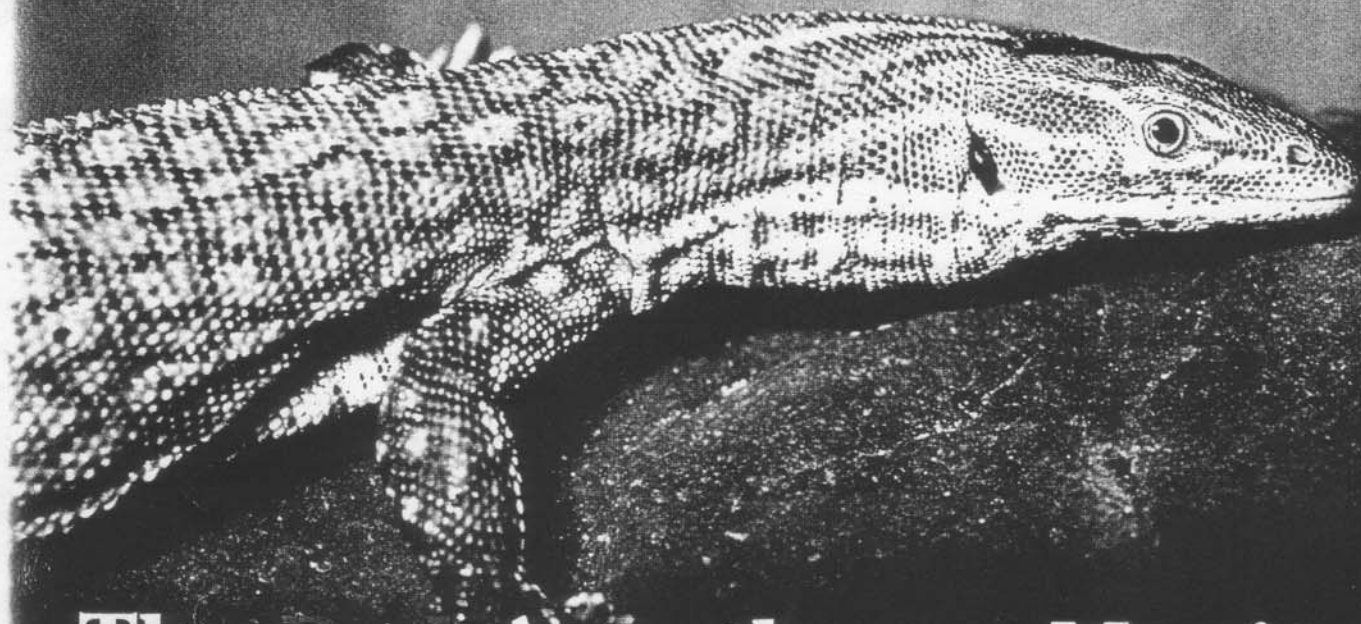


Husbandry and Captive Breeding of



The Red Acanthurus Monitor

Varanus acanthurus

A Giant Dwarf

by Peter Kuhn, with Justin Julander. Photos by Jeff Lemm

Varanus acanthurus, commonly known as the spiny-tailed monitor or ridge-tailed monitor, is native to northwestern Australia and a few islands off the northern and western coasts. An Australian origin isn't surprising, since dwarf monitors (subgenus *Odatia*) are ostensibly found nowhere else and are thought to have evolved in Australia (Bennett 1998). Spiny-tailed monitors are indigenous to a variety of habitats, ranging from arid to subtropical and tropical. Terrestrial and rock-dwelling, these monitors live in rocky areas within their range, but also make use of trees, spinifex grass, hollow logs, burrows and abandoned termite mounds.

Three subspecies of *V. acanthurus* have been described: *V. acanthurus acanthurus* from the eastern part of the range, *V. a. brachyurus* from the west,

and *V. a. insulanicus* from the islands. These subspecies differ in coloration, with the island populations darker and the nominate form yellow as adults.

The nominate form, often called the yellow *acanthurus*, is more commonly available in the U.S. reptile market. The red desert *acanthurus* is presently described as *V. a. brachyurus*, due to its geographic origin in western Australia, larger size and characteristic yellow stripe from the snout through the eye (De Lisle 1996).

Description - The *acanthurus* monitors are stocky, robustly proportioned lizards. As with other monitor species, males are larger than females. Red *acanthurus* are larger than the common form and have been reported to reach a maximum length of 30 inches (76 cm). Our adult males average 10 inches (25 cm) snout-vent length (SVL).

Tail length is one to one and a half times the SVL. The tail is ringed with backwardly projecting, blunt spines. These allow the tail to be used as a wedge in rock crevices and to plug up the entrance of burrows, making it difficult to remove the lizards from their place of refuge. The tail is also used defensively as a club. The legs are short and stocky, giving these varanids somewhat of a tank-like appearance.

Ground colors range from vibrant red-orange to rich reddish brown. Rows of brightly contrasting yellow ocelli (eye-spots), dotted with black in the center, run from the neck to the tail base. The head is dark reddish brown, with paler patterns matching the body's ground color. Red *acanthurus* have a cream or yellow pattern on the top of the head, which the common form does not share, in addition to the light colored stripe extending from the

snout through the eye. Multiple stripes run down the neck, merging into ocelli as they reach the body. The neck's underside is white with black ocelli, and the rest of the ventral surface is white with black speckling. The forelegs are red with white or yellow speckling, and the hind legs are black with yellow spots, creating a beautiful overall contrast. Alternating black and red broken banding occurs along the upper length of the tail; the bands are black and white on the underside. Unlike many species which lose color with age, the red desert spiny-tailed monitor becomes brighter, with more vibrant coloration developing over time.

Behavior - The intelligence of *acanthurus* is evident as they inspect their environment, flicking their tongues quickly as they move around the enclosure. They dig and search for new areas to explore, thoroughly investigating anything new in their environment. Their fanatical inspection, however, can lead to injury as they rearrange cage furnishings. Large landscape items must be in contact with the bottom of the cage to prevent the lizards from being crushed or becoming wedged under heavy items. These are docile lizards, rarely attempting to bite or lash with their tails. Males are more outgoing than females and are visibly prominent in their habitat, whereas females prefer the security of hiding places and tend to be reclusive.

Hatchling Husbandry

In the wild, *acanthurus* hatch underground and dig their way to the surface. Captive-bred neonates will burrow extensively if their substrate is conducive to that activity. We use a mix of sandy yard dirt and are often amazed at the network of burrows the youngsters create.

Habitats should include hiding places at both ends of a temperature gradient. This allows the young animals to thermoregulate safely and securely with minimal stress. We provide bottom heat at one end of the habitat with a basking light and corresponding hot spot above. Neonate monitors require moisture to maintain hydration, so we dampen the substrate under the hide spots. This also aids proper shedding.

Neonates can be raised in a group and will start to feed on crickets within days of hatching. Day old *acanthurus* average two inches (5.1 cm) SVL and

readily eat medium sized crickets. We have raised a number of animals on crickets exclusively with great success; a nutritional supplement (Miner-All®) is given every few days. Cricket food is provided in the enclosure, because some crickets inevitably hide until dark. Excess crickets should be kept to a minimum, however, because they can irritate the hatchlings and also eat lizard feces if no other food is available. There have also been reports of crickets munching on sleeping lizards when hunger reaches extremes. Young monitors will readily eat pinky parts or ground meat in addition to crickets, but we have not found it necessary for healthy growth of hatchlings.

Watching the little monitors eat crickets is hilariously entertaining. Once a cricket has been singled out from the pack for consumption, red *acanthurus* are relentless in their pursuit. One cricket at a time is selected from many and marked for consumption. A cricket is chased, with the lizard following the prey's every move. They jump when the cricket jumps, and run the length of the enclosure to catch and consume their prey. We presume their keen sense of smell may be a determining factor in this behavior.

Young Adults

With proper care, red *acanthurus* grow incredibly fast and can be bred successfully when less than one year old. Keys to successful reproduction include proper temperature gradients and adequate food. Sub-adult and adult animals use a basking spot of 130-160°F (54-71°C) with a temperature gradient down to the mid 70's°F (about 24°C). This may sound extreme, but only a small area directly under the basking light reaches these high temperatures and a precipitous thermal decline is essential.

To facilitate proper thermal regulation we offer a variety of temperature zones by creating layers under the light with plywood platforms, roofing tiles, or cork bark. These materials provide varied thermal zones and allow the animals to thermoregulate from hidden, secure locations. Although cork bark is aesthetically pleasing, crickets hide in the crevices where they can't be caught. Roofing tiles work well, but care must be taken when stacking because they are heavy enough to mortally injure a monitor. Flat rocks and slate may be cemented together to form layered basking sites, but retrieval of monitors from such

structures may be impossible. Plywood [3/8 inch (10 mm)] serves as a thermal insulator and is light weight, but is less attractive.

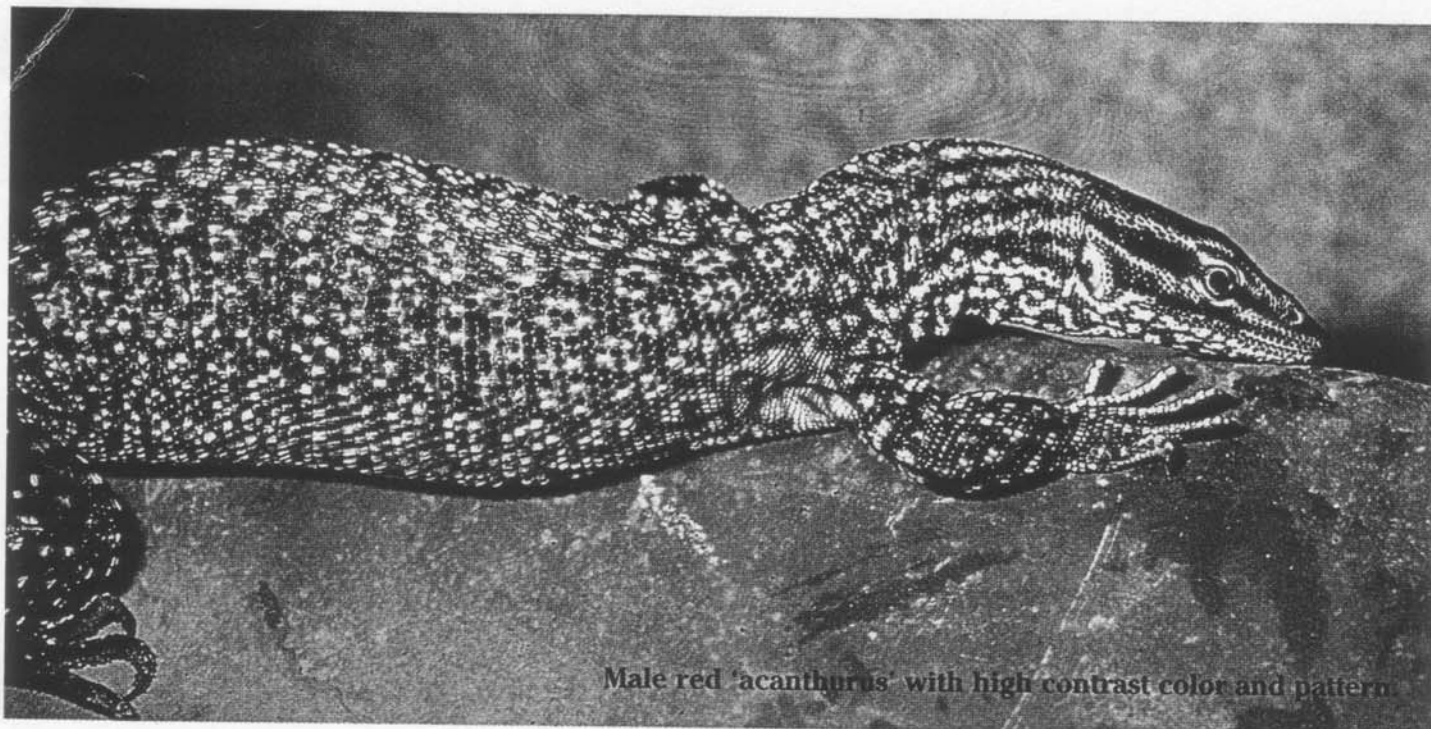
Young *acanthurus* are flighty and reclusive but calm down with age and soon learn to recognize their keeper. Our monitors are maintained in colonies of up to five per enclosure through adulthood. We've observed little fighting when the young monitors are raised as siblings. An alpha animal comes to the fore and spends much time away from the hide spots. The alpha animal typically grows at the fastest rate, attains the largest size, and invariably is a male. Sexual play activity is often seen in young red *acanthurus*; males mount males and females, and females mount males as well as females.

Sex determination - It is our impression that sexual identity is ambiguous in neonatal *acanthurus*, and that an individual's sex determination is impacted greatly by social environment. We acknowledge that no academically acceptable proof can be offered at this date, but our overwhelming experience and that of other breeders working with the species provides conclusive observational evidence (Repashy, pers. comm; Retes, pers. comm.).

We find it impossible to accurately sex hatchlings by popping, probing, or other methods. All breeders that we know who keep hatchlings in communal housing find, upon maturing of the group, both sexes within the group. For example, five hatchlings raised in a community mature into a 2.3 or 3.2 sex ratio. Considering the hundreds of *acanthurus* hatchlings that have been raised communally, the observational evidence is convincing.

Diet - In nature, spiny-tailed monitors consume an enormous variety of prey, based on season and availability. Fecal samples from wild monitors contain dark waste material with a small amount of white uric acid; feces from monitors in captivity should be similar. We recommend a diet consisting mainly of insect prey, such as crickets, due to the beneficial components of chitinous exoskeletons and the bulk provided.

Our spiny-tailed monitors are aggressive feeders and we increase diet diversity as the lizards mature. Crickets remain a diet staple, and other



Male red 'acanthurus' with high contrast color and pattern

Orthopterans are offered as available. Pink or fuzzy mice are offered, live and thawed, along with various worms (*Zoophobas artratus*, *Tenebrio molitor* and *Galleria mellonella*), ground meat, and gizzards. Fish is offered occasionally.

Reproduction

By six months of age, sexual characteristics are becoming apparent. Males are generally more outgoing, while females prefer hide spots. Males appear larger than females, and are much heavier and wider of body. Males have thicker, blockier heads, while females develop narrower, pointed heads. Eye color may also be an indicator of the animals' sex, with males typically exhibiting a fiery red eye, and females displaying softer orange to brown eyes. Spurs, a cluster of scales at the base of the tail, provide the most conclusive means of identifying an animal's sex. Males typically have a palpable, firm spur that protrudes. Females may lack spurs altogether or have smaller, softer spurs than males. In some individuals, secondary sexual characteristics are inconclusive. With these "in-betweeners," one can't be certain until egg deposition is observed.

Nests - After diet and thermal requirements are met, the most critical area of reproductive husbandry is proper nesting for the gravid female. If a suitable nesting site is not available, the females will hold the eggs too long and lay infertile eggs, or may cycle,

swell up, breed and never produce at all. In a front opening cage, a nest box must be used to provide deep enough substrate for burrowing. We have had good success with 32-quart (30 l) plastic storage boxes. A hole is cut or drilled in the lid for access and the box is filled with a mixture of dirt and vermiculite. Nesting substrate should hold enough moisture so it clumps in one's hand while staying light enough to allow aeration.

Nest box husbandry is an art of its own, as temperatures in the low to mid 80's°F (about 29°C) must be maintained while keeping the substrate moist enough for successful burrowing. In a top opening cage, the enclosure substrate can also serve as nest box medium. The same considerations regarding depth of substrate, temperature, and moisture apply.

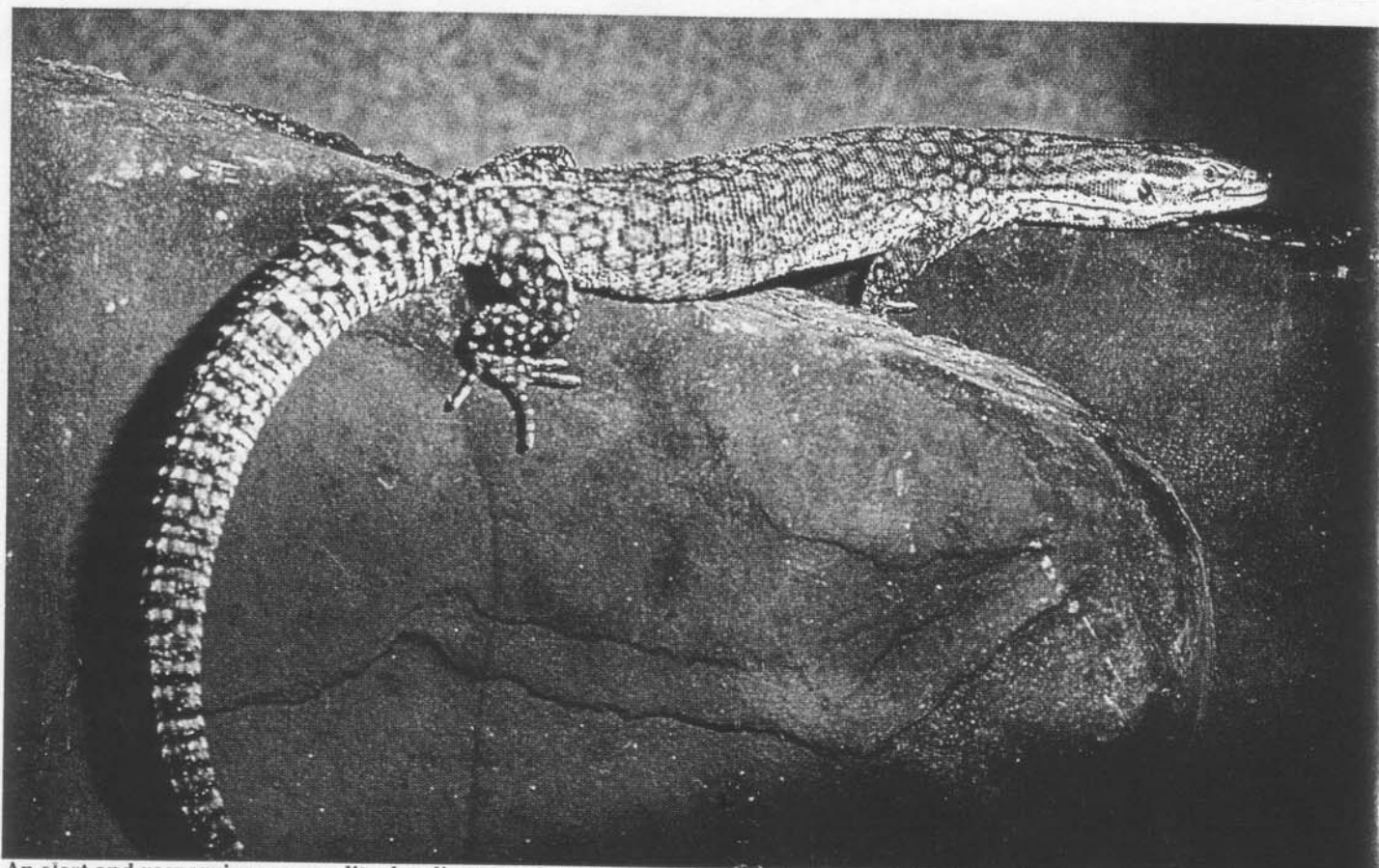
Breeding and Egg Laying - We do not cool or hibernate the monitors to induce cycling. Nighttime lows may vary with the seasons, but we leave heating pads on 24 hours daily from fall through spring. Basking lights are on from 12 to 16 hours daily year-round. Care is taken in the hot summer months to avoid excessive ambient temperatures, which can be lethal.

Copulation can last for hours or even all day. Under proper conditions, oviposition can occur as soon as two weeks after copulation. After 45 days post-copulation, the chances of fertile egg viability decrease markedly.

Gravid females eat large amounts of food until a few days before laying, when they may not feed at all. Extensive basking at high temperatures will be noted. The week prior to laying, gravid females may begin digging burrows; some may be extensive. We have not found it necessary to separate gravid females, however care must be taken that eggs aren't consumed by cage-mates.

A burrow will be obvious before oviposition. Eggs are generally deposited at night, and the burrow will be filled in when laying is completed. If lucky, you may see the gravid female backing into the burrow, in preparation for laying. Once the eggs have been laid, the female goes through an elaborate process of moving and arranging the clutch. The females appear to be very precise in what they are doing and will move an egg a fraction of an inch again and again until they seem to be satisfied it is in the exactly correct position. The behavior is unfathomable to me but incredibly fascinating. When all is set in the burrow, she then carefully fills in the burrow until no trace is visible.

After egg deposition, a female may appear quite thin. Her tail may be shrunk and folds of skin along her trunk may be obvious. However, red *acanthurus* are so robust, it is not always obvious when a female has laid eggs. Thus careful observation is vital to successful retrieval of eggs. Moreover, while the nest box may pro-



An alert and responsive personality, hardiness, and attractive appearance have made the Australian spiny-tailed monitor one of the rising reptile stars of the late 90's.

vide conditions adequate for the females to lay, we are not offering the range of choices these animals would have in the wild. Incubating conditions in the nest box may be far from ideal. The earlier eggs are recovered from the box and placed in an incubator, the better are chances for success.

Red *acanthurus* eggs are larger than eggs from yellow *acanthurus*. First clutches may contain five to seven eggs, with later clutches producing egg counts into the teens. These prolific animals multi-clutch regularly and often produce three to five clutches yearly in captivity.

Egg Husbandry

Retrieving monitor eggs is careful work. If an egg breaks, make certain that other eggshells aren't contaminated with the liquid. Should this happen, wash each egg carefully with warm water; otherwise egg death may occur.

We use a 1:1 ratio (by weight) of perlite and water as our incubation medium. Combine the two and shake vigorously for complete mixing. Plastic food storage containers make great egg chambers for incubation. We place a few small holes in the cover or sides for air exchange. Monitor the egg

chamber closely, removing heavy condensation if it occurs on the lid, and adding water if the eggs begin to desiccate. We incubate *V. acanthurus* at 86–87°F (30–31°C). Hatching usually occurs in 12 to 14 weeks.

Conclusions

Spiny-tailed monitors are a fantastic monitor for hobbyists and professional breeders. Their small size, robust natures, and terrific dispositions make them easy to care for, while being prolific breeders. The red desert *acanthurus*, with its outrageous colors, is the pinnacle of beauty in spiny-tailed monitors. As these lizards become more available through captive breeding, their popularity will grow. Indeed, we expect the red desert *acanthurus* will become a perennial favorite in herpetoculture.

About the author: Peter Kuhn is a well-known breeder of Australian pythons and small monitor lizards. He is the California State Coordinator for NRAAC (National Reptile and Amphibian Advisory Council) and owner of Python Pete Reptiles. Visit his web site at WWW.PYTHONPETE.COM or reach him at (619) 273-1925.

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(See Pete Kuhn's classified on page 60.)

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