citizen conservation

#Amphibians

Basic information and care guidelines for *Agalychnis annae*, the Blue-sided leaf frog

As of: 15 April 2026 | *Agalychnis annae* | Photo: Heiko Werning

Contents

1. Profile

Scientific Name: *Agalychnis annae* (Duellman, 1963)
Common Names: English: Blue-sided Tree Frog, Blue-sided Leaf Frog; Orange-eyed Leaf Frog; Spanish: Rana azul, Rana de los cafetales, Rana de café; German: Orangeaugen-Laubfrosch, Blauflanken-Laubfrosch, Kaffeeplantagen-Laubfrosch; French: Rainette arboricole à cotes bleues
Head-body length: Males 55–74 mm; females 65–85 mm
CC#Amphibians category: I, under special management, for experienced keepers only
Conservation status according to the IUCN Red List: Vulnerable (VU)
CITES conservation status: Appendix II
EU Habitats Directive conservation status: Annex B
Housing: Get on well with each other, group housing possible. A humid, moderately temperate terrarium, e.g. 60–80 x 60 x 100–120 cm (length x width x height) for groups of up to 10 animals. 24–26 °C during the day, 17–20 °C at night. Regular misting.
Required equipment: Climbing branches and other climbing and hiding places; dense planting with large-leaved plants; substrate not required for hygiene reasons. A small water dish suitable for bathing. For breeding toads, use aquariums or plastic tubs; group breeding is possible. For rearing young animals, use smaller rearing terrariums, e.g. 40–60 x 40 x 40–60 cm.
Diet: Two to three times a week, common live food such as crickets, houseflies, cockroaches, woodlice, grasshoppers, etc. Tadpoles should be fed fish food or similar daily; juveniles should be fed smaller live food daily.

2. Why is *Agalychnis annae* a Citizen Conservation species?

Holger Kraus, curator at Zurich Zoo and member of the CC Advisory Board, in front of the research workshop at Zurich Zoo | Heiko Werning

Agalychnis annae is now extinct across large parts of its former range. The main cause was likely the spread of the chytrid fungus *Batrachochytrium dendrobatidis* (*Bd*) in Central America.

The remaining populations are found almost exclusively in urban or agricultural areas and are highly fragmented. Although the conservation status in the wild has improved in recent years thanks to species conservation projects such as reintroduction and population support programmes, the species is still classified as 'Vulnerable' on the IUCN Red List.

The presence of remnant populations in towns, settlements and on plantations poses increased risks due to environmental pollution. Another threat comes from introduced fish that prey on the tadpoles.

It therefore seems sensible to establish an ex-situ population outside the species' natural range. However, no such projects have been undertaken to date, which is why Citizen Conservation decided to launch a conservation breeding programme in 2025, which began in 2026.

The starting point for this was a clutch of eggs and tadpoles of *Agalychnis annae* that were illegally brought into Switzerland in 2024 and seized at Zurich Airport; these were handed over to Zurich Zoo by the authorities, which initially reared the animals in order to identify the species. In August 2025, the first successful breeding took place there with the animals, which were barely a year old. These clutches were also successfully reared, and the resulting young frogs were subsequently to be distributed to various zoos and private terrarium keepers under Citizen Conservation (CC) to establish a stable conservation breeding population. On 27 March 2026, in a large-scale operation accompanied by a television crew from SWR, nearly 200 frogs were transferred from Zurich Zoo to Karlsruhe Zoo, where the animals were immediately distributed to 14 private keepers and zoos within 48 hours via a pre-organised 'frog chain' – an exemplary collaboration between authorities, zoos and private terrarium keepers for species conservation!
In 2026, the CC Advisory Board set a target of 225 animals, spread across 32 breeding groups, to ensure a genetically healthy terrarium population in the long term.

The start of the "frog chain": Lukas Reese (left) and Timo Deible (right) from Karlsruhe Zoo and Holger Kraus (centre) from Zurich Zoo carry the first 200 or so frogs to be included in the CC programme to the van heading for the border and Germany, accompanied by a camera crew from SWR. | Tim Benz, Zoo Zürich

3. Biology and conservation

3.1 Biology
- Systematics and nomenclature

With its 14 species, the genus *Agalychnis* belongs to the relatively small Neotropical family of leaf-tailed frogs (Phyllomedusidae), which in turn comprises eight genera totalling 67 species. This family includes a number of prominent species and genera, such as the magnificent leaf-tailed frogs of the genus *Cruziohyla* or the maki frogs of the genus *Phyllomedusa*. *A. annae* was also placed in the latter genus when first described by Duellman (1963), until the same researcher placed it in the genus *Agalychnis* in 1968.

Duellman named the species after his wife Anna. The genus name is composed of the Greek prefix 'aga', meaning 'very', and 'lychnis', meaning 'glowing red in the dark', and refers to the best-known species of the genus, the red-eyed tree frog *Agalychnis callidryas* (Eisenberg & Kaesling 2012).

Undoubtedly the most famous member of the genus *Agalychnis* is the red-eyed tree frog, *Agalychnis callidryas*; here is a pair in amplexus. | Heiko Werning

There is also a conservation breeding programme at CC for the critically endangered lemur tree frog (*Agalychnis lemur*). | Heiko Werning

Original site where *Agalychnis annae* was found, near Monteverde, where the species has now disappeared | Heiko Werning

Location where *Agalychnis annae* was found in a park in the San José area | Heiko Werning

- Distribution and habitat

Agalychnis annae is found in central Costa Rica at mid-elevations of 600–1,650 metres above sea level. Originally, the species had a relatively wide distribution in the Costa Rican highlands, spanning the northern Cordillera de Talamanca, the Cordillera de Tilarán and the Cordillera Central, including the Central Valley where the capital, San José, is located. The species is now extinct across most of this area (Hertz et al. 2020; Savage 2002). The surviving populations are confined, of all places, to the urban and suburban parts of the Central Valley around San José, as well as to coffee plantations on the lower slopes of the Cordillera de Talamanca (Hertz et al. 2020).
The range is estimated at 16,414 km², with the populations within it being highly fragmented.

A reported occurrence in Panama, in the vicinity of Cerro Colorado, remains unclear, as it is based solely on the discovery of a single individual. Further research is needed to determine whether a population actually exists there (Hertz et al. 2011, 2012, 2020).

Originally, the species inhabited premontane moist and lowland rainforests. Today, it is found only in human settlements, in streams that are in some cases heavily polluted, in gardens, parks and coffee plantations, as well as in artificial water bodies such as ponds, reservoirs and drainage areas.

Blue flanks and orange eyes are the hallmarks of this beautiful tree frog.
| Tobias Eisenberg

The underside is whitish in colour.
| Tobias Eisenberg

Land-dwelling individuals do not yet display the typical colouring of adults.
| Heiko Werning

- Description

The blue-sided leaf frog resembles the well-known red-eyed tree frog (*Agalychnis callidryas*), but is more robustly built and has different colouring. Detailed descriptions can be found in Duellman (1963, 1970, 2001), Eisenberg & Kaesling (2012), Leenders (2016) and Savage (2002), to which reference is made summarily below.

This is a medium-sized species of leaf frog. At 65–85 mm, the females are larger than the males, which measure 55–74 mm. Duellman (1970) gives average measurements for adult individuals of 67.8 mm for males and 82.9 mm for females.

Typical of the genus *Agalychnis* is the flat body shape with a broad, relatively flat skull and large, round eyes situated on the sides of the head and protruding distinctly upwards and outwards. The eardrum is clearly visible and its diameter is about half that of the eyes; at the top and along the rear edge, it is slightly overhung by a fold of skin that extends to the base of the upper arm. The eardrum is located at the back of the throat. The limbs are long. The forearm is very robust, whilst the upper arm is somewhat more slender. The toes and fingers are broad and flat. They end in round adhesive pads and are connected by webbing (the fingers for the rear two-thirds, the toes for the rear three-quarters). The frogs' skin is smooth.

The colouring is particularly striking: the base colour of the blue-sided leaf frog is a rich green, which changes from a light green during the day to a darker green at night. The underside, by contrast, is whitish to slightly pink and somewhat granular.

The iris of the large eyes is strikingly orange to yellowish in colour and bordered by a black outer ring. At night, the intensity of the orange colouration increases. The vertical pupil dilates significantly at night. The lower eyelids are speckled with gold.

Another striking feature is the bluish colouring of the flanks. This extends to the limbs, specifically the outer sides of the legs and, in some cases, the fingers and toes. The inner sides of the upper arms are pink to fuchsia in colour, whilst the fingers and toes are also orange and green in places. The upper surfaces of the limbs are as green as the back. On the back, numerous small white spots may be visible in some animals. Light-coloured stripes run from the elbow down the lower edge of the forearm to the base of the fourth finger and from the heel to the fifth toe.

Newly emerged land-dwelling individuals do not yet display the colouration of adult animals; they still lack the blue flanking colouration and the orange-yellowish eyes.

The females become noticeably more robust.
| Tobias Eisenberg

- Sexual dimorphism

In addition to the difference in size between the larger females and the smaller males, the females' more robust build is also striking.

During the mating season, a brown mating callus also forms on the base joint of the first finger on the male's hand. Furthermore, the sexes differ in the appearance of the mouth region: viewed from the side, it slopes gently from the eyes to the nostrils in males, whilst the transition is more blunt in females (Duellman 2001; Eisenberg & Kaesling 2012).

Males are smaller and slimmer. | Tobias Eisenberg

Direct comparison: a pair of *Agalychnis annae*, with the female on the right | Martin Huber

- Mode of life

Agalychnis annae, active at night in its habitat in a park in the San José metropolitan area | Heiko Werning

Blue-sided leaf frogs are nocturnal. During the day, they usually cling to the undersides of leaves (for example, they particularly like the undersides of coffee plant leaves) and a resting position characteristic of tree and leaf frogs, in which the arms and legs are drawn so tightly against the body and the lower legs and forearms are folded beneath the thighs and upper arms that the entire frog looks like a single oval bulge. The eyes are then retracted and covered by the net-like skin of the eyelid, so that they are barely visible. The bright colours of the sides and eyes are then not visible. This sleeping position serves both as camouflage and as protection against water loss by minimising the surface area. The colouring of the frogs is significantly lighter green during the day.

As darkness falls, they wake up, 'unfold', open their eyes, moult and begin their active period, which they spend on the leaves and branches of bushes, large plants and trees. Like all leaf frogs, they are good climbers and rarely ever descend to the ground. They usually move in a characteristic, almost walking manner, but can also hop in the typical frog manner and swim to some extent.

A distinctive feature of the blue-sided leaf frog is its defensive behaviour. If the animals are persistently disturbed whilst sleeping during the day, they push off from their perch and let themselves fall backwards. On the ground, they briefly play dead with their backs arched and their legs drawn up against their bodies, before subsequently making a hasty getaway with long leaps.

The life expectancy for *A. annae* is estimated at around 10 years.

Larval habitat in a park in Costa Rica | Heiko Werning

- Reproduction in the wild

The breeding season for *A. annae* is concentrated during the Costa Rican rainy season from May to November, though breeding can occur year-round in very humid habitats. To mate following rainfall, the animals – sometimes in large gatherings of several hundred individuals – congregate at ponds, pools or slow-flowing waters; artificial water sources are also readily accepted. The males attract attention with loud calls. Territoriality is not pronounced; the calling males sometimes sit close together. If a male approaches a calling conspecific, the latter often attempts to cling to the newcomer. The clinging male then emits defensive calls, whereupon it is immediately released. Even then, no aggressive behaviour occurs.

Often, several males attempt to cling to a female. Mating takes place in the axillary amplexus, during which the smaller male clings to the female's back with his forelegs clamped in her armpit region. Once in position, he ceases all further activity and closes his eyes. If other males attempt to cling to the female, they are driven off by the male on her back with kicks and defensive calls. The amplexus takes place at a height of up to 10 metres; the female then descends towards the water with the male on her back to fill her bladder, so that she can later release fluid over the clutch. She then climbs up to leaves hanging over the water at a height of 35 cm to 3 m, to which she attaches her eggs. Whilst the female squeezes out the eggs, the male slides backwards on her back until his cloaca is positioned beneath hers and he releases his sperm over the clutch. In addition to leaves, spawn is also attached to branches, lianas or man-made structures such as pipes, concrete walls and the like. A clutch comprises 45–126 eggs; many of these are so-called abortive eggs, i.e. a gelatinous mass in which no embryo develops. They serve to protect the clutch from drying out. Shortly after the end of egg-laying (Proy 1993 reports 17 minutes), the male leaves the female.

Over the next 5–7 days, the tadpoles inside the eggs grow until they hatch. As this happens, the eggs swell noticeably at first, and the initially greenish yolk gradually turns a light brownish colour. When they hatch, the tadpoles simply drop into the water below. Further development takes a surprisingly long time in the natural habitat and extends over several months, ranging from around 250 days to a year. Proy (1993) measured a water temperature of 21.7 °C at midday in a larval habitat, a park pond in San José. At higher temperatures, the entire development process proceeds somewhat faster.

3.2 Threat status

Agalychnis annae has become extinct across a large part of its original range, presumably due to the devastating outbreak of the chytrid fungus *Bd* that swept through Central America from the late 1980s onwards. It is possible that the lethality of the fungus was triggered or exacerbated by other factors, such as those linked to climate change (Hertz et al. 2020). In largely undisturbed natural areas, such as Tapantí National Park or the famous Monteverde Reserve – where the Costa Rican golden toad (*Incilius periglenes*) has also gone extinct and where Blue-sided leaf frogs were once very common – the species has disappeared entirely. It was therefore classified as 'Endangered' (EN) in previous assessments by the IUCN Red List in 2004, 2008 and 2014.

It then became apparent that the surviving populations in Costa Rica's Central Valley and on the slopes of the Cordillera de Talamanca have recovered somewhat; it seems the frogs have 'learned' to live with the fungus (Hertz et al. 2020). However, it is also possible that the environmental conditions in the Central Valley, which have been disturbed by humans (e.g. pollution), are more problematic for the fungus than for the frogs (Leenders 2016). The phenomenon of the frog population recovering in heavily disturbed habitats, of all places, whilst the species remains absent from nature reserves, remains a mystery (Leenders 2016).

The blue-sided leaf frogs have since been reintroduced at several sites in the Central Valley and appear to have established themselves there (Hoffmann 2005). In the latest Global Amphibian Assessment, the species was therefore downgraded to 'Vulnerable' (VU) by Hertz et al. (2020).

Nevertheless, the situation remains precarious. The populations are found in urban areas subject to intensive human use or on plantations. As a result, their distribution is highly fragmented, making genetic exchange difficult or impossible. Although the species appears to be quite tolerant of water pollution and other anthropogenic influences, environmental pollution and, for example, the use of pesticides are considered further threats. Another threat is introduced swordtails (*Xiphophorus helleri*), which feed on the larvae (Eisenberg & Kaesling 2012). Furthermore, suitable habitats continue to decline (Hertz et al. 2020).

A view over the seemingly untouched cloud forests of Monteverde, where *Agalychnis annae* used to be found but has since disappeared. | Heiko Werning

Today, blue-sided leaf frogs are mainly found in heavily urbanised areas, such as here in Herera, Costa Rica. | Heiko Werning

An image with symbolic potential: *Agalychnis* (presumably the red-eyed *A. callydrias*) on billboards in the immediate vicinity of the last known locations of *A. annae* – is this what the future looks like? | Heiko Werning

Sign in a hotel garden near San José, where *Agalychnis annae* lives | Heiko Werning

Research station at Zurich Zoo – the birthplace of Citizen Conservation's Blue-sided leaf frog conservation breeding programme | Heiko Werning

3.3 Conservation efforts

The downgrading from 'Endangered' to 'Vulnerable' on the Red List is also due to successful species conservation measures on the ground in Costa Rica, where the frogs have been reintroduced at various locations, including gardens, in the San José Central Valley, in some cases by private individuals without an official mandate (Hertz et al. 2020). At the same time, efforts are being made to inform the public about the threat to this striking frog species. The fact that it has become extinct in largely undisturbed natural areas and has survived only in heavily human-influenced settlement areas and plantations seems somewhat strange: the species was once widespread in various protected areas, but has now completely disappeared from them, with the exception of the Zurqui sector in Braulio Carillo National Park (Hertz et al. 2020). The Simón Bolívar Zoo in San José has carried out a successful 'head-starting' programme, in which clutches were incubated in human care and the tadpoles reared, with the aim of later reintroducing the young frogs into the wild. However, the zoo was closed in 2024 and converted into an 'urban national park'.
An important task for the future will be to create biological corridors between the isolated populations.

Agalychnis annae has never been traded internationally on a large scale, but was occasionally exported officially from Costa Rica in the 1970s and 1980s and was sold in Germany (Ennenbach 2026, personal communication). It has also been kept in small numbers outside Costa Rica for many years, both by private keepers and by the Manchester Museum in the UK. However, the terrarium populations appear to have declined significantly. It is unknown whether, apart from the specimens held in Manchester, there are any remaining stock from earlier imports in private hands; recent efforts by interested frog keepers to obtain the animals have been unsuccessful.
In Costa Rica, *A. annae* is protected by the Wildlife Protection Act No. 7317, the Environmental Protection Act No. 7554 and Decree No. 32633 of the Regulations on the Protection of Wildlife.

At the 15th Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES CoP15) held in Doha in 2010, the (then) genus *Agalychnis* was included in Appendix II of the Convention; it has been listed there since 23 June 2010; *A. annae* has been protected ever since. Subsequently, further species were placed in the genus *Agalychnis* which were not necessarily intended to be protected under CITES. Consequently, at CoP19 in 2023, the blanket reference to the genus was replaced by a specific list of the species to be protected, meaning that *A. annae* is now explicitly named.

4. Keeping

Agalychnis annae has been occasionally imported into Europe on an official basis since at least the 1980s (Ennenbach, personal communication). In 1991, Proy (1993) imported animals from Costa Rica to Austria with the relevant official authorisation (Proy 1993). There are a number of published reports on the husbandry and breeding of the species (Proy 1993, 2000; Huber 2011–2013; Eisenberg & Kaesling 2012).

Despite the fact that the species has been kept in the terrarium hobby for a long time, its population in Europe – unlike, for example, the red-eyed tree frog (*Agalychnis callidryas*) – has not yet stabilised. At the time of the species' inclusion in CC in March 2026, we were aware of only one private keeper; according to zootierliste.de and ZIMS, there was another specimen in a zoo at the time, housed in the vivarium of the Manchester Museum in the UK. However, it cannot be ruled out that there are a few further specimens in private ownership.
It seems likely that the species' modest success record in the terrarium trade to date is partly due to its altitudinal distribution, which may require cooler housing conditions and, above all, a greater drop in temperature at night than is necessary for *A. callidryas*. Furthermore, breeding this species is generally somewhat more difficult than with the red-eyed tree frog. On the other hand, there has so far been a lack of coordination regarding terrarium stocks, which generally increases the risk of terrarium populations becoming extinct.
The husbandry recommendations set out here are based on the experience of Zurich Zoo (Holger Kraus), private keepers Tobias Eisenberg, Martin Huber and Christian Proy, as well as on the information provided in Eisenberg & Kaesling (2012), Huber (2011–2013) and Proy (1993, 2000).
The CC collection of *A. annae* originates from a customs seizure at Zurich Airport in 2024; both tadpoles and a clutch of eggs were smuggled into Switzerland. The animals and the clutch were transferred to Zurich Zoo. There, the frogs developed well and reproduced for the first time in 2025; some of the resulting offspring were distributed via CC to other institutional and private keepers in 2026.

Lukas Reese from Karlsruhe Zoo inspects young blue-sided leaf frogs before they are moved to the CC keepers.
| Tim Benz, Zoo Zürich

A basic knowledge of terrarium keeping is a prerequisite for participation in the CC and must be demonstrated to the CC office prior to taking possession of the animals, either th-rough a formal certificate of competence, such as that offered by the DGHT/VDA-Sachkunde GbR, or by providing the CC office with details of your previous experience and knowledge of terrarium keeping. Such basic knowledge is therefore not covered in our care guidelines. For more comprehensive and fundamental information, we strongly recommend that keepers of *Agalychnis annae* consult the book "Rotaugenlaubfrösche – die Gattungen *Agalychnis* und *Cruziohyla*" by Tobias Eisenberg & Jörg Kaesling (Natur und Tier – Verlag, 2012, in German language).

In principle, the provisions of the general CC guidelines and the boarding agreement apply to all CC animals.

Lukas Reese from Karlsruhe Zoo inspects young blue-sided leaf frogs before they are moved to the CC enclosures.
| Timo Deible, Zoo Karlsruhe

4.1 Regulations and documentation requirements

Agalychnis annae is listed internationally in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), in the EU in Annex B of the EU Regulation on the protection of species, and in Germany as 'specially protected' under the Federal Nature Conservation Act. This means that keepers in Germany are required by law to register their animals with the relevant authorities. The keeper must register the animals with the relevant authority (e.g. the local nature conservation authority; please search online for the relevant authority in your area) immediately upon acquisition, presenting the CC transfer certificate / proof of origin. Any changes to the stock, such as offspring, transfers or deaths, must also be reported to the authority. The timeframe and frequency of these reports must be agreed with the authority; otherwise, a period of two weeks is generally considered sufficient to meet official requirements. Different reporting and licensing conditions apply in other countries. Keepers in those countries must research and comply with these requirements independently.

It goes without saying that the basic local legal requirements must also be observed when keeping animals; these may vary from country to country. In Germany, for example, this is the Animal Welfare Act, which applies to the keeping of all animals; in Switzerland, it is the provisions of the Animal Welfare Ordinance.

At CC, owners always receive the animals with a handover document, which also serves as proof of origin. Accordingly, when handing over their animals, CC breeders must ensure that they complete and sign the 'Certificate of Origin and Transfer' form provided by CC in full. This should include not only the origin of the offspring's parents, but also that of the parents' parents. This ensures a complete chain of documentation.

All documents relating to handover procedures within CC or from CC must be emailed immediately to the CC Office (amphibians@citizen-conservation.org) as a scan or photograph. Please observe this rule, as otherwise the CC office will have to make enquiries, which unnecessarily consumes resources and, overall, represents a significant amount of unnecessary additional work that we would prefer to invest in the expansion of our conservation breeding programmes or other tasks.

All CC animals are the property of the non-profit Citizen Conservation Foundation gGmbH. This also applies to all offspring resulting from them (see CC guidelines and placement agreement). Keepers are therefore not permitted to give away or sell the offspring themselves. Offspring are distributed within the project as long as this is sensible in terms of population management. *A. annae* is currently classified in CC Category I, which means that the sale of surplus offspring is prohibited.

All CC holders should, where possible, have bred their species at least once and continue to practise this skill in the future. In the case of explosive spawners such as *A. annae*, however, the number of offspring is so high that the number of animals to be reared should be agreed in consultation with the CC office. As breeding is normally triggered by targeted stimulation and the frogs produce spawn that can be safely discarded immediately after laying, it is not a problem to adapt the frequency and number of breeding cycles to the requirements of CC's population management.

A key aspect of CC is the coordination of the inventory, so we must always be kept informed of its development. Twice a year, CC participants are therefore contractually obliged to submit a stock report, currently always by 1 March and 1 September. This stock report (number of animals, their sex where possible, animals that have died or been bred in the last six months) can be submitted online. You will receive a timely reminder from the CC office; you will be informed of the current method for submitting the stock report. In addition, we welcome observations and experiences regarding husbandry and breeding, as an important aim of CC is to generate knowledge on ex-situ husbandry and the biology of the species managed within our conservation breeding network. We are also always happy to receive photos or videos of the animals and their care. We may then use these, for example, in publications or on social media. Permission to use the images within the framework of the CC programme is deemed to have been granted upon submission, unless expressly objected to; CC always credits the photographer in publications, unless expressly objected to.
Please also inform the CC Office informally by email at amphibians@citizen-conservation.org of any unusual or unexplained deaths, even between population reports, so that we can discuss any necessary further steps, such as investigations into the other animals, a post-mortem examination or veterinary care.
When reporting clutches and young tadpoles, estimates are often the only figures available, but these are still helpful. Please also inform the CC Office of any breeding successes, even outside of the stock reports, so that, if necessary, new keepers for the offspring can be sought in good time or a decision can be made as to whether and how many eggs should be incubated.

If owners are no longer able or willing to keep the animals or breeding stock, the CC office must be informed as early as possible so that the animals can be rehomed to other keepers.
Veterinary tests are required for every change of location within CC, i.e. when animals are transferred from one person to another; a skin swab for the chytrid fungus *Bd* and a faecal sample for parasites must be tested; further tests may be arranged if necessary. Instructions and the necessary dry swabs and faecal sample tubes can be provided by CC; CC will cover the costs of the tests. A corresponding test request form for a suitable laboratory is available from the CC office.
Under no circumstances should the animals be placed together without consulting other individuals of the same species that are not part of the CC programme. It is crucial for the establishment of a long-term conservation breeding programme that the animals' genetic background can be traced; therefore, uncontrolled interbreeding with animals from outside the programme must be avoided. At CC, two lines are currently kept separate (based on the confiscated clutch and the confiscated tadpoles, as it cannot be ruled out that the adult animals resulting from them are not related to one another). From a herd book management perspective, it is often desirable to avoid interbreeding between generations. Therefore, please do not keep parent animals and sexually mature offspring together without prior consultation with the CC office. Siblings, on the other hand, can be kept together without hesitation and bred with one another until the CC herd book records indicate otherwise.
Further detailed explanations of how CC works can be found in our CC guidelines and in the FAQs on our website, citizen-conservation.org.

Agalychnis annae packed in plastic containers for transport | Tim Benz, Zoo Zürich

4.2 Transport and Quarantine

Please note that with CC, the recipient is responsible for transporting the animals and must also bear the costs involved.

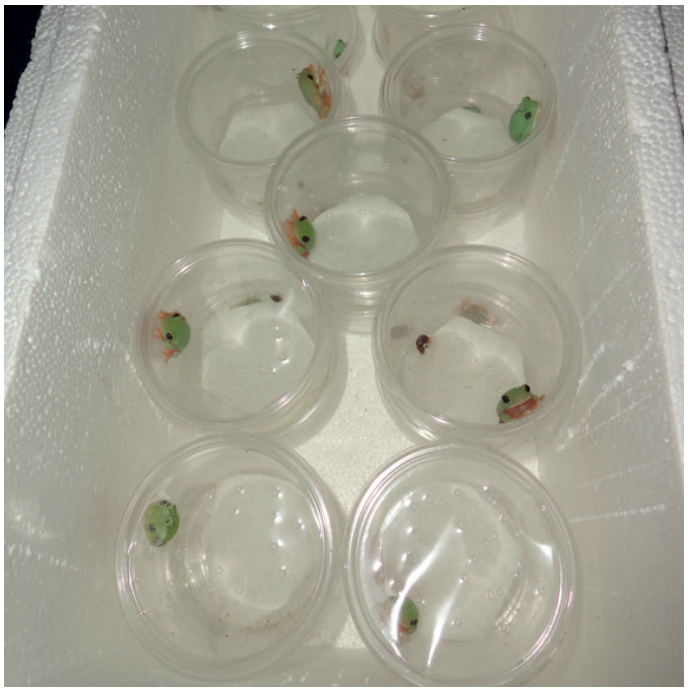
Ideally, the frogs should be collected from the previous owner. This is the least stressful option for the animals, and it gives you the opportunity to discuss any questions about their care or perhaps see how they have been kept so far. Alternatively, trade fairs, conferences, etc. are suitable venues for a handover, either in person, or by asking other hobbyists in the region if they can take the animals with them. If a personal handover is not feasible, shipping is also an option. The frogs usually survive this without any problems. Please note that the shipping of vertebrates may only be carried out by licensed companies. Unfortunately, at least at present, no companies offer this service to private individuals. However, the CC office can arrange for shipping to and from private individuals. As this involves a considerable amount of additional work for the CC office, we ask that you first thoroughly explore all other options before resorting to this option. You will then receive a leaflet on shipping from the CC office.

Within the CC scheme, all frogs should be tested for the chytrid fungus *Bd* and for parasites whenever they are moved to a new location. To ensure the tests are carried out correctly, you can also obtain a CC information sheet; if required, we will also send you dry swab and faecal sample tubes. The costs of these tests are covered by the CC; you only need to pay the postage for sending the samples to the laboratory.

When transporting and, in particular, when posting, care must be taken to ensure that the *Agalychnis annae* do not overheat. Temperatures above 25 °C should be avoided. It is best to place the animals for transport individually or in small groups in plastic containers with some damp moss or damp kitchen paper, and to secure the containers with adhesive tape to prevent the lid from being pushed off. The containers should then be placed in a heat-insulated box, such as a polystyrene box. A cooling pack prevents overheating, depending on the outside temperature. In winter, a heat pack may be necessary. Ideally, the cricket boxes should also be secured against slipping inside the polystyrene box using wooden skewers.

Upon arrival, the frogs are placed in a quarantine terrarium and kept in quarantine for a few weeks in accordance with the general principles of terrarium care. Thereafter, their care should follow the guidelines set out below.

It is generally possible to transport tadpoles, for example in bottles half-filled with water, plastic bags or other containers. However, losses have occurred during the transport of tadpoles; it is safer to transport fully developed frogs.



The transport boxes are then placed – secured to prevent them from sliding – in insulated polystyrene boxes. | Martin Huber

The best way to arrange transport is to collect the animals in person. | Tim Benz, Zoo Zürich

Terrariums for *Agalychnis annae* at Zurich Zoo; two of these terrariums are connected by a passageway.
| Tim Benz, Zoo Zürich

A terrarium for *Agalychnis annae* at Tobias Eisenberg's home, before the frogs were introduced; featuring a built-in water channel at the front with a drain for easy cleaning, a sprinkler system, an aquarium heater and no substrate
| Tobias Eisenberg

4.3 The terrarium
- Size and design

All-glass terrariums or terrariums made from rigid foam panels are well suited.
At Zurich Zoo, two interconnected terrariums measuring 60 x 72 x 83.5 cm (length x width x height), which are connected by a sealable tube with an external diameter of 70 mm, providing a total space of 120 x 72 x 83.5 cm (if necessary, the two halves can be separated by sealing the tube, for example, if the sexes are to be kept apart). These tanks have proven suitable for keeping and breeding even larger groups of around 10 animals.

Eisenberg & Kaesling (2012) recommend terrariums for frogs of the genus *Agalychnis* that are at least 80 cm high, or preferably 100–150 cm. They specify 60 x 60 x 80 cm as the minimum dimensions for small groups of around three animals. Proy (1993) successfully kept his animals in a terrarium measuring 65 x 50 x 70 cm.

The 'General Care Guidelines for Anurans' issued by the DGHT-AG Anuren specify tank dimensions of 10 x 6 x 12 cm, multiplied by the length of the frogs, for four animals. For frogs up to about 8 cm in length, this would result in a tank size of 80 x 48 x 96 cm for four animals; for each additional animal, 6 x 1 cm should be added to the area.

The Swiss Animal Welfare Ordinance stipulates that a terrarium for two frogs of the genus *Agalychnis* must have a floor area of at least 10 x 5 x body length and a height of 10 x body length. For each additional animal, an area of 2 x 2 x body length is required. Assuming a body length of 8 cm, this results in a minimum terrarium size of 80 x 40 x 80 cm for two animals and an additional area of 16 x 16 cm or 256 cm^2 for each additional animal.

It has proven effective to use terrariums with a base that is glued in place so that it is higher at the back than at the front. The resulting slope ensures that water in the terrarium automatically drains towards the front along the base. This creates a 'water channel' at the front, and the tank can also be kept clean easily because dirt is washed away with the water as it drains towards the front. Ideally, there should be a drain built into the floor right at the front, through which the dirty water can be easily drained from the tank. Such specialised frog tanks are manufactured and sold by specialist suppliers, but can also be built yourself if you have the necessary DIY skills.

Adequate ventilation is essential. Tree frogs are susceptible to stuffy air and, above all, waterlogging; drier areas are also required within the terrarium. Various versions of 'chimney ventilation' have proven effective, with a ventilation opening, for example, at the front beneath the sliding panels or relatively low down on one side, as well as a second, larger ventilation opening in the lid. The ventilation openings must be sealed with fine-mesh wire gauze (e.g. stainless steel gauze, mesh size 0.5 mm) to prevent both frogs and live food from escaping. The wire mesh must not extend right up to the side panels to prevent the frogs from rubbing their snouts against it. Eisenberg & Kaesling (2012) recommend that the ventilation area should be approximately 10% of the area of a side panel and 30–50% of the lid. A vertical ventilation area on the front panel makes watering significantly easier.

A natural-looking terrarium for *Agalychnis annae* at Victoria Lambrecht's | Victoria Lambrecht

- Terrarium set-up

Unless the terrarium is already a specialised frog terrarium with a sloping base that 'automatically' creates a water section, the basic equipment should include a water dish in which the frogs can quench their thirst.

The back and side walls can be designed as desired; however, the frogs will sit and move around on vertical glass panes as well, so the terrarium walls will be used as additional space for movement anyway. It is important to provide various sturdy climbing branches in different orientations, as well as at least one broad-leaved plant, which can, for example, be placed in a flower pot inside the tank. For hygiene reasons, hydroponics can also be used as a substrate in the flowerpot; however, the expanded clay pellets should not be larger than 4 mm, as otherwise there is a risk of intestinal blockage in the frogs if they accidentally swallow the pellets along with their prey. It is important that the frogs can use the terrarium space to climb on branches and leaves. Cork tubes, flower pots or similar items can provide hiding places. Plastic plants are not recommended; live plants have a beneficial effect on the terrarium environment.

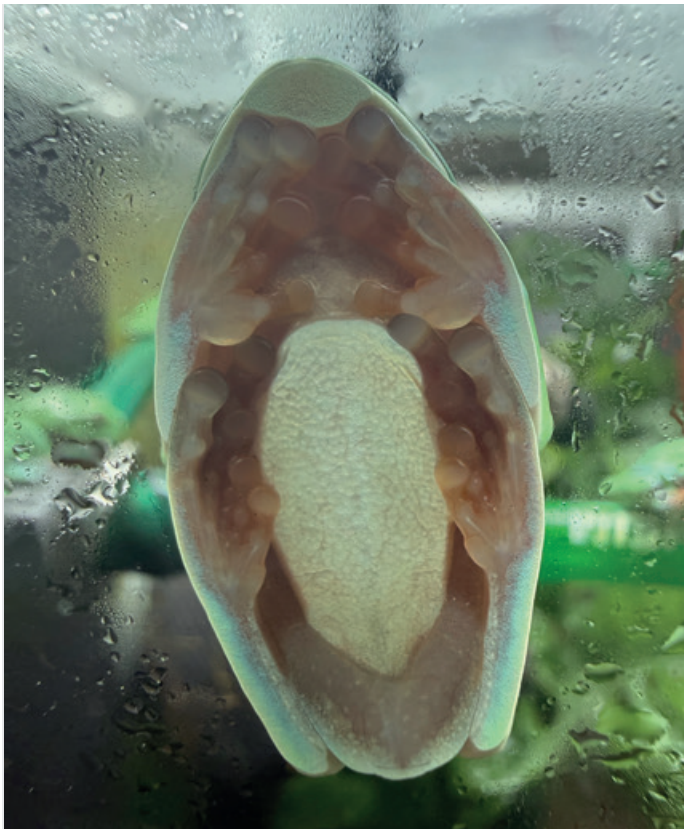
At night, the blue-sided leaf frogs climb around the terrarium, making full use of the structures provided, such as branches, roots and plants. | Martin Huber

Typical resting position on the underside of a large leaf | Martin Huber

A substrate is not necessary in tree frog terrariums and is often omitted by many keepers for hygiene reasons, as tree frogs are generally quite susceptible to diseases caused by microorganisms. Alternatively, a foam mat can be used as a substrate, which can be washed regularly – Proy (1993) recommends washing such a mat regularly in a washing machine at 90 °C and also thoroughly cleaning the entire terrarium once a month. Of course, keeping them in tanks set up and planted to resemble natural habitats is also possible, but one must be aware that this increases the risk of infection and therefore particular attention must be paid to maintaining hygiene (daily cleaning of the water tank, removal of faeces and other waste, changing the substrate if necessary, thoroughly hosing down the plants, etc.).

The larger the terrarium, the less significant these hygiene issues become; conversely, in smaller tanks and with higher stocking densities, particular attention must be paid to hygiene.

You will find numerous practical suggestions on the setup, substrate and planting of terrariums for *Agalychnis* in the book by Eisenberg & Kaesling (2012).



The terrarium panes are also often used as a place to walk around and sleep. | Tobias Eisenberg

Large, sturdy plants form the core of the terrarium setup. | Martin Huber

The blue-sided leaf frog, active at night in the terrarium | Martin Huber

- Terrarium climate and technical equipment

The air temperature in the terrarium should not exceed 24–26 °C during the day and should cool down to 17–20 °C at night. It is advisable to vary the temperature throughout the year. For example, readiness to mate can be triggered by lowering the temperature to 18 °C during the day whilst providing intensive misting. The frogs can easily tolerate temporary maximum temperatures of up to 30 °C.

At Zurich Zoo, the animals are kept year-round in a room with a constant temperature of 24 °C; temperature fluctuations are created by switching the lighting on and off. This creates a temperature gradient with a peak of approx. 26 °C. At night, temperatures drop to 22 °C. Due to the cooling effect of evaporation following irrigation with very fine spray nozzles, the temperature briefly drops to 18 °C.

The frogs should be kept in fairly humid conditions all year round; to ensure regular misting, it is advisable to install a misting system in the terrarium. Alternatively, plant misters or air pumps can, of course, be used for manual misting.

However, the frogs must not be kept too damp either: as a general rule, the leaves should be dry again about two hours after spraying. The relative humidity should drop to 60% in at least some parts of the terrarium. It rises accordingly after spraying and at night.

All-glass terrarium with a large ventilation area in the lid and a built-in misting system (the green pipes in the background) | Tobias Eisenberg

LED light bars or fluorescent lamps can be used for daytime lighting. In addition, a UV light source, such as those available from terrarium suppliers, may be useful for creating locally higher temperatures whilst providing UV light. Although the frogs are nocturnal, they also absorb UV light at their resting places. Otherwise, the lighting intensity must primarily meet the requirements of the plants. The duration of lighting can vary between 10 and 14 hours throughout the year (longer in summer, shorter in winter) or remain constant at 12 hours, and is best controlled by a timer. A local spotlight may, if necessary, be switched on for just a few hours during late morning and midday. Lamps, and especially spotlights, must not be installed inside the terrarium (risk of burns!), but above the lid. Please note that glass filters UV radiation from the light.

No special lighting is normally required at night; the frogs can see well at night even with minimal residual light.

It goes without saying that a thermometer and hygrometer must be available to monitor the temperature and humidity in the terrarium.

Thermometers and hygrometers for monitoring key parameters | Martin Huber

Outlet nozzles of a sprinkler system | Heiko Werning

4.4 Care

- Socialisation

As *A. annae* does not display territorial behaviour and group housing is likely to have a positive effect on breeding success, CC recommends keeping them in larger groups of around 10 animals on average, although, as is common with frogs, keeping small numbers or even single individuals is not a problem from an animal welfare perspective. Males are also compatible with one another, so groups consisting of several males and females can be kept together successfully.

Keeping them with other species places increasingly higher demands on the keeper and requires experience. CC therefore recommends keeping them in a species-specific tank. In principle, however, in sufficiently large terrariums, they can be kept with other amphibians or lizards, such as geckos or anoles.

They can be kept in larger groups without any problems. | Martin Huber

Rinsing the terrarium is part of the regular maintenance routine. | Tobias Eisenberg

- Regular maintenance work

As frogs from the Phyllomedusidae family are often sensitive to high concentrations of microorganisms or parasites, it is advisable to pay particular attention to hygiene when keeping them. Substrate should be avoided, or an artificial substrate that is easy to clean should be used (e.g. foam mats); in natural-style setups, particular attention must be paid to ensuring adequate ventilation and preventing mould growth; the terrariums should not be too small or too densely populated, and the substrate must be kept as clean as possible by regularly removing faeces, food remains, etc. The plants in the terrarium should also be kept clean by regularly hosing them down. The water dish must be cleaned regularly, as the frogs like to deposit their droppings there or moult in it. The necessary humidity in the tank must be maintained by regular spraying (several times a day to several times a week, depending on the season); a sprinkler or misting system can perform this task.

Handle with care: young frogs in particular can sometimes panic if disturbed. | Tim Benzo, Zoo Zürich

- Handling

All amphibians have skin components that act as a defence against microorganisms. Those found in *Agalychnis annae* are not harmful to humans. Nevertheless, the animals should only be handled with bare hands very rarely, if at all – primarily to protect the frogs' skin. As a general rule, the frogs should only be handled rarely, and it is recommended to wear nitrile gloves (disposable gloves) when doing so.

Young frogs and those recently introduced to their enclosure in particular may sometimes react with panic if disturbed whilst sleeping during the day.

Blue-sided leaf frogs are nocturnal; during the day they sleep (although they do occasionally become active to feed). Keepers should therefore be aware that the frogs are normally only seen sleeping during the day. At night, once the lighting has been switched off, they become active immediately. To observe them in the terrarium, a torch can be used for short periods; if they are illuminated for longer, the frogs will retreat. The light from (weaker) LED headlamps, on the other hand, does not seem to disturb the frogs (Eisenberg & Kaesling 2012). For longer night-time observations, diffuse room lighting or dim lamps, e.g. blue or red in colour, are suitable.

- Feeding

Blue-sided leaf frogs can be fed a diet of standard commercial and hobbyist feed insects. Adults, for example, eat large crickets, woodlice, houseflies, cockroaches and small desert locusts. The feed insects themselves should always be well-fed. If purchased from a shop, they should be fed high-quality food for a few days before being given to the frogs.
The live food should be dusted with a vitamin and mineral supplement before each feeding. Young frogs should be fed daily for the first few months; this is then gradually reduced, and from around six months of age, it is sufficient to feed them two to three times a week. It is best to feed them during their active phase, i.e. after the terrarium lighting has been switched off in the evening.
Young frogs at Zurich Zoo could also be fed during the day without any problems. After a few minutes, all the frogs are active and searching for food. Young frogs can also be fed very effectively with ovenfish, which remain on horizontal leaves for a relatively long time and can then be collected one by one.

At Zurich Zoo, the young frogs ate Terflys, crickets, woodlice and ovenfish.

The calcium and vitamin requirements of the frogs at Zurich Zoo were largely met through an appropriate diet for the feed animals ('gut loading').

Blue-sided leaf frog eating a cockroach | Martin Huber

'Feeding tree' for blue-sided leaf frogs in the terrarium: the feed insects are placed on the climbing support for the pothos plant, where they usually crawl around for quite some time, creating movement that attracts the frogs, which then catch them. | Martin Huber

White woodlice are used at Zurich Zoo to rear young frogs. | Heiko Werning

5. Breeding

Proy (1993, 2000) recommends inducing reproductive readiness in blue-sided leaf frogs by simulating a dry season of around three months, during which the frequency and volume of watering are reduced. During this period, the females produce eggs that eventually become visible through the abdominal wall.

Mating readiness and egg-laying can be triggered by intensive misting with water at 20–22 °C, whilst simultaneously lowering the daytime temperature to around 18 °C, ideally as a low-pressure weather system approaches. Humidity should also be increased by partially covering the ventilation area. Alternatively, a special sprinkler tray can be used.

As soon as the 'rainy season' begins, the frogs start croaking and shortly afterwards enter the amplexus. Egg-laying usually takes place from around the third day onwards. The males stimulate one another whilst croaking, but show no territorial behaviour towards other males. Please note that the frogs' croaking is quite loud.

A plump female prepared for breeding | Martin Huber

Differences in size and weight between a pair set aside for breeding | Martin Huber

A rainy season must be simulated for breeding; special rainwater basins are ideal for this purpose. | Martin Huber

Amplexus in the rain tank | Martin Huber

At Zurich Zoo, the temperature was not lowered to induce mating. Instead, from the beginning of August 2025, the duration of the sprinkler system was manually increased on a regular basis. On 19 August 2025, the sprinkling was increased to eight daily intervals of 5 minutes each, after it had been observed in the preceding days that some females had gained significant weight and pairs could now be seen in amplexus every day. On 20 August 2025, a total of six pairs were in amplexus. Consequently, a very large quantity of crickets was provided as food in the evening. The following day, two clutches were found, and two more the day after that. A further day later, a particularly robust female laid a series of clutches. On 23 August 2025, embryonic development could be observed in the first clutches.

Egg-laying appears to occur mainly during the second half of the night or the first half of the morning. Clusters of eggs are often attached to large plant leaves, but in the terrarium they are also frequently found on the glass panes, cork walls or similar surfaces.

The eggs may hatch within the terrarium. It is safer to remove clutches attached to plant leaves, along with the leaf, from the terrarium and place them under suitable climatic conditions (24 °C, high humidity, e.g. in a separate small terrarium) over a container filled with water, so that the tadpoles fall directly into the water after hatching. Please note: the eggs must not come into direct contact with the water. After 2–3 days, you can see that development of the larvae has begun in fertilised eggs. Initially, the young embryo is rod-shaped. Unfertilised eggs become cloudy or develop mould. Adjacent fertilised eggs usually continue to develop unharmed. Gradually, the embryo becomes more 'tadpole-shaped', although initially it still has external gills.

Pair in amplexus | Martin Huber

Pair spawning | Martin Huber

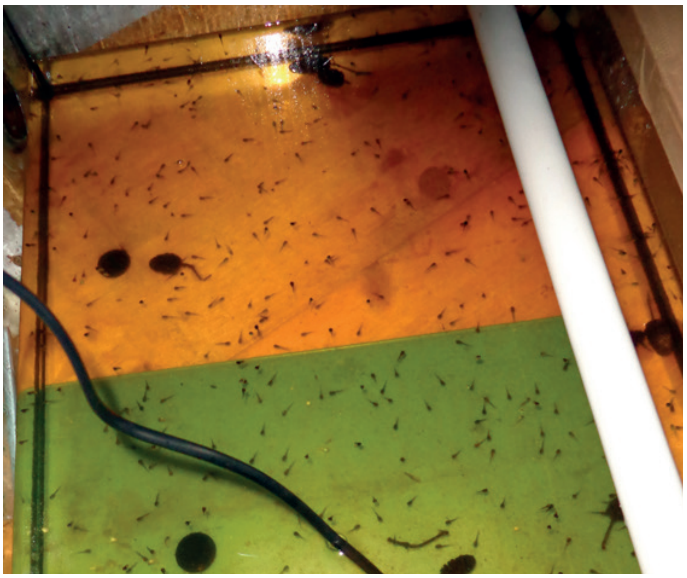
Complete success – numerous clutches in the rain tank | Martin Huber

Clutch laid on a leaf with embryos already visibly developing | Tobias Eisenberg

- Rearing Tadpoles

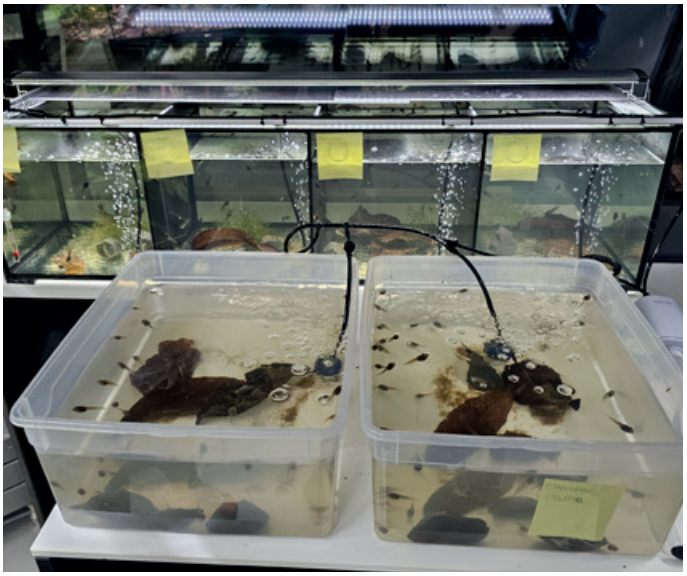
The larvae hatch more or less simultaneously after about a week and drop into the water below them. By nine days at the latest, they no longer have external gills (Proy 1993).

In the first 1–2 days after hatching, it is best to leave the larvae in the water containers whilst the water level is still low. They can then be reared together in spacious aquariums or tubs. The larval density can be 1–1.4 larvae per litre of water. Proy (1993) reared up to 70 tadpoles in water-filled plastic tubs measuring 60 x 40 x 40 cm. Stale tap water is used as rearing water. Proy did not use filters or aerators. Other keepers use at least one aerator ('bubble stone').

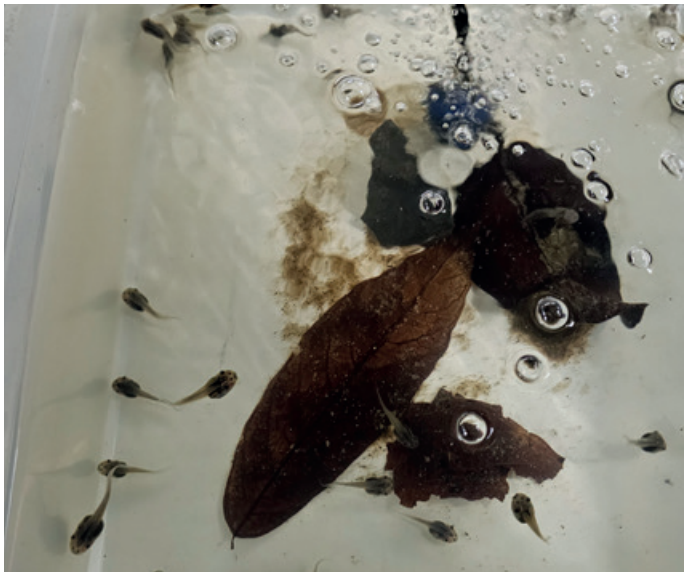


Newly hatched tadpoles in an aquarium with a low water level | Martin Huber

Newly hatched tadpole | Martin Huber



Tadpole rearing tank for *Agalychnis annae* at Zurich Zoo | Heiko Werning



View into a rearing aquarium with tadpoles that have already grown somewhat, before their hind legs have emerged | Heiko Werning

Tadpoles before their hind legs emerge | Martin Huber

With frequent water changes, it is possible to rear tadpoles even without an aerator or filter | Martin Huber

Proy (1993) carried out a complete water change every 2–3 days; Eisenberg & Kaesling (2012) recommend a partial water change at least every two weeks. The frequency of this ultimately depends on both the stocking density and the aquarium's equipment. Faeces and debris should be siphoned out of the aquarium from time to time. A small internal aquarium filter may also be useful and necessary.

In Proy's (1993) study, the water used had a pH of 7.2–7.5, and he reported rearing temperatures of 18.8–24.1 °C. A water almond leaf in the water exerts a certain antibacterial effect and lowers the pH slightly. For the same effect, so-called 'tadpole tea' (according to Eisenberg & Kaesling 2012: an extract made from 28 g of alder cones, 28 g of peat fibres and 1.9 l of rainwater, boiled for 20 minutes, then strained and diluted in a ratio of 1:100 with stale tap water; though there are also numerous other recipes) or a few alder cones placed in the water.

Substrate is not required; stones on the bottom provide structure in the tank. Lighting is not strictly necessary, but it promotes the growth of algae, which the lampreys enjoy eating. Some keepers use UV lighting, such as a UV fluorescent lamp, at least temporarily (e.g. once a week for 15 minutes, Eisenberg & Kaesling 2012) to prevent deficiency symptoms.

The colour of the free-swimming tadpoles ranges from brown to pale pink; at night, the edges of their fins turn almost black. They can be fed fish flake food, but will also eat blanched herbs, red mosquito larvae, freshwater shrimp, finely chopped prawns, algae, spirulina, pollen, crushed rabbit pellets and floating food. The tadpoles should be fed daily, or better still several times a day, with small quantities that they can consume within a few minutes. According to Proy (1993), regular feeding of freshwater shrimp results later in good colouration of the reared animals, corresponding to that of animals in the wild.

After about two months at the temperatures mentioned above, the tadpoles measured 45–58 mm in Proy (1993), with the tail length accounting for 32 mm in the larger larvae. The tadpoles have a thread-like tail tip. They usually move diagonally through the water, with their heads pointing upwards.

From around the 45th day, the hind legs began to emerge. From around the 70th day, movements of the front legs, which were still concealed within pouches, could be seen, and the back began to turn dark green. Two to three days after the front legs emerged, the larvae left the water, sometimes with vigorous tail-flapping. At this point, they were 75–91 days old, with an average of 81 days (Proy 1993). About a week later, the metamorphosis is finally complete. A detailed description of larval development can be found in Eisenberg & Kaesling (2012).

Growth and development times are heavily dependent on temperature, stocking density, diet and possibly other factors. They can also vary even among siblings of the same age kept in the same rearing tank. Above all, however, they vary greatly depending on the conditions in different breeding facilities or in the natural habitat. The range extends from around 80 days to a full year (Eisenberg & Kaesling 2012). Under the terrarium conditions described here, a development period of just under three months can be expected.
To encourage them to move onto land, the larvae are best placed in small, slanted, tightly-sealed containers (e.g. plastic terrariums) with a low water level, so that a deeper section of water forms on one side of the tank whilst the other remains dry. Additionally, a few plant tendrils (live or artificial) should be placed inside. This allows the young frogs to leave the water easily at any time. Please note: once their front legs have fully developed, the tadpoles can climb well, even on vertical, smooth surfaces. A lid is therefore essential.

Tadpole with hind legs
| Tim Benzo, Zoo Zürich

Tadpole shortly before the emergence of the front legs, viewed from the side ...
| Tim Benzo, Zoo Zürich

... and photographed from above
| Tim Benzo, Zoo Zürich

A juvenile frog undergoing metamorphosis; the tail has not yet fully regenerated | Holger Kraus, Zoo Zürich

Juvenile frogs undergoing metamorphosis | Martin Huber

The last remnants of the tail are still clearly visible on this juvenile frog, which has already come ashore | Tobias Eisenberg

- Rearing young frogs

After hatching, the tadpoles are around 20–25 mm long. They are then distributed in small groups among rearing tanks. Eisenberg & Kaesling (2012) recommend rearing 20–40 tadpoles in tanks measuring 40–60 x 40 x 40–60 cm.

Five to seven days after metamorphosis is complete, they begin to feed. They already consume prey the size of a housefly (Proy 1993). The young are misted twice daily and fed daily during the first six months of life.

Particular care must be taken to ensure hygienic conditions for the young frogs. Substrate should definitely not be used, and the tanks should be cleaned at least partially (removing faeces, dead feed animals, cleaning the water dish, etc.) as often as possible, ideally daily.

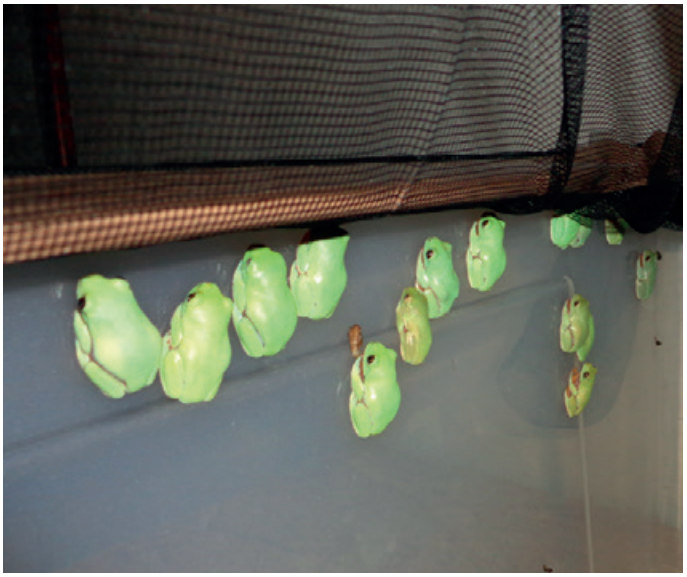
The young frogs have a greenish back during the day and a reddish-brown one at night. The underside is cream-coloured, and the fingers and toes are orange. In the first few months, they do not yet have webbing between their fingers and toes.

They react particularly strongly to disturbances during the day, as described in section 3.1, by catapulting themselves backwards onto the ground, playing dead there briefly, and then jumping away frantically. This behaviour is particularly pronounced when accompanied by spraying. As they grow older, the frogs become calmer, and their defensive and flight behaviour diminishes.

Agalychnis annae reaches sexual maturity at 10–12 months. The first noticeable difference between the sexes is that the young females become more robust and a brood patch soon becomes visible, even though the birds are still the same size.

Rearing box for young frogs | Martin Huber

Young frogs in a rearing terrarium at Zurich Zoo | Holger Kraus, Zoo Zürich



Young frogs in a rearing box | Martin Huber

Lively little fellows: young frogs in a terrarium | Martin Huber

6. Problems

Sometimes a pair will enter the amplexus without the female laying eggs. In such cases, there is a risk that the male's nuptial pads may cause the female pain. Therefore, pairs that do not spawn should be separated after a few days.

Otherwise, it is important to keep a close eye on the frogs at all times to detect any signs of illness or stressed behaviour at an early stage.

Regular faecal examinations, including those of the enclosure, also help to prevent serious health problems. The most important preventive measures, alongside a healthy diet, are good hygiene in the terrarium.

If the frogs enter amplexus without laying eggs, they should be separated again to prevent problems.
| Holger Kraus, Zoo Zürich

Something's not right here! blue-sided leaf frog displaying stress colouration | Martin Huber

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