

## Contracting behaviour in three species of *Phyllomedusa* (Anura: Hylidae: Phyllomedusinae)

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Amphibians are a common prey for several animal taxa and also have a wide variety of anti-predator mechanisms, such as cryptic and deimatic colouration, toxic skin secretions, and stereotyped behaviours (Duellman and Trueb 1986). One of these defensive strategies in Neotropical anurans is the “shrinking behaviour”, first reported briefly by Bokermann (1965) for the hylid frog *Phyllomedusa centralis*. Some years later Sazima (1974) further described this behaviour in *P. rohdei* experimentally faced with a snake predator, and presented a picture in which an adult frog appears with the dorsum arched and the four limbs contracted. This behaviour was also documented in other species of *Phyllomedusa* (Toledo, Sazima and Haddad 2010), who named it shrinking or contracting behaviour (see also Toledo, Sazima and Haddad 2011). The authors indicate that frogs displaying this posture remain motionless, generally with the eyes closed, the limbs bent close to the body, sometimes the dorsum and head arched ventrally.

We report here similar observations in three species of this genus: *P. azurea*, *P. iheringii*, and *P. tetraploidea*.

Field observations were made on an adult specimen of *P. azurea*, an adult male of *P. iheringii* found walking on an unpaved road of a hilly area, and an adult male of *P. tetraploidea* found calling on the vegetation about 1 m from a pond. In all three cases, frogs exhibited the defensive behaviour when being handled, immediately after capture. They remained immobile, with the four limbs bent close to the body, the dorsum was slightly arched, as well as the head, towards the belly, and the eyes were partially closed (Figure 1). The specimen of *P. iheringii* was transferred to a plastic bag after being photographed, and remained in this posture for at least 15 min, the specimen of *P. azurea* for a few minutes, and the specimen of *P. tetraploidea* remained only a few seconds in this posture after handled. Collected specimens were euthanized with lidocaine, and deposited in the following herpetological collections: Museo Nacional de Historia Natural de Montevideo, Uruguay, MNHN; Colección Diego Baldo of Museo de La Plata, La Plata, Argentina; Departamento de Zoologia da Universidade Federal do Rio Grande do Sul, Brazil (Table 1).

The defensive display observed by us in *P. azurea*, *P. iheringii*, and *P. tetraploidea* is the same shown in the available illustrations of previous reports on contracting behaviour in species of *Phyllomedusa*: *P. bahiana* (Toledo et al. 2010), *P. rohdei* (Sazima 1974), and *P. venusta* (Escobar-Lasso & González-Durán 2012). Toledo, Sazima and Haddad (2010) reported contracting behaviour for the first time in *P. azurea* (without photographs), and its occurrence also in *P. bahiana*, *P. burmeisteri*, *P. distincta*, and *P. nordestina*. These authors suggested that this behaviour is possibly characteristic of phyllomedusines, as it was reported in several species of *Phyllomedusa* and also *Phrynomedusa marginata* (see taxonomy in Faivovich et al. 2010). Its occurrence in other phyllomedusinae deserves further study to determine if the contracting

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**Figure 1.** Contracting behaviour in *Phyllomedusa*: *P. azurea* MLP DB 6286 (left), *P. iheringii* MNHN 9491 (upper right) and *P. tetraploidea* UFRGS 6902 (lower right).

behaviour constitutes a plesiomorphic condition in this subfamily or evolved independently several times.

It is noteworthy that adult specimens of *P. rohdei* displaying this defensive strategy swallowed by a snake were regurgitated soon afterwards – maybe due to the effect of toxic skin secretions on the predator

– and survived (Sazima 1974). Contracting behaviour seems to be present mostly in toxic anuran species (Toledo *et al.* 2010), and its association with skin toxins is likely an effective defensive strategy against snakes and eventually other kind of predators.

**Table 1.** Collection data of specimens.

Species and voucher specimen	Collection site	Date and time of observation
<i>P. azurea</i> (MLP DB 6286)	Pirané, Formosa Province, Argentina (25°40'S, 59°04'W).	18 November 2007, 23:00 h.
<i>P. iheringii</i> (MNHN 9491)	Quebrada de los Cuervos, Departamento de Treinta y Tres, Uruguay (32°59'S, 54°27'W).	9 October 2012, 22:00 h.
<i>P. tetraploidea</i> (UFRGS 6902)	Municipality of Chapecó, near the margin of the Uruguay River, State of Santa Catarina, Brazil (27°16'S, 52°42'W).	9 December 2013, 20:45 h.

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