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SALAMANDERS AND NEWTS

Himalayan Crocodile Newt

Tylototriton verrucosus

Tylototriton verrucosus is a large, dark brown crocodile newt from the mountains of western Yunnan, northern Myanmar and adjoining regions. It grows to 13-24 cm and is the most water-loving of the crocodile newts kept in enclosures: during the warm part of the year it often stays entirely in the water, where it is active and inquisitive.

Family: Salamandridae Former name: *Pleurodeles verrucosus; Triturus verrucosus* **Mild skin toxins**

KEY FACTS

THE ANIMAL

Adult size	**13-24 cm** total length incl. tail
Weight	**12-18 g**
Lifespan	**10-20 years**
Active	**At dusk and at night**
Lifestyle	**Semi-aquatic**
Habitat	**Montane forest and wetland**
Skin toxins	**Mild** Wash your hands after contact and keep your fingers away from your eyes and mouth
Difficulty	**Intermediate**

CARE

Min. enclosure	**60 × 30 × 35 cm** L × W × H for 4 adults
Temperature, day	**18-25 °C**
Temperature, night	**15-20 °C**
Humidity	**70-90%**
Water	**Aquaterrarium** depth 12-15 cm
UVB	**Not required**
Diet	**Insects, vertebrates and worms/snails**
Kept	**In pairs or in groups**

BREEDING

Reproduction	**Egg-laying**
Development	**Larvae in water**
Egg-laying site	**In water**
Sexually mature	**12-36 months**
Eggs per season	**30-200**
Hatching	**10-12 days** at 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	**Near Threatened (NT)**

About the species

Tylototriton verrucosus is a large, sturdy newt. Adults measure 13-24 cm including the tail, most 15-20 cm, and animals of 12-13 cm weigh 12-18 g. The ground colour is chocolate brown to black, with orange or brown areas on the tail, head, legs and the warts that sit over the tips of the ribs. The head is broad and angular with bony ridges, and a row of knobs runs along the

back. The tail is flat like an oar with a fin both above and below, and the lower edge of the tail is orange-yellow. When the animal lives in water, the skin becomes smoother and darker, and the pale areas stand out more clearly. Females are slightly larger than males. The species can live for over 20 years.

Size and appearance vary greatly. In the trade there are at least two or three forms: a compact, dark form of up to about 17 cm, which is the most water-loving; a slimmer, paler form of up to about 24 cm; and a form resembling *Tylototriton shanjing*, of up to about 17 cm. Locality data for trade animals are seldom reliable, so it is not always possible to say which species or population an animal comes from.

The name has covered many populations. *T. verrucosus* was described in 1871 from western Yunnan, and until 1995 the orange animals from the rest of Yunnan were also counted here; they are now *Tylototriton shanjing*, the species' closest relative. Since then the populations in Nepal, Darjeeling and Bhutan have been described as *T. himalayanus* (2015), and populations in Thailand, Laos, Vietnam and Myanmar as, among others, *T. anguliceps*, *T. panhai*, *T. uyenoi* and *T. kachinorum*.

The skin glands behind the eyes, in the warts along the sides and in the tail secrete a toxic substance consisting mostly of proteins. It is highly toxic if it gets into the body of a predator. The tips of the ribs are blunt and do not break through the skin as in *Pleurodeles waltl*; instead the animal raises its ribs so that they press the secretion out of the warts, and it lowers its head, arches its back and lifts or lashes its tail. For humans the animal is not dangerous through ordinary skin contact, but the secretion irritates the mucous membranes of the eyes and mouth. Wash your hands before and after any contact.

Distribution and habitat

Tylototriton verrucosus in its current circumscription occurs in the mountains of western Yunnan in China, in northern Myanmar and north-eastern India and at two sites in northern Thailand (Doi Pha Hom Pok in Chiang Mai Province and Doi Chang in Chiang Rai Province). Older records from Nepal, Darjeeling, Bhutan, Laos and Vietnam belong to other species (see the description), and several finds from China may belong to *Tylototriton shanjing*.

The species lives in the foothills and slopes of the mountains where there is or has been montane forest, also in cultivated land such as rice paddies.

> **Native range:** China, Myanmar (Burma), India and Thailand.

HABITAT

The habitat is damp montane forest and areas where there has been montane forest, including terraces and rice paddies. The species is not fussy about breeding water: everything from puddles to lakes is used. It is more water-loving than other crocodile newts and often stays in the water from spring to autumn, depending on the temperature. Its food is spiders, worms, millipedes, scorpions, snails and many kinds of insects. The animals breed in May and June, and courtship and mating take place at night.

In the mountains the winters are cool and the summers warm and wet. This seasonal rhythm is imitated in captivity.

Care

THE ENCLOSURE

Tylototriton verrucosus is best kept in an aquaterrarium. Above about 18 °C the dark form can be kept entirely in water. An aquarium of 60 × 30 × 35 cm suits two pairs of the dark form and fewer animals of the larger forms. Water depth does not matter much; 12-15 cm is suitable. Provide a large island of cork, roots or stones so that the animals can climb out of the water when they wish.

The animals differ: some use land and water equally, and young animals of the pale forms in particular spend most of their time on land. An animal that prefers to be out of the water is moved to a set-up with roughly half land and half water, and it must always be easy to climb out of the water. The land section can be coconut fibre mixed with bark.

The species thrives in a planted aquarium. A filter can be used, but the current must be kept weak. The lid must be tight.

TEMPERATURE

By day the temperature should be 18-25 °C, with about 25 °C in summer, and 15-20 °C at night. In winter the animals are kept at 15-18 °C. The dark form tolerates both higher and lower temperatures for a few days without harm. At cooler winter temperatures, 10-13 °C, the animals spend most of their time on land and eat only rarely, as little as once a month. Below

about 18 °C the animals must have access to land.

An annual temperature cycle with a cooler winter and a warmer summer keeps the animals healthy and triggers breeding. Keep the aquarium cool in summer, out of direct sun, and do not heat with lamps.

HUMIDITY AND MISTING

Humidity is not decisive in a water-rich set-up; 70-90 % is an estimate. Where there is land, keep the land section damp but not muddy. Make sure the air does not stand still.

Read more: Humidity, misting and ventilation

WATER AND WATER QUALITY

The water depth is 12-15 cm. Change 20-30 % of the water every other week, and more often if there is a lot of uneaten food. Tap water is treated with a water conditioner against chlorine, chloramine and heavy metals before use. A filter can be used, but the animals should have only a weak current.

Amphibians have very permeable skin, so avoid soap, cleaning agents and hand cream near the water, and rinse your hands in clean water before touching the animals.

LIGHTING AND UVB

The species is active at dusk and at night, and UVB is not necessary. A day length of about 12 hours in summer is a good, but not essential, rhythm, and otherwise the light just needs to suit the plants. Avoid direct sun.

Read more: Lighting and UVB

FEEDING

The species is not fussy, and large females can eat astonishing amounts in a short time. The food is earthworms (small and medium ones whole, large ones chopped), tubifex and bloodworms (live, frozen or freeze-dried), blackworms, shrimp, pieces of fish (not salted fish or sea fish) and strips of heart or other lean meat. In water the animals use their sense of smell to find food that has been left over, even in the dark. With a varied diet, vitamin and mineral supplements are normally not necessary.

The warmer the animals are kept, the more often they must be fed. In summer feed every second or third day, in winter less often. Give as much as the animals eat in about 15 minutes. If the animals spend a lot of time on the island for some days after a large feeding, it is a sign of ammonia or nitrite from uneaten food, and then it is better to give smaller portions more often. Females are greedier and more aggressive than males, so the males often get less; check that they eat well.

Read more: Calcium, vitamins and supplements

BEHAVIOUR AND HANDLING

In the water the animal is active and inquisitive and can become quite tame: it swims over to the glass for food and takes food from tweezers and fingers. It is not suited to daily handling, however. Pick the animal up only when necessary, with wet, clean hands, and wash your hands afterwards.

A pair or a group can be kept together. Males often grab a female and swim off with her when other males are nearby. Provide plenty of space and hiding places.

Breeding

SEXUAL MATURITY AND SEXING

The species can become sexually mature after just one year, but most often only after 2-3 years. The males are then at least about 13 cm, the females slightly larger. Males are often more brightly coloured, but this is not a fixed rule. In the breeding season the male has a swollen vent and a higher tail fin, and in the dark form he has a pale ring around the eyes. Outside the breeding season the sexes are told apart by the vent opening, which is slightly longer in the male, and by the tail fin, which is on average higher in the male.

MATING

The most important trigger is a rise in temperature from about 18 °C to 22-25 °C over a few hours or days, or a large water change. Day length probably also plays a role. If the aquarium follows an annual temperature cycle, mating happens by itself in spring. Females eat more in the run-up to egg-laying.

The male waves his tail at the female as in *Triturus*, but more slowly. He can grasp the female with his front legs, but sperm transfer takes place in a circling dance in which the male deposits several spermatophores and the female picks up one or more with her vent. Mating takes place at night.

EGGS AND LARVAE

Egg-laying usually begins within 36 hours of mating. The eggs are laid in the water and are small for the genus, about 5 mm including jelly. The female lays 30-200 eggs per season, depending on her size, often spread over about a month. A few large females lay over 300 eggs.

The larvae are predators. For the first few days they live off the yolk, which is seen as a cream-coloured mass in the belly. They are then fed newly hatched brine shrimp, young daphnia and microworms; from about 12 mm young daphnia can be the main food, and from 20-25 mm they are given frozen bloodworms and live blackworms, preferably chopped, together with adult daphnia. Feed daily: well-fed larvae are less likely to eat each other.

METAMORPHOSIS

At 25 °C the eggs hatch after 10-12 days, and the newly hatched larvae are 8-9 mm. The larvae thrive at 20-27 °C, which is warm compared with most newts. Well-fed larvae look like small adults after about two months, begin to metamorphose after about three months and are typically finished after 90-150 days, before the end of the year. Metamorphosis typically takes place at 5-7 cm, but some metamorphose at a smaller or much larger size.

In most clutches there are animals that stay in larval form and metamorphose only after sexual maturity at 12 cm or more; they can breed in that state. After metamorphosis the species seldom needs a proper land phase, but a set-up with both land and water is best until the animals are at least 10 cm.

Read more: Rearing tadpoles

REARING THE YOUNG

Newly metamorphosed young are kept in a set-up with damp land and easy access to shallow water until they are at least 10 cm. Give small earthworms, chopped earthworms and bloodworms, and feed often in small portions. Young kept slightly warmer in winter eat more and grow faster, but the temperature should not go above 23 °C. Feeding must be monitored so that the smallest animals get something too.

Health and common mistakes

Typical problems and mistakes:

- Poor water quality from uneaten food, with high ammonia and nitrite. The animals then seek out the island.
- Malnutrition of males in mixed groups.
- Drowning in set-ups without easy access to land.
- Excessive temperature over longer periods.
- 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 *T. verrucosus*. 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, 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.

The full guide with map and updates: herpy.org/en/salamanders/tylototriton-verrucosus