

**A NEW CLICK BEETLE GENUS FROM CHILEAN  
TEMPERATE FORESTS,  
ALYMA (COLEOPTERA: ELATERIDAE: POMACHILIINI)**

ELIZABETH T. ARIAS  
Essig Museum of Entomology  
University of California, Berkeley  
210 Wellman Hall  
Berkeley, CA 94720  
etarias@berkeley.edu

**Abstract**

*Alyma* Arias, a **new genus** of Elateridae from Chile, is here described and illustrated with eight included species: *A. pallipes* (Solier), **new combination**, *A. ariasvillegasai* Arias, **new species**, *A. calafquenensis* Arias, **new species**, *A. contulmoensis* Arias, **new species**, *A. lawlerae* Arias, **new species**, *A. quiriquinaensis* Arias, **new species**, *A. rieseorum* Arias, **new species**, and *shapiroei* Arias, **new species**. The type species of the genus *Alyma* is *Cardiophorus pallipes* Solier, 1851.

**Resumen**

Se presenta para Chile un nuevo género *Alyma* Arias con ocho especies: *A. pallipes* (Solier) **nueva combinación**, *A. ariasvillegasai* Arias, **nueva especie**, *A. calafquenensis* Arias, **nueva especie**, *A. contulmoensis* Arias, **nueva especie**, *A. lawlerae* Arias, **nueva especie**, *A. quiriquinaensis* Arias, **nueva especie**, *A. rieseorum* Arias, **nueva especie**, *A. shapiroei* Arias, **nueva especie**, las que se describen e ilustran. La especie tipo del género *Alyma* es *Cardiophorus pallipes* Solier, 1851.

---

Chilean elaterids are a diverse group that have received little taxonomic attention. The family comprises about 48 genera in Chile and about 112 species. During the course of my studies I have followed mainly the systematic assessments of Gur'jeva (1974), who studied the thoracic structures of click beetles, Dolin (1975), who studied wing venation, and Calder (1996), who also considered Russian authors in preparing his monograph on Australian click beetles. I began my research with the genus *Deromecus*, initially described by Solier (1851) with eight species, the type species being *D. angustatus* Solier. Several authors added several new species to *Deromecus* (Blackwelder 1944). One of the species placed in *Deromecus* by Fleutiaux (1907) (*D. pallipes*) was initially described by Solier (1851) in *Cardiophorus* in the group "Cardiophorites." Barlett-Calvert (1898) omitted *D. pallipes* from his publication on "Chilean Elaterides."

According with my studies *D. pallipes* does not belong to the Cardiophorites group because it lacks the generic characters of the genus *Cardiophorus* Eschscholtz, such as: mesocoxae close to mesepimeron and mesepisternum, and pronotosternal process short and truncate, scutellum cordiform (Platia 1994), and incomplete lateral pronotal carina (Calder 1996). Likewise, *D. pallipes* does not belong to the genus *Deromecus* Solier because lacks its generic characters, such as: rounded and protruding frontoclypeal carina, vertical clypeus, simple tarsomere 4 (without lobes), mesocoxae open to mesepimeron and metaepisternum, bursa copulatrix with one dorsal short star shape plate, and walls of mesosternal cavity distinctively elevated. The phylogeny for this tribe and its members has yet to be completed.

I am proposing the new genus *Alyma* (Elaterinae Pomachiliini) with the following species: *A. pallipes* (Solier 1851), new comb., *A. ariasvillegasai* Arias, n. sp., *A. calafquenensis* Arias, n. sp., *A. contulmoensis* Arias, n. sp., *A. lawlerae* Arias, n. sp., *A. quiriquinaensis* Arias, n. sp., *A. riaseorum* Arias, n. sp., and *A. shapirooi* Arias, n. sp.

### Material and Methods

Specimens and primary types were borrowed from museums around the world for examination of morphological characters. Specimens were compared with the type material to complete descriptions. The museums and institutions that contributed to this work are indicated in the Acknowledgements and, in the text, by the acronyms in brackets, excluding [ETA] the author's collection. Type specimen repositories are also indicated in the descriptions.

Measurements were made with a calibrated ocular micrometer as follows: total body length (mm) from the frontal margin to the apex of the elytra; elytral width: maximum width of the elytra when both sides are in focus. Indices mentioned here: Eye index [EI] and pronotal elytral index [PEI]. Proportions are given to facilitate comparison among individuals or among species (Arias 1999; Arias 2001*b*). Antennomere proportion [AP] lists the lengths of antennomera 2 through 11 (antennomere 1, because of its curve, is difficult to measure, so has been omitted) as 1/100th of the total antennal length. Length is taken from the dorsal view. Tarsomere proportion [TP] lists the lengths of the tarsomera as 1/100th of the total tarsal length.

Specimens from which the genitalia were removed were first relaxed overnight in warm water with a few drops of soap added. For examination of male genitalia, the last abdominal segment was removed and placed in water with a few drops of soap in a Petri dish and left overnight. Then, genitalia were extracted and glued to a point with transparent balsam, and placed on the pin under the specimen. For examination of female genitalia, the abdomen was removed and placed in 5% KOH overnight; then transferred to water for a few minutes, then placed in Triple Stain to color the membrane structures, and finally into water again to inflate the soft structures. Female genitalia were stored in a small vial with glycerin.

Drawings were made using a camera lucida on a dissecting scope (Leica MZ7.5). All dates in the records given were converted to a standard format of day.MONTH.year, with the month given in Roman numerals. Places and names given from the recorded labels are the original spellings. Drawings of tarsomera are from the lateral view.

### Definitions

Antennal groove: also referred to as antennal pocket (Arias 1999; Arias 2001*a, b*). Presence of a longitudinal groove in the apical portion of the hypomeron and the pronotosternal suture appearing double (Arias 1999; Arias 2001*a, b*). Antennomeres 1–3 are accommodated in this groove.

Prescutum: the anterior part of the mesonotum. It is the main insertion point of the muscles responsible for clicking. The form and incision on the anterior margin of the prescutum is a persistent subfamily character (Gur'jeva 1974). This feature might offer some clarification at generic level.

Pronotosternal suture: commonly found as a single feature in Elateridae, sometimes grooved in part of its anterior length. Occasionally, this suture thickens giving the appearance of a double suture, (Golbach 1994). Hayek (1990) mentioned that the terminology "single" and "double" are misleading, giving the idea that there are two sutures instead of only one. The suture or line of junction between the prosternum and

the hypomeron is invariably manifested as a single line. However, when the suture is double, it is in reality accompanied through at least the anterior half of its length, or all of its length, by a narrowed, polished band of thicker cuticle, referred to as "double sutures." This band is the modified inner margin of the pronotal hypomeron (hereafter hypomeron), and it may be punctate or not, with setae or not; it may be slightly raised, and in some species slightly convex in part of its length.

Terminology used for setae appearance, such as: semi-decumbent, decumbent, semi-erect and erect, follows Wilson (1955).

### *Alyma* Arias, **new genus**

**Type Species.** *Cardiophorus pallipes* Solier 1851:17, present designation. Gender feminine.

**Description.** Body stout or elongate; convex; brown, yellowish or reddish brown, with or without longitudinal dark patterns on elytra; integument dull, shiny or lustrous; length 3.9–6.9 mm, width 1.1–2.4 mm.

**Head:** punctate, punctures confluent; vestiture long, yellowish, pale or gold; frontoclypeal region generally sloping to base of clypeus or extending forward, in some species not visible from above; Eyes small, EI: 2.8; clypeus vertical, thin  $1/5 \times$  width of labrum, narrow at middle; labrum fully exposed, vertical; mandibles bidentate, base of mandibles with a curved carina; maxillary and labial palps with apical segments securiform; antenna 11-segmented, antennal insertion small and inserted into a depression; antennomere 2 conical or serrate, antennomera 3, 4, 9, and 10 conical or serrate, antennomera 5 through 8 serrate, antennomere 11 serrate, triangular or tubular, separated by more than two diameters.

**Prothorax:** convex; subquadrate; narrowed anteriorly to receive head; lateral margins entirely carinate, sinuate or parallel-sided, inclined mesodorsally, carina directed ventrally from apex of pronotal posterior angles through lateral pronotal margin; pronotal basal area strongly declivous to prescutum; pronotal basal margin straight or curved; prescutum notch V-, or U-shaped; pronotal posterior angles acute, uni-carinate, straight or divergent; prosternum longer than wide, convex; pronotosternal suture appearing double, straight or sinuated, marginate along hypomeral border and at procoxal margin; hypomeron punctate, hypomeron apex exceeding pronotosternal lobe; antennal groove present, carinate apically at hypomeral margin; articulation of prothoracic estemite around procoxa acute, directed outward, marginate; pronotosternal spine more or less horizontal with a ledge immediately behind procoxae, with a subapical tooth; without a median longitudinal groove; procoxae globular.

**Scutellum:** oval, U-shaped or triangular, curved anteriorly, flat or convex; mesosternal cavity oval or subrectangular, cavity sides (also called cavity walls) slightly elevated at mesocoxal region; posterior margin of mesosternal cavity extending in distance posteriorly shortly; mesocoxae longer than wide; mesocoxal cavity open to mesepisternum; mesosternum and metasternum separated by distinct external suture.

**Elytra:**  $2.2\text{--}2.9 \times$  pronotal length; striate, stria with punctures; vestiture short, semi-erect; metathoracic wings absent; metathoracic coxal plate with widest region closest to medial body line rather than to abdominal lateral side; parallel-sided, setae decumbent or semi-erect, gold; apex rounded, or truncate, free of spines. Leg: femur globular; tarsomere 1 through tarsomere 3 decreasing in length distally, tarsomere 3 ventrally flat, tarsomere 4 bilobate.

**Abdomen:** punctate; last abdominal ventrite angulate.

**Female genitalia:** 1.48 mm in length, vagina without sclerotised internal structures; delicate, enlarging gradually towards apex; bursa copulatrix globular, anterior section of bursa with 2 accessory glands tube shape, posterior end of bursa greatly enlarged and coiled, medial part of bursa with 2 sclerotised structures star shape and another long sclerotised structure at top, two non sclerotised spiral spermathecae attached to posterior end of bursa (Fig. 4).

**Etymology.** The name *Alyma* honors Alfred Newton (*Al*) y (*and* in Spanish) Margaret Thayer (*ma*) (Field Museum of Natural History) for their extraordinary dedication to the study of Coleoptera, and their steadfast help and constant encouragement they have given to my coleopteran studies.

**Biology.** Adult specimens have been collected from October through February. There is no other information on the biology of the species or on immature stages.

**Distribution.** V–IX Regions of Chile.

**Remarks.** This genus does not present a distinctive sexual dimorphism, excluding genitalia. The genus *Alyma* differs from *Deromecus* in terms of: presence of narrow and vertical clypeus narrowed at the middle by frontoclypeal carina; rounded carina at base of mandibles (side view); mesocoxae open to metaepisternum; mesosternal cavity walls slightly elevated; tarsomere 3 and tarsomere 4 lobed, with a long erect setae arising from distal portion; distal part of bursa copulatrix with 2 accessory glands semi-sclerotised tube shaped, medial part of bursa with 2 sclerotised structures star shaped and another long sclerotised structure at the top.

#### Key to the species of *Alyma*

- |    |   |   |
|----|---|---|
| 1  | Pronotum less than 2/3 parallel-sided, pronotal posterior angles divergent .....  | 2                                       |
| 1' | Pronotum over 2/3 parallel-sided, pronotal posterior angles straight. ....  | 4                                       |
| 2  | Integument dull; vestiture thick, pale; tarsomere 4 similar in length to tarsomere 2 (Fig. 24) .....                                  | <i>A. calafquenensis</i> Arias, n. sp.  |
| 2' | Integument shiny, tarsomere 4 small than tarsomere 3 .....  | 3                                       |
| 3  | Body color reddish brown, elytra flat, tarsomere 4 very small, 0.7 × tarsomere 3 (Fig. 28) .....                                      | <i>A. shapiro</i> Arias, n. sp.         |
| 3' | Body color brownish, elytra semi-convex, tarsomere 4 almost similar in length to tarsomere 1 (Fig. 23) .....                          | <i>A. ariasvillegasai</i> Arias, n. sp. |
| 4  | Antennomere 2 serrate .....   | 5                                       |
| 4' | Antennomere 2 conical .....   | 7                                       |
| 5  | Body color brownish, pronotum and elytra with longitudinal dark stripes. ....   | 6                                       |
| 5' | Body color shiny yellowish, pronotum and elytra with similar color. ....  | <i>A. rieseorum</i> Arias, n. sp.       |
| 6  | Antennomere 11 triangular, tarsomere 3 elongate (Fig. 9). ....  | <i>A. contulmoensis</i> Arias, n. sp.   |
| 6' | Antennomere 11 elongate, tarsomere 3 as long as wide (Fig. 10). ....  | <i>A. lawlerae</i> Arias, n. sp.        |
| 7  | Antennomere 11 tubular (Fig. 6), lacks median longitudinal depression over pronotum, elytral apex truncate. ....                      | <i>A. pallipes</i> (Solier)             |
| 7' | Antennomere 11 subtriangular (Fig. 11), median longitudinal depression over posterior section of pronotum, elytral apex rounded. .... | <i>A. quiriquinaensis</i> Arias n. sp.  |

#### *Alyma pallipes* (Solier), new combination

(Figs. 1, 6, 14, 22, 34)

**Holotype.** *Cardiophorus pallipes* Solier 1851:17 (original designation).

*Deromecus pallipes* Fleutiaux 1907:200.

**Description.** Body: Stout; reddish brown; integument dull, vestiture semi-erect, gold; length 6.9 mm, width 2.4 mm; PEI: 2.9.

**Head:** convex; frontoclypeal carina region sloping downward; labrum 2.4 × as long as wide; antennomera 2–3 conical, remaining ones serrate, antennomere 11 tubular, reaching apex of pronotal posterior angles, [AP: 7-8-9-10-10-10-12-10-10-14], (Fig. 6).

**Prothorax:** strongly convex medially; punctate; longitudinal short impression over posterior half; pronotal posterior angles divergent; prosternum convex; hypomeron rugulose, apically antennal groove not carinate, bi-excavate, (Fig. 14); prosternum at procoxae marginate, pronotal

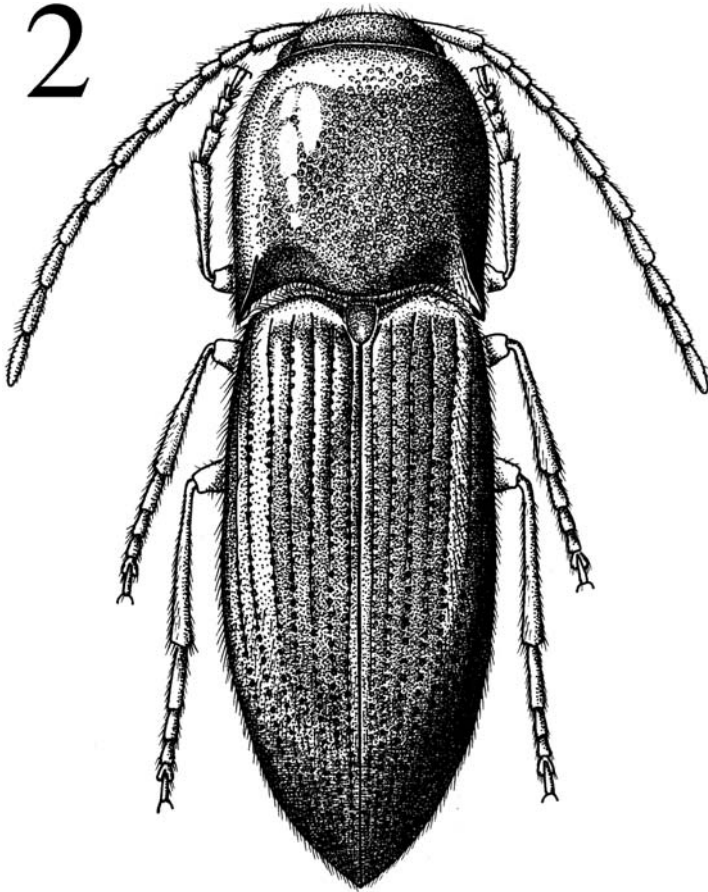


**Fig. 1.** Dorsal habitus of *Alyma pallipes* (Solier) (= *Cardiophorus pallipes* Solier).

sides at procoxal margin slightly elevated, without lateral lobes; procoxae separated by  $0.7 \times$  procoxal diameter; pronotosternal spine  $1.4 \times$  procoxal diameter.

*Scutellum*: oval, long hairs decumbent; mesocoxae separated by  $0.4 \times$  mesocoxal diameter; posterior margin of mesosternal cavity extending posteriorly  $0.3 \times$  mesocoxal diameter.

*Elytra*: not parallel-sided, second third widest; striate, punctures dense; apex truncate. *Leg*: yellowish, vestiture light yellowish brown, tarsomere 4 very small [TP: 43-23-13-4-17] (Fig. 22).



**Fig. 2.** Dorsal habitus of *Alyma lawlerae* (Fig. 2) (Illustration Alexis Solodovnikov).

**Type Material.** *Cardiophorus pallipes* Solier 1851:17, CHILE (female), 6.9 mm in length, examined. [MNHN]. The specimen is in poor condition.

**Biology.** *Alyma pallipes* has been collected in araucarian forests. There is no other information on the biology of this species.

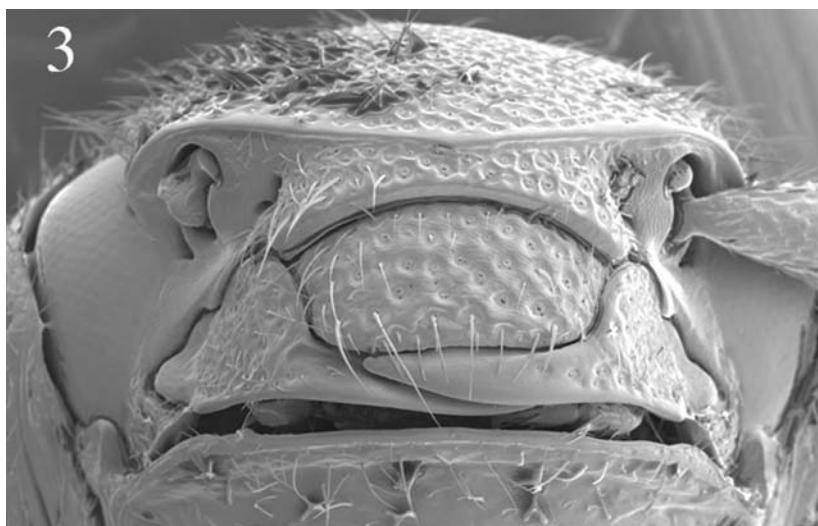
**Distribution.** IX Region, Chile, (Fig. 34).

**Remarks.** *Alyma pallipes* can be recognized by its dull reddish integument, gold semi-erect vestiture and pronotal posterior angles divergent.

*Alyma ariasvillegasai* Arias, **new species**  
(Figs. 4, 7, 15, 23, 34)

**Description.** Body: Elongate; brown; integument shiny; vestiture yellowish pale, decumbent, sides parallel-sided; length 6.3 mm, width 1.9 mm; PEI: 2.6.

**Head:** convex; frontoclypeal carina region extended forward; clypeus and labrum with setae semi-decumbent; labrum slightly convex, 2 × as long as wide; antennomera 2 through 8 serrate, antennomere 9 exceeding pronotal posterior angles, [AP: 7-6-10-10-11-13-12-9-10-12], (Fig. 7).



**Fig. 3.** Scanning electron micrograph of head of *Alyma lawlerae*.

*Prothorax*: convex medially; areolate, sides parallel; base curved; pronotal posterior angles straight; prosternal lobe bent; prosternum convex; pronotosternal lobe marginate broadly curved; pronotosternal suture sinuate; hypomeron punctate, sinuate basally, antennal groove present (Fig. 15); prosternum at procoxae marginate, and slightly elevated; procoxal distance  $2.0 \times$  procoxal diameter, pronotosternal spine length  $0.7 \times$  procoxal diameter.

*Scutellum*: U-shaped, vestiture semi-decumbent, long, yellow; mesocoxae separated by  $0.3 \times$  mesocoxal diameter; posterior margin of mesosternal cavity extending posteriorly  $0.4 \times$  mesocoxal diameter.

*Elytra*: interstria rugulose, slightly convex; striae pitted, pits regular; interstria convex; elytral apex rounded and explanate. *Leg*: yellowish brown; tarsomere 4 almost similar in length to tarsomere 1, [TP: 25-19-18-23-15], (Fig. 23).

**Type Material.** Holotype: female, Petorca, Palo Colorado, 27.X.1991, CHILE, 6.3 mm in length, J. Solervicens.

**Distribution.** Petorca, V Region, Chile, (Fig. 34).

**Remarks.** *Alyma ariasvillegasai* can be recognized by its shiny integument, brownish color, yellowish pale vestiture semi-decumbent and straight posterior pronotal angles.

**Etymology.** The name of this species honors Professor Patricio Arias Villegas (Universidad de Concepción) my uncle, who dedicated his life to students' education.

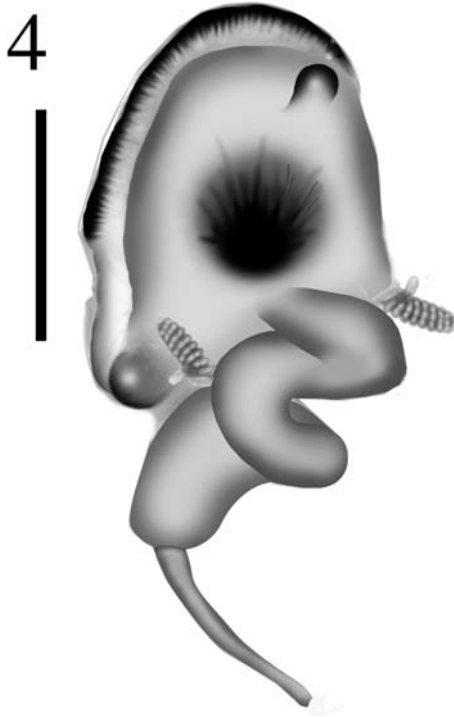
### *Alyma calafquenensis* Arias, **new species**

(Figs. 8, 16, 24, 29, 34)

**Description.** Body: elongate; brown; integument dull; vestiture thick pale yellowish, semi-decumbent; length 6.1 mm, width 2.1 mm; PEI: 2.6.

*Head*: convex; frontoclypeal carina region sloping downward; clypeus and labrum with long setae, decumbent; labrum slightly convex,  $2.0 \times$  as long as wide; antennomera 2 through 8 serrate, antennomere 9 exceeding pronotal posterior angles, [AP: 7-6-9-9-12-9-9-9-12] (Fig. 8).

*Prothorax*: strongly convex medially; areolate, sides parallel; base curved; pronotal posterior angles straight; prosternal lobe strongly bent; prosternum strongly convex; pronotosternal lobe



**Fig. 4.** Female genitalia of *Alyma ariasvillegasai* (Illustration Nancy V. Arias). Scale bar = 1.0 mm.

marginate broadly curved; pronotosternal suture sinuate; hypomeron rugulose, uni-excavate, apically not marginate, antennal groove present (Fig. 16); prosternum at procoxae marginate, and slightly elevated; procoxal distance  $2.0 \times$  procoxal diameter, pronotosternal spine length  $0.7 \times$  procoxal diameter.

*Scutellum*: U-shaped, vestiture semi-decumbent, long, yellow; mesocoxae separated by  $0.3 \times$  mesocoxal diameter; posterior margin of mesosternal cavity extending posteriorly  $0.4 \times$  mesocoxal diameter.

*Elytra*: interstria rugulose, slightly convex; striae pitted, pits irregular; interstria flat; elytral apex rounded and crenulate. *Leg*: yellowish brown; tarsomere 4 similar in length to tarsomere 2, [TP: 25-19-18-23-15], (Fig. 24).

*Male genitalia*: aedeagus  $2.5 \times$  as long as wide; median lobe spoon shaped; (Fig. 29).

**Type Material.** Holotype: male CHILE, Calafquén, 25.I.1986, L.E. Peña, 6.1 mm in length, [ETA].

**Distribution.** Calafquén, IX Region, Chile, (Fig. 34).

**Remarks.** *Alyma calafquenensis* can be recognized by its dull integument, brown color, yellowish pale and thick vestiture semi-decumbent, and straight posterior pronotal angles.

**Etymology.** This species is named after the place where it was collected.

*Alyma contulmoensis* Arias, **new species**  
(Figs. 9, 17, 25, 30, 34)



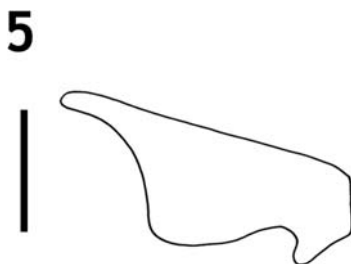


Fig. 5. Plate of *Alyma shapiroei*. Scale bar = 0.5 mm.

**Description.** Body: stout; brown; integument semi-dull; a dark longitudinal strip covering pronotum, and elytra; vestiture long gold semi-decumbent; length 6.0 mm, width 2.0 mm; PEI: 2.7, (n = 6).

**Head:** convex; frontoclypeal carina region sloping downward; clypeus and labrum with long setae erect; labrum  $2 \times$  as long as wide; antennomera 2 through 9 serrate, antennomere 9 exceeding pronotal posterior angles, [AP: 8-7-10-10-10-10-11-11-10-13], (Fig. 9). **Prothorax:** strongly convex; areolate, sides sinuate; base straight; pronotal posterior angles straight; prosternal lobe broadly curved, strongly bent; prosternum strongly convex; posterior angle or tip of the hypomerion bent inside, carina lateral, not meeting with hypomerion carina; pronotosternal suture sinuate, one spurious carina basally; hypomerion rugulose, bi-excavate, antennal groove simple (Fig. 17); prosternum at procoxae marginate, and slightly elevated; procoxal distance  $2.0 \times$  procoxal diameter, pronotosternal spine length  $0.7 \times$  procoxal diameter.

**Scutellum:** U-shaped, vestiture semi-decumbent, long, yellow; mesocoxae separated by  $0.3 \times$  mesocoxal diameter; posterior margin of mesosternal cavity extending posteriorly  $0.4 \times$  mesocoxal diameter.

**Elytra:** interstria rugulose, slightly convex; striae pitted, pits irregular and confluent; elytral apex rounded. **Leg:** yellowish brown; tarsomere 4 similar in length to tarsomere 1, [TP: 39-20-14-7-20], (Fig. 25).

**Male genitalia:** aedeagus  $2.5 \times$  as long as wide; median lobe parallel-sided; (Fig. 30).

**Type Material.** Holotype: male, CHILE, Contulmo, 6.0 mm in length, [ETA]. Paratypes here designated 3 males and 3 females: CHILE, Contulmo, 16. XII. 1985, L. E. Peña. [ETA].

**Distribution.** Contulmo, VIII Region, Chile, (Fig. 34).

**Remarks.** *Alyma contulmoensis* can be recognized by its semi-dull integument, brownish color, long gold vestiture, a longitudinal dark strip covering pronotum and elytra, and straight posterior pronotal angles.

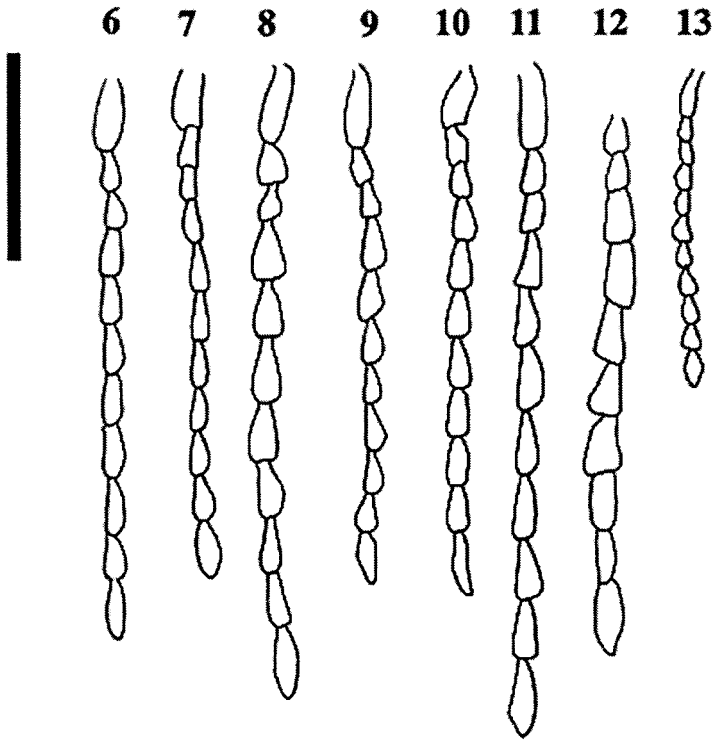
**Etymology.** This species is named after the place, Contulmo, where it was collected.

*Alyma lawlerae* Arias, **new species**  
(Figs. 2, 3, 4, 10, 18, 26, 31, 34)

**Description.** Body: Stout; brown; integument semi-dull; a longitudinal dark strip covering pronotum and elytra; vestiture yellowish decumbent; sides parallel-sided; length 6.0–6.4 mm (n = 5), width 2.0–2.3 mm; PEI: 2.3.

**Head:** slightly convex; frontoclypeal carina region sloping downward; clypeus and labrum with long setae decumbent; labrum slightly convex,  $2.1 \times$  as long as wide; antennomere 2 and antennomere 3 conical, remaining ones serrate, antennomere 9 exceeding pronotal posterior angles, antennomere 11 elongate [AP: 8-6-9-10-11-11-10-11-11-13], (Fig. 10).

**Prothorax:** convex anteriorly; alveolate, sides sinuate; base straight; pronotal posterior angles divergent; prosternum strongly convex; pronotosternal lobe narrowed, broadly curved;



**Figs. 6–13.** Antenna of *Alyma* species. **6)** *A. pallipes*; **7)** *A. ariasvillegasai*; **8)** *A. calafquenensis*; **9)** *A. contulmoensis*; **10)** *A. lawlerae*; **11)** *A. quiriquinaensis*; **12)** *A. rieseorum*; **13)** *A. shapiroii*. Scale bar = 0.5 mm.

pronotosternal suture sinuate, not excavate; hypomeron rugulose, uni-excavate, apically not marginate, antennal groove simple (Fig. 18); prosternum at procoxae marginate, and slightly elevated; procoxal distance  $0.9 \times$  procoxal diameter.

*Scutellum*: U-shaped, with vestiture semi-decumbent, long, yellow; mesocoxae separated by  $0.3 \times$  mesocoxal diameter; posterior margin of mesosternal cavity extending posteriorly  $0.4 \times$  mesocoxal diameter.

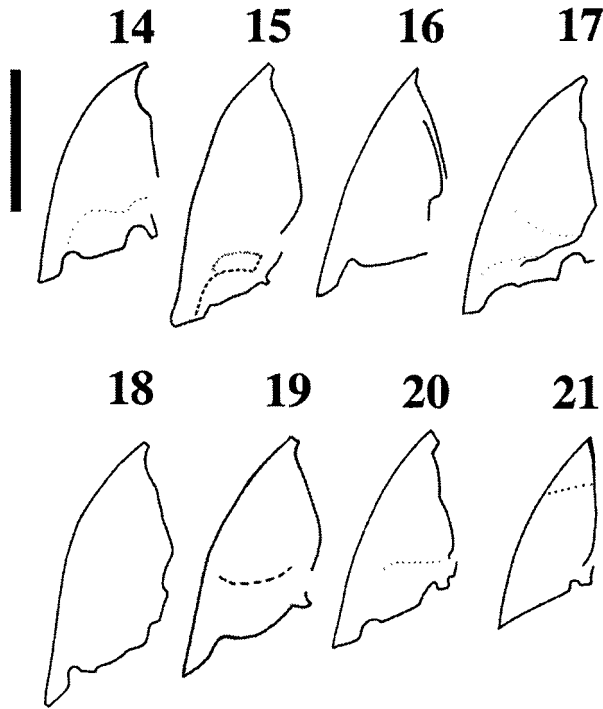
*Elytra*: interstria rugulose, slightly convex; striae with pits irregular; elytral apex explanate. *Leg*: yellowish brown; tarsomera 3 and 4 similar in length and width, [TP: 33-16-13-13-25], (Fig. 26).

*Male genitalia*: aedeagus  $3.2 \times$  as long as wide; median lobe sides sinuate, apex slightly curved; parameres concave from the base through the body's widest part, apex pointed towards inside (Fig. 31).

**Type Material.** Holotype: male, CHILE, Periquillo, Concepción, 6.XI.1994, T. Cekalovic, 5.9 mm in length, [ETA]. Paratypes here designated. Two females: CHILE, Periquillo, Concepción, 22.XI.1992, T. Cekalovic [ETA]. Other material studied: 2 females CHILE Concepción, Fundo El Manzano [ETA]; one male CHILE, Periquillo, Concepción, 07.X.1994, T. Cekalovic [ETA].

**Distribution.** Concepción, VIII Region, Chile, (Fig. 34).

**Remarks.** *Alyma lawlerae* can be recognized by its convex pronotum, bi-excavate hypomeron, tarsomere 3 and tarsomere 4 similar in length and in width.



**Figs. 14–21.** Pronotal hypomera of *Alyma* species. **14)** *A. pallipes*; **15)** *A. ariasvillegasai*; **16)** *A. calafquenensis*; **17)** *A. contulmoensis*; **18)** *A. lawlerae*; **19)** *A. quiriquinaensis*; **20)** *A. rieseorum*; **21)** *A. shapirooi*. Scale bar = 1.0 mm.

**Etymology.** The name of this species greatly honors Professor Sharon P. Lawler (University of California, Davis) for her strong help and support during several years of my Ph.D.

*Alyma quiriquinaensi* Arias, **new species**

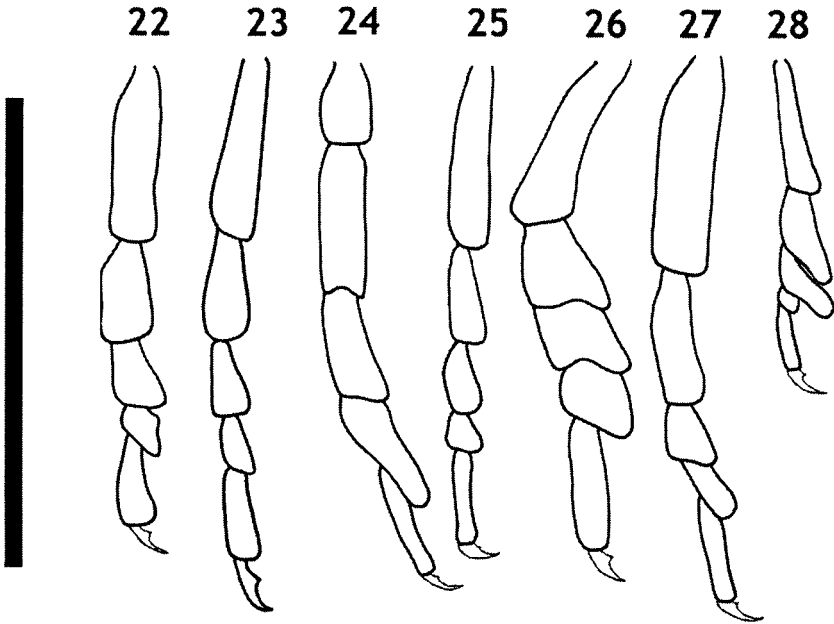
(Figs. 11, 19, 32, 34)

**Description.** Body: stout; brown; integument dull; vestiture pale yellowish semi-decumbent; length 6.1 mm, width 2.1 mm; PEI: 2.6.

**Head:** convex; frontoclypeal carina region sloping downward; clypeus and labrum with long setae semi-decumbent; labrum slightly convex,  $2 \times$  as long as wide; antennomera 2 through 8 serrate, antennomere 9 exceeding pronotal posterior angles, [AP: 7-6-10-10-11-13-12-9-10-12], (Fig. 11).

**Prothorax:** strongly convex medially; areolate, sides parallel-sided; longitudinal depression over posterior half of pronotum; base curved; pronotal posterior angles divergent; prosternal lobe strongly bent; prosternum strongly convex; tip of posterior angle bent towards inside; pronotosternal lobe marginate, broadly curved; pronotosternal suture sinuate, without an accompanying grooved along its side; hypomeron rugulose, uni-excavate, apically not marginate, antennal groove present (Fig. 19); prosternum at procoxae marginate, and slightly elevated; procoxal distance  $2.0 \times$  procoxal diameter, pronotosternal spine length  $0.7 \times$  procoxal diameter.

**Scutellum:** U-shaped, vestiture decumbent, long, yellow; mesocoxae separated by  $0.3 \times$  mesocoxal diameter; posterior margin of mesosternal cavity extending posteriorly  $0.4 \times$  mesocoxal diameter.



**Figs. 22–28.** Tarsi of *Alyma* species. 22) *A. pallipes*; 23) *A. ariasvillegasai*; 24) *A. calafquenensis*; 25) *A. contulmoensis*; 26) *A. lawlerae*; 27) *A. rieseorum*; 28) *A. shapiro*. Scale bar = 0.5 mm.

*Elytra*: interstria rugulose, slightly convex; striae pitted, pits irregular; elytral apex rounded. Leg: yellowish brown; the specimen lacks tarsomere.

*Male genitalia*: aedeagus  $2.5 \times$  as long as wide; median lobe parallel-sided; base of parameres straight, (Fig. 32).

**Type Material.** Holotype: male, CHILE, Quiriquina, 2-44; 6.1 mm in length, [MNNC].

**Distribution.** Quiriquina Island, VIII Region. Chile, (Fig. 34).

**Remarks.** *Alyma quiriquinaensis* can be recognized by its brown color, dull integument and yellowish vestiture semi-decumbent, and divergent posterior pronotal angles.

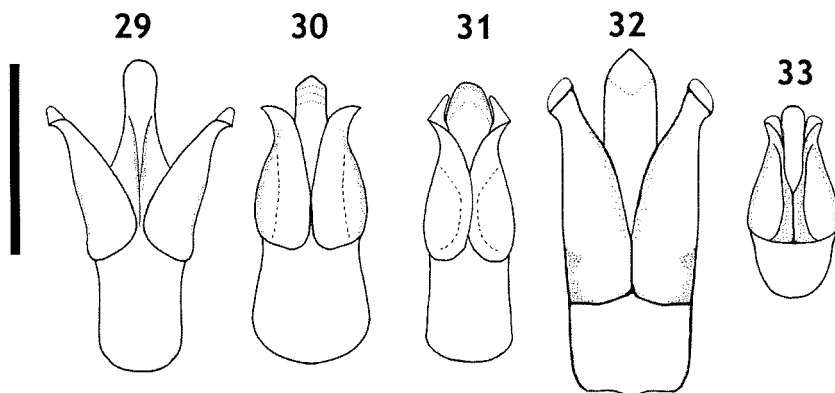
**Etymology.** This species is named after the place Quiriquina where it was collected.

*Alyma rieseorum* Arias, **new species**  
(Figs. 12, 20, 27, 34)

**Description.** Body: Elongate; yellowish brown; integument semi-shiny; vestiture semi-decumbent and semi-erect and gold; length 4.6 mm, width 1.8 mm; PEI: 2.6.

*Head*: convex, brown; frontoclypeal carina sloping down; clypeus rugulose; clypeus and labrum with setae semi-erect; labrum slightly convex;  $2.3 \times$  as long as wide, basally with 5 long setae decumbent; apical segment of labial palp shiny; antennomera 3, 4, 9, 10, conical, antennomera 5 though 8 serrate, antennomere 11 triangular, [AP: 8-7-9-13-10-9-10-11-9-14] (Fig. 12).

*Prothorax*: strongly convex; alveolate, sides parallel-sided; base curved; pronotal posterior angles straight; prosternum slightly convex; pronotosternal lobe margin broadly curved, and



**Figs. 29–33.** Male genitalia of *Alyma* species. **29)** *Alyma calafquenensis*; **30)** *A. contulmoensis*; **31)** *A. lawlerae*; **32)** *A. quiriquinaensis*; **33)** *A. shapiroei*. Scale bar: 0.5 mm.

slightly bent; pronotosternal suture curved, slightly excavate; hypomeron punctate, umbilicate, punctures dense, marginate apically, antennal impression (Fig. 20); prosternum at procoxae slightly marginate, sides slightly elevated; procoxae separated by  $1.2 \times$  procoxal diameter; pronotosternal spine process length  $1.5 \times$  procoxal diameter.

*Scutellum*: triangular;  $0.9 \times$  as long as wide, with long semi-decumbent yellow vestiture; mesocoxae separated by  $0.7 \times$  mesocoxal diameter; posterior margin of mesosternal cavity extending posteriorly,  $0.3 \times$  mesocoxal diameter.

*Elytra*: striate; interstria rugulose semi-convex; striae slightly punctate, punctures sparse; elytral apex truncate. *Leg*: light yellow; tarsomere 3 smaller than tarsomere 4; [TP: 34-13-9-11-33] (Fig. 27).

**Type Material.** Holotype: female, Canelillos, Cauquenes. 5.XI.1991. *Leg*: M. Elgueta.

**Distribution.** Cauquenes, VII Region, Chile, (Fig. 34).

**Remarks.** *Alyma rieseorum* can be recognized by its yellowish color and its semi-shiny integument and posterior pronotal posterior angles.

**Etymology.** The name of this species honors Sergio Riese and Maria Luisa Riese (Genoa), who contributed Chilean elaterid specimens for my research.

### *Alyma shapiroei* Arias, **new species**

(Figs. 5, 13, 21, 28, 33, 34)

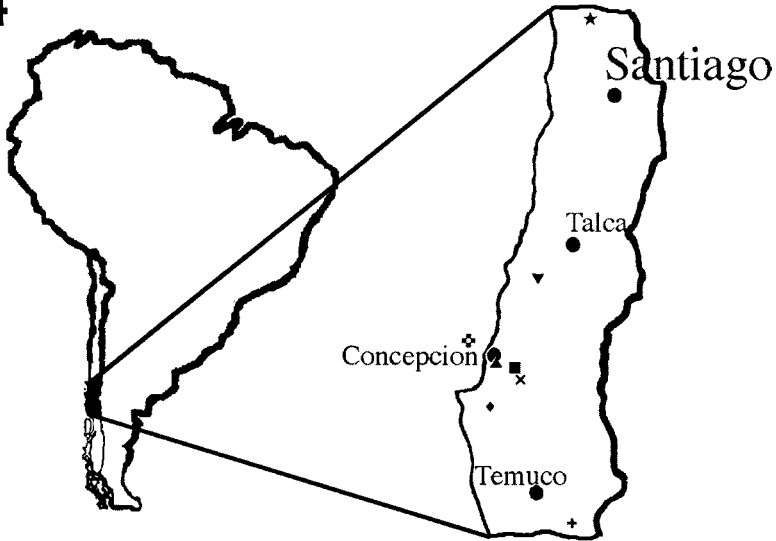
**Description.** Body: Elongate; brown, integument shiny; vestiture erect and semi-erect gold; 3.9-4.7 mm long, width 1.1-1.4 mm; PEL: 2.2-2.5.

*Head*: convex; frontoclypeal region sloping downward; clypeus and labrum with setae erect; clypeus with a vertical carena at middle; apical segment of labial palp translucent almost entirely; labrum slightly convex,  $2.1 \times$  as long as wide; antennomera 2-3 conical, and remaining ones serrate, antennomere 11 triangular, AP: 8-9-10-9-11-11-9-10-10-14 (Fig. 13).

*Prothorax*: convex anteriorly; alveolate, sides straight; base curved; pronotal posterior angles straight, long; prosternum slightly convex; pronotosternal lobe broadly curved, and slightly bent; pronotosternal sutures straight, curved at procoxal margin only, slightly excavate, opening apically through second third; hypomeron punctate, umbilicate, punctures dense, base oblique, marginate apically; antennal groove present and carinate (Fig. 21); prosternum at procoxae marginate, sides slightly elevated; procoxal distance  $1.2 \times$  procoxal diameter; pronotosternal spine strongly bent after procoxae; length  $1.5 \times$  procoxal diameter.

*Scutellum*: oval;  $1.3 \times$  as long as wide, with long semi-decumbent yellow vestiture; mesocoxae

34



**Fig. 34.** Distribution map of *Alyma* species. *Alyma pallipes* (Solier) (■), *A. ariasvillegasai* (★), *A. calafquenensis* Arias, new sp., *A. contulmoensis* Arias, new sp. (◆); *A. lawlerae* Arias, new sp., (▲); *A. quiriquinaensis* Arias, new sp., *A. rieseorum* Arias, new sp. (▼); *A. shapiro* Arias, new sp., (×).

separated by posterior margin of mesosternal cavity  $0.7 \times$  mesocoxal diameter; posterior margin of mesosternal cavity extending posteriorly  $0.3 \times$  mesocoxal diameter, and posterior region quadrate.

*Elytra*: striate; interstria rugulose semi-convex; striae strongly impressed. *Leg*: light yellow; tarsomere 4 very small ( $0.3 \times$  than tarsomere 3), [TP: 37-20-15-5-23] (Fig. 23).

*Male genitalia*: aedeagus  $2.0 \times$  as long as wide; median lobe curved anteriorly (Fig. 28).

**Type Material.** Holotype: female: Chile, Estero Nonguén, Concepción, 19.XI.1999. T. Cekalovic, [ETA]. CHILE, male: Estero Nonguén, Concepción, 19.XI.1999. T. Cekalovic, [ETA]. Paratypes here designated. CHILE, two females: Estero Nonguén, Concepción, 19.XI.1999. T. Cekalovic, [ETA]. Concepción, Periquillo, 7.XI.1992. T. Cekalovic. [ETA].

**Distribution.** Nonguén, VIII Region, Chile (Fig. 34).

**Remarks.** This species can be recognized by its shiny integument, gold erect vestiture, and straight long posterior pronotal angles.

**Etymology.** The name of this species honors Professor Arthur M. Shapiro (University of California, Davis) for his constant help during my graduate studies, and his dedication to South American biogeographic studies.

### Discussion

The phylogenetic relationships among members of the tribe Pomachiliini are still uncertain. The genera *Deromecus* and *Alyma* belong to the tribe Pomachiliini because they exhibit the following characters: complete lateral carina, complete frontoclypeal carina across front of frons, pronotosternal suture appearing double, mesocoxae open to mesepisternum, and scutellum not cordiform (Arias 1999; Arias 2001a).

### Acknowledgments

I thank very much the following institutions and their personnel in facilitating access to the material used in this research: [MNHN] Muséum National d'Histoire Naturelle, Paris, France (Claude Girard); [MNNC] Colección Nacional de Insectos, Museo Nacional de Historia Natural, Santiago, (Mario Elgueta D., and Ariel Camousseight M.), Universidad Metropolitana, Santiago, Chile (Jaime Solervicens).

Special thanks to Sergio Riese who contributed part of the material used in this research. Rick Harris in helping with the SEM pictures.

Special thanks in editing this and other papers: Palma Lower (University of California, Davis). Harold and Esther Kerster for adding useful comments to the manuscript, and anonymous reviewers.

I thank very much Arthur M. Shapiro, Sharon P. Lawler and Marcel Holyoak for their support; to the Ernst Mayr Grant in funding the study of the type material at the Muséum d'Histoire Naturelle, Paris, as well as my great appreciation to Dr. Claude Girard in facilitating my research at his laboratory and Dr. Stephen Boucher for his help.

I extend my warmest thanks to Richard M. Bohart for his financial support.

### Literature Cited

- Arias, E. T. 1999.** *Gabryella, Alyma* and *Lynnyella*, new taxa of click beetles from temperate South America (Coleoptera, Elateridae, Elaterinae). Ph.D. Dissertation, University of California, Davis.
- Arias, E. T. 2001a.** *Gabryella*, a new genus of click beetles from temperate South American Forests (Coleoptera, Elateridae, Elaterinae). *Contributions on Entomology, International* 4(5):381–397.
- Arias, E. T. 2001b.** *Lynnyella*, a new genus of click beetles from temperate South American Forests (Coleoptera, Elateridae). *Gayana* 65(2):137–148.
- Barlett-Calvert, G. 1898.** Monografía de los Elateridos de Chile. *Anales de la Universidad de Chile*. 1897, tomo XCVII:779–860.
- Blackwelder, R. E. 1944.** Checklist of the Coleopterous insects of Mexico, Central America the west Indies, and South America. Part 1. Smithsonian Institution United States National Museum, Bulletin 185. Washington.
- Calder, A. A. 1996.** Click beetles. Genera of the Australian Elateridae (Coleoptera). *Monographs on Invertebrate Taxonomy* 2:1–401. Canberra.
- Dolin, V. G. 1975.** Wing venation in click beetles and its significance for the taxonomy of the family. *Zoologicheskii Zhurnal* 54:1618–1633. (In Russian)
- Fleutiaux, E. 1907.** Révision des Elateridæ du Chili. *Revista de Historia Natural* 11:160–232.
- Golbach, R. 1994.** Elateridae (Col.) de la Argentina. *Historia, Catálogo actualizado hasta 1991 inclusive y Clave de subfamilias y de géneros de Centro y Sudamérica*. *Opera Lilloana* 41, 48 pp.
- Gur'jeva, E. L. 1974.** The thorax of click beetles and the significance of the structural characters for the system of the family. *Entomological Review* 53:67–90.
- Hayek, C. M. F. von. 1990.** A reclassification of the *Melanotus* group of genera (Coleoptera: Elateridae). *Bulletin of the British Museum of Natural History (Entomology)*, 591:37–115.
- Platia, G. 1994.** Coleoptera Elateridae. *Fauna d'Italia, XXXIII*, 429 p. Bologna: Edizioni Calderini.
- Solier, A. 1851.** Coleopteros elateroideos [pp. 5–38]. *In: Historia física y política de Chile* (C. Gay). Paris.
- Wilson, E. O. 1955.** A monographic revision of the ant genus *Lasius*. *Bulletin of the Museum of Comparative Zoology at Harvard College* 113:1–201.

(Received 28 May 2004; accepted 20 June 2004. Full page charges borne by the author. Publication date 18 October 2004.)