

Notes on the Distribution and Reproductive Biology of *Centrolene geckoideum* Jimenez de la Espada in Colombia and Ecuador (Amphibia: Centrolenidae)

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ABSTRACT

Centrolene geckoideum is known from upper montane cloud forests (1910-2100 m) in Colombia and northern Ecuador. Males guard egg clutches and call from behind waterfalls. The tadpole and egg masses are described for the first time.

Centrolene geckoideum Jimenez de la Espada (Fig. 1 a-b) is a large (8 ♂♂ 70.7-77.0 [\bar{x} = 74.5] mm SVL, 3 ♀♀ 60.7-64.6 (\bar{x} = 62.0) SVL), poorly known

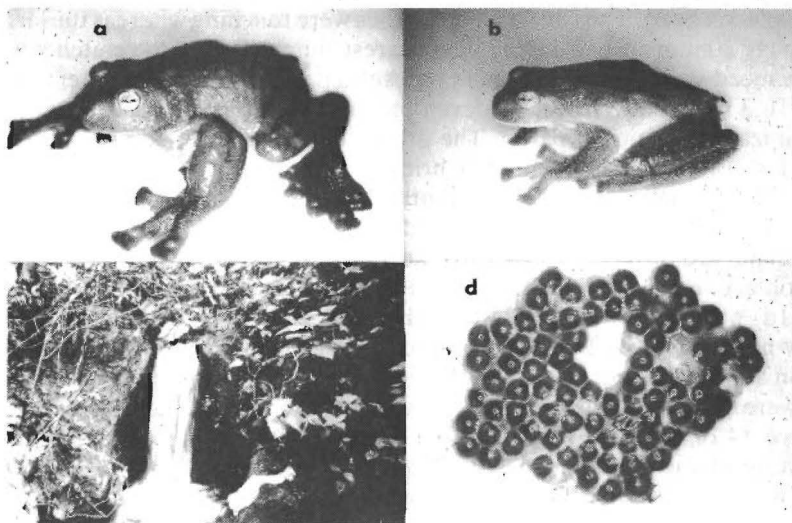


Fig. 1. *Centrolene geckoideum* (a) ♂, 75.5 mm SVL, JDL 12634, and (b) ♀, 64.6 mm SVL, JDL 12635; (c) waterfall behind which 3 males were calling; (d) egg mass, JDL 12633, horizontal axis 70 mm.

frog from the Andes of Colombia and Ecuador. To date little more than descriptions (Cochran and Goin, 1970: 497-499) and locality records (Goodman and Goin, 1970: 276) have been published. The published records are Quebrada Los Zapadores, Prov. Pichincha, Ecuador, 1910 m (west slopes of Andes) and two localities in Depto. Antioquia, Colombia (Páramo Frontino, Urrao, 3000 m, and Medellín), from the northern extremes of the Cordillera Occidental and C. Central of Colombia. Cochran and Goin (1970: 498-499) noted that males have large humeral spines (absent in females) and that males are larger than are females. Goodman and Goin (1970) reported finding adult males on a boulder in a shaded stream by day. Virtually nothing is known of the life history of this frog.

On 30 May 1981 we collected examples of *C. geckoideum* along streams in the vicinity of the Hacienda Brillante, vereda San Julian, municipio Calarcá, Depto. Quindío, Colombia, 2030-2100 m. We were first attracted to the frogs while tracing a loud, high-pitched, trilled whistle to the vicinity of a waterfall 3 m in height (Fig. 1c). To our ears, 2-3 individuals were chorusing. The din of the waterfall and the quality of the call conspired to prevent actual observation of the males while calling. Three adult males with partially distended vocal sacs and one adult female were found clinging to the vertical or overhanging surfaces in the spray zone behind the waterfall (Fig. 2). The males were 1.0-2.0 m apart. One male was 10 cm below the female who was perched immediately below three egg masses. The female (JDL 12635) had ovulated and spontaneously released her 112 eggs (capsules 4.5-5.5 mm in diameter, egg diameters 3.5-4.0 mm) while being photographed 3 June 1981.

The three egg masses were 40 x 60, 40 x 62, and 42 x 70 mm, one egg thick (long axis vertical). The two smaller clutches were touching whereas the largest clutch lay 20 mm away from the next nearest clutch. Two of the clutches were in advanced stages of development (capsules 6.0-6.5 mm in diameter, larvae 16.0-16.3 mm total length, in developmental stage 25 [Gosner, 1960], no keratinization of mouth parts). The other "clutch" contained only ruptured capsules. The jelly of the clutch is brittle.

On 31 May 1981 we searched another waterfall on the same stream (ca. 200 m upstream). A single male called sporadically behind a falls 4 m high. This male was sitting directly atop an egg clutch (50 x 70 mm, long axis horizontal) on an overhanging rock within the dense spray zone. This clutch (Fig. 1d) was one egg thick with 77 embryos and 12 decomposing ova (presumably not fertilized). The "empty space" evident inside this clutch was also seen in another clutch; its cause and significance are unknown. As before, the eggs were "glued" to the rock and had to be cut off the rock. The embryos are in stage 14 of Gosner (1960) and the capsules are 5.3-6.0 mm in diameter.

Several larvae spontaneously emerging from the clutches found 31 May 1981 were kept live in plastic bags filled with cold water. The tadpoles were carried about on our field trip through north-central Colombia between elevations of 100-3400 m (June 1-15, 1981). Periodically, rocks bearing algae and periphyton were placed in the bags. Upon returning to Bogotá, we noticed that

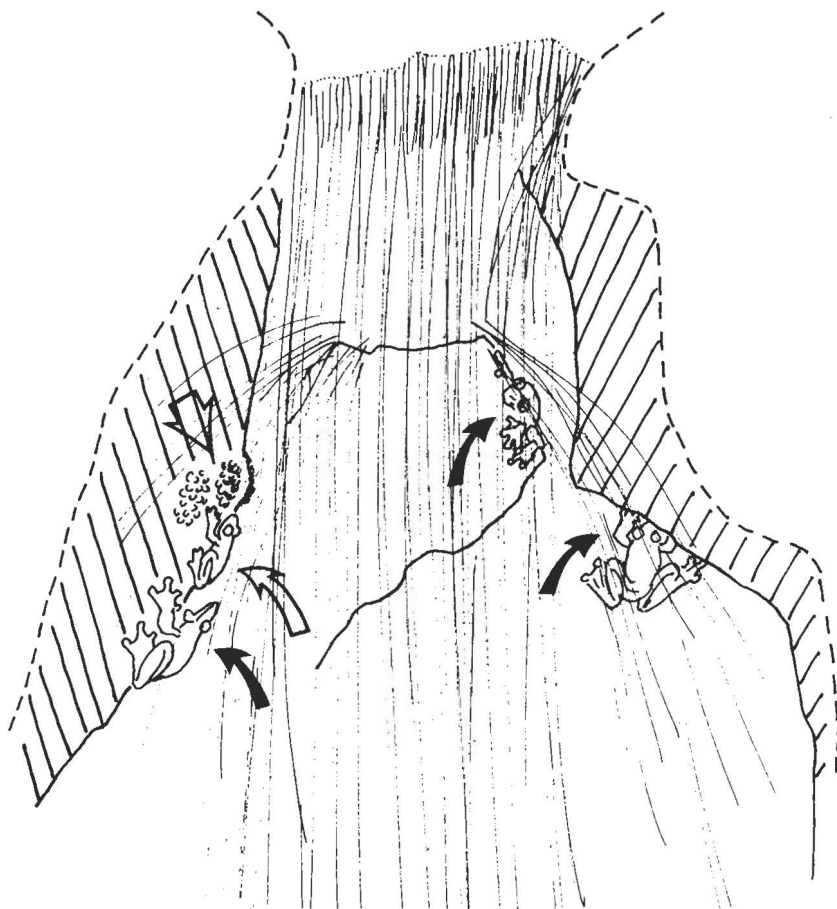


Fig. 2. Sketch of waterfall (see Fig. 1c) and placement of *Centrolene geckoideum* within the spray-zone. Males are indicated with solid arrows, the female with an open arrow. The short arrow points to the advanced egg masses.

the yellowish color to the gut evident at hatching (yolk?) had been replaced by browns.

One tadpole appeared near death 30 June 1981 and was preserved. The tadpole was 22.3 mm total length at death and exhibited a typical centrolenid body form (see Cochran and Goin's, 1970: 494, figure misidentified as *Geobatrachus walkeri*). No upper tooth rows but two lower tooth rows are apparent (inner broadly divided medially). The upper beak is thick with minute serrations but without thin tapering lateral projections. The lower beak is thin and poorly keratinized. One row of large subconical papillae border the

mouth ventrolaterally and posteriorly (Fig. 3). Seining the stream immediately below the falls yielded only catfishes (*Astroblepids*).

In addition to the four localities mentioned above, *C. geckoideum* is also known from 1 km by road SW San Ignacio, Prov. Pichincha, Ecuador, 1920 m (a male was heard calling 27 December 1977; three specimens were found in the spray zone of a small waterfall, ca. 2.5 m high, two males on rocks and elephant ear plants, a female on rocks behind the falls), km 42, carretera Guadalupe-Florencia, Depto. Caquetá, Colombia, 2100 m (an adult male, ICN 4633, found plastered to a *Guneria* leaf beside a stream flowing through forests; on the Amazonian versant of the Cordillera Oriental), Cueva Los Guacheros, municipio Acevedo, Depto. Huila, Depto. Huila, 1900 m (photographs on file in ICN, specimen lost; locality in headwaters of Río Magdalena), and ca. Corinto, municipio Pajarito, Depto. Boyacá, Colombia, 2000 m (numerous examples, marked population living along cascading stream on Amazonian versant of Cordillera Oriental; under study by JVR).

Aside from the record for Páramo Frontino (3000 m) and the purported type-locality (Río Napo, Ecuador), all records of *C. geckoideum* of which we are aware are from upper montane cloud forest (1910-2100 m) beside swiftly flowing, shaded mountain streams with numerous waterfalls. Our experiences

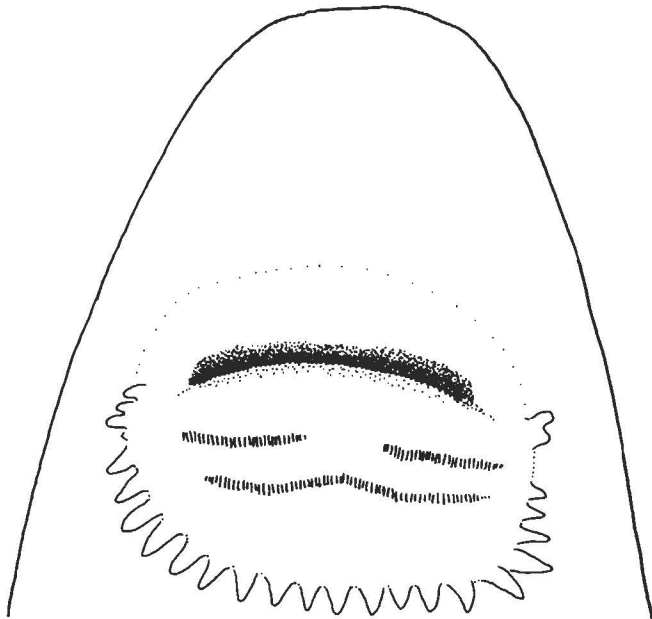


Fig. 3. Mouth parts of a tadpole of *Centrolene geckoideum*, stage 25 of Gosner.

with reproductively active animals are suggestive of no seasonality. We anticipate that our observations at Hacienda Brillante (males guarding clutches glued to rock faces behind waterfalls) are typical of normal behavior. If so, the rarity of the frog and the previous lack of information on reproductive biology are products of the secretive nature and seldom-visited micro-habitat of the frog. *Centrolene geckoideum* is wide-spread in the northern Andes.

Centrolene geckoideum is the only member of the genus. All other species of the family belong to a single genus (Goin, 1964), usually called *Centrolenella* (*Cochranella* and *Teratohyla* are synonyms), but Lynch (1981) recently suggested that the genus be called *Hyloopsis*. Students of neotropical frogs have long characterized *Centrolenella* (or *Hyloopsis*) by the habit of males guarding egg clutches afixed to leaves. We have found a species in Deptos. Antioquia and Quindío that afixes its egg mass to leaves or to moss-encrusted twigs. We suggest that the habit of male guarding of egg clutches suspended on vegetation, twigs, or rocks be considered a synapormorphy of the family Centrolenidae.

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RESUMEN

La rana, *Centrolene geckoideum* es conocido de bosques nublados (1910-2100 m.s.m.) en los Andes de Colombia y Ecuador al norte. Los machos guardan las posturas y cantan detrás cascadas. Se describen el renacuajo y las postura.

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