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POISON DART FROGS

Phantasmal poison frog

Epipedobates tricolor

Epipedobates tricolor is a small, dark brown poison frog of 19-23 mm with yellow to yellow-green stripes and spots. It occurs only on the western slopes of the Andes in central Ecuador and is threatened. Almost all "tricolor" in the trade are in fact the closely related *Epipedobates anthonyi*; true *E. tricolor* is rare in terrariums.

Family: Dendrobatidae Former name: *Dendrobates tricolor; Phyllobates tricolor*

KEY FACTS

THE ANIMAL

Adult size	**19-23 mm** snout-vent length
Lifespan	**5-14 years**
Active	**By day**
Lifestyle	**Terrestrial**
Habitat	**Rainforest and montane forest**
Skin toxins in the wild	**Mild**
Skin toxins in captivity	**None** Captive-bred animals. Wild-caught animals can keep their toxins for a long time
Difficulty	**Intermediate**

CARE

Min. enclosure	**40 × 40 × 40 cm** L × W × H for 3 adults
Temperature, day	**22-26 °C**
Temperature, night	**18-20 °C**
Humidity	**80-100%**
Water	**Water dish** depth 1-2 cm
UVB	**Optional** Ferguson zone 1
Diet	**Small invertebrates (springtails, fruit flies)**
Kept	**In pairs or in groups**

BREEDING

Reproduction	**Egg-laying**
Development	**Tadpoles carried to water**
Egg-laying site	**On the ground**
Sexually mature	**5-10 months**
Eggs per clutch	**10-20**
Hatching	**9-14 days** at 22-24 °C
Larval period	**42-80 days** from hatching to metamorphosis
Larval diet	**Algae/plants and complete diet**
Parental care	**Guards the eggs and carries the tadpoles**

PROTECTION AND PAPERWORK

CITES	**Appendix II**
IUCN	**Vulnerable (VU)**

About the species

Epipedobates tricolor is a small, smooth poison frog with a head almost as wide as the body and relatively small eyes. Males measure 19-21 mm and females 20-23 mm from snout to vent, and females are also slightly broader. The ground colour is dark brown, and three yellow to yellow-green stripes run along the back: one in the middle and one on each side. The stripes may be unbroken or broken up into spots, and the limbs have light stripes and spots. In the armpits, groin and backs of the

knees there are often reddish spots. Colour and markings vary greatly, both between localities and within the same population. In the "Cielito" form from the area near San José del Tambo the middle stripe is dissolved into rows of dots, and the markings are yellow, whitish or blue-green, so the frog resembles a starry sky.

The species was described by George Albert Boulenger in 1899 and has also been placed in the genera *Phyllobates* and *Dendrobates*. It is closely related to *Epipedobates anthonyi* and *Epipedobates machalilla*.

E. tricolor and *E. anthonyi* were for many years confused or regarded as one species, until a genetic study in 2004 showed that they are two species, separated by a belt at least 200 km wide. The animals that have been bred in large numbers since the 1980s under the name "tricolor" are almost all *E. anthonyi*, and almost all terrarium literature on "*E. tricolor*" from before 2004 is really about *E. anthonyi*. True *E. tricolor* only reached Europe much later and in small numbers from a conservation centre in Ecuador. If you buy a "tricolor", ask about locality and lineage: "Santa Isabel" is a form of *E. anthonyi*, while "Cielito" is a form of true *E. tricolor*. *E. anthonyi* is slightly larger, up to 25-27 mm, and typically redder with turquoise to cream-coloured stripes; *E. tricolor* is darker and more brownish with yellow to yellow-green stripes. A reliable but practically useless distinguishing feature is the bones, which are green in *E. tricolor* and white in *E. anthonyi*.

The genus is known for the alkaloid epibatidine, which acts as a far stronger painkiller than morphine. The substance was found in frogs that were then called *E. tricolor*, but which are today regarded as *E. anthonyi*. Poison frogs do not produce their poison themselves; they take it up from their diet in the wild, and this has not been investigated for *E. tricolor* specifically. The skin of wild *E. tricolor* is regarded as dangerous to humans, and wild-caught animals should only be touched with nitrile gloves. Animals in captivity gradually lose the poison, and captive-bred animals are practically non-toxic. Skin toxicity is regarded as mild: the skin can irritate mucous membranes, so wash your hands and do not handle the animals.

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

Distribution and habitat

Epipedobates tricolor occurs only in Ecuador, on the western foothills of the Andes in the provinces of Bolívar and Cotopaxi. The species lives mostly at 750-1,769 m above sea level, but has also been found down to 319 m. The species is known from about 20 localities, and the whole range is estimated at about 6,900 km².

Some recorded observations further south, in Azuay, El Oro, Loja and in Peru, lie within the range of *Epipedobates anthonyi* and probably date from before the species split in 2004. They are not included on the map. Records from Germany and the USA are animals in captivity.

The IUCN assesses the species as Vulnerable (VU), while the Ecuadorian red list from 2021 regards it as Critically Endangered. The population is declining, a few populations have disappeared, and the threats are deforestation for agriculture, cattle farming and roads, and pollution of the streams with agricultural chemicals. There is no protected area within the range.

> **Native range:** Ecuador.

HABITAT

Epipedobates tricolor lives near streams in rainforest and cloud forest and in forest remnants on the western Andean slopes. It lives in the leaf litter on the forest floor and also climbs in the vegetation. The species disappears from heavily altered areas, but can survive in forest remnants near grazing land.

The species is diurnal, and the males call mostly in the morning from elevated perches. The food is small arthropods such as mites, ants, termites, beetles, springtails and spiders. The climate at the equator varies little over the year, but the nights are cooler than the days, and rain falls all year with dry and wet periods. Breeding is therefore presumed to take place all year with less activity in the dry periods. Precise measurements of temperature and humidity from the habitats are not documented.

Read more: Humidity, misting and ventilation Read more: Feeder animals: keeping and breeding

Care

THE ENCLOSURE

One male and two females of *Epipedobates tricolor* need an enclosure of at least 40 × 40 × 40 cm. A group of 5-10 animals needs at least 60 × 60 × 40 cm, and more animals require more floor area. The requirements are much the same as for *Epipedobates anthonyi*.

E. tricolor is shyer than *E. anthonyi* and lives more hidden, so the enclosure should be densely planted. Bromeliads are particularly good: the frogs use the leaf axils as cover and a lookout and readily lay eggs in them. A planted back and side wall with small ledges provides room to climb, and a layer of beech or oak leaves on part of the floor provides cover.

Build up the base with a few centimetres of expanded clay pellets as a drainage layer, a water-permeable mesh barrier and on top a substrate of soil, moss, coconut fibre and leaf litter. Roots, stones and cork provide structure, and a few flat stones should be able to dry quickly. Distribute several egg-laying sites and feeding spots around the enclosure. Ventilation at the bottom at the front and at the top at the back or side keeps the glass free of condensation, and the openings are covered with mesh that fruit flies cannot get through.

Read more: Terrarium construction and bioactive substrate

TEMPERATURE

Keep 22-26 °C during the day with both cooler and warmer zones, and let the temperature drop to 18-20 °C at night. The species comes from mid altitudes and does not like high temperatures: the temperature must not exceed 27 °C for long periods, and over 29 °C is dangerous. The heat normally comes from the room and the lighting; heat mats and heat cables are rarely used.

Avoid direct sun, and measure with a digital thermometer down in the enclosure. A cooler and slightly drier period of about three months in winter gives the females a break from egg-laying. It is not true dormancy.

Read more: Brumation and the seasons

HUMIDITY AND MISTING

Humidity should be 80-100 %. The species tolerates down to 50 % for short periods if it has access to water, but low humidity without water can quickly become fatal. A rain system with e.g. three sprays a day of 20-60 seconds works well. Leaves and fixtures should be dry again about an hour afterwards, and the substrate must not become waterlogged. In winter, spraying is less frequent or shorter.

A fogging system provides short periods of about 100 % and clearly increases the frogs' activity. Use rain or reverse-osmosis water in both rain and fogging systems.

WATER AND WATER QUALITY

Make one or more small water holes with about 2 cm of water, e.g. saucers, drinking dishes or half Brazil nut shells that the frogs can easily climb out of. The male may use them to deposit tadpoles.

Use rain water, reverse-osmosis water or dechlorinated tap water. Amphibians absorb water and substances through the skin, so soap, cleaning products, chlorine and hand cream must not come anywhere near. Change the water often, and scrub the dishes without soap. Tadpoles are reared in their own containers (see Eggs and tadpoles).

Read more: Rearing tadpoles

LIGHTING AND UVB

The lighting is for the plants. Fluorescent tubes or LED bars for about 12 hours a day are enough, and the day length can vary slightly over the year. The frogs can be kept without UV light with no visible difference in wellbeing, but a weak UV content can be provided to be on the safe side, also for tadpoles. UVB is therefore optional; if you choose it, stay within Ferguson zone 1, and provide shade.

Read more: Lighting and UVB

FEEDING

Epipedobates tricolor is small but greedy and takes relatively large prey. Juveniles eat springtails and *Drosophila melanogaster*, and adults also take the larger *Drosophila hydei*, small crickets, firebrats, aphids, bean beetles and white woodlice. Only live, moving animals are eaten. Do not collect feeder insects from the wild; they may carry parasites and pesticides.

Feed adults 2-3 times a week in the "dry season" and more often in the "rainy season", and only as much as the frogs eat in a few minutes. Always dust the feeder insects with a vitamin and mineral powder for amphibians, and give them good food yourself. Fixed feeding spots make it easy to see that all animals get something, and your own cultures of fruit flies and springtails ensure an even supply.

BEHAVIOUR AND HANDLING

The males of *Epipedobates tricolor* call with a soft, trilling voice, mostly in the morning and especially after misting, most often from an elevated perch. They are territorial: first they defend their area with calls, then they chase and wrestle with intruders. Females are not known to be territorial. The species can be kept in pairs, but does better in groups, if the enclosure is large enough. Provide several feeding spots and many visual barriers, and separate the animals if one is chased persistently. At sexual maturity females may eat each other's eggs.

E. tricolor is far shyer than *E. anthonyi*, and it should be kept in a species-only enclosure. Never mix species or locality forms.

Do not handle the animals; the skin is thin and does not tolerate salt, soap and cream from the hands. If a frog has to be moved, lure it into a clean plastic tub, and wash your hands before and after.

Breeding

SEXUAL MATURITY AND SEXING

Adults are relatively easy to sex: females are broader, especially before egg-laying, and males call. The animals begin to breed 5-10 months after metamorphosis, the males probably slightly before the females. The first clutches are often small and infertile. The easiest way to a pair is to buy a group of juveniles and let them grow up together.

MATING

The species can breed all year round, but a cooler and drier period in winter gives a pause and a clear peak in the "rainy season". "Cielito" appears to be far less productive than *Epipedobates anthonyi*. Even in groups the animals form fixed pairs.

The male calls, especially in the morning. If a receptive female approaches him, he switches to a short, croaking call and runs to an egg-laying site with the female following. It can take hours before the pair decides. The male then grasps the female's head in what is called cephalic amplexus, deposits his sperm, and the female lays the eggs.

EGGS AND TADPOLES

In the wild about 10 eggs per clutch are laid in the leaf litter, and in the terrarium "Cielito" lays 10-20 eggs. In the terrarium the eggs are preferably laid in leaf axils on bromeliads, but also on large leaves or in artificial caves such as half coconut shells on a saucer with a smooth, dried oak leaf, or in film canisters. The male waters the eggs with water he has collected in his bladder, guards them and chases other frogs away. When they hatch, he helps the tadpoles free of the eggs, and they climb onto his back. He may spend several days finding a suitable water hole.

If you want to rear them deliberately, you remove the clutch after a few days, when the embryo can be clearly seen, and keep it in a closed box without ventilation at 22-24 °C with a little reverse-osmosis or rain water, so that the eggs are moist without being submerged. The tadpoles do not eat each other and can be reared together, but rearing them individually gives the best control. Use reverse-osmosis or rain water with a pH of 6-7, only 1-2 cm deep for the first few days, later up to 10 cm, at 22-24 °C, preferably with a couple of oak or catappa leaves. Feed daily with flake fish food, shrimp food, spirulina, daphnia and chopped red bloodworms, and change the water as needed, e.g. once or twice a week in small tubs.

METAMORPHOSIS

The eggs hatch after 9-14 days, at 22-24 °C after about two weeks. The larval development lasts 6-10 weeks depending on temperature and food; for "Cielito" it lasts 60-80 days.

When all four legs have developed, metamorphosis is near, even though the tail is still long, and the light markings begin to show on the otherwise black tadpoles. The transition from water to land must be gentle: use a tilted box or a small aquaterrarium, or add stones, cork or water plants that stick up out of the water, so the little frogs can easily climb out.

REARING THE YOUNG

Newly metamorphosed juveniles measure 8-10 mm. Rear them in a small enclosure with the same climate and set-up as the adults' and a layer of beech or oak leaves to hide in; the juveniles are far shyer than the parents. For the first three days or so they live off the tail.

Feed once or twice daily for the first few weeks with springtails, small fruit flies and newly hatched crickets, always dusted with vitamin and mineral powder. After about two months feeding can gradually be reduced. It takes about eight months before the juveniles have reached their final size and colour. They can easily be reared in larger groups.

Health and common mistakes

Epipedobates tricolor is easy to keep when the climate is right. Typical problems are:

- Chytrid fungus (*Batrachochytrium dendrobatidis*), which has wiped out whole populations in terrariums. Quarantine new animals and have them tested, and disinfect equipment.
- Spindly legs: juveniles that develop weak or no front legs at all during metamorphosis. The cause has not been established, but the food, water quality and too many tadpoles in the same water are suspected. Old parent animals more often produce deformities.
- Heat: the species comes from mid altitudes, and prolonged heat above 26-27 °C causes stress. Over 29 °C is dangerous.
- Desiccation at low humidity without access to water.
- Parasites such as roundworms and flagellates, which cause weight loss despite a good appetite and require a faecal sample at the vet.
- Stress in shy animals in an enclosure that is too open or in the company of other species.

Contact a vet with amphibian experience if a frog loses weight, does not eat for several days or develops sores on the skin.

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.