a multivitamin, and use vitamin D3 carefully as long as the animal has UVB. Feeder insects must be farmed and have been fed well beforehand. Rodents are only a small part of the diet in the wild and easily cause obesity and liver damage, so they should at most be a rare treat. Thawed small fish or eggs can be used for variety. Follow the animal's weight and shape, and adjust the amount accordingly.

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

BEHAVIOUR AND HANDLING

Varanus mitchelli is a shy and cautious species that hides a lot and is not an animal you pick up every day. Bites from such a small monitor are not dangerous, but the claws are sharp and can cause scratches, and a bite can cause an infection. The animal is fast and can escape if it is let loose, but it does not cause the serious injuries that large monitors can.

Taming must be slow. Sit quietly by the enclosure, let the animal get used to your hand and your scent, and offer food from tweezers. Do not grab the animal from above, because a hand from above resembles a bird of prey. Do not hold it firmly by force; short moments in the hand are enough. How tame the animal becomes is not documented.

Reptiles can carry salmonella. Always wash your hands after touching the animal, the water, the substrate and the tools, keep children and pregnant women away from cleaning, and do not use kitchen utensils for the enclosure. The species is kept singly, and males must never be kept together. Stress shows as fleeing, open mouth, hissing, refusal of food and too much time in hiding.

Read more: Quarantine and hygiene

Breeding

SEXUAL MATURITY AND SEXING

Sex differences and age at sexual maturity are not documented for the species. In related *Odatria* species the males are typically slightly larger than the females, and a vet with experience of reptiles can sex the animal.

The animals are sexually mature at a snout-vent length of about 22 cm. Only breed adult animals in good condition, and do not let young females lay before they are fully grown.

MATING

Mating and the breeding season are not documented in detail. The species can breed in captivity, but the experience is based on few animals. It is unknown whether the species needs a cooler period, and a winter rest should therefore not be introduced without reason.

Introduce the male to the female's enclosure and watch them closely. If the male is too eager, he must be removed at once. Give the female plenty of food and calcium throughout the season. After laying, the female needs extra food.

EGG-LAYING AND CLUTCHES

Clutches are 7-27 eggs: in the wild typically 7-12 and in captivity up to 27, averaging about 20. A female can lay up to six clutches in a season at intervals of 6-9 weeks. The eggs weigh 3.0-6.1 g and are 23-32 mm long and 11-19 mm wide.

Place a laying box with damp soil or vermiculite in the enclosure, so that the female can bury the eggs. If there is no suitable place, monitors often lay in unfortunate spots or retain the eggs, which can cause egg binding. Contact a vet with experience of reptiles if the female digs without laying, seems ill or sits heavily for several days.

Read more: Common diseases and signs of illness

INCUBATION

The eggs are carefully moved to an incubator without being turned. Place them in half-damp vermiculite or perlite in a closed box with small air holes, and keep a stable temperature. At 26-31 °C the eggs hatch after 157-289 days, in the wild after 90-150 days. The long and highly variable incubation period requires patience.

Which temperature gives the best results within the range is not documented. Eggs that collapse or go mouldy should not be removed until you are sure that they are dead.

Read more: Incubating eggs

REARING THE YOUNG

Newly hatched juveniles weigh 2.6-4.5 g and are 14-18 cm long in total with a snout-vent length of 5-7 cm. The body grows to about 10 cm in 7-8 weeks, and after that it goes more slowly: about 5 cm more over the next two years. They are so small that they need small feeder insects such as newly hatched crickets, springtails and small mealworms, dusted with calcium. Feed them daily and give water in a shallow dish where they cannot drown. Keep them separately, because the juveniles show dominance behaviour towards each other.

For juveniles a smaller terrarium with a shallow water section and plenty of hiding places is best. Weigh them every two weeks, and move them to a larger terrarium as they grow.

Health and common mistakes

Typical problems in monitors, which also apply to *Varanus mitchelli*:

- Too low a temperature or a lack of a basking spot causes poor digestion, loss of appetite and a weakened immune system.
- Too little UVB and calcium causes brittle bones with soft jaws, bent limbs and tremors. Dust the food and use proper UVB light.
- Obesity and liver damage if the food contains too much fat, especially if rodents are given.
- Skin problems and fungi in a constantly wet substrate or in dirty water.
- Parasites and stress in wild-caught animals, which often have intestinal worms and other parasites. Have a faecal sample examined by a vet, and keep new animals in quarantine.
- Egg binding in females without a suitable laying site.

A healthy animal has clear eyes, a round tail and an even, smooth skin and is active. See a vet with experience of reptiles if the animal loses weight, does not eat for several weeks or looks listless. The species is very rare in private collections, so find a vet in good time.

Animals in the trade are rare, and there is no real breeding line in the hobby. The species has been seen in illegal trade. Where an animal is wild-caught, expect parasites, stress and poor weight.

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.