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Reprinted from COPEIA, 1965, No. 4, December 31  
pp. 421-425

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The Systematic Status and Biology of *Telmatobius montanus*  
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The Systematic Status and Biology of *Telmatobius montanus*  
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The poorly known *Telmatobius montanus* was rediscovered in the high Andean mountains between Mendoza and Talca on the Argentinian-Chilean frontier. Morphological characters of the adults and tadpoles are described. There is convergence in male secondary sex characters toward the leptodactylid frogs of the genus *Eupsophus* (*nodosus* group).

INTRODUCTION

THE species *Telmatobius montanus* Lataste (in Philippi) is known from 1 poorly preserved specimen. Four of the original 5 syntypes were lost, and the male specimen from the Central Chilean Cordillera (Potrero Grande, Santiago) described by Müller (1938) was destroyed in World War II (Cei 1962). According to Müller (1938), the geographic range of *T. montanus* extends from 32°30' to 34°20' south latitude. This peculiar Chilean frog inhabits small, high Andean pools and streams. While examining the cordilleran biocenosis in the Mendoza Mountains on the Argentinian-Chilean frontier, 80 km west of Bardas Blancas, Malargue, in March 1964, we found some frogs and tadpoles referable to *T. montanus*. The present paper gives a new detailed description of adults of both sexes, a description of the tadpoles, and remarks on the biology of this species.

We thank Dr. W. E. Duellman of the Museum of Natural History, University of Kansas, for his kindness in reading the manuscript and for his help in putting it in English.

*Telmatobius montanus* Lataste  
(in Philippi 1902)

*Type-locality*.—Lakes of the Andean region of Santiago, Chile.

*Lectotype*.—A syntype, CNHM 9979 (female).<sup>1</sup>

*Distribution*.—On the basis of our records, the species occurs at elevations above 2,000 m in the Andean region between 30°30' and 36°00' south latitude. Specimens examined: 15 km from Argentinian frontier, 2,400 m, facing Maule Lake, Talca, Chile, IBM-UNC 1646<sup>1</sup>, 10 specimens; 3 km from Chilean frontier, 2,500 m near the international road to Talca, Malargue, Mendoza, Argentina, IBM-UNC 1639-41, 1643 (tadpoles).

*Diagnosis*.—A stout, moderate-sized species of *Telmatobius* differing from other known species by its external secondary sexual characters.

*Description of adults*.—Measurements of 5 males and 6 females, respectively (mean and observed range in mm): snout-vent length 55.6 (52-58), 56.6 (52-65); head length 15.1 (14-16), 15.4 (14-17); head width 17.7 (17-18.5), 17.5 (16-19); interorbital distance 4.1 (4-4.5), 3.9 (3.2-5); width of eyelid 4.6 (4.2-5), 4.7 (4.2-5.8); internarial distance 3.7 (3.5-4), 3.6 (3.2-4); diameter of eye 5.2 (4.5-6), 5.6 (5-6); length of femur 27.9 (25.5-29.5), 27.7 (26-30); length of tibia 28.5 (26.5-30), 28.1 (26-30); length of foot

<sup>1</sup> Chicago Natural History Museum (CNHM); Instituto Biología, Mendoza, Universidad Nacional de Cuyo (IBM-UNC).

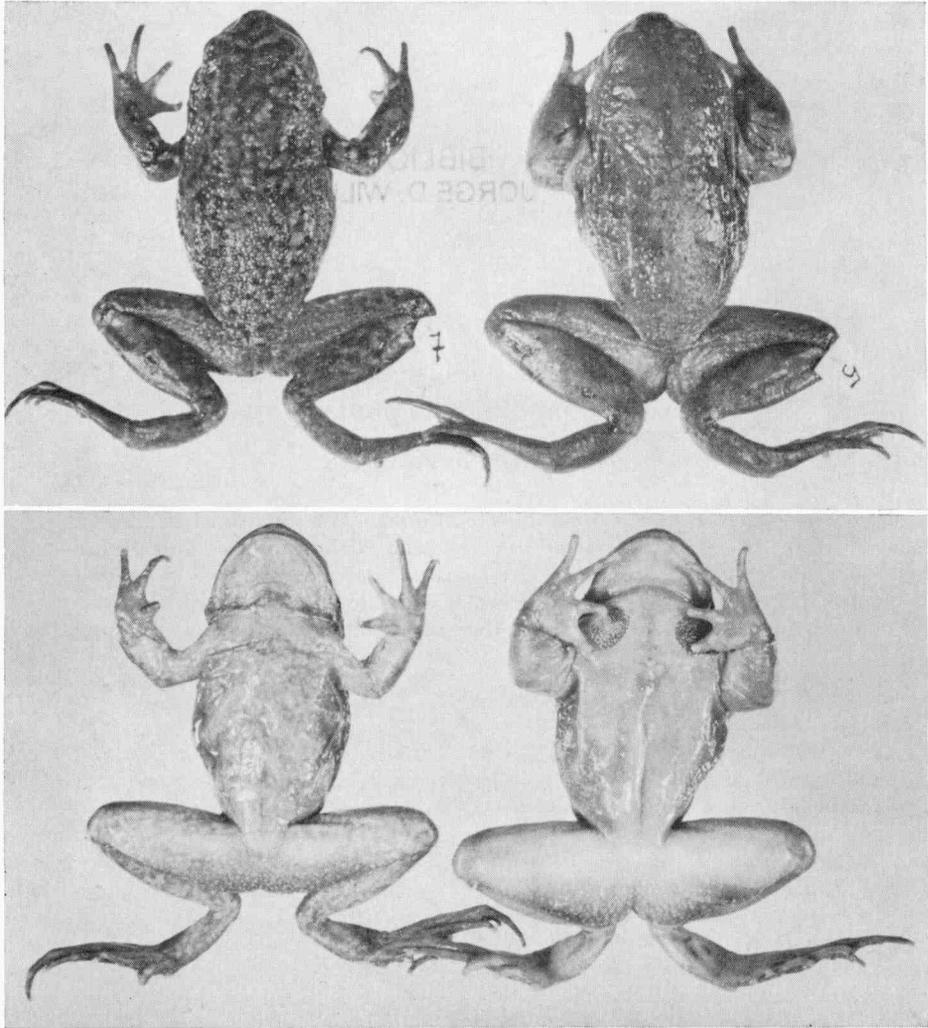


Fig. 1. *Telmatobius montanus*: male (right) and female (left). Slightly reduced.

43.4 (40-45), 42 (38-45). Head as wide as body, less than one-third length of body; snout rounded, slightly protruding beyond lower jaw; canthus distinct; nostrils lateral, nearer snout than eyes; diameter of eye greater than its distance from nostril; interorbital distance narrower than eyelid, greater than internarial distance (Fig. 1). Maxillary teeth present; vomerine teeth in 2 rounded oblique patches between upper borders of choanae; tympanum indistinct under folds of skin; dermal fold from upper eyelid downward behind tympanum; tongue elliptical, free posteriorly. Forearm stout, long, especially in males; when carried backward, forearm crosses groin; outer palmar tubercle

large, flat, somewhat larger than inner; subarticular tubercles evident, one on base of each finger; length of fingers from shortest to longest 1-2-4-3. Hind limb slender; when carried forward tibiotarsal articulation extending to eye in both sexes; in adpressed hind limbs heels not overlapping; inner metatarsal tubercle elliptical, outer conical, small; subarticular tubercles conical; length of toes from shortest to longest 1-2-5-3-4; toes fully webbed; tarsal fold present. Skin tuberculate and granular above, less so below; strong tubercles in tympanic region; supratympanic fold strong; dermal folds present laterally in males.

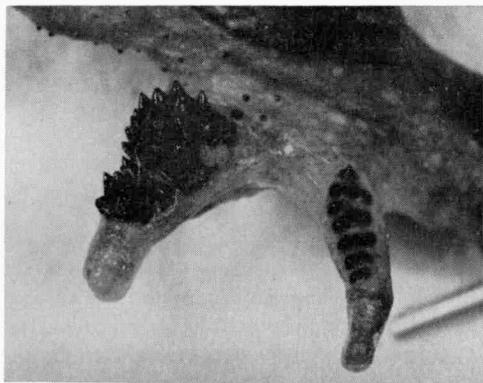


Fig. 2. Nuptial thumb pads of *Telmatobius montanus* male. Enlarged.

*Secondary sex characters in males.*—Forearm stouter than in females, with marked dark spiny pads on the first finger and narrow band of spiny warts on the second finger; bilateral circular spiny areas of conical pigmented tubercles on the chest; scattered spiny warts on the forearms and upper lip; skin more granular and folded (Figs. 2, 3).

Maximum height in millimeters of the spiny pads in 4 males: mean, 1.6 (1.5–1.9); maximum height of the isolated spiny warts: 0.9 (0.8–1.0). Diameter of the circular spiny areas on the chest: 5.65 (5.4–6.0).

*Coloration.*—In life, dorsum greenish brown in males with scattered indistinct yellowish spots; belly creamy white and bluish white, darker with purplish tint on inferior surfaces of limbs; bilateral circular spiny areas on chest reddish brown. Dorsum brown mottled with small and diluted yellow irregular spots in females; an irregular narrow yellow interorbital bar; venter creamy white with indistinct reticulated dark spots posteriorly on throat and inferior surfaces of legs. In alcohol, dorsum brown with small irregular yellow spots, less evident or indistinct in males; belly cream color, with faint gray or brown reticulations more evident in females; white warts in anal region in both sexes.

*Pectoral girdle* (Fig. 4).—Omosternum cartilaginous with short stem and dilated tip; sternum cartilaginous, expanded posteriorly, slightly emarginate, shorter than the epicoracoids, and twice length of omosternum.

*Tadpoles* (Figs. 5–6).—The following description is based on IBM-UNC 1639, 10 specimens (21–29 mm) without hind limb buds; IBM-UNC 1640, 10 specimens (50–

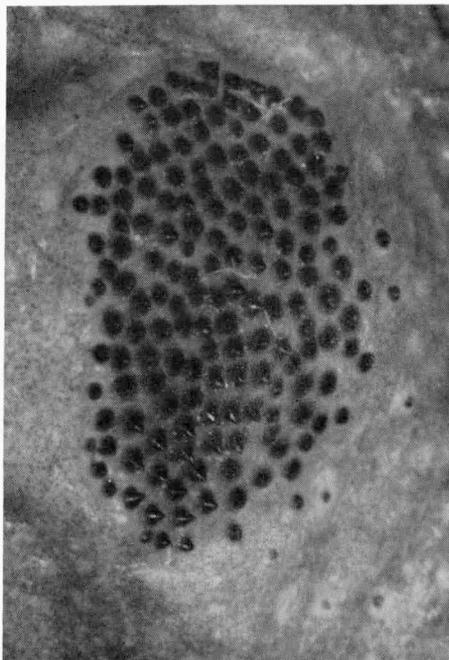


Fig. 3. Horny circular spiny areas on the chest of male specimens of *Telmatobius montanus*. Enlarged.

62 mm) with small hind limb buds; IBM-UNC 1641, 3 specimens (66–71 mm) with hind legs well developed and larval mouthparts still present.

Body and head less than twice as long as wide; head not wider than body, large, somewhat depressed; ventral profile convex, with pronounced abdominal bulge; snout rounded; eyes small, dorsal; interorbital distance less

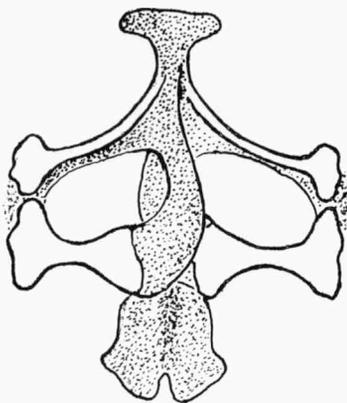


Fig. 4. Shoulder girdle of *Telmatobius montanus*.  $\times 5$ .

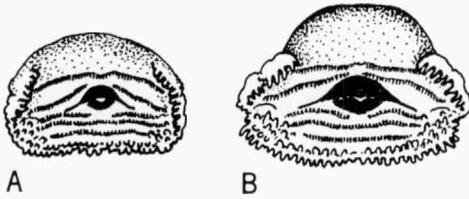


Fig. 5. Mouthparts of tadpoles of *Telmatobius montanus*: A, 27 mm larva,  $\times 6$ ; B, 57 mm larva,  $\times 4$ .

than distance of eye from tip of snout; inter-narial distance greater than interorbital, but less than distance between nostril and eye; nostril nearer to eye than to tip of snout; spiracle sinistral, opening laterally nearer to ventral base of tail than to tip of snout; spiracular tube inconspicuous; anus dextral. Caudal musculature strong, longer than head and body; fins well developed above and below, low near body, higher posteriorly; tip of tail rounded; dorsal and ventral fins extending onto body; skin lubricous, very pigmented, velvety surface. Width of mouth somewhat greater than distance between eyes; lips thickened, protruding laterally, strongly infolded, edges bordered by marginal papillae of various sizes; upper lip thick, prominent; tooth rows  $2/3$ , upper rows about equal in length, longer than upper beak; second upper row and first lower row divided; other rows continuous; third lower row shorter than second; horny brown-black beak serrated.

Color (in life and in 5% formalin): velvety black dorsally with some small and diffuse golden yellow spots on flanks and belly; tail transparent but marked with many irregular dark brown spots, especially on dorsal fin and on tip of tail.

*Remarks.*—This species lives at elevations between 2,000 and 2,500 m in the Andean Cordillera. We obtained adult specimens from small, steep stony streams that are warmed by midday sun. All streams are close to permanent snow. The adults stay in deep horizontal holes somewhat circular in shape and about 10–12 cm in diameter, and located under the water level at the borders of the streams. The burrowing capacity of these aquatic, soft-skinned frogs is astonishing if they are, as is probable, the builders of such holes, some 1.5 m deep. They likely take shelter in them during the long period of hibernation of 5 or 6 months.

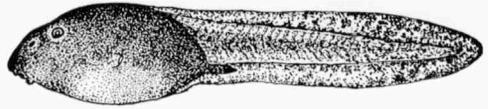


Fig. 6. Lateral view of 57 mm tadpole of *Telmatobius montanus*.  $\times 1$ .

On the Argentinian slope we found specimens in a natural sulfur spring. There the frogs were swimming freely in deep rocky pools or in pits in the spring; sometimes they were hidden in holes on the borders of the spring. Tadpoles in all stages were observed swimming slowly or resting on the bottom of the largest pools. Probably mating and egg deposition occur repeatedly during the summer season. All males had well-developed secondary sexual characters at the time of the capture. Under stress, the males in captivity quickly lose the spiny, pigmented, horny areas on the chest, but they are also able to produce them again in some 12 to 14 hr. The strong, horny thumb spines are more resistant to the effects of captivity stress.

The call of these frogs is deep, but weak, and can be described as a low croak. The frogs call irregularly from under water by day.

The remarkable sexual characters of *T. montanus* indicate a special position in comparison with the other representatives of the *Telmatobiinae*. None of the known *Telmatobius* shows the symmetrical circular spiny area on the chest and the size of the strong, dark, spiny thumb pad described for *T. montanus*. According to Schmidt (1928, 1954) and Vellard (1951, 1953, 1955) and by personal observations, spines of such a size and structure are not present in the *jelskii*, *marmoratus*, *culeus*, *crawfordi*, and *albiventris* groups, and also are lacking in *peruvianus*, *simonsi*, *halli*, *hauthali*, *latirostris*, *brevipes*, *intermedius*, and *atacamensis*. They have not been reported for *niger*, *cinereus*, or *ignavus*. All the known species of *Telmatobius* show smaller thumb spinules and the general structure of their pads is very different.

A striking similarity exists between the thumb pad ornamentation and circular spiny chest area of *T. montanus* and those reported for the leptodactylid frogs of the genus *Eupsophus* (*nodosus* group). *Eupsophus* probably is a primitive leptodactylid line, and its great antiquity as a member of the

oldest Tertiary Patagonian fauna (Schaeffer 1949) supports such an ancestral position. The convergence of the secondary sexual characters of *Telmatobius montanus* to a *Eupsophus*-like condition, in evident contrast with the other 46 known species of *Telmatobius*, seems to indicate at least its great phyletic independence and perhaps warrants a subgeneric position. We can remember that Lutz (1930) proposed a subgeneric arrangement for *Leptodactylus* fundamentally based on the general morphology of the secondary sexual characters.

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