

NEW DATA OF *OCYS TACHYSOIDES* (ANTOINE, 1933) IN THE IBERIAN PENINSULA AND DISCUSSION ABOUT ITS MORPHOLOGICAL DISTINCTION FROM *OCYS HARPALOIDES* (AUDINET-SERVILLE, 1821) (COLEOPTERA, CARABIDAE)

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ABSTRACT

Ocys tachysoides (Antoine, 1933) and *Ocys harpaloides* (Audinet-Serville, 1821) are two close-related species whose distinction was difficult before the publication of some recent works. While *O. harpaloides* is well known in the Iberian Peninsula, scarce data of *O. tachysoides* are available (only four records have been published). We hypothesized that *O. tachysoides* has been largely misidentified with *O. harpaloides* in the territory. To test this hypothesis, Iberian collections material of *O. harpaloides* and *Ocys* sp. were studied and (re)identified to species level based on the currently known diagnostic characters (genitalia and external traits). The hypothesis was supported, as a total of 9 wrong or non-previously identified samples of *O. tachysoides* were noticed. Thus, and together with three recent captures in Central Spain, 11 new records of *O. tachysoides* are provided. Our results suggest that, at least in the Iberian populations, the morphology of the male and female genitalia and the microsculpture pattern are consistent diagnostic characters. On the contrary, rare expressions of elytra coloration, elytra shape and shape of the hind angles of pronotum occurs in both species. The actualized chorology of *O. tachysoides* shows that the species is present in Central and North-West Spain and in North and Central Portugal, in temperate and relatively high humid regions (frequently with mountainous and forest habitats). Future studies are necessary to assess the real distribution and autecology of *O. tachysoides*.

Key words: Bembidiini, character expression, chorology, Iberian Peninsula, new records, *Ocys*, *Ocys tachysoides*, *Ocys harpaloides*.

RESUMEN

Nuevos datos de *Ocys tachysoides* (Antoine, 1933) en la península ibérica y discusión sobre su distinción de *Ocys harpaloides* (Audinet-Serville, 1821) (Coleoptera, Carabidae).

Ocys tachysoides (Antoine, 1933) y *Ocys harpaloides* (Audinet-Serville, 1821) son dos especies próximas cuya distinción era difícil antes de la publicación de ciertos trabajos recientes. Mientras que *O. harpaloides* es bien conocido en la península ibérica, los datos disponibles sobre *O. tachysoides* son escasos (tan solo cuatro citas han sido publicadas). Se planteó la hipótesis de que *O. tachysoides* ha sido frecuentemente confundido con *O. harpaloides* en dicho territorio. Para evaluarla, se estudió material ibérico, de colección, de *O. harpaloides* y *Ocys* sp. y se (re)identificó a nivel de especie basándose en los caracteres diagnósticos actualmente conocidos (genitalia y rasgos externos). Un total de 9 ejemplares de *O. tachysoides* fueron localizados entre el material estudiado, lo que apoya la hipótesis inicial. Así, y junto con tres capturas recientes en España central, se aportan 11 citas nuevas de *O. tachysoides*. Los resultados sugieren que, al menos en las poblaciones ibéricas, la morfología de la genitalia y el patrón de la microescultura son caracteres diagnósticos consistentes. Por el contrario, ambas especies pueden presentar expresiones poco comunes de la coloración y forma de los élitros y de la forma de los ángulos posteriores del pronoto. La corología actualizada de *O. tachysoides* muestra que la especie está presente en el centro y noroeste de España y en el centro y norte de Portugal, en regiones templadas y húmedas que, frecuentemente, cuentan con hábitats montañosos y forestales. Son necesarios futuros estudios para esclarecer la distribución real y la autoecología de *O. tachysoides*.

Palabras clave: Bembidiini, corología, expresión de caracteres, nuevas citas, *Ocys*, *Ocys tachysoides*, *Ocys harpaloides*, península ibérica.

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Introduction

Bembidiini (Coleoptera, Carabidae, Trechinae) is one of the most species-rich tribes of ground beetles in the Iberian Peninsula and Balearic Islands. In this territory, Bembidiini represents about 10% of the carabid fauna, with 130 species belonging to the genera *Bembidion* Latreille, 1802 (108 spp.), *Asaphidion* Gozis, 1886 (9 spp.), *Ocys* Stephens, 1828 (5 spp.), *Cillenius* Samouelle, 1819 (1 sp.) and *Sinechostictus* Motschulsky, 1864 (7 spp.) (Ortuño & Toribio, 2005; Serrano, 2020). The carabid beetles of this tribe are common elements of humid habitats, such as river and lake shores, in where they generally prey on other invertebrates (Andersen, 1970; Hering & Plachter, 1997).

The genus *Ocys* is a well-defined group that occupies a basal position in the phylogeny of Bembidiini (Maddison, 2012). It is characterized by a labium fused with the pre-basilar, a careniform apical striola and the presence of an only one discal setigerous pore (Ortuño & Toribio, 2005). In the Iberian Peninsula and Balearic Islands, some *Ocys* are endemisms with a narrow distribution and strict habitat requirements, others are euryoic ground beetles easily found in so many humid habitats and others are poorly known species that have been collected very sporadically in the territory (Ortuño & Toribio, 2005). In particular, the last two different situations occur between two close related species of the *Ocys* s. str. group: *Ocys harpaloides* (Audinet-Serville, 1821) and *Ocys tachysoides* (Antoine, 1933).

Ocys harpaloides is a widespread Palearctic element (Maggi *et al.*, 2003: 272) and the most common species of *Ocys* in the Iberian Peninsula and Balearic Islands (Ortuño & Toribio, 2005). Abundant data of *O. harpaloides* have been provided from this region (Baehr, 1986; Zaballo, 1989; Andújar *et al.*, 2000; Novoa *et al.*, 2003; Ortuño & Toribio, 2005; Peláez & Salgado, 2007; Serrano *et al.*, 2015; Toribio & Ramos Abuín, 2018; among others).

On the other hand, *O. tachysoides* is a rare species in the territory (4 records; Sciaky, 1998; Toribio, 2013; Toribio & Ramos Abuín, 2018). It was described as a “form” of *O. harpaloides* occurring in North Africa (Antoine, 1933), but afterwards the same author raised it to the category of species (Antoine, 1955). The decision was based principally on differences in elytra shape and aedeagus morphology, and the

typical expressions of these characters were described for the two *Ocys* (Antoine, 1955). The first record of *O. tachysoides* in the Iberian Peninsula was provided by Sciaky (1998) from Portugal, and the existing scarce data were summarized in the monography of Iberian Bembidiini published by Ortuño & Toribio (2005). Since then, only some comments and three more records were published (Toribio, 2013; Toribio & Ramos Abuín, 2018), so the knowledge about Iberian populations of this species has been hardly increased.

More recently, Maddison & Anderson (2016) played an integrative morphological and molecular study on specimens from North Africa and different regions of Europe (including the Iberian Peninsula) that confirmed the validity of the taxonomic status of *O. tachysoides*. Maddison & Anderson (2016) also demonstrated that several European collection samples of *O. tachysoides* have been wrong identified as “forms” of *O. harpaloides*, so its global distribution was largely increased. In addition, Maddison & Anderson (2016) proposed new diagnostic characters and described their typical expression in both species: elytra coloration, spermatheca morphology, microsculpture pattern and shape of the hind angles of pronotum.

Soon after the publication of the work of Maddison & Anderson (2016), new wrong-identified collection material of *O. tachysoides* was detected in Germany and the Netherlands, increasing again the chorological knowledge of the species (Fritze *et al.*, 2017; Muilwijk & Felix, 2017). However, Muilwijk & Felix (2017) suggested that some of the morphological external characters reported by Maddison & Anderson (2016) were similar between some Dutch samples of *O. harpaloides* and *O. tachysoides*, so not all of them would be completely reliable for the species identification.

We hypothesized that the scarce number of records of *O. tachysoides* in the Iberian Peninsula may results from the difficult distinction of the two species of *Ocys*, especially before the publication of the most recent works. To test this hypothesis, we re-studied Iberian collection material of *O. harpaloides* and *Ocys* sp. in order to detect wrong and/or non-identified individuals of *O. tachysoides*. In addition, we assessed the species recognition based on external characters in this material and in three recently collected individuals of *O. tachysoides*. The

Table 1.— List of studied specimens from Spain (SP) and Portugal (PG). The taxon assignation of each sample before [*taxon (collection label)*] and after [*specific (re)assignation*] of the study is included. The (re)identified material of *Ocys tachysoides* is highlighted with a light grey background.

Tabla 1.— Lista de los ejemplares estudiados de España (SP) y Portugal (PG). Se indica el taxón asignado a cada muestra antes [*taxon (collection label)*] y después [*specific (re)assignation*] del estudio. El material (re)identificado de *Ocys tachysoides* está resaltado por un fondo gris claro.

	Locality	UTM	Taxon (collection label)	Specific (re)assignation
Andalusia (SP)	2 ♂♂. Cueva Motilla, El Parralejo, Cortes de la Frontera, Cádiz, 14-III-2010, GIEX leg.	30STF74	<i>Ocys</i> sp.	<i>Ocys harpaloides</i>
	1 ♀. Finca Almoraima, Campo de Gibraltar, 31-III-1987, V.M. Ortuño leg.	30STF81	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
Aragon (SP)	1 ♀. Ansó (Veral river), Huesca, 01-V-2002. V.M. Ortuño leg.	30TXN73	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
	1 ♂, 1 ♀. Barranco Galapatizos, Luesia, Zaragoza, 26-VII-2016, V.M. Ortuño leg.	30TXM69	1 ♂ <i>Ocys harpaloides</i> ; 1 ♀ <i>Ocys</i> sp.	<i>Ocys harpaloides</i>
	1 ♀, Selva de Oza (Aragón Subordán river), Huesca, 30-IV-2002, V.M. Ortuño leg.	30TXN83	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
Asturias (SP)	1 ♂, Ribadesella, 05-VIII-1981, J. Ramos leg.	30TUP31	<i>Ocys harpaloides</i>	<i>Ocys tachysoides</i>
Balearic Islands (SP)	1 ♀, Cueva de Sa Cometa dels Morts, Mallorca, 28-VIII-2010, M. Vadell leg.	31SDE80	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
Cantabria (SP)	1 ♂, Aniezo, 26-VIII-2001, V.M. Ortuño leg.	30TUN77	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
	1 ♀, Cueva del Valle Rasines, VIII-2015, M. Gutiérrez leg.	30TVN69	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
Castile and Leon (SP)	2 ♀♀, Arroyo de Prao Viejo, Salientes, León, 1458 m, 07-VIII-2019, V.M. Ortuño & O. Arribas leg.	29TQH14	<i>Ocys</i> sp.	<i>Ocys tachysoides</i>
	1 ♂, Gudillos, Segovia, 04-III-1973, R. Outerelo leg.	30TVL00	<i>Ocys harpaloides</i>	<i>Ocys tachysoides</i>
	1 ♂, Hayedo de la Pedrosa, Segovia, 1630 m., 05-X-2019, J. Muñoz-Santiago leg.	30TVL66	–	<i>Ocys tachysoides</i>
	1 ♀, Valle de Iruelas, Ávila, 18-I-1995, V.M. Ortuño leg.	30TUK67	<i>Ocys harpaloides</i>	<i>Ocys tachysoides</i>
Castile-La Mancha (SP)	1 ♀, Anquela del Ducado, Guadalajara, 24-I-1984, Subias leg.	30TWL73	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
	1 ♀, Cuenca (source of Cuervo river), 16-V-1987, V.M. Ortuño leg.	30TWK97	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
Catalonia (SP)	1 ♂, Beuda, Gerona, 05-V-1991	31TDG77	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
	2 ♂♂, Embalse de Boadella, Gerona, 04-VII-1990, V.M. Ortuño leg.	31TDG88	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
	1 ♂, 1 ♀, Terrades, Gerona, 03-V-1991, V.M. Ortuño leg.	31TDG88	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
	1 ♀, Vilafant, Gerona, 24-VIII-1994, V.M. Ortuño leg.; 2 ♀♀, idem, 27-VIII-1994, V.M. Ortuño leg.	31TDG97	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
Madrid (SP)	1 ♂, Arroyo de la Dehesa, Somosierra, 1406 m., pitfall trapping from 17-IV-2021 to 18-V-2021, V.M. Ortuño & E. Andrés Gómez leg.	30TVL55	–	<i>Ocys tachysoides</i>
	1 ♀, Arroyo de Majalvir, Lozoya, 1700 m., 23-IV-2021, J. Muñoz-Santiago leg.	30TVL33	–	<i>Ocys tachysoides</i>
	1 ♂, Aldea del Fresno, 11-II-1973, R. Outerelo leg.	30TUK96	<i>Ocys harpaloides</i>	<i>Ocys tachysoides</i>
	1 ♀, El Pardo, 03-VII-1978, M.E. Mínguez leg.	30TVK38	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
	1 ♂, Meco, 610 m, unkown date, J. Álvarez leg.	30TVK78	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
	1 ♀, Montejo de la Sierra, 24-XI-1986, V.M. Ortuño leg.	30TVL54	<i>Ocys harpaloides</i>	<i>Ocys tachysoides</i>
	1 ♀, Villaviciosa de Odón, 29-IV-1992, V.M. Ortuño leg.	30TVK16	<i>Ocys harpaloides</i>	<i>Ocys tachysoides</i>
Montalegre (PG)	1 ♂, Morgade, 26-VII-1983, Outerelo leg.	29TPG02	<i>Ocys harpaloides</i>	<i>Ocys tachysoides</i>
Valencian Community (SP)	1 ♂, 1 ♀, Cova del Oroa, Chesa, 10-V-2009, Sendra & Teruel leg.	30SXJ93	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>
	1 ♂, Altea, Alicante, 15-I-1989, J.M. Beltrán leg.	30SYH57	<i>Ocys harpaloides</i>	<i>Ocys harpaloides</i>

objectives of the present study are: 1) provide new records of *O. tachysoides* in the Iberian Peninsula; 2) study the consistency of the diagnostic external characters of *O. tachysoides* and *O. harpaloides* in Iberian populations.

Material and methods

STUDIED MATERIAL

A total of 37 specimens of *Ocys* was studied (Table 1). From this material, 29 individuals had been identified as *O. harpaloides* and 5 as *Ocys* sp. before our work (this information was obtained from the collection label of each sample). The remaining 3 individuals were recently collected in different localities of Central Spain by hand (exploring under rocks, wood, detritus and others refuges of the soil) and pitfall trapping. These last samples were studied for first time.

The studied material is deposited in the collection of Department of Life Sciences, Faculty of Sciences, University of Alcalá, Alcalá de Henares, Madrid, Spain (V.M. Ortuño Collection) and in the J. Muñoz-Santiago collection, Madrid, Spain.

SPECIES (RE)IDENTIFICATION AND STUDY OF DIAGNOSTIC CHARACTERS

All the studied material was (re)identified to species level with no considering the information provided by the collection labels. Specific (re)assignments were based jointly on the study of the genitalia and all the known diagnostic external characters. The study was done using a NIKON SMZ 1000 stereomicroscope. The median lobe of the aedeagus was studied in left-lateral view, and the study of the female genitalia was focused on the spermatheca morphology.

In order to check and compare the consistency and reliability of the diagnostic external characters,

both typical and atypical expressions of them were recognized for each sample after completing the specific (re)identifications. The typical expression of the studied characters is summarized in Table 2 for both species, according to the published information (Antoine, 1933, 1955; Maddison & Anderson, 2016). High-quality illustrations of these characters and their expressions were provided by Maddison & Anderson (2016) and Muilwijk & Felix (2017).

CHOROLOGY

An actualized distribution map of *O. tachysoides* in the Iberian Peninsula was done using QGIS (Quantum Gis Development Team, 2018). All records were implemented in the UTM system with coordinates of 10x10km. When necessary, Google Earth (2015) was used to obtain those coordinates.

The occurrence points in the map reflect both the previously known (white circles) and the new (red circles) records. This information overlaps with two templates that inform about the orography and the annual average pluviometry of the Iberian Peninsula. The records provided by Sciaky (1998) and Toribio (2013) were not included in the distribution map due to their imprecision, but they are discussed.

Results

SPECIFIC (RE)IDENTIFICATION OF COLLECTION MATERIAL

From the total of 29 collection samples previously identified as *O. harpaloides*, 7 were re-identified as *O. tachysoides*; from the total of 5 collection samples of *Ocys* sp., 3 were identified as *O. harpaloides* and 2 as *O. tachysoides*; the three recently collected samples, studied for first time, were identified as *O. tachysoides* (Table 1).

Table 2.— Summary of the known diagnostic characters of *Ocys harpaloides* and *O. tachysoides* and their typical expression, according to the published information.

Tabla 2.— Resumen esquemático de los caracteres diagnósticos conocidos de *Ocys harpaloides* y *O. tachysoides* y sus expresiones típicas, de acuerdo a la información publicada.

	Diagnostic characters	Typical expression	
		<i>Ocys harpaloides</i>	<i>Ocys tachysoides</i>
Genitalia	Median lobe	Apex thinner and markedly bent toward, so the base is slightly arcuate	Apex wider and poorly or nothing bent toward, so the base is clearly straighter
	Spermatheca	Opposite side of the efferent duct insertion point markedly curved	Opposite side of the efferent duct insertion point much less curved, almost straight
External characters	Microsculpture pattern	Transverse lines closely spaced. No tendency to form meshes	Lines not closely spaced. Tendency to form meshes
	Elytra coloration	Anterior and central regions paler than the lateral and posterior margins	Both margins and central disc with a uniform dark color (brown or black)
	Elytra shape	Pyriform, with the maximum width in the apical third	Oval, with the maximum width at the median level
	Shape of the hind angles of pronotum	No straight and no protruding angles, with no deep border	More protruding angles directed to the humeral region, with marked border

DIAGNOSTIC CHARACTERS AND TYPICAL EXPRESSIONS

The study of male and female genitalias was very useful for the species identification, as both the median lobe and the spermatheca are clearly different between *O. harpaloides* and *O. tachysoides* in all samples, according to the published information (Antoine, 1955; Ortuño & Toribio, 2005; Toribio, 2013; Maddison & Anderson, 2016; Muilwijk & Felix, 2017).

With respect to the diagnostic external characters, 13 individuals of *O. harpaloides* and 6 of *O. tachysoides* presented all the typical character expressions of their respective species, while the rest of the samples presented at least one character atypically expressed. The study of the external morphology revealed that the incidence of atypical trait expressions is different among the 4 characters here evaluated (Fig. 1). The microsculpture was the most consistent character, as all samples presented the pattern that is considered typical of their species. The elytra coloration and elytra shape were less consistent as, in both cases, atypical expressions were presented by 5 of the 37 studied samples. The variability of elytra coloration found in the studied material of *O. tachysoides* and *O. harpaloides* is illustrated in Fig. 2. Finally, the shape of the hind angles of pronotum was the less consistent character: 11 individuals presented an atypical expression of this character.

CHOROLOGY

Previous records: Serra da Estrela, Guarda, Portugal (Sciaky, 1998) [non-precise]; Guadalajara, Castilla-La Mancha, Spain (Toribio, 2013) [non-precise]; Moal-Cangas de Narcea (Tablizas stream), Asturias, Spain (Toribio & Ramos-Abuín, 2018) [29TPH96]; Paredes-

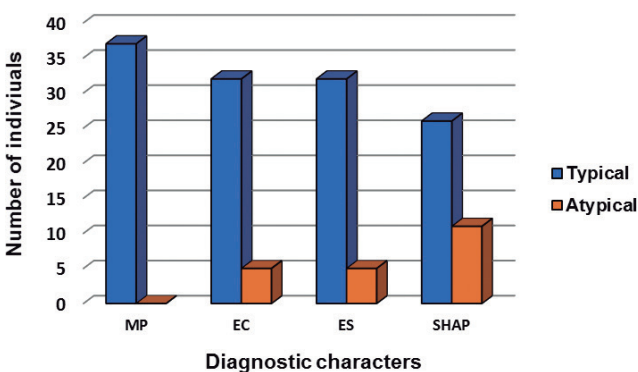


Fig. 1.— Incidence of typical and atypical expressions of diagnostic external characters in 37 individuals of *Ocys tachysoides* and *Ocys harpaloides*. Abbreviations: microsculpture pattern [MP]; elytra coloration [EC]; elytra shape [ES]; shape of the hind angles of pronotum [SHAP].

Fig. 1.— Incidencia de expresiones típicas y atípicas de caracteres externos diagnósticos en 37 individuos de *Ocys tachysoides* y *Ocys harpaloides*. Abreviaturas: patrón de microescultura [MP]; coloración de los élitros [EC]; forma de los élitros [ES]; forma de los ángulos posteriores del pronoto [SHAP].

Valdés (Esva river), Asturias, Spain (Toribio & Ramos-Abuín, 2018) [29TQJ01].

A total of 11 new records are provided for *O. tachysoides* in North-West and Central Spain and in North Portugal (Fig. 3). The majority of these records occurs in mountainous (Fig. 3A) and relatively humid (Fig. 3B) regions.

Discussion

The initial hypothesis was supported, as several samples of *Ocys tachysoides* were noticed among collection material previously identified as *Ocys harpaloides* and *Ocys* sp. (Table 1). The results of this work suggest that the recognition of *O. tachysoides* and *O. harpaloides* should not be assessed only by a superficial study of their external appearance, as individuals of both species could present atypical expressions of one or more diagnostic external characters (Fig. 1).

The microsculpture pattern was the most consistent external character in the studied material: microsculpture forming meshes, with lines not closely spaced, is typical of *O. tachysoides*, while microsculpture not forming meshes, with transverse lines closely spaced, is typical of *O. harpaloides*. We must indicate that it could be difficult to distinguish the expressions of this trait without comparison material of the two species. The elytra coloration, elytra shape and shape of the hind angles of pronotum were, all of them, less consistent characters, as atypical expressions were detected in all cases in the two studied species. Thus, we suggest not considering typical expressions of these last three traits, but more or less common expressions (at least in the Iberian populations). The variability of elytra coloration in the two studied *Ocys* is illustrated for first time in the present work (Fig. 2). In *O. tachysoides*, the most common elytra coloration is entirely dark, contrasting with the paler head and pronotum (Fig. 2A). However, elytra in this species also could be reddish or brown, resulting in a poor or inexistent contrast between these three body parts (Figs. 2B, C). In *O. harpaloides*, the anterior and central regions of elytra are commonly paler than the lateral and posterior margins (Fig. 2D), but in some individuals the elytra coloration is uniform, more or less similar to the head and pronotum (Fig. 2E, F).

The new records of *O. tachysoides* provided in this work highly increase its chorological knowledge in the Iberian Peninsula. In this territory, the species is known from the central and northwestern regions, and it occurs in relatively humid locations with temperate climate and, frequently, mountainous orography (Fig. 3). In Spain, we provide the first records of *O. tachysoides* for the autonomous communities of Madrid and Castile and Leon, and we confirm its presence in Asturias. We also provide the second

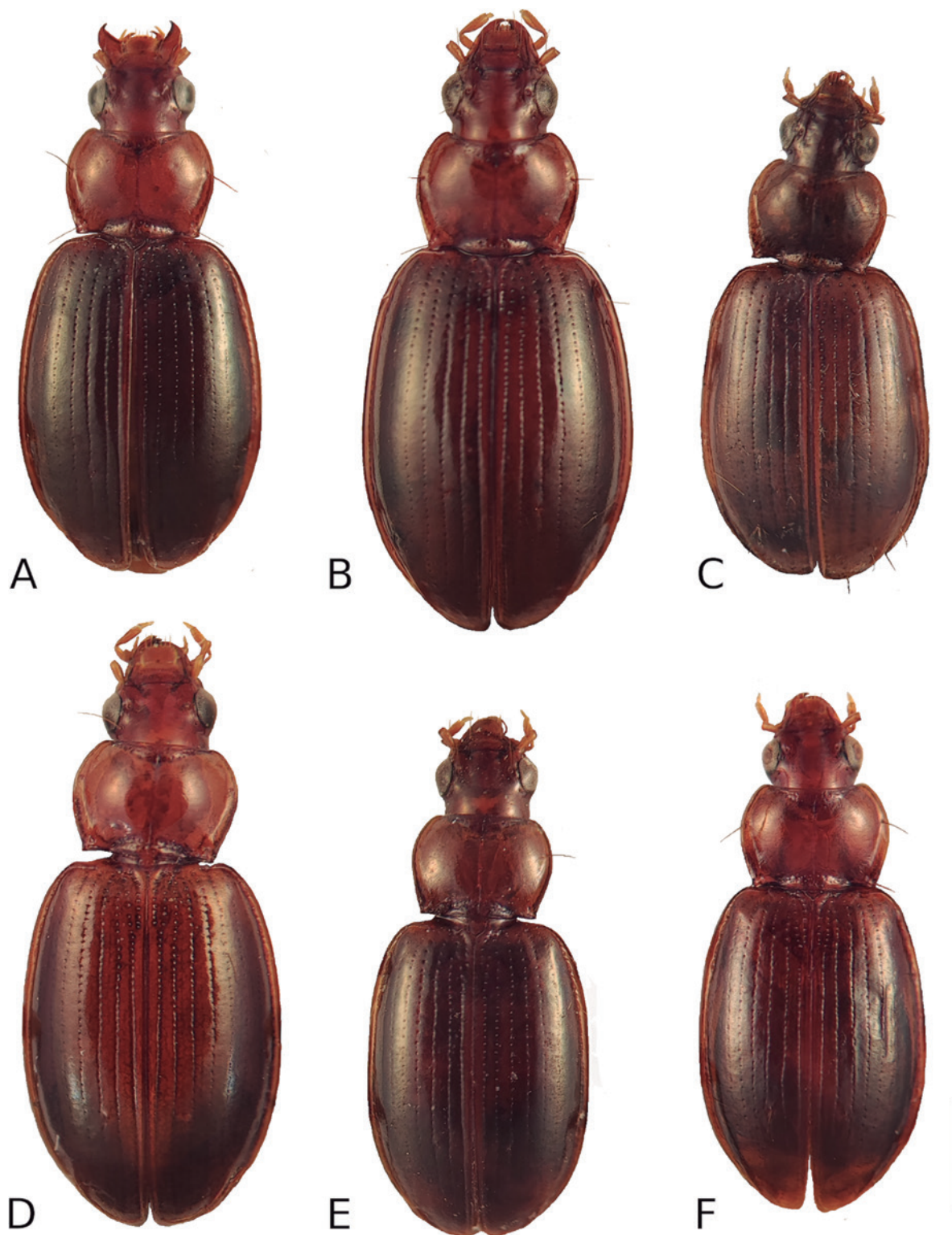


Fig. 2.— Variability of elytra coloration in *Ocys tachysoides* and *O. harpaloides*. Most common elytra coloration in *O. tachysoides* (A) and *O. harpaloides* (D). Rare elytra coloration in *O. tachysoides* (B, C) and *O. harpaloides* (E, F). Scale: 1 mm. Collection localities of samples (all in Spain): Hayedo de la Pedrosa, Segovia (Castile and Leon) (A); Montejo de la Sierra (Madrid) (B); Aldea del Fresno (Madrid) (C); Vilafant, Girona (Catalonia) (D); Barranco Galapatizos, Luesia, Zaragoza (Aragon) (E); Gudea, Altea, Alicante (Valencian Community) (F).

Fig. 2.— Variabilidad de la coloración de los élitros en *Ocys tachysoides* y *O. harpaloides*. Coloración de los élitros más común en *O. tachysoides* (A) y en *O. harpaloides* (D). Coloración de los élitros poco frecuente en *O. tachysoides* (B, C) y en *O. harpaloides* (E, F). Escala: 1 mm. Localidades de colecta de las muestras (todas en España): Hayedo de la Pedrosa, Segovia (Castilla y León) (A); Montejo de la Sierra (Madrid) (B); Aldea del Fresno (Madrid) (C); Vilafant, Girona (Cataluña) (D); Barranco Galapatizos, Luesia, Zaragoza (Aragón) (E); Gudea, Altea, Alicante (Comunidad Valenciana) (F).

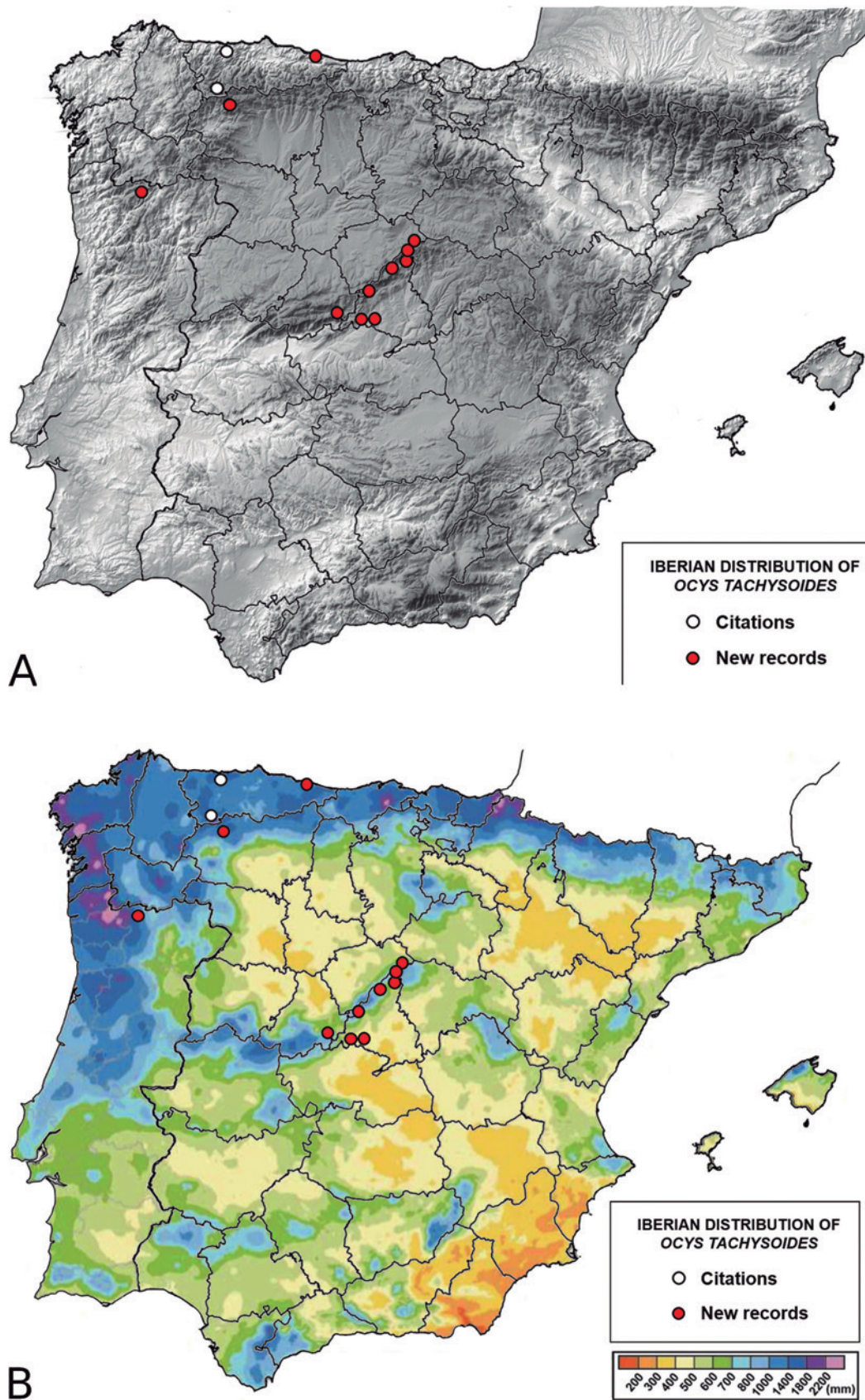


Fig. 3.— Actualized distribution of *Ocys tachysoides* in the Iberian Peninsula. The maps represent the orography (A) and the annual average pluviometry (B) of the territory. Modified from (AEMET & IMP, 2011).

Fig. 3.— Distribución actualizada de *Ocys tachysoides* en la península ibérica. Los mapas representan la orografía (A) y la pluviometría media anual (B) del territorio. Modificado de (AEMET & IMP, 2011).



Fig. 4.— Two habitats in where *Ocys tachysoides* was collected. Hayedo de la Pedrosa (beech forest in Segovia, Castile and Leon, Spain) (A). Arroyo de Majalvir (pinewood in Madrid, Spain) (B).

Fig. 4.— Dos hábitats en los que *Ocys tachysoides* ha sido colectado. Hayedo de la Pedrosa (hayedo en Segovia, Castilla y León, España) (A). Arroyo de Majalvir (pinar en Madrid, España) (B).

record for Portugal and the first one for the district of Montalegre.

From our samplings and the collection labels of the studied material (Table 1), we inform about different forest habitats (Fig. 4) in where *O. tachysoides* is present: mountain beech forest of *Fagus sylvatica* L. (Hayedo de la Pedrosa; Fig. 4A); gallery mixed forest of *Betula alba* L., *Quercus robur* L., *Salix alba* L. and *Corylus avellana* L. (Arroyo de Prao Viejo); woodland of *Eucalyptus globulus* Labill. close to freshwater (Ribadesella); mountainous pinewood of *Pinus sylvestris* L. (Arroyo de Majalvir; Fig. 4B). It is known that *O. tachysoides* can occur under bark of several tree species in forests and woodlands (NMNI, 2006; Maddison & Anderson, 2016). We confirm this behavior in our samplings, as *O. tachysoides* was collected removing bark from dead trees. Ortuño & Toribio (2005: 48) also did it for *O. harpaloides*, so both species may share this particular microhabitat. In addition, we indicate that studied material of *O. tachysoides* from Arroyo de Prao Viejo was collected by sieving leaf litter near a river stream.

From all these data, we suggest considering humid forests as relevant habitats for *O. tachysoides* in the Iberian Peninsula.

Different suitable environments for *O. tachysoides* in this territory should be also considered. Part of the studied material (Table 1) could have been collected in humid but more open areas. Unfortunately, this information was not provided by collection labels. In fact, Toribio & Ramos Abuín (2018) collected the species under rolling stones in a riparian habitat (what is a more common behavior among Bembidiini).

Finally, with respect to the locations from where no data of *O. tachysoides* are available, we avoid suggesting real absences. New Iberian records of this species are expected to be noticed in the future. Considering the wide distribution of *O. harpaloides* (Ortuño & Toribio, 2005), safely both species co-occur in the Iberian territory, at least in the most humid environments and under some concrete conditions. More samplings are needed to understand the abiotic and biotic conditions in where populations of *O. tachysoides* develop.

CONCLUSIONS

Ocys tachysoides and *Ocys harpaloides* are two close related species whose distinction could be assessed by studying the genitalia and several external diagnostic characters. However, variability of external morphology must be considered to avoid wrong identification. We suggest the following species-identification method to distinguish between Iberian samples of *O. tachysoides* and *O. harpaloides*, based on three consecutive steps ordered from more to less reliable: 1) study the genitalia; 2) recognition of the microsculpture pattern; 3) jointly study the shape of the elytra, elytra coloration and shape of the hind angles of pronotum, always considering that rare expressions of these last traits can be found in the two species.

The new records of *O. tachysoides* increase its distribution range in the Iberian Peninsula: the species occurs in Central and North-West Spain and North and Central Portugal, and for now it is known from temperate and relatively highly humid regions, frequently with mountainous orography. Humid forests are suitable habitats for *Ocys tachysoides*, in where it finds shelter under tree bark and different soil elements.

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