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MONITOR LIZARDS

Marbled Water Monitor

Varanus marmoratus

Varanus marmoratus is a large, semi-aquatic monitor from northern Luzon and the nearby islands in the Philippines and was formerly a subspecies of *Varanus salvator*. Nothing has been published about the care and breeding of the species, so the guidance cautiously borrows from *V. salvator*.

Family: Varanidae Former name: *Varanus salvator marmoratus*

KEY FACTS

THE ANIMAL

Adult size	**100-196 cm** total length incl. tail
Lifespan	**15-20 years**
Active	**By day**
Lifestyle	**Terrestrial and semi-aquatic**
Habitat	**Rainforest and wetland**
Difficulty	**Expert**

CARE

Min. enclosure	**245 × 185 × 245 cm** L × W × H for 1 adult
Temperature, day	**27-30 °C**
Basking spot	**45-55 °C**
Temperature, night	**24-27 °C**
Humidity	**60-70%**
Water	**Water section** depth 35-50 cm
UVB	**Recommended** Ferguson zone 3
Diet	**Insects, vertebrates and worms/snails**
Kept	**Singly**

BREEDING

Reproduction	**Egg-laying**
Clutch size	**6-18 eggs**
Incubation	**180-210 days** at 30 °C

PROTECTION AND PAPERWORK

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

About the species

Varanus marmoratus is a robust, long-necked monitor of the *Varanus salvator* group, the so-called water monitors. The species was described in 1834 as *Hydrosaurus marmoratus*, and the name means "marbled" in Latin. For most of the 20th century it was regarded as a subspecies of *V. salvator* under the name *V. salvator marmoratus*, and since 2007 it has been treated as a separate species. The taxonomy is still in flux: several of the group's forms are geologically very young, and the populations on the Bicol Peninsula, Polillo and Catanduanes and on Mindoro have since been separated as the distinct species *Varanus dalubhasa* and *Varanus bangonorum*. Older information on *V. marmoratus* therefore partly applies to other species.

The species is distinguished from the other Philippine water monitors by scale counts and pattern. The back is dark grey to black with transverse rows of yellowish spots that are more or less distinct, and a dark stripe runs behind the eye with a light, yellowish stripe below it. The throat is finely dotted and marbled with one or more crossbands at the front, and the belly is whitish with black crossbands. The juveniles are lighter olive-brown and have four to six rows of large, pale spots between the fore and hind legs and distinct bands of yellow spots on the tail. The pattern can dissolve with age, and some animals are partly black. The tail is muscular, triangular in cross-section and more than one and a half times as long as the body.

Males reach up to 196 cm in total and females up to 180 cm. The lower limit of 100 cm in the fact box is an estimate, and the weight is not documented.

Nothing has been published on the care and breeding of this particular species. Everything in the following sections on enclosure, temperature, food and breeding is borrowed from *V. salvator* or is an estimate and is marked as such. Use the figures as a starting point, not as an answer key.

This is an animal you commit to for at least 15 years, if it lives as long as *V. salvator*. It needs a room or a home-built facility, a pool where it can swim, strong heat and large quantities of whole prey. Space, food costs and time are the real limits, not interest in the animal. The species is rare in international trade, and animals that appear may be wild-caught, even if declared as captive-bred.

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

Distribution and habitat

Varanus marmoratus lives only in the Philippines: in the northern part of Luzon and on the island groups of Lubang, Batanes and Babuyan. The species' type locality is given as San Mateo near Manila, and it has been found in many provinces, including Cagayan and Isabela in the north.

Other Philippine water monitors live on other islands and in other parts of Luzon, and they must not be confused with this species, even though they were formerly regarded as the same form: *Varanus dalubhasa* on the Bicol Peninsula, Polillo and Catanduanes, *Varanus bangonorum* on Mindoro and *Varanus cumingi*, *Varanus nuchalis* and *Varanus palawanensis* further south.

The map shows recorded finds. Records from the Bicol Peninsula and other islands may come from the split-off species or from older identifications.

> **Native range:** Philippines.

HABITAT

Varanus marmoratus is an adaptable species found in everything from untouched forest to farmland. In the northern Sierra Madre it has been seen in coastal areas entirely without forest, in agricultural plantations, in scrub, in secondary forest and in remnants of original forest, especially along forest edges, from lowland to mid-elevation areas. It is often seen eating carrion around settlements and on heavily disturbed riverbanks, and it has apparently benefited from human activity.

The climate is tropical, but temperature and humidity have not been measured in the species' habitats. The species is diurnal, lives on the ground and also climbs trees, like *Varanus salvator*. In *V. salvator* burrows are often in riverbanks, and the animals seek water to swim, hunt and flee. It is likely that *V. marmoratus* does the same, but this is not documented.

The species is hunted for meat and skin and caught for the pet trade, often with snares and bamboo traps. The meat is sold at stalls along the main roads, and deforestation can threaten the species locally.

Read more: Humidity, misting and ventilation

Care

THE ENCLOSURE

The dimensions are borrowed from *Varanus salvator*. One adult *Varanus marmoratus* needs at least 245 × 185 × 245 cm (length × width × height). This is a home-built enclosure or a whole room, not an ordinary glass terrarium. A pair needs at least 245 × 245 × 245 cm.

In *V. salvator* the juveniles are about 25 cm at hatching and under good conditions can grow several times their length in a year. A one-year-old needs about 120 × 120 × 120 cm. Plan for the adult size from the beginning, and have the adult facility finished before the animal needs it. A built enclosure of insulated panels holds heat and humidity better than glass.

Furnish with a large water basin where the animal can swim and dive fully under. The water must be changed often unless there is a powerful filter, and the filter intake must not be able to trap the animal. Provide deep, firm substrate to dig in, for example soil mixed with sand, and many hides: hollow logs, boxes and pipes. Water monitors like to climb, so use the height

with strong branches, shelves and logs as basking spots. Live plants are quickly destroyed. All doors must have secure locks, because the animal is strong and finds weaknesses. Lamps and heat sources must be shielded from claws and tail, so that the animal does not burn itself.

TEMPERATURE

The temperatures for *Varanus marmoratus* are borrowed from *Varanus salvator*, which lives close to the equator, where the temperature does not vary much over the year. By day the enclosure must be 27-30 °C, and the basking spot must have a surface temperature of 45-55 °C, measured with an infrared thermometer. There must be a large temperature gradient, so that the animal can choose between a basking spot, moderate warmth and cool shade.

Several spot lamps side by side over a large area warm the whole animal evenly and reduce the risk of burns. At night the temperature may fall a little, to 24-27 °C. An animal with suitable warmth basks for a while, walks around and returns to the basking spot several times a day. If it lies on the basking spot all day, it is too cold, and if it never basks, it is too hot. A winter rest is not necessary for a tropical species.

Read more: Heat and temperature

HUMIDITY AND WATER

Humidity must be around 60-70 %. The figure is borrowed from *Varanus salvator*. Heat combined with a large water area raises humidity by itself, and the substrate in the digging zone must be slightly damp, not wet. Conditions that are too humid, and stagnant, humid air, cause fungal and bacterial skin infections and mould, so good ventilation is just as important as humidity.

WATER AND WATER QUALITY

Like *Varanus salvator*, the species is regarded as semi-aquatic, and a large water area is a prerequisite, not decoration. The basin must be deep enough for the animal to dive completely under, and the 35-50 cm in the fact box is an estimate. Give it an edge or ramp so that the animal can easily get out again. The animal often passes faeces and urine in the water, so the water must be changed often or heavily filtered. A large basin is heavy and requires a solid floor, a drain and a waterproof surface. The animal drinks from the water area, so keep the water clean.

LIGHTING AND UVB

The species is diurnal, basks a great deal and probably needs UVB. The recommendation is borrowed from related, diurnal monitors and is not documented for *Varanus marmoratus*: use UVB for animals with a high basking need (Ferguson zone 3) over a large part of the basking area, and make sure the animal can at the same time withdraw into shade. Combine with powerful heat lamps over the basking spot. Keep the light on for about 12 hours a day all year round, because the species lives close to the equator, and keep the night dark. Place the lamps out of the animal's reach or in strong protection.

Read more: Lighting and UVB

FEEDING

The food is borrowed from *Varanus salvator*. The species is a versatile carnivore: in the wild it takes invertebrates, vertebrates and carrion, and it is often seen eating refuse around settlements. Juveniles live mostly on insects, for example crickets and cockroaches, that are well fed and dusted with calcium and vitamin D3. In the first year they are fed every day or every other day, because they grow a great deal. Gradually they move on to whole prey such as rodents, fish and poultry of suitable size. One-year-olds are fed three to four times a week and adults over two years two to three times a week.

The food must be whole animals, because bones and offal provide calcium and vitamins that meat alone does not. Water monitors rarely say no to food and easily become too fat, and rodents as the only food cause obesity and fatty liver. Alternate therefore between fish, fowl, eggs and rodents, and weigh the animal regularly. The animal must be able to bask after the meal to digest. The cost of food grows with the animal's size and is a significant part of the lifelong expense.

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

BEHAVIOUR AND HANDLING

Nothing is documented about the temperament of *Varanus marmoratus* in captivity, so be prepared for it to behave like other large water monitors. They defend themselves with the tail, claws and jaws. A tail whip can cause nasty injuries, the claws can lacerate deeply, and a bite from a large monitor causes deep wounds that easily become infected. Serious injuries are possible, even from an animal of about a metre.

Wild-caught animals are often nervous and bite, and they need many months to settle in. Captive-bred *Varanus salvator* can become very calm. Taming requires short, calm and positive contacts, repeated often. Approach from below and not from above, because movements over the animal are perceived as threatening, and preferably while it stands in shallow water, where it is calmer. Handling larger animals requires experience, calm, two people and heavy gloves. Small children and other animals must be kept away.

Monitors can carry salmonella. Wash your hands thoroughly after any contact with the animal, water, faeces and food. Keep the animals singly. Pairs can only be kept together in a very large facility with many hides, and they must be followed closely.

Read more: Quarantine and hygiene

Breeding

SEXUAL MATURITY AND SEXING

Nothing is documented about sexual maturity and sexing in *Varanus marmoratus*. In *Varanus salvator* the males are larger than the females, have a more powerful and broader snout and distinct bulges from the hemipenes, while the females are slimmer with a more pointed snout. Sexing is difficult, even for experienced keepers, and often requires a vet. In wild *V. salvator* the males become sexually mature at about 1 m and the females at about 50 cm, but this is not documented for this species.

MATING

Mating has not been described for *Varanus marmoratus*. In wild *Varanus salvator* the breeding season runs from April to October. In captivity well-fed females of *V. salvator* can come into season several times a year, and this can be seen from an increased appetite. When breeding *V. salvator*, ultrasound is used to see when the female's follicles are 15-25 mm, and then the male is put with her. He is removed again after mating, so that she can eat and bask in peace. Pairs require a large facility, and the male can be violent.

EGG-LAYING AND CLUTCHES

The species is egg-laying. Clutch size is not documented for *Varanus marmoratus*. *Varanus salvator* lays 6-18 eggs in captivity, depending on the age and size of the female. The female lays the eggs about 30-45 days after mating, in the wild preferably in rotten logs and stumps. Give her deep substrate of a consistency in which she can dig stable burrows, kept at about 30 °C. She often digs trial holes for several days before choosing a site. If she finds no suitable place, she may retain the eggs.

INCUBATION

Incubation is not documented for *Varanus marmoratus*. The figures here are borrowed from *Varanus salvator*: the eggs are incubated in a plastic box with a damp incubation medium at 30 °C and hatch after 180-210 days, that is, six to seven months. Remove the eggs from the enclosure as soon as they are laid, and do not turn them.

Read more: Incubating eggs

REARING THE YOUNG

Rearing of juveniles has not been described for *Varanus marmoratus*. In *Varanus salvator* the juveniles are about 25 cm at hatching. They live mostly on insects and are fed every day or every other day in the first year. Keep them singly to avoid bites and competition for food. They grow quickly and must be moved up to larger units at regular intervals. Think about where the juveniles will live as adults before the eggs are incubated: a clutch produces many large animals, and it is hard to find homes for them.

Health and common mistakes

Nothing is documented about diseases in *Varanus marmoratus* in captivity. The following applies to *Varanus salvator* and other large monitors:

- Obesity and fatty liver, when rodents become the staple food or the animal is overfed. Obesity shortens life.
- Bone disease from too little UVB, calcium and vitamin D3, especially in young, fast-growing animals.
- Fungal and bacterial infections in the skin in air that is too damp and stagnant.
- Bacterial infection in bite wounds and mouth rot. Clean all wounds, and contact a vet.
- Burns from unshielded heat lamps.

- Parasites and stress, especially in wild-caught animals after transport.
- Salmonella, which can be transmitted to humans.

The species is rare in the international trade: since 2010 only about 30 animals have been recorded, most for research. On the Philippine home market, by contrast, it is the most widely offered and cheapest monitor, because it is common and easy to catch, and the animals there are almost all illegally taken from the wild. Animals that have been exported as captive bred are in some cases suspected of being wild-caught, and smuggled animals of the species have been seized on their way to a large reptile fair in Europe. The species is also protected in the Philippines. Demand documentation of origin, and have a new animal examined for parasites by a vet with experience in reptiles. See a vet if the animal loses weight, refuses food or seems lethargic.

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.