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PARENTAL CARE AND CLUTCH SIZE OF *PRISTIMANTIS REICHLEI* (ANURA: STRABOMANTIDAE) FROM BOLIVIA

CUIDADO PARENTAL Y TAMAÑO DE PUESTA DE *PRISTIMANTIS REICHLEI* (ANURA: STRABOMANTIDAE) DE BOLIVIA

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Resumen.– *Pristimantis reichlei* es una especie ampliamente distribuida, ocupando bosques amazónicos de Bolivia, Perú y Brasil. Sin embargo, hay poca información disponible sobre su historia natural o biología reproductiva. Aquí documentamos por primera vez el cuidado parental y el tamaño de puesta para esta especie. Se presume partenogénesis.

Palabras claves.– Biología reproductiva, desarrollo directo, comportamiento reproductivo.

Abstract.– *Pristimantis reichlei* is a widely distributed species, occurring in the Amazonian forests of Bolivia, Peru and Brazil. However, little information is available on its natural history or breeding biology. Here we document for the first time the parental care and the clutch size of this species. Parthenogenesis is presumed.

Key words.– Breeding biology, direct development, reproductive behaviour.

The genus *Pristimantis* Jiménez de la Espada, 1870, is represented by 591 species. Its distribution includes the southern Caribbean, Central America, and South America (Frost, 2021). In Bolivia, 17 species of the genus *Pristimantis* have been registered (those endemics marked with an asterisk): *Pristimantis altamazonicus, P. carvalhoi, P. danae, P. dundeei, P. fenestratus, P. koehleri*, P. llojsintuta*, P. ockendeni, P. olivaceus, P. pharangobates, P. platydactylus, P. reichlei, P. samaipatae*, P. skydmainos, P. toftae, P. ventrimarmoratus* and *P. zimmermanae* (Reichle, 2007; De la Riva & Reichle, 2014; Frost, 2021).

Direct development is typical of many amphibian groups, including the family Strabomantidae (Hedges et al., 2008). Data of parental care in Strabomantidae, including the genus *Pristimantis*, were reported in several studies (e.g., Lynch 1984a; Crump 1996; De la Riva & Lynch, 1997; Vargas & Castro, 1999; Chinchilla-Lemus & Meneses-Pelayo, 2009; Rojas-Rivera et al., 2013; De la Riva & Burrowes, 2014; Mamani et al., 2017).

In Bolivia, information about oviposition or parental care in Strabomantidae is available for species of the genus *Microkayla*, namely *Microkayla illampu* (De la Riva, 2007), and *Microkayla teqta* (De la Riva & Burrowes, 2014). Also, a single record exists on parental care in *Yunganastes fraudator*, based on a clutch of 30 eggs (De la Riva & Lynch, 1997) and Martínez & Rodríguez (2007, described the clutch of *Pristimantis danae* from Peru (a species registered in Bolivia). While clutch size and parental care of over 21 species of *Pristimantis* have been described in South America (e.g., Lynch 1979; Lynch 1984b; Rodríguez 1994; Lynch & Duellman, 1997; Carrillo & Catenazzi, 2007; Martinez & Rodriguez, 2007; Chinchilla-Lemus & Meneses-Pelayo, 2009; Lehr, Moravec & Cusi, 2012; Lehr & Von May, 2017), there is very little information on the clutch of the seventeen species of *Pristimantis* reported in Bolivia and nothing is known about reproduction or parental care.

Pristimantis reichlei Padial & De la Riva, 2009, is distributed in primary and secondary forests through the Andean slopes of Peru and Bolivia, and has been reported in the Amazonian lowlands of Brazil (Padial & De la Riva, 2009; Melo-Sampaio & Barbosa de Souza, 2010).

During a field trip on December 9, 2019, a gravid female of *P. reichlei* (SVL= 32.73 mm) was found and captured near the

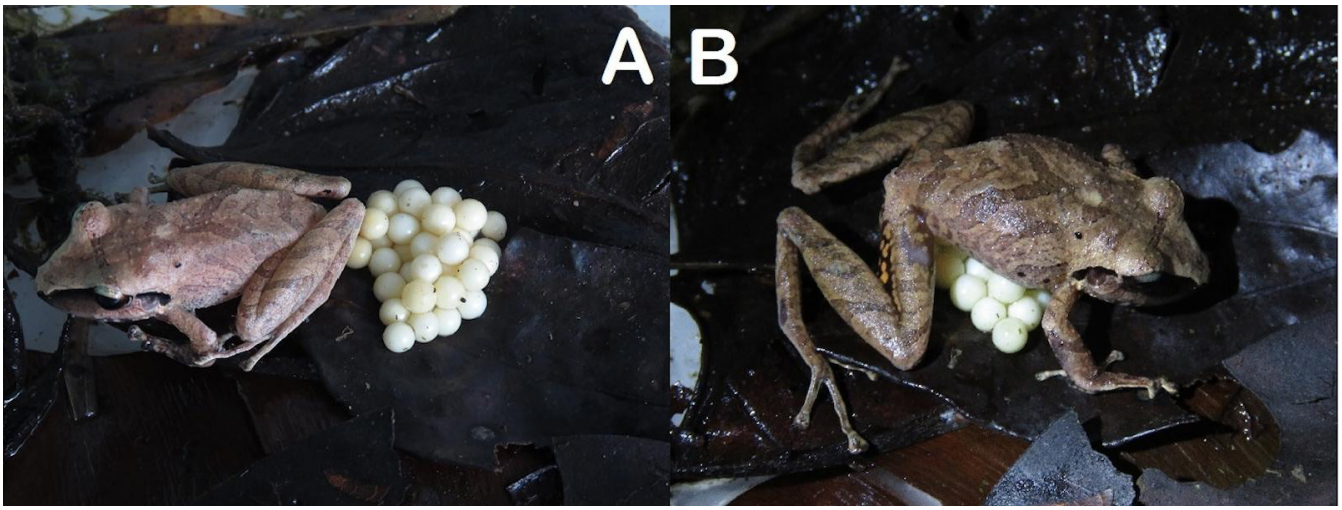

Figura 1 (A-B). *Pristimantis reichlei* (LHC = 32.73 mm) hembra adulta cubriendo una puesta de 28 huevos. Fotos: Oliver Q-M.
Figure 1 (A-B). Female of *Pristimantis reichlei* (SVL = 32.73 mm) protecting and covering a clutch of 28 eggs. Photos: Oliver Q-M.

Figura 2. Juveniles (flechas rojas) de *P. reichlei* provenientes de la puesta de 28 huevos. Fotos: Oliver Q-M.
Figure 2. Juveniles (red arrows) of *P. reichlei* from the clutch of 28 eggs. Photos: Oliver Q-M

locality of Yanamayu, in Carrasco National Park, Cochabamba department, Bolivia (-17.413932°; -65.264189°, WGS84, 1484 m.a.s.l.), in the ecological zone of the Yungas Boliviano-Peruanos (Ibisch & Mérida, 2003). At the time of the capture of the female specimen, no male was registered near or in the surroundings.

A few hours after capture of the specimen, a clutch of 28 eggs was observed in the field bag. The female and the clutch were deposited in a plastic container filled with litter and immediately the female completely covered the egg mass with her body. The container was transferred to the work camp located within the same area (Fig. 1). The clutch had the form of a bunch of grapes; the eggs were 4.58 to 4.75 mm in diameter, spherical, whitish-cream. Fourteen eggs were not viable and the other 14 eggs were fertile and completed their development, giving rise to 14 juveniles (Fig. 2). The entire process had a duration of six days, from the moment of capture and oviposition, until the moment of the hatching of the froglets. During this time the female was not subjected to any type of disturbance, and she was protecting the clutch every day, placing herself above the clutch. After the study, the specimens were returned to the area where they were collected.

Martínez & Rodríguez (2007) studied the clutches of 15 individuals of *Pristimantis danae* (sister species of *P. reichlei*) from three localities (between 1240–2040 m a.s.l.) in the Cosñipata valley, Peru. The number of eggs per clutch varied from 28 to 40 eggs and the diameter of the eggs from 2.0 to 3.2 mm; therefore, our results regarding clutch size in *P. reichlei* (SVL 32.73 mm; 28 eggs; 1484 m.a.s.l.) are similar to those of *P. danae*, since they are within the clutch range. While the eggs appear to be significantly larger in *P. reichlei* versus *P. danae* (4.58-4.75 mm vs. 2.0-3.2).

However, the size of the body, that is, the snout-vent length of the female and the number of eggs did not obtain any type of relationship. Likewise, no type of association was found between the clucht size and altitude (30-35 eggs at 1480 m.a.s.l.) as proposed by Martínez & Rodríguez (2007).

According to Lynch, (1971) the amplexus in the genus occurs in a standard axillary position. Although there are known cases of internal fertilization in Strabomantidae, species such as: *Eleutherodactylus coqui* and *Eleutherodactylus jasperi* (Marvalee, 1978, Townsend et al., 1981; Kasinky et al., 2005), fertilization mechanism or any other type of behaviour during the amplexus has not been observed in any species of the genus.

Through the results evidenced in this work, we cannot verify how the fertilization of the eggs was carried out, but we can verify external development of the embryos. Therefore, since no male was recorded in the vicinity or at the time of capture, we presume that an exceptional case of parthenogenesis could have occurred in the species, this reproductive mechanism being one of the least common in amphibians.

This finding represents the first record of parental care for *Pristimantis reichlei* and for any species of the genus in Bolivia, and the second record of clutch size for a species of the genus in the country.

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