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SALAMANDERS AND NEWTS

## Marbled Salamander

# *Ambystoma opacum*

*Ambystoma opacum* is a small, stocky salamander of 9-11 cm from eastern North America, black with crossbands of white or silvery grey. The species has an unusual breeding biology: mating and egg-laying take place on land in autumn, and the female stays with the eggs until rain fills the hollow and the larvae hatch. The adults live hidden and do best kept cool.

Family: Ambystomatidae  Former name: *Salamandra armigera; Salamandra fasciata*  **Mild skin toxins**

KEY FACTS

### THE ANIMAL

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|---|---|
| Adult size | **9-11 cm**<br>total length incl. tail |
| Lifespan | **4-10 years** |
| Active | **At night** |
| Lifestyle | **Terrestrial and burrowing** |
| Habitat | **Temperate woodland and meadow** |
| Skin toxins | **Mild**<br>Wash your hands after contact and keep your fingers away from your eyes and mouth |
| Difficulty | **Beginner** |

### CARE

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| Min. enclosure | **40 × 25 × 25 cm**<br>L × W × H for 1 adult |
| Temperature, day | **18-24 °C** |
| Temperature, night | **16-20 °C** |
| Humidity | **80-95%** |
| Water | **Water dish**<br>depth 1-2 cm |
| UVB | **Not required** |
| Diet | **Insects and worms/snails** |
| Kept | **Singly or in groups** |

### BREEDING

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| Reproduction | **Egg-laying** |
| Development | **Larvae in water** |
| Egg-laying site | **On the ground** |
| Sexually mature | **12-24 months** |
| Eggs per season | **50-200** |
| Clutches per year | **1** |
| Larval period | **60-270 days**<br>from hatching to metamorphosis |
| Larval diet | **Other larvae and small aquatic invertebrates (daphnia, mosquito larvae)** |
| Parental care | **Guards the eggs** |

### PROTECTION AND PAPERWORK

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

## About the species

*Ambystoma opacum* is a small and robust salamander in a genus where most species are larger. Adults are 9-11 cm long including the tail. Females are larger than males.

The base colour is black, and white or pale grey bands lie across the head, back and tail, giving the species its marbled appearance. The male's bands are shining white and become even whiter in the breeding season, when his vent also swells. The female's bands are silvery grey. Newly metamorphosed juveniles have white spots, which over the first months merge into bands. The larvae are greyish and about 1 cm long at hatching.

When threatened, the animal arches its body, butts with its head and lashes its tail. This draws attention to the tail, where glands release an unpleasant secretion. The secretion becomes weaker after repeated attacks. Wash your hands after handling.

The species can live 8-10 years or longer, but many animals in captivity die earlier, on average after about 4 years.

## Distribution and habitat

*Ambystoma opacum* lives in the eastern half of the USA, from Massachusetts and southern New Hampshire west to central Illinois, south-eastern Missouri, Oklahoma and eastern Texas and south to the Gulf of Mexico and the Carolina coast. The species is absent from the Florida peninsula. There are separate populations in eastern Missouri, central Illinois, north-western Ohio and north-eastern Indiana and along the southern shores of Lake Michigan and Lake Erie.

> **Native range:** United States.

### HABITAT

*A. opacum* lives in damp deciduous forest, often close to ponds and streams, but is also found on dry slopes, as long as there is damp soil nearby. The soil is soft and often sandy or gravelly. The species is not a strong digger and mostly uses existing tunnels and crevices. Adults lie under fallen wood, stones and leaves or in tunnels up to a metre below ground. Most come out only at night, and outside the breeding season they are seldom seen.

The breeding biology sets the species apart from most other *Ambystoma* species. In late summer and autumn, from August in the north to November in the south, the animals migrate to dried-up ponds, ditches and hollows that only fill later in the year. The males arrive first, about a week before the females. Mating takes place on land, and the female lays the eggs in a small depression under leaves, moss or wood at the bottom of the dry hollow. She stays with the eggs to keep them damp. When the autumn rains flood the hollow, the eggs hatch. The larvae grow through the winter in the fish-free water before they metamorphose in spring. If the rain does not come, the eggs can lie dormant and hatch the following spring, if it does not get too cold.

The larvae hatch earlier than in most other salamanders and so gain a head start in size. After metamorphosis the young survive best in forest and poorly when they have to cross open country.

Read more: Rearing tadpoles

## Care

### THE ENCLOSURE

There is little knowledge about the husbandry of *Ambystoma opacum*, and the advice on substrate and water is partly borrowed from the closely related *Ambystoma maculatum* and *Ambystoma tigrinum*, which are kept far more often. The species is smaller than both.

An adult needs a floor area of at least 40 × 25 cm and two animals at least 50 × 30 cm. A group of four or five animals needs at least 60 × 40 cm, and more animals require more floor area. Floor area is more important than height, and 25 cm in height is enough. Use a plastic box with a tight-fitting lid and small ventilation holes, or a glass terrarium with a mesh lid. The lid must be firmly fixed, because the animals can climb and push at it.

Use damp topsoil free of fertiliser, vermiculite and other additives, coconut fibre, or a mix of the two. A deep layer lets the animal burrow and makes it hard to see, so a thin layer with several slanted hides of bark or stone is a good choice if the animal is to be seen. Leave one end slightly drier than the other, so that the animal can choose for itself. Avoid peat and other acidic substrates, which can cause loss of salts from the body. Never use bark or chips of cedar and pine, because the oils are toxic to amphibians. Gravel must not be used, because the animal can swallow it; decorative stones must be larger than the animal's head.

Provide at least one hide per animal, e.g. a piece of bark without sharp edges or a flat stone. Damp, unbleached paper towel with crumpled pieces as hides is suitable for quarantine and can be changed once or twice a week. Remove uneaten food the day after feeding. New animals are quarantined separately.

Read more: Quarantine and hygiene

### TEMPERATURE

By day the temperature should be 18-24 °C, and at night it can be a couple of degrees cooler, 16-20 °C. The species tolerates cold better than heat, and above 30 °C for long periods it can die. Use no heat lamp or heat mat, and place the container somewhere cool and out of direct sun, e.g. in a cool north-facing room.

At low temperatures the animals eat less. The larvae must not be exposed to temperatures near the upper limit, because this can cause deformities.

Read more: Heat and temperature

### HUMIDITY AND MISTING

The substrate must be damp, but never wet or muddy, because the animal absorbs water through its skin. A damp substrate corresponds to 80-95% humidity. Mist the substrate with chlorine-free water when the surface looks dry. If paper towel is used, it is dampened with chlorine-free water. Good ventilation prevents skin infections.

Read more: Humidity, misting and ventilation

### WATER AND WATER QUALITY

Adults are poor swimmers, and the species drowns if it cannot get out of the water. Deep dishes and water sections must therefore be avoided. A water dish should be no more than 1-2 cm deep and should have stones or bark, so that the animal can easily climb out again. Change the water every 3-4 days.

Use tap water treated against chlorine and chloramine, or spring water with a pH between 6 and 8. Distilled, demineralised and sterile water must not be used, because it is too pure and disrupts the body's salts. The same water is used for misting and for wetting your hands before handling the animal.

The larvae are raised in an aquarium with a sponge filter. The water must be cool, and the pH must not fall below 6.5, because growth is otherwise inhibited. Test the water at least twice a week. Change at least 10-20% of the water every week, or siphon off waste daily with an airline tube, so that the larvae are not sucked up. The replaced water is topped up with the same amount of chlorine-free water. Do not use iodine-based cleaning agents, because iodine can kill amphibians.

### LIGHTING AND UVB

The species is nocturnal and lives hidden, so it does not need special lighting and does not need UVB either. UV light can damage the eyes and skin of amphibians, and larvae must not be exposed to it. Daylight in the room, or a fluorescent tube without heat by day and darkness at night, gives a good daily rhythm. The container must not stand in direct sun.

Read more: Lighting and UVB

### FEEDING

Adults eat crawling and flying insects, worms and small snails: crickets, earthworms and compost worms, and occasionally waxworms. The feeder animals must be smaller than the animal's head. Waxworms are fatty and are given only rarely, e.g. to thin or stressed animals; prick the skin before giving them, so that they are easier to digest. All food for land animals is dusted with calcium and vitamins.

The animal hunts by movement and smell and usually does not eat dead food, so give the food live, if necessary held out with tongs.

Frequency depends on temperature. At 15 °C four crickets a week is enough for growth and for producing eggs. At 18 °C adults get four to six two-week-old crickets twice a week. At higher temperatures they must be fed more often. The species has a low metabolism and easily becomes fat, so feed moderately.

Newly metamorphosed juveniles are fed every day or every other day on wingless fruit flies and newly hatched crickets. When they are about six months old, they can move on to adult feeding.

The larvae are predators and are fed live food in generous amounts, because hunger and overcrowding make them cannibals. Newly hatched larvae get brine shrimp nauplii, chopped white worms, chopped tubifex worms, daphnia and copepods. After one to two weeks, larger prey such as adult brine shrimp, daphnia, mosquito larvae, whole tubifex worms and blackworms are introduced. Check live food from the wild for predators such as hydras, diving beetles, dragonfly larvae and backswimmers. Tubifex worms can carry disease-causing bacteria, and mosquito larvae from polluted water can contain heavy metals.

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

### BEHAVIOUR AND HANDLING

Adults lie hidden most of the time and come out at night to hunt. The species does not bite humans. Outside the breeding season the animals live alone, and males in particular bite each other on the snout if they meet. If the animals are kept close together, they avoid each other, which can cause stress, reduced appetite and infections. Animals of very different sizes should not be kept together, because a large salamander eats a smaller one. If animals are to share a container, all must have their own hide, and they are fed separately.

The skin is thin and permeable, and salts and oils from the hands can damage it. Handle the animal as little as possible, with clean, wet hands, and wash your hands afterwards. Use gloves if several animals are cared for one after another, so that infection is not carried on.

## Breeding

### SEXUAL MATURITY AND SEXING

The male is distinguished from the female by his whiter bands and, in the breeding season, by a swollen vent. The female is larger and has silvery-grey bands, and her body becomes broader as the eggs ripen. The animals become sexually mature after 1-2 years, fastest in the southern parts of the range and slowest in the north.

### MATING

Mating takes place in autumn and happens on land, not in water. The male and female dance around each other, after which the male deposits a spermatophore, which the female picks up with her vent. Many females have already mated before they reach the breeding site. Mating in captivity is difficult, because animals that know each other often stop mating. Keep males and females apart until the breeding season.

Introduce one male at a time to the female in a plastic box with damp, unbleached paper towel as the base. The paper towel gives the spermatophore a good surface and makes it easy to see whether the female has picked it up: a spermatophore that has not been picked up has a small white cap on top. Two or more males with the same female disturb each other and reduce success. Mating and egg-laying are triggered mainly by humidity. Imitating rain does not work, because egg-laying happens before the rain comes. Hormone treatment may be necessary if the female holds on to her eggs; this is handled by a vet.

### EGGS AND LARVAE

The female lays 50-200 eggs in a small depression under a hide of cork bark or a layer of damp sphagnum. The moss must not be dripping wet, because humidity determines where the female chooses to lay. The soil under the hide must be soft enough for her to dig. The eggs are laid on land, not in water.

The female stays with the eggs and keeps them damp until water arrives. However, she often leaves them before flooding or after disturbance. The eggs hatch only once they have been under water. After laying, the whole clutch can therefore be moved to an aquarium with chlorine-free water, an air stone or sponge filter, where the eggs hatch over a few days. Remove the larvae as they hatch, so that they do not eat each other, and remove eggs with fungus, so that it does not spread.

The female lays eggs once a year. Newly hatched larvae are about 1 cm long. Uniform size, plenty of food and few larvae per litre prevent cannibalism and produce larger juveniles.

### METAMORPHOSIS

The larvae stay in the water for 2-9 months, depending on how far north they come from: in the south they metamorphose after two months, in the north after eight to nine. The signs of metamorphosis are that the gills shrink and the tail becomes thicker. When they appear, the larvae are moved to a small container or aquarium with a sloping bottom and a low water level at one end. Place flat stones or cork bark on the slope, so that the newly metamorphosed animals can climb out, and crumpled damp paper towel at the top as a hide.

A newly metamorphosed salamander is harmed if it cannot get out of the water and can drown. Move it as quickly as possible to an adult set-up on land. The juveniles that come out of the water are about 5 cm long.

### REARING THE YOUNG

Newly metamorphosed juveniles are placed in an adult set-up with damp paper towel or damp topsoil without peat and with several hides. They are fed every day or every other day on wingless fruit flies and newly hatched crickets, all dusted with calcium and vitamins. Sort the juveniles by size, because larger juveniles eat smaller ones. Keep them cool, below 24 °C. After about six months they can move on to adult feeding. Growth and amounts for the juveniles are not documented.

## Health and common mistakes

The most common problems are:

- Too warm: keep the temperature below 24 °C. Above 30 °C for long periods can be fatal.
- Obesity in adults because of low metabolism: feed moderately, and use waxworms rarely.
- Drowning: adults and newly metamorphosed juveniles can drown in deep water. Use only a shallow water dish with an exit.
- Acidic substrate, e.g. peat: causes loss of salts. Avoid peat and bark of cedar and pine.
- Swallowed gravel or stones: can be fatal.
- Dehydration: keep the substrate damp.
- Intestinal worms: adults can carry parasites. A vet can treat on arrival and again after 14-21 days, and a faecal sample is checked 7-10 days after the second treatment.
- Cleaning agents with iodine: can kill amphibians. Do not use iodine, and rinse everything well after cleaning.
- Dense stocking of larvae: causes poorer growth, smaller juveniles and cannibalism.
- Predators in live food for larvae: check the food for hydras, diving beetles, dragonfly larvae and backswimmers.

Salamanders can carry the fungal disease Bsal (*Batrachochytrium salamandrivorans*), which is fatal to many species. Quarantine new animals for several weeks, and wash hands and equipment between containers.

Go to a vet who knows amphibians if the animal refuses food for a long time, has open sores or has swellings.

### 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.