

Odontophrynus barrioi, a New Species of Anuran from Argentina

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ABSTRACT.—A new species of *Odontophrynus* from 2200 m altitude in the Sierra de Famatina, Argentina, is described. Morphological as well as cytogenetic features differentiate the new species, *O. barrioi*, from the populations of the *O. occidentalis* group.

The genus *Odontophrynus* is widespread in several regions of southern and eastern South America. In arid and subarid territories of western Argentina, *Odontophrynus occidentalis* (Berg, 1898) is predominant, sympatric with *O. americanus* in the eastern pampean boundaries. The range of the group extends in subandean areas along the Cordilleran Mountains, at 500 to 2000 m of altitude in Catamarca and the La Rioja Mountains in the north. Southwards it reaches northern Patagonia in Rio Negro and Neuquén Provinces, but marginal populations are also found eastwards in the pampean reliefs of the Sierras of Cordoba and San Luis and on the sandy Atlantic coasts of Buenos Aires Province (Savage and Cei, 1965; Barrio, 1964; Cei, 1980a) (Fig. 1).

Having in mind the characteristic cytogenetic features of *O. americanus* whose diploid-tetraploid populations were described by Beçak et al. (1966, 1970), a comparative populational study on *O. occidentalis* was carried out. During this study polyploid populations of *O. occidentalis* were not detected. However, significant karyotypic differences in heterochromatin patterns were found between an isolated population from the extra-Andean Famatina massif in La Rioja Province, and several other populations ranging from Mendoza to the southernmost localities in the species distribution (Ruiz et al., in press). Besides the karyotypic differences, these

populations are different in several morphological and biological characteristics.

The isolated population from the La Rioja Mountains lies in a geographical area characterized by striking endemisms (Cei, 1980b), and is described as a new form of the genus. Holotype and paratypes are deposited in the Zoological Museum of the University of São Paulo (MZUSP).

Odontophrynus barrioi sp. nov.
(Fig. 2)

Holotype.—MZUSP 57635. An adult male, from Aguadita springs, 2200 m, 30 km north of the village of Famatina, Sierra de Famatina, La Rioja Province, Argentina, collected on 17 November 1978 by J. M. Cei.

Paratypes.—MZUSP 57635-57638, two adult males; 57636-57639, two adult females; 57640-57647; eight juvenile specimens; all the same data as the holotype.

Definition.—A stout *Odontophrynus* of the *occidentalis* group, characterized by small, high head; nostril very near tip of snout; diameter of eye about equal to its distance from nostril; interorbital distance about one-half width of upper eyelid; no well defined parotoid glands; irregularly arranged rounded glandular warts; lateral fringes poorly developed on fingers; metatarsal tubercle shovel-like, moderately developed; short fore-

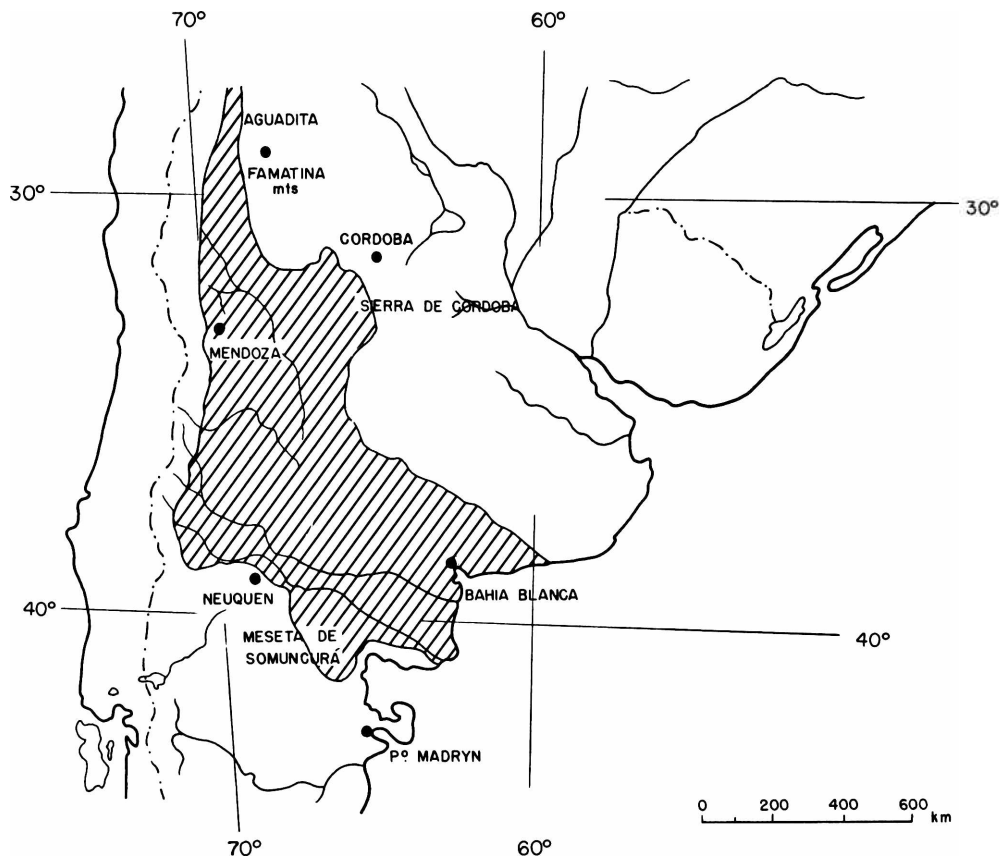


FIG. 1. Tentative distribution of the *Odontophrynus occidentalis* group in western and central Argentina (hatched area). Type-locality of *O. barrioi* in Sierra de Famatina, La Rioja Province (black area).

limb and hind limb; tibia equal to femur; vertebral light stripe absent.

Description of the Holotype.—Body chubby, with stout forelimbs and hind limbs. Head small, high, wider than long, one-fourth body length. Snout short and rounded, sharply truncate in profile. Nostril lateral, nearer tip of snout than eye. Diameter of eye about equal to distance from nostril to anterior corner of eye. Interorbital distance equal to distance between nostrils, and about one-half width of upper eyelid. Canthus rostralis bluntly rounded. Pupil elliptical; tympanum concealed; two flattened glandular warts between eye and tympanum; an enlarged bulky gland on upper eyelid. Tongue rounded, one-half width of mouth opening, its

posterior border free, slightly notched; vomerine teeth in two transverse round patches between choanae.

Forelimb strong and short; heavy glandular patch on upper surface of forearms. Adpressed forelimb with fourth finger crossing middle of body. First finger longer than second and fourth, reaching penultimate phalanx of third. Lateral fringes of fingers slightly developed; shovel-like tubercle on base of first finger; palmar tubercles rounded. Hind limb short, stout, tarso-metatarsal articulation reaching axilla. Tibia equal to femur. Tibial glandular patches present. Toes slightly webbed; subarticular tubercles of toes soft, rounded. Inner metatarsal tubercle shovel-like, unpigmented, moderately

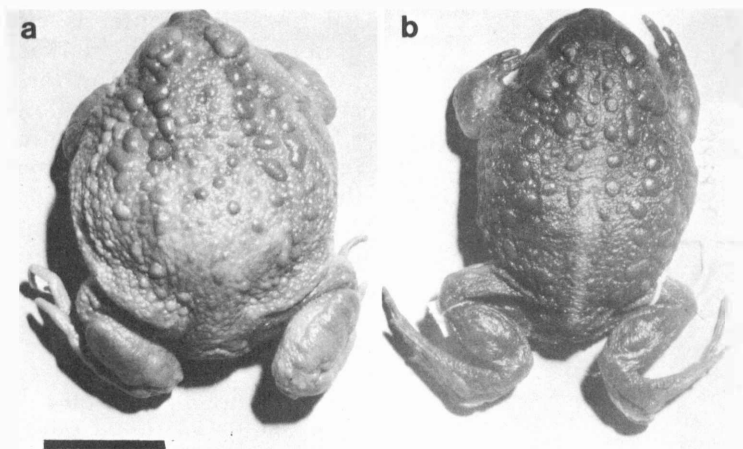


FIG. 2. A. Holotype of *Odontophrynus barrioi* from Famatina Mountains, La Rioja Province, Argentina. B. A male specimen of *O. occidentalis* from Malargue, Mendoza Province, Argentina. Bar equals 2 cm.

developed and cornified; outer small, rounded. Tarsal ridge shovel-like, distinct. Heels touching with hind limbs bent at right angles to body.

Dorsal skin granular, with scattered, irregularly arranged, rounded glandular warts. Parotoid glands irregular, rounded. Venter heavily granular everywhere, more distinctly granular in coxal and anal regions. A transverse fold of skin across throat, denoting presence of vocal sac, almost unpigmented externally. A faint gray brownish nuptial pad on thumb.

Coloration in Life.—Brownish above; faint lateral and dorsal yellowish longitudinal bands recognizable; warts darker brown. Ventrally bluish or brownish, with scattered white granuli. No light vertebral stripe present. *Coloration in alcohol*. Dorsally gray yellowish; dorsal warts darker; ventrally whitish.

Measurements of the Holotype (in mm).—Snout-vent 56; head length 18.5; head width 23.5; hind limb 63; forelimb 29; axilla-groin 25.5.

Measurements of Paratypes (in mm).—Males: snout-vent 48–52.5; head length 16.5–18; head width 23–24; hind limb 56–57; forelimb 31–32; axilla-groin

24–25. Females: snout-vent 53.5–55; head length 18–18; head width 21–25; hind limb 52–59; forelimb 28.5–31; axilla-groin 28.5–29. Size range in juvenile specimens: 27–37.

Distribution.—Known only from the type-locality (Fig. 1).

Etymology.—The species is named after the late Avelino Barrio, University of Buenos Aires, Argentina, who contributed much to the ecological knowledge of this anuran group.

Remarks.—Significant differences between the tadpoles of Famatina *Odontophrynus* and tadpoles of *Odontophrynus occidentalis* from Mendoza Province have been also observed (Ceï and Crespo, in press). Tadpoles of *Odontophrynus barrioi* (stages 35–42, after Gossner, 1960) show stouter and darker bodies; snout bluntly rounded, less protruding than in *occidentalis* larvae; spiraculum opening dorsolaterally; different internasal distance; nostrils more laterally located; tip of tail gently rounded, almost acuminate in *occidentalis*; lower beak more heavily pigmented, with stronger denticulations; and less broadly interrupted second upper row of denticles.

Larval characteristics support the differences in morphology of adults.

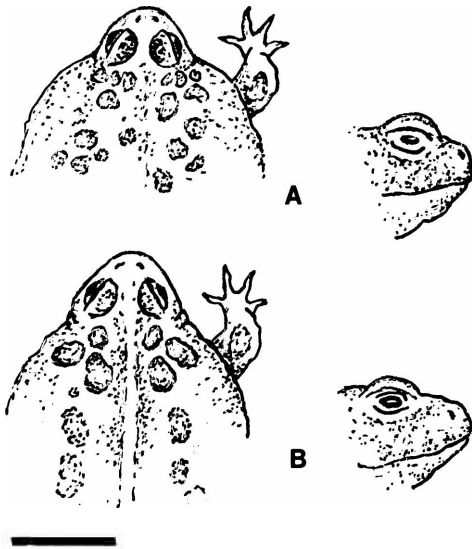


FIG. 3. Dorsal and lateral aspects of *O. barrioi* (A) and *O. occidentalis* (B). Bar equals 2 cm.

Odontophrynus barrioi at first sight appears larger and stouter than *occidentalis*, with a smaller and more truncate head and shorter forelimbs and hind limbs. In comparison with our description of *O. barrioi*, *O. occidentalis* (Berg, 1898) has the head length contained less than $3\frac{1}{2}$ times in the body length; nostrils nearer to eye than to tip of snout; diameter of eye greater than its distance from nostril; interorbital distance equal to upper eyelid; fringes of fingers well developed; subarticular tubercles of toes strong, prominent; inner shovel-like metatarsal tubercle very strong, cornified, black-pigmented; tibia shorter than femur; adpressed forelimb with fourth finger crossing groin; tarso-metatarsal articulation reaching between tympanum and eye; heels separated with hind limbs bent at right angles to body. Significant osteological differences are also present (Crespo and Ceï, in press). Moreover, different skin structure and coloration may be recognized: the parotoid glands larger, symmetrical in *O. occidentalis* (Fig. 3); enlarged glandular patches rather regularly arranged in dorsal longitudi-

nal rows; the venter is more heavily granular yellowish, darker on lower hind limb surfaces. The dorsum is olive brown with indistinct yellowish shades; a light vertebral stripe. Throat of males intensely black; faint grayish nuptial thumb pads. A combination of 16 different morphological characters support specific divergence between *O. occidentalis* and *O. barrioi*.

Ecology and reproduction of this isolated species from the subarid environments of La Rioja "sierras" are practically unknown. Tadpoles in all stages of development were found from October to April in small pools of running water in their montane habitat. As in *O. occidentalis*, adults are fossorial and secretive, difficult to observe except in the mating periods.

Under the same environmental conditions the rate of growth of *O. barrioi* is apparently more accelerated than in *O. occidentalis*. Metamorphosed toads of both species were captured in October–November 1978 in the Famatina and Chacras de Coria (near the city of Mendoza), and were placed, at about the same time, under laboratory conditions in São Paulo. However, after nine months, significant differences between the two samples were found in size and development. On 1 August 1979, the *O. occidentalis* sample ranged from 34 to 55 mm ($\bar{x}_1 = 43.4$); the *O. barrioi* sample from 50 to 60 mm ($\bar{x}_1 = 57.0$).

DISCUSSION

The population here described as *O. barrioi* has $2n = 22$ chromosomes (Ruiz et al., in press), as do other diploid species of the genus *Odontophrynus*, and a secondary constriction on the short arm of pair 11. Silver stain-banding patterns showing the active ribosomal gene sites in pair 11 are similar in all *O. occidentalis* populations. C-banding, however, is different in pairs 1 and 2. *O. barrioi* has a block of constitutive heterochromatin on the pericentromeric area of the metacentric pair 1, mostly on the short arm. This feature does not

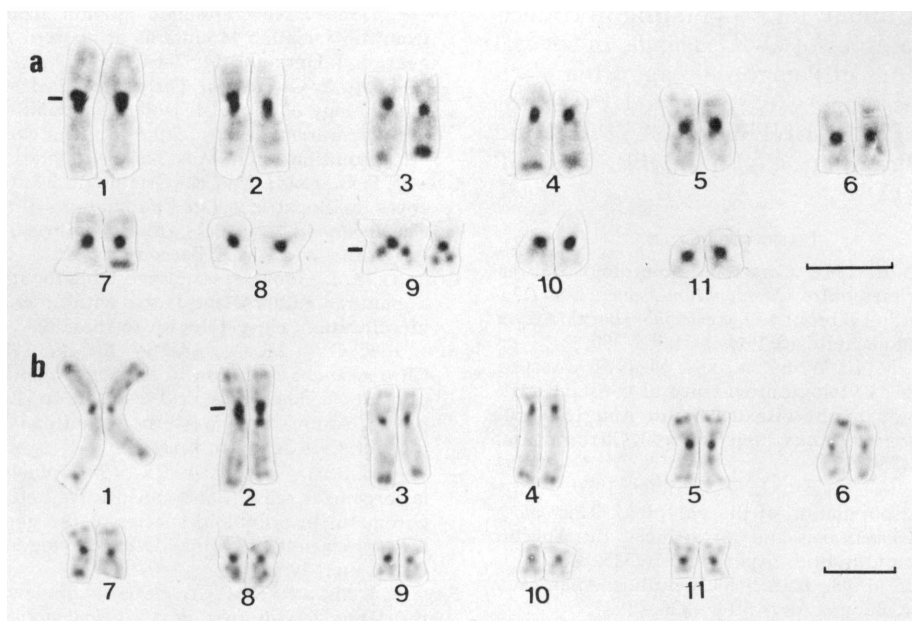


FIG. 4. C-banded karyotypes showing the main blocks of pericentromeric constitutive heterochromatin: on pair 1 in *O. barrioi* (a) and on pair 2 in *O. occidentalis* (b), as described in Ruiz et al. (in press). Bars equal 5 μ m.

appear in *O. occidentalis*, which bears a heterochromatic block on the submetacentric pair 2 (Fig. 4).

The combination of unique morphological, karyotype, larval (Cei and Crespo, in press) and osteological (Crespo and Cei, in press) character states characterize *O. barrioi* as a separate entity of the *O. occidentalis* group. Since the new species, at about 2200 m of altitude, is geographically isolated from *O. occidentalis*, these differences may well result from selection. Reproductive isolation would also allow independent differentiation in the genetic pool. Chromosome modifications, including gene duplications, heterochromatic blocks and structural rearrangements would also reinforce the barriers which separate the diverging species.

Present endemic conditions prevailing in the herpetofaunal elements of Famatina Mountains may be correlated with the environmental changes in this

geomorphologically isolated embossment following Pleistocene glaciation. Geographical speciation of the *O. occidentalis* group probably fits the general adaptive process pointed out for some representative reptiles from that region (Cei, 1980b). *O. barrioi* may be added to the phyletic *occidentalis* line in the cladogram recently proposed by Ruiz et al. (1981) on the basis of nucleolar organizer regions and constitutive heterochromatin in the polyploid species complex of the genus *Odonophrynus*.

A significant relationship between karyotype and phenotype in both the isolated Famatina species and in the scattered southern *O. occidentalis* populations is probable. Further information is needed concerning karyological patterns throughout the range of these toads.

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