

New distributional and ecological data of *Ochthebius*  
(*Gymnochthebius*) *francki* Bruch, 1915 (Coleoptera, Hydraenidae)  
with a key to the Argentinean species

Nuevos datos de distribución y ecológicos de *Ochthebius*  
(*Gymnochthebius*) *francki* Bruch, 1915 (Coleoptera, Hydraenidae)  
con una clave para las especies argentinas

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**RESUMEN.** Este artículo presenta nuevos datos de distribución de *Ochthebius* (*Gymnochthebius*) *francki* (Bruch, 1915) y describe los ambientes y cuerpos de agua donde ocurre. También proporciona una clave para las nueve especies de *Ochthebius* (*Gymnochthebius*) en Argentina e incluye un mapa de distribución actualizado.

**Palabras clave:** Agua dulce, bioindicadores, coleópteros acuáticos, *Ochthebius* (*Gymnochthebius*), Región Neotropical.

**ABSTRACT.** This paper presents new distributional data for *Ochthebius* (*Gymnochthebius*) *francki* (Bruch, 1915), describes the environments and water bodies where it occurs. In addition, it provides a key to the nine *Ochthebius* (*Gymnochthebius*) species in Argentina and includes an updated distribution map.

**Keywords:** Aquatic Coleoptera, bioindicators, freshwater, Neotropical Region, *Ochthebius* (*Gymnochthebius*).

## INTRODUCTION

The minute moss beetles of the family Hydraenidae are very small Coleoptera (0.8-3.3 mm) that live in different environments ranging from aquatic to terrestrial, and from grasslands up to 3000-4000 meters above sea level. The family is worldwide distributed and includes 1664 species, with 40 genera and 4 subfamilies: Hydraeninae, Ochthebiinae, Orchymontiinae and Prosthetopinae (Benneti & Hamada, 2022; Jäch *et al.*, 2016; Torres & Archangelsky, 2014; Villastrigo *et al.*, 2019).

To date, in Argentina there are 16 known species belonging to three genera and two subfamilies (Hydraeninae and Ochthebiinae): *Hydraena* Kugelann, 1794; *Ochthebius* Leach, 1815 and *Meropathus* Enderlein, 1901. The latter is only known from Islas Malvinas and Isla de los Estados in Tierra del Fuego Province (Torres & Archangelsky, 2014, Villastrigo *et al.*, 2019).

The genus *Ochthebius* includes 58 species and is widely distributed. It is currently divided into 10 subgenera: *Angiochthebius* Jäch & Ribera, 2018, *Asiobates* Thomson, 1859, *Aulacochthebius* Kuwert, 1887, *Cobalius* Rey, 1886, *Enichocerus* Stephens, 1829, *Gymnanthelius* Perkins, 1997, *Gymnochthebius* Orchymont, 1943, *Hughleechia* Perkins, 1981, *Micragasma* Sahlberg, 1900, and *Ochthebius* Leach, 1815 (Villastrigo *et al.*, 2019). The subgenus *Gymnochthebius* is the most abundant in the Neotropical region, and there are some species in North America and Oceania (Perkins, 1980; Perkins & Archangelsky, 2002). There are nine known species of *Ochthebius* (*Gymnochthebius*) in Argentina, although it is also likely that some Chilean species that inhabit the Andes Mountains could be found in southern Argentina (Delgado & Archangelsky, 2005; Perkins, 1980; Perkins & Archangelsky, 2002; Torres & Archangelsky, 2014).

The *O. (G.) francki* type specimen was collected for the Parque Saavedra, La Plata city, Buenos Aires Province by Bruch (1915). More recently, several specimens have been collected in Isla Martín García, and Neuquén and Salta Provinces (Perkins, 1980; Torres & Archangelsky, 2014). Yet, information about this species is scarce.

The aims of the current study are to report

for the first time the presence of *Ochthebius (Gymnochthebius) francki* in Santa Fe Province, provide information about its habitat, and present a key to the male adult Argentinean species of the *Gymnochthebius* subgenus.

## MATERIAL AND METHODS

### Study area

Samples were obtained in "Bajo las Estacas", "El Chupino" and "Confluencia" streams located in Santa Fe Province (Figures 1 and 2), which belong to the Undulating Pampa complex of the Pampa ecoregion according to Biasatti *et al.* (2016). Sampling sites where *O. (Gymnochthebius) francki* were collected, represent the sites named as P4 to P6 in Capeletti *et al.* (2019). The region has a temperate temperature regime, with an annual average temperature of 16.5 °C. Annual rainfall varies from 700 to 1000 mm, with approximately 70% of the rain falls occurring in Summer, from October to March. The streams flow mainly from West to East into the Paraná River (Biasatti *et al.*, 2016). Streams in the area are generally 20 to 50 m wide and 10 to 50 km long, with very gently sloping banks. There are transition strips between the ravines and the higher lands (Iriondo, 2016).

### Edaphology

There are two predominant soil in the surrounding area of the streams: casilda and peyrano, which are highly fertile and provide homogeneity to the region's productive system (Herrera *et al.*, 2014). The soil type is Mollisol (Argiudoll group) with silty loam surface texture and silty clay subsurface texture (GeoINTA, 2014), characterized by the absence of floating macrophytes on the riverbank.

### Entomological material

The material consists of samples obtained in



Figure 1. Sampling sites where *O. (G.) francki* was collected.

Figura 1. Sitios de muestreo en los cuales se colectó *O. (G.) francki*.



Figure 2 a-g. Sampling sites. a. Bajo las Estacas, b. El Chupino, c-g. Confluencia.

Figura 2 a-g. Sitios de muestreo. a. Bajo las Estacas, b. El Chupino, c-g. Confluencia.

November 2017 from an agricultural matrix basin to evaluate the ecological health of streams of different orders based on the quality of the riparian vegetation, the fluvial habitat, and the attributes of the benthic macroinvertebrates (Capeletti *et al.*, 2019). At each site, three benthic macroinvertebrate samples were collected using the multiple habitat sampling methodology and design (multihabitat approach, EPA; Barbour *et al.*, 1999) with a D-net equipped with a 200  $\mu\text{m}$  mesh (0.3 m wide and 1 m long handle). Aquatic beetles were separated from

other macroinvertebrates. The male adult of the Hydraenidae specimens were identified with the keys provided in Perkins (1980) and compared to the original description (Bruch, 1915). The material was deposited in the "Lorenzo Scaglia" Natural Sciences Museum, Mar del Plata, Argentina.

## RESULTS

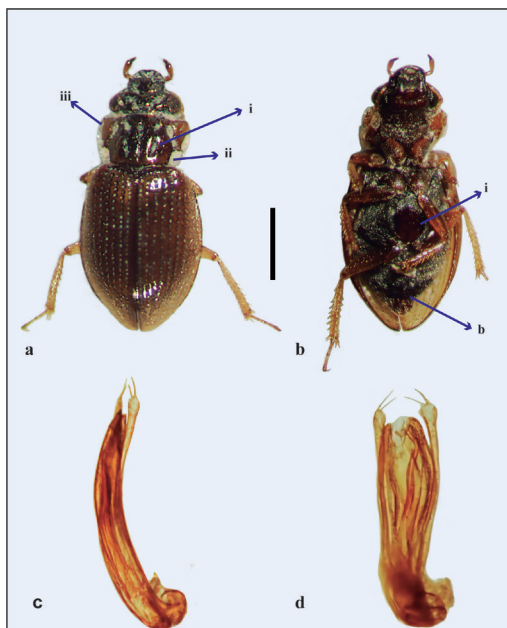
The main characteristics of the sampled environments are described in Table 1.

**Table 1.** Physical, limnological and geographical characteristics of the sample sites.

**Tabla 1.** Características físicas, geográficas y limnológicas de los sitios de muestreo.

Sampling sites	Stream order	Geographic coordinates	Patch	Light exposition	Velocity-depth regimes	Substrate composition	Riparian vegetation
Bajo las Estacas	1°	32°26'8.87"S 61°18'24.55"W	Shallow, fast	Exposed to the sun	Sedimentation between 30 and 60%	Tosca, silt and clay (equal percentage)	Grasses, <i>Schoenoplectus californicus</i> , <i>Hydrocotyle bonariensis</i> and <i>Ammia</i> spp
El Chupino I El Chupino II	2°	32°26'23.53"S 61°18'10.69"W	Deep, lentic	Large clearings	High frequency of rapids	Tosca and lower percentage of silt and clay	Grasses, <i>Ammia</i> spp., <i>Cyperus entrerianus</i> and <i>Parkinsonia aculeata</i>
Confluencia I Confluencia II Confluencia III Confluencia IV	3°	32°25'27.66"S 61°16'49.06"W	Deep, lentic Deep, fast Shallow, fast Shallow, lentic	Large clearings	High frequency of rapids	Tosca and lower percentage of silt and clay	Grasses, <i>Anthemis</i> sp. and <i>Ammia</i> spp

*Ochthebius (Gymnochthebius) francki* Bruch, 1915 (Figure 3).



**Figure 3 a-g.** *Ochthebius (Gymnochthebius) francki*. Habitus a. Habitus, dorsal view. i: Pronotum foveae, ii: Membranous area of pronotum, iii: Anterolateral margin of pronotum rounded. b. Habitus, ventral view i: Median area of metasternum without pubescence, ii: Fifth abdominal sternum with anterior half with pubescence. c. Male genitalia, lateral view, d. Male genitalia, ventral view. Scale bars for a and b = 0.5 mm.

**Figura 3 a-g.** *Ochthebius (Gymnochthebius) francki*. Habito a. Habito, vista dorsal. i: Fóvea del pronoto, ii: Área membranosa del pronoto, iii: Margen anterolateral del pronoto redondeado. b. Habito, vista ventral. i: Área media del metasterno sin pubescencia, ii: Quinto estenito abdominal con la mitad anterior con pubescencia. c. Genitalia del macho, vista lateral. d. Genitalia del macho, vista ventral. Barras de escala para figuras a y b = 0.5 mm.

**Material Examined:** Examined male adult specimens were collected from Santa Fe Province, Cañada Carrizales, “Bajo las Estacas”, “El Chupino” and “Confluencia” streams. Julieta Capeletti col. (XI-2020); sample “El Chupino” I (2 specimens); sample “Confluencia” III (1 specimen); sample “Confluencia” II (1 specimen); sample “Bajo las Estacas” (3 specimens); sample “Confluencia” VI (1 specimen); sample “El Chupino” I (1 specimen); and sample “Confluencia” I (1 specimen).

**Diagnosis:** Small size 1.8-1.9 mm (N = 10). Head dark brown with slight metallic sparkle. Pronotum and elytra brown to yellow-brownish. Pronotum very finely and sparsely punctuated. Elytral striae moderately deeply impressed. Metasternum with a large median glabrous area. Fifth urosternite with only the anterior half with pubescence (for a complete description, see Perkins 1980).

Distribution in Argentina: Buenos Aires, Neuquén, Santa Fe and Salta Provinces (Figure 4).



**Figure 4. Distribution of species of subgenus *Ochthebius (Gymnochthebius)* in Argentina.** 1. *O. (G.) francki*, 2. *O. (G.) fossatus*, 3. *O. (G.) ischigualasto*, 4. *O. (G.) jensenhaarupi*, 5. *O. (G.) octonarius*, 6. *O. (G.) plesyotipus*, 7. *O. (G.) reticulatissimus*, 8. *O. (G.) reticulatus*, 9. *O. (G.) topali*. \* New record.

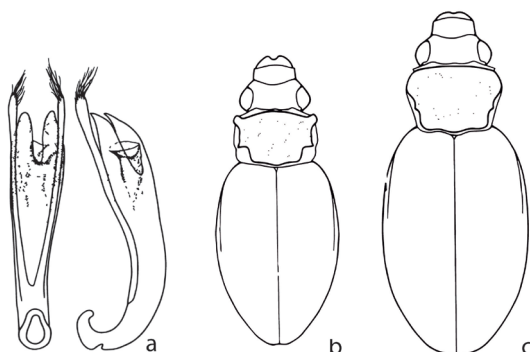
**Figura 4. Distribución de especies del subgénero *Ochthebius (Gymnochthebius)* en Argentina.** 1. *O. (G.) francki*, 2. *O. (G.) fossatus*, 3. *O. (G.) ischigualasto*, 4. *O. (G.) jensenhaarupi*, 5. *O. (G.) octonarius*, 6. *O. (G.) plesyotipus*, 7. *O. (G.) reticulatissimus*, 8. *O. (G.) reticulatus*, 9. *O. (G.) topali*. \* Nuevo registro.

**Key to the Argentinean species of the subgenus *Ochthebius* (*Gymnochthebius*) with updated distribution along the country.** (Modified and adapted from Perkins, 1980 and Perkins & Archangelsky 2002).

- 1. Fifth abdominal sternum without pubescence; pronotum with pronounced, digitiform anterior lobe; small species (1.26-1.76 mm). Distribution: Tucumán province.....***Ochthebius fossatus***
- 1'. Fifth abdominal sternum entirely or partially covered by pubescence; pronotum with anterior lobe more rounded, not digitiform; larger species (1.70-2.50 mm) .....
- 2. Fifth abdominal sternum and metasternum entirely covered by pubescence; size large, body broad; main piece of aedeagus symmetrical (Figure 5) .....
- 2'. Abdominal sternum 5 with hydrofuge pubescence in anterior half, posterior half glabrous; metasternum with large median glabrous area; size medium to large; main piece of aedeagus variable .....
- 3. Pronotal foveae large, markedly microreticulate; elytra deeply striate-punctate throughout (Figure 5c). Distribution: Rio Negro province..... ***Ochthebius plesiotypus***
- 3'. Pronotal foveae small, slightly microreticulate at most; elytra not deeply striate-punctate .....
- 4. Pronotal lateral depressions extended posteriorly; elytral rows of punctures very fine, separated by 2.0-3.0 times puncture diameter, not arranged in striae; body broad; aedeagus with parameres curving outwards. Distribution: Tucumán province.....***Ochthebius octonarius***
- 4'. Pronotal lateral depressions shorter; elytra with rows of larger punctures, separated by 0.5-1.0 times puncture diameter; striae moderately deep in anterior half of elytron, very shallow on remainder; body narrow; aedeagus with parameres straight (Figure 5a). Distribution: Jujuy, La Rioja, Mendoza, Rio Negro and Tucumán provinces..... ***Ochthebius jensenhaarupi***
- 5. Pronotum distinctly quadrate, entire surface coarsely microreticulate; large, robust species (2.00-2.50 mm); main piece of aedeagus almost symmetrical .....
- 5'. Pronotum less quadrate, microreticulation absent from areas between anterior and posterior lateral foveae, in most specimens restricted to foveae or absent; smaller species (1.70-2.08 mm); main piece of aedeagus distinctly asymmetrical .....
- 6. Elytral intervals clearly costate, rows of punctures obscured by well-developed microreticulation; pronotum uniformly microreticulate, dull; aedeagus with distal portion of main piece narrow, parameres almost straight. Distribution: Tucumán province .....
- 6'. Elytral intervals rounded, not costate, rows of punctures clearly defined, not obscured by microreticulation; pronotal disc with microreticulation slightly effaced, hence slightly more reflective than remainder of pronotum; aedeagus with distal portion of main piece wider, parameres curving inwards .....
- 7. Dorsal coloration dark; microreticulation of pronotum and elytra less developed; parameres weakly arcuate. Distribution: San Juan province .....
- 7'. Dorsal coloration brown; microreticulation of pronotum and elytra more developed; parameres distinctly arcuate. Distribution: Jujuy province .....

8. Pronotal anterior lobes digitiform; pronotal reliefs very convex (Figure 5b). Distribution: Rio Negro province ..... ***Ochthebius topali***

8'. Pronotal anterior lobes rounded; pronotal reliefs flat or slightly convex. Distribution: Buenos Aires, Neuquén, Salta and Santa Fe provinces ..... ***Ochthebius francki***



**Figure 5. Body shapes and symmetrical male genitalia.** Symmetrical male genitalia of *O. (G.) jensenhaarupi* a. Male genitalia, ventral and lateral lateral view. Habitus. b. *O. (G.) topali* habitus, dorsal view. c. *O. (G.) plesiotypus* habitus, dorsal view. Figure modified and adapted from Perkins, 1980.

**Figura 5. Formas del cuerpo y genitalia simétrica del macho.** Genitalia del macho simétrica de *O. (G.) jensenhaarupi* a. Genitalia del macho, vista ventral y lateral. Hábito. b. *O. (G.) topali* hábito, vista dorsal. c. *O. (G.) plesiotypus* hábito, vista dorsal. Figura modificada y adaptada de Perkins, 1980.

## DISCUSSION

As is observed in Figure 4, the knowledge of family Hydraenidae in Argentina is fragmentary. Although many studies on aquatic Coleoptera, and surely many sampling campaigns, have been conducted in Argentina, there are numerous provinces where Hydraenidae species have not been reported. This could be due to the lack of taxonomists specializing in this family and the lack of taxonomists in the last decades per se (Agnarsson & Kuntner, 2007; Pinto *et al.*, 2021). For example, the last species described for the genus in Argentina was *Ochthebius (Gymnochthebius) ischigualasto* (Perkins & Archangelsky, 2002). It is believed that there are still many species to be discovered, and

that other species from neighboring countries are probably also present in Argentina (Torres & Archangelsky, 2014).

In our study, *O. (G.) francki* was found in a basin with streams of different orders, within an agricultural matrix. The specimens were found in low-order streams (from 1 to 2 on the Strahler scale), with optimal fluvial habitat conditions, but not very good conditions according to the riverbank quality (Capeletti *et al.*, 2019). The information provided in this study could be useful to use *O. (G.) francki* as a bioindicator of environmental quality. However, their tolerance to different environmental gradients should be previously studied. Several methodologies have been developed that allow us to use a wide variety of organisms as bioindicators that reflects the chemical and physical changes generated by human activities in the ecosystem. These methodologies are considered as a necessary tool, along with traditional chemical analyses, to characterize environmental pollution. The use of macroinvertebrates as bioindicators is a useful tool to detect alterations that occur in aquatic ecosystems (Prat *et al.*, 2009).

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