Bamboo tree frog
Polypedates leucomystax

Figure 1. *P. leucomystax* (BT)

Introduction

Description

Polypedates leucomystax, commonly called the bamboo tree frog, common tree frog, or the four-lined tree frog, is a slender rhacophorid tree frog with a pointed snout and prominent eyes (Fig.1). *P. leucomystax* is polymorphic, colouration and patterning are highly variable, even amongst wild specimens collected in the same area (Church, 1963). The end of each toe terminates in a large disc, enabling this species to climb well. Females may grow to 80 mm snout vent length (SVL) and males to 60 mm SVL.

Distribution

Polypedates leucomystax is a widely distributed species, occurring in northeast India, Bangladesh, Nepal, western Yunnan (China) and most of mainland southeast Asia. The species is also found throughout much of Indonesia and the Philippines. It has been introduced to Japan and Papua New Guinea. It can be found from sea level up to 1, 500 m asl (IUCN *et al.*, 2006).

Conservation Status and Threats

This species is listed as Least Concern by the IUCN Red List due to its extensive distribution and its tolerance of a wide range of habitat types(IUCN *et al.*, 2006).. It should be noted, however, that *P. leucomystax* represents a complex of cryptic species, and taxonomic revision of the complex is required (IUCN *et al.*, 2006).

Habitat and Ecology

Polypedates leucomystax is very adaptable and occurs in a wide variety of habitats, including beach vegetation, various human habitats, natural edge habitats, and closed subtropical or tropical forest (IUCN *et al.*, 2006).

Sexing Individuals

Polypedates leucomystax are sexually dimorphic with females reaching maximum SVLs up to 50% larger than males. Some males exhibit grey pigmentation on the throat.

Reproduction and Larval Development

In drier parts of its range, breeding is restricted to the wet season. In wetter areas of its range the species reportedly breeds year round.

Males congregate around slow moving or still water bodies. They sit in elevated positions and call to females to attract them. The call is a nasal quack. Females respond to the males by tapping their toes, the males then move closer to the females (Narins, 1995).

Amplexus and Nest Production

Amplexus is axillary in this species. Once in amplexus the female deposits up to 500 eggs (Average egg diameter = 1.85 mm) on a surface overhanging water (Duellman & Trueb, 1994). The male fertilises the eggs and both sexes secrete mucus. The male uses his hind legs to whisk this up into a foam. This process can take 12 hours. The resulting ball of foam measures approximately 100mm across (Yorke, 1983). Mass nesting has been observed in the wild, the resulting egg mass measured a metre across (Gaulke & Cadiz, 2002). The surface of the nest hardens after a couple of hours (Staniszewski, 1995). In captivity females can produce more than one nest per breeding season (pers. obs.).

Longevity and Age at Sexual Maturity

Lifespan and age at sexual maturity in the wild have not been reported. The maximum lifespan in captivity is also unknown; to date captive individuals have been recorded to live six to eight years. Sexual maturity can be reached at one year of age in captivity.

Captive Management

Introduction
This species is commonly kept by zoos and private individuals, and has been bred in captivity for decades. Durrell obtained this species in mid-2005.

Identifying Individuals
At Durrell, adult specimens were not individually identifiable as specimens did not possess characteristic markings. Juvenile *P. leucomystax* were marked with different coloured visible implant elastomer (VIE) and this allowed us to recognise individual animals (Fig. 2).

Figure 2. *P. leucomystax* metamorph marked with VIE (BT)

Housing
At Durrell this species was housed and bred in two different types of enclosure. The first enclosure was a 500 x 500 x 900 mm glass vivarium with a secure mesh lid. A partition divided the floor of the vivarium into a water area (70 mm deep) and a land area. Coarse gravel was used as the substrate for the land area.
The second enclosure was a converted plastic storage unit. It measured 600 x 800 x 600 mm, and had a wire mesh lid. A 250 x 150 x 100 mm water dish was provided. No substrate was provided in this enclosure (Fig. 3).
Branching is essential when keeping this species. In both enclosures, multiple bamboo lengths (30 mm diameter) were provided. To these, 150 mm lengths of PVC pipe (70 mm diameter) were attached to provide refugia for the frogs. Artificial plants were also attached to the sides of the vivarium and branches to provide additional refugia, and oviposition sites.

Temperature, Humidity and Lighting
The room this species was housed in was heated to between 23 and 27˚C (night/day summer) and 20 and 25˚C (night/day winter). A Reptisun 2.0 strip light was used for lighting. All adult specimens were given monthly UVb boosts where the animals were exposed to a 300w OSRAM ultra vita lux spot for 20 minutes. To do this the frogs were put in a plastic box with a plastic mesh lid under the OSRAM bulb. The frogs were positioned so that the UVb reading inside the box measured 300 µW / sq. cm. The UVb reading was obtained by using a solarmeter 6.2 (Solatell Inc). The solarmeter was set up in exactly the same type of box the frogs received their UVb boosts in, the bottom of the box was removed to allow the sensor to sit on the level which would have been equivalent to the base of the box. This was important as it allowed the measurement of UVb the frogs would be exposed to through the mesh of the lid of their box. The box with the solarmeter was then held with the sensor directly below the strongest beam of light being ommited from the OSRAM bulb. The solarmeter and box was then moved away from the bulb until it gave the desired reading of 300 µW / sq. cm. It was at this distance below the light that the frogs were positioned for the UVb boost.
The enclosure was lightly misted with tap water daily. Humidity was increased, and rainfall simulated, using warm sprays (23 ^{o}C) delivered via a sprinkler system to stimulate breeding. These sprays were started between 2 and 3 pm daily, and stopped at 8am the following day.

Routine Husbandry
All animals were visually inspected every two days. The water dish was cleaned out and refilled, and faeces were removed daily. The enclosure and all furniture were thoroughly scrubbed (with a brush and hot water, no chemical cleaners or disinfectants were used) twice a week.

Figure 3. One set up for housing and breeding *P. leucomystax* (BT)

Diet in captivity
At Durrell *P. leucomystax* were fed on live invertebrates, predominantly crickets (*Gryllus assimilis* and *Gryllus bimaculatus*). Cockroaches (*Blaberus crani-*

ifer) and locusts (*Locusta migratoria*) were occasionally offered. Juvenile animals were fed on live pin head crickets and *Drosophila hydei*. All food items were dusted with Nutrobal ®(vitamin and mineral supplement) immediately prior to being fed out.
Adults were fed every three to six days (depending on season and condition), juveniles up to six weeks of age were fed daily.

Reproduction in Captivity

Breeding Seasonality
In captivity *P. leucomystax* breed during the warmer months. At Durrell this was from April through to October.

Provision of Breeding Sites
Adults need branching over-hanging water on which to make their foam nest.

Care of Foam Nest
Once hardened, the nest can be removed from the enclosure to facilitate collection of tadpoles. Nests were gently removed from the deposition site and stuck (the underside of the nest remains sticky) to the side of a large plastic container. This container was then raised at a slight angle and the bottom filled with water. This created a deeper area of water (approximately 1.5cm) at the end of the container furthest from the nest. It is essential that there is water directly below the nest for tadpoles to drop down into. The foam nest was lightly sprayed with tap water daily.

Tadpole Husbandry and Development
After hatching, tadpoles were transferred to a glass tank measuring 400 x 250 x 250 mm. At Durrell tap water was used to rear tadpoles, and oak leaves were added to soften the water. Partial (20 – 30%) water changes occurred two to three times per week. Air stream sponge filters were used for filtration, and were cleaned at each partial water change. The water was not heated and ranged in temperature from 23 – 26^{o}C.
Tadpoles were fed predominantly on a powdered tadpole food (components: ground tropical fish flake, grass pellet, trout pellets, tubifex, river shrimp, spirulina algae and cuttlefish bone). They metamorphosed after approximately 60 - 90 days at the above-mentioned temperatures.

Rearing Metamorphs
Metamorphs were housed in small plastic containners (Pal Pens), 350 x 200 x 300mm. Sps were housed in groups of up to 12 (groups were divided amongst larger Pal Pens as individuals grew). Paper towel was used as the substrate, and was kept permanently damp. This was replaced as necessary. A water dish was provided. It is essential that the water dish is easy for the metamorphs to climb out of (a rock or small branch in the water dish facilitates access). At Durrell we provided branching for climbing and artificial plants for refugia. The metamorphs were raised at the same temperature as the adults (23 - 27˚C), were misted with room temperature tap water twice daily, and were provisioned with a Reptisun 5.0 strip light. UVB boosts were not administered to metamorphs. Metamorphs were fed daily until about six weeks of age with pin head crickets and (occasionally) *Drosophila.* All food items were dusted with Nutrobal ®. After 8 weeks, the interval was gradually increased to once every three days.

Health

Problems Encountered in Captivity
This species appears susceptible to rostral abrasions (Fig. 4). The provision of adequate space is important in minimising / avoiding the occurrence of rostral lesions.

Figure 4. Rostral abrasion in a female *P. leucomystax* (BT)

Routine Veterinary Procedures At Durrell Wildlife Conservation Trust
Specimens have been given intra-muscular injections of antibiotics (*e.g.* Baytril, 10 mg/kg) when they have suffered from severe rostral abrasions.
All imported specimens were treated against *Batrachochytrium dendrobatidis* by bathing them in Itroconoazole solution (1:99) for five minutes daily for 11 days. There was zero mortality for specimens undergoing this treatment.
Specimens were treated for parasites using Levamisole. Specimens were bathed in baths (60mg/kg) for 30 minutes once a week for three weeks. No mortality was observed for specimens undergoing this treatment.

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