

# Phyllomedusa burmeisteri

*Phyllomedusa burmeisteri*  
in defensive posture,  
feigning death (thanatosis)  
Photo: M. Canelas



Jaime Bertoluci, Patrícia S. Santos, Marco A. S. Canelas, & José Cassimiro

## The Brazilian Common Walking Leaf Frog



This amazing leaf frog (family Hylidae, subfamily Phyllomedusinae) can be easily seen walking at night across the branches of shrubs and trees in several localities of the Brazilian Atlantic Rainforest. Its surprising coloration includes the four colours of the Brazilian flag: green over the entire dorsal surface, and brilliant yellow, blue, and white on the concealed parts of the flanks and thighs. The opposable thumbs, typical of the Phyllomedusinae, pro-

vide a grasping hand capable of supporting the entire animal with no difficulty. The vertical pupils, also characteristic of the subfamily, enhance night vision in the shadows of the forest understory. When touched, this frog may become immobile as if dead (HADDAD and SAZIMA, 1992; FEIO et al., 1998), a defense behaviour known as death feigning, tonic immobility, or thanatosis. In this way the frog usually survives the attacks of water snakes *Liophis miliaris* (SAZIMA, 1994).

*Phyllomedusa burmeisteri* Boulenger, 1882, was described from Rio de Janeiro, southeastern Brazil. This species and others described later form the *burmeisteri* group (POMBAL and HADDAD, 1992; FROST, 2004). It is widely distributed in eastern Brazil, from Sergipe to São Paulo, at elevations from sea level up to 1,000 metres (IUCN, 2005). Although the species has been known since the 19th century, several aspects of its natural history were not known until the 1990s.

In this article we present information on breeding ecology and behaviour of this frog based on a brief review of literature, observations of captive specimens, and fieldwork conducted in three Atlantic forest reserves in the Brazilian state of Minas Gerais: Reserva Particular do Patrimônio Natural Santuário do Caraça, 20° 05' S, 43° 28' W (CANELAS, 2003); Parque Estadual da Serra do Brigadeiro, 20° 43' S, 42° 29' W (SANTOS, 2003); and Reserva Particular do Patrimônio Natural Feliciano Miguel Abdala, 19° 44' S, 41° 49' W (CASSIMIRO and BERTOLUCI, 2002).

### Pedal luring

BERTOLUCI (2002) described pedal luring in *Phyllomedusa burmeisteri* from observations of a captive adult female maintained in a glass terrarium. This is the third anuran species reported to exhibit this behaviour — the other two are the terrestrial leptodactylid horned frogs *Ceratophrys calcarata* (MURPHY, 1976) and *C. ornata* (RADCLIFFE et al., 1986) — and the first record of the behaviour in an arboreal frog.

The female *Phyllomedusa burmeisteri* exhibited pedal luring when offered adult crickets. We do not know exactly what *P. burmeisteri* feeds on in the wild, but other *Phyllomedusa* species are known to feed primarily on Orthoptera (crickets and grasshoppers) Blattaria (cockroaches), and spiders (PARMELEE, 1999).

The observed pedal luring consisted of slow undulations of the fourth and fifth toes of each foot alternately. As the cricket approached the frog, toe movements became more frequent. Round white spots on the dorsal surfaces of the expanded toe discs contrast with the overall dorsal green coloration of the frog; thus, the toes and toe movements are

perceptible under low light conditions, enhancing prey attraction. The distal lateral fringe of the fifth toe is also whitish, and together with the



Pedal luring *P. burmeisteri* female. Photo: J. Bertoluci

white spot resembles a vermiform animal. Finger movements were not observed even though the fingertips are also white. When the frog rests by day, the white digital markings are concealed under the body — as visually signaling frog species keep conspicuous colours hidden when

in resting positions (HÖDL and AMÉZQUITA, 2001).

Pedal luring and tongue protraction may be associated with the arboreal habits and relatively slow movement of these frogs. Luring behaviour is typical of relatively sluggish sit-and-wait anuran predators that

ambush prey more agile than themselves (MURPHY, 1976; RADCLIFFE et al., 1986).

BERTOLUCI (2002) maintained that pedal luring behaviour in *P. burmeisteri*, as in some salamanders (BAVETZ, 1994), is not associated with prey type, but rather with the necessity of provoking prey to approach a sit-and-wait predator that cannot readily approach the prey — which is often the case in an arboreal environment. This behaviour seems to represent an innate action pattern (BARLOW, 1977) triggered by the sight of prey, and that functions as a lure to any susceptible prey, as suggested by RADCLIFFE et al. (1986) for *Ceratophrys ornata*.

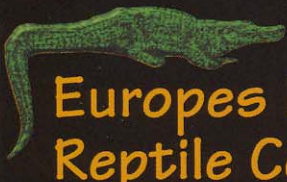
Pedal luring in frogs also seems to be associated with cryptic coloration. Both *Ceratophrys* spp. (MURPHY, 1976; RADCLIFFE et al., 1980) and *P. burmeisteri* have cryptic coloration, and a similar pattern is seen in snakes that display caudal luring (SAZIMA and PUERTO, 1993).

Pedal luring may have evolved in these anurans to increase their effective encounter rate with prey items (RADCLIFFE et al., 1986), and this behaviour could also occur in other species of



Photo: J. Cassimiro

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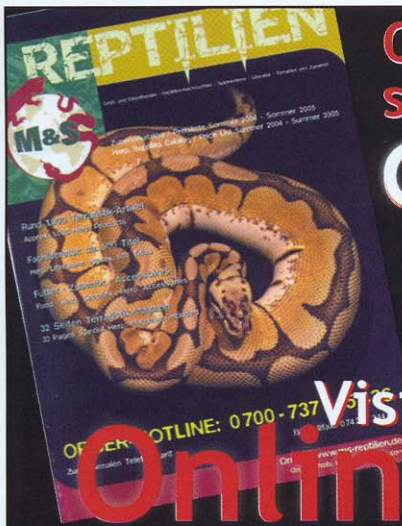
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Phyllomedusinae (e.g., *Phyllomedusa bicolor*) that also have white digit tips, as well as in other sit-and-wait anurans (BERTOLUCI, 2002).

*Phyllomedusa burmeisteri* captures its prey by slow and rigid forward movement followed by rapid tongue protraction as soon as the prey is at a reachable distance. The Phyllomedusinae are the only hylids that have highly protrusile tongues (DEBAN and NISHIKAWA, 1992). The frog seems to facilitate swallowing by positioning its body and head almost vertically, and pulling its eyes in. The hands are used to hold and manipulate prey.

### Breeding behavior

*Phyllomedusa burmeisteri* males typically call while perched 20–300 centimetres up on vegetation at the edge of permanent or temporary water bodies. The number of males in a chorus can vary from two to 15 (SANTOS, 2003; ABRUNHOSA and WOGEL, 2004).

ABRUNHOSA and WOGEL (2004) have described the breeding behaviour of *P. burmeisteri* in detail based on observations made in the state of Rio de Janeiro, Brazil. The following description is entirely according to these authors. During breeding activity, males communicate acoustically and visually, and even engage in physical combat with one another to defend calling sites. During these interactions, four types of calls are used: two advertisement calls — a more frequently emitted short call (with fewer pulses), and a long call; a territorial call; and an encounter call. The long advertisement call and the territorial call are emitted in sequence by a resident male when walking toward an intruding male. Territorial behaviour may also include visual displays in which the resident male stretches and retracts the legs alternately, separating the toes and exhibiting the yellow spots on the flanks and thighs. Physical combat occurs when the intruding male does not retreat, and lasts for 20–80 minutes. Combat includes seizing, head clapping, and kicking, and is usually accompanied by



*P. burmeisteri* female. Photo: J. Bertoluci



*P. burmeisteri* breeding site. Photo: J. Cassimiro

emission of the encounter call. Generally combat ceases when the winner left the rival and resumes calling coming back to its own calling site or when the rival escape from the aggressor. This complex social behaviour is also present in *Phyllomedusa sauvagii* (HALLOY and ESPINOZA, 2000), *P. hypocondrialis* (MATOS et al., 2000), and *P. boliviana* (VAIRA, 2001). Males increase call rate when females are near them.

In the three reserves studied, breeding activity of *P. burmeisteri* occurred from September to February, and was greatest between October and December. This seasonal pattern is closely associated with the rainy season. More males in breeding aggregations are seen in periods of intense rainfall, which create temporary pools and increase the water level in semipermanent and permanent ponds. In Rio de Janeiro, calling activity was positively correlated with air temperature, pond depth, and number of males at the pond (ABRUNHOSA and WOGEL, 2004).

Oviposition is quite similar to that of other *Phyllomedusa* species. The amplexant pair selects a leaf over water, the female deposits eggs, the male fertilizes them, and the two frogs fold the leaf over the nest — on hatching, the larvae fall into the water below, where they continue developing (DUELLMAN and TRUEB, 1994). A single clutch may contain 162–234 greenish-white eggs (ABRUNHOSA and WOGEL, 2004). The nektonic tadpoles develop

in temporary, semipermanent, or permanent ponds, and were collected in the Parque Estadual da Serra do Brigadeiro in February, April, May, and September (SANTOS, 2003). According to BOKERMANN (1964) larvae survive out of water for many hours in humid substrates.

#### Status

*Phyllomedusa burmeisteri* is listed in the IUCN Red List category “Least Concern.” Because of the species’ wide distribution, tolerance of habitat modification, and presumed large population, it is not likely to be declining fast enough to qualify for listing in a more threatened category. Mining and logging activities in its habitats are major threats to the species, but its range also includes several protected areas.

Needed conservation measures include research (on population numbers and range, biology and ecology, habitat status, and trends and monitoring) and habitat and site-based actions (maintenance, conservation, and monitoring of protected areas) (IUCN, 2005). These measures will help to ensure future generations the pleasure of sharing the planet with this wonderful and still enigmatic treefrog. ■

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*P. burmeisteri* female. Photo: J. Bertoluci



*P. burmeisteri* male ingesting prey. Photo: J. Bertoluci

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*P. burmeisteri* female walking. Photo: J. Bertoluci

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