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MONITOR LIZARDS

Biak Emerald Monitor

Varanus kordensis

Varanus kordensis is a slender, green arboreal monitor with a net of dark ring-shaped spots, and it lives only on the island of Biak north of New Guinea. It belongs to a group of tree monitors known to be difficult to keep and breed, and there are almost no detailed husbandry figures for this particular species.

Family: Varanidae Former name: *Monitor kordensis; Varanus prasinus kordensis*

KEY FACTS

THE ANIMAL

Adult size	**70-90 cm** total length incl. tail
Lifespan	**8-15 years**
Active	**By day**
Lifestyle	**Arboreal**
Habitat	**Rainforest**
Difficulty	**Expert**

CARE

Min. enclosure	**120 × 80 × 180 cm** L × W × H for 1 adult
Temperature, day	**24-34 °C**
Basking spot	**45-50 °C**
Temperature, night	**22-25 °C**
Humidity	**75-95%**
UVB	**Recommended** Ferguson zone 2
Diet	**Insects and vertebrates**
Kept	**Singly or in pairs**

BREEDING

Reproduction	**Egg-laying**
Sexually mature	**12-24 months**
Clutch size	**2-5 eggs**
Clutches per year	**1-3**
Incubation	**160-190 days** at 28-30 °C

PROTECTION AND PAPERWORK

CITES	**Appendix II**
EU annex	**Annex B**
IUCN	**Data Deficient (DD)**

About the species

Varanus kordensis is a slender, arboreal monitor with a long tail and strong claws. The tail is well over twice as long as the body, round in cross-section and prehensile in the outer third. The ground colour is yellowish olive-green to dark green, overlaid with a net of dark ring-shaped spots (ocelli) that also cover the legs and tail. This distinguishes it from *Varanus prasinus*, which has transverse dark bands. The throat and belly are light brown, and the nape scales have a distinct keel. In older animals the net pattern may disappear, and in captivity many animals lose the yellow pigment and turn turquoise.

The species reaches 70-90 cm in length including the tail. Snout-vent length and adult weight are not known for the species. The related *Varanus beccarii* measures 26-29 cm from snout to vent and 74-80 cm in total and weighs about 210 g, which gives a rough guide. Lifespan is not known either; 8-15 years is an estimate based on related tree monitors.

The species was described in 1874 and has for long periods been regarded as a subspecies of *V. prasinus* or merged with it altogether. Since 2002 it has been treated as a separate species. Older information on green tree monitors can therefore apply to *V. prasinus*, *V. kordensis* or both. Size, build, behaviour and care requirements are so similar that experience with one species can usually be applied to the other.

The species is shy and nervous, especially wild-caught animals, which can take many months to settle. It is not an animal for cuddling, but for those who want to watch a diurnal climbing animal in a large, well-equipped enclosure.

V. kordensis needs a room or a very tall home-built enclosure, strong heat and light, artificial rain several times a day, live insects all year round and a keeper who can read small signs of illness. The cost of food is modest, but the cost of construction, lamps and vet care is not. There is little experience with the species, and animals in the trade are often wild-caught.

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

Distribution and habitat

Varanus kordensis is found only on Biak in the Schouten Islands, an island in Cenderawasih Bay north of New Guinea in the Indonesian province of Papua. The type locality is Biak, written "Kordo" or "Mysore" in the older literature. The species is the only green tree monitor in its group that lives on an island off New Guinea, and the island is small, so it is one of the most geographically restricted in the group.

Whether the species is also found on the neighbouring islands in the Schouten group is not documented. The map shows only Biak. Records outside Biak may come from captive animals or misidentified animals of *Varanus prasinus*.

> **Native range:** Indonesia.

HABITAT

Varanus kordensis lives in the tropical rainforest on Biak, where it stays in the tree canopy and rarely comes down to the ground. How high it lives, its microhabitat and daily rhythm, and the temperatures and humidity levels it meets in the wild are not known.

The related *Varanus prasinus* eats large arboreal arthropods such as grasshoppers, katydids, stick insects, cockroaches and beetles, and the females lay their eggs in termite nests up in the trees. This has not been seen in *V. kordensis*, but it is a reasonable starting point for furnishing the enclosure. The climate on an island at the equator is warm and humid all year. On the Aru Islands, where *Varanus beccarii* lives, the temperature is about 25 °C at night and 31 °C by day, and about 2,000 mm of rain falls a year.

Read more: Humidity, misting and ventilation

Care

THE ENCLOSURE

Care of *Varanus kordensis* is almost the same as for the other green tree monitors: a large, tall enclosure with many hides, thick branches and cork tubes. The figures in this section are borrowed from the closely related *Varanus beccarii*. One adult needs at least 120 × 80 × 180 cm (length × width × height), and larger is better. A breeding pair needs at least 160 × 120 × 180 cm, preferably built from waterproof plywood. A juvenile is moved to about 80 × 60 × 110 cm when it becomes so active that it needs more space. Height is more important than floor area, and the animals use the whole space.

Line the back wall and sides with cork panels. Fit thick branches at many heights and angles, and let some hang freely, so that the animal has to coordinate its movements when climbing. Drill holes of different sizes in some of the branches and fill them with small pieces of food, so that the animal has to fish the food out. Make several closed hides at the top and some boxes with leaf litter where the animal can sleep and lay eggs.

A 5-15 cm layer of forest soil with dead oak leaves works as substrate. Live plants such as monstera, ficus, bromeliads and pothos provide cover and hold moisture. A heated water basin about 15 cm deep helps to keep humidity up. The species does not dig and does not need deep substrate. The animals are fast and can slip past an open door, so make double doors or an airlock, and shield all lamps and heat sources with mesh, so that the animal cannot burn itself. Ventilation must be good, preferably with an opening at the bottom and one at the top.

TEMPERATURE

The temperatures are borrowed from *Varanus beccarii* and are a cautious starting point for *Varanus kordensis*. By day the temperature must be 24-34 °C and at night 22-25 °C. The surface temperature of the basking spots must be 45-50 °C. Measure it with an IR thermometer, not as air temperature. There must be a large temperature gradient, so that the animal can choose

between warm branches at the top and cooler, shaded zones below.

Use several spot lamps or metal halide lamps over the uppermost branches, and place the basking spots so that the animal can withdraw from the heat when it wants. All lamps must sit behind mesh. Measure with a digital thermometer at the top and the bottom, and check the surface of the basking spot with the IR thermometer every time the setup has been changed.

Read more: Heat and temperature

HUMIDITY AND WATER

Humidity must be high, about 75-95 %, and should not fall below 75 %. Dry conditions cause dehydration and problems with shedding. Automatic misting six times a day for one minute at a time and a heated water basin at about 27 °C keep humidity at 75-95 %, without the substrate becoming constantly wet.

Tree monitors drink droplets from leaves and walls and can also drink from the basin. Mist so heavily that droplets form on the leaves. Let the substrate and the uppermost branches dry a little between mistings, so that mould and fungus do not develop. A hygrometer at the top and one at the bottom show whether humidity holds around the clock.

LIGHTING AND UVB

Varanus kordensis is diurnal and basks in the tree canopy. The need for UVB is not known for the species, but UVB is recommended. An enclosure for a pair can be lit with two 75 W and one 150 W metal halide lamp (HQI) and two halogen spots. Use a UVB source that covers the uppermost branches, for example a powerful metal halide lamp with UV or a high-output tube, and reckon on Ferguson zone 2 as a cautious starting point. There must always be shade, so that the animal can withdraw from the light.

Replace the light sources according to the manufacturer's instructions, because the UV output falls over time. Keep the light on for about 12 hours a day and dark at night. Measure the UV index if possible, and adjust the distance to the branches accordingly.

Read more: Lighting and UVB

FEEDING

Varanus kordensis lives mostly on insects. In captivity the staple diet consists of crickets, cockroaches, grasshoppers and eggs, and chicken, meat, prawns and rodents are given only occasionally. The related *Varanus prasinus* lives in the wild on large arboreal arthropods. More than 90 % of the food should be insects (dubia cockroaches, rose chafer larvae, zophobas larvae and others), and the rest can be fish, chicken and snake eggs, day-old chicks and a little meat now and then. Rodents as the staple food easily cause obesity and do not correspond to the species' natural food.

An adult should be given 10-20 g of food a week divided over one to two feedings. Release the food in the enclosure if you like, or hide it in drilled branches, so that the animal has to hunt and search for it. Calcium (calcium citrate) and a supplement of vitamins and minerals are dusted on the food, and the insects must be well fed before they are passed on. A few animals take a little fruit, but fruit is not necessary.

Juveniles of green tree monitors may refuse food for up to two weeks after hatching and sometimes longer, and some take only flies at first. A mashed mixture of eggs, insects and a little banana or spinach, baked in a microwave, can be used as a supplement.

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

BEHAVIOUR AND HANDLING

Varanus kordensis is so small that a bite is rarely serious, but the claws are sharp and can cause deep tears, and the tail is used for gripping, not for whipping. The animals are fast and shy and prefer to flee rather than bite. Handle the animal only when necessary, for example for a vet visit or a move, and never grab the tail. Wild-caught and stressed animals bite more often. Use gloves if necessary.

Taming is rarely more than getting used to people being in the room. Wash your hands thoroughly after all contact with the animal, enclosure and food, because reptiles can carry salmonella, and keep the enclosure away from the kitchen and from small children.

Social housing is not known for the species. In *Varanus beccarii* the male chases the female violently during mating, so a pair needs a large enclosure with a sliding partition, so that the animals can be separated. Keep the animals singly, and put a pair together only if the enclosure is very large, has many visual barriers and can be divided completely. It can take months before

a new animal eats calmly and shows itself.

Read more: Quarantine and hygiene

Breeding

SEXUAL MATURITY AND SEXING

Sex differences and sexing are not known for *Varanus kordensis*. *Varanus prasinus* is sexually mature after about a year, and 12-24 months is a reasonable starting point. Adult breeding animals of *Varanus beccarii* are 26-29 cm from snout to vent and weigh 210-214 g. The animals should be fully grown and in good condition before they are put together. The sex is most reliably determined by a vet with reptile experience.

MATING

Varanus kordensis was first bred in captivity in 2002, and mating is only sparsely described. In *Varanus beccarii* the male is put together with the female after four weeks of quarantine. The male chases the female violently, and mating lasts about two hours. Separate the animals if the chase becomes too violent. A winter rest is not known in the species and should not be given.

EGG-LAYING AND CLUTCHES

Varanus kordensis lays 2-5 eggs 25-40 days after mating, and the female can lay several times a year. *Varanus prasinus* lays up to three clutches a year, and the eggs weigh about 11 g. Give the female at least three boxes of damp leaf litter or soil, so that she can lay eggs without having to dig in the substrate. Some females instead bury the eggs in damp substrate by the water basin. The female must be well fed and free of parasites, because poor condition produces weak eggs.

INCUBATION

The eggs of *Varanus kordensis* hatch after 160-175 days at about 30 °C on damp substrate and after 190 days at 28-29 °C. Place them in vermiculite, moistened 1:2 by weight, at 30 °C and about 95 % humidity in the boxes. Dead, fully developed foetuses are a known problem in the group, and a juvenile may need help getting out of the egg after a good 160 days.

The eggs must not be turned. Mark the top with a pencil, and place them in a box with small air holes. Possible causes of the losses are too high humidity in the last third of incubation, shells that are too thick and a lack of vitamins and minerals in the female. Keep the humidity moderate at the end of incubation, and air the box.

Read more: Incubating eggs

REARING THE YOUNG

Rearing *Varanus kordensis* is similar to rearing *Varanus beccarii*: a newly hatched juvenile measures about 19 cm in total and weighs 8 g, at 6 weeks 23 cm and 10 g, and after 21 weeks 27 cm and 14 g. The juveniles may refuse food for a month and then have to be force-fed. At first they often take only flies, and after about five months they take live dubia cockroaches.

Keep the juveniles singly in a small, damp enclosure with thin branches, plants and kitchen paper or sphagnum, and mist them directly, so that they drink. Move them to a larger enclosure when they become active, and contact a vet if a juvenile does not gain weight.

Health and common mistakes

Animals in the trade are most often wild-caught or so-called farmed animals from Indonesia and often have many intestinal parasites such as roundworms, tapeworms, protozoa and amoebae. The stress of captivity makes the parasites multiply and can cause loss of appetite, lethargy and failure to thrive. Have a faecal sample examined by a vet with reptile experience before the animal is put in its final enclosure, and treat according to the result. The trade in tree monitors from small islands is not regarded as sustainable, because the populations are small. Preferably buy captive-bred animals.

Typical faults and diseases:

- Humidity that is too low, which causes dehydration and problems with shedding. Keep the humidity above 75 %, and mist several times a day.
- Stress, nervousness and loss of appetite in wild-caught animals. They need peace, many hides and fixed routines.
- Too little calcium and vitamins for the females, which produces weak eggs and dead foetuses.

- Dead, fully developed foetuses when humidity and temperature during incubation are not right.
- Weak juveniles that eat poorly and must be weighed regularly.
- Bacterial infections, for example atypical mycobacteria, which can affect even animals that are thriving.
- Salmonella. Wash your hands, and do not use kitchen utensils for the enclosure.

See a vet if the animal loses weight, refuses food for more than two weeks or has sunken eyes, dry skin or difficulty breathing.

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.