

# The presence of *Dolomedes plantarius* (Clerck, 1757) (Araneae: Pisauridae) in the Ebro Delta extends its distribution in the Iberian Peninsula southwards

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## ABSTRACT

**The presence of *Dolomedes plantarius* (Clerck, 1757) (Araneae: Pisauridae) in the Ebro Delta extends its distribution in the Iberian Peninsula southwards**

The rare *Dolomedes plantarius* has been observed in a permanent pond (“ullal”) in the Ebro Delta (Catalonia, north-eastern Spain). This is the most meridional record registered in the Iberian Peninsula, and perhaps in western Europe. Thus, the presence of this semiaquatic species may vary our assumptions on its rarity. Such finding evidences the relevance of aquatic environments in general and “ullals” in particular for biodiversity conservation, as well as the importance of considering both the semiaquatic and the terrestrial species inhabiting them.

**Key words:** Araneae, Pisauridae, *Dolomedes plantarius*, Iberian Peninsula, Spain, Catalonia, Ebro Delta

## RESUMEN

**La presencia de *Dolomedes plantarius* (Clerck, 1757) (Araneae: Pisauridae) en el Delta del Ebro expande su distribución en la Península Ibérica hacia el sur**

La rara *Dolomedes plantarius* ha sido observada en una poza permanente (“ullal”) en el Delta del Ebro (Cataluña, noreste de España). Este registro constituye el más meridional de la Península Ibérica, y tal vez de Europa occidental. Por tanto, la presencia de esta especie semiacuática puede variar nuestras asunciones sobre su rareza. Dicho hallazgo evidencia la importancia de los ambientes acuáticos en general y los “ullals” en particular para la conservación de la biodiversidad, así como la importancia de considerar tanto las especies semiacuáticas como las terrestres que los habitan.

**Palabras clave:** Araneae, Pisauridae, *Dolomedes plantarius*, Península Ibérica, España, Cataluña, Delta del Ebro

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## INTRODUCTION

The genus *Dolomedes* (Latreille, 1804) is represented in Europe by two species: *Dolomedes fimbriatus* (Clerck, 1757) and *Dolomedes plantarius* (Clerck, 1757) (Helsdingen, 1993; Duffey, 1995). These two species are widespread across the continent, but they are always rare, especially in the Mediterranean regions (Duffey, 1995, 2012; Milano *et al.*, 2018). In the case of the Iberian Peninsula, there have been several reports of *Dolomedes fimbriatus* from different Spanish localities, always in the northern part (Melic *et al.*, 1996; Maguregi & Zabala, 2000; Melero & Torralba Burrial, 2008; Fernández & Maguregui, 2013; Carballeira *et al.*, 2017). Only recently, *Dolomedes plantarius* has been detected in the northeast of the Peninsula (Bellvert *et al.*, 2013).

*D. plantarius* is a semiaquatic, large spider. Adult females can have bodies of slightly over 20 mm in length with a span of 70 mm including their legs (males are slightly smaller). It is typically brown in colouration with white or cream stripes along the sides of the body, being very similar to *D. fimbriatus*, with which it was often misidentified (Helsdingen, 1993). The main distinction between the males of the two species is in the tibial apophysis of the pedipalps (Renner, 1987; Lecigne, 2016), forked in *D. plantarius* but without bifurcation in *D. fimbriatus*. In the case of females, both species are distinguished by the morphology of the epigyne (Renner, 1987; Lecigne, 2016). However, differentiation between the two species using juvenile specimens is very difficult, or even impossible, and it is probably the main cause of the existing erroneous identifications (Melic *et al.*, 1996; Duffey, 2012).

## METHODS AND RESULTS

On 18-V-2020, a 22.9-mm-long female individual (Fig. 1) was detected at a permanent pond in the “Ullals de l’Arispe” (UTM ETRS89-31: 296797, 4505049) in Amposta (Catalonia, Spain), in the northeast of the Iberian Peninsula. This location was sampled together with other twenty (Fig. 2) that integrate a set of lentic areas selected in the Ebro Delta. Such set has been annually sampled since 2014, in the framework of an agreement with



(a)



(b)

**Figure 1.** Individual of *Dolomedes plantarius* found in the “Ullals de l’Arispe” (a), and detail of the epigynum (female genitalia; b). *Individuo de Dolomedes plantarius encontrado en los “Ullals de l’Arispe” (a), y detalle del epigino (genitales femeninos; b).*

the Catalan Water Agency (ACA) for the monitoring of the lower Ebro and its delta. The samples were taken following a hand-net protocol (ACA, 2006) and fixed in ethanol 100 % for its identification in laboratory, following Renner (1987).

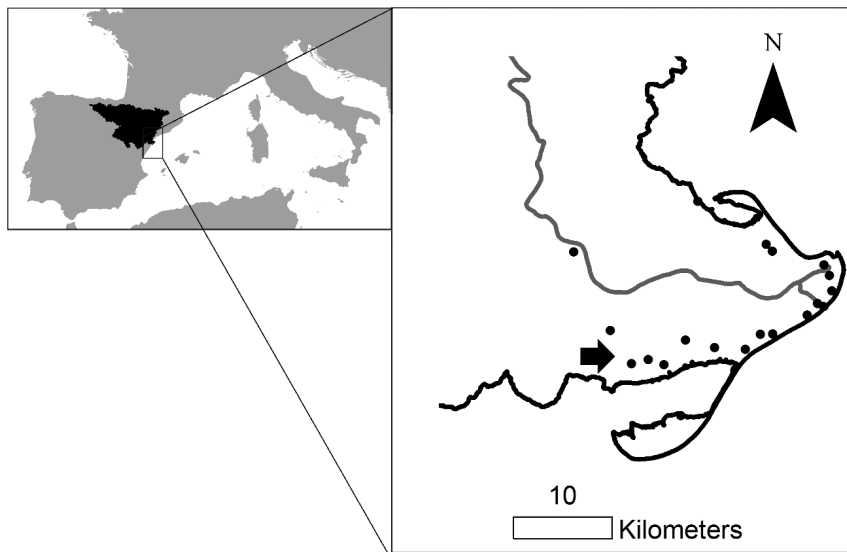
## DISCUSSION

Until now, in the Iberian Peninsula, the fen raft spider *Dolomedes plantarius* was only known in a pond close to the Ter River and other nearby localities, in the province of Girona (Bellvert *et al.*, 2013; Quintana *et al.*, 2013; A. Bellvert & G. Dalmau, pers. comm.). The finding of this species in Ebro Delta extends its distribution more than

200 km southwards in the Iberian Peninsula. Moreover, this observation represents one of the more meridional citations in Europe. Other meridional records in western and eastern Europe are located in similar or more meridional latitudes, such as those described in Italy (Sardinia and Naples), Greece, North Macedonia, Turkey and Bulgaria, but they correspond to old records and some of these citations need to be confirmed (Lecigne, 2016; Milano et al., 2018; Naumova, 2018).

Like in Bellvert et al. (2013), *D. plantarius* was only detected in a permanent freshwater pond with availability of vegetation and macroinvertebrate fauna (necessary for its life cycle and feeding, respectively). Most of the locations sampled in the framework of the monitoring of the Ebro Delta were located in brackish waters with conductivity values that prevent the presence of this species. Among the freshwater sites sampled, the spider was found only in an artesian spring pond (locally known as “ullal”). Artesian spring ponds are water resurgences caused by rainwater that flows through aquifers formed in the Port and Montsià mountain ranges towards the Mediterranean Sea. When such water reaches the deltaic materials, saturated, it emerges and forms ponds

that constitute wetlands. Given the karstic origin of the aquifers, these waters differ from the rest of aquatic environments in the delta. They constitute mesohaline environments with a great content of carbonates and chlorides, being oligotrophic and highly transparent. There are several clusters of artesian spring ponds in the Ebro Delta, but the most important are the “Ullals de l’Arispe”, which are composed by more than 25 hectares of wetlands located in peat bogs, and with around twenty artesian spring ponds in the area. They constitute highly valuable wetlands that host rare and vulnerable species such as the macrophyte *Nymphaea alba*, the endemic planarian *Phagocata ullala*, the aquatic gastropods *Melanopsis tricarinata*, *Tarraconia rolani* and *Belgrandia boscae*, the crustaceans *Palaemonetes zariquieyi* and *Parhomoeogammarus pacaudi*, and the fishes *Cobitis paludica*, *Gasterosteus aculeatus* and *Valencia hispanica*, among others. They also contain the priority habitat type 7210 (Calcareous fens with *Cladium mariscus* and *Caricion davallianae*) of the Habitats Directive (Council Directive 92/43/EEC) (Aymerich et al., 2014). These wetlands present an aquatic vegetation that is of particular importance for the setting up of *D.*



**Figure 2.** Locations sampled, highlighting the one where the species was found (arrow). The Ebro River is shown in grey. *Localidades muestreadas, señalando aquella donde la especie fue encontrada (flecha). El Río Ebro se muestra en gris.*

*plantarius*, both on banks and on water surface (Duffey, 2012). Helophytic vegetation present in these artesian springs, such as *Carex* spp., *Cladium mariscus*, *Phragmites australis* or *Typha* spp. (Curcó, 2007), has been cited as an appropriate mesohabitat for the species in other European populations (Duffey, 1995). Similarly, the existence of hydrophytic species such as *Nymphaea alba*, *Potamogeton* spp. or *Myriophyllum* spp. in the wetlands (Curcó, 2007) also creates suitable mesohabitats for hunting, constructing nursery webs and hiding from predators (Duffey, 2012). Regarding food availability, besides aquatic macroinvertebrates, these habitats also harbour populations of the anuran *Pelophylax perezi* and the fishes *Gasterosteus aculeatus*, *Valencia hispanica* and *Gambusia holbrooki* (Roig, 2008; López et al., 2012), which can be predated by spiders, as they are able to capture small-sized fishes or anuran larvae (Nyffeler & Pusey, 2014; Nyffeler & Altig, 2020).

Both *D. fimbriatus* and *D. plantarius* live in wetlands and marshes, and they need the presence of water at some point of their life cycle, but they differ considerably in their habitat requirements, so they rarely coexist (Helsdingen, 1993; Duffey, 2012; Lecigne, 2016; Dickel et al., 2019). In this sense, *D. fimbriatus* needs water only during the mating period, and it can inhabit marshy sites without permanent open water surfaces, peat bogs or small water bodies, whereas *D. plantarius* lives on the water surface, the overhanging or surrounding aquatic vegetation, usually associated with large water bodies (for example, slow flowing rivers or marshy areas with open waters; Duffey, 1995; Dickel et al., 2019). Tolerance to shade constitute a second difference between these two species, since *D. fimbriatus* tolerates shade to a large extent, while *D. plantarius* selects open tree-free habitats due to its preference for higher temperatures and light availability (Helsdingen, 1993; Duffey, 2012). However, these ecological requirements for *D. plantarius* can be different in southern Europe, where it has been found, among others, in reed beds (Duffey, 2012), riparian forests (Iorio & Villepoux, 2012), or forested ponds (Bellvert et al., 2013).

The fact that the populations of *D. plantarius* in Spain are widely separated could indicate that

the species is in its meridional limit of the distribution, or that these artesian spring ponds acted as a relict refuge due to general loss of pristine wetlands and landscape fragmentation (Gallego-Fernández et al., 1999; Milano et al., 2018). However, despite the general good status of conservation of the “ullals”, and the fact that they are included in the Natural Park (Ebro Delta), this area has been influenced by agricultural practices (for example, drainage, replacement of native species by alien individuals, etc.), which could affect the viability of the populations of this spider species. In this context, *D. plantarius* is considered a vulnerable species at a global scale (according to the International Union for Conservation of Nature or IUCN) and it is considered rare in Europe (Lecigne, 2016). Thus, conservation concerns regarding this species have been pointed out in several European countries, which have protected it or classified it as vulnerable or threatened (Helsdingen, 1993; Leroy et al., 2013; Lecigne 2016) due to its great dependence on local conditions (Helsdingen, 1993; Duffey, 2012), being vulnerable to a wide range of human pressures such as water abstraction (Smith, 2000) or climate change (Leroy et al., 2013). However, new distributional data suggest that this species could be more widespread than it was considered in the past, and that suitable habitats have probably been overlooked. Duffey (2012) considered that a decline in population numbers of *D. plantarius* in Europe was not supported, due to the increase of new records all across the continent. This could be the case of Spain, where the knowledge about this genus is relatively recent. In the case of the Ebro Delta, where there are more “ullals” and other suitable habitats, future surveys with a combination of different sampling techniques will allow clarifying if this species is more widespread in the region, and it will allow defining better its vulnerability. However, due to the alarming decline of water quality and loss of freshwater wetlands in the Mediterranean region (Gallego-Fernández et al., 1999), the inclusion of *D. plantarius* in the Atlas and Red Data Book of Threatened Invertebrates in Spain (Verdú et al., 2011), as Bellvert et al. (2013) suggested, might help to ensure its conservation in the meantime.

The finding of *D. plantarius* in the “Ullals de



l'Aríspe" confirms that some aquatic sites can harbour or be refuge for semiaquatic or terrestrial organisms (e.g., Ficetola et al., 2011; Stewart et al., 2017; Zamora-Martín et al., 2021). This shows not only the importance of aquatic habitats for biodiversity conservation, but also the importance of particular and/or small habitats among them (Biggs et al., 2017), such as the "ullals". Future monitoring surveys will allow clarifying if this species is more widespread in the Ebro Delta, as stated. This may result fundamental, as interactions between aquatic, semiaquatic and terrestrial organisms play an important role in the functioning of both ecosystems (e.g., Sanzone et al., 2003), existing a coupling between them characterized by reciprocal subsidies (Fritz & Whiles, 2021).

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