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SALAMANDERS AND NEWTS

Eastern Newt

Notophthalmus viridescens

Notophthalmus viridescens is a North American newt of 7-14 cm with three life stages: aquatic larvae, bright orange terrestrial juveniles (efts) and olive-green adults with red, black-edged spots. Adults are easy to keep in a planted aquarium, a cool winter promotes breeding, and the species is highly vulnerable to the Bsal fungus.

Family: Salamandridae

Mild skin toxins

KEY FACTS

THE ANIMAL

Adult size	**7-14 cm** total length incl. tail
Lifespan	**12-15 years**
Active	**By day and at night**
Lifestyle	**Terrestrial and 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	**60 × 30 × 30 cm** L × W × H for 4 adults
Temperature, day	**18-23 °C**
Temperature, night	**16-20 °C**
Humidity	**70-90%**
Water	**Aquaterrarium** depth 10-20 cm
Water temperature	**18-23 °C**
UVB	**Optional**
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	**24-36 months**
Eggs per season	**200-400**
Clutches per year	**1**
Hatching	**21-56 days**
Larval period	**60-150 days** from hatching to metamorphosis
Larval diet	**Small aquatic invertebrates (daphnia, mosquito larvae)**
Parental care	**None**

PROTECTION AND PAPERWORK

CITES	**Not listed**
EU annex	**Not listed**
IUCN	**Least Concern (LC)**

About the species

Notophthalmus viridescens goes through three distinct life stages. The larva lives in water with feathery gills. After 2-5 months it metamorphoses into a terrestrial juvenile salamander, an eft, of 3-5 cm with dry, rough skin and a bright red or orange colour with two rows of black-edged red spots. After two to three years on land (up to seven in some populations) it returns to

the water as an adult. Adults are most often 7-12 cm long, yellow-brown to green-brown on the back, with a yellow belly and small black spots and, depending on the form, red spots with a black edge along the sides. The skin is slightly moist and rough, and the eyes are small with horizontal pupils.

In the breeding season males can be recognised by a swollen cloaca, a taller, keel-shaped tail fin, broader hind limbs and rough, black nuptial pads on the inside of the thighs and on the toes. There are four regional forms, which DNA studies do not regard as true subspecies: the red-spotted form (largest, up to 14 cm, rows of red spots with a black ring), the striped form (smallest, under 10 cm, red spots fused into a broken band, often skips the eft stage), the central form (up to 12 cm, few small spots or none) and the peninsula form in Florida (dark, without red spots, often neotenic, that is, it becomes sexually mature in larval form with gills). Neoteny also occurs in other populations, and some animals skip the eft stage entirely.

Skin toxin: The skin contains tetrodotoxin, a potent nerve toxin that deters predators. The content is low compared with the western North American *Taricha* species. Efts have roughly ten times the concentration in the skin of adults: a whole eft contains 0.014-0.11 mg, an adult 0.005-0.057 mg. The red spots do not contain more toxin than the rest of the skin, but efts with many spots have the most toxin in total, and the red colour is a warning to predators. The toxin acts when it enters the body, so never put the animal in your mouth, keep secretions away from eyes and mucous membranes, and wash hands after touching. The larvae have only a little toxin.

Distribution and habitat

Notophthalmus viridescens is distributed across eastern North America, from the southern Canadian provinces south to Florida and southern Texas and west to Minnesota, Kansas and Oklahoma. The red-spotted form is found in the eastern and north-eastern USA and Canada, the central form in the central states and the Deep South, the striped form on the coastal plains of the Carolinas and the peninsula form on the Florida peninsula.

> **Native range:** United States and Canada.

HABITAT

Larvae and adults live in small, often muddy bodies of water: ponds, small lakes, ditches, swamps, flooded areas and slow streams, often without fish and with abundant aquatic vegetation. The species is found in both deciduous and coniferous forest. Adults tolerate both very shallow and deep water and forage both by day and at night. Efts are nocturnal and most active on rainy nights, while they hide in the leaf litter in dry weather.

In winter, animals in dry areas go underground or under logs, but in permanent water they are active all winter and forage under the ice. If the water dries up, adults leave it temporarily. The species breeds from late winter to early spring.

Care

THE ENCLOSURE

Adults are kept in a planted aquarium with a small land area, stones or driftwood breaking the water surface. For four adults an aquarium of 60 × 30 × 30 cm suits. The water must not have strong flow: use a filter with gentle outflow, or break up the current with plants and furnishings. The species prefers still water.

Efts are fully terrestrial and need a humid forest-floor enclosure. Alternatively they can be kept in simple plastic containers with damp soil or damp kitchen paper, which are cleaned and misted regularly. Lids must always fit tightly, because the young are good at escaping. Provide hides of cork bark or bark and place the food in shallow dishes so that leftovers do not contaminate the soil. Keep efts at the same temperatures as adults.

TEMPERATURE

In spring and summer 18-23 °C suits, and at night it may be a couple of degrees cooler. In winter the water temperature is lowered to 5-10 °C, and the cool winter promotes breeding behaviour. The species is active in cold winters and forages under the ice, so it does not need a true hibernation, but the water must not approach freezing.

Heat is poorly tolerated. In the wild the animals leave the water when it gets too warm. Keep the aquarium cool, and avoid direct sun.

Read more: Brumation and the seasons

HUMIDITY AND MISTING

Adults live in water, so the humidity above the water matters less. Efts need 70-90 % humidity and a damp, but not wet, substrate. Mist the enclosure regularly, and keep soil and leaf litter damp. In dry, sunny weather efts seek cool, humid cover.

Read more: Humidity, misting and ventilation

WATER AND WATER QUALITY

Adults are kept in water where depth is not decisive. 10-20 cm of water with plants and hides is plenty, and the animals use all the space. The water must be still and clean. Use tap water from which chlorine and chloramine have been removed, and change part of the water every week. Remove food remains immediately.

Amphibians absorb substances through the skin, so soap, cleaning agents, hand cream or insecticides must never get into the water. Efts need a shallow dish of clean water.

LIGHTING AND UVB

UVB is not necessary for *N. viridescens*, but can be used. Shade and plant cover are more important than bright light.

Shorter days and cooler water in winter promote breeding behaviour.

Read more: Lighting and UVB

FEEDING

N. viridescens eats anything small that it can overpower. Adults take chopped earthworms, blackworms and bloodworms (live or frozen) and strips of beef heart. Some also take pellets for amphibians or fish, but these should not be the main food. In the wild adults eat worms, small amphibians and amphibian eggs, small fish, insects and crustaceans.

Efts are harder to feed because of their size and are given small earthworms, white worms, small crickets, fruit flies and very small waxworm and mealworm larvae. The larvae eat daphnia, small snails and beetle larvae, and in captivity newly hatched brine shrimp, daphnia and microworms.

Read more: Feeder animals: keeping and breeding

BEHAVIOUR AND HANDLING

Adults swim fast with the flattened tail and are slow on land. They are best kept in pairs or in a small group, but males can compete and fight over the females. Watch for females that are constantly harassed by males, and remove them if necessary.

Handling should be rare. Wash hands afterwards, and avoid getting secretions in eyes and mouth.

Breeding

SEXUAL MATURITY AND SEXING

In the breeding season males are recognised by a swollen cloaca, a tall, keel-shaped tail fin, broader hind limbs and black nuptial pads on the thighs and toes. Females are round with eggs. Sexual maturity is reached at around 3 years of age, and both males and females breed for the first time at about this age.

Provide both males and females. Animals in captivity that are fed generously can become sexually mature earlier.

MATING

Mating takes place from late winter to early spring. The male grasps the female with his hind limbs behind her forelimbs and rubs his chin against her snout while waving his tail and spreading pheromones. Then he lets go, positions himself in front of her and deposits a spermatophore on the bottom, which the female picks up. It may look as though the female is being suffocated, but she rises to the surface when she needs air.

A cold winter in which the water is cooled down to 5-10 °C promotes mating. Males also grasp other males by mistake. Females that are constantly in amplexus can become stressed and should be removed.

EGGS AND LARVAE

The female lays 200-400 single, jelly-coated eggs on aquatic plants. Egg-laying takes several weeks, because she lays only a few eggs a day. The eggs hatch after 3-8 weeks, depending on temperature. The female does not tend the eggs, and adults may eat them, so eggs and larvae are moved to a separate tank. Bad eggs are white and opaque and are removed at once.

The larvae live on the yolk for the first few days and must then be given small, live foods several times a day: newly hatched brine shrimp, daphnia, microworms and blackworms. Change part of the water every day, and sort the larvae by size, because the large ones eat the small ones. Allow 4-8 litres of water per larva as they approach metamorphosis.

Read more: Rearing tadpoles

METAMORPHOSIS

The larval period is 2-5 months. Metamorphosis is seen in the gills shrinking, the colour changing and the animals gulping air from the surface. Provide an easily accessible land area and a tight lid, because the young escape. Most salamanders stop eating during metamorphosis.

The larvae become efts, which are fully terrestrial and need a humid enclosure. Once the gills have disappeared completely, they can be placed in the water dish of the enclosure, and they go on land by themselves when ready. Some populations and forms skip the eft stage, so ensure access to water straight away.

REARING THE YOUNG

Efts in the enclosure are fed small earthworms, white worms, fruit flies and small crickets. They remain terrestrial for two to three years (up to seven in some populations) and return to the water by themselves when they are ready to breed. Give them access to a water dish, and move them to an aquarium with a land area when they stay in the water.

Surplus young should not be released into the wild, because the animals can carry diseases and affect local populations. Pass them on to other keepers instead.

Health and common mistakes

Adult *N. viridescens* are hardy in a well-kept aquarium. The most common problems are:

- Heat. The animals leave the water when it gets too warm. Keep the water below about 23 °C.
- Poor water quality. Ammonia and nitrite cause skin problems and illness.
- Parasites. Leeches are an important cause of death in wild adults.
- A substrate that is too dry or too warm for efts, which dry out.

Bsal (*Batrachochytrium salamandrivorans*) is a deadly fungus that mainly affects salamanders, and *N. viridescens* has a high risk of dying from it. At 6 and 14 °C infected animals become ill and die, while animals at 22 °C do not become infected, so the cool winter is precisely the most dangerous time. Quarantine is therefore important: new animals are kept apart for several weeks and tested with a skin swab before they join other salamanders and before they get a cold winter. Disinfect nets and equipment, and do not share equipment between aquaria.

Contact a vet with knowledge of amphibians if an animal stops eating, has white or red patches on the skin, swells up or lies at the surface.

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.