

SCUTELLERIDAE



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Resumen

Se presenta una revisión de la fauna argentina de Scutelleridae, basada en la literatura y datos de colecciones científicas. Se registran 24 especies en 13 géneros, de los cuales un género pertenece a Scutellerinae y los demás a Pachycorinae. Se presenta una breve revisión sobre la sistemática, distribución y biología del grupo, así como una clave de identificación para las subfamilias y géneros, y una lista de plantas huéspedes conocidas para las especies argentinas. El estudio de más ejemplares depositados en colecciones y la identificación de material aun no determinado podrá aumentar el total de especies registradas. Además, un esfuerzo de muestreo dirigido a regiones menos exploradas, como las provincias más australes y regiones de mayor altitud, aclarará el conocimiento acerca de la biogeografía y diversidad del grupo en la Argentina.

Abstract

We present a review of Scutelleridae from Argentina, based on literature and collection data. A total of 24 species distributed in 13 genera is recorded, one genus belonging to Scutellerinae and the remaining to Pachycorinae. A synthesis of systematics, distribution and biology of this group is presented, as well as a key to subfamilies and genera and a list of host plants of the Argentinean species. The study of more specimens deposited in collections and the identification of undetermined material may raise the total of recorded species. Additionally, a greater sampling effort in southern provinces and high altitude regions may enhance knowledge of the biogeography and diversity of this group in Argentina.

Introduction

Scutelleridae are the second most speciose family within Pentatomoidea, with about 450 described species distributed in roughly 80 genera worldwide. They include some of the most colorful true bugs. Also called shield bugs, scutellerids are characterized by the enlarged scutellum, which covers most of the hemelytra and abdominal segments. Their size ranges from 5 to 20 mm (Javahery *et al.*, 2000).

Several species in different infrafamilial groups are strikingly polymorphic. As a consequence, the number of synonyms for these taxa is high. Polymorphic color patterns for species recorded from Argentina were described and illustrated for *Pachycoris torridus* (Monte, 1937; Sánchez-Soto *et al.*, 2004; Santos *et al.*, 2005), *Agonosoma flavolineata* (Paleari, 1992a, 1994), *Augocoris illustris* (Barber & Bruner, 1932), and occur in other genera as well. Polymorphism is usually sex-related, as in *P. torridus*, with 17 morphs described, adult males frequently monochromatic and adult females polychromatic (Santos *et al.*, 2005). Also in some other Neotropical genera, there is a clear sexual dimorphism, males with a variegated color pattern and females with large spots.

Surprisingly, this large group has been little studied, especially in the Neotropical region. Catalogs that treat world scutellerids are Lethierry & Severin (1893) and Kirkaldy (1909). The last published revision and key for world genera is Schouteden (1904). McDonald & Cassis (1984) and Cassis & Vanags (2006) revised the Australian fauna. Palearctic scutellerids have been studied by Fischer (2001) and more recently by Carapezza (2009). A few Neotropical genera have been revised (Eger, 1987, 1990; Paleari, 1992a). Eger & Lattin (1995) clarified generic placement of some species and proposed new synonymies.

The status of Scutelleridae has changed during its taxonomical history, being included by earlier authors as a tribe or subfamily within Pentatomidae (e.g., Stål, 1872; Schouteden, 1904; Kirkaldy, 1909; Leston, 1952). The most recent authors, however, agree with the familial ranking of the group (McDonald, 1966; Gross, 1975; McDonald & Cassis, 1984; Cassis & Vanags, 2006; Grazia *et al.*, 2008). Their monophyly is widely accepted, although most cladistic studies have included few representatives of this family (e.g., Gapud, 1991; Fischer, 2001; Grazia *et al.*, 2008) and additional studies are needed. The relationship of Scutelleridae to other pentatomoid families differs among authors, and their phylogenetic position varies from basal to more apomorphic. In a study employing molecular and morphological characters, the position of Scutelleridae within Pentatomoidea was ambiguous, its position dependent on the character set used in the analysis (Grazia *et al.*, 2008). However, they were usually positioned basally relative to Pentatomidae.

The infrafamilial classification has been controversial. Cassis & Vanags (2006) listed five subfamilies: Elvisurinae, Odontotarsinae, Pachycorinae, Scutellerinae, and Tectocorinae. Carapezza (2009) proposed a new subfamily, Hoteinae, to include the Old World genera *Hotea* and *Deroplax*. The definition of Pachycorinae was questioned by the author, as they share several characters with Odontotarsinae. Hoteinae were accepted in Rider's classification (Rider, 2010), but he maintained the status of Pachycorinae, as well as Elvisurinae, Eurygastrinae, Odontoscelinae, Odontotarsinae, Scutellerinae, and Tectocorinae.

In the Neotropics, Scutelleridae are represented by 25 genera of Pachycorinae and one genus of Scutellerinae, *Augocoris*. Argentinean scutellerids were studied by Stål (1870, 1872), Berg (1878, 1879, 1891, 1892a, b), Montandon (1894), Schouteden (1904), Pennington (1923), Bosq (1937, 1940), Pirán (1948, 1963, 1970), Eger (1990), and Paleari (1992a).

Diagnosis

Small to medium-sized, ovoid to elongate-ovoid in shape; most of Neotropical species are dull coloured, with a few exceptions (*Pachycoris* spp., *Agonosoma* spp., and *Augocoris* spp.). Antennae 3- (Scutellerinae) or 5-segmented (Pachycorinae). Scutellum enlarged and almost entirely covering hemelytra and abdomen. Femora and tibiae unarmed. Hemelytra with frenum

reduced or absent, corium and clavus membranous distally. Propleura with laminate carinae (Schuh & Slater, 1995). Ostiolar peritreme of metathoracic glands absent to well developed, variable in shape, length and distance from metacoxae. External genitalia visible or concealed by seventh sternite. Aedeagus usually with three pairs of conjunctival processes. Female gonocoxites 9 (= second valvifers) fused medially (Gapud, 1991), with visible fusion line (Grazia *et al.*, 2008). Tricobothria paired. All Pachycorinae with stridulatory areas on lateral thirds of abdominal venter (Schuh & Slater, 1995).

Biogeography

The majority of studied specimens were collected in the provinces of Buenos Aires, Corrientes, Córdoba, Salta, Tucumán, and Misiones. Thus, most of the records are from the, Pampa, Chaco, and Parana biogeographic provinces, all included in the Chacoan subregion (Morrone, 2006). More collection efforts are needed in the Monte, Neotropical arid zone, and at the limit with the Andean-Patagonian region. Also, extensive collections in Patagonian, Prepuneña and Puneña biogeographic provinces could reveal altitudinal and latitudinal limits of distribution. Biogeographic works using methods of historical biogeography have not included scutellerids, probably because information about their distribution and phylogeny is still scarce.

Scutelleridae in Argentinean collections

The most representative collections for Argentinean scutellerids are the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (MACN), Instituto Fundación Miguel Lillo (IFML), and Museo de La Plata (MLP). Since there are no Argentinian researchers currently working on scutellerids, most of the material is represented by specimens studied by former workers on Heteroptera, such as Berg and Pirán. MLP contains the types of Berg's species, including the holotype of *Coptochilus lentiginosus*; eight syntypes of *Tetyra poecila* and one syntype of *Diolcus pusillus* (= *Misippus spinolae*) (Coscarón & Froeschner, 2000). Some species, although not yet recorded for Argentina, are deposited in these collections, such as *Lobothyreus lobatus*, collected in Misiones province. The identification of undetermined specimens deposited in the Argentinean collections would offer a much clearer picture of the diversity in the country.

Key to Argentinean Scutelleridae

- 1- Stridulatory areas present on each side of abdominal venter; antennae five-segmented..... Pachycorinae.....2
- Stridulatory areas absent on abdominal venter; antennae three-segmented..... Scutellerinae.....*Augocoris*
- 2- Distance from ostiole to metacoxae shorter than distance from ostiole to lateral margin of metapleuron.....3

- Distance from ostiole to metacoxae longer than or subequal to distance from ostiole to lateral margin of metapleuron.....10
 - 3- Ostiole attended by ruga or sulcus that is at least three times as long as wide.....4
 - Ostiole not attended by ruga or sulcus or attending structure less than twice as long as wide.....8
 - 4- Ostiolar rugae reaching anterolateral corner of metathoracic evaporative area.....5
 - Ostiolar rugae not reaching anterolateral corner of metathoracic evaporative area.....6
 - 5- Anterolateral pronotal margins straight or slightly sinuous.....*Lobothyreus*
 - Anterolateral pronotal margins concave.....*Crathis* (*)
 - 6- Ostiolar rugae strongly curved anterad; male genital cup and female basal plates concealed by last abdominal sternite.....*Agonosoma*
 - Ostiolar rugae relatively straight or slightly curved anterad; male genital cup and female basal plates exposed.....7
 - 7- Pronotum twice as wide as long; posterior margin of scutellum strongly concave.....*Galeacius* (*)
 - Pronotum less than twice as wide as long; posterior margin of scutellum rounded, truncate, or shallowly concave.....*Symphylus*
 - 8- Head concave dorsally, lateral and anterior margins elevated.....*Coptochilus*
 - Head convex dorsally, lateral and anterior margins depressed.....9
 - 9- Ostiole not attended by ruga or sulcus...*Misippus*
 - Ostiole attended by short elevated ruga...*Camirus*
 - 10- Each abdominal spiracle within or subtended by callus.....11
 - Abdominal spiracles not within or subtended by calli.....12
 - 11- Each abdominal spiracle located in dorsal edge of concolorous callus.....*Ascanius*
 - Each abdominal spiracle subtended by pale callus.....*Chelycoris*
 - 12- Distance from metacoxae to ostiole about twice the distance from ostiole to lateral margin of metapleuron.....*Tetyra*
 - Distance from metacoxae to ostiole subequal to or slightly greater than distance from ostiole to lateral margin of metapleuron.....13
 - 13- Ostiole not attended by ruga or sulcus.....*Polytes*
 - Ostiole attended by short auriculate ruga.....14
 - 14- Abdominal sternites depressed near lateral margins.....*Pachycoris*
 - Abdominal sternites not depressed laterally.....*Orsilochides*
- (*) Genera recorded for southern or central Brazil, probably occurring in Argentina.

Economic importance

In a broad sense, scutellerids are generalist phytophagous pentatomoids. Excepting for the Holarctic *Eurygaster*, that feed mainly on grasses such as wheat (Javahery *et al.*, 2000), most scutellerids are not crop pests (Javahery *et al.*, 2000). In the Neotropics, the only species reported as economically

important is the polyphagous *P. torridus* (Sanchez-Soto *et al.*, 2004), especially on orchards (Fig. 1, Table I).

Biological aspects

All species are considered generalist phytophages (Javahery *et al.*, 2000), but the host plants are known for only a few species (Table I). Euphorbiaceae, Poaceae, Myrtaceae, and Malvaceae are among the most frequently cited families of host plants (Rider, 2010). *Pachycoris torridus*, by far the most studied scutellerid in the Neotropics, feeds mainly on Euphorbiaceae, although being reported on several phylogenetically unrelated host plant species in Brazil (Santos *et al.*, 2005). Feeding on euphorbs is possibly related to acquisition of toxic compounds used against predators by this aposematic species (Santos *et al.*, 2005). Santos *et al.* (2005) cite *Cnidocolus pubescens* (Euphorbiaceae) as the native host plant for *P. torridus*. Similarly, Cervantes-Peredo (2002), in Central America, reported the occurrence of *Pachycoris klugii* on *Cnidocolus multilobus*. In southern Brazil, we have observed adults and egg masses of *Chelycoris haglundii* on *Croton* sp. (Euphorbiaceae), and adults of *Ascanius* sp. on *Rubus erythrocladus* (Rosaceae). *Croton* sp. was also observed as host plant for *C. haglundii*, *Chelycoris lethierryi*, *Orsilochides leucoptera*, and *A. flavolineata* in the state of Mato Grosso do Sul, central Brazil.

There are few studies of the biology or description of immature stages for Neotropical taxa (Monte, 1937; Paleari, 1992a, b; Peredo, 2002; Santos *et al.*, 2005). As in other pentatomoids, nymphal development includes five instars. In *A. flavolineata*, egg masses have a mean number of 14 eggs, laid in two rows. In the laboratory, the total development from egg to adult took about 40 days (Paleari, 1992b). Nymphs of this species are gregarious until third instar, in both field and laboratory conditions (Paleari, 1992b). Santos *et al.* (2005) observed two egg masses laid by *P. torridus*, with 75 and 92 eggs, respectively. In the second egg mass, 35.8% of the eggs were parasitized by an unidentified Trichogrammatidae (Hymenoptera: Chalcidoidea). These data are very similar to those found by Cervantes-Peredo (2002) for *P. klugii* (average of 81.4 eggs per mass, 38% of eggs parasitized by a scelionid wasp). Costa Lima (1928) described *Pseudotelenomus pachycoris* from *P. torridus* in Brasil. The tachinid flies *Trichopoda pennipes* and *Trichopoda pallipes* were reported parasitizing *P. torridus* in Brasil (Guimarães, 1977). Maternal care was recorded for *P. torridus* by Hussey (1934) and Santos *et al.* (2005). Adult females were observed guarding first-instar nymphs. This behavior had also been described for *P. klugii* on eggs and first-instar nymphs (Cervantes-Peredo, 2002).

Inventories carried out in southern Brazil have showed specimens of *P. torridus* and less frequently *C. haglundii* and *Tetyra* sp. inside terrestrial bromeliads during the cold season, apparently in diapause (unpublished data, Fig. 2). This habit was also reported for *P. klugii* (Cervantes-Peredo, 2002).

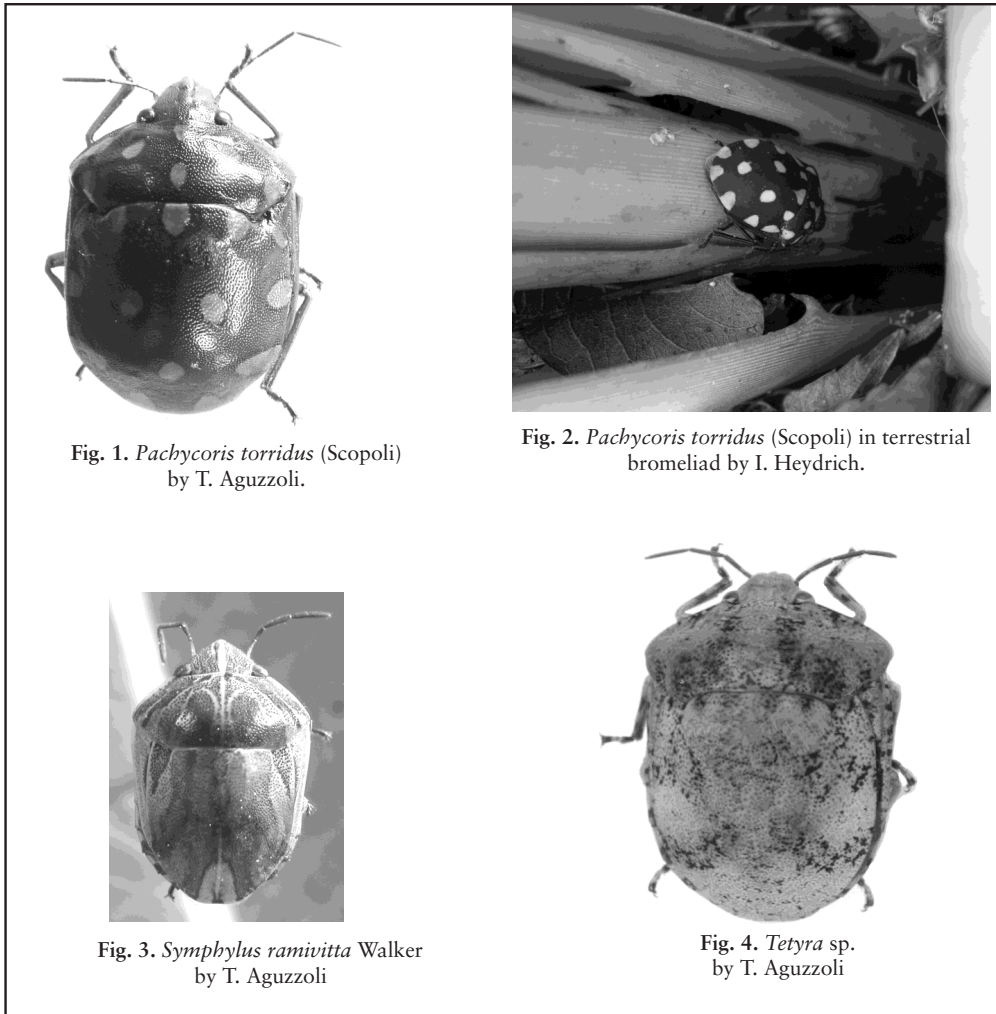


Fig. 1. *Pachycoris torridus* (Scopoli) by T. Aguzzoli.

Fig. 2. *Pachycoris torridus* (Scopoli) in terrestrial bromeliad by I. Heydrich.



Fig. 3. *Symphylus ramivitta* Walker by T. Aguzzoli

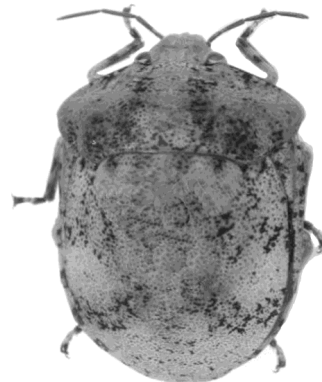


Fig. 4. *Tetyra* sp. by T. Aguzzoli

Table I. Host plants by genera or species of Scutelleridae occurring in Argentina.

Species	Host family	Host species	Reference
<i>Agonosoma flavolineata</i> Laporte, 1832	Convolvulaceae	<i>Ipomoea batatas</i> (L.) Lam.	Rider (2010)
	Euphorbiaceae	<i>Croton glandulosus</i> L.	Paleari (1992b)
	Malvaceae	<i>Gossypium hirsutum</i> L.	Quintanilla <i>et al.</i> (1976)
<i>Agonosoma trilineatum</i> (Fabricius, 1781)	Euphorbiaceae	<i>Cnidocolus urens</i> (L.) Arthur	Hallman (1979)
<i>Ascanius</i> sp.	Rosaceae	<i>Rubus erythrocladus</i> Mart.	new host plant record
<i>Augocoris illustris</i> (Fabricius, 1781)	Euphorbiaceae	<i>Phyllanthus epiphyllanthus</i> L.	Wolcott (1936)
	Malvaceae	<i>Gossypium</i> sp.	Maes (1994)
	Rubiaceae	<i>Borreria verticillata</i> (L.) Meyer	Maes (1994)
	Sapotaceae	<i>Chrysophyllum oliviforme</i> L.	Rider (2010)
		<i>Chrysophyllum canito</i> L.	Bruner <i>et al.</i> (1945)
		<i>Mimusops elengi</i> L.	Bruner <i>et al.</i> (1945)
			<i>Sideroxylon foetidissimum</i> Jacq.
<i>Chelycoris haglundii</i> (Montandon, 1895)	Euphorbiaceae	<i>Croton</i> sp.	new host plant record

Species	Host family	Host species	Reference
<i>Chelycoris lethierryi</i> (Montandon, 1895)	Euphorbiaceae	<i>Croton</i> sp.	new host plant record
<i>Misippus spinolae</i> (Signoret, 1863)	Poaceae	<i>Oryza sativa</i> L.	Quintanilla <i>et al.</i> (1976)
		<i>Sorghum bicolor</i> (L.) Moench	Quintanilla <i>et al.</i> (1976)
<i>Orsilochides leucoptera</i> (Germar, 1839)	Euphorbiaceae	<i>Croton</i> sp.	new host plant record
	Malvaceae	<i>Gossypium hirsutum</i> L.	Quintanilla <i>et al.</i> (1976)
	Poaceae	<i>Sorghum bicolor</i> (L.) Moench	Quintanilla <i>et al.</i> (1976)
<i>Pachycoris torridus</i> (Scopoli, 1772)	Anarcadiaceae	<i>Anacardium occidentale</i> L.	Silva <i>et al.</i> (1968)
		<i>Mangifera indica</i> L.	Silva <i>et al.</i> (1968)
		<i>Schinus terebinthifolius</i> Raddi	Sanchez-Soto <i>et al.</i> (2004)
	Aquifoliaceae	<i>Ilex paraguayensis</i> St.Hil.	Bosq (1937)
	Boraginaceae	<i>Cordia</i> sp.	Maes (1994)
	Euphorbiaceae	<i>Aleurites fordii</i> Hemsl.	Bosq (1940); Silva <i>et al.</i> (1968)
		<i>Cnidoscolus pubescens</i> Pohl	Santos <i>et al.</i> (2005)
		<i>Croton californicus</i> Müll. Arg.	Rider (2010)
		<i>Jatropha curcas</i> L.	Costa Lima (1940), Callan (1948), Silva <i>et al.</i> (1968)
		<i>Jatropha</i> sp.	Maes (1994)
		<i>Sapium haematospermum</i> Müll. Arg.	Hussey (1934)
		<i>Schinus terebinthifolius</i> Raddi	Sanchez-Soto <i>et al.</i> (2004)
	Malpighiaceae	<i>Malpighia glabra</i> L.	Soto & Nakano (2002); Michelotto <i>et al.</i> (2006)
	Myrtaceae	<i>Eucalyptus</i> sp.	Silva <i>et al.</i> (1968)
		<i>Psidium araça</i> Raddi	Silva <i>et al.</i> (1968)
<i>Psidium guajava</i> L.		Bosq (1937); Silva <i>et al.</i> (1968)	
Poaceae	<i>Oryza sativa</i> L.	Silva <i>et al.</i> (1968)	
Rubiaceae	<i>Coffea</i> sp.	Maes (1994)	
Solanaceae	<i>Manihot esculenta</i> L.	Silva <i>et al.</i> (1968)	
<i>Symphylus deplanatus</i> (Herrich-Schaeffer, 1837)	Boraginaceae	<i>Cordia macrostachya</i> (Jacquin) Roemer and Schultes	Rider (2010)
<i>Tetyra pinguis</i> (Germar, 1839)	Rubiaceae	<i>Coffea</i> sp.	Maes (1994)
<i>Tetyra poecila</i> Berg, 1878	Fabaceae	<i>Gleditsia triacanthos</i> L.	Berg (1879)
		<i>Acacia caven</i> (Mol.) Molina (cited as <i>Acacia cavenia</i>)	Berg (1879)
		<i>Acacia farnesiana</i> (L.) Willd.	Berg (1879)
	Solanaceae	<i>Cestrum pseudoquina</i> Mart.	Berg (1879)
		<i>Solanum bonariensis</i> L.	Berg (1879)

Conclusions

The scarcity of information on Argentinean taxa reflects the lack of taxonomical and biological works on Neotropical scutellerids, compared with other biogeographical regions and other pentatomoids. There is an urgent need for basic research, including taxonomic revisions, phylogenetical analyses, inventories, community studies, and acquisition of data on host plants and predator-prey relations. In the Pachycorinae, many genera need revision, such as *Symphylus* and *Tetyra* (Figs. 3, 4), a large complex of widely distributed species in the Neotropics.

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Appendix 1. List of genera and species recorded for Argentina.

Scutelleridae Leach, 1815

Scutellerinae Leach, 1815

- Augocoris gomesii* Burmeister, 1835. Bs.As. Needs checking - probably refers to *A. eherenbergi* cited by Walker (1867) and *A. olivaceous* by White (1842) and Berg (1879).
- Augocoris illustris* (Fabricius, 1781). Bs. As., Tuc. Cited as *A. sexpunctatus* by Berg (1891).
- Pachycorinae Amyot & Serville, 1843.
- Agonosoma flavolineata* Laporte, 1832. Cha., Fo., Sal., Cs.
- Agonosoma trilineatum* (Fabricius, 1781). Argentina.
- Ascanius atomarius* (Germar, 1839). Mnes., Tuc.
- Ascanius hirtipes* (Herrich-Schaeffer, 1836). Argentina.
- Ascanius* indet.. Mnes., Cha., Fo., Tuc.
- Camirus conicus* (Germar, 1839). Cs., Cba.
- Camirus impressicollis* Stål, 1862. Argentina.
- Camirus* indet.. Fo., Cha., Mnes., Cs., S.Fe.
- Chelycoris haglundii* (Montandon, 1895). Fo., Cha., Cs, E.R.
- Chelycoris lethierryi* (Montandon, 1895). Sal., Tuc., Cba.
- Chelycoris scitulus* (Walker, 1867). Sal., Tuc., Cm., Fo., S.E., Cs., Cited as *Demoleus oblongus* by Berg (1891).
- Chelycoris vittatus* Distant, 1911. Mnes., Cs.
- Coptochilus ferrugineus* Amyot & Serville, 1843. Sal., Tuc.
- Coptochilus lentiginosus* Berg, 1878. Mnes., Cba.
- Lobothyreus lobatus* (Westwood, 1837). Mnes.
- Misippus spinolae* (Signoret, 1863). Bs. As., S.E., Mnes., Cs., Cba., E.R., Mza., L.P. Cited as *Misippus variabilis* by Berg (1879), Pirán (1948) and Quintanilla *et al.* (1976) and *Diolcus pusillus* by Berg (1891).
- Orsilochides leucoptera* (Germar, 1839). Tuc., Mnes., Cs., E.R. Cited as *Orsilochus variabilis* by Berg (1891) and *Chelysoma leucoptera* by Quintanilla *et al.* (1976).
- Pachycoris torridus* (Scopoli, 1772). Ju., Sal., Tuc., Cm., Mnes., Cs., Cba., E.R., Mza.
- Polytes fenestra* Breddin, 1903. Ju.
- Polytes granulatus* (Walker, 1868). Ju. Cited as *Trichothyreus vitticeps* by Pirán (1970).
- Polytes obscurus* (Dallas, 1851). Tuc.
- Symphylus deplanatus* (Herrich-Schaeffer, 1837). Argentina.
- Symphylus ramivitta* Walker, 1868. Sal.
- Symphylus* indet.. Mnes., E.R., Cm.
- Tetyra poecila* Berg, 1878. S.E., Cs., S.Fe., Bs.As.
- Tetyra pinguis* (Germar, 1839). Argentina.
- Tetyra* indet.. Bs.As., Cs., E.R., Sal.

