TRANSLATIONS

Biawak. 2008. 2(2): 89-94

Moldovan, D. 2007. Haltung und Zucht von *Varanus* (*Odatria*) *similis* Mertens, 1958. Sauria 29(3): 21-26.

Husbandry and Captive Reproduction of *Varanus (Odatria) similis*, Mertens, 1958

DANIEL MOLDOVAN
Martin-Boyken-Ring 9
D-31141 Hildesheim, Germany
webmaster@baumwarane.de
http://www.baumwarane.de

Abstract - Following a brief general overview of the *Varanus timorensis* complex, the husbandry conditions, behavior, diet, breeding and the raising of juveniles of *V. similis* are described in detail.

Key words: Reptilia: Squamata: Varanidae: *Varanus similis* Mertens 1958: captive care, behavior, breeding, rearing

Introduction

Varanus similis with its related species *V. scalaris*, *V. auffenbergi* and *V. timorensis* presently forms the so-called *timorensis*-complex within the subgenus *Odatria*. Different analyses conducted by several authors trying to emphasize the relationships between the species have not led to a clear, distinct difference. Mertens (1958) first described *V. similis* as a subspecies of *V. timorensis*. Due to a different morphology of the hemipenes, Branch (1982), Böhme (1988) and also Ziegler and Böhme (1997) concluded that *V. similis* cannot be accepted as a synonym of *V. timorensis*. Nevertheless, the demarcation between *V. similis* and *V. scalaris* (Mertens 1941) is still not clear (Böhme 2003). Mertens (1958) doubted that there were enough reasons to justify two (sub-) species names because the two species only differ in a few ways. Storr (1980) considered *V. similis* to be a synonym of *V. scalaris*. Following this reasoning, Wilson and Knowles (1988) did not accept the taxon *V. similis* either and considered at least all Australian populations to be variations of *V. scalaris*. In 1999, Sprackland described *V. auffenbergi* and thereby revived new discussions about the diversity of this species complex. For example, the magnificent "leopard-*timorensis*" from the island of Kisar (NE of Timor) still waits to be explored and described.

Actually, the species complex is still far away from taxonomic clarity. It can only be hoped, that future herpetological investigations on the Indo-Australian archipelago will benefit scientific examination of the relationships and will hopefully result in a complete revision of the entire *timorensis*-complex.

Acquisition, Size, Sexual dimorphism

The author´s pair of *V. similis* was purchased in 2004, aged 2 years. The animals are German captive

born specimens and presently have a total length of 50 cm (male) and 45 cm (female). Male and female could only be distinguished between by the larger size of the male and its wider skull and stronger neck. Post-cloacal spurs are missing; differences in color, pattern, nor prominent hemipenal bulges can be used to distinguish the sex.

Housing

The pair of *V. similis* was housed in a tall terrarium measuring 1 x 1 x 2 m (l x w x h). Though this enclosure may be a little bit oversized, dimensions of 80 x 80 x 130 cm (l x w x h) should be regarded as minimum. The terrarium was furnished with some hollow cork tubes as shelters, which the animals preferred to stay in, and the rear walls were covered with pieces of natural cork, which they could use for climbing. Ground substrate was a 5 cm layer of pine bark, mixed with potting soil. The enclosure was planted with a large *Yucca* and several *Philodendron* in pots, and some plastic plants. It was illuminated with one 150 Watt HQI flooder type daylight (5000° Kelvin), and a hotspot with a 150 Watt halogen spotlight, which was directed at a branch. An additional ReptiGlo 8.0 UVB ® (HAGEN GmbH u. Co KG, Holm , Germany) fluorescent tube mounted 30 cm above a favorite resting spot provided a permanent supply of UV light, complemented by a fixed-installation UV flooder OSRAM Ultravitalux ® (OSRAM GmbH, Munich, Germany) of 300 Watts, which was switched on manually every day for ca. 20 min. An under-floor heating cable (20 Watt) was used to increase humidity by heating the ground substrate moderately. The temperatures varied from 30° C in the upper stories to 25° C on the ground. The hotspot provided a local temperature of 40° C for basking. A wooden nest box, usually used for nesting lovebirds, was filled with half potting soil and half sand, and fixed to the rear wall in the upper story of the terrarium. This was a proper nesting place which was used by the female each breeding season without any problems. In general, only successful experiences have resulted from using appropriately dimensioned wooden nest boxes for all my tree dwelling monitors. Nevertheless, equivalent boxes placed on the ground might fulfill the same purpose of course, if a temperature of at least 27° C can be provided. It is good advice to provide at least several nest boxes at different locations from which the female can choose from, though *V. similis* does not seem to be very particular about nest sites, as also described by Berghof (2001). A daily misting in the evening provided a relative humidity level of 60-80%. During the dry season, between November and January, misting was decreased. A water bowl with fresh water completed the furnishings.

Behavior

It is a great concern of mine that people do away with the preconception many adhere to that this species complex is extraordinarily shy. Generally, shyness is an attribute of all wild-caught monitor lizards. To understand their initial shyness in captivity, you need to observe their biology in the wild. All species of the *timorensis*-complex are medium-sized tree dwellers, preferring hollow tree trunks and niches to live in, and they are ambush hunters, not active foragers as is the case with *V. tristis*. Because of this fact, wild-caught specimens are not extraordinarily shy when first housed in captivity; they are just behaving naturally. Additionally, they react to a threat (humans) in their natural manner - they flee or hide until the presumed predator has passed.

This natural behavior is wrongly characterized as `shyness` and wrongly compared to supposed ‘tame’ *Odatria* such as *V. tristis*, but in fact it’s not that easy because most *V. tristis* are captive born and are therefore used to captivity (i.e. tameness in monitors to me means that a monitor lizard does not constantly try to flee when observed, and even takes food from forceps). In my opinion, their shyness and flightiness would be same as in *V. timorensis* or *V. auffenbergi*, the only *Odatria* species which can presently be purchased as wild-caughts. Even *V. timorensis* can almost be as ‘tame’, visible, and active as

other monitor lizards, and furthermore, captive-born specimens were as confiding as any other captive born *Odatria* specimen **(**Hutter, 2007**,** *pers. report*).

If you are a beginner, it is strongly advised to obtain captive-born specimens. Wild-caught animals will disappoint your expectations of a usually visible monitor lizard which can proudly be shown to visitors. Do not prevent their natural behavior by removing their hiding places. If you do, keeping reptiles might be absolutely wrong for you.

My pair of *V. similis* leave their hiding places every morning to bask, showing absolutely no shyness. They have even become quite aggressive when fed, jumping towards the forceps to get to the feeder insect right away!

Diet

The animals accept all common types of feeder insects and are not dainty with food, taking nearly everything offered. They were mainly fed roaches (*Blaptica dubia, Blaberus atropus*) of adequate size, which are bred by me. Locusts were a welcomed variation of prey, and desert locusts (*Schistocerca gregaria*) were more popular than migrating locusts (*Locusta migratoria*) and were pursued with greediness and pertinacity. In particular, when the locusts flapped their wings, this would trigger an extraordinary feeding response. To provoke this wing-flapping, the locust had to be held with forceps by its abdomen, and it would more or less instantly begin to flap its wings. Adult male roaches of *B. dubia* with fully developed wings had the same effect on feeding response.

Occasional feedings with pinky mice, smelt, and mussel meat complemented the diet and were especially fed to the gravid female. Any offered food was dusted with a multi-vitamin, multi-mineral supplement called Korvimin ZVT+Reptil ® (WDT eG, Garbsen, Germany). Once a week each specimen got a single feeder insect or pinky mouse which was prepared with one drop of a liquid vitamin supplement called Multi-Bio-Weyxin ® (Veyx Pharma GmbH, Schwarzenborn, Germany). Therefore, the animals were considered to have been provided with sufficient vitamins and minerals. Neither the male nor the female showed any signs of deficiencies.

Because *V. similis* is an opportunistic feeder, it is absolutely necessary to observe and regulate the individual food intake to avoid obesity.

Varanus similis is not an active forager like *V. tristis*; most of the time, it lies in wait for a feeder insect. Short breaks in feeding and subsequently given locusts were a great allure to the monitors, who couldn´t wait to pursue them head over heels!

Gravid females should be fed more protein and sufficient vitamins and minerals to produce well-supplied eggs for the long incubation period. Nevertheless, it is important to keep the vitamin and mineral supplement application rates documented. An easy way to supplement calcium is to prepare pinky mice with little pieces of *Sepia* valve. My female *V. similis* appreciated this high quality diet with two record clutch sizes of 15 fertile eggs in 2005 and 18 fertile eggs in 2006; this confirmed that the male was in good health. A 100% hatch rate with strong and perfect hatchlings also indicated that the diet was adequate.

Mating, Gravidity, Oviposition

The animals mated each year in the same season. During the dry season, from November through January, the animals were less active and highly secretive. Though the photoperiod and temperature were unchanged, the average temperatures (summer 30-35°C, winter 25-28°C) correlated with indoor temperatures in the occasionally heated room where the enclosure was placed. In February, when the subsequent rainy season was initiated, the misting was intensified and the animals were fed more and began to become more active through the day. After 4-5 weeks, in around mid-March, mostly in the

evenings, the male was observed continuously pursuing the female through the terrarium, intensively checking the female with its tongue and scratching on the female's back to stimulate her to lift her tail. Mating was suspected to have taken place in the cork tubes, because it was not yet observed. Nevertheless, a successful mating can easily be determined by an increasing appetite and growing girth of the female. Depending on clutch size, oviposition took place after 4-6 weeks, mainly at night in the prepared rear wall nest box. Shortly before oviposition, the hip bones could be seen through the skin, which is in my opinion, a good indicator not only that the egg development phase is finished, but also of the short amount of time before oviposition. The eggs were buried deep in the substrate, with the nest covered with great care. After oviposition, the female needed to be fed the same quality and quantity diet as during gravidity to recover. The male was left in the terrarium during the entire time of gravidity, oviposition, as well as after oviposition, and no agonistic behavior by the female could be observed.

Clutch sizes cited in literature lie between 3-6 eggs (Eidenmüller and Wicker, 1991), 11 eggs (Lambertz, 1994) and 12 eggs (Berghof, 2001). The clutch sizes of 15 and 18 eggs reported in this article may be an exception and are considerably larger than the ones achieved by specimens living in the wild.

Incubation

After oviposition, the entire nest box was removed from the terrarium to recover the eggs. This is regarded as very useful, as the eggs can be removed without any disturbance and without having to work in small areas or confines, half inside and half outside the terrarium. The clutch was moved into a prepared Bruja FB 300 Rep ® (*Janeschitz GmbH, Hammelburg, Germany*) reptile incubator at temperatures between 28-29° C. The incubator should already be tested a few days before estimated oviposition. The eggs were placed in groups of 3-4 in plastic freezer boxes, only half-buried in moist Perlite ® to improve controlling possible variation in conditions. To provide the best humidity, the boxes were sealed after being prepared with ventilation holes. These little boxes maintained a stable microclimate. Even if the incubator was opened to examine the eggs from time to time for a few minutes, the temperature and humidity would not decrease as fast as if the eggs were incubated in open boxes.

The reason for only half-burying the eggs was to make signs of egg infertility visible, which can't be ascertained if the egg is completely buried. Eggs react to over-moistening (sweating) and to a substrate running dry (denting egg shell); therefore, the keeper at least has a chance to improve incubation parameters more quickly than in the worst case, only seeing the results (rotten egg) if something went wrong. An egg completely buried in an over-moistened substrate will even rupture due to an abnormal intake of water, and the embryo may even drown. The keeper has no chance to react or even recognize this; on the other hand, an egg only half-buried will begin to sweat and may even be recognized by its unusual growth, so the keeper has at least some chance of preventing the death of the embryo. The time leading up to an egg drying out is longer. An egg placed in too dry a substrate at an adequate depth will also show signs of drying out by developing recesses or dents in the shell.

In my opinion, monitor lizard eggs are more sensitive to excessive moisture than to a temporary relative dryness. Accidental damage to eggs exposed to an over-moistened substrate is irreversible in most cases; on the other hand, most eggs which suffer from a dry substrate should be able to be rescued. However, both extremes should be avoided if possible.

After 2-3 weeks, the substrate in the freezer boxes was remoistened moderately by dripping water into the furthest corners of the boxes. It is absolutely important to avoid direct contact with the eggs. On the other hand, it is not even necessary to get the water as close as possible to the egg, because capillary action and the evaporation within the box will do this much better than the keeper could.

The little monitor lizards emerged from their eggs after an incubation period of 120-136 days. Initially, only the noses stuck out of the eggs, but all animals hatched within 24 h of slitting their egg shells, without

any yolk sacs remaining. Hatchlings should be removed from the incubation container as soon as possible, sooner if eggs are incubated in groups, because it is possible that the hatchlings could disturb their unhatched siblings or even shift the remaining eggs out of their correct position, which may result in late term death of a viable egg, e.g., if the egg is turned upside down. For this reason, it is advisable to mark the tops of the eggs with a cross or something similar to be able to determine their original position. Therefore, the best choice would be to incubate each egg individually, though this may cause spatial problems in conventional incubators.

Raising

The hatchlings were raised in a separate glass terrarium measuring 60 x 30 x 30 cm (l x w x h) for the first 6 months. It was furnished with some cork tubes, a shallow water bowl, heated by a 40 Watt halogen spotlight, and additionally illuminated by a 18 Watt ReptiGlo 5.0 UVB ® (HAGEN GmbH u. Co. KG, Holm, Germany) UV fluorescent tube, which was placed in the terrarium for UV. Initially, the terrarium floor was only covered with paper towels until the umbilicus was healed to prevent infections.

By day 4, the little monitors had already fed on small crickets, roaches and little pieces of smelt and pinky mice from forceps. They quickly developed the same greediness for food as their parents. It was quite a challenge to control 15-18 greedy babies. Therefore it became necessary to split the group to help control individual feeding. Their food was also dusted with Korvimin ZVT+Reptil ®.

The further raising of the F1 generation *V. similis* proceeded without any problems. If fed properly, the small monitor lizards may reach sexual maturity at 2 years of age.

Results

Varanus similis is an undemanding, appreciative species of moderate size, which can be kept and bred quite easily. Therefore, in my opinion, it is an alternative tree-dwelling equivalent to the popular ground dweller *V. acanthurus*.

Literature Cited

Böhme, W. 1988. Zur Genitalmorphologie der Sauria: Funktionelle und stammesgeschichtliche Aspekte. Bonner Zoologische Monographien 27: 1-176.

Böhme, W. 2003. Checklist of the living monitor lizards of the world (family Varanidae). Zoologische Verhandelingen, Leiden 341: 3-43.

Branch, W.R. 1982. Hemipeneal Morphology of Platynotan Lizards. Journal of Herpetology 16(1): 16-38.

Berghof, H.-P. 2001. Die Pflege und Vermehrung des kleinen neuguineischen Baumwarans *Varanus (Odatria) similis* Mertens 1958. Herpetofauna, Weinstadt 23(135): 5-13.

Eidenmüller, B. and R. Wicker 1991. Einige Beobachtungen bei der Pflege und Nachzucht von *Varanus (Odatria) timorensis similis* Mertens 1958. Salamandra 27(3): 187-193.

Lambertz, K. 1994. Haltung und Zucht von *Varanus similis*. Elaphe 2(2): 16-17.

Mertens, R. 1941. Zwei neue Warane des australischen Faunengebietes. Senckenbergiana Biologica 23(4/6): 266-272.

Mertens, R. 1958. Bemerkungen über die Warane Australiens. Senckenbergiana Biologica 47: 229-293.

Sprackland, R.G. 1999. A new species of monitor (Squamata: Varanidae) from Indonesia. Reptile Hobbyist 4(6): 20-27.

Storr, G.M. 1980. The monitor lizards of Western Australia. Records of the Western Australian Museum 8(2): 237-293.

Wilson, S.K. and D.G. Knowles. 1988. Australia´s Reptiles. William Collins Pty., Sydney.

Ziegler, T. and W. Böhme. 1997. Genitalstrukturen und Paarungsbiologie bei squamaten Reptilien, speziell den Platynota, mit Bemerkungen zur Systematik. Mertensiella 8: 1-210.

Captions for figures in original article

Fig. 1: Breeding pair of *Varanus similis*
Fig. 2: Male *Varanus similis*
Fig. 3: Terrarium for the breeding pair of *Varanus similis*
Fig. 4: Juvenile upon emerging from its egg
Fig. 5: Juveniles of a few weeks old in the raise-up terrarium
Fig. 6: Juveniles basking in the terrarium