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A poorly known and discussed species,  
*Cnemidophorus leachei* Peracca 1897,  
and general remarks on the genus *Cnemidophorus*  
in Argentina (Lacertilia, Teiidae)

## ABSTRACT

A general survey of Argentine species of the genus *Cnemidophorus* was carried out. The interest of the tongue shape and morphology as character state of taxonomic value was stressed, and general relationships of different species groups were analyzed. The taxonomic status of *Cnemidophorus leachei* Peracca 1897 was reconsidered on the basis of a new combination of characters lending support to its specific status. Significant morphological differences between *C. leachei* and the closely related species *Cnemidophorus lacertoides* were critically evaluated.

## INTRODUCTION

A reconsideration of the taxonomic status of the questionable taxon *Cnemidophorus leachei* Peracca 1897 was the primary purpose of this paper. Notwithstanding, the deficient knowledge of the general relationships and distribution of the genus *Cnemidophorus* in Argentina (Williams and Tedesco, 1985; Ceí, 1986; Williams, Viñas and Donadio, 1987) led us to attempt a preliminary survey of several of its taxa. The recognized Argentine species of *Cnemidophorus* are *C. ocellifer* (Spix, 1825) from the northern subtropical and Chacoan regions, *C. longicaudus* (Bell, 1843) from the arid western territories and northern Patagonian flats, and *C. lacertoides* Duméril and Bibron, 1839 from the Pampean Ventania. *Cnemidophorus leachei* Peracca, 1897, synonymized

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under *C. lacertoides* by Peters and Donoso Barros (1970), is known from Jujuy. To these forms we have added a recently described species from the eastern slopes of the Sierras of Córdoba (1990). All the above species require morphological comparisons, to establish consistent characters as indicators of significant interspecific differences. We present here the results and discussion of our comparative analysis.

#### MORPHOLOGICAL OBSERVATIONS

Morphological and phyletic relationships between *Cnemidophorus* and *Ameiva* have been pointed out (Burt, 1931): in some cases even systematic uncertainties were reported (e.g. *Cnemidophorus vittatus* versus *Ameiva vittata*: cfr. Vance, 1978). However, a fundamental morphological condition, the tongue sheath of *Ameiva*, absent in *Cnemidophorus*, is a clear cut character state to differentiate any form of both genera (Fig. 1, A). We recently studied an interesting morphological character, the tongue. The shape and structure of the tongue has proved to be useful in separating species groups.

The results are presented in Fig. 1 and 2 (made on well preserved specimens, under a Wild binocular). Striking differences in shape and epidermal structure are shown when all the observed populations belonging to the *lacertoides* group are compared with *C. ocellifer* and *C. longicaudus*. A remarkable parallelism is noted with another character state in the same species of the genus: absence (*lacertoides* species group) or the presence (*C. ocellifer* and *C. longicaudus*) of the supraorbital granular semicircles. On the other hand, *ocellifer* and *longicaudus* are morphologically separated by the unique triangular lobule covering the ear opening of the latter.

Thus, at first sight, three unquestionable species groups may be recognized among the Argentine taxa of *Cnemidophorus*: the *ocellifer* species group (to be included in a larger continental *lemniscatus* species group: Maslin and Secoy, 1986), the *longicaudus* species group and the *lacertoides* species group. Intraspecific differentiation or speciation processes have not been reported either for *C. ocellifer* or *longicaudus*, in spite of their wide geographical scattering and their noticeable adaptiveness to dry western environments and/or different Chacoan biotopes. On the contrary, the *lacertoides* species group exhibits high populational variation and topographic isolation.

Speciation processes are known throughout its extensive latitudinal area, leading to characterized local forms, and occasionally at a specific level, as in the case of *C. serranus* and *C. leachei*.

To separate taxa of the genus *Cnemidophorus* one of the most used characters is still the number of longitudinal ventral scale rows: 8 in *ocellifer* (*lemniscatus* species group) and *longicaudus*; 10 in *lacertoides*. A careful screening of the longitudinal ventral scale rows in all the South American *Cnemidophorus*

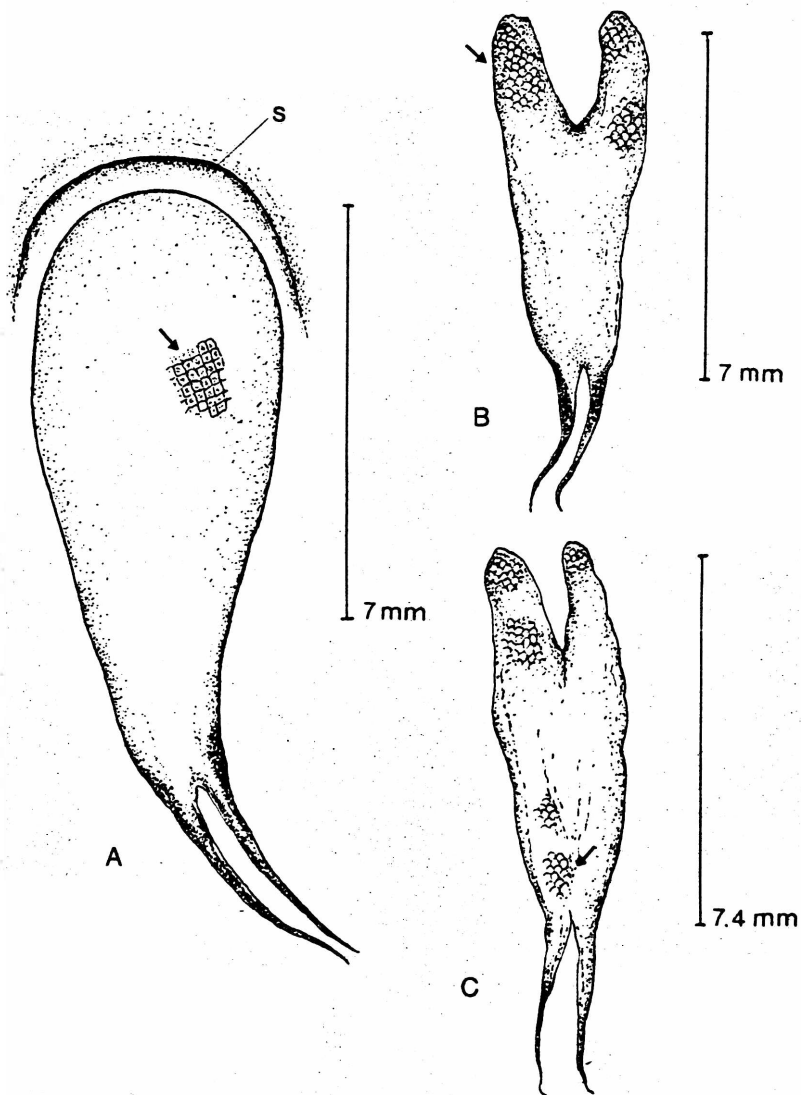


Fig. 1 - Tongue of South American teiid Lizards of the genera *Ameiva* and *Cnemidophorus*. A - *Ameiva ameiva* from Monte Quemado, Santiago del Estero province, Argentina (FML.IH.001893): s- sheath; arrow- lingual scales juxtapsed. B - *Cnemidophorus ocellifer* from Monte Quemado, Santiago del Estero province, Argentina (FML.IH.001802): arrow- lingual scales subimbricate. C - *Cnemidophorus longicaudus* from Pº Rio Blanco, 30 km SE Andalgalá, Dep. Pomán, Catamarca province, Argentina (FML.IH.001615): arrow- lingual scales subimbricate.

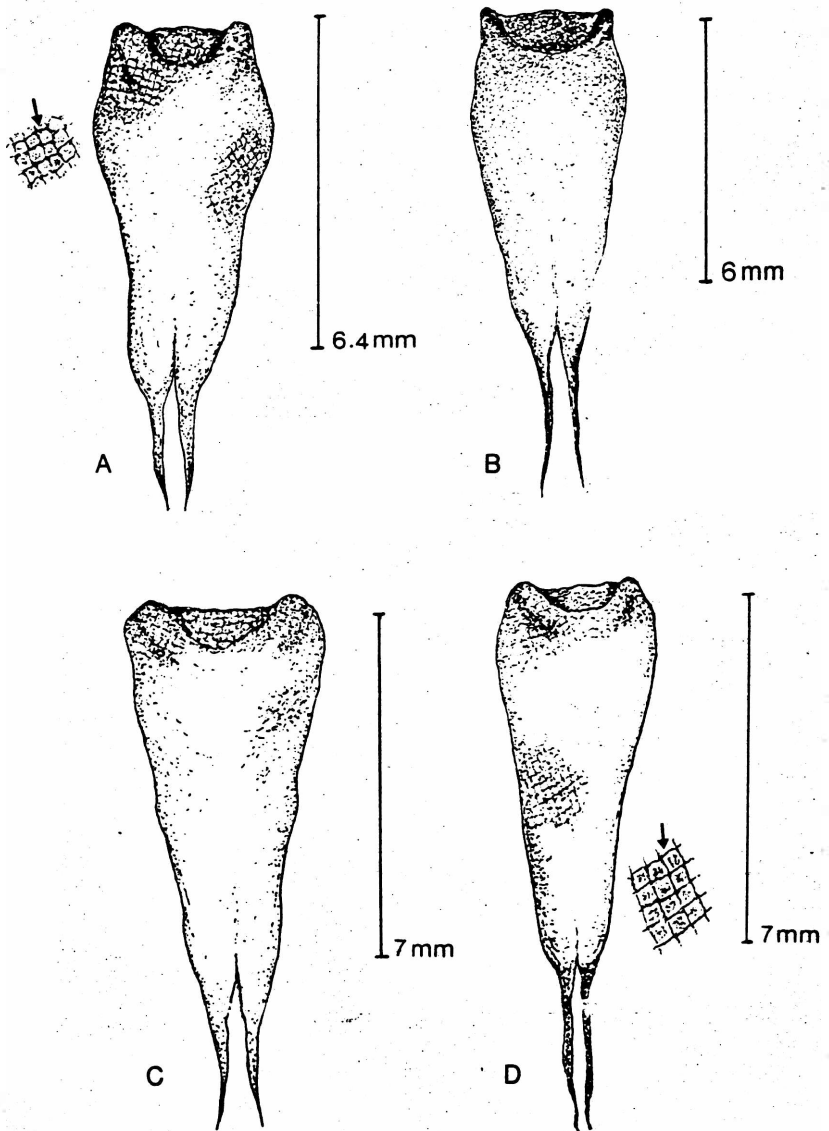


Fig. 2 - Tongue of the South American teiid Lizards of the genus *Cnemidophorus* (*lacertoides* species group).

A - *Cnemidophorus lacertoides* from Las Piedras, Dep. Artigas, Uruguay (FML.IH-001756): arrow-lingual scales juxtaposed. B - *Cnemidophorus serranus* from Tanti, Sierras de Córdoba, Córdoba province, Argentine. C - Holotype of *Cnemidophorus leachei* (MZUT.R-2146.1). D - *Cnemidophorus leachei* from Angosto Rio Pescado, Dep. Orán, Salta Province, Argentina (FML.IH-00907): arrow-lingual scales juxtaposed (as in B and C).

may suggest 10 as a primitive number, also found in *Ameiva*. Eight scale rows occur through the reduction of the scales located at the outermost edge of the ventrals, often much smaller than the other ventrals. The latter was suggested by an examination of 20 specimens of *C. lacertoides* from Parque Tornquist, Sierra de La Ventana, Buenos Aires prov. (MACN.32862-32881,32887) (1). Five of 20 specimens showed a process of reduction of the scales at the outermost edge of ventrals, giving rise to 8 or 9 scale rows. We also found the reduction in a sample from Las Piedras, Dep. Artigas, Uruguay (FML, IH.01756). Moreover, in specimens of *C. ocellifer* from Corrientes an occasional reduction to 6 scale rows has been noted (Alvarez de Avanza: pers. comm.). On the other hand, Peracca (1895) reported specimens of *C. ocellifer* from Rio Apa (Paraguay: MZUT, R.2140) having enlarged rudimentary scales at the outermost edge of ventrals, giving rise to 10 ventral scale rows. Also *Cnemidophorus serranus*, a taxon characterized by 8 scale rows (Tanti and Biale Masse populations, Punilla district of Córdoba) may occasionally have 10 scale rows, increasing the number of rudimentary scales at the outermost edge of ventrals (Fig. 3). Remarks of such a variation of rudimentary scales located at the outermost edge of the ventrals were made by Crystal and Dixon (1987) on *Cnemidophorus gramivagus* from Venezuela, a species of the *lemniscatus* species group.

In spite of individual variation of scales at the outermost edge of the ventrals, the normal presence of 8 longitudinal ventral scale rows in *C. serranus* appears to be a significant character that separates this rare secretive species from *C. lacertoides* southward and from the subtropical populations of *leachei* northward. As formerly shown (Cei and Martori, 1990: crf. Color Plate I), a different color pattern is another distinctive feature of this slender, medium-sized teiid lizard from Córdoba mountain slopes. In addition minor but consistent differences in lepidosis may be added: frontal equal to its distance from rostral; rostral narrower than mental; fore leg and hind leg shorter than in *lacertoides* or in *leachei*. Moreover, for several morphometric characters, *C. serranus* is a very dimorphic one among all the forms of the *lacertoides* species group (Cei and Martori, 1990), being monomorphic for coloration.

If the taxonomic status of *Cnemidophorus serranus* can be objectively supported by a simple interspecific comparison, then *C. leachei* may also be recognized by similar comparisons. By its general morphology, lepidosis and color pattern *C. leachei* is closely related to *C. lacertoides*. However, the following significant differences emerge, giving an acceptable new combination of cha-

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(1) Acronyms used in this paper: MACN-Museo Argentino Ciencias Naturales, Buenos Ayres; FML, IH- Fundación M. Lillo, Instituto Herpetología, Tucumán, Argentina; MZUT, R- Museo Zoologica Università di Torino, Italy, Reptiles.

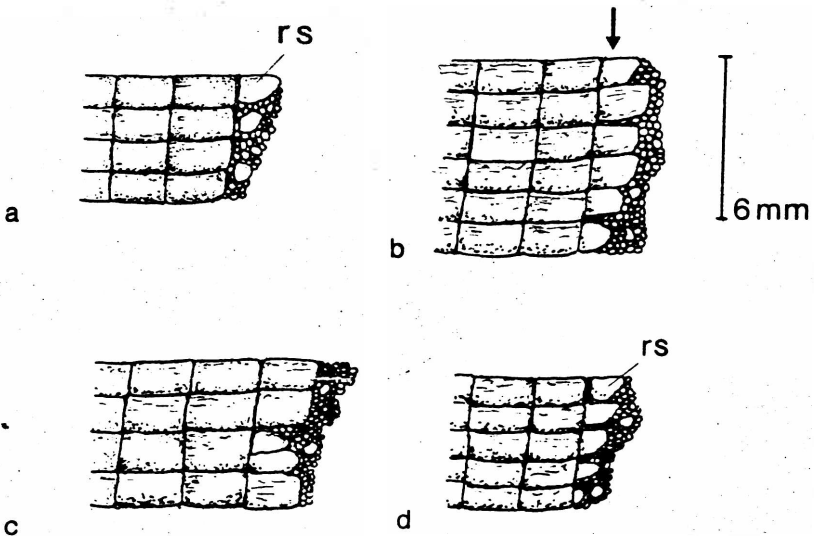


Fig. 3 - Variation of transversal scale rows in *Cnemidophorus serranus* from Sierras de Córdoba, Department of Punilla. Individual increasing of the rudimentary scales (*rs*) located at the outermost edge of ventrals (*arrow*), in specimens from the localities of Tanti (a, b, c) and Bialet Masse (d).

racters distinguishing the old Peracca's species from *C. lacertoides* and from *C. serranus*.

- 1) Frontal longer than its distance from rostral (Fig. 4): shorter in *lacertoides*, equal in *serranus*;
- 2) frontal beyond the upper corner of the small first supraocular (Fig. 4): behind in *lacertoides*, at the same level, or behind in *serranus*;
- 3) higher number of fourth toe lamellae in *leachei* (27-30 versus 25-27 in *serranus*, and 24-25 in *lacertoides*);
- 4) foot longer, with 4. toe longer than 3. toe in *leachei* (snout-vent/foot 3.05-3.33 versus 3.66-4.26 in *serranus* and *lacertoides*);
- 5) hind leg crossing the axilla in *leachei* (not reaching axilla in *serranus*, not reaching, or barely reaching axilla in *lacertoides*);
- 6) a somewhat different color pattern (Color Plate I), with narrow but distinct dorso-lateral and lateral whitish stripes on a greenish ground, continuing

on the proximal part of tail. Never observed in *leachei* the lateral, broken white line variation, usually present (30%) in the still examined populations of *lacertoides* (Fig. 5). Between the dorso-lateral and lateral white stripes a brownish band with transversal dark marks almost more regular than in *lacertoides*. A confused, irregular dark border on the inner side of the white dorso-lateral band. Ventrally whitish or bluish, with distinct darker borders on the posterior edge of the scales. White lines or dots on fore and hind limbs.

A detailed study of *Cnemidophorus leachei* is difficult because of the secretive behavior and the relative scarcity of these lizards. They live under stones, in creeks and bushy environments. Beside Peracca's types (7 specimens in the MZUT herpetological Collection, R.2146, 1-7, from San Lorenzo Valley, 30 km NW of Ledesma. Jujuy prov., Argentina, col. A. Borelli), we were able to locate the following samples and localities in the FML, IH:00472, Yuto, Jujuy prov., I, 1966, col. R. Laurent; 00855, Estancia Cachipunco, Sierra Santa Barbara, 1500-1700 m, Jujuy prov., S, V, 1973, col. Massoia; 00871, Finca Arrazayal, Angosto Rio Pescado, 640-800 m, Dep. Orán, Salta prov., 10, XI, 1978, col. Halloy, Pagaburo, Budin, Hidalgo; Pers. Coll. O. Donadio, Buenos Ayres (without number), Rio Yala, road 9, Jujuy prov., 16, V, 1983, Col. Viñas.

The available specimens of *C. leachei* allow for little analysis of population variation in a region of more than 150 km. The sample from Angosto Rio Pes-

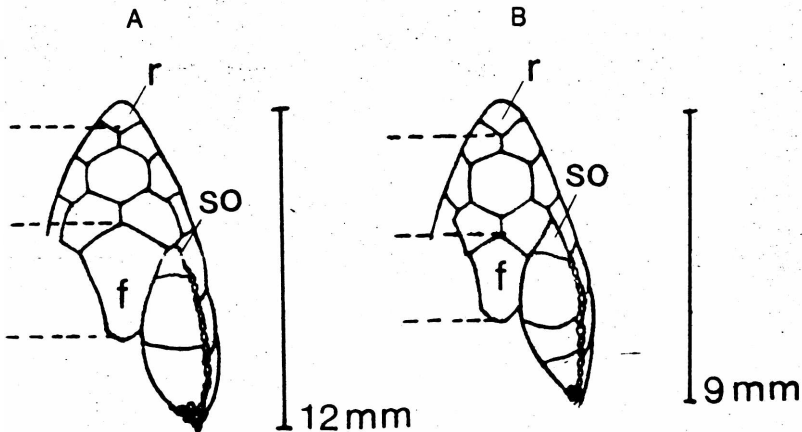


Fig. 4 - Specific differences in cephalic lepidosis in *Cnemidophorus* of the *lacertoides* species group.

A - Frontal (f) longer than its distance from rostral (r), and going beyond the extreme corner of the first supraocular (so) in *C. leachei*. B - Frontal (f) shorter than its distance from rostral (r), and not reaching the extreme corner of the first supraocular (so) in *C. lacertoides*.

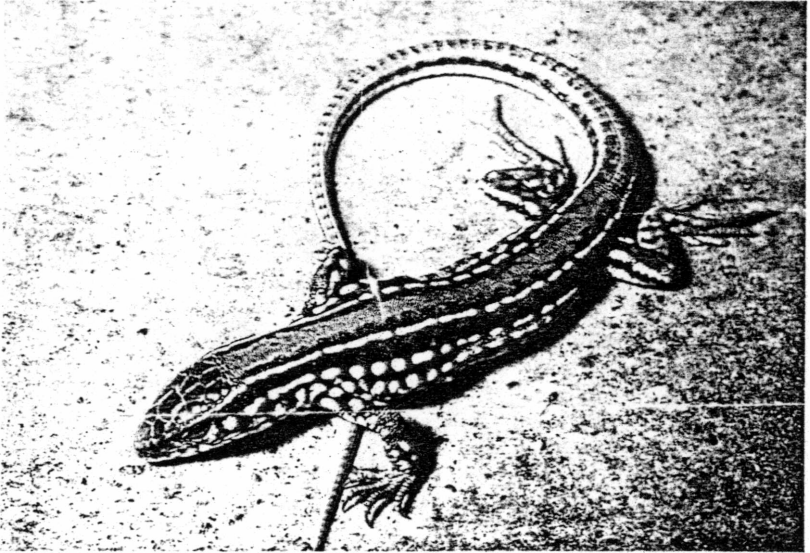


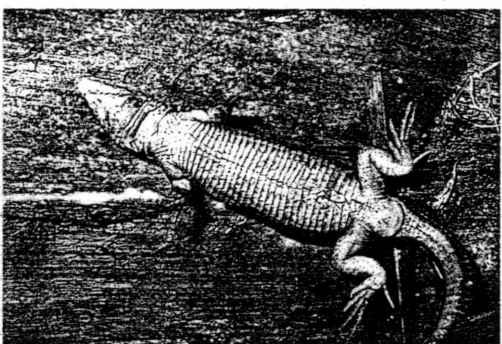
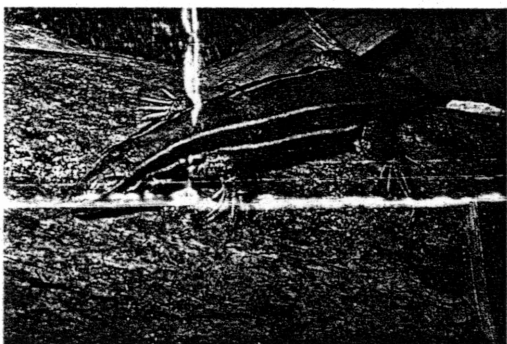
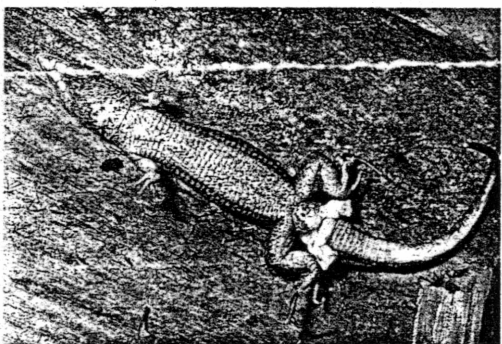
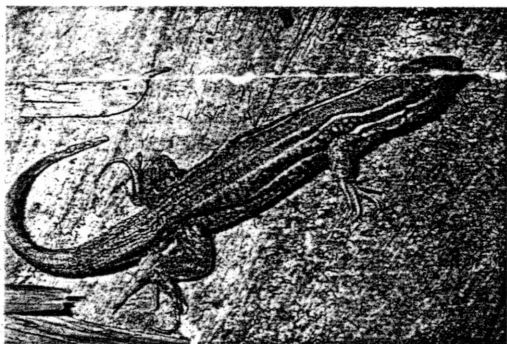
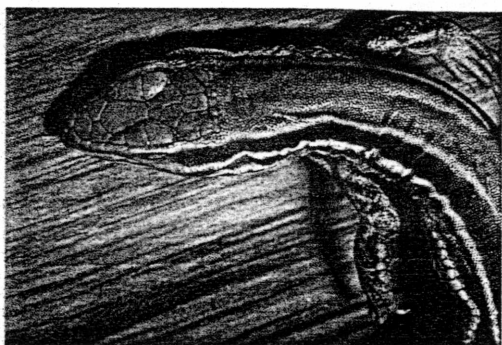
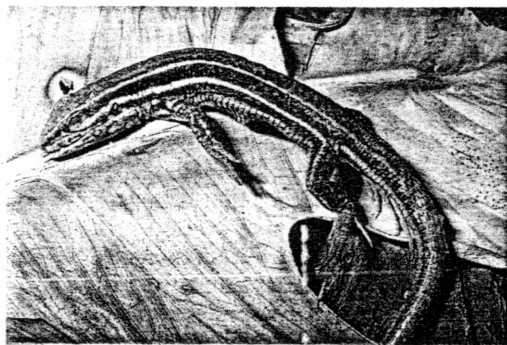
Fig. 5 - Variation of typical color pattern (30%) in populations of *C. lacertoides*: a female adult specimen from Sierra de la Ventana, Buenos Aires province (slightly augmented). The "broken white line" variation is shown.

cado, Oran, Salta (FML.IH. 00907), e.g., by its greater size and color pattern (Color Plate I, 3-6), is somewhat different from the Peracca's types (originally eleven, all females). Moreover, the presence of males in our sample suggests a bisexual condition.

#### DISCUSSION AND CONCLUSIONS

The above new combination of characters appears enough to demonstrate the need for a conclusive statement about the taxogenetic boundaries of *Cnemidophorus leachei* and its nomenclatural relation with the nearby southern form *C. lacertoides*. In a critical discussion of *C. gramivagus* and *C. lemniscatus*, Mc Crystal and Dixon (1987) indicate overlap of many meristic characters in closely related species of *Cnemidophorus*. They also assume that exogenous factors could to affects similarly nonconservative characters in different species, so exerting direct or indirect selection pressure on their populations "if one or more of its environmental conditions were the same". We





- 1 - *Cnemidophorus leachei* Peracca, 1897 from San Lorenzo Valley, NE of Ledesma, Jujuy prov. Argentina: Lectotype (MZUT-R.2146-1). Slightly augmented.
- 2 - Head of the lectotype of *Cnemidophorus leachei*: dorsal view, augmented.
- 3 - *Cnemidophorus leachei*: male specimen from Angosto Rio Pescado, Dep. Orán, Salta Prov., Argentina, Col. Halloy, Pagaburo, Budin, Hidalgo 10-XI-1978 (FML.IH-00907).
- 4 - The same specimen: ventral view.
- 5 and 6 - *Cnemidophorus leachei*: female specimen. The same data as the male specimen (FML.IH-00907-2).

need better ecological information concerning the nature of our secretive teiid lizards, but some affinities can be pointed out between the mesophilous habitat of *C. lacertoides*, sheltering under stones in wet mountain biotopes, and some environments of the subtropical forest, in northern Salta, where the *leachei* populations live, "with small mountain streams cutting through deep humid valley" (Laurent, 1977: 423, 425).

Given the apparently moderate features of the most significant meristic characters supporting the taxonomy of *Cnemidophorus leachei*, a tentative trinomial nomenclature could be provided. However, the subspecies is primarily a taxogenetic concept, and it is difficult to accept possible gene flow between the very separate populations of *lacertoides* and *leachei*. There is an enormous physiographic gap between their distribution area, compounded by the probable lengthy geological time of segregation. A quite similar case was analyzed for the disjunctive location of related species of Patagonian atelognathid frogs (Ceï, 1984; *Atelognathus praebasalticus* and *A. salai*). Beside any morphological distinctiveness, the impressive geographic isolation was considered a major factor leading to very unlikely gene flows between ecologically specialized allopatric populations. An analogous problem was strengthened by the gekkonid *Homonota darwini macrocephala* Ceï, 1978, disjoined from the nominal Patagonian form by a wide lineal space of about 1700 km. Its tentative subspecific position was justified by the lack of sufficient biological and ecological information and further collecting and reconsideration are needed to ascertain suitably its true taxonomic relationships.

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NOTE - The original spelling of the Peracca's species was *Cnemidophorus leachei* (Boll. Mus. Zool. Anat. comp. R. Univ. Torino, XII, 274, 1897: 6-8), not *leachi*, as in some emendations.

As lectotype of *Cnemidophorus leachei* the specimen MZUT. R. 2146-1 from the original syntypes of Peracca was selected. Seven specimens of the original Borelli's sample are still present at the Museum of Turin; other specimens are in the British Museum (cfr. Maslin and Secoy, 1986).

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## RIASSUNTO

Si presenta una discussione generale delle specie del genere *Cnemidophorus* in Argentina. L'interesse della forma e morfologia della lingua come carattere di valore tassonomico è posto in evidenza, così come l'analisi delle relazioni generali tra i vari gruppi di specie che lo compongono. Si ritorna a considerare lo status tassonomico di *Cnemidophorus leachei* Peracca 1897, sulla base di una nuova combinazione di caratteri che ne sostengono il livello specifico.

Differenze morfologiche significative tra *C. leachei* e la specie strettamente affine *C. lacertoides* sono sottoposte a un esame critico dettagliato.

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