Breeding the Spiny-tail Monitor (*Varanus acanthurus* Boulenger)

by
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Varanus acanthurus is a widespread species of Australian dwarf monitor lizard. This diurnal saurian varies considerably in color and size, with the largest specimens in the northwest. Several subspecies have been described, though Storr, in a 1980 review of western Australian varanids, recognised only the nominate form. Nevertheless, *Varanus baritji* has been mistaken for *V. acanthurus* (in Swanson's book, *Lizards of Australia*), and it seems likely that several subspecies or species may eventually need formal recognition.

There is little published information available on reproduction in spiny-tail monitors, or ridge-tailed monitors as they are sometimes called by the Australians, though Frankfurt Zoo has been successful in reproducing the species. I believe this article is the first published report of double clutching in *V. acanthurus*. The grandparents of my animals came to Germany in 1983. They were taken near Mt. Isa, Queensland. The animals first reproduced in the zoo in 1983, and offspring were distributed to other German zoos. By 1989, the original zoo had produced offspring to the F3 generation, and my lizards came from those. From the zoo, I obtained two males that hatched on 2-3 June 1989, and from a private breeder I got a female that hatched on 12 August 1989; all animals had CITES documentation, and all measured 5.5-5.9 inches (14-15 cm) total length on arrival.

During the first four months in my care, all three animals were housed together in a 11.8 X 11.8 inch (30 X 30 cm) vivarium and kept at a daytime temperature of 90° F (32° C). The lizards were later relocated into an 31.5 X 11.8 inch (80 X 30 cm) vivarium. The cage had two inches of clean sand substrate and was provided with rocks, a large log, and flat pieces of slate arranged in stacks, providing cover for the lizards. The rear and two side walls of the enclosure were covered with thin sheets of bark, providing more climbing surfaces. Daytime temperature ranged from 79-104° F (26-40° C), and nighttime lows from 60-68° F (16-20° C) in the summer, 57-63° F (14-17° C) in winter. Heat was provided by a heating pad under the cage, and by lamps above the enclosure. Ultraviolet light is provided by a UV lamp for 10-15 minutes, twice weekly. Access to the vivarium is by a sliding front panel of glass, and half the front is made of fine wire. This allows both better ventilation in the cage and allows the lizards to benefit from 2.5 hrs of direct sunlight entering the room each day.

The young lizards were fed small crickets that had been fed on greens and vitamins for several days. Waxworms were refused. Mineral supplements, especially calcium and Nekton-Rep® vitamin mixture, were added to each feeding. Lizards are briefly sprayed with luke-warm water each morning, and a water dish is provided every third day. Vitamins B and multicomplex vitamins are always added to the water.

At three months, the lizards measured about 7.5-7.9 inches (19-20 cm) and began accepting pink mice twice a week and large insects 2-3 times per week. In May 1990, the lizards were again moved into larger quarters, measuring 47 X 19.7 X 19.7 inches (120 X 50 X 50 cm). The cage is heated by a 20 watt, 6 X 7.8 inch (15 X 40 cm) plate, a 50 watt mercury and 100 watt incandescent lamps and kept between 82-105° F (28-41° C) by day, and 57-63° F (14-18° C) at night. Humidity is kept at 50-65%. The lizards are fed insects and one mouse each, twice a week, three weeks per month.

Lizards more than one year old can be sexed by visual inspection of the region lateral to the vent. Males have distinct, enlarged spines in this area, while these are absent or very tiny in females.

During the first winter, I did not allow conditions for hibernation, but reduced the light cycle from 14.5 hr to 8 hr and left the heat plate on for 14 hr. When the lizards were moved to the large vivarium, they began with a 12 hr light cycle, which was increased 30 min every two weeks, to a maximum of 14.5 hr in August.

By October 1990, the animals measured about 15-15.7 inches (38-40 cm). During the second winter, I changed conditions to induce hibernation from late October 1990 until February 1991. The 100 watt lamp was replaced with a 60 watt bulb, and the heat plate under the vivarium was turned off. Daylight was gradually reduced to 6.5 hr in December, then increased again to 12 hr in February, 14.5 hr in April. Feeding was reduced to once weekly, three weeks per month.

Activity was greatly reduced through December, and the female generally hid except when feeding. I increased the amount of food offered as the light cycle increased, and by January 10 the males began engaging in frequent ritual combat. By late February, combat bouts virtually halted, and on January 26 the female became active. On March 1, intense mating occured and continued with the female and both males through March 3. After March 7, the female resumed hiding and only reemerged to feed during March 7-19. By March 19, it was obvious that she was gravid. I examined her by hand and could clearly see three eggs through the ventral

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skin. At this time, I removed the males from the cage and added a 11.8 X 4.7 X 4.7 inch (30 X 12 X 12 cm) box of wet sand into the large vivarium. The sand was moistened daily, and the container was sunk into the substrate so the surface of the moist sand was flush with the drier cage sand. A large piece of shale, supported by stones, was positioned over the moist sand. A heat tape kept the box warm at night; by day, the lamp provided heat.

On March 26, the female refused food, and on March 29, at 6:30 a.m., three eggs were found: two in the sandbox, and one on top of the sand, under the shale. The top egg was dented, another was adhering to the bottom of the box. All were gently removed to an incubator. Eggs were kept in moist vermiculite at 80-83° F (27-28.5° C) and 65-85% humidity. The dented egg expanded by the end of the day, but by 11 April it became yellow, soft, and smelly. It was removed from the incubator, opened, and proved to be infertile. On May 5, my younger daughter accidentally turned one of the eggs, and on May 12 that egg split and spilled fluid. Upon opening the egg, I discovered a well-developed, dead embryo. The remaining egg was white and continued to grow.

At 4:30 p.m. on July 17, in response to its appearance, the egg was slit and the tip of a nose and actively flickering tongue were visible. By 11:00 p.m., the entire head was exposed, but by 12:00 a.m. had withdrawn back into the egg. By 6:30 p.m. on July 18, the baby had fully emerged from the egg. Incubation was 111 days, and the neonate had the following measurements (in mm): TL=135, SVL=60. The baby was then housed in the same vivarium that had originally been used for the parents when they were juveniles. The baby began accepting small crickets on July 20 and was growing rapidly. On July 25, it measured 5.9 inches (150 mm), and by September 1, it was 6. 9 inches (175 mm).

Meanwhile, after egg deposition the female resumed normal feeding, and on April 4 the two males were returned to the large vivarium with her. On April 14, copulation was again observed, the female mating with both males. By April 17, the female was again obviously gravid, and the males were placed in a separate vivarium. On May 5, the female was observed to excavate sand from the laying box, but not refill the box. On May 7, she again went off feed, and again laid eggs three days later. Digging was seen at 9:30 a.m. on May 10, and by 6:30 p.m., four eggs had been laid and buried. The female looked very thin after laying this second clutch.

The female resumed feeding and quickly regained weight, so on May 26 the males were returned to her vivarium. Within 30 minutes, ritual combat and mating had resumed, and by June 14 the female again appeared gravid. She dug in the moist sand, but laid no eggs. On July 13, I gave her an injection of oxytocin to induce laying, but no eggs came.

The four eggs were incubated as per the first clutch. On August 28, 1991, one egg was noticably dented. Humidity in the incubator was 70% and 3-4 cc water was added to the vermiculite. By 7:00 p.m., two more eggs were similarly dented, and 10-12 cc water was added to the vermiculite. By 12:00 a.m., the humidity was 85%, and one egg had fully reformed. The next day only one egg was still badly dented, and this was removed and incubated separately from the other eggs. At 9:00 p.m. on the 29th, I slit the dented egg and saw an embryo that seemed due in about three weeks.

On September 2, the slit in the egg had begun "healing," and the egg appeared less dented with each day. On September 6, I observed numerous tiny lumps visible on each of the other three eggs, and these were interpreted as exploratory pokes with the egg tooth. At 10:55 a.m. on September 6, the slightly dented egg was slit, and the head of the young monitor was exposed, tongue flicking. At 8:45 p.m. on September 7, the first baby of the second clutch was completely hatched, 120 days after laying. It had a TL of 5.3 inches (135 mm) and weighed 3.5 gm. The belly retained a 0.2 inch slit. The neonate was removed to a 11.8 X 11.8 inch (30 X 30 cm) vivarium with paper towel substrate and an egg-carton for hiding. The baby assumed a position half-coiled, on its side, keeping the belly off the ground, and appeared to go to sleep.

The second egg of the second clutch was slightly slit on the evening of the 7th, and by 8:30 a.m. on September 8, the head of the final baby was protruding from its egg. By 8:45 a.m., the second egg was slit further, but below the spot observed the night before, so that the head of the monitor was emerging from beneath the egg. By 1610, the second baby was fully hatched (TL=5.1 inches [130 mm], 3.5 gm), and at 8:15 p.m. the third baby emerged (TL=5.7 inches [145 mm], 3.9 gm).

On September 11, I gently squeezed the final egg (that I had slit earlier), and bloody fluid came out. On the 14th, I opened the egg and found a dead, nearly fully developed embryo. This animal has subsequently been preserved and will be deposited in a museum. On that same day, the babies of the second clutch began feeding on young crickets, and the lone juvenile from the first clutch accepted part of a pink mouse. All the juveniles are doing well, and, if they grow at a rate similar to that of their parents, they should be large enough to reproduce by 1993.

Editor's Note: *Rainer Thissen is an experienced private German reptile breeder and is currently the treasurer for Deutsche Gesellschaft für Herpetologie und Terrarienkunde (DGHT), the Society which publishes the journal Salamandra.*

Literature Cited

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