Redescription and first record of *Diaphylla granulata* for Argentina (Coleoptera: Scarabaeidae: Melolonthinae)

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Redescripción y primer registro de *Diaphylla granulata* para la Argentina (Coleoptera: Scarabaeidae: Melolonthinae)

■ **RESUMEN.** El género *Diaphylla* Erichson, previamente conocido en Chile, se cita por primera vez para la Argentina con la especie *Diaphylla granulata* Philippi, 1864. Se redescribe la especie *Diaphylla granulata* sobre la base de su morfología externa y genitalia, y se discute sobre su distribución y posición sistemática entre los Melolonthinae.

PALABRAS CLAVE. Coleoptera. Melolonthinae. *Diaphylla.* Argentina. Nuevo registro.

■ **ABSTRACT.** The genus *Diaphylla* Erichson, previously known from Chile, is recorded for the first time for Argentina with the species *Diaphylla granulata* Philippi, 1864. *Diaphylla granulata* is redescribed based on external morphology and genitalia features, and its distribution and systematic placement within Melolonthinae are here discussed.

KEY WORDS. Coleoptera. Melolonthinae. *Diaphylla.* Argentina. New record.

INTRODUCTION

The genus *Diaphylla* was established by Erichson in 1847, and currently consists on five described species, *Diaphylla granulata* Philippi 1864, *Diaphylla hispida* Erichson, 1847, *Diaphylla lampropyga* Philippi, 1864, *Diaphylla luctuosa* Philippi & Philippi, 1864, and *Diaphylla ornata* Philippi, 1864. All species are known only from Chile except *D. hispida* that was originally recorded for Peru. Despite that *Diaphylla* is relatively common in Central Chile no records have been previously recorded for this genus in similar habitats in Argentina.

The systematic placement of the genus *Diaphylla* has been uncertain. Erichson (1847) originally placed the genus in the tribe Sericoidini, Blackwelder (1944) and Evans (2002) placed the genus in the Melolonthinae tribe Macrodactylini, and later Evans (2003) considered the genus as *Incertae Sedis* in his «Checklist of the New World Chafers»

The purpose of this paper is to cite *D. granulata* for the first time in Argentina, to provide a description of this species, and to discuss the systematic placement of the genus and possible relationship with other South American Melolonthinae.

MATERIAL AND METHODS

For this study eight specimens of *Diaphylla granulata* were examined: five from the collection of Museo de Ciencias Naturales de La Plata (La Plata, Argentina) (MLP), erroneously identified as *Myloxena* sp., and the holotype and two paratypes from the Museo Nacional de Historia Natural, Santiago, Chile (MNNC).

Description is based on these specimens from MLP that were collected by Sergio Schajovskoy in 1960 and 1964 in the locality of Pucará in Parque Nacional Lanín in Neuquén province, Argentina and the type material.

Internal and external morphological characters formed the basis of this work. Observations were made with a stereomicroscope, drawings were made with the aid of a camera lucida, and measurements were obtained using an ocular micrometer. Male genitalia were dissected, studied and placed in a glycerin-filled vial beneath the specimen.

The following standards were used for characters:

Measurements: Length was measured from the apex of the clypeus to the apex of elytra. Two width measurements were taken: across the humeri and greatest width across the elytra.

Punctures: Punctures were defined as large or coarse if they were 0.04 mm or larger, moderate if 0.04-0.02 mm and small if they were less than 0.02 mm. Surface is defined as punctulated if covered with numerous minute and closely set punctures.

Puncture density: Punctures were considered dense if they were nearly confluent or distance between punctures were less than 0.02 mm, moderate if punctures were 0.02-0.06 mm apart, and sparse if the punctures were separated by more than 0.06 mm distance.

Setae type: There were found five types of setae on this specie. These setae could be long (0.60 mm or larger), moderately long (0.60-0.20 mm) or short (less than 0.20 mm):

(1) White, short setae: Whitish setae, recumbent, approximately 0.20 mm in length, wider at the base than at apex.

(2) White-yellowish, long setae: Whitish-yellowish in color, longer than 1mm, slender, same width at the base and apex.

(3) Dark brown setae: Dark brown color, wider at base than apex, thick, and erect.

(4) Testaceous setae: Brownish-yellow in color, wider at base than apex, erect. Those on apex and venter of tarsomeres and antennomeres.

(5) Spine-like setae: Brown color, much wider at base than apex, thick. Those on apical margin of meso- and metatibiae.

Setae are subject to wear and may be abraded.

Setae density: Setae were considered dense if there were more than 10 setae per 0.25 mm , moderate (10-5 setae per 0.25 mm^2), sparse (1-5 setae per 0.25 mm^2) and very sparse if distance between 2 setae was larger than 0.5 mm.

RESULTS

Diaphylla granulata Philippi, 1864
(Figs. 1-12)

Diaphylla granulata R. A. Philippi, 1864: 439; F. H. Philippi, 1887: 689; Van den Branden, 1883: 119; Dalla Torre, 1913: 325; Blackwelder, 1944: 230; Evans, 2003: 354; Evans & Smith, 2005: 302.

Redescription. Male. Color brown. Shape suboval. Length: 9.50-10.10 mm; width across humeri: 4.20-4.60 mm; greatest width: 5.30-6.00 mm. Surface covered with two types of setae: white shorts and long, thick, and dark browns. Pronotum dark brown, with well-defined longitudinal stripe of white, short setae on middle, stripe continues on scutellum, covering its surface. Elytra light brown, covered with white short setae, with long thick and dark brown setae inserted on scattered dark brown spots. Legs slender, dark brown; tarsi nearly twice longer than tibiae (Figs. 1-2).

Head (Figs. 3-6): rectangular, 1.2 times as

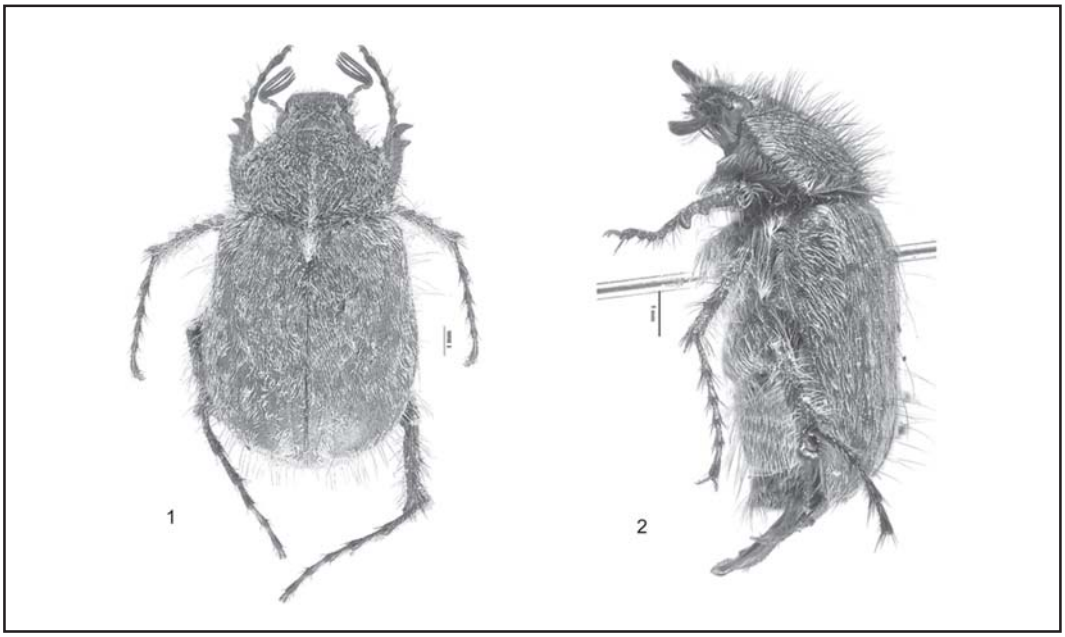


Fig. 1-2. *Diaphylla granulata*, 1, dorsal view; 2, lateral view.

long as wide. Surface densely, coarsely punctuate, covered with white, short, and recumbent setae and with short, dark brown setae. White setae more dense in frons and vertex, around the eyes, and on eye canthus. Frontoclypeal suture evident, complete, sinuate. Clypeus well-developed, declivous with respect to frons; shape rectangular with rounded angles, margin broadly reflexed and dark; clypeal apex with brown, short setae on ventral side.

Eyes slightly facetted, partially divided by eye canthus. Eye canthus with white, short and brown, moderately long setae. Ventral half of the eye slightly larger than dorsal. Antenna with 10 antennomeres (Fig. 3), antennal club with 6 antennomeres, 1st antennomere pyriform, as long as 2nd and 3rd combined; surface covered with scattered, moderately long and testaceous setae; 2nd antennomere small, globose, less setose than 1st; 3rd and 4th cylindrical; 4th 0.7 times as long as 3rd, with apical projection and medially excavated on insertion of 5th antennomere. Antennal club as long as segments 1-5 combined, 1st club antennomere 1/3 shorter and 1/3-1/2 narrower than 2nd.

Mouth parts (Figs. 5-6): labrum visible in dorsal view, protruding beyond clypeal apex, rectangular, anterior margin slightly mesally sinuated and with apical fringe of setae on both sides. Labium rectangular, longer than wide, ventrally covered with long setae, strongly punctured. Labial palpus with 3 segments, distal segment with apex acute. Maxillae with laterostipe covered with long setae, galea armed with four teeth in inner face; maxillary palpus with distal segment pyriform and sharp-pointed. Mandibles reduced, triangular, slightly sclerotized, unarmed; scissorial area membranous with row of small setae on margin.

Pronotum (Figs. 1-2): brown, 1.5 times as wide as long, maximum width at middle. Surface covered with white, short and brown, moderately long setae; setae moderately dense, more dense than head setae; with line of more dense setae on middle, setae white, short; line wider at pronotal base, continuous with setae on scutellum; surface punctuated, punctures density moderate. Pronotal anterior margin with membrane, not beaded; lateral margins evident, dark, and with glabrous and reflexed edges; posterior margin

of pronotum near scutellum lighter in color than rest of pronotum. Anterior angles acute and beaded; posterior angles rounded, not beaded. Scutellum: brown with dark margins, triangular, 1.5 times wider than long.

Elytra (Figs. 1-2): light brown, 1.2 times longer than maximum width, moderately convex, rounded at apex, wider at apex. Surface punctulated, with dense, white, short setae, and with very sparse, dark brown, long setae. Insertion point of brown setae on setigerous tubercles; tubercles as small, glabrous protuberance, like brown spots seen with naked eye. Humerus slight. Seven striae in each elytron, feebly impressed, none complete, sutural stria evident, stria proximal to humerus short. Epipleural border fuscous, narrow, narrowly beaded, slightly reflected and provided with moderately long, brown setae. Metathoracic wings fully developed.

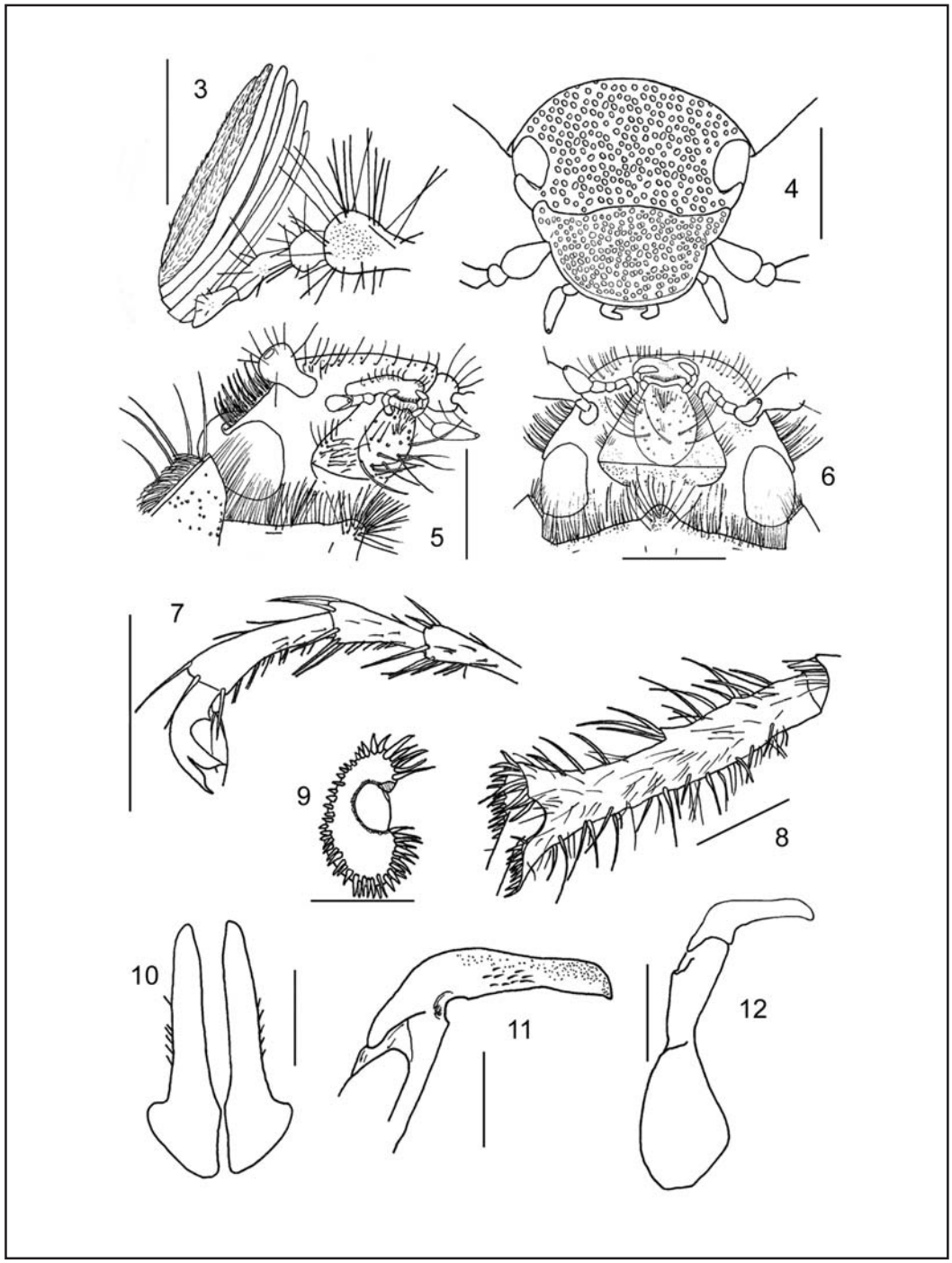
Venter: Ventral surface covered with whitish setae, except prosternum. Prosternum glabrous and smooth, with row of moderately dense setae that covers mentum inserted on prosternal apical margin. Metasternum with medial longitudinal suture, sparsely punctuated, densely covered with whitish-yellowish, long, slender setae. Sternites light brown, with rows of short setae. Sternite 5th and 6th separated by evident flavotestaceous membrane. Sternite 5th wider than 3rd and 4th together. Pygidial plate moderately convex, 2 times wider than long, punctulated, triangular, setose, with apical margin weakly reflexed; 4/5 of pygidial plate exposed beyond elytral apex.

Legs (Figs. 7-9): coxae and femorae covered with setae, setae testaceous and whitish, moderately long to long. Protibia bidentate, teeth large rounded; tibial surface covered with white, short setae; setae more dense on inner side of dorsal surface. Protibial apex oblique and setose, setae testaceous. Protarsi near twice as long as protibia. Pro-, meso- and metatarsomeres slender and thickened at apex, imbricate; with long and testaceous setae on apex; short and white setae on dorsal surface and short, testaceous setae on ventral surface. Protarsomeres 1-4 similar in length, 5th 1.5 times longer than protarsomeres 1-4 individually. Pro-, meso-, and metatarsal claws (Fig. 7) toothed; basal tooth larger than apical; surface with weak striae. Mesotibia wider at apex, surface with testaceous, long, sparse setae and whitish, long, moderately dense setae. Mesotibia with 1 transversal carinae; carina at 3/4 tibial length; carinae with thick, testaceous, spine-like setae; apex with two thick, short spurs and long and fine spine-like setae on apical margin. Mesotarsi near twice as long as mesotibia; first tarsomere 1.33 times as long as 2nd and equal in length to 3rd and 4th combined; 2nd subequal to 5th. Metatibia slender (Fig. 8), surface with testaceous, long, sparse setae and whitish, short, moderately dense setae; with well-developed transversal carinae at middle; carinae with thick, testaceous, spine-like setae. Metatibia wider at apex, apex dark with short, spine-like setae. Metatibial spurs absent (Fig. 9). Tarsal insertion with notch; notch on inner face of tibia. Metatarsal length near twice as long as metatibia. First metatarsomere slightly longer than 2nd ; 3rd and 4th subequal to 2nd; 5th 1.5 times as long as 4th.

Male genitalia: As in Figures 10-12. Phallobase 2.5 times longer than parameres. Parameres nearly straight, slightly curved at apex. With short, setae, setae suberect towards apex of parameres.

Type material MNNC: Holotype: [Prov. Valdivia] [Typus] [*granulata*/ (Phil.) /1826] [*Diaphylla/ granulata* Phil. / Det: A. Martínez 1971/ y L. Peña.] [Chile / M. N./ H.N. / Tipo/ Nº/ 2920]. Paratype: [Paratypus] [*Diaphylla/ granulata* Phil./ Det: A. Martínez 1971/ y L. Peña.] [Prov. Valdivia/ Paratipo] [Chile / M. N./ H. N. / Tipo / Nº/ 2921]. Paratype: [Paratypus] [*Diaphylla/ granulata* Phil. / Det: A. Martínez 1971/ y L. Peña.] [Prov. Valdivia / Paratipo] [Chile / M. N./ H. N. / Tipo / Nº/ 2922].

Other material examined. ARGENTINA. Neuquén: Parque Nacional Lanín: Pucará, 12/11/1964, Sergio Schajovskoy (4 males) and 10/10/1960, Sergio Schajovskoy (1 male) (MLP).



Figs. 3-12. *Diaphylla granulata.* 3*,* antenna. 4, head dorsal view. 5-6, ventral view showing mouthparts. 7-8, Legs: 7, protarsomeres 3-5 and protarsal claw; 8, metatibia; 9, metatibial apex. 10-12, Male genitalia: 10, parameres dorsal view; 11, parameres lateral view; 12, parameres and phallobase. Scale bars = 1mm except for figures 9 and 10 = 0.5 mm

Specimens were found in the Museo de la Plata collection identified as *Myloxena* sp. *Diaphylla granulata* was previously known only for the X Region in Chile and with this data this species is no longer considered endemic for Chile.

Distribution of the genus *Diaphylla*

All the species of *Diaphylla* are recorded for Chile but *Diaphylla hispida* was described originally for Peru (Erichson, 1847) and apparently, it has not been found in Peru since its description. I infer that the original record is incorrect or the specimen on which Erichson based his description was incorrectly labelled. Species of *Diaphylla* are known from the *Nothofagus* forests (Fagaceae) in Chile and Argentina, as it is inferred from locality data (Fig. 13). The absence of *Nothofagus* forest in Peru suggests that the distribution of *D. hispida* for this country must be erroneous, as also noticed by Gutiérrez (1949).

The studied specimens were collected by Sergio Schajovskoy in 1960 and 1964 in the locality of Pucará in the Lanín National Park in the province of Neuquén. This region is very interesting from the point of view of entomology, because the Andes mountain range diminishes its altitude and there are many lakes and low passes that could be used as corridors, therefore it does not exist a barrier that separates Chilean from Argentinean environments (Willink, 1991). This makes us think that this species crossed the barrier passing by passages as has happened with many other species (see Roig-Juñent *et al.,* 2004).

Systematic Position

Problems with the systematic placement of *Diaphylla* arise from the lack of a modern revision of the genus. Based on the analysis of morphological features, *Myloxena* Berg and *Faargia* Martinez (Melolonthinae: Pachydemini) are the most similar to *Diaphylla*. Both *Faargia* Martínez and *Myloxena* Berg are being revised by (Ruiz-Manzanos, in prep). These genera are similar to *Diaphylla* based on the following characters: labrum dorsoventrally flattened, weakly bilobulated, visible in dorsal view; clypeal margin reflexed; 5th sternite wider than 3rd and 4th combined; presence of membrane on suture between 5th and 6th sternites; membrane in elytral margin (clearly visible specially at apex); absence of metatibial spurs on males and presence of an ample notch on inner face of metatibia. *Diaphylla* may be readily distinguished from these *Myloxena* and *Faargia* by the following characters: tubercles on elytra, antennal club with 6 antennomeres, 1st antennomere of the antennal club narrower and shorter than 2nd, and antennal club antennomeres not longer than length of pedicel on males.

CONCLUSIONS

With the data provided here the distribution of the genus *Diaphylla* is extended to Argentina. In agreement with Gutiérrez (1949) who noticed that the locality from Peru must be erroneus, due to the absence of *Nothofagus* forests in that area, and the fact that it has never been collected again in Peru, the distribution of *Diaphylla* must be restricted to Chile and Argentina.

Based on morphological observations *Diaphylla* could be placed close to the Pachydemini genera *Myloxena* and *Faargia*. A molecular study of these genera would provide more information about this issue.

This genus has been poorly studied and collected and this, all together with its uncertain taxonomical position and distribution, requires of the accomplishment of new studies and search of specimens.

ACKNOWLEDGMENTS

I thank Federico C. Ocampo (University of Nebraska State Museum, Lincoln, USA) and Sergio Roig-Juñent (Instituto Argentino de Investigaciones de las Zonas Áridas, Mendoza, Argentina) for their advise, critical

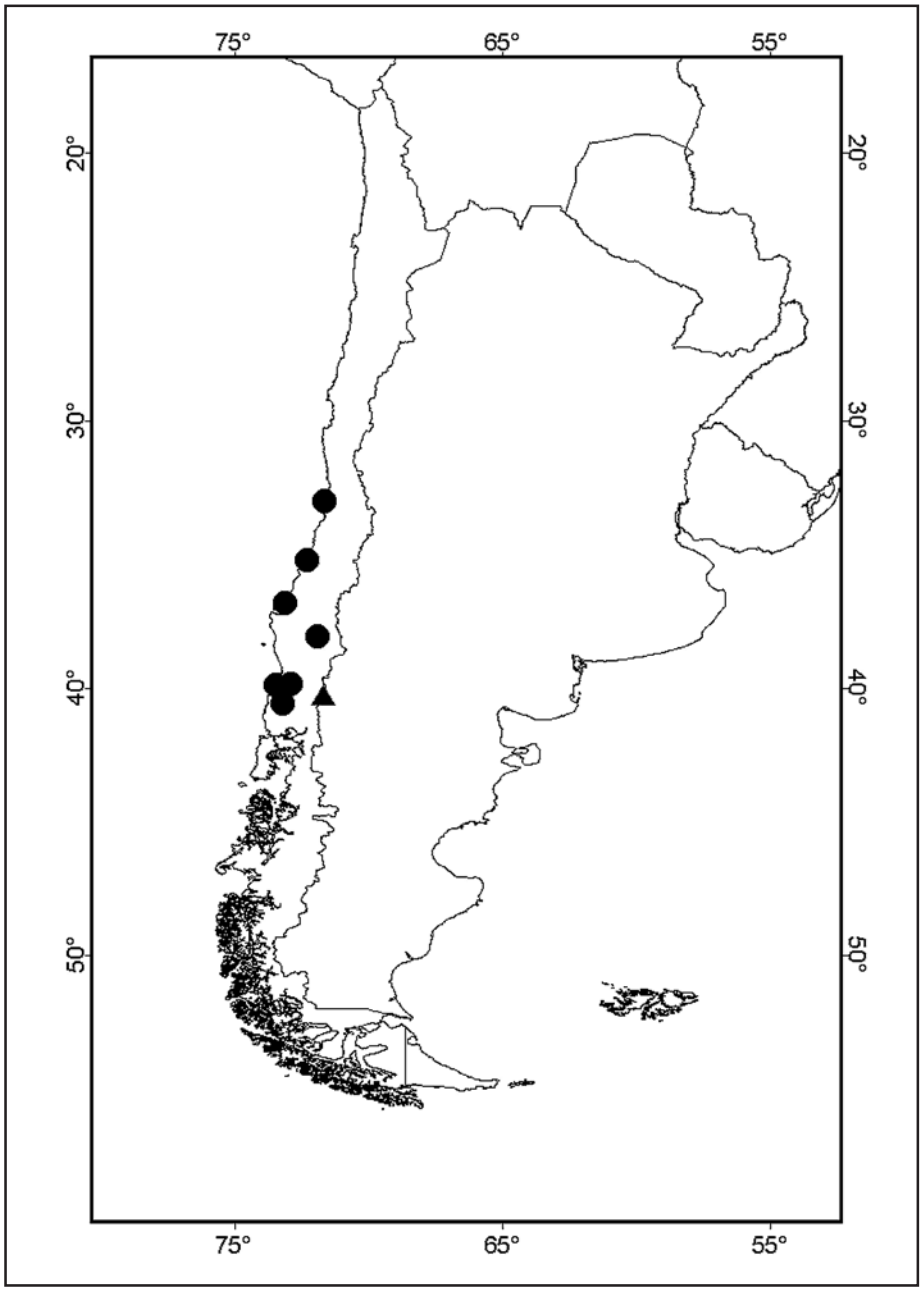


Fig. 13. Distribution map for *Diaphylla*. Circles represent known data. Triangle denotes new data for Argentina.

review, and patience while preparing the manuscript. I extend my gratitude to Mario Elgueta (Museo Nacional de Historia Natural, Santiago, Chile) and to Norma Diaz and Analía Lanteri (Museo de La Plata, La Plata, Argentina) for making available the material for this study. This paper is a contribution to the project «Southern South American Scarabs» NSF-BSI grant (DEB-0342189) to Andrew Smith and Federico Ocampo and to the project «Diseño de una red de reservas para la protección de la biodiversidad en

América del Sur Austral, utilizando modelos predictivos de distribución con taxones hiperdiversos» of the Fundación BBVA. My special thanks to Jose Manuel Ruiz, Rosa Manzanos and Julio de Liras for their supporting, and encouraging assistance.

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Recibido: 11-VIII-2006
Aceptado: 29-IX-2006