Conspecificity of Liolaemus isabelae Navarro & Núñez, 1993 and Liolaemus nigroventrolateralis Ortiz, 1994 (Iguania: Tropiduridae: Liolaeminae) from Northern Chile

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The conspecificity of the Chilean Liolaeminae lizards Liolaemus isabelae Navarro & Núñez, 1993 and Liolaemus nigroventrolateralis Ortiz, 1994 is discussed. A careful comparison of the holotype and paratypes of L. nigroventrolateralis with the type series and additional topotype specimens of L. isabelae indicate the conspecificity of the two forms. Furthermore, the characters studied by Ortiz (1994) to diagnose L. nigroventrolateralis do not distinguish this species from L. isabelae. There are no distributional or ecological differences between the two species. Therefore, we consider that L. nigroventrolateralis is a synonym of L. isabelae.

Key words: conspecificity, distribution, ecology, Liolaemus

Ortiz (1994) described Liolaemus nigroventrolateralis based on material from the Salar de Pedernales, at 3425 m (26°15'S, 69°10'W), Chañaral Province, Third Administrative Region of Chile (Fourth Administrative Region fide Ortiz, 1994, in errore). In the main discussion provided by Ortiz (1994) to support the status of the new taxon, there are detailed comparisons with five congeneric species living in the same area: Liolaemus nigriceps Philippi, L. montanus Koslowsky, L. rosenmanni Núñez & Navarro, "L. eleodori" from Chile ("L. rosenmanni, see Pincheira-Donoso & Núñez, 2005) and L. melanopleura (sic) Philippi. However, Ortiz (1994) apparently ignored several previously published studies in which the Liolaemus species characterized by the combination of traits observed in L. nigroventrolateralis were placed as members of the subgenus Liolaemus (sensu stricto), and those taxa showing a different series of traits were recognized under the subgenus Eulaemus (e.g. Laurent, 1992; Cei, 1993). Because L. nigriceps, L. montanus and L. rosenmanni belong to the Eulaemus clade (see Schulte et al., 2000; Pincheira-Donoso & Núñez, 2005), Ortiz (1994) focused on the comparison of species that are actually not phylogenetically related. Therefore, the specific differences found by Ortiz (1994) may be an artefact of early divergent phylogenetic histories (e.g. Felsenstein, 1985; Harvey & Purvis, 1991). On the other hand, the comparison performed by Ortiz (1994) between the new taxon and L. melanopleura appears to be a matter for discussion, because L. melanopleura is an enigmatic taxon. Indeed, it not only is known on the basis of two specimens, but the type locality also still remains a mystery (Pincheira-Donoso & Núñez, 2005). Finally, and perhaps more importantly, Ortiz (1994) did not compare L. nigroventrolateralis with the very similar species Liolaemus isabelae, previously described (Navarro & Núñez, 1993) based on material from “El Cerrito”, 12 km northwest of La Ola settlement, Salar de Pedernales, 3350 m, Chañaral Province, Third Administrative Region (see Appendix). Curiously, in some later general systematic accounts for the genus Liolaemus, Etheridge (1995) and Etheridge & Espinoza (2000) did not refer to the species described by Ortiz (1994).

Although Ortiz (1994) failed to provide a formal diagnosis for L. nigroventrolateralis, he did indicate, in the abstract, that it has a “dorsal color pattern with a mid dorsal yellow band spotted with black dots, and a strong melanism running from the axilla to the groin, gut area, gular region, ventral surface of forelegs, hind legs and tail, low number of precloacal pores (2) and a moderate number of midbody scales”, the same diagnostic traits previously described for L. isabelae by Navarro & Núñez (1993).

A comparative analysis of the holotype and paratypes of L. nigroventrolateralis with the type sample and topotypes of L. isabelae indicates the two species are conspecific. We performed comparisons on different traits, including morphometric, meristic and chromatic characters. The variables body size and scales around midbody were analysed using two-tailed Student t-tests.

The body size observed in both species is similar. The snout–vent length measured for the type series of L. nigroventrolateralis is 71.81±6.38 mm (range 61.22–77.84 mm), and 72.13±7.27 mm (range 59.6–83.5 mm) for L. isabelae. The statistical comparison of those variables showed non-significant differences (t-test, t(0.05,16)=2.120, P=0.933, n=18). Also, in both L. nigroventrolateralis and L. isabelae, the head-length/head-width ratio ranges between 1.19 and 1.20.

The cephalic lepidosis of L. nigroventrolateralis is identical to that of L. isabelae. Both exhibit smooth anterior scales anterior to the frontal, and somewhat more wrinkled scales in the posterior areas of the head, although there are in both series individual specimens in which all the head scales are almost smooth. In both species the rostral scale is 2–3 times wider than high and the nasal contacts the rostral shield. In shape, size, number and distribution, the nasal scales, frontonasals, unpaired scales of the snout, frontal, prefrontals, postfrontals, in-
Table 1. Comparative measurements (mm) of the holotypes of *L. nigroventrolateralis* and *L. isabelae*. In the first column: snout–vent length (SVL); axilla–groin length (A–GL); hind-limb length (H–LL); fore-limb length (F–LL); head length (HL); head width (HW) and tail length (TL). For *L. nigroventrolateralis*, “x”=appendix presents a regenerated portion.

<table>
<thead>
<tr>
<th>Measurements</th>
<th><em>L. nigroventrolateralis</em> (MZUC 19008)</th>
<th><em>L. isabelae</em> (MNHN 23259)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>Male</td>
</tr>
<tr>
<td>SVL</td>
<td>77.8</td>
<td>78.9</td>
</tr>
<tr>
<td>A–GL</td>
<td>37.5</td>
<td>38.4</td>
</tr>
<tr>
<td>H–LL</td>
<td>49.4</td>
<td>44.0</td>
</tr>
<tr>
<td>F–LL</td>
<td>29.4</td>
<td>29.8</td>
</tr>
<tr>
<td>HL</td>
<td>16.9</td>
<td>17.2</td>
</tr>
<tr>
<td>HW</td>
<td>13.9</td>
<td>14.4</td>
</tr>
<tr>
<td>TL</td>
<td>111.0 + x</td>
<td>133.0</td>
</tr>
</tbody>
</table>

Table 2. Comparisons between the type series of *L. nigroventrolateralis* and *L. isabelae*. Type locality (Type loc), latitudinal range (LAR), longitudinal range (LOR), altitudinal range (ALR), snout–vent length (SVL), scales around midbody (SAMB). Values of SVL and SAMB are mean±standard deviation (range). *P* values from Student *t*-tests.

<table>
<thead>
<tr>
<th></th>
<th><em>L. nigroventrolateralis</em></th>
<th><em>L. isabelae</em></th>
<th><em>P</em> value (df=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>n</em></td>
<td>5</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Type loc</td>
<td>Salar de</td>
<td>Salar de</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pedernales</td>
<td>Pedernales</td>
<td></td>
</tr>
<tr>
<td>LAR</td>
<td>26°15’–26°15’ S</td>
<td>26°14’–26°26’ S</td>
<td></td>
</tr>
<tr>
<td>LOR</td>
<td>69°10’–69°13’ W</td>
<td>69°12’–69°37’ W</td>
<td></td>
</tr>
<tr>
<td>ALR (m)</td>
<td>3320–3425</td>
<td>2850–3500</td>
<td></td>
</tr>
<tr>
<td>SVL (mm)</td>
<td>71.81±6.38</td>
<td>72.13±7.27</td>
<td>0.933</td>
</tr>
<tr>
<td></td>
<td>(61.22–77.84)</td>
<td>(59.6–83.5)</td>
<td></td>
</tr>
<tr>
<td>SAMB</td>
<td>58.60±2.87</td>
<td>59.15±3.35</td>
<td>&gt;0.7</td>
</tr>
<tr>
<td></td>
<td>(55–62)</td>
<td>55–64</td>
<td></td>
</tr>
</tbody>
</table>

terparietal and parietais are indistinguishable in *L. nigroventrolateralis* and *L. isabelae*. The presence and disposition of the lentiform sensory organs are variable in both taxa, being found on the frontal scales and unpaired scales of the snout, not reaching the frontals. In the holotype of *L. nigroventrolateralis* there are four supraocular scales on each side, whereas in the holotype of *L. isabelae* there are five on each side. Nevertheless, in both samples studied there may be four or five of them.

The canthus rostralis, loreals, supraciliaries, preoculars, suboculars and the ciliar sides are the same in both species. In the holotypes of *L. nigroventrolateralis* and *L. isabelae* there are five supralabial scales, the fourth one longest and curved upward posteriorly. Some individuals of both species have six supralabial scales with the fifth the longest. The temporal scales of the individuals of both species have six supralabials with the fourth one longest and curved upward posteriorly. Some

In the holotype of *L. nigroventrolateralis*, three, but the range observed was 2–3 in all of the males. The number of scales around midbody measured in both type series showed almost identical values (for *L. nigroventrolateralis*: 58.6±2.87, range 55–62; for *L. isabelae*: 59.15±3.35, range 55–64), which do not differ significantly (*t*=2.12, *P*=0.7, *n*=18; see Tables 1 and 2).

The diagnostic characters given in the abstract and in the description of Ortiz (1994) for *L. nigroventrolateralis* do not provide sufficient evidence for distinguishing it from *L. isabelae*. The dorsal pattern of a medium dorsal yellow band, spotted with black dots and a bold melanism between axilla and groin, the abdomen, gular region and ventral surface of the limbs and tail, are present in all known specimens of *L. isabelae*. In this species, and in *L. nigroventrolateralis*, the sides are strongly melanic, bordering a yellow band on the middle of the back, with scattered, irregular black spots, sometimes forming a vertebral line, and also showing a predominance of melanism on the dorsum and head. Both *L. nigroventrolateralis* and *L. isabelae* are sexually dichromatic, with males hav-
ing bolder yellow spots, and the throat and ventral surface of limbs and tail more melanic than in females, which may lack ventral melanism entirely.

In addition, no ecological differences (H. Núñez, field observations) appear to exist between these species, and their geographical distributions are absolutely continuous and overlapping (see Pincheira-Donoso & Núñez, 2005). Therefore, we conclude that _L. nigroventrolateralis_ Ortiz, 1994 should be recognized as a synonym of _L. isabelae_ Navarro & Núñez, 1993.

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**REFERENCES**


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**APPENDIX**

**Studied material**

_Liolaemus nigroventrolateralis_: MZUC 19007-19011, type series, Museo de Zoología, Facultad de Ciencias Naturales y Oceanográficas, Universidad de Concepción, Chile, Salar de Pedernales (26°15’S, 69°10’W; 26°15’S, 69°13’W), 3425 m, Tercera Region, Chile.

_Liolaemus isabelae_: MNHN 2359–2362; 2697–2698; 3312–3314, Museo Nacional de Historia Natural de Chile, “El Cerrito”, 12 km NW campamento La Ola, Salar de Pedernales, 3350 m (26°14’S, 69°37’W), Tercera Región, Chile; MNHN 2713–2715, Mina “El Hueso”, Potrerillos, 2850 m (26°26’S, 69°28’W), Tercera Región, Chile; MNHN 2735–2736, Quebrada de Pedernales, cerca del Salar de Pedernales, 3672 m (26°22’S, 69°17’W), Tercera Region, Chile.

_Liolaemus isabelae_: MZUC 19000-19006, type series, Museo de Zoología, Facultad de Ciencias Naturales y Oceanográficas, Universidad de Concepción, Chile, Salar de Pedernales (26°14’S, 69°10’W; 26°15’S, 69°13’W), 3425 m, Tercera Region, Chile.


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