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MONITOR LIZARDS

Sand Monitor

Varanus gouldii

Varanus gouldii is a large, diurnal ground-dwelling monitor from most of Australia and southern Papua New Guinea. It digs, runs fast and eats almost anything it can overpower. The species is hardy in captivity, but it grows to nearly 160 cm, so it needs a home-built enclosure or a whole room, powerful heat and a keeper with experience of large monitors.

Family: Varanidae Former name: *Varanus gouldii flavirufus; Varanus flavirufus*

KEY FACTS

THE ANIMAL

Adult size	**100-160 cm** total length incl. tail
Weight	**2,000-6,000 g**
Lifespan	**10-20 years**
Active	**By day**
Lifestyle	**Terrestrial and burrowing**
Habitat	**Desert, semi-desert and savanna**
Difficulty	**Experienced**

CARE

Min. enclosure	**300 × 150 × 150 cm** L × W × H for 1 adult
Temperature, day	**25-35 °C**
Basking spot	**50-58 °C**
Temperature, night	**20-24 °C**
Humidity	**30-60%**
Water	**Water dish**
UVB	**Recommended** Ferguson zone 3
Diet	**Insects and vertebrates**
Kept	**Singly**

BREEDING

Reproduction	**Egg-laying**
Clutch size	**5-17 eggs**
Clutches per year	**1-2**
Incubation	**180-190 days** at 28-31 °C

PROTECTION AND PAPERWORK

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

About the species

Varanus gouldii is a powerfully built, long-legged monitor with a pointed snout and a distinctly compressed tail. The ground colour is yellowish brown to greyish brown with paler and darker cross-bands and spots, and there is a dark band with a pale edge behind the eye. The tail tip is yellowish. When the species was described in 1838, emphasis was placed on two yellow stripes on the side of the neck. The species grows to up to 160 cm in total length, on average about 130-140 cm, and weighs up to about 6 kg. Females weigh on average only about a third of the males' weight. Snout-vent length is not documented.

The taxonomy has been confused. *V. gouldii* was formerly regarded as containing several forms that are now separate species, including *V. rosenbergi* and *V. panoptes*, and the older literature mixes them up. Figures and experience from older texts and from the trade therefore do not always apply to this particular species. The desert form *V. g. flavirufus* from the interior of Australia is slightly smaller and is treated by some authors as a separate species (*V. flavirufus*). In the wild the species can be confused with *V. panoptes* and *V. tristis*. The species name probably honours the English ornithologist John Gould.

It is an active, curious and alert species that searches its territory by day, turning stones and digging for prey. It can rise on its hind legs to look around. It is not an animal to handle for pleasure, but juveniles that are accustomed to calm contact can become fairly tame.

For anyone considering the species: an adult needs a home-built enclosure of at least 300 × 150 cm with a deep substrate, powerful heat and whole prey every week, and you should expect it to live at least 10-20 years. Some of the care figures are borrowed from related Australian ground-dwelling monitors or are estimates.

Distribution and habitat

Varanus gouldii is found across large parts of the Australian mainland in grassland, savanna, open forest and arid regions. The red interior, west to the Canning Stock Route in Western Australia, is inhabited by the form *V. g. flavirufus*. The species is also found in southern Papua New Guinea.

The type specimen (a neotype) comes from Karrakatta near Perth in Western Australia. The population is large and widespread.

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

HABITAT

Varanus gouldii lives first and foremost on the ground and is found in many kinds of habitat: open forest, grassland, savanna, scrub and arid desert regions. It digs large burrows as refuges from heat, cold and enemies and also uses rock crevices and hollow trees.

The climate varies greatly. In parts of Queensland summer days average about 37 °C and winter days about 23 °C with nights around 12 °C. The animals are active by day and retreat into the burrows at night and in the cool season, and where the winter is cool they hibernate. The eggs are often laid deep in a termite mound, 50-60 cm down, and the termites repair the mound, so that temperature and moisture are kept stable. Food is anything the animal can overpower: juveniles eat mostly insects and small lizards, adults also small mammals, birds, crustaceans, scorpions, snakes, amphibians, eggs and carrion.

Care

THE ENCLOSURE

An adult needs far more than an ordinary commercial enclosure: a home-built enclosure or a room of at least 300 × 150 × 150 cm (length × width × height) for one animal. The size follows the rule of thumb of an enclosure twice as long as the animal and just as wide. An enclosure for two animals must be at least 50 % larger. An outdoor aviary of 450 × 200 × 200 cm with about 60 cm of sand substrate is also suitable.

Juveniles can initially be kept in a box of about 90 × 60 × 60 cm, but they grow quickly and must be moved to more space during the first or second year.

The substrate must be deep: 40-60 cm of sand and soil that can hold a burrow without it collapsing. The species digs up plants, so they are not worth using. Furnish with several hides, for example large hollow logs, cork tubes and rock caves that the animal can wedge itself into: it feels safest when its body touches the walls of the hide. A large basking stone at the hot end holds the heat well into the night and often becomes the animal's preferred sleeping place. Stones must lie stably on the floor of the enclosure so that they do not topple when the animal digs under them. The lid must be tight and lockable, because the species is strong and can climb. All heat sources must be shielded so that the animal cannot burn itself. In an outdoor aviary, wire mesh must be laid under the substrate so that the animal does not dig its way out.

TEMPERATURE

Varanus gouldii loves sun and needs a large temperature gradient.

By day the cool part of the enclosure must be 25-28 °C, and the air just under the lamps at the hot end must reach about 47 °C in adults. The surface of the basking spot must reach 50-58 °C measured with an IR thermometer on the surface itself, not in the air. Juveniles need a hot end of about 35 °C, a cool end of about 26 °C and a basking spot of up to 58 °C. Use several bulbs and large surfaces, so that a large animal can lie fully in the heat, and provide shade and cooler zones so that it can cool down. At night the heat is switched off and the temperature falls to 20-24 °C.

Check with an IR thermometer and a digital thermometer with a probe. Temperatures that are too low cause poor digestion and poor growth, and heat that is too concentrated and unshielded bulbs cause burns. Animals kept outdoors dig in and hibernate when it gets cold; a winter rest in the enclosure requires experience.

Read more: Heat and temperature

HUMIDITY AND WATER

The species comes from dry, hot regions. Keep humidity at 30-60 % and ensure good ventilation. The most important thing is that the substrate is slightly damp in depth, so that the burrows hold, while the surface is dry. A slightly damp hide helps with shedding if the skin sticks.

Read more: Humidity, misting and ventilation

WATER AND WATER QUALITY

Place a large, heavy and low water container at the cool end, so that the animal cannot tip it over, and change the water daily. The animal drinks from it, and large animals may lie in it to cool down. Place the container far from the basking spot, so that the water does not become too warm and the humidity does not rise unnecessarily. *Varanus gouldii* does not swim like the aquatic monitors, so the container does not need to be deep, but it must be large enough for the animal to lie in.

LIGHTING AND UVB

Varanus gouldii is diurnal and lives in full sun. Because the species basks in open country, UVB corresponding to Ferguson zone 3 is recommended: a powerful UVB tube (T5 HO, 12-14 %) that gives a UV index of about 4-6 at the basking spot and covers about half the length of the enclosure. There must always be shade to retreat to.

Let day length follow the season: longer in summer and shorter in winter. White reflector bulbs give both heat and light, for example a 100 W bulb at the hot end for about 10 hours a day. Replace UVB tubes according to the manufacturer's instructions.

Read more: Lighting and UVB

FEEDING

Varanus gouldii eats anything it can overpower, and the diet must be varied and consist of whole prey. Juveniles get insects (crickets, cockroaches, mealworms) and chopped newborn mice, while adults get mice, rats, chicks, quail, chicken necks and kangaroo meat. Eggs and insects can be included throughout life.

Growing juveniles are fed every day: so many chopped mice and insects that they lose interest, and a few more later in the day. Adults are fed every 3-5 days, depending on how large the last meal was. Prey must not be wider than the animal's head, because smaller prey is easier to digest. Overfeeding is the most common problem in captivity: when rodents become the main food, monitors quickly become fat, and food that is too fatty strains the liver. Avoid processed dog and cat food.

Whole prey with bones covers most of the calcium requirement, and insects for juveniles are dusted with calcium.

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

BEHAVIOUR AND HANDLING

Safety: *Varanus gouldii* is large, fast and alert. If it feels threatened, it can rise up, puff itself up, hiss and lash its tail. The claws are powerful, and a bite from an animal of over a metre can cause deep lacerations that bleed and heal slowly. Tail whips can cause nasty scrapes, especially from fully grown males.

Juveniles get used to being handled and can become fairly tame, but even a tame animal can bite and scratch hard. Handle the animal only when necessary, so that it is less stressed, and use leather gloves for large animals. Keep fixed, calm routines. Use long tweezers or tongs when feeding, and do not keep your hands in the enclosure when there is food nearby. Use every handling to check the animal for signs of illness.

Reptiles often carry salmonella. Wash your hands thoroughly after any contact with the animal, the substrate, the water and the food, and do not leave children alone with the animal.

Keep the animals singly. The species eats smaller monitors, and adults should not be put together without reason. A pair requires a very large room and must be supervised.

Read more: Quarantine and hygiene

Breeding

SEXUAL MATURITY AND SEXING

In *Varanus gouldii* the males are much larger and heavier than the females, which weigh only about a third as much, so size shows the sex in adults. Young animals are hard to sex; in related monitors it requires an experienced vet. Age and size at sexual maturity are not known. Females must be fully grown and in good condition before they lay eggs, so that egg-laying does not drain them of calcium.

MATING

Varanus gouldii has been bred many times, both in zoological collections and by private keepers. In the wild the animals mate in the rainy season: the male digs at the female's nest and mates with her over several days. Outdoors in Queensland the animals mate in October and November, after spending the winter down in a burrow, and the female lays eggs in December. The changing seasons in temperature and day length probably trigger the breeding season, and plenty of whole prey promotes it and can give several clutches.

When the female and male are put together, it must be done gradually and under close supervision, because they are two large, strong animals.

EGG-LAYING AND CLUTCHES

In the wild the female typically lays 10-17 eggs, in captivity 5-17 eggs, and she can lay two clutches in a year. In the wild the female digs 50-60 cm into a termite mound and lays the eggs in a chamber at the end. In captivity she needs a large container with at least 50 cm of damp sand or damp soil, where she can dig a chamber. Without a suitable place she may retain the eggs, and this can become serious. If she is limp, has a swollen belly or digs for days without laying, a vet must be contacted.

INCUBATION

The eggs are carefully lifted out without being turned and placed in vermiculite mixed with water in the ratio 1:1 by weight. At 28-31 °C they hatch after about 180-190 days. Keep the box closed with small air holes, and check it regularly.

REARING THE YOUNG

Juveniles grow quickly and need food straight away. They are kept singly in a box of about 90 × 60 × 60 cm with a warm end of about 35 °C, a basking spot of up to 58 °C and a cool end of about 26 °C, with hides and a deep substrate. Feed them daily with small insects and chopped newborn mice until they lose interest, and give a few more later in the day. Give them time to settle in before they are handled. Juveniles quickly become large and strong, so the space for them must be planned before you start breeding.

Health and common mistakes

Varanus gouldii is hardy in captivity. Animals kept outside Australia are captive bred, and captive-bred monitors are generally more robust, calmer and easier to breed than wild-caught monitors. The list below applies to large, ground-dwelling monitors in general.

- Burns from unshielded and too concentrated heat sources, especially in large animals that lie under a single bulb.
- Overheating: the animal must always be able to get away from the heat to shade or a cool burrow.
- Temperatures that are too low, which cause poor digestion, poor growth and a weakened immune system.
- Obesity and liver problems from too many rodents and too frequent feeding.
- Metabolic bone disease from too little calcium, D3 and UV, especially in fast-growing juveniles and females in egg-laying.
- Parasites and stress, especially in newly bought animals. Have a faecal sample examined, let new animals settle in peace, and ask the seller about the animal's origin and papers.
- Bites from live prey, which can cause infected wounds. Give the prey dead.
- Salmonella, which can infect humans.

See a vet with experience in reptiles if the animal loses weight, does not eat for several weeks 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.