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SALAMANDERS AND NEWTS

Emperor Crocodile Newt

Tylototriton shanjing

Tylototriton shanjing is a robust, dark brown crocodile newt from Yunnan in south-western China with a bright orange head, dorsal ridge, gland warts and tail. It grows to 12-20 cm, lives on land almost all year and enters the water only to breed. The animal is calm and hardy, but its skin secretes a toxic substance, so wash your hands after any contact.

Family: Salamandridae

Mild skin toxins

KEY FACTS

THE ANIMAL

Adult size	**12-20 cm** total length incl. tail
Lifespan	**10-20 years**
Active	**At dusk and at night**
Lifestyle	**Terrestrial and semi-aquatic**
Habitat	**Montane forest**
Skin toxins	**Mild** Wash your hands after contact and keep your fingers away from your eyes and mouth
Difficulty	**Intermediate**

CARE

Min. enclosure	**75 × 30 × 30 cm** L × W × H for 4 adults
Temperature, day	**18-25 °C**
Temperature, night	**15-20 °C**
Humidity	**60-80%**
Water	**Water dish**
UVB	**Not required**
Diet	**Insects and worms/snails**
Kept	**In pairs or in groups**

BREEDING

Reproduction	**Egg-laying**
Development	**Larvae in water**
Egg-laying site	**In water**
Sexually mature	**24 months**
Eggs per season	**30-150**
Hatching	**10-12 days** at 22-25 °C
Larval period	**90-150 days** from hatching to metamorphosis
Larval diet	**Other larvae and small aquatic invertebrates (daphnia, mosquito larvae)**
Parental care	**None**

PROTECTION AND PAPERWORK

CITES	**Appendix II**
EU annex	**Annex B**
IUCN	**Vulnerable (VU)**

About the species

Tylototriton shanjing is a robust, heavily built crocodile newt. It reaches 12-20 cm including the tail. The ground colour is dark brown to black, and the contrast is striking: the ridges of the head, the parotoid glands behind the eyes, the dorsal ridge, the round warts along the sides, the limbs and the tail are orange. The shade ranges from yellow-orange to almost rusty red, while the pattern is fairly uniform from animal to animal. The skin is rough and granular, and the bony ridges on the head and back are distinct. Females are usually slightly larger than males. Lifespan has not been documented for the species; 10-20 years is borrowed from its closest relative, *Tylototriton verrucosus*.

The orange warts along the sides are large toxin glands, and beneath them sit the tips of the ribs. The tips are blunt and do not break through the skin as in *Pleurodeles waltl*, but when the animal is grabbed or threatened it raises its ribs so that they press on the glands and squeeze out the secretion. At the same time it lowers its head, arches its back and lifts its tail so that the glandular areas face the attacker. The secretion consists mostly of proteins and is highly toxic if it gets into the body of a predator; the studies were carried out on *T. verrucosus*. For humans the animal is not dangerous through ordinary skin contact, but the secretion irritates the mucous membranes of the eyes and mouth and can cause severe itching. Wash your hands before and after any contact.

T. shanjing was separated from *Tylototriton verrucosus* in 1995; until then the orange animals from Yunnan were counted as that species. The separation was confirmed in 2008 on the basis of larval development and a new identification key to the genus, and the two species are each other's closest relatives. Animals in the trade often have uncertain origins; *T. shanjing* is recognised by its clearly orange areas, while the other species in the group are darker and at most burnt orange.

Distribution and habitat

Tylototriton shanjing occurs only in Yunnan in south-western China, in the central, western and southern parts of the province, from the tropical south through the subtropical middle to the temperate north-west. The mountains along the Nu, Yuan and Lancang rivers are the core area. The species lives from about 1,000 m up to 2,100-2,500 m above sea level.

The species consists of four genetic lineages corresponding to four areas: southern Yunnan, north-western Yunnan, the border region with Myanmar in the west and central-western Yunnan. The lineages arose in separate refuges during the ice ages, and the rivers have not been barriers to the species.

> **Native range:** China.

HABITAT

The habitat is damp, vegetated mountain forest close to still water: ponds, pools and slow-flowing streams. The species lives on land for most of the year, hidden under stones, logs and leaf litter, and is active at dusk and at night. It eats insects, insect larvae and worms. The breeding season runs from May to August, and only then do the animals enter the water. The eggs are laid singly or in strings on aquatic plants and stones in ponds and pools, and the larvae live in the water until they metamorphose.

The highland climate has a cooler, drier winter and a warm, wet summer. This seasonal rhythm is the basis of its care.

Care

THE ENCLOSURE

Tylototriton shanjing is a terrestrial newt that needs water only in the breeding season. Four adults can be kept in an enclosure of 75 × 30 × 30 cm; floor area is more important than height, and a pair needs at least 60 × 30 cm. The species is not social, but tolerates its own kind well.

The substrate is 5-8 cm of tightly packed soil without fertiliser or perlite, preferably mixed with coconut fibre, sphagnum and bark, so that it does not clump and does not hold too much water. Create a humidity gradient by pouring water in only one end, so that the moisture seeps slowly through the soil, and the other end is dry. The soil must not turn to mud. A drainage layer at the bottom keeps the substrate fresh. Provide many hiding places of cork bark, moss and small logs; the animals do not really burrow, but hide under things.

Outside the breeding season the adults manage with a shallow water bowl with sloping sides. Crocodile newts are clumsy, so avoid deep water, smooth edges and hiding places in the water where an animal can become trapped. The lid must be mesh: good ventilation prevents respiratory and skin problems.

Read more: Humidity, misting and ventilation Read more: Terrarium construction and bioactive substrate

TEMPERATURE

The daytime temperature is 18-25 °C and the night temperature 15-20 °C. In summer it may well reach 24-26 °C by day. In winter the animals are kept cooler, at about 15-17 °C around the clock, on a drier substrate. The temperature can drop to 10-13 °C but must never reach freezing. The length of the cool period is not documented. The difference between summer and winter is what makes the animals breed.

T. shanjing tolerates more heat than most newts, but more than a day or two above 27 °C should be avoided. Place the enclosure in a cool room out of direct sun, and do not heat with lamps. Young animals grow best at about 24 °C.

HUMIDITY AND MISTING

The species prefers fairly dry conditions, drier than other terrestrial crocodile newts. 60-80 % humidity is an estimate. Mist lightly so that the wet end of the substrate is always damp, and leave the dry end dry. Stagnant, saturated air and muddy soil must be avoided.

The water bowl must always be there so that the animals can seek water if the enclosure becomes too dry.

WATER AND WATER QUALITY

Outside the breeding season the water is a shallow bowl with sloping sides and dechlorinated tap water, changed regularly. In the breeding season there must be a larger water area of at least 30 × 30 cm (see "Mating").

Amphibian skin is very permeable. Never use soap, cleaning agents or hand cream near the water, and rinse your hands in clean water before touching the animals.

LIGHTING AND UVB

Tylototriton shanjing is active at dusk and at night and lives hidden, so it rarely comes out while the light is on. UVB is not necessary. The lighting is for the plants; an LED bulb that gives off almost no heat is enough. Day length must follow the seasons, shorter in winter and longer in summer, if the animals are to breed. The enclosure must not stand in direct sun.

Read more: Lighting and UVB

FEEDING

Earthworms are the best staple food; large earthworms are cut into suitable pieces. Small crickets are a good supplement when they are well fed themselves, and waxworms and mealworms can be given for variety, but not as the main food. With a varied diet, vitamin and mineral supplements are normally not necessary.

Adults are fed 1-2 times a week with as much as they eat in about 20 minutes, and less often in winter. Young animals are fed three times a week with food slightly smaller than the width of the mouth. The animals are slow, so the food is best held out with tweezers, and you should check that all animals eat.

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

BEHAVIOUR AND HANDLING

The animal is calm and slow and can become very tame: many beg for food at the glass once they have got used to their keeper. It is still not an animal for daily handling. Pick it up only when necessary, with wet, clean hands or powder-free gloves, and wash your hands afterwards.

A small group can be kept together. The defensive posture with lowered head, arched back and raised tail is a sign of stress.

Breeding

SEXUAL MATURITY AND SEXING

The sexes are told apart by the vent: the male's opening is slit-shaped, the female's round and cone-shaped. In young animals the sex can usually be seen from about one year of age, and the vent can be gently opened if it is unclear. Females are slightly larger than males. The young can reach adult size at 18 months, but are rarely sexually mature before 2 years of age; growth depends on temperature and food.

MATING

Breeding is triggered by imitating the seasons: a cool, dry winter at about 15-17 °C and a warmer, damper summer, with a day length that follows the season. In late spring or early summer the water temperature is suddenly raised to 24-25 °C, and the humidity is brought almost up to 100 % by closing the lid tightly for a few days. The water area must be at least 30 × 30 cm and have a small island; if the enclosure does not have this, the animals are moved to an aquarium with an island. Let the animals enter the water themselves, and do not place them in. If they have not entered the water after two days, they are moved back, and the attempt is repeated after a couple of weeks.

Mating is a circling dance in which the male deposits spermatophores, which the female picks up with her vent. The animals must have plenty of food all year round so that the females can form eggs.

EGGS AND LARVAE

Egg-laying usually takes place about a day after mating. The eggs are small and white and are laid singly on aquatic plants and other items in the water; plastic plants also work. A large, well-fed female can lay over 100 eggs in the season. The 30-150 eggs in the specification box is borrowed from *T. verrucosus*. The adults often eat the eggs, including the female herself, so the adults are removed from the water, or the eggs are moved to another aquarium; once the jelly has set, the eggs tolerate being moved.

The larvae are predators. For the first 1-3 days they live off the yolk. Until the front legs have developed, they take only small, live prey such as newly hatched brine shrimp and daphnia, at least once and preferably twice a day. After 10-14 days they also take frozen bloodworms, chopped at first. The larvae eat each other, so keep few larvae per aquarium (under 50 in 40 litres), and thin them out as they grow. The water is kept clean with daily water changes, up to half if you like, with water at the same temperature; a filter can suck up larvae and food, so use at most a large sponge filter with weak aeration.

METAMORPHOSIS

At about 22 °C the eggs hatch after roughly 10 days, and the larvae are about 10 mm at hatching. They are kept at the same temperature as the eggs. The larval period is not documented for the species; the 90-150 days in the specification box is borrowed from *T. verrucosus*. The larvae can metamorphose at as little as 4 cm, but clean water and few larvae per aquarium produce larger young, and they are easier to rear.

When the gills begin to shrink, the larva is moved to shallow water, about 2-3 cm, with a gravel beach and a piece of bark to hide under. Newly metamorphosed young drown easily.

REARING THE YOUNG

As soon as the young have left the water, they are moved to an enclosure set up like the adults'. The young are not kept with adult animals. They eat the same as the adults, only smaller: small crickets, pieces of earthworm and frozen bloodworms, which small young readily take from a toothpick or tweezers. Feed three times a week at about 24 °C, and sort by size so that the smallest are not overlooked.

Health and common mistakes

Typical problems and mistakes:

- Drowning. Crocodile newts are clumsy, and deep water, smooth edges and traps under hiding places in the water are dangerous, especially for newly metamorphosed young.
- Excessive temperature. More than a day or two above 27 °C should be avoided.
- Poor ventilation and a substrate that is too wet, which cause respiratory and skin problems. Wet patches on the skin that do not dry when the animal is on land suggest a bacterial infection; the skin of a healthy animal is dry out of the water.
- Malnutrition in groups where the fastest eat everything.
- Larvae that float are usually underfed.
- Bsal (*Batrachochytrium salamandrivorans*) is a skin fungus that kills many European salamanders. It probably originates in East Asia, and many East Asian salamanders tolerate the infection and can carry it; it has been found in wild *Tylototriton verrucosus* and several other species in the genus. The genus is not resistant as a whole, however: *Tylototriton wenxianensis* can die of the disease. New animals are therefore quarantined for several weeks, kept apart from other salamanders and amphibians, with their own equipment and good hand hygiene.

See a vet with amphibian expertise if the animal stops eating, develops sores, cloudy eyes, swellings or discoloured skin.

Read more: Quarantine and hygiene

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.