



***Stenodema longicuneata* (Carvalho and Rosas, 1966) (Hemiptera, Heteroptera, Miridae) in Patagonia: redescription, new synonym and geographic distribution**

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Abstract: The genus *Stenodema* Laporte, 1832 is a group of grass-feeding plant bugs worldwide distributed, with five species recorded for the Subantarctic sub-region (*sunsu* Morrone 2015). Males of *Stenodema longicuneata* (Carvalho and Rosas, 1966) are redescribed and photographed. *Stenodema laolaoensis* (Carvalho, 1985) is proposed as a junior synonym of *S. longicuneata*. New geographic records are provided and distributional and biogeographic issues are discussed.

Key words: Argentina, Chubut, male redescription, plant bugs, *Stenodema laolaoensis* (Carvalho, 1985), Stenodemini.

INTRODUCTION

More than 2025 species of Heteroptera have been recorded for Argentina and a higher richness is expected (Coscarón 2017). Particularly, few authors have recently contributed to the knowledge of this group in Argentinean Patagonia (e.g.: Carpintero 1999, Carvajal et al. 2017, Coscarón et al. 2015, Diez and Coscarón 2015, Cornelis et al. 2016, Diez et al. 2016).

The tribe Stenodemini China, 1943 (Hemiptera: Heteroptera: Miridae: Mirinae) is a worldwide group of grass-feeding plant bugs with *Stenodema* Laporte, 1833 as type genus (Schwartz

2008). *Stenodema* includes 59 species, five of them being known for the Subantarctic sub-region (*sensu* Morrone 2015): *S. longicuneata* (Carvalho and Rosas, 1966), *S. laolaoensis* (Carvalho, 1985), *S. dohrni* (Stål, 1859), *S. insuavis* (Stål, 1860) and *S. praeelsa* (Distant, 1989). Carvalho and Rosas (1966) described the genus *Penacoris*, with *longicuneatus* as type species. In 1985, Carvalho described *columbiensis* and *laolaoensis*, including them into *Penacoris*. Posteriorly, Schwartz (2008) proposed the genus *Penacoris* as junior synonymy of *Stenodema* and transferred *longicuneatus*, *columbiensis* and *laolaoensis* to *Stenodema*.

In the present work, four specimens of *S. longicuneata* collected from the Argentinean province of Chubut, as well as the holotype of *S.*

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laolaoensis, deposited in the Museo de La Plata (MLP), were studied. The aim of this paper is to redescribe *S. longicuneata*, providing new character variability and distributional records in Patagonia, and propose *S. laolaoensis* as new synonym.

MATERIALS AND METHODS

Specimens were collected from low vegetation of the forest understory in the Argentinean provinces of Neuquén and Chubut (Figs. 20-24) by means of a Garden vacuum model 56/86 Stihl and a sweep-net with a diameter of 35 cm in February 2013 and January 2014. In addition, the holotype of *S. laolaoensis* (Figs. 2, 3, 5, 6), deposited in the entomological collection of the Museo de La Plata (MLP), La Plata, Argentina, was studied and compared to the collected material. Specimens were studied and photographed through a Leica MZ 9 5 binocular microscope and a Leica DMC2900 camera. Measurements are expressed in millimeters. Terminology follows Carvalho (1975) and Carpintero and Estevez (2001). The distribution was taken from Carvalho and Rosas (1966), Carvalho (1985), Carpintero and Carvalho (1993), Carpintero (1999) and Coscarón (2017). For the construction of geographic distribution map, QUANTUM-GIS 2.8.2 (QGIS Development Team 2016) program and a high resolution shapefile of the Andean biogeographical region (Romano 2017) were utilized. All collected material was deposited in the collection of the Museo Argentino de Ciencias Naturales Bernardino Rivadavia (MACN), Buenos Aires, Argentina.

Stenodema longicuneata (CARVALHO AND ROSAS, 1966)

(Figs. 1, 4, 7-15)

Penacoris longicuneatus Carvalho and Rosas, 1966: 75 [n. sp., original description]; Carvalho, 1985: 10 [comparison]; Carvalho and Froeschner 1987: 192 [Check list]; Carpintero and Carvalho,

1993: 409 [Distribution]; Schuh, 1995: 1018 [Catalogue]; Carpintero 1999: 52 [Distribution]; Prado 2008:41 [Check list].

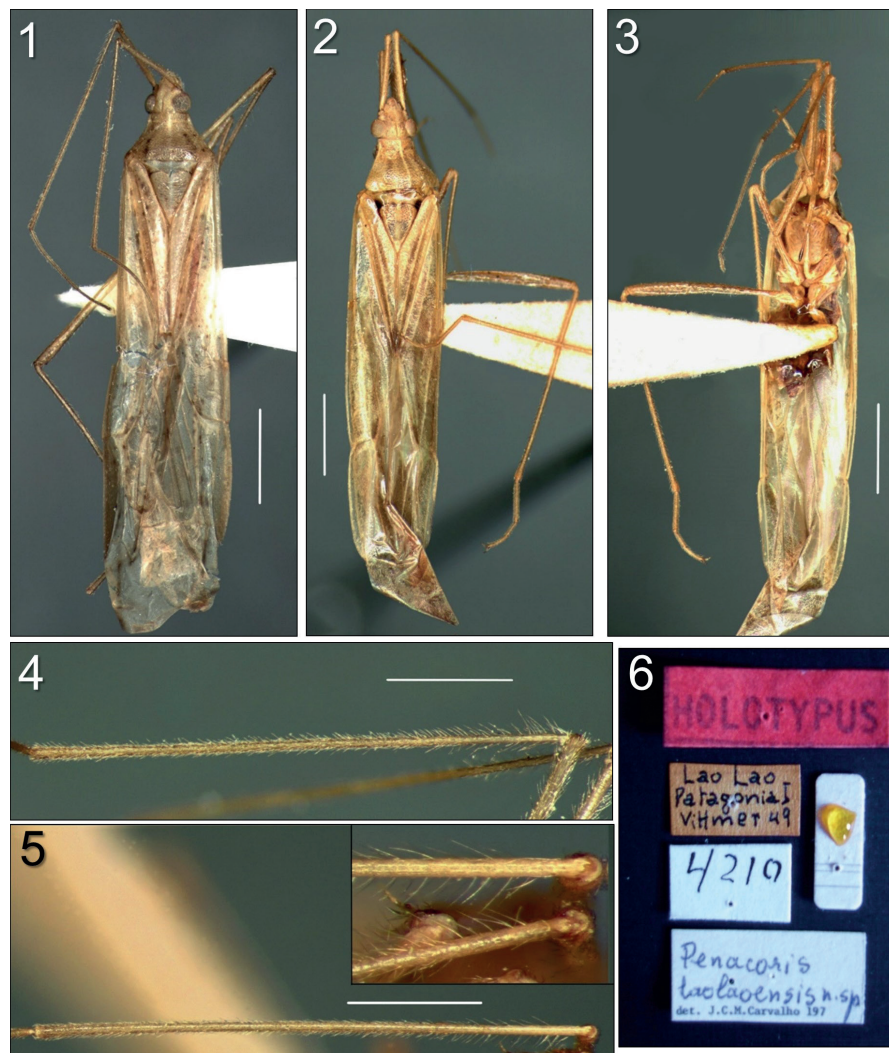
Penacoris laolaoensis Carvalho, 1985: 9 [n. sp., original description]; Carpintero and Carvalho, 1993: 409 [Distribution]; Schuh, 1995: 1018 [Catalogue]; Carpintero, 1999: 52 [Distribution].

Stenodema longicuneatus: Schwartz, 2008: 1174 [new combination]; Coscarón 2017: 182 [Catalogue].

Stenodema laolaoensis: Schwartz, 2008: 1174 [new combination]; Coscarón, 2017: 182 [Catalogue]; syn. n.

Description of the male

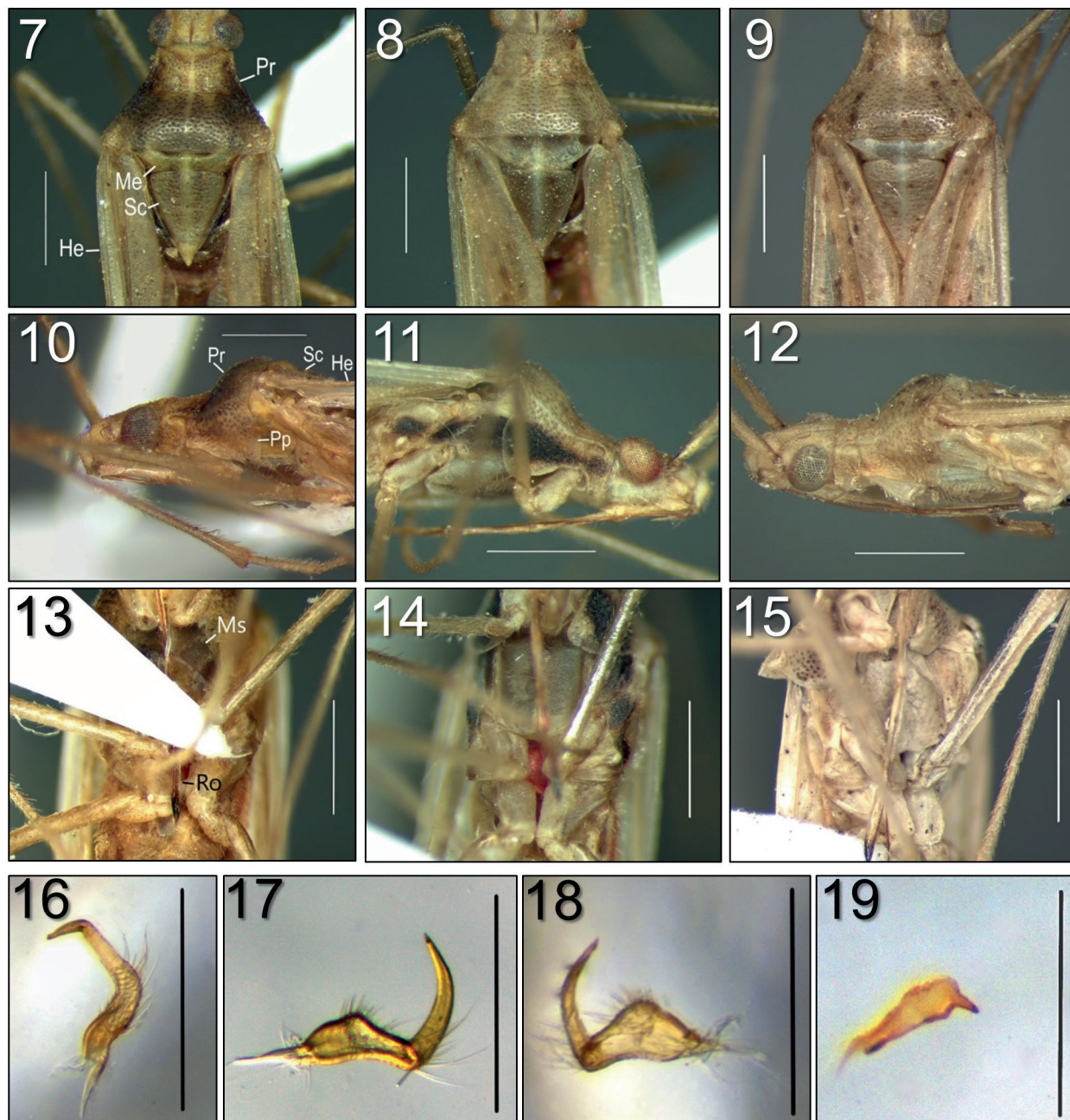
COLORATION: General, straw to yellowish with very variable darker areas. Clypeus with thin red band from ventral view, lacking in one specimen. Apex of fourth segment of rostrum black. Pronotum with pale medial fasciae, blurring in the posterior lobe (Figs. 7-9). Three specimens with two discontinuous, variable in thickness, faint ochreous to dark brown sub-lateral bands (Figs. 8, 9). One specimen with two longitudinal dark bands running from near anterolateral angles intensifying and reaching lateral margin of pronotum medially, disc of posterior lobe ochreous, humeral angles paler (Fig. 7). Mesoscutum light straw to straw greenish, paler in the medial line. Scutellum with medial fasciae, apex and basal angles paler, straw to ochreous (Figs 7-9). Pronotum, scutellum and hemelytra with brown spots in two specimens (Fig. 9). Corium and membrane hyaline, clavus and nervures of corium light brown. Pleura with a faint brown to brown-black longitudinal band (Figs. 10-12). Mesosternum pale to dark brown (Figs. 13-15). Abdomen tinted with lateral thin red band and with sublateral broad, discontinued in the segment junctures and faint to brown band, one specimen without the thin red band, another specimen lacking the broad band. STRUCTURE: Antennal



Figures 1-6 - *Stenodema longicuneata*, dorsal view (1); holotype of *S. laolaoensis*, dorsal view (2) holotype of *S. laolaoensis*, ventral view (3) *S. longicuneata* antennal segment II (4) *S. laolaoensis* holotype antennal segment II (5) *S. laolaoensis* holotype labels (6). Scale bars: 2mm (Figs. 1-3), 1mm (Figs. 4, 5).

segment I and base of II covered with long, whitish, protruding pubescence. Length of hairs at base of segment II two times or more as width of segment (Fig. 4). Distal portion of antennal segment II and segment III and IV thin, covered with short, whitish, protruding hairs. Pronotum and scutellum densely punctured with the exception of the medial fascia in the former and the apex, medial fascia and basal angles in the latter. Mesoscutum widely exposed, sparsely punctured (Figs. 7-9). Femora and tibiae very long and thin, covered by a thin

pubescence, hind femora without spines and hind tibiae covered with hairs as long or more than width of segment. Ratio of antennal segments: 1: 2.27: 1.33: 0.88. Head across eyes 1.12 times wider than head length. Length of segment I of antenna 1.87 times longer than width of head width across eyes. Rostrum 3.1 times longer than head across eyes. Pronotum width 1.63 times longer than pronotum length. Hind femora 1.56 times as long as fore femora, and 1.70 times as long as middle femora. Hind tibiae 1.70 times longer than fore tibiae and



Figures 7-19 - *S. longicuneata*, pronotum, mesoscutum, scutellum and hemelytra (7-9). propleura (10-12) mesosternum (13-15) left paramere dorsal view (16) left paramere external view (17) left paramere internal view (18) right paramere dorsal view (19). Scale bars: 1mm (Figs 7-15), 0,5mm (Figs 16-19). Hemelytra (He); Mesoscutum (Me); Mesosternum (Ms); Pronotum (Pr); Propleura (Pp); Rostrum (Ro); Scutellum (Sc).

1.67 times longer than middle tibiae. Hemelytra very long, 2.60 times longer than abdominal length. Length of the cuneus about 4.39 times longer than width of base. Male genitalia: (Figs. 16-19). Left paramere very curved at distal apex and protruding with sickle shape (Fig. 16-18). Right paramere with internal margin curved inwards, distal apex with a dentiform prolongation (Fig. 19).

Examined material

Argentina: Rio Negro: Lao Lao (right spelling: Llao Llao), **Holotype of *S. laolaoensis***; Vihner col. I/1949; MLP: 4210 (1♂); Neuquén: Lanin National Park: Rucachoroi (39°14'13"S, 71°10'52"W) (1♂). Coscarón-Diez-Ruiz Espindola col. 9/I/2014; Chubut: Los Alerces National Park (42°53'19"S, 71°37'14"W) (1♂). Coscarón-Diez-Pall-Quirán col. 22/II/2013; Los Alerces National Park (42°51'41"S, 71°37'29"W) (1♂). Diez-Coscarón-Ruiz Espindola col. 10/I/2014; Lago Puelo National Park (42°05'44"S, 71°36'58"W) (1♂). Coscarón-Diez-Ruiz Espindola col. 10/I/2014.

Distribution (Fig 20)

Chile: Curicó: Curicó; Arauco: Caramavida: Nahuelbuta, (Carvalho y Rosas 1966). Argentina: Neuquén: National Park Lanin: Pucará (Carpintero 1999), Los Totoros (23 Km. NW from V. La Angostura) (Carvalho 1985); Río Negro, locality not specify (Carpintero and Carvalho 1993), Lao Lao (right spelling: Llao Llao) (Carvalho and Rosas, 1966).

New record

Argentina: Chubut: Los Alerces National Park (Figs. 22, 23), Lago Puelo National Park (Fig 24).

Taxonomic discussion

Carvalho and Rosas (1966) described *Penacoris longicuneatus* (transferred to *Stenodema* genus

by Schwartz 2008) upon two specimens, which showed differences in the coloration of clypeus, pronotum and hemelytra. Based on the specimens studied in the present work, a new pattern of pronotum coloration was observed (Fig. 7) as well as variability in coloration of scutellum, pleura, mesosternum and abdomen (Figs. 7-15).

One specimen of *S. longicuneata* studied in this work showed similar pattern of coloration that *S. laolaoensis*, whose holotype is the only specimen known: faint pronotal bands, absence of spots in scutellum and hemelytra and dark pleural band. In the original description of the latter, Carvalho (1985) stated: "...rostrum alcançando as coxas medianas..." (rostrum reaching median coxae) and "...antenna II com pêlos curtos em toda sua extensão (mais curtos que a grosura do segmento) ..." (short hairs along antennal segment II, shorter than width of segment). Differently, the rostrum of *S. longicuneata* reaches hind coxae and hairs of antennal segment II are two times or more longer than width of segment (Carvalho and Rosas 1966). However, in this study no differences have been observed in rostrum length of *S. longicuneata* and that of *S. laolaoensis* (Table I). The shorter aspect of the rostrum of *S. laolaoensis* is due to the fact that the holotype is broken and glued at level of prothorax not exactly in the natural position (Fig. 3). Moreover, some hairs observed in the basal portion of antennal segment II are two times longer or more than width of segment, character present in *S. longicuneata* and *S. laolaoensis* (Figs. 4, 5).

Male parameres, illustrated by Carvalho and Rosas (1966) and Carvalho (1985) in the original description of *S. longicuneata* and *S. laolaoensis* respectively show a very distinct aspect. However, the former authors illustrated the external view of the parameres whereas the latter illustrated the upper view, leading to a misinterpretation especially of the left paramere which is long and recurved (Figs. 16-18).

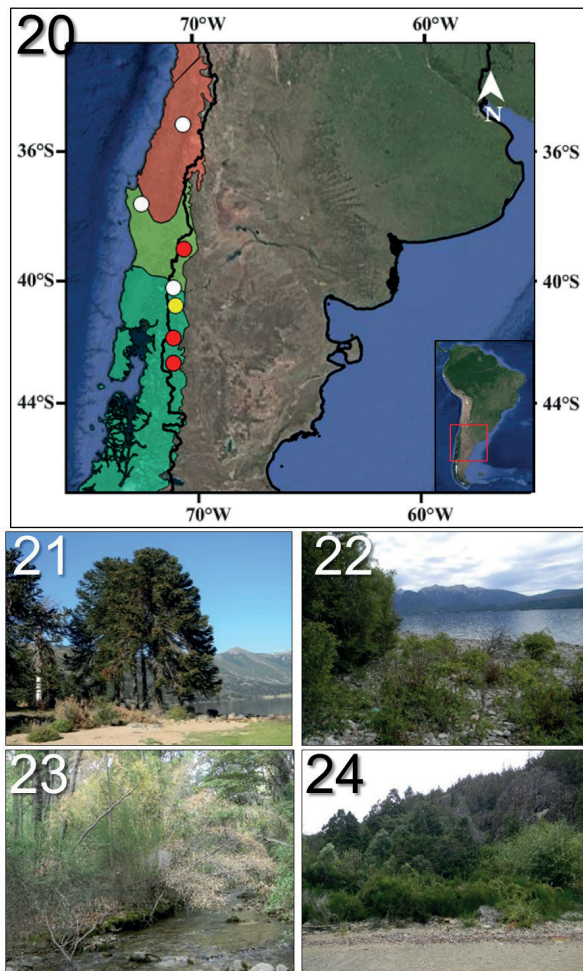
TABLE I
Measurements (mm.) of *Stenodema longicuneata* (Carvalho and Rosas, 1966) and *Stenodema laolaoensis* (Carvalho, 1985).

Characters	<i>S. longicuneatus</i>	<i>S. laolaoensis</i>
Total length	10.80 (10.0-11.10)	11.5
Head length	0.94 (0.84-1.03)	0.90
Head width across eyes	1.06 (1.03-1.09)	1.02
Anteocular region length	0.48 (0.46-0.50)	0.5
Vertex	0.44 (0.43-0.44)	0.42
Width of eyes	0.31 (0.30-0.32)	0.30
Rostral length	3.20 (3.20-3.20)	3.30
Length of antennal segment I	1.85 (1.80-1.95)	1.83
Length of antennal segment II	4.38 (4.26-4.50)	4.72
Length of antennal segment III	2.56 (2.38-2.69)	2.70
Length of antennal segment IV	1.69 (1.65-1.73)	—
Pronotum length	1.11 (1.08-1.15)	1.12
Pronotum at minimum width	0.76 (0.73-0.77)	0.77
Pronotum at maximum width	1.84 (1.76-1.88)	1.73
Scutellar width at base	0.86 (0.72-1.02)	0.78
Scutellar length	1.04 (0.97-1.10)	1.05
Fore femora length	2.59 (2.38-2.80)	2.53
Middle femora length	2.11 (2.03-2.19)	2.10
Hind femora length	3.63 (3.46-3.73)	3.38
Fore femora width	0.18 (0.17-0.20)	0.18
Middle femora width	0.20 (0.17-0.25)	0.18
Hind femora width	0.23 (0.17-0.25)	0.28
Fore tibiae length	2.71 (2.53-2.80)	2.70
Middle tibiae length	2.74 (2.65-2.84)	2.73
Hind tibiae length	4.57 (4.42-4.76)	4.56
Fore tibiae width	0.15 (1.12-1.17)	0.13
Middle tibiae width	0.13 (1.12-1.15)	0.12
Hind tibiae width	0.12 (0.10-0.13)	0.12
Hemelytra length	9.40 (9.20-9.70)	9.60
Cuneo length	2.48 (2.43-2.53)	2.48
Cuneo width	0.56 (0.55-0.58)	0.55
Abdominal length	3.45 (3.26-3.73)	—

Other two morphological differences between these two species that can be noticed based on the original descriptions are the “length of segment I of antenna/width of head” ratio being 2 and 1.8 and the “length of cuneus/base of cuneus” ratio being 6 and 4 in *S. longicuneata* and *S. laolaoensis* respectively. These differences cannot be supported based on the material herein examined since the

former proportion varied from 1.78 to 1.93 in *S. longicuneata* and is equal to 1.79 in *S. laolaoensis*, and the second proportion equates 4.39 for *S. longicuneata*, whereas it’s 4.51 in *S. laolaoensis*.

Due to all the aspects mentioned above, *S. laolaoensis* is proposed as a junior synonym of *S. longicuneata*.



Figures 20-24 - distribution map (20) collecting sites: Lanin National Park: Rucachoroi (21) Los Alerces National Park (22, 23), Lago Puelo National Park (24). Dark green: Valdivian Forest Province (Subantarctic Forest sub-region); light green: Maule Province (Subantarctic Forest sub-region); orange: Central Chile sub-region. White points: *S. longicuneata* previously recorded sites; red points: *S. longicuneata* herein recorded sites; yellow point: *S. laolaoensis* holotype record.

The coloration of this species, as well as in others *Stenodema*, shows a high variability, thus identification based on this character is not recommended. The known distributional limit of *S. longicuneata* was expanded southward, reaching 42°53'S (Chubut, Argentina). Besides, the Chubut records herein stated are of great importance because of, until the present, this species was not known for Lago Puelo National Park and Los Alerces National Park. In the context of loss

biodiversity, reporting this species in new protected areas and providing tools to a correct identification will help planners and decision makers to manage national biodiversity priorities better.

Notes on distribution and biogeography

There are 14 species of *Stenodema* (disregarding *S. laolaoensis*) recorded for the Neotropical and Andean regions (*sensu* Morrone 2015). *S. guatemalana* is located in Mexico and Central America. Other ten species (*S. andina*, *S. argentina*, *S. columbiensis*, *S. dohrni*, *S. fritzi*, *S. golbachi*, *S. longicuneata*, *S. noaensis*, *S. panamensis* and *S. praecelsa*) are distributed in the Andes environments of South America from Colombia to south Argentina and Chile, although *S. panamensis* also reaches Mexico and Panama. *S. insuavis* is widely recorded in Argentina (all provinces with the exception of San Juan province) reaching south Brazil in Rio de Janeiro and Chile and Uruguay. *S. guaraniana* is restricted to south Brazil (Rio de Janeiro and Santa Catarina states) and northeast Argentina (Misiones province). *S. brasiliana* is only known for a female collected in the state of Mato Grosso, Brazil.

Stenodema longicuneata has been recorded in the south portion of Central Chilean sub-region (Chilean province of Curicó) and in Maule (in Chile and Argentina) and Valdivian Forest (only Argentina) provinces of Subantarctic sub-region, distribution ranging from 35° to 37° 47' in Chile, and from 39°14' to 42°53'S in Argentina (Fig. 20).

Based on distribution of twenty-four genera belonging to Asteracea (Angiosperm), Buprestidae and Curculionidae (Coleoptera) and Gnaphosidae (Araneae) families, Morrone et al. (1997) stated a delimitation for "Central Chile" with four areas of endemism within it (Coquimbo, Santiago, Curicó and Ñuble) and carried out a cladistic analysis of this areas and the Subantarctic province (Subantarctic sub-region *sensu* Morrone 2015). "Central Chile"

differs from the Central Chilean sub-region *sensu* Morrone (2015) only on its northern limit at 30° S and 26° S respectively. The southernmost areas of endemism, Curicó and Ñuble, resulted more closely related to the Subantarctic province than to the areas of endemism located northward (Coquimbo and Santiago). According to this results, Morrone et al. (1997) suggest that the Curicó-Ñuble area could represent an overlap zone with elements of the “Central Chile” zone in the strict sense and the Subantarctic province. The distribution of *S. longicuneata* (Fig. 20) constitute a new support for this proposal. The spider *Apodrassodes tranca* (Gnaphosidae) shows an almost identical distribution pattern than *S. longicuneata* (Platnick and Shadab 1983).

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AUTHOR CONTRIBUTIONS

Pablo M. Pereyra's contributions: measurements; description of collected specimens and *Stenodema laolaoensis* holotype; taxonomic discussion; distribution and biogeographic consideration; writing, photographs, map and images making. Fernando Diez's contributions: collecting, identification and description of specimens; writing; photographs, map and images making. María del Carmen Coscarón's contributions: collecting and work's supervision.

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