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FROGS

Large-webbed Bell Toad

Bombina maxima

Bombina maxima is the largest species in the genus: a stout, grey-brown, heavily warty frog of 6-8 cm with an orange belly, marbled with black, which it displays when it feels threatened. It comes from the mountains of south-western China and wants clean, cool water and a cool terrarium. It is easy to keep when the temperature is held down, but makes greater demands on water quality than *Bombina orientalis*.

Family: Bombinatoridae Former name: *Bombinator maximus* **Mild skin toxins**

KEY FACTS

THE ANIMAL

Adult size	**6-8 cm** snout-vent length
Lifespan	**6-15 years**
Active	**By day and at dusk**
Lifestyle	**Semi-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	**Intermediate**

CARE

Min. enclosure	**80 × 40 × 40 cm** L × W × H for 4 adults
Temperature, day	**18-23 °C**
Temperature, night	**12-17 °C**
Humidity	**60-85%**
Water	**Aquaterrarium** depth 5-10 cm
UVB	**Optional**
Winter rest	**4-8 °C** 8-12 weeks
Diet	**Insects and worms/snails**
Kept	**In groups**

BREEDING

Reproduction	**Egg-laying**
Development	**Tadpoles in water**
Egg-laying site	**In water**
Sexually mature	**24-36 months**
Eggs per clutch	**20-150**
Hatching	**3-10 days** at 18-22 °C
Larval period	**30-90 days** from hatching to metamorphosis
Larval diet	**Algae/plants and complete diet**
Parental care	**None**

PROTECTION AND PAPERWORK

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

About the species

Bombina maxima is the largest species in the genus. Adults are 6-8 cm from snout to vent, and males become larger than females. The body is stout and broad, and the back is olive-grey to blackish brown and covered in large warts mixed with pore-rich glands. Behind the eyes there are glandular ridges as in toads, so the animals resemble a small toad more than a fire-bellied toad. The belly is bright orange to yellow and marbled with black, in roughly equal parts, or with mostly black. The body shape, the triangular to heart-shaped pupils and the brightly coloured belly are traits of the genus.

There is heavy webbing between the toes of the hind feet. In the male the webbing runs straight across between the toes all the way to the tips in an almost straight line, while in the female it is smaller and curves in between the toes. Males also have dark nuptial pads on the inside of the arms, and in this large species they can reach all the way up onto the chest. After hibernation females can also be recognised by a rounder body and smoother skin.

The species was described in 1905 as *Bombinator maximus* from three females from Yunnan. The species name means "the largest". Older literature and animals in trade are often confused with close relatives now regarded as separate species, especially *Bombina microdeladigitora* from Yunnan, Hubei and northern Vietnam. It has smaller webbing, and its status is still disputed.

The skin contains a mixture of active proteins and small antimicrobial peptides that protect against microbes and predators. When in danger the frog arches its back and shows the colours of its belly while giving off a bitter secretion. For humans the secretion is harmless on intact skin, but it stings in the eyes, nose and mouth. The skin toxicity is therefore rated as mild: wash your hands every time you have touched the animals, the water or the furnishings, and touch them only when necessary.

Read more: Brumation and the seasons

Distribution and habitat

Bombina maxima is native to the mountain regions of south-western China: Yunnan, south-western Sichuan and Guizhou. The type specimens came from Yunnan. The species may also occur in Myanmar, but this is not confirmed, so the country is not on the map. Older records from northern Vietnam refer to another species, *Bombina microdeladigitora*.

The species is regarded as relatively common in its range and is not threatened. The skin is used in traditional Chinese medicine.

> **Native range:** China.

HABITAT

Bombina maxima lives in the highlands, mostly at 2,000-3,600 m, where summers are fresh and winters cold. It occurs in and by swamps, springs, marshes, ponds, ditches, canals and small waterholes in mountain valleys and on farmland, and under stones by mountain streams and in still pools connected to them. It lives half in water and half on land, like the rest of the genus.

The populations breed after hibernation from early May to early June. The animals become sexually mature after two years. In the wild males live up to six years and females up to five. Highland life means the species is adapted to cool water and cool nights, and that it does not tolerate heat as well as the relatives that come from the lowlands.

Care

THE ENCLOSURE

The species needs an aquaterrarium in which about two thirds of the floor area is water and one third land. Four adults need at least 80 × 40 × 40 cm. The species becomes considerably larger than *Bombina orientalis*, so give more space if you can: a group of five to ten animals needs at least 100 × 50 × 40 cm. Keep the animals in a group, preferably with more females than males, so the males do not wear down each individual.

The land section can be built of stones, cork and roots over a drainage layer, with moss and leaf litter as cover and plenty of hides in the form of cork bark caves and rock crevices. A layer of soil with ferns, pothos or ficus can hang out over the water and makes it easier to climb out. The water section gets a substrate of gravel or sand and robust aquatic plants such as waterweed, Java moss and Java fern. There must also be open water. The terrarium must be very well ventilated, and the lid must fit completely tight, because the animals climb well, especially as young. Never keep *B. maxima* with other species of the genus, with which it can cross, and never with salamanders or other amphibians.

A small, quiet filter with gentle outflow is recommended, because the species is more sensitive to poor water than its relatives. Without a filter the water must be changed more often.

Read more: Terrarium construction and bioactive substrate

TEMPERATURE

The species comes from cool highlands and must be kept cooler than most frogs. By day 18-23 °C is suitable, and the temperature should never exceed 25 °C. At night it may fall to 12-17 °C. The daytime temperature normally comes from the room and the light alone. Do not place the terrarium in direct sun or in a warm room, and use no heaters. The night temperature corresponds to the climate of the cool highlands.

Hibernation is a prerequisite for breeding and also benefits the animals' health. Lower the temperature gradually, and stop feeding 2-3 weeks beforehand, so the gut is empty. The animals hibernate at 4-8 °C for 8-12 weeks, for example in a cold cellar or a refrigerator, in a small box with damp moss and cork bark. The temperature must stay above 3 °C and below 10 °C. Check the animals at least once a week. When hibernation is over, the temperature is raised a little at a time, and the animals return to the terrarium. Only healthy, well-nourished animals should hibernate. The length of hibernation is borrowed from the rest of the genus.

HUMIDITY AND MISTING

Humidity should be 60-85 %. The large water section does most of the work, so it is enough to mist the land section lightly once a day. Moss and soil on the land section must be damp but not wet, and there must be damp hides.

Good ventilation is just as important as humidity. Stagnant, saturated air causes mould and bacteria, so never close the ventilation completely.

Read more: Humidity, misting and ventilation

WATER AND WATER QUALITY

The water must be 5-10 cm deep, and the animals must always be able to climb out easily, for example along sloping roots, flat stones or plants. The water is at room temperature and should not be heated. Use tap water from which chlorine and chloramine have been removed with a water conditioner, or water that has stood overnight. Change part of the water every week or every other week, and clean the filter as needed. Remember that amphibians absorb substances through the skin: no soap, detergents, hand cream or insecticides must ever get into the water.

The water should be still, with only gentle movement from the filter. The species otherwise makes no particular demands on water hardness.

LIGHTING AND UVB

Give 12 hours of light a day in the summer half of the year and slightly shorter days in winter, controlled by a timer. An LED fixture with a daylight spectrum gives enough light for the plants. The animals do not seek heat, but the light helps them maintain their daily rhythm.

UVB is optional. There are no studies of the need in the species, but a weak UVB tube over one end of the land section can be provided if the animals have shade in the rest of the terrarium.

Read more: Lighting and UVB

FEEDING

The food must move. Give ordinary feeder insects of a suitable size: crickets, flies, woodlice, earthworms and small snails. Mealworms are fatty and are given only once in a while. The feeder animals must have been well fed for a couple of days before being passed on, and are dusted with a vitamin and mineral powder at every third feeding. For young they are dusted at every feeding.

Adults are fed every third day, newly metamorphosed young every day. Give only as much as the animals can take in a few minutes, and remove leftovers quickly so the water is not polluted. Although the species has only a small, disc-shaped tongue that cannot be shot out, it catches prey surprisingly deftly.

The bright colour of the belly requires carotenoids. Feed the feeder animals carrots or other carotene-rich vegetables, give water fleas, or use a powder with canthaxanthin. Otherwise the belly can become pale and yellow.

Read more: Feeder animals: keeping and breeding

BEHAVIOUR AND HANDLING

The species is active by day and at dusk and is often seen out in the open, on land or floating at the surface. It is best kept in a group. In the breeding season things get lively when the males call from the water. The males cling to anything that moves, including other males, who answer with a release call.

Pick the animals up only when necessary. The skin is delicate, and the secretion can irritate eyes and mouth. Use wet hands or a clean, damp plastic tub, and wash your hands afterwards. For cleaning, the animals are moved to a plastic box with damp kitchen paper and air holes in the lid.

Breeding

SEXUAL MATURITY AND SEXING

Males are recognised by larger and more extensive webbing between the toes, a stouter body and the dark nuptial pads on the arms that appear during hibernation. Females are rounder and get smoother skin. Outside the breeding season the sexes are hard to tell apart, and the webbing alone is not always reliable. Both males and females become sexually mature after two years. The easiest way to be sure of both sexes is to buy a group of four or more.

MATING

Hibernation is the prerequisite for breeding. Shortly after dormancy the males begin to call and swim around in the water. Fresh, cool water and misting imitate the rain in the wild and speed up mating. The male grips the female around the waist in front of the hind legs. A pair can sit together for hours until egg-laying takes place in the water, most often in the evening and at night.

If a pair has mated, they can be moved to a separate spawning tank, so you avoid collecting the eggs from the whole terrarium.

EGGS AND TADPOLES

The eggs are laid in many small clumps, which are attached to aquatic plants, stones or other things in the water. The number per laying is not documented for the species; the figure in the specifications is borrowed from the genus, in which the female lays in several rounds through the season. There is no parental care, and the adults readily eat eggs and tadpoles.

Leave the eggs for a day before moving them, because fertilisation often takes place only after a few hours. The tadpoles need plenty of space to develop healthily: allow at least two litres of water per tadpole, and keep the water level at about 20 cm. Then the young become larger and stronger when they go onto land, and dense groups do not inhibit each other's growth. A layer of gravel or sand on the bottom takes up the dirt the tadpoles produce and can be siphoned off. Change part of the water every day.

For the first days the larvae live off the yolk. After that they are fed several times a day in small portions. The tadpoles eat both plant and animal food: scalded nettles, dandelion, lettuce and algae, and water fleas and artemia. In this species a larger share of the food must be animal, while fish flakes may make up only a small part.

Read more: Rearing tadpoles

METAMORPHOSIS

The eggs hatch after 3-10 days, depending on the temperature. The water should be at 18-22 °C. A higher temperature gives faster development but smaller young, which are often harder to raise. Cooler water gives larger and stronger young. The larval period is borrowed from the genus: 1-3 months, shortest in warm water. The tadpoles reach up to about 27 mm in length.

When the forelimbs break through, the tadpoles must be moved to a tub with a few millimetres of water and damp kitchen paper, where they cannot drown. As long as they have a tail stump, they need no food, because they absorb the tail.

REARING THE YOUNG

The young are raised in small plastic boxes or terrariums with damp kitchen paper at first and later damp moss with cork bark as a hide. When the tail is gone, they are fed aphids, fruit flies or small crickets. The food is always dusted with vitamin and mineral powder, because fast-growing young otherwise develop bone disease with crooked or short limbs. Feed them every day. In the first days after metamorphosis they have a pale belly, which gets its colour later if the food contains carotenoids. Keep the young cool, at the same temperature as the adults.

Health and common mistakes

Bombina maxima is robust, and most problems are caused by husbandry errors:

- Overheating, if the temperature stays above 25 °C for long. This is what the species is most sensitive to.

- Poor water quality. The species is more sensitive than most relatives, so use a filter and change water regularly.
- Chytrid fungus (*Batrachochytrium dendrobatidis*). Quarantine new animals for at least 30 days, and have them tested.
- Bone disease in young when the food is not dusted with vitamins and minerals. The signs are crooked or short limbs and poor growth.
- Yellow belly without carotenoids in the food. This is only a cosmetic problem.
- Intestinal parasites in newly acquired animals. Have them examined by a vet with amphibian expertise.

See a vet if an animal stops eating, gets red spots, swellings or sores, or sits lethargically and does not respond.

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.