herpy

SALAMANDERS AND NEWTS

Italian Crested Newt

Triturus carnifex

Triturus carnifex is a robust crested newt of 12-18 cm from Italy, the southern Alps and the north-western Balkans. It has warty, dark skin and a yellow or orange belly with large, blurred black spots, and the female often has a yellow stripe along the back. In spring the male develops a tall, serrated crest. The species is hardy and easy to keep and breed.

Family: Salamandridae Former name: *Salamandra carnifex; Salamandra platycauda* **Mild skin toxins**

KEY FACTS

THE ANIMAL

Adult size	**12-18 cm** total length incl. tail
Lifespan	**7-17 years**
Active	**At dusk and at night**
Lifestyle	**Semi-aquatic**
Habitat	**Wetland and temperate woodland and meadow**
Skin toxins	**Mild** Wash your hands after contact and keep your fingers away from your eyes and mouth
Difficulty	**Beginner**

CARE

Min. enclosure	**45 × 30 × 30 cm** L × W × H for 4 adults
Temperature, day	**12-20 °C**
Temperature, night	**8-15 °C**
Humidity	**70-95%**
Water	**Aquaterrarium** depth 15-30 cm
Water temperature	**10-20 °C**
UVB	**Not required**
Winter rest	**4-10 °C** 6-12 weeks
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	**12-36 months**
Eggs per season	**150-400**
Hatching	**14-35 days**
Larval period	**56-112 days** from hatching to metamorphosis
Larval diet	**Complete diet, other larvae and small aquatic invertebrates (daphnia, mosquito larvae)**
Parental care	**None**

PROTECTION AND PAPERWORK

CITES	**Not listed**
EU annex	**Not listed**
IUCN	**Vulnerable (VU)**

About the species

Triturus carnifex is a large and heavily built crested newt. Adults reach up to 17-18 cm, with females the largest. The skin is warty and dark brown with black spots, and the belly is yellow to orange with large, round, grey to black spots with blurred edges. The throat is dark with white speckles. Unlike *T. cristatus*, *T. carnifex* has few or no white speckles along the flanks, and females and juveniles almost always have a yellow or greenish stripe along the back.

In the aquatic phase in spring the male develops a tall, serrated crest and a white band along the sides of the tail. The female is more heavily built and can look pear-shaped, while the male is slimmer and has a large cloaca. The species was formerly regarded as a subspecies of *T. cristatus* and can hybridise with its close relatives, so different crested newts are not kept together.

The skin of crested newts secretes tetrodotoxin and other toxins in small amounts, and threatened animals curl up and secrete a milky fluid. It can irritate mucous membranes, so wash your hands after handling and do not touch your eyes or mouth. For *T. carnifex* itself the toxin has not been measured.

Care is the same as for *T. cristatus*. Figures for lifespan, egg-laying and development are not documented for *T. carnifex* and are borrowed from crested newts as a group; adult crested newts normally live 7-9 years in the wild, a few up to 17 years.

Distribution and habitat

Triturus carnifex lives in Italy, where it occurs up to 1,800 m in the Apennines, and onwards in the southern Alps in Switzerland and Austria and in the north-western Balkans, including Slovenia, Croatia and Bosnia and Herzegovina. To the north and east the range borders on other crested newts, and hybrids occur in the contact zones.

The species has been introduced to several places outside its natural range, including the Netherlands, the Azores and Great Britain. In the Netherlands it has mixed genes with the native *T. cristatus*. The introduced populations do not belong to the original range.

> **Native range:** Italy, Switzerland, Austria, Slovenia, Croatia and Bosnia & Herzegovina.

HABITAT

Triturus carnifex breeds in water and can spend up to four months in the water. It prefers deep, still ponds without predatory fish, which eat the larvae, and swims freely in the water column. When the animals enter the water depends on the location of the pond: they typically arrive between February and May and leave the water between July and October. In warmer ponds they arrive within a month and leave the water within two weeks in July. Migration to the water probably increases after rain.

The animals are most active at night and breed in the deeper parts of the pond, where they avoid competition with smaller newts, which they also eat. Females in breeding condition prefer a higher body temperature than males and females without eggs. In higher and colder regions the animals grow larger. On land they hide, like other crested newts, under stones and wood and in holes in the ground, and hibernate frost-free.

Care

THE ENCLOSURE

Triturus carnifex can be kept following its natural cycle with an aquatic phase and a terrestrial phase, or in water all year. An aquatic set-up or a terrestrial set-up must be at least 45 × 30 × 30 cm for two pairs, and bigger is always better. If the whole life cycle is to take place in one set-up, it must be correspondingly larger, with room for both a spacious water section and a land section. Two separate set-ups are often easiest.

The aquatic set-up can be very simple: an aquarium without substrate, with Canadian pondweed (*Elodea*) or other plants and some pieces of clay pipe or flowerpot shards as hiding places and help with shedding. Dense plants in mid-water are important, as the animals seek cover there and the female lays eggs in the leaves. A floating board or a slope allows the animals to leave the water. The water must be calm, even with a filter, as the species lives in still water.

The terrestrial set-up must be well ventilated and never either bone dry or waterlogged. A layer of moist, unfertilised soil several centimetres deep retains moisture, and a layer of moss on top provides cover. Bark and stones provide more hiding places. The lid must always be tight, as newts climb up glass and squeeze through small gaps. A lid of fine mesh on a frame gives good ventilation and keeps even the smallest feeder insects in.

TEMPERATURE

Triturus carnifex loves cool conditions. The water must be kept below 25 °C, as in warmer water the animals try to leave it. The animals are fully active down to about 10 °C. The terrestrial phase is kept at roughly the same temperature as the aquatic phase: 12-20 °C by day and 8-15 °C at night. Place the set-up somewhere cool and out of direct sun; in warm periods a cool room or a cellar helps.

A cool winter is the most important prerequisite for breeding. About six weeks at 10 °C is enough to bring the animals into breeding condition, and down to 4 °C does not harm them; in the wild the winter rest is longer. Feeding is cut back during the period. If the temperature goes all the way down towards 4 °C, feeding is stopped about a week beforehand, so that no undigested food is left in the gut. After the rest the animals are moved to the aquatic set-up at 15-20 °C.

HUMIDITY AND MISTING

In the aquatic phase humidity is no problem. In the terrestrial phase the soft skin dries out quickly, so the substrate must be kept moist, with a humidity of 70-95 %. Mist regularly with dechlorinated water or rainwater, preferably at one end, so that a humidity gradient forms and the animals can choose how humid they want it.

The substrate must never become waterlogged, as it then rots and fungus appears. Stagnant air also causes fungus, so ventilation must be good. If it is too dry, the animals sit still with dry, dull skin and try to get back to the water. Then humidity must go up, or the animals must go back into the aquatic set-up.

Read more: Humidity, misting and ventilation

WATER AND WATER QUALITY

A water depth of 15 cm is enough, and deeper is fine: 15-30 cm gives the animals room to swim. The water is kept at 10-20 °C. The species tolerates many kinds of water, but chlorine can harm it; tap water that has stood for a couple of days is unproblematic.

A filter with a gentle current means less work. Without a filter the water is changed regularly and the bottom is kept clean. A bare bottom is easiest to keep clean; avoid gravel and small stones that the animals could swallow.

LIGHTING AND UVB

The animals are nocturnal and do not need UVB or artificial light for their own sake. The plants need light to grow, and an ordinary aquarium lamp is enough. After the winter rest, more light together with more food and rising temperature helps bring the animals into breeding condition. The lamp must not heat the water.

Read more: Lighting and UVB

FEEDING

In the aquatic phase *T. carnifex* takes a wide range of food: earthworms, freshwater shrimps (*Gammarus*), bloodworms, daphnia and white worms. Frozen bloodworms, fish food and turtle pellets are also taken, but often need to be offered with tweezers at first. A varied diet makes vitamin and mineral supplements unnecessary, and feeder insects can be gut-loaded before they are offered.

In the terrestrial phase feeding is harder, as motionless food is seldom taken on land. Offer live earthworms, white worms, waxworms, small crickets and fruit flies.

Females need to build up reserves for the following spring and may eat large amounts, while males must not be overfed. Adults are fed twice a week. Food from ponds and ditches may contain toxins or disease, so it must not be collected at polluted sites or in waters with wild amphibians.

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

BEHAVIOUR AND HANDLING

Triturus carnifex is robust and easy to keep. In the water the animals snap hard at anything that moves, including each other during feeding, and in the wild they also eat smaller amphibians. Between animals of the same size this seldom causes injuries, but animals of different sizes must be kept separately.

During the breeding season the males are territorial and can be aggressive towards other males, especially if there are many in a small space. An animal that is being bullied is moved. The skin is sensitive, so the animals are handled only when necessary; if an animal must be moved, use a wet hand or a net. The set-ups must always be completely closed, as the animals are good at escaping, and escaped animals must never come into contact with wild populations.

Breeding

SEXUAL MATURITY AND SEXING

The sexes are easy to tell apart. Males are slim with a large cloaca, females more heavily built and often pear-shaped, and the female almost always has a clear yellow dorsal stripe. In breeding dress the male is unmistakable with his tall, serrated crest and the white band along the sides of the tail. The animals reach sexual maturity after 1-3 years, depending on food and temperature. With plenty of food, even in winter, they can breed as early as the year after hatching; in the wild it takes longer. The sexes cannot be told apart as juveniles, so for breeding you need a small group to be sure of both sexes.

MATING

Mating is triggered by a cool winter followed by rising temperature, more light and more food, especially live food. After the winter rest the animals are moved to an aquatic set-up at 15-20 °C; if they are put on a floating board in early spring, they normally enter the water within a few days. The males develop their crest within a few weeks, and then mating begins.

The male displays to the female with tail vibrating and whiplash movements of the tail, arches his back and waves his crest, and there must be an open patch on the bottom for the dance. If the female is interested, the male deposits a spermatophore on the bottom and leads the female over it so that she can pick it up with her cloaca. Fertilisation is internal. The males can become aggressive towards each other, especially when crowded.

EGGS AND LARVAE

The female begins laying eggs a few days after mating and continues for several weeks, 150-400 eggs in all. Each egg is laid singly in the leaf of an aquatic plant: the female chooses the leaf, folds it around the egg with her hind legs and presses it together, and the egg sticks the leaf fast. The eggs are pale, 1.8-2 mm in diameter and have a jelly capsule of about 6 mm. Canadian pondweed (*Elodea*) and water forget-me-not have leaves of the right size, and strips of thin plastic of about 1 cm also work. The female prefers to lay where the plants stand dense.

The parents eat eggs and larvae, so the folded leaves are removed and moved to a separate tub. About half of the eggs die within 1-2 weeks; this is due to a chromosome defect that the whole genus has, and is normal. The dead eggs are quickly attacked by fungus and are removed so that the fungus does not spread. The eggs hatch after 2-5 weeks, depending on the temperature; at 18-21 °C it takes 2-3 weeks.

The newly hatched larvae are about 1 cm and live on the yolk for the first few days. After that they are predators: first infusoria, then cyclops and small daphnia, later larger daphnia, white worms and bloodworms. In time some larvae take frozen bloodworms and fish food. The larvae are fed daily. They live freely in the water column, so the water must be 10-15 cm deep with plants in mid-water. The larvae are far more sensitive to water quality than the adults and require frequent water changes. Large larvae are very greedy and attack each other if they get too little food or are kept too densely; divide them into small groups by size.

METAMORPHOSIS

The larvae metamorphose after 8-16 weeks, depending on food and temperature, when they are 5-8 cm. When all four legs have developed, the colours of the young appear and the external gills are withdrawn. Now the young must be able to climb out of the water, otherwise they can drown: a floating board, a slope or stones sticking up.

The young can also be raised in the water if they are kept in a predominantly aquatic set-up and fed in the water; they then get used to staying there.

REARING THE YOUNG

The newly metamorphosed young live on land like the adults but need smaller food: aphids, white worms, fruit flies and small crickets. They eat large amounts and grow quickly; with plenty of food they are full-grown in a year, but two years is more common. Sort them by size so that the large ones do not take the small ones. The terrestrial set-up must be moist, cool and well ventilated. Young animals often go into the water in spring before they are sexually mature, so they must have access to water.

Health and common mistakes

Triturus carnifex is hardy, and most problems are due to husbandry errors:

- Heat: water above 25 °C stresses the animals and makes them leave the water. Move the set-up to a cooler place.
- Dryness in the terrestrial phase: still animals with dry, dull skin. Raise the humidity, and move them to the water if necessary.
- Poor ventilation: stagnant air causes fungal infections and can poison the animals with carbon dioxide.

- Fungus on eggs and skin: remove dead eggs quickly, and keep water and substrate clean.
- Larvae floating belly-up: underfeeding or crowding can make larvae swallow air. Place the larva in a dish with so little water that it cannot turn over, and give plenty of food; the air often comes out again within half an hour.

The fungus *Batrachochytrium salamandrivorans* (Bsal) is fatal to many salamanders and newts. New animals must be quarantined in a separate set-up, and equipment, water and hands are kept separate between set-ups. Asian salamanders and newts can carry the infection without being ill and must never come into contact with the species, either directly or via water and equipment. Captive-bred animals less often carry diseases and parasites than wild animals. If an animal becomes ill without a clear cause, contact a vet who knows amphibians.

Read more: Quarantine and hygiene Read more: Buying animals: captive-bred, wild-caught and transport

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.