



# Vietnamese crocodile newt

(*Tylototriton vietnamensis*)



Joining forces to save Vietnam's species  
**EAZA Campaign 2024-2025**





## General Introduction

Vietnam is one of the global hotspots of biodiversity and is a megadiverse country. Discoveries of new species are regularly reported from it, including crocodile newts. Crocodile newts (genus *Tylototriton*) have become the subject of intensive systematic research in recent years, which has led to an enormous gain in knowledge. It has become apparent that some of the species previously assumed to be widespread actually conceal many independent species, which have then been redescribed. As a result, the genus *Tylototriton* is now the most diverse of the salamander family (Salamandridae), with nearly 40 species, making it the most species-rich genus within this family. This also revealed that some crocodile newts have a very small distribution and are therefore highly endangered. Remarkably, 16 of these species have been described in the past five years, and there remain several unnamed taxa, which contain cryptic species that are morphologically difficult to distinguish. At the current time, seven species and eight taxa are known from Vietnam, all scientifically described in the past two decades.

## Biology

The Vietnamese crocodile newt (*Tylototriton vietnamensis*) belongs, within the caudate amphibians, to the salamander family (Salamandridae). Crocodile newts, scientifically known as the genus *Tylototriton*, inhabit montane forest areas throughout the Asian monsoon climate zone.

*T. vietnamensis* is one of the only relatively recently (2005) described crocodile newt species and was previously considered to belong to the black knobby newt (*T. asperrimus*) – now being restricted to a small area in southeastern China. Therefore, animals from Vietnam described as *T. asperrimus* in older literature may also represent *T. vietnamensis* or other crocodile newts described later,



such as Ziegler's crocodile newt (*T. ziegleri*), which is similar in appearance and that was described eight years later from northern Vietnam, in the year 2013.

The Vietnamese crocodile newt is a small representative of the genus. Typical for the genus are the many warts on the skin of the upper side and on the sides, which are rather small in *T. vietnamensis*. Also typical are the large parotoid glands (ear glands) on the back sides of the head. Characteristic of the genus are three warty, longitudinal, well-developed dorsal ridges reminiscent of crocodiles. Females reach a snout-vent length of up to 8.4 cm and have a much stockier build than the males, which grow to a maximum length of 7.5 cm. The sexes can also be identified by their cloaca: Females show a more punctate cloacal opening; in males it is slit-shaped. The laterally flattened, tapering tail is slightly longer than the head and body and has a fringe above and below. 20 cm total length can be reached. The head is broader than the trunk and somewhat flattened. Webbed toes are absent except for the very base of the toes. Vietnamese crocodile newts are uniformly black, brown to gray in color. While on land, they are noticeably darker than in water. In sharp contrast to this rather dusky base coloration, finger and toe tips and the underside of the tail are bright yellow to red-orange in color. Some animals show similarly colored rib knots, occasionally the uppermost part of the tail is also yellow to red-orange.

The body coloration of the larvae is yellowish, the legs are whitish, the gills are slightly orange. The body is black spotted. After leaving the water to go on land, juveniles measure approximately 53-75 mm and weigh 1.1-2.8 g according to data from husbandry. After metamorphosis, the small crocodile newts are uniformly black or dark brown in color, except for the now bright orange finger and toe tips and the equally bright tail stripe. At the age of one year, the sexes can already be distinguished reasonably well.

*T. vietnamensis* inhabits a very small range. It is not locally abundant and so far is known to inhabit only 22 ponds across its range. It is known to inhabit only three provinces of northern Vietnam. The type locality is the Tay Yen Tu Nature



Reserve in Bac Giang Province. Other localities are the Mau Son mountain in Lang Son Province and Yen Tu and Dong Son - Ky Thuong nature reserves in Quang Ninh Province. These localities are relatively small remnants of lowland rainforest with granite rocks. Modelling indicates that no significant, previously undiscovered range expansions are to be expected.

The Vietnamese crocodile newt is an obligate forest dweller. It is associated with ponds in lowland secondary evergreen forest characterised by a vegetation community of hardwoods, bamboo and shrubs. *T. vietnamensis* inhabits altitudes range from about 180 to 980 m above sea level. Humidity in the habitat varies between 68 and 100 %, whilst the temperature is between about 24 and 34 ° C. The region is characterised by the summer monsoon. Most observations of the species have occurred around temporary pools during the breeding season. Outside of this period the species is predominantly terrestrial.

Breeding occurs during the rainy season between April and July. At the beginning of this period, small waterholes such as shallow pools, large puddles or temporary shallow lakes are formed, which are then immediately visited by the males. They clearly prefer the water at this time of the year and only very few males can still be found on land – provided sufficient rainfall ensures such temporary water bodies are available. These mating waters located in the forest, are small, shaded, and muddy; often they are only a few inches deep. Newts prefer areas that are at least half shaded by trees. Waters in cleared areas are therefore not used. Unlike males, females probably spend short periods in the water only for courtship. During courtship, a mating dance takes place, also known from other congeners. The male repeatedly bumps the female with his head and undulates his tail in the direction of the female. Finally, it deposits several spermatophores (sperm capsules) and directs the female over them by means of the gyratory movements with the cloaca. After mating in the water, the females lay their eggs under leaves on the forest floor, up to 2 m from the bank under foliage on the forest soil.



Reproduction is by aquatic larval development and coincides with the rainy season when pools and ponds form. Densely vegetated pools with relatively long hydroperiods appear to be preferred by the species, and both eggs and larvae have been recorded in such pools from April to July. Under keeping conditions, it was observed that females also can produce two clutches in one year. Clutch size varies greatly; clutches of 5-85 eggs have been recorded so far from nature, and up to 178 eggs under keeping conditions. The eggs have a diameter of about 6-14 mm. After oviposition, they are transparent and then turn increasingly brownish, but remain translucent. The larvae measure about 15.5-18 mm after hatching. According to the limited data available so far, metamorphosis in the wild occurs at a length of about 4.5 cm and a weight of 0.6 g in October. Under keeping conditions, metamorphosis takes place about 6–7 weeks after hatching at total lengths of 53.1 – 74.7 mm. Under keeping conditions, the duration from hatching to metamorphosis varies between two and six months, depending on husbandry conditions. Adult crocodile newts and their larvae are carnivorous, feeding on a diverse food spectrum consisting of aquatic crustaceans, worms, snails, insects and spiders.

## Status

The Vietnamese crocodile newt has only a very small distribution area. The species is dependent on forested areas, which are increasingly being cleared for agricultural land. It can cope with some habitat disturbance and is not necessarily dependent on primary forests, but large-scale logging and habitat conversion for agriculture have rendered large portions of its range uninhabitable. Only small, fragmented remnant forest stands remain. Mining is also a threat, as the range is located in a region with large coal deposits and the impacts of the mines (infrastructure, pollution) are present, even close to the borders of the protected areas. Niche modeling has shown that potentially undetected occurrences of this newt would only be expected in highly fragmented habitats threatened by deforestation. Accordingly, no significant expansion of the distribution range can be assumed, and the discovery of many more occurrences is virtually impossible.



Overall, only a few small and highly fragmented habitats remain. Recent satellite imagery reveals that the forest of the species' only known localities is almost entirely surrounded (and in parts intersected) by agricultural land.

A further threat, as with all crocodile newts, is the collection of the animals for traditional medicine as well as for the national and international pet trade. The genus *Tylototriton* has therefore been listed in Appendix II of the Convention on International Trade in Endangered Species (CITES). Individuals from Tay Yen Tu Nature Reserve and Mau Son Mountain are collected from the wild and sold at nearby tourist sites, while pet shops in the north and south of Vietnam contain the species. Searches of online platforms advertising this species have confirmed its presence in the international pet trade. The Vietnamese crocodile newt is listed as „Vulnerable“ (VU) in the IUCN Red List, as this species has an estimated extent of occurrence (EEO) of 6,639 km<sup>2</sup>, it occurs in ten or less threat-defined locations, there is a decline in the extent and quality of its habitat, and there is likely a decline in the number of mature individuals due to collection for the pet trade and traditional medicine. According to IUCN, the population trend is decreasing. *T. vietnamensis* is listed as Endangered in the Vietnamese National Red List. Protection status according to EU Species Protection Regulation is in Appendix B, and protection status in Germany is „specially protected“.

An intensive survey during one breeding season counted only 216 individuals for the biggest population currently known. Habitat loss due to rapid agricultural expansion and its projected increased impact on forest quality in Vietnam, and overcollection for trade and traditional medicine are very likely causing continued population declines in this species.

## Conservation action

On the IUCN list, the upgrade from „potentially endangered“ (near threatened, NT) to EN occurred in 2016 after new knowledge of its only small range and



habitat threats were incorporated into the assessment. It was recently downgraded to the IUCN status Vulnerable, as this species is subject to conservation actions through the Institute of Ecology and Biological Resources (IEBR), the Me Linh station for Biodiversity, Vietnam and Cologne Zoo, Germany including conservation breeding programmes, capacity building, and public awareness. Over 400 individuals have been successfully bred and raised to metamorphosis at Cologne Zoo, including the first F2 breeding. Progeny from the zoo's breeding programme have been distributed to other European zoos and to private breeders within the Citizen Conservation Programme as insurance populations, with some also being repatriated from Cologne Zoo to Vietnam, where they are held in IEBR's Melinh station and have been successfully bred there already. Actions having taken in place for this species thus are another Reverse the Red example.

But the most important conservation measure still is the improved preservation of the nature reserves in the distribution area.

Another important step towards ensuring this species' persistence is to evaluate the current population status and the actual distribution, including the updated, topical threat situation.

## Campaign objectives

The Vietnamese crocodile newt is a prototype for the global threat to amphibians and the endangerment of biodiversity through deforestation and human activities and thus can serve well as an ambassador for these issues in zoos. The species is part of a comprehensive in-situ/ex-situ biodiversity conservation project in Vietnam, which is being carried out by the IEBR and Cologne Zoo, among others, and thus demonstrates the possibilities of such a holistic species conservation approach in line with the „One Plan Approach“ to biodiversity conservation. In addition, a good part of the knowledge about the Vietnamese crocodile newt could be gained from zoo keeping, so that extensive biological knowledge



important for species conservation could be gained from this species in a relatively short time after its discovery. It also represents a Reverse the Red case to tell, as it was recently downgraded from EN to Vu due to the outcomes of the European conservation breeding attempt, initiated by partners Cologne Zoo and IEBR.

To expand conservation measures for the Vulnerable Vietnamese crocodile newt, the EAZA Vietnam campaign will foster, together with its partners IEBR, Tay Yen Tu NR, Yen Tu NR, and CRES:

- Continued population monitoring;
- Genetics (for new populations);
- In country conservation breeding (investment in ongoing assurance colony project at Melinh Station for Biodiversity);
- Extension of the European breeding program, viz. advertise for more participating zoos and thus more breeding successes;
- Restocking measures, if necessary, and inoculation of uninhabited ponds in the area of occurrence;
- Increased conservation measures, such as strengthening ranger patrols;
- Yen Tu and Mau Son are tourist sites with many visitors, thus tourists can be informed through signboards, awareness;
  
- Another crocodile newt similar in appearance, *Tylototriton zieglerei*, is likewise threatened, less known than *T. vietnamensis* and occurs nearby the range of occurrence of *T. vietnamensis*, so that conservation activities could easily be combined;
- For *T. zieglerei* the site Quan Ba, in Ha Giang Province, could be recommended, after population monitoring, for a nature reserve; also





development of signboards would make sense here (this site is also famous for other species such as the Tonkin snubnose monkey, or the just recently discovered, seemingly very rare mossy frog species *Theleoderma khowii*, which also would allow for inclusion of *Theleoderma* mossy frogs, held by many zoos, into campaign activities).





Vietnamese crocodile newt (*Tylototriton vietnamensis*) at the Cologne Zoo. Phot. T. Ziegler