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SALAMANDERS AND NEWTS

Fire Salamander

Salamandra salamandra

Salamandra salamandra is the black salamander with yellow spots or stripes that lives in European deciduous forests. It grows to 14-21 cm, is nocturnal and can live for more than 20 years. The species gives birth to live larvae in water, has mild skin toxins and tolerates heat poorly, so it needs a cool and very clean enclosure.

Family: Salamandridae

Mild skin toxins

KEY FACTS

THE ANIMAL

Adult size	**14-21 cm** total length incl. tail
Lifespan	**20-30 years**
Active	**At night**
Lifestyle	**Terrestrial**
Habitat	**Temperate woodland and meadow**
Skin toxins	**Mild** Wash your hands after contact and keep your fingers away from your eyes and mouth
Difficulty	**Intermediate**

CARE

Min. enclosure	**80 × 40 × 30 cm** L × W × H for 3 adults
Temperature, day	**12-20 °C**
Temperature, night	**10-15 °C**
Humidity	**75-90%**
Water	**Water dish** depth 2-3 cm
UVB	**Not required**
Winter rest	**4-6 °C** 6-10 weeks
Diet	**Insects and worms/snails**
Kept	**In pairs or one male with several females**

BREEDING

Reproduction	**Live-bearing**
Development	**Gives birth to larvae in water**
Sexually mature	**24-48 months**
Litter size	**20-40 young**
Clutches per year	**1**
Larval period	**40-150 days** from hatching to metamorphosis
Larval 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

Salamandra salamandra is one of the most recognisable amphibians in Europe. The skin is smooth and deep black, and the back is marked with yellow, more rarely orange or red, spots or stripes. The pattern differs from animal to animal, so each individual can be recognised by it. Adults from Central Europe are usually 14-17 cm from snout to tail tip, a few up to 20-21 cm. The two main Central European forms, *S. s. salamandra* (spotted) and *S. s. terrestris* (striped), differ clearly in pattern,

and as a rule only the striped form exceeds 20 cm. The tail is slightly shorter than the head and body together, and the legs are short and sturdy. The female is stockier than the male. Males rarely weigh more than 20 g, gravid females more than 50 g, and the heaviest animals up to 71 g.

Skin toxins: The species has large poison glands behind the eyes (the parotoids) and a row of glands along each side of the back all the way to the tail. The glands release a whitish secretion containing salamander alkaloids such as samandarin and samandaridin. A badly stressed animal can squirt the secretion in thin jets for more than a metre. In humans the secretion usually causes only a slight burning sensation on the skin, but in sensitive people and small children it can cause nausea, vomiting and difficulty breathing. Young dogs and cats that bite the animal can develop lockjaw, neck stiffness and heavy drooling, and in a few cases they die. Wash your hands before and after working in the enclosure, and do not touch your eyes and mouth afterwards. The black-and-yellow pattern is a warning to predators.

Populations in North Africa, on Corsica and in the Middle East were formerly included under the name of this species and are now regarded as separate species. Live birth of larvae is rare among salamanders. In some populations in north-western Spain, fully formed young are born on land instead.

Distribution and habitat

Salamandra salamandra occurs across large parts of Central and Southern Europe: from the Iberian Peninsula through France, the Benelux countries and Germany to the Alps and the Carpathians, down through Italy and the Balkans to Greece and east to Ukraine, Romania and Bulgaria. In the north the range limit runs through northern and central Germany. The species is absent from Scandinavia, Great Britain and Ireland. About 14 subspecies are recognised, most of them on the Iberian Peninsula, and they differ from one another in size, pattern and way of life.

Populations in North Africa, on Corsica and in the Middle East are now regarded as other species and are not included on the map. In the Netherlands, Belgium and parts of western Germany many populations have disappeared following outbreaks of salamander plague (Bsal), and the overall population is declining.

Read more: Quarantine and hygiene

> **Native range:** Portugal, Spain, France, Belgium, Netherlands, Luxembourg, Germany, Switzerland, Austria, Italy, Czechia, Slovakia, Poland, Hungary, Slovenia, Croatia, Bosnia & Herzegovina, Serbia, Montenegro, North Macedonia, Albania, Greece, Bulgaria, Romania and Ukraine.

HABITAT

Salamandra salamandra lives in moist deciduous and mixed forests in hilly and mountainous country, especially beech forests with springs and streams, most often at 200-400 m altitude. The species does occur from sea level up to about 1,000 m in the Bavarian Alps, and it tolerates altered surroundings so well that it is also seen at forest edges and in parks and gardens. During the day it lies hidden under dead wood, stones and roots. At night and after rain it comes out to eat slugs, earthworms, beetles, spiders and centipedes.

Activity follows the weather. The best weather is around 10 °C, a humidity of 75-90 % and no wind. The animals are active in every month in which the temperature is between about 3 and 12 °C and the air is moist, with a peak in April-May and another in August-September. In winter they hibernate frost-free, often in the same caves year after year, and in hot, dry summers they withdraw. The female deposits the larvae in cold, oxygen-rich, clear water of 8-10 °C, preferably in fish-free springs and the upper reaches of streams. In the lowlands, still water is also used.

Read more: Humidity, misting and ventilation

Care

THE ENCLOSURE

For 2-3 *Salamandra salamandra*, the enclosure needs a floor area of at least 80 × 40 cm, preferably 100 × 50 cm, and a height of about 30 cm. It must have large mesh areas, because stagnant air and stagnant moisture cause disease, and the lid must be completely secure: the species is a skilled escape artist, and young animals climb well. Three things are essential: hiding places, the ability to regulate the moisture of the skin themselves, and very high hygiene.

The substrate must be relatively dry, because the animal gets its fluid by soaking in the water bowl at night. Firmly packed and dried clay, bentonite or fertiliser-free soil are suitable, and a slight slope gives a humidity gradient. The most hygienic setup is a box with newspaper without coloured print (replaced every 3-6 weeks), a water bowl and a damp box with sphagnum (replaced about every 8 weeks), and hides made of cork or clay. Faeces are removed immediately, because otherwise they cause skin problems. Place the enclosure in an unheated room without sun through the window, preferably not facing south. Never use soil, moss or leaves from the wild without sterilising them first, because they can carry Bsal.

Live plants require light and moisture that do not suit the species, and the animals like to dig down into the plant pots. Artificial plants that can be cleaned are a good alternative.

TEMPERATURE

Salamandra salamandra is a cool-climate animal. By day the temperature should be 12-20 °C, which an unheated room provides in the active part of the year, and by night 10-15 °C. If the temperature rises above 20 °C for several days, cooling is needed, because above about 23 °C many animals lose their appetite and develop poor skin. 26-27 °C can be tolerated briefly if it becomes markedly cooler at night. Heat is the greatest danger, especially in heatwaves, in rooms with sun and under a roof.

An annual winter rest gives healthier animals and more regular breeding. It is kept at 4-6 °C for 6-10 weeks in the period November-March. The animals are placed individually in small boxes with black peat and slightly damp sphagnum, in a cold cellar or a refrigerator, and checked every 14 days. Start 2-3 weeks after the last feeding. Afterwards acclimatise them slowly to 15-17 °C, give a bath in shallow water, and wait 2-3 days before feeding. If the enclosure is at 9-12 °C in winter, the rest can be omitted. 10-12 °C all year round is too cold, because the animals need warmer periods for their metabolism. A summer rest of 8-12 weeks with very little food and almost no misting is also natural.

HUMIDITY AND MISTING

The humidity should be about 75-90 %, while the substrate must be relatively dry. Too much ground moisture inevitably causes skin problems. The moisture therefore sits in the water bowl, the damp box and the hides, so that the animal can choose for itself between damp and dry.

Spray only lightly, especially in summer, about twice a week, and let the surface dry after 2-3 hours. In boxes with newspaper, no spraying is done at all. A light mist in warm, thundery weather can trigger mating, while heavier spraying ends a summer rest. Use dechlorinated tap water or rainwater, and avoid stagnant air.

WATER AND WATER QUALITY

All animals must have a water bowl with an easy exit, because the species is a poor swimmer and can drown. The bowl holds 2-3 cm of water and is wide enough for the animal to lie in. It is checked every 1-2 weeks, and every day during the breeding season. Use dechlorinated tap water (let it stand for a day) or rainwater, and change it when it is dirty.

For a gravid female, a shallow, roomy bowl must be available towards the end of gestation, because the female deposits the larvae in water, mostly at night. Move the larvae immediately to a rearing container of their own (see breeding).

LIGHTING AND UVB

The species does not need UVB. It is nocturnal, and the daylight in an ordinary room with windows is enough, as long as the sun does not shine directly in. Strong light makes the animals hide.

If you want plants or want to show the animals off, LED lighting on a timer can be used, because it does not warm the enclosure. Avoid lamps that give off heat.

Read more: Lighting and UVB

FEEDING

Salamandra salamandra eats only animal food. In the wild at least 60-70 % of the diet consists of slugs, earthworms, spiders, centipedes and beetles. In the enclosure, earthworms, crickets, field crickets and terrestrial isopods are good feeder animals. Earthworms are cut into pieces for small animals. Soaked tortoise pellets can be given with tweezers and are enriched with calcium and vitamins. Small plant-eating slugs such as *Deroceras reticulatum* can be given as an extra treat, while *Arion* slugs are unsuitable. Collected slugs must not be used in areas where Bsal occurs.

Adults are fed about every 10-14 days, young animals every week. The animals should always be slightly hungry and take the food immediately. The feeder animals must be well fed and dusted with a calcium and vitamin supplement, otherwise the animal develops rickets. Remove feeder animals that are left after 1-2 days, especially crickets. Breaks of a few weeks are

natural.

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

BEHAVIOUR AND HANDLING

Salamandra salamandra is shy and nocturnal and spends most of the day in hiding. Most animals learn to take food from tweezers and come out when feeding. The species is best kept in pairs (1 male and 1 female) or as 1 male and 2 females. Larger groups can work, but the males can stress one another and harass the females, and rearranging the group can result in the animals not getting on together. Groups of males alone can go well.

Constant stress weakens the immune system. Keep the species separate from other amphibian species. The animal is handled only when necessary, with wet, clean hands, because the skin is sensitive and the secretion irritates the mucous membranes. Dogs and cats must be kept away from the animal.

Breeding

SEXUAL MATURITY AND SEXING

The species reaches sexual maturity at 2-4 years of age. Slow-growing animals mature later. Outside the mating season the sexes are difficult to tell apart. In summer the male's cloaca is swollen, with a distinct lengthwise slit. The male is also slightly slimmer than the female but often has a broader head, and a gravid female can weigh more than 50 g. A pair (1 male and 1 female) or 1 male and 2 females suit breeding.

MATING

Mating takes place on land, mostly in summer and autumn, but it can happen all year round when the weather suits. The male creeps under the female, grips her forelegs and deposits a spermatophore, which the female takes up into her cloaca. The female can store the sperm for up to two years, so fertilisation can take place long after mating. A light mist from a flower sprayer in warm, thundery weather or when air pressure is falling can trigger mating. The moisture must have dried off again after 2-3 hours. A cold winter rest and seasonal variation in light and temperature give more regular breeding. If you see a spermatophore, mating has taken place.

EGGS AND LARVAE

Salamandra salamandra does not lay eggs but gives birth to live larvae (larviparity), which is rare among salamanders and newts. The larvae develop inside the female's body, and the egg membranes burst at birth. Mating in summer or autumn typically produces larvae the following spring. Gestation lasts from about 12 weeks to 8-9 months, because the female stores the sperm, so fertilisation can occur long after mating. In a first pregnancy many of the eggs are often infertile. The female deposits the larvae in water, mostly at night, in bursts over several days or weeks. A litter averages about 30 larvae, from a few up to 70 and in rare cases 80, depending on the female's age, size and condition. The larvae are 25-35 mm, have external gills and four legs from the start and can hunt straight away.

Move the larvae at once to a rearing tub. They are predators and strongly cannibalistic, so only larvae of the same size are kept together, and there must be plenty of food. Shallow plastic trays of 20 × 20 cm with 4-8 cm of water hold 4-5 larvae, and in trays of 40 × 30 cm with 5 cm of water allow about 0.5 l per larva. The water must be 15-20 °C, well oxygenated (airstone and pump), have a pH of 6-7 and be free of ammonia and nitrite. Leaves of oak or *Terminalia catappa* help against fungus. Change the water every 2 days and remove uneaten food at once. The larvae are fed daphnia, copepods, tubifex, enchytraeids, cleaned mosquito larvae or small pieces of earthworm. White mosquito larvae (*Chaoborus*) are not recommended.

METAMORPHOSIS

The larval period depends on temperature and food. At 15-20 °C it takes 8-12 weeks, under very favourable conditions as little as 4-6 weeks, and at about 10 °C 3-5 months. It is normal for not all larvae to complete metamorphosis, because the weak are eaten by siblings. As metamorphosis approaches, the gills become smaller, the fin fold on the tail disappears, the black-and-yellow pattern becomes clear, and the head changes shape.

The larva must now be able to leave the water easily so that it does not drown. Use a container with a sloping bottom and 1-2 cm of water, or add a sloping stone. Metamorphosis takes about 10 days, and the animal does not eat during that time. Once the young have moved onto land, they are transferred to a small, damp enclosure.

Read more: Rearing tadpoles

REARING THE YOUNG

Newly metamorphosed young must be kept much more humid than adults for the first few weeks. The enclosure should not be large, so the feeder insects are easily found. A plastic box of 20 × 20 cm is enough for 3-5 young. The substrate is damp kitchen paper, and there is no water bowl for the first three months. After that you can switch to a natural substrate.

The young are fed small crickets, springtails, small isopods and pieces of earthworm, every week, and the food is dusted with calcium and vitamins. Sort the young by size. Rickets is a common problem with incorrect feeding.

Health and common mistakes

The species is robust and can live for more than 20 years, but incorrect care quickly causes problems:

- Skin problems: A wet substrate, too high humidity and poor hygiene are the most common causes, and they are difficult to treat. Keep the substrate dry, and remove faeces immediately.
- Overheating: Above 20 °C for several days stresses the animal, and above about 23 °C many animals lose their appetite and develop poor skin.
- Rickets: Caused by a lack of calcium and vitamins. Dust the feeder animals, and feed them well.
- Fungus in larvae: Arises from uneaten food and poor water quality. Sick larvae are separated.
- Shedding: If a fold of skin sits tightly around the neck, young animals can be strangled. Provide damp hides.
- Escape: Escaped animals are hard to find and dry out quickly.

Salamander plague (Bsal, *Batrachochytrium salamandrivorans*) is a fungal disease that causes deep sores in the skin and kills *S. salamandra* within a short time. Entire populations can disappear within a few months. East Asian salamanders can carry the infection without becoming ill. In captivity, sick animals can usually be treated successfully if the disease is discovered in time. Quarantine new animals, have them tested with a skin swab, use separate equipment for each population, and disinfect tools, hands and shoes. Do not use material from the wild without sterilising it, and keep the species separate from other salamanders and amphibians. Never release animals into the wild. If there are sores, weight loss or loss of appetite, see a vet with expertise in amphibians.

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.