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Aquatic Coleoptera from two protected areas of the Humid Chaco eco-region (Chaco Province, Argentina)

LIBONATTI, María L., Mariano C. MICHAT and Patricia L. M. TORRES

IBBEA-CONICET - Laboratorio de Entomología, Departamento de Biodiversidad y Biología Experimental, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina; e-mail: libonatti.marialaura@gmail.com

Los coleópteros acuáticos de dos áreas protegidas de la ecorregión Chaco Húmedo (Provincia del Chaco, Argentina)

RESUMEN. Se presenta por primera vez una lista de las especies de coleópteros acuáticos que habitan en el parque nacional Chaco y en el refugio de vida silvestre El Cachapé, dos áreas protegidas pertenecientes a la ecorregión Chaco Húmedo. Se identificaron 122 especies incluidas en 45 géneros y 10 familias. Dos especies se citan por primera vez para la Argentina: *Ora atroapicalis* Pic y *Ora semibrunnea* Pic (Scirtidae). Diez géneros (Dytiscidae: *Anodocheilus* Babington, *Bidessonotus* Régimbart, *Hemibidessus* Zimmermann; Noteridae: *Mesonoterus* Sharp, *Notomicrus* Sharp; Hydraenidae: *Hydraena* Kugelann, *Gymnochthebius* Orchymont; Hydrophilidae: *Chasmogenus* Sharp, *Chaetarthria* Stephens; Scirtidae: *Ora* Clark, *Scirtes* Illiger) y 41 especies son citados por primera vez en la provincia del Chaco. La alta diversidad de coleópteros acuáticos registrados destaca la importancia de estas áreas protegidas.

PALABRAS CLAVE. Coleópteros acuáticos. Inventario. Parque Nacional Chaco. Refugio El Cachapé. Región Neotropical.

ABSTRACT. A list of the species of aquatic Coleoptera inhabiting Chaco National Park and El Cachapé Wildlife Refuge, two protected areas located in the Humid Chaco eco-region, is presented for the first time. One hundred and twenty-two species included in 45 genera and 10 families were identified. Two species are new for Argentina: *Ora atroapicalis* Pic and *Ora semibrunnea* Pic (Scirtidae). Ten genera (Dytiscidae: *Anodocheilus* Babington, *Bidessonotus* Régimbart, *Hemibidessus* Zimmermann; Noteridae: *Mesonoterus* Sharp, *Notomicrus* Sharp; Hydraenidae: *Hydraena* Kugelann, *Gymnochthebius* Orchymont; Hydrophilidae: *Chasmogenus* Sharp, *Chaetarthria* Stephens; Scirtidae: *Ora* Clark, *Scirtes* Illiger) and 41 species are first cited for Chaco Province. The high diversity of aquatic Coleoptera recorded highlights the importance of these protected areas.

KEY WORDS. Aquatic Coleoptera. Inventory. Chaco National Park. El Cachapé Refuge. Neotropical Region.

INTRODUCTION

The Gran Chaco occupies more than 100 million ha of territory in four South American countries (Argentina, Paraguay, Bolivia and Brazil), and is thus the largest forested region in the continent after Amazonia. Due to its large extension including both tropical (18°S) and subtropical (31°S) latitudes, it shows strong gradients that define distinct subregions: the Humid, Dry, and Montane Chaco. The existence of broad climatic gradients, together with geological and topographic features, generate a wide diversity of environments: wide plains, swamps, dry or seasonally flooded savannas, marshes, salt flats, a great variety of forests and scrublands, and typi-

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cal montane habitats in the southwestern portion, which lead to a high level of biodiversity (TNC *et al*., 2005). In Argentina, the Humid Chaco eco-region is located in the eastern part of Chaco and Formosa Provinces and in the northern part of Santa Fe Province, and covers 16 millon ha representing 5.7% of the Argentinean surface. However, only 0.4% of the protected surface of Argentina belongs to this eco-region, thus contradicting the minimal international standard recommended of 10% (Brown *et al*., 2012). During the last two decades, the advance of the agricultural frontier, the increased deforestation and the development of the road system have contributed to the loss of native forest in the Chaco eco-region, resulting in 96% of forest loss in Santa Fe Province, 32% in Chaco Province and 11% in Formosa Province (Brown *et al*., 2012).

In order to evaluate possible future impacts of anthropic environmental changes, it is necessary to rely on inventories of natural ecosystems. So far, the available information about the diversity of aquatic Coleoptera in Chaco Province is scarce and fragmentary. Although Neiff & Poi de Neiff (1978), Poi de Neiff (1983) and Poi de Neiff & Neiff (1984) have made valuable contributions to the knowledge of macroinvertebrates associated to aquatic macrophytes in Humid Chaco, their studies had an ecological approach and were not focused on aquatic Coleoptera.

Chaco National Park and El Cachapé Wildlife Refuge are among the 13 protected areas found in Chaco Province, both are considered priority areas for biodiversity conservation (TNC *et al*., 2005), and the aquatic Coleoptera inhabiting them are unknown. Therefore, the focus of this paper is to provide the first inventory of aquatic Coleoptera from the Humid Chaco eco-region, based on material collected in the two protected areas mentioned above.

MATERIAL AND METHODS

Study areas

Chaco National Park was created in 1954, in the central-eastern part of Chaco Province (26º 40' S, 59º 48' W, Fig. 1). With an extension of 14,981 ha, it occupies part of the departments Sargento Cabral and Presidencia de la Plaza, the small city of Capitán Solari being the nearest locality. On the other hand, El Cachapé, which previously was a private cattle ranch, became a Wildlife Refuge in 1990 after an agreement between its owner and the Vida Silvestre Argentina foundation. It is located in the south-eastern part of Chaco Province (26º 49' S, 59º 08' W), in the department Primero de Mayo, the nearest locality being the small village named La Eduviges. It covers a surface of 1,750 ha (Fig. 1). Both areas preserve a representative portion of the Humid Chaco eco-region. The main habitats comprise: forests of *Schinopsis balansae (quebracho colorado chaqueño)*; scrubland, composed mainly of *Schinopsis lorentzii (quebracho colorado santiagueño), Aspidosperma quebracho-blanco (quebracho blanco), Prosopis alba (algarrobo blanco), Prosopis nigra (algarrobo negro)* and *Tabebuia* spp. *(lapacho)*; gallery forest, dominated by *Gleditsia amorphoides (espina corona), Myrsine laetevirens (canelón), Trichilia catigua (catiguá colorado), Brunfelsia australis (jazmín paraguayo), Trichilia elegans, Allophylus edulis (chal chal)*, with ground covered by several species of bromeliads; savanna, characterized by *Copernicia alba (caranday)* and several species of *Paspalum*; marshes and small ponds (Brown *et al*., 2012). These environments lodge a wide diversity of mammals, reptiles, birds and fishes. From a topographic point of view, this area is part of the large Chaco-Pampa Plain, extending from the Pampean and subandean hills to the Paraguay-Paraná Rivers in the north and to the Atlantic coast in the east, with a general slope from west to east. The altitude within this eco-region is less than 100 masl and the mean annual precipitation is 1200 mm.

Sampling sites

The sites sampled were not selected according to any specific criterion, they involved every kind of available fresh water found in the two protected areas. However, given the difficult characteristics of the landscape, we only had access to a small portion of the whole area. Although we were unable to find more aquatic habitats, we suspect that additional water bodies may be found with a more extensive search.

The sites A-D are inside Chaco National Park or very close to its boundaries; the sites E-H are inside El Cachapé Wildlife Refuge:

A. Small oval pond about 20 m in length, 5 m in width and 20 cm maximum depth, located next to the road, 1 km apart from the entrance to Chaco National Park, completely exposed to insolation, with muddy soil, turbid water, and vegetation composed of Poaceae on the margins and center.

B. Large square pond (drinking trough about 15x15 m and 1 m maximum depth) located contiguous to pond A, completely exposed to insolation, with muddy soil, very turbid water, and vegetation composed of Poaceae and Cyperaceae on the margins.

C. Negro River. This is the only river present in the Chaco National Park and one of the main rivers of Chaco Province, running with N-S direction between the marshes of Negro River and Barranqueras River. The sampling site was established near the campsite of the park, in a zone of the river with very slow current, semi-exposed to insolation (gallery forest on the margins), muddy bottom, and completely covered by floating vegetation, mainly *Pistia stratiotes*, accompanied by *Eichhornia* sp. and *Spirodela intermedia*, with some Poaceae also present.

D. Negro River. This sampling site is located outside the park but at a short distance from its boundaries. The bottom was muddy and the current very slow, the surface of the water being covered almost totally by *Nymphoides indica* and *Azolla cristata*, with some *Polygonum punctatum, Sagittaria montevidensis* and *Hydrocotile* sp. also present. This site was more exposed to insolation, although gallery forest was present on the margins.

E. Relatively small pond about 15 m in length, 5 m in width and 40 cm maximum depth, located behind the house for visitors, semi-exposed to insolation, with sandy soil, turbid water, Poaceae and Cyperaceae on the margins, and surrounded by some large trees.

F. Very small pond about 2 m in length, 1 m in width and 10 cm maximum depth, located near the house for visitors, exposed to insolation, with muddy soil, very turbid water, and almost completely covered by *Nymphoides indica*.

G. Small semipermanent oval pond about 15 m in length, 5 m in width and 70 cm maximum depth, located next to the main road entering the refuge, completely exposed to insolation, with muddy soil, very slightly turbid water, and *Polygonum punctatum* and Poaceae on the margins.

H. Quiá stream. Main stream of the refuge. The sampling site was established about 100 m apart from the manor house, in a completely exposed sector with muddy soil, relatively clear water, and almost completely covered by *Nymphoides indica* and other unidentified dycotiledons.

Collection techniques

Specimens studied were captured in El Cachapé Wildlife Refuge on 3-4 December 2008 and in Chaco National Park on 18-20 January 2011. Collection techniques consisted of aquatic nets (round bag, 25-30 ring diameter, 0.5-1.0 mm mesh) and mercury light traps (250 watts), according to Torres *et al*. (2012). Subaquatic traps were also employed, consisting of a 6 L plastic bottle baited with tuna, placed on the bottom of pond B during the night. This kind of trap is very useful for capturing large-sized active adult Dytiscidae which usually avoid aquatic nets. The material collected in these expeditions was fixed *in situ* with 96% ethanol and is held in the collection of the Laboratory of Entomology, Buenos Aires University, Argentina.

Taxonomic identification

Taxonomic classification of aquatic families of Coleoptera followed Nilsson (2013) (for Dytiscidae), Beutel & Roughley (2005) (for Gyrinidae), Nilsson (2011) (for Noteridae), Short & Fikáček (2013) (for Hydrophilidae) and Lawrence & Yoshitomi (2007) (for Scirtidae). Specimens collected were identified to the lowest possible taxonomic level, using available keys and literature (Pic, 1922, 1928; Young, 1974; Grosso, 1979; Trémouilles, 1989; Young, 1990; Grosso, 1993; Trémouilles *et al*., 1995; Miller, 2000; Oliva *et al*., 2002; Trémouilles *et al*., 2004, 2005; Miller, 2005, 2009; Archangelsky *et al*., 2009; Libonatti *et al*., 2011). Identification of the species of the family Scirtidae was made by comparison with type material or identified material borrowed from the Muséum National d'Histoire Naturelle (Paris, France) and the Natural History Museum (London, United Kingdom).

RESULTS

A total of 122 species of Coleoptera were identified, included in 45 genera and 10 families (Table I). Dytiscidae was the most represented family in terms of number of genera (17), fol-

lowed by Hydrophilidae (12), Noteridae (6), Gyrinidae (2), Hydraenidae (2), Scirtidae (2), Haliplidae (1), Dryopidae (1), Epimetopidae (1) and Hydrochidae (1). However, with regards to species, Hydrophilidae was the richest family (43), followed by Dytiscidae (37), Noteridae (21), Scirtidae (7), Hydrochidae (5), Hydraenidae (3), Gyrinidae (2), Haliplidae (2), Dryopidae (1) and Epimetopidae (1). Two species are new for Argentina: *Ora atroapicalis* Pic and *Ora semibrunnea* Pic (Scirtidae). Ten genera (Dytiscidae: *Anodocheilus* Babington, *Bidessonotus* Régimbart, *Hemibidessus* Zimmermann; Noteridae: *Mesonoterus* Sharp, *Notomicrus* Sharp; Hydraenidae: *Hydraena* Kugelann, *Gymnochthebius* Orchymont; Hydrophilidae: *Chasmogenus* Sharp, *Chaetarthria* Stephens; Scirtidae: *Ora* Clark, *Scirtes* Illiger) and 41 species of aquatic Coleoptera are first cited from Chaco Province (Table I).

DISCUSSION

Suborder Adephaga

Family Dytiscidae

With more than 4200 described species (Nilsson, 2013), Dytiscidae is the world's most speciose family of water beetles. The Argentinean fauna of Dytiscidae is composed of 119 species, distributed in eight subfamilies (Agabinae, Colymbetinae, Copelatinae, Dytiscinae, Hydroporinae, Hydrodytinae, Laccophilinae, Lancetinae) and 31 genera (Libonatti *et al*., 2011). In the habitats sampled in our study, the family was represented by four subfamilies, 17 genera and 37 species, seven of which are new for Chaco Province (Table I).

We found one genus and two species of the subfamily Copelatinae: *Copelatus caelatipennis* Aubé and *C. longicornis* Sharp, the former one is herein first cited from Chaco Province. Six genera of Copelatinae exist worldwide (Balke *et al*., 2004), two of them are present in Argentina: *Copelatus* Erichson, distributed in Buenos Aires, Chaco, Corrientes, Entre Ríos, Jujuy, Misiones and Salta Provinces (Trémouilles, 1998; Torres, *et al*., 2008, 2012), and *Agaporomorphus* Zimmermann, recently discovered in Misiones and Corrientes Provinces (Libonatti *et al*., 2011; Torres *et al*., 2012).

The subfamily Dytiscinae was represented by three tribes (out of four present in Argentina) and three genera (Aciliini: *Thermonectus* Dejean, Aubehydrini: *Notaticus* Zimmermann, and Cybistrini: *Megadytes* Sharp). Currently, there are five species of *Thermonectus* distributed from central to northern Argentina. *Thermonectus succinctus* (Aubé) is the only species previously recorded from Chaco Province (Trémouilles, 1989). *Thermonectus circumscriptus* (Latreille), formerly cited from Misiones, Salta, Santa Fe and Jujuy Provinces (Trémouilles, 1998; Torres *et al*., 2008), is cited here for the first time. The monotypic genus *Notaticus* contains *N. fasciatus* Zimmermann, which in Argentina inhabits Formosa, Salta, Chaco, Corrientes and Santa Fe Provinces (Trémouilles, 1998). Particularly in Chaco Province, it had been recorded from the localities El Pintado, Resistencia, Fontana, El Palmar and San Bernardo (Trémouilles & Bachmann, 1981). The genus *Megadytes* is represented by 10 species in Argentina, distributed all throughout the country north of Río Negro Province (Trémouilles, 1998; Torres *et al*., 2007, 2008). Four of the six species known to be present in Chaco Province were identified in this study, and one species in adult stage could not be identified with the available keys.

The subfamily Hydroporinae includes six tribes in Argentina, five of which were found in this study: Bidessini Sharp, Hydrovatini Sharp, Hyphydrini Sharp, Methlini Branden and Vatellini Sharp. In Argentina, nine genera of Bidessini are present (Libonatti *et al*., 2011), and in this study we found five genera and five species. Three genera and three species are first recorded from Chaco Province: *Anodocheilus maculatus* Babington, known to occur in Buenos Aires, Corrientes and Entre Ríos Provinces (Trémouilles, 1998; Torres *et al*., 2007; Libonatti *et al*., 2011; Torres *et al*., 2012), *Bidessonotus obtusatus* Régimbart, so far distributed in Jujuy, Corrientes and Entre Ríos Provinces (Torres *et al*., 2008; Libonatti *et al*., 2011; Torres *et al*., 2012), and *Hemibidessus conicus* (Zimmermann), recently discovered in the Argentinean fauna, in Corrientes Province (Libonatti *et al*., 2011; Torres *et al*., 2012). The only species of *Brachyvatus* Zimmermann occurring in Argentina, *B. acuminatus* (Steinheil), was originally described from Buenos Aires and later discovered in Corrientes, Entre Ríos and Chaco Provinces (Torres *et al*., 2007; Libonatti *et al*., 2011; Torres *et al*., 2012). Its presence in Chaco Province was mentioned

for the first time by Libonatti *et al*. (2011), who examined material coming from El Cachapé Refuge. The genus *Liodessus* Guignot, widely distributed in this country (Trémouilles, 1998), was cited for the first time from Chaco Province by Poi de Neiff & Neiff (1977), who found an unidentified species associated to *Pistia stratiotes* in the Barranqueras river. Here, we found an unidentified species in both areas studied.

The tribe Hydrovatini was represented in this study by the genus *Hydrovatus* Motschulsky, one of the two genera of this tribe. All the three species of *Hydrovatus* occurring in Argentina were collected in the present study: *Hydrovatus caraibus* Sharp, *H. crassulus* Sharp and *H. turbinatus* Zimmermann. Altogether, these species are distributed in eastern-central and northern Argentina, but so far Chaco Province has been part of the distribution of the first two only (Trémouilles *et al*., 2005), thus *H. turbinatus* is first recorded. The other genus of Hydrovatini is *Queda* Sharp, with only one species in Argentina: *Q. youngi* Biström, recently recorded from Corrientes Province (Libonatti *et al*., 2011; Torres *et al*., 2012). This species has not been recorded from Chaco Province, but it is expectable to be found there as well as in Formosa Province (Libonatti *et al*., 2011).

The Argentinean members of the tribe Hyphidrini are placed in two genera: *Desmopachria* Babington and *Pachydrus* Sharp (Trémouilles, 1995). In this study, specimens of *Desmopachria concolor* Sharp, *Pachydrus globosus* (Aubé) and *P. obesus* Sharp were captured, all of which were formerly known from Chaco Province (Neiff & Poi de Neiff, 1978; Trémouilles, 1998). Additionally, four unidentified species of *Desmopachria* were found.

The tribe Methlini contains two genera worldwide, of which only *Celina* Aubé is present in the American continent (Nilsson, 2013). There are seven species described from Argentina, distributed in eastern-central and northern Provinces, including Chaco (Trémouilles, 1998; Torres *et al*., 2007). Adults of four unidentified species and larvae of *Celina* were collected in Chaco National Park, but the lack of a taxonomic revision of the Neotropical species makes their identification very difficult.

Within the subfamily Laccophilinae, only Laccophilini is present in Argentina (Nilsson, 2013), represented by *Laccophilus* Leach, distributed in central and northern provinces including Chaco (Trémouilles, 1998; Torres *et al*., 2008), and an unpublished genus (Toledo & Michat, in prep.) which occurs in Chaco, Corrientes and Entre Ríos Provinces (Libonatti *et al*., 2011). Five unidentified species of *Laccophilus* and one species of the unpublished genus were collected in this study.

Family Gyrinidae

The Argentinean fauna of Gyrinidae includes three genera (*Andogyrus* Ochs, *Gyretes* Brullé and *Gyrinus* Müller) and about 26 species, altogether distributed in the whole territory except the southernmost part of Patagonia (Michat & Archangelsky, in press). In the study area, we collected two species: *Gyrinus violaceus* Régimbart and an unidentified species of *Gyretes* (Table I). So far, the former species had been cited from Brazil, Uruguay and Argentina, in Salta, Misiones and Corrientes Provinces (Bruch, 1915; Fernández *et al*., 2008; Torres *et al*., 2012; Michat & Archangelsky, in press). Thus, this is the first mention of this species for Chaco Province.

Family Haliplidae

The family is represented in Argentina by the genus *Haliplus* Latreille with 10 species, altogether covering practically the whole country (Vondel & Spangler, 2008). Two species were found in the study area: *Haliplus maculicollis* Zimmermann and an unidentified species. The distribution of *H. maculicollis* in Argentina comprises Santiago del Estero, Salta, Buenos Aires, Formosa and Corrientes Provinces (Vondel & Spangler, 2008; Gómez Lutz *et al*., 2012). Therefore, this paper provides the first record for Chaco Province.

Family Noteridae

Noteridae comprises almost 260 species worldwide, included in three subfamilies, six tribes and 16 genera (Nilsson, 2011). Two subfamilies, three tribes and six genera occur in Argentina (Noterinae: Noterini: *Hydrocanthus* Say, *Mesonoterus* Sharp, *Suphis* Aubé, *Suphisellus* Crotch, Pronoteriini: *Pronoterus* Sharp; Notomicrinae: Notomicrini: *Notomicrus* Sharp) (Trémouilles *et al*., 1995; Nilsson, 2011).

In our study, the genus *Hydrocanthus* was represented by four of the six species that inhabit Argentina. *Hydrocanthus debilis* Sharp, *H. sharpi* Zimmermann and *H. socius* Sahlberg had been

previously cited from Chaco Province (Blackwelder, 1944; Nilsson, 2011). The fourth species, *H. paraguayensis* Zimmermann, is first cited here.

A single species of the genus *Mesonoterus, M. laevicollis* Sharp, was collected. Both the genus and the species are cited for the first time from Chaco Province. Three species of the genus *Suphis* were identified: *Suphis cimicoides* Aubé, *S. fluviatilis* Guignot and *S. freudei* Mouchamps, all of them previously known from Chaco Province (Grosso, 1993).

Twenty-three species of *Suphisellus* are found in Argentina (Nilsson, 2011; Torres *et al*., 2012) and 10 species were found in the study area. Three of them were unknown from Chaco Province: *S. cribrosus* (Régimbart), *S. curtus* (Sharp) and *S. subsignatus* (Sharp). *Suphisellus curtus* (Sharp) was earlier recorded from Corrientes Province (Torres *et al*., 2012).

The Argentinean members of the genus *Notomicrus* are represented by three species (Nilsson, 2011; Torres *et al*., 2012), two of which were collected in this study: *N. brevicornis* Sharp and *N. trailli* Sharp. *Notomicrus brevicornis* is known from Santa Fe and Corrientes Provinces (Bruch, 1927; Torres *et al*., 2012) and *N. trailli* from Corrientes Province (Torres *et al*., 2012). This is the first record of the genus and both species from Chaco Province.

Suborder Polyphaga

Family Dryopidae

Four genera of Dryopidae are recognized in Argentina: *Dryops* Olivier, *Helichus* Erichson, *Onopelmus* Spangler and *Pelonomus* Erichson (Trémouilles ***et al.***, 1995). In this study, we found an unidentified species of *Pelonomus*. Three species of this genus occur in Argentina and several others in Brazil (Blackwelder, 1944).

Family Epimetopidae

The family Epimetopidae is part of the superfamily Hydrophiloidea, together with other five families all over the world. In Argentina, there are representatives of five hydrophiloid families: Epimetopidae, Georissidae, Hydrochidae, Spercheidae and Hydrophilidae (Archangelsky *et al*., 2009). The Epimetopidae include 18 species in the genus *Epimetopus* Lacordaire, five of which occur in Argentina (Oliva *et al*., 2002). In this study, we collected *Epimetopus trogoides* (Sharp), previously cited from Entre Ríos and Chaco Provinces (Oliva *et al*., 2002).

Family Hydraenidae

In South America this family contains ca. 140 species and eight genera (Archangelsky *et al*., 2009). In Argentina, there are members of the genera *Gymnochthebius* Orchymont, *Hydraena* Kugelann and *Meropathus* Enderlein. Species of other three genera from bordering countries (*Hydraenida* Germain, *Ochthebius* Leach, *Parhydraenida* Balfour-Browne) might also be present (Torres & Archangelsky, in press). Here we collected three species: *Gymnochthebius fossatus* (LeConte) and two unidentified species of *Hydraena*. Up to now, the only record for the family Hydraenidae from Chaco Province is that by Neiff & Poi de Neiff (1978), who identified some larvae at the family level. Therefore, both genera and *G. fossatus* are cited here for the first time.

Family Hydrochidae

This monogeneric family is represented by 17 species in Argentina, most of them distributed in the northern part of the country (Oliva ***et al.***, 2002). In this paper, we report the presence of five species: *H. drechseli* Makhan, *Hydrochus ducalis* Knisch, *H. obscurus* Sharp, *H. richteri* Bruch and *H. variabilis* Knisch. *Hydrochus ducalis* was known from Santa Fe, Chaco, Formosa and Corrientes Provinces (Fernández & Bachmann, 1998; Torres *et al*., 2012) and *H. obscurus* was known from Buenos Aires, Entre Ríos, Corrientes, Misiones, Santa Fe, Chaco and Formosa Provinces (Fernández & Bachmann, 1998). *Hydrochus drechseli,* so far known from Formosa Province, *H. richteri,* earlier distributed in Buenos Aires, Entre Ríos, Corrientes, Misiones and Santa Fe Provinces, and *H. variabilis,* previously known to occur in Buenos Aires, Entre Ríos, Corrientes, Misiones and Santa Fe Provinces (Fernández & Bachmann, 1998), are new records for Chaco Province.

Family Hydrophilidae

The Argentinean Hydrophilidae include almost 150 species and 22 genera, recently classified in five subfamilies: Acidocerinae, Chaetarthriinae, Enochrinae, Hydrophilinae, and Sphaeridiinae (Short & Fikáček, 2013). In this study, we collected specimens of all the subfamilies, 12 genera, two new for Chaco Province, and 43

species, 16 new for Chaco Province.

The subfamily Acidocerinae was represented in our study by the three genera inhabiting Argentina: *Chasmogenus* Sharp, *Helobata* Bergroth and *Helochares* Mulsant. *Chasmogenus sapucay* Fernández, the only Argentinean member of the genus, is known from Formosa, Santiago del Estero and Corrientes Provinces (Oliva *et al*., 2002; Torres *et al*., 2012), therefore we cite the genus and species for the first time from Chaco Province. *Helobata* includes five species (Oliva *et al*., 2002; Torres *et al*., 2012), of which we found two: *H. cossyphoides* (Bruch) and *H. larvalis* (Horn). *Helobata cossyphoides* is new for Chaco Province, since it was known from Buenos Aires, Entre Ríos, Corrientes and Santa Fe Provinces (Oliva *et al*., 2002). *Helochares* has five species known to exist in Chaco Province. We collected three species, of which only one (*H. mesostitialis* Fernández) was previously recorded. The other two are first cited: *H. atratus* Bruch, earlier distributed in Buenos Aires, Entre Ríos, Misiones, Santa Fe and Santiago del Estero Provinces, and *H. mini* Fernández, previously known from Corrientes and Santa Fe Provinces (Oliva *et al*., 2002).

The subfamily Chaetarthriinae was represented by the genus *Chaetarthria* Stephens, first recorded here from Chaco Province. One out of six species of this genus occurring in Argentina was recorded: *C. bruchi* Balfour-Browne. The known localities for this species are in La Rioja, Misiones, Salta and Tucumán Provinces (Fernández & Bachmann, 1998; Archangelsky, 2002).

The subfamily Enochrinae, with only the genus *Enochrus* Thomson present in Argentina, was represented by four species in this study, two of which first cited from Chaco Province: *E. circumcinctus* (Bruch) and *E. obsoletus* (Bruch). The former species was known from Buenos Aires, Entre Ríos, Corrientes, Misiones, Santa Fe, Formosa, Tucumán, Jujuy and La Rioja Provinces (Denton & Oliva, 1999; Oliva *et al*., 2002; Torres *et al*., 2012), whereas the latter was known to occur in Buenos Aires, Entre Ríos, Corrientes, Santa Fe, Tucumán and Jujuy Provinces (Oliva *et al*., 2002).

Within the subfamily Hydrophilinae, three tribes were found in the study area: Berosini, Hydrophilini and Laccobiini. The tribe Berosini was represented by the genera *Berosus* Leach and *Derallus* Sharp, with nine and five species respectively. *Berosus holdhausi* Knisch, *B. rufulus* Knisch, *B. speciosus* Knisch, *D. altus* (LeConte) and *D. ambitus* Orchymont are recorded from Chaco Province for the first time. The tribe Hydrophilini was represented by *Hydrobiomorpha* Blackburn, with three species, *Hydrophilus* Geoffroy, with one species, and *Tropisternus* Solier, with nine species. *Tropisternus regimbarti* Orchymont, previously known from Formosa and Salta Provinces, and *T. sharpi* Orchymont, earlier known to occur in Buenos Aires, Entre Ríos, Corrientes and Misiones Provinces (Oliva *et al*., 2002), are herein first cited from Chaco Province. The tribe Laccobiini was represented by three unidentified species in the genus *Paracymus*. The current distribution of this genus includes Buenos Aires, Entre Ríos, Corrientes, Misiones, Chaco, Tucumán, Córdoba and San Luis Provinces (Poi de Neiff & Neiff, 1977; Archangelsky, 1999; Oliva *et al*., 2002; Torres et al., 2007, 2012).

The subfamily Sphaeridiinae in Argentina includes eight species in one tribe (Coelostomatini) and one genus (*Phaenonotum* Sharp) (Trémouilles *et al*., 1995). In this study, we found two species: *P. argentinense* Bruch and *P. puncticolle* Bruch. The former species is distributed in Buenos Aires, Entre Ríos, Santa Fe and Tucumán (Archangelsky, 1991) and the latter is known from Buenos Aires, Entre Ríos and Santa Fe (Archangelsky, 1992), and therefore both species are new for Chaco Province.

Family Scirtidae

About 1,300 species and almost 50 genera are recognized in Scirtidae around the world (Klausnitzer, 2009). The family is currently divided in three subfamilies: Stenocyphoninae, Nipponocyphoninae and Scirtinae (Lawrence & Yoshitomi, 2007). Up to now, Argentina had housed 17 species classified in one subfamily (Scirtinae) and five genera (*Cyphon* Paykull, *Ora* Clark, *Prionocyphon* Redtenbacher, *Pseudomicrocara* Armstrong, and *Scirtes* Illiger) (Trémouilles *et al*., 1995; Klausnitzer, 2012; Libonatti & Ruta, 2013). Larvae of Scirtidae had been cited from Chaco Province under the old name Helodidae (not presently in use), as part of the pleuston associated to *Pistia stratiotes* in the Barranqueras River (Poi de Neiff & Neiff, 1977). We report the finding of two species in Chaco National Park, which are new for Argentina: *Ora atroapicalis* Pic and *O. semibrunnea* Pic, both

previously known from Brazil (Pic, 1922, 1928). Representatives of *Scirtes brevenotatus wagneri* Pic were also collected in Chaco National Park. In the original description of this subspecies, Pic (1928) informed that it is distributed in "R. Argentine", without mentioning any more details about the type locality. The examination of the holotype revealed that it was collected in Santiago del Estero Province: "Républ. Argentine / CHACO DE SANTIAGO / DEL ESTERO, Río Dulce". For this reason, this is the first record from Chaco Province. *Scirtes oblongus* Guérin-Méneville was originally described from Yucatán (Mexico) (Guérin-Méneville, 1861), and soon after cited from Veracruz (Mexico) and Panzós (Guatemala) (Champion, 1897). More recently, this species was recorded from several localities in Florida (United States of America) (Epler, 2009). The type material of this species is supposed to be deposited at the Muséum National d'Histoire Naturelle, but unfortunately, in recent visits to that museum it was not found (Ruta, pers. comm., 2013). Several specimens collected in Chaco National Park (referred to as *Scirtes* aff. *oblongus* in Table I) resulted similar in colour pattern, general shape and morphology of male genitalia, with subtle differences noticeable, to specimens of this species (identified by Champion) collected at Panzós, and most likely represent an allied species. However, the identification should be confirmed after examination of the type material. Specimens of three additional species, two of *Ora* and one of *Scirtes*, were also collected in Chaco National Park, but they could not be assigned to any known species.

Final considerations

Knowing the spatial distribution of species (in other words, to inventory) is the first crucial step for every practice related to conservation of natural ecosystems. The information provided by inventories allows to select sites to protect and design reserves, to assess the potential for sustainable use of natural resources, to prioritize those sites inhabited by endangered species, and to provide the base for selecting species or assemblages for ecological monitoring (Kremen *et al.*, 1993). Both Chaco National Park and El Cachapé Wildlife Refuge were established mainly to preserve the Humid Chaco flora and fauna, mostly mammals, reptiles, and birds known to be endangered. Since previous knowledge about biodiversity of aquatic Coleoptera in the Humid Chaco eco-region was extremely scarce and fragmentary, our study represents the first attempt to inventory the fauna of this group of beetles in this area. Although incomplete and subject to improvements after additional fieldwork, our samplings clearly demonstrate that the region holds a high diversity of aquatic beetles, including several infrequent species rarely found in other regions or in scientific collections. The presence of several unidentified taxa (Table I) also emphasizes the potential of the area as a source of new, still undescribed species. In conclusion, these findings highlight the great importance of the Humid Chaco eco-region for the preservation of biodiversity.

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Table I. List of species of aquatic Coleoptera collected at Chaco National Park and El Cachapé Wildlife Refuge. A-H: sites studied (see Fig. 1 and Material and Methods); LTC: light traps at Chaco National Park; LTE: light trap at El Cachapé Refuge; NA: new for Argentina; NCP: new for Chaco Province.

	NA	NCP	LTC	LTE	A	B	C	D	E	F	G	H
ADEPHAGA												
DYTISCIDAE												
Copelatinae												
Copelatus caelatipennis Aubé		+	+				+				+	+
C. longicornis Sharp			+									
Dytiscinae												
Aciliini												
Thermonectus circumscriptus (Latreille)		+	+									
T. succinctus (Aubé)			+		+			+			+	+
Thermonectus sp. (larvae)					+							
Aubehydrini												
Notaticus fasciatus Zimmermann							+		+			+
Cybistrini												
Megadytes (Bifurcitus) magnus Trémouilles & Bachmann						+[1]						
M. (Megadytes) carcharias Griffini						+[1]					+	+
M. (M.) laevigatus (Oliver)												+
M. (M.) sp.								+				
M. (Trifurcitus) fallax (Aubé)												+
Hydroporinae												
Bidessini												
Anodocheilus maculatus Babington		+	+		+				+		+	+
Bidessonotus obtusatus Régimbart		+	+						+		+	+
Brachyvatus acuminatus (Steinheil)		+	+		+		+				+	+
Hemibidessus conicus (Zimmermann)		+	+									
Liodessus sp.			+	+	+			+	+		+	+
Hydrovatini												
Hydrovatus caraibus Sharp			+						+			
H. crassulus Sharp							+					
H. turbinatus Zimmermann		+	+									
Hyphydrini												
Desmopachria concolor Sharp			+		+				+		+	+
Desmopachria sp. 1			+								+	
Desmopachria sp. 2			+		+				+		+	+
Desmopachria sp. 3			+						+		+	+
Desmopachria sp. 4			+									
Pachydrus globosus (Aubé)			+				+				+	
P. obesus Sharp			+									
Methlini												
Celina sp. 1			+		+							
Celina sp. 2			+									
Celina sp. 3			+									
Celina sp. 4			+									
Celina sp. (larvae)							+					
Vatellini												
Derovatellus lentus (Wehncke)			+						+		+	+
Vatellus haagi Wehncke			+									+
Laccophilinae												
Laccophilus sp. 1			+		+			+	+	+	+	+
Laccophilus sp. 2			+								+	+

	NA	NCP	LTC	LTE	A	B	C	D	E	F	G	H
Laccophilus sp. 3			+					+	+			+
Laccophilus sp. 4			+		+			+			+	+
Laccophilus sp. 5			+		+							
Laccophilinae (unpublished genus)			+						+		+	+
GYRINIDAE												
Gyrininae												
Gyrinini												
Gyrinus violaceus Régimbart		+	+		+	+		+	+	+		+
Orectochilini												
Gyretes sp.			+									
HALIPLIDAE												
Haliplus maculicollis Zimmermann		+	+		+			+				
Haliplus sp.												+
NOTERIDAE												
Noterinae												
Noterini												
Hydrocanthus debilis Sharp			+		+			+	+			+
H. paraguayensis Zimmermann		+	+	+			+		+		+	+
H. sharpi Zimmermann							+	+				
H. socius Sahlberg			+									
Mesonoterus laevicollis Sharp		+	+									+
Suphis cimicoides Aubé			+		+		+				+	+
S. fluviatilis Guignot			+		+							+
S. freudei Mouchamps			+									
Suphisellus cribosus (Régimbart)		+	+									
S. curtus (Sharp)		+	+									+
S. flavopictus (Régimbart)			+			+	+		+		+	+
S. grammicus (Sharp)			+									
S. grossus (Sharp)			+									
S. nigrinus (Aubé)			+									
S. remator (Sharp)			+					+	+			+
S. rotundatus (Sharp)			+		+							
S. subsignatus (Sharp)		+	+									
Suphisellus sp.			+									
Noterini (larvae)							+	+				
Pronoterini												
Pronoterus punctipennis Sharp			+									
Notomicrinae												
Notomicrus brevicornis Sharp		+	+									
N. traili Sharp		+	+									
POLYPHAGA												
DRYOPIDAE												
Pelonomus sp.			+		+						+	
EPIMETOPIDAE												
Epimetopus trogoides (Sharp)			+									
HYDRAENIDAE												
Hydraena sp. 1		+	+								+	
Hydraena sp. 2		+									+	
Gymnochthebius fossatus (LeConte)		+									+	
HYDROCHIDAE												
Hydrochus drechseli Makhan		+					+				+	
H. ducalis Knisch			+								+	+
H. obscurus Sharp					+		+					+
H. richteri Bruch		+	+		+		+				+	+

	NA	NCP	LTC	LTE	A	B	C	D	E	F	G	H
H. variabilis Knisch		+			+							+
HYDROPHILIDAE												
Acidocerinae												
Chasmogenus sapucay Fernández		+	+									
Helobata cossyphoides (Bruch)		+	+								+	
H. larvalis (Horn)			+								+	+
Helochares atratus Bruch		+	+									
H. mesostitialis Fernández			+				+					+
H. mini Fernández		+	+				+					
Chaetarthriinae												
Chaetarthria bruchi Balfour-Browne		+	+									
Enochrinae												
Enochrus circumcinctus (Bruch)		+									+	
E. obsoletus (Bruch)		+	+									
E. sublongus (Fall)			+		+						+	
E. vulgaris (Steinheil)			+		+		+				+	+
Hydrophilinae												
Berosini												
Berosus decolor Knisch			+									
B. holdhausi Knisch		+									+	
B. minimus Knisch			+		+						+	+
B. patruelis Berg			+									
B. pedregalensis Jensen-Haarup			+									
B. reticulatus Knisch			+		+			+				
B. rufulus Knisch		+	+		+						+	+
B. speciosus Knisch		+	+									
B. stenocoptus Jensen-Haarup			+									
Derallus altus (Leconte)	+		+									
D. ambitus Orchymont	+										+	
D. angustus Sharp							+					+
D. argutus Orchymont			+				+					
D. paranensis Oliva			+		+						+	+
Hydrophilini												
Hydrobiomorpha irina (Brullé)			+								+	
H. longa (Bruch)												+
H. spinosa (Orchymont)			+									
Hydrophilus ensifer Brullé			+									
Tropisternus apicipalpis (Chevrolat)											+	+
T. collaris (Fabricius)			+					+			+	+
T. dilatatus Bruch							+					
T. laevis (Sturm)			+		+						+	+
T. lateralis limbatus (Brullé)			+		+						+	+
T. mergus (Say)			+								+	+
T. ovalis Laporte			+		+			+			+	+
T. regimbarti Orchymont	+		+									
T. sharpi Orchymont	+		+									
Laccobiini												
Paracymus sp. 1			+		+						+	+
Paracymus sp. 2			+		+						+	
Paracymus sp. 3			+									
Sphaeridiinae												
Coelostomatini												
Phaenonotum argentinense Bruch	+	+			+							
P. puncticolle Bruch	+	+										

	NA	NCP	LTC	LTE	A	B	C	D	E	F	G	H
SCIRTIDAE												
Ora atroapicalis Pic	+	+	+									
O. semibrunnea Pic	+	+	+									
Ora sp. 1			+									
Ora sp. 2			+									
Ora sp. (larvae)					+							
Scirtes brevenotatus wagneri Pic		+	+									
Scirtes aff. oblongus Guérin-Méneville			+									
Scirtes sp.			+									
Scirtidae (larvae)											+	

[1] captured using subaquatic trap.

LITERATURE CITED

ARCHANGELSKY, M. 1991. El género *Phaenonotum* en la Argentina. I. Redescripción de *Phaenonotum regimbarti* Bruch, 1915 y *Ph. argentinense* Bruch, 1915 (Coleoptera, Hydrophilidae, Sphaeridiinae). *Revista de la Sociedad Entomológica Argentina* 49(1-4): 157-164.

ARCHANGELSKY, M. 1992. El género *Phaenonotum* Sharp en la Argentina (Coleoptera: Hydrophilidae). II. Reubicación de *Hydroglobus puncticollis* Bruch, 1915, dentro del género *Phaenonotum*. *Revista de la Sociedad Entomológica Argentina* 51(1-4): 47-51.

ARCHANGELSKY, M. 1999. Immature stages of *Paracymus rufocinctus* Bruch, 1915 and *Enochrus* (*Methydrus*) *vulgaris* (Steinheil, 1869) (Coleoptera: Hydrophilidae: Hydrophilinae). *Elytron* 13: 87-99.

ARCHANGELSKY, M. 2002. Nuevas larvas de Hydrophilidae (Coleoptera: Hydrophiloidea): *Hemiosus multimaculatus* y *Chaetarthria bruchi*. *Revista de la Sociedad Entomológica Argentina* 61(3-4): 89-97.

ARCHANGELSKY, M., V. MANZO, M. C. MICHAT & P. L. M. TORRES. 2009. Coleoptera. *In*: Domínguez, E. & H. R. Fernández (eds.), *Macroinvertebrados bentónicos sudamericanos, Sistemática y biología,* vol. 2, Fundación Miguel Lillo, Tucumán, pp. 411-468.

BALKE, M., I. RIBERA Y A. P. VOGLER. 2004. MtDNA phylogeny and biogeography of Copelatinae, a highly diverse group of tropical diving beetles (Dytiscidae). *Molecular Phylogenetics & Evolution* 32: 866-880.

BEUTEL, R. G. & R. E. ROUGHLEY. 2005. Gyrinidae. *In*: Beutel, R. G. & A. B. Leschen (eds.), *Coleoptera, Volume 1: Morphology and Systematics (Archostemata, Adephaga, Myxophaga, Polyphaga partim), Handbuch der Zoologie Volume IV Arthropoda: Insecta, Part 38,* De Gruyter, Berlin, pp. 55-64.

BLACKWELDER R.E. 1944. Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. Part 2. *United States National Museum Bulletin* 185: 189-341.

BROWN, A., S. PACHECO & L. CRISTÓBAL. 2012. *Bitácora. Los caminos del Chaco. Obras viales y paisajes de conservación en la región chaqueña.* Ediciones del Subtrópico, Tucumán.

BRUCH, C. 1915. Catálogo sistemático de los coleópteros de la República Argentina. Pars II. Familias: Haliplidae, Dytiscidae, Gyrinidae, Hydrophilidae y Staphylinidae. *Revista del Museo de La Plata* 19: 174-526.

BRUCH, C. 1927. Suplemento al catálogo sistemático de los coleópteros de la República Argentina. II. Addenda, corrigenda y lista de especies. *Physis* 8: 537-553.

CHAMPION, G. C. 1897. Fam. Dascillidae. *In:* Waterhouse, C., G. Horn & G. C. Champion (eds.), Biologia Centrali-Americana. Insecta Coleoptera, vol. 3, part 1, Taylor and Francis, London, pp. 586–662, pls. 26–27.

DENTON, J. S. & A. OLIVA. 1999. Biodiversity in some lentic habitats from southern South America. I. Hydrophilidae Berosini and Hydrophilini (Coleoptera, Hydrophiloidea). *Revista del Museo Argentino de Ciencias Naturales,* nueva serie 1(1): 49-52.

EPLER, J. H. 2009. More new distribution records for Florida water beetles (Coleoptera: Dytiscidae, Elmidae, Hydrophilidae, Scirtidae), with additional notes on *Scirtes oblongus* Guerin-Meneville. *Insecta Mundi* 87: 1-5.

FERNÁNDEZ, L. A. & A. O. BACHMANN. 1998. Hydrophiloidea. ***In***: Morrone, E, J. J. & S. Coscarón (eds.), *Biodiversidad de Artrópodos argentinos, Una perspectiva biotaxonómica,* vol. 1, Ediciones Sur, La Plata, pp. 218-226.

FERNÁNDEZ, L. A., M. ARCHANGELSKY & V. MANZO. 2008. Coleópteros acuáticos y semiacuáticos del Parque Provincial Salto Encantado y Valle del Cuñá Pirú (Misiones, Argentina). *Revista de la Sociedad Entomológica Argentina* 67(3-4): 87-98.

GÓMEZ LUTZ, M. C., L. FERNÁNDEZ & ARTURO I. KEHR. 2012. Coleópteros acuáticos de lagunas situadas en el noroeste de la provincia de Corrientes, Argentina. *Revista de la Sociedad Entomológica Argentina* 71(1-2): 73-85.

GROSSO, L. E. 1979. Contribución al conocimiento biológico y sistemático de las especies argentinas de Noteridae (Coleoptera, Adephaga). Doctoral thesis N° 374. Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata, 166 pp.

GROSSO, L. E. 1993. Revisión de las especies neotropicales del género *Suphis* Aubé, con la descripcion de *S. ticky* n.sp. (Coleoptera- Noteridae). *Acta Zoológica Lilloana* 42(2): 225-238.

GUÉRIN-MÉNEVILLE, F. E. 1861. Monographie du nouveau genre ***Dicranopselaphus*** et description de quelques autres Insectes coléoptères appartenant aussi a la famille des Dascillides. *Revue et magasin de zoologie pure et appliquée* ser. 2, t. 13: 531-547.

KLAUSNITZER, B. 2009. *Insecta: Coleoptera: Scirtidae,* vol. Spektrum Akademischer Verlag, Heidelberg.

KLAUSNITZER, B. 2012. Zur Kenntnis der Gattung *Prionocyphon* L. Redtenbacher 1858 sensu lato (Coleoptera, Scirtidae) aus Südamerika (181. Beitrag zur Kenntnis der Scirtidae). *Linzer biologische Beiträge* 44: 1177-1194.

KREMEN, C., R. K. COLWELL, T. L. ERWIN, D. D. MURPHY, R. F. NOSS & M. A. SANJAYAN. 1993. Terrestrial arthropod assemblages: their use in conservation planning. *Conservation Biology* 7(4): 796-808.

LAWRENCE, J. F. & H. YOSHITOMI. 2007. *Nipponocyphon,* a new Genus of Japanese Scirtidae (Coleoptera) and its Phylogenetic Significance. *Elytra* 35: 507-527.

LIBONATTI, M. L., M. C. MICHAT & P. L. M. TORRES. 2011. Key to the subfamilies, tribes and genera of adult Dytiscidae of Argentina (Coleoptera: Adephaga). *Revista de la Sociedad Entomológica Argentina* 70(3-4): 317-336.

LIBONATTI, M. L. & R. RUTA. 2013. Review of the Argentinean species of *Pseudomicrocara* Armstrong (Coleoptera: Scirtidae). *Zootaxa* 3718(2): 137-157.

MICHAT, M. C. & M. ARCHANGELSKY. In press. Gyrinidae. *In:* Roig-Juñent, S., L. E. Claps & J. J. Morrone (eds.), *Biodiversidad de Artrópodos argentinos,* vol. 3.

MILLER, K. B. 2000. Revision of the Neotropical genus *Hemibidessus* Zimmermann (Coleoptera: Dytiscidae: Hydroporinae: Bidessini). *Aquatic Insects* 23: 253-275.

MILLER, K. B. 2005. Revision of the New World and southeast Asian Vatellini (Coleoptera: Dytiscidae: Hydroporinae) and phylogenetic analysis of the tribe. *Zoological Journal of the Linnean Society* 144: 415-510.

MILLER, K. B. 2009. On the systematics of Noteridae (Coleoptera: Adephaga: Hydradephaga): Phylogeny, description of a new tribe, genus and species, and survey of female genital morphology. *Systematics and Biodiversity* 7(2): 191-214.

NEIFF, J. J. & A. POI DE NEIFF. 1978. Estudios sucesionales en los camalotales chaqueños y su fauna asociada. I. Etapa seral *Pistia stratiotes – Eichhornia crassipes. Physis,* sección B, 37(95): 29-39.

NILSSON, A. N. 2011. A world catalogue of the family Noteridae, or the burrowing water beetles (Coleoptera, Adephaga). Version 16.VIII.2011. Umeå: distributed electronically as a PDF file by the author, 54 pp. Available on: http://www2.emg.umu.se/projects/biginst/andersn/WCN/WCN_20110816.pdf

NILSSON, A. N. 2013. A world catalogue of the family Dytiscidae, or the diving beetles (Coleoptera, Adephaga). Version 1.I.2013. Umeå: distributed electronically as a PDF file by the author, 304 pp. Available on: http://www2.emg.umu.se/projects/biginst/andersn/WCD_20130101.pdf

OLIVA, A., L. A. FERNÁNDEZ & A. O. BACHMANN. 2002. Sinopsis de los Hydrophiloidea acuáticos de la Argentina (Insecta, Coleoptera). *Monografías del Museo Argentino de Ciencias Naturales* 2: 1-67.

PIC, M. 1922. Nouveautés diverses. *Mélanges exotico-entomologiques* 37: 4-7.

PIC, M. 1928. Notes et descriptions. *Mélanges exotico-entomologiques* 51: 8-9.

POI DE NEIFF, A. 1983. Observaciones comparativas de la mesofauna asociada a *Pistia stratiotes* L. (Araceae) en algunos ambientes acuáticos permanentes y temporarios (Chaco, Argentina). *Physis,* sección B, 41(101): 95-102.

POI DE NEIFF, A. & J. J. NEIFF. 1977. El pleuston de *Pistia stratiotes* de la laguna Barranqueras (Chaco, Argentina). *Ecosur* 4: 69-101.

POI DE NEIFF, A. & J. J. NEIFF. 1984. Dinámica de la vegetación acuática flotante y su fauna en charcos temporarios del sudeste del Chaco (Argentina). *Physis,* sección B, 42(103): 53-67.

SHORT, A. E. Z. & M. FIKÁČEK. 2013. Molecular phylogeny, evolution and classification of the Hydrophilidae (Coleoptera). *Systematic Entomology.* Online early.

The Nature Conservancy (TNC), Fundación Vida Silvestre Argentina (FVSA), Fundación para el Desarrollo Sustentable del Chaco (DeSdel Chaco) & Wildife Conservation Society Bolivia (WCS). 2005. *Evaluación Ecorregional del Gran Chaco Americano / Gran Chaco Americano Ecoregional Assessment.* Fundación Vida Silvestre Argentina, Buenos Aires.

TORRES, P. L. M. & M. ARCHANGELSKY. In press. Hydraenidae. ***In***: Roig-Juñent, S., L. E. Claps & J. J. Morrone (eds.), *Biodiversidad de Artrópodos argentinos,* vol. 3.

TORRES, P. L. M., S. A. MAZZUCCONI & M. C. MICHAT. 2007. Los coleópteros y heterópteros acuáticos del Parque Nacional El Palmar (Provincia de Entre Ríos, Argentina): lista faunística, diversidad y distribución. *Revista de la Sociedad Entomológica Argentina* 66 (3-4): 127-153.

TORRES, P. L. M, S. A. MAZZUCCONI, M. C. MICHAT & A. O. BACHMANN. 2008. Los coleópteros y heterópteros acuáticos del Parque Nacional Calilegua (Provincia de Jujuy, Argentina). *Revista de la Sociedad Entomológica Argentina* 67(1-2): 127-144.

TORRES, P. L. M., M. C. MICHAT, M. L. LIBONATTI, L. A. FERNÁNDEZ, A. OLIVA & A. O. BACHMANN. 2012. Aquatic Coleoptera from Mburucuyá National Park (Corrientes Province, Argentina). *Revista de la Sociedad Entomológica Argentina* 71(1-2): 57-71.

TRÉMOUILLES, E. R. 1989. Contribución para el conocimiento del género *Thermonectus* Dejean en la Argentina y areas limítrofes (Coleoptera, Dytiscidae). *Revista de la Sociedad Entomológica Argentina* 46(1-4): 95-115.

TRÉMOUILLES, E. R. 1995. Insecta, Coleoptera, Dytiscidae. Fascículo 1. Dytiscidae: Methlinae-Hydroporinae. *Fauna de Agua Dulce de la República Argentina* 37: 1-82.

TRÉMOUILLES, E. R. 1998. Dytiscidae. ***In***: Morrone, J.J. y S. Coscarón (eds.), *Biodiversidad de artrópodos argentinos. Una perspectiva biotaxonómica,* La Plata, pp. 210-217.

TRÉMOUILLES, E. R. & A. O. BACHMANN. 1981. Distribución del género *Notaticus* en la Argentina (Coleoptera, Dytiscidae). *Physis,* sección B, 39(97): 101-102.

TRÉMOUILLES, E. R., M. C. MICHAT & P. L. M. TORRES. 2005. A synopsis of the South American *Hydrovatus* (Coleoptera: Dytiscidae: Hydroporinae), with notes on habitat and distribution, and a key to species. *Revista de la Sociedad Entomológica Argentina* 64(1-2): 61-69.

TRÉMOUILLES, E. R., A. OLIVA & A. O. BACHMANN. 1995. Insecta Coleoptera. ***In***: Lopretto, E. C. & G. Tell (eds.), *Ecosistemas de Aguas Continentales, Metodologías para su Estudio,* vol. 3, Ediciones Sur, La Plata, pp. 1133-1197.

TRÉMOUILLES, E. R., P. L. M. TORRES & M. C. MICHAT. 2004. New distributional records and comments for the species of the genus *Queda* Sharp 1882 (Coleoptera: Dytiscidae: Hydrovatini). *Revista de la Sociedad Entomológica Argentina* 63(1-2): 38-40.

VONDEL, B. J. VAN & P. J. SPANGLER. 2008. Revision of the Haliplidae of the Neotropical Region including Mexico (Coleoptera: Haliplidae). *Koleopterologische Rundschau* 78: 69-194.

YOUNG, F. N. 1974. Review of the predaceous water beetles of genus *Anodocheilus* (Coleoptera: Dytiscidae: Hydroporinae). *Occasional papers of the Museum of Zoology, University of Michigan* 670: 1-28.

YOUNG, F. N. 1990. A review of classification of the water beetles of the New World genus *Bidessonotus* Régimbart (Coleoptera: Dytiscidae: Hydroporinae: Bidessini). *Quaestiones Entomologicae* 26: 355-381.