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New geographic and host records for scelionid wasps (Hymenoptera: Scelionidae) parasitoids of insect pests in South America

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Abstract

This contribution provides new parasitoid/host associations for scelionid species distributed in Argentina, Brazil, Colombia and Uruguay, and new geographic records. The parasitoid species examined belong to the genera *Gryon* Haliday, *Phanuropsis* Girault, *Trissolcus* Ashmead, and *Telenomus* Haliday, and all of them attack insect pests. Three cases of multiple scelionid species emerging from a single egg mass of Pentatomidae are reported.

Key words: Scelionidae, host records, multiple parasitoidism, Argentina

Introduction

Scelionid wasps are primary idiobiont endoparasitoids of eggs of insects and spiders. Most of them are solitary parasitoids but there are some few gregarious species, with five to more than twenty individuals completing development in a single egg. This is encountered for some Telenominae that attack large-sized eggs (Johnson 1984, Margaría *et al.* 2007).

Scelionids strongly avoid superparasitoidism, discriminating previously parasitized eggs via detection of an external marking pheromone or via recognition of internal markers (Bosque and Rabinovich 1979; Klomp *et al.* 1980; Strand 1985). Cases of multiple scelionid species emerging from a single egg mass have been reported, with some frequency in the United States of America (Yeargan 1979), Brazil (Correa-Ferreira 1986; Correa-Ferreira & Moscardi 1995; Foerster & Queiroz 1990; Medeiros *et al.* 1997) and Africa (Schulthess *et al.* 2001; Agboka *et al.* 2002).

The scelionid fauna of Argentina and most South American countries is poorly known and it has been recently studied by some of the authors of this article (Loiácono 1998, Loiácono & Margaría 2002, Margaría (unpubl.). In this contribution we report new parasitoid/host associations, including three cases of multiple scelionid species emerging from a single egg mass, and new geographic records at country or state level.

Scelionid species herein studied belong to the genera *Gryon* Haliday, *Phanuropsis* Girault, *Trissolcus* Ashmead, and *Telenomus* Haliday, and attack eggs of Hemiptera Heteroptera and Lepidoptera, most of them of economic importance. The information on tritrophic relationships, including parasitoid hosts and host plants of the insect pests, is essential to establish biological control strategies.

Materials and methods

The specimens herein examined were received at the “División Entomología” of the “Museo de La Plata” for identification, and the vouchers were deposited in this institution. The information on the studied species was organized as follows: valid name of the scelionid species (listed in alphabetical order), geographic

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distribution, references of the individuals examined, insect hosts, and host plants. For the classification of the Scelionidae we follow Johnson (1992).

Results

Gryon gallardoi (Brèthes)

Distribution: Argentina and Brazil (Loíacono 1980, Marchiori *et al.* 2002). New state record for Brazil, Federal District.

Material examined: Brazil, Federal District, Planaltina, Fazenda 3 Pinheiros: 2 females, 20-I-1993, Medeiros coll.

Host records: *Corecoris lativentris* (Dallas) and *Leptoglossus zonatus* Dallas (Hemiptera: Coreidae) (Loíacono 1980; Mineo and Caleca 1987; Marchiori *et al.* 2001).

Gryon variicornis (Fouts)

Distribution: Nicaragua, Panamá, Colombia, Guyana and Brazil (Masner 1979).

Material examined: Colombia, Valle del Cauca, Pradera: 6 females, VIII-2005, Kolberg coll., reared from eggs of *Antiteuchus* sp. (Hemiptera: Pentatomidae) on *Macadamia* (Proteaceae).

Host records: Unknown (Masner 1979). *Antiteuchus* sp. is the first host record for this parasitoid species.

Gryon vitripenne Masner

Distribution: United States of America (Masner 1983), Brazil (Rio Grande do Sul) (Polaszek and Kolberg 2008). New state record for Brazil, Mato Grosso.

Material examined: Brazil, Mato Grosso, Campo Verde, Fazenda Mourão: 2 females and 2 males, 9-III-2004, Sylvie coll., reared from eggs of bugs on *Oryza sativa* (Poaceae).

Host records: Coreidae sp. (Masner 1983), *Holymenia rubiginosa* (Polaszek and Kolberg 2008). Some egg batches from Mato Grosso were also attacked by *Trissolcus urichi*.

Phanuopsis semiflaviventris Girault

Distribution: Saint Augustine Island, Honduras, Costa Rica, Panama, Colombia, Venezuela, Trinidad and Tobago, Guyana, Surinam, Brazil and Bolivia (Girault 1916; Johnson 1987a, 2004; Loíacono 1995; Santos and Albuquerque 2001). New department record for Colombia, Quindío.

Material examined: Colombia, Quindío, Calarca, Vereda Española: 3 females and 1 male, 22-II-03, Sánchez Sosa coll., reared from eggs of Pentatomidae on *Macadamia* sp. (Proteaceae).

Host records: *Antiteuchus piceus* (Palisot de Beauvois), *A. tripterus* (Fabricius), *A. sepulcralis* (Fabricius) and *A. variolosus* (Westwood) (Hemiptera: Coreidae) (Johnson 1987a; Loíacono 1995; Santos and Albuquerque 2001).

Telenomus alecto (Crawford)

Distribution: Guatemala, Barbados, Puerto Rico, British Guyana, Colombia, Ecuador, Peru, Brazil, Bolivia

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and Argentina (Bin and Johnson 1982; Loíácono and Margaría 2002; Johnson 2004; Cueva Ventura and Condemarín Montealegre 2004).

Material examined: Argentina, Salta, Quebrada de Humahuaca: 8 females and 6 males, reared from eggs of *Tolype guentheri* (Berg.) (Lepidoptera: Lasiocampidae).

Hosts records: *Diatraea flavigennella* (Box), *D. rufescens* Box and *D. saccharalis* (Fabricius) (Lepidoptera: Pyralidae) (Bin and Johnson 1982; Loíácono and Margaría 2002). *Tolype guentheri* is a new host record of a different Lepidoptera family.

***Telenomus connectans* Ashmead**

Distribution: United States of America, Costa Rica, Dominican Republic, Jamaica, Grenada, Saint Vincent Island and Brazil (Johnson 1984, 2004). New state record for Brazil, Federal District.

Material examined: Brazil, Federal District, Itabuna: 2 males, reared from eggs of *Erynnis ello* (Linné) (Lepidoptera: Sphingidae).

Hosts records: *Erynnis ello*, *Manduca sexta* Butler, *Perigonia stulta* Herrich-Schaffer et Schaffer, *Sphinx merops* Boisduval, *Xylophanes tersa* (Linneo) and *X. neoptolemus* (Cramer) (Lepidoptera: Sphingidae) and Hesperiidae (Lepidoptera) (Gahan 1930; Johnson 1990, 2004).

***Telenomus dolichocerus* (Ashmead)**

Distribution: Canadá, United States of America and Cuba (Johnson 1984, 2004). New country record, Brazil.

Material examined: Brazil, Río Grande do Sul: 4 females and 2 males, Kolberg coll., reared from eggs of *Holhymenia rubiginosa* Breddin and *Anisoscelis foliacea* (Dallas) (Hemiptera: Coreidae); Porto Alegre: 4 females and 2 males, I-2006, Kolberg coll., reared from undetermined coreid eggs on *Passiflora alata* (Passifloraceae).

Host records: *Emesaya brevipennis* (Say) (Hemiptera: Reduviidae) (Johnson 1984). *Holhymenia rubiginosa* and *Anisoscelis foliacea* are new hosts records, both belonging to Coreidae.

***Telenomus impressus* (Ashmead)**

Distribution: Saint Vincent Island, Saint Lucia and Brazil (Nixon 1940). New state record for Brazil, Amazonas.

Material examined: Brazil, Amazonas, Manaos: 11 males, 2-V-1978, Becker coll., reared from Flatidae eggs (Hemiptera).

Host records: *Ormenis* aff. *pygmaea* (Hemiptera: Flatidae) (Nixon 1940).

***Telenomus podisi* Ashmead**

Distribution: Canadá, United States of America, Mexico, Bahamas, Cuba, Dominican Republic, Nicaragua, Caiman Islands, Grenada, French Guyana, Saint Vincent Islands, Brazil, Bolivia and Argentina (De Santis and Vidal Sarmiento 1979; Johnson 1984; 2004; Loíácono and Margaría 2002). New country record for Uruguay; and new province records for Argentina, Buenos Aires and Tucumán.

Material examined: Colombia, Quindío, Calarca, Vereda Espanola: 4 females, IX-2005, Sánchez coll., reared from eggs of *Podisus* sp. (Hemiptera: Pentatomidae) on *Macadamia* (Proteaceae); 1 female and 1 male, VIII-2005, Sánchez Sosa coll., reared from eggs of *Loxa* sp. (Hemiptera: Pentatomidae) on *Macadamia*.

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Brazil, Mato Grosso do Sul, Dourados, Ponta Pörá: 3 females and 1 male, 23-IX-2005, 4 females and 1 male, 7-IV-2006, Arce Gomez coll.; Dourados, Itapará: 2 females and 2 males, 9-V-2005, 2 females and 4 males, 30-III-2006, Arce Gomez coll.; Dourados, Barreñao: 5 females and 2 males, 1-II-2006, Arce Gomez coll.; reared from eggs of *Dichelops melacanthus* (Dallas) (Hemiptera: Pentatomidae) on *Zea maiz*. Argentina, Tucumán, Leales, 6 females, 25-II-07, Berta coll., collected with mesh; Buenos Aires, Irala: 12 females and 2 males, 10-II-2001, Corral coll., reared from eggs of *Nezara viridula* (L.) on *Glycine max* (Fabaceae); 25 de Mayo, Gobernador Ugarte: 8 females and 1 male, 16-II-2001, Corral coll., reared from eggs of *Nezara viridula* on *Glycine max*. Uruguay, Artigas: 5 females and 5 males, 4-II-1947, Ruffinnelli coll., reared from eggs of pentatomid, Soriano, Dolores: 6 females and 15 males, II and III-2004, Ávila coll., reared from eggs of *Piezodorus guildinii* (Hemiptera: Pentatomidae) on *Glycine max*; Paysandú: 22 females and 11 males, I, II and III-2004, Castiglioni coll., reared from eggs of *Piezodorus guildinii* on *Glycine max*; Colonia, La Estanzuela: 32 females and 35 males, I, II and III-2005, Alzugaray coll., reared from eggs of *Piezodorus guildinii* on pastures.

Host records: Pentatomidae, Scutelleridae (*Diolcus chrysorrhoeus* (Fabricius) and Coreidae (Hemiptera: Heteroptera) and Auchenorrhyncha (Cicadellidae). Within Pentatomidae the species have been reported for eggs of *Acrosternum hilare* (Say), *Banasa dimidiata* (Say), *Brochymena* sp., *Chlorochroa sayi* (Stål), *Cosmopepla bimaculata* (Thomas), *C. carnifex* Fabricius, *Diolcus chrysorrhoeus* (Fabricius), *Euchistus impictiventris* Stal, *E. heros* (Fabricius), *E. servus* (Say), *E. tristigmus* Dallas, *E. variolarius* Palisot et Beauvois, *Euthyrhynchus floridanus* (Linneo), *Holcostethus limbolorarius* (Stal), *Nezara viridula*, *Oebalus insularis* Stal, *O. poecilus* (Dallas), *O. pugnax* (Fabricius), *O. ypsilonlongriseus* (De Geer), *Peribalus limbolarius* Stal, *Piezodorus guildinii* Westwood, *Podisus maculiventris* (Say), *P. nigrispinus* Dallas, *P. placidus* Uhler, *P. serieventris* Uhler, *Podisus* sp., *Solubea poecila* (Dallas), *Solubea pugnax* (Fabricius), *Trichopepla semivittata* (Say) and *Thyanta custator* (De Santis and Vidal Sarmiento 1979; Johnson 1984, 2004; Medeiros *et al.* 1997; Guharay 1999; Loíacono and Margaría 2002; Rider 2006). *Loxa* sp. is a new pentatomid host.

Two cases of scelionid species emerging from a single egg mass (*T. podisi* + *Trissolcus teretis* and *T. podisi* + *Trissolcus brochymenae*) are herein reported for *Piezodorus guildinii* in Uruguay.

***Telenomus polymorphus* Costa Lima**

Distribution: Brazil (Costa Lima 1943). New country record for Colombia, and new state records for Brazil, San Pablo and Minas Gerais.

Material examined: Colombia, Quindío, Calarca, Vereda Española: 2 females, 22-II-2003, reared from eggs of Reduviidae (Hemiptera) on *Macadamia* sp., Sánchez Sosa coll. Brazil, San Pablo, Piracicaba: 6 females, reared from eggs of *Heza* sp. (Hemiptera: Reduviidae); Minas Gerais, Lavras: 1 female, 28-III-1986, Fraga coll., reared from eggs of reduvioid.

Host records: *Heza insignis* and *Heza* sp. (Hemiptera: Reduviidae) (Costa Lima 1943).

***Telenomus sulculus* Johnson**

Distribution: United States of America, Mexico, Cuba, El Salvador, Guyana, Ecuador and Perú (Johnson 1984). New country record for Brazil.

Material examined: Brazil, San Pablo, Sertãozinho: 14 females and 1 male, VI-1973, Bianchi coll., reared from eggs of an undetermined reduvioid on *Saccharum officinarum* (Poaceae).

Hosts records: *Zelus rubidus* Lepetellier et Serville and *Zelus* sp. (Hemiptera: Reduviidae) (Johnson 1984).

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***Trissolcus basalis* (Wollaston)**

Distribution: United States of America, Bermuda, Cuba, Jamaica, Dominican Republic, Dominica, Saint Vincent Island, Grenada, Trinidad, Madeira, Venezuela, Brazil, Argentina, Turkey, Morocco, Egypt, Senegal, Ivory Coast, Eritrea, Kenya, Tanzania, Zimbabwe, South Africa, Japan, China, Hawaii, Montserrat Island, New Caledonian, Fidji, French Polynesia, Tonga, Cook Island, Vanuatu and Australia (La Porta and Crouzel 1984, Johnson 1985, 2004, Molinari *et al.* 2008). New country records for Colombia and Uruguay, new state record for Brazil, San Pablo, and new province record for Argentina, Córdoba.

Material studied: Colombia, Valle del Cauca: 2 females and 1 male, IX-2005, Sánchez Sosa coll., reared from eggs of Pentatomidae on *Macadamia* (Proteaceae); Quindío, Calarca, Vereda Española: 1 male, IX-2005, Sánchez Sosa coll., reared from eggs of *Podisus* sp. on *Macadamia*. Brasil, San Pablo, Campinas: 60 females and 10 males, XII-1984, da Silva coll., reared from eggs of *Piezodorus guildinii*; 1 female and 1 male, 22-III-1991, Regina coll., reared from eggs of *Piezodorus guildinii*.

Hosts records: *Nezara viridula*, *Acrosternum aseadum* Rolston, *Alcaeorrhynchus grandis* (Dallas), *Dichelops furcatus* (Fabricius), *Euschistus heros* (Fabricius), *Murgantia histrionica* (Hahn), *Piezodorus guildinii* (Westwood), *Podisus maculiventris* Say, *Podisus* sp., (Hemiptera, Pentatomidae) and Scutelleridae sp. (Johnson 1985, 2004; Medeiros *et al.* 1997, 1998; Molinari *et al.* 2008).

***Trissolcus bodkini* (Crawford)**

Distribution: Trinidad, Costa Rica, Colombia, Guyana and Brazil (Johnson 1987b, 2004). New department record for Colombia, Quindío.

Material examined: Colombia, Quindío, Calarca, Vereda Española: 4 females, 22-II-03, Sánchez Sosa coll., reared from eggs of Pentatomidae on *Macadamia* sp. (Proteaceae). **Hosts records:** *Dinocoris variolosus* (Linneo) (Hemiptera, Reduviidae) and *Antiteuchus tripterus* (Fabricius) (Hemiptera, Pentatomidae) (Johnson 1987b, 2004).

***Trissolcus brochymenae* (Ashmead)**

Distribution: United States of America, Mexico, Dominican Republic, Trinidad, Saint Vincent Island, Saint John, Guatemala, Honduras, Costa Rica, Jamaica, Colombia, Venezuela, Perú, Guyana and Brazil (Johnson 1987b; Correa-Ferreira 1993; Zanuncio *et al.* 2000; Loíácono and Margaría 2002). New department record for Colombia, Quindío.

Material examined: Uruguay, Paysandú: 7 females, 4-III-2004, Castiglioni coll., reared from eggs of *Piezodorus guildinii*, on *Glycine max* (Fabaceae); Colonia, La Estanzuela: 10 females and 11 males, I-II-III-2005, Alzugaray coll., reared from eggs of *Piezodorus guildinii*, on legume forages.

Hosts records: *Acrosternum aseadum* Rolston, *A. impicticorne* (Stål), *A. hilare* (Say), *Brochymena arborea* (Say), *Murgantia histrionica* (Hahn), *Nezara viridula*, *Piezodorus guildinii* and *Podisus nigrispinus* (Dallas) (Hemiptera, Pentatomidae) (Johnson 1984, 1987b, Zanuncio *et al.* 2000). A case of two scelionid species emerging from a single egg mass, *T. brochymenae* + *T. podisi* is herein reported for *P. guildinii* in Uruguay.

***Trissolcus leviventris* (Cameron)**

Distribution: Mexico, Belize, Ecuador, El Salvador, Trinidad, Venezuela, Guyana, Brazil and Paraguay (Johnson 1987b, 2004). New department record for Colombia, Quindío.

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Material examined: Colombia, Quindío, Calarca, Vereda Española: 1 female and 1 male, IX-2005, Sánchez Sosa coll., reared from eggs of *Podisus* sp. (Hemiptera: Pentatomidae) on *Macadamia* (Proteaceae); 1 male, I-2005, Sánchez Sosa coll., reared from eggs of *Loxa* sp. on *Macadamia* (Proteaceae).

Hosts records: *Edessa rufomarginata* (De Geer) (Hemiptera, Pentatomidae) (Johnson 1987b). *Podisus* sp. and *Loxa* sp. are new pentatomid host records.

***Trissolcus teretis* Johnson**

Distribution: Ecuador, Brazil, Chile and Argentina (Johnson 1987b, 2004; Molinari *et al.* 2008). New country record for Uruguay, and new province records for Argentina, Córdoba and Tucumán.

Material examined: Argentina, Tucumán, Tala Pozo: 1 male, 25-IV-06, Lizarralde coll., collected by sweeping. Uruguay, Paysandú: 1 female and 1 male, 4-III-2004, Castiglioni coll., reared from eggs of *Piezodorus guildinii* on *Glycine max*.

Hosts records: *Brontocoris nigrolimbatus* (Spinola) and *Euschistus heros* (Fabricius) (Hemiptera, Pentatomidae) (Johnson 1987b; Medeiros *et al.* 1997; Molinari *et al.* 2008). *Piezodorus guildinii* is a new pentatomid host record. A case of two scelionid species emerging from a single egg mass, *T. teretis* + *Telenomus podisi* is herein reported for *P. guildinii* in Uruguay.

***Trissolcus urichi* Crawford**

Distribution: Mexico, Trinidad, Dominican Republic, Panama, Saint Kitts, Saint Lucia, Saint Vincent Island, Antigua and Barbados, Guyana, Brazil, Bolivia, Paraguay, Argentina and Uruguay (Johnson 1987b, 2004; La Porta 2000a, b; Molinari *et al.* 2008).

Material examined: Brazil, Paraná, Curitiba: 140 females and 40 males, V-2003, Siqueira coll., reared from eggs of *Pellaea stictita* (Hemiptera, Pentatomidae) on *Ligustrum lucidum* (Oleaceae); Mato Grosso, Campo Verde, Fazenda Mourão: 2 females and 2 males, 18-II and 18-III-2004, Sylvie coll., reared from eggs of bugs on *Oryza sativa* (Poaceae).

Hosts records: *Acrosternum aseadum* Rolston, *Antiteuchus variolosus* Westwood, *Brontocoris nigrolimbatus* (Spinola), *Dichelops furcatus* (Fabricius), *Edessa meditabunda* Fabricius, *E. rufomarginata* (De Geer), *Edessa* spp., *Euschistus heros* (Fabricius), *Nezara viridula* (Linneo), *Piezodorus guildinii* (Westwood), *Podisus nigrispinus* (Dallas), *Tibraca limbaticollis* Stål and *Thyanta perditor* (Fabricius) (Hemiptera, Pentatomidae), and *Sphyrocoris obliquus* (Hemiptera, Scutelleridae) (Barrera 1973; Johnson 1987b; Medeiros *et al.* 1997, 1998; La Porta 2000 a, b; Zanuncio *et al.* 2000; and Rebolledo *et al.* 2006).

Pellaea stictita is a new pentatomid host record. A case of two scelionid species emerging from a single egg mass, *T. urichi* + *Gryon vitripenne* is herein reported for some egg batches of an undetermined bug from Mato Grosso.

Discussion

In most scelionid hosts herein studied egg batches have been parasitized by a single species, however, egg masses of two heteropteran hosts were attacked by two different scelionid species, one Gryonini and one Telenomini, or two Telenomini. *Gryon vitripenne* + *Trissolcus urichi* were recovered from the same egg batches of *Holhymenia rubiginosa* (Hemiptera: Coreidae), and *Telenomus podisi* + *Trissolcus teretis* have emerged from the same egg mass of *Piezodorus guildinii* (Hemiptera: Pentatomidae) - first couple records for these hosts-. We also confirm that *Telenomus podisi* + *Trissolcus brochymenae* can emerge from single egg mass of *P. guildinii*, information previously reported by Correa-Ferreira and Moscardi (1995).

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Euschistus heros, another pentatomid host, pest of sunflower and soybean in Brazil, shows multiple scelionid species emerging from a single egg mass (*Telenomus podisi* + *Trissolcus urichi*, *T. podisi* + *Telenomus basalis*, *T. basalis* + *T. urichi*), and by one scelionid species and a parasitoid of another family (*T. urichi* + *Eupelmus* sp.) (Medeiros *et al.* 1997). Schulthess *et al.* (2001) and Agboka *et al.* (2002) studied mixed parasitoidism by *Telenomus busseolae* Gahan + *Telenomus isis* Polaszek, in egg masses of the noctuid stem borer *Sesamia calamistis* Hampson (Lepidoptera), in order to asses the prevailing parasitoidism of these species in midaltitudes and highlands of eastern Africa. They conclude that mix parasitism usually occur during periods when percentage of egg batches are low, or when the most frequent parasitoid species in a given area not fully exploit the egg batches (Agboka *et al.* 2002). Insights on oviposition behavior, intra and interspecific host discrimination, and super and multiparasitism by scelionids, will help to decide which species should be introduced in a given area for biological control purposes.

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