

First evidence of reproduction of *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) in Portugal

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SUMMARY

On 18 July 2017 a population of *Trithemis kirbyi* Selys, 1891 was found at the Ribeira de Asseca in Tavira, Algarve, Portugal. In addition to adult males a newly emerged male was seen. This is the first proof of reproduction of *T. kirbyi* in Portugal and the third record for the country.

RESUMEN

El 18 de Julio de 2017, una población de la especie *Trithemis kirbyi* Selys, 1891 ha sido encontrada en el río Ribeira de Asseca in Tavira, Algarve, Portugal. Además de varios machos adultos, se observó un individuo macho recién emergido. Este registro es la primera prueba de reproducción de *T. kirbyi* en Portugal y la tercera cita de la especie para el país.

INTRODUCTION

Trithemis kirbyi Selys, 1891 is a very common species in Africa and can be found throughout this continent in semi-arid and open dry habitats. It is also present in the southern part of the Arabian Peninsula, especially Oman and occurs further east to southwestern India (Kalkman & Prunier, 2015). In Europe, it was first observed as

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a vagrant in 2003 in Sardinia (Holusa, 2008). The first records for the Iberian Peninsula date from 2007 when it was found in Manilva, southern part of Malaga Province (Chelmick & Pickess, 2008). *Trithemis kirbyi* was clearly able to reproduce in Spain and commenced colonisation along the Mediterranean coastline quickly followed by interior regions such as Extremadura and Castilla La-Mancha. For a chronological overview of the expansion in Spain we refer to Polette *et al.* (2017). By the end of 2016 it had reached northern Aragon, near the border with France and Basque Country (Brouwer, 2016; Miralles-Núñez *et al.*, 2017). In France *T. kirbyi* was first detected in 2017 with several observations from the departments of the Aude, Gard and Ardeche, the latter being the most northern locality in Europe so far (Polette *et al.*, 2017).

Somewhat unexpectedly, the first observation from Portugal dates only from 2016 when *Trithemis kirbyi* was observed at the Ribeira das Carreiras, just south of Mertola, southern Alentejo (Lesparre, 2017). On 4 June 2017, one male was photographed at a gravel pit in Paderne, Algarve. This represents only the second record for the country (Loos, 2017). In this paper, we report the second observation of *T. kirbyi* for the Algarve and the first proof of successful reproduction in Portugal.

OBSERVATIONS IN PORTUGAL

On 18 July 2017 Pego Do Inferno and the confluence of the Ribeira de Asseca with the Ribeira do Alportel on the border of Tavira and Santo Estêvão, Algarve, Portugal (37°09'20.5"N, 07°41'45.8"W) were visited. This site is situated 25 km from the Spanish province of Huelva and approximately 8 km from the Gulf of Cadiz. The Pego do Inferno is sometimes referred to as Cascata Moinhos da Rocha and corresponds with locality nº 106 in De Knijf & Demolder (2010). At the time of visit, the Ribeira do Alportel was almost completely dry with only small residual pools remaining behind in the dry riverbed. Immediately below the pool of the waterfall,



the Ribeira de Asseca (Fig. 1) is bordered by riverine forest for some 100 meters before it meets the Ribeira do Alportel. At the confluence some pebble beaches and sand banks are present. Downstream, the Ribeira de Asseca continues to flow through a small zone of adjacent forest.

Just after 13h local time at least four mature males of *Trithemis kirbyi* were observed on the pebble beaches and the sand banks, at least two of which were patrolling between the pebbles and the pool below the waterfall. In addition, another very young male, having emerged only some hours earlier was detected, resulting in five individuals being present.

Other odonate species recorded at this site were *Platycnemis latipes* Rambur, 1842, *Ceriagrion tenellum* (de Villers, 1789), *Erythromma lindenii* (Selys, 1840), *Ischnura graellsii* (Rambur, 1842), *Onychogomphus forcipatus unguiculatus* Vander Linden, 1820, *Onychogomphus uncatatus* (Charpentier, 1840), *Crocothemis erythraea* (Brullé, 1832), *Orthetrum chrysostigma* (Burmeister, 1839), *Orthetrum coerulescens* (Fabricius, 1798) and *Trithemis annulata* (Palisot de Beauvois, 1807).

Figure 1. The Ribeira de Asseca, Tavira, Portugal, 18 July 2017. Photo: Geert De Knijf.

DISCUSSION

Since its first discovery in 2007 in Malaga (Chelmick & Pickess, 2008), *Trithemis kirbyi* has colonised not only Andalusia but also much of the interior and eastern parts of Spain. In 2017 several vagrants were seen in southern France (Polette *et al.* 2017 and references therein). Populations can now be found from Southern Spain to the foothills of the Pyrenees in Aragon and Catalonia (Herrea-Grao *et al.*, 2012; Miralles-Núñez *et al.*, 2017). This indicates that colonisation has advanced at an average of almost 100 km per year over a period of approximately 10 years. This rapid range expansion has also been noticed in northern Africa (Dumont & Chevalier, 2016) where the species has colonised the Atlantic (western) Sahara, currently an extension of South Morocco. Although *T. kirbyi* is a common African species, it is unlikely that the recent expansion has originated from the south of the Sahara. It is far more likely that it has originated from the Moroccan populations (Dumont & Chevalier, 2016). An expansion of range in Morocco had already been noticed in the 1990s, both in a southerly and a northerly direction (Jacquemin & Boudot, 1999), which resulted finally in crossing the Mediterranean and the first observations for Spain in 2007 (Chelmick & Pickess, 2008).

This range expansion in Europe and Northern Africa appears to be the result of a combination of factors. Both regions have experienced several heat-waves particularly in the last two decades. This has resulted in the increase of so-called African dragonfly species in Europe of which *Trithemis annulata* is probably the most well-known (Kalkman *et al.*, 2015). Further, during this same period many man-made water bodies were constructed, both for private use such as swimming-pools and garden ponds. Also for agricultural use, such as cattle ponds and especially the many irrigation reservoirs along the Spanish Mediterranean coast. *Trithemis kirbyi* has a very long flight-period and is able to reproduce successfully several times a year. The larvae develop in temporary as well as perennial waters

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and larval development can be completed in 50 days in Namibia (Suhling & Martens, 2007).

Observations from neighbouring Portugal have lagged behind. It was almost 10 years after the discovery in Spain that *T. kirbyi* was found in the Baixo Alentejo region (Lesparre, 2017). Reasons for this are unclear. Portugal experiences a cooler wetter climate influenced by the Atlantic Ocean, although the inner regions of the Alentejo and the south east have warm dry conditions similar to those in neighbouring Andalusia and Extremadura. In addition, fewer odonatologists are present and the number of visitors looking for dragonflies is lower than for Spain. Since 2007, the year that *T. kirbyi* was found in Spain, several thorough inventories have been undertaken to investigate the dragonfly fauna of Alentejo and Algarve (De Knijff & Demolder, 2010; Loureiro do Santos, 2011, 2014; Maravalhas & Soares, 2013; Marquez-Rodriguez, 2014; Fonseca, 2015). As a consequence of more extensive farming the number of water bodies is much lower in southern Portugal than along the Mediterranean part of Spain. It is probable that all these factors have contributed to the late arrival and colonisation of the Algarve and Alentejo regions by *Trithemis kirbyi*. Interestingly, the first record from the adjacent Spanish Province of Huelva dates from 2012 (Obregón-Romero *et al.*, 2013); however, expansion in this province was most notable in 2017 (Prunier pers. comm.) which coincides with the Portuguese expansion.

May, June and July 2017 were characterised by a heat-wave in great part of southwestern Europe, with temperatures soaring to 40°C in the Languedoc and Provence (Météo-France, 2017) and up to 46.9°C on 13 July in Cordoba, a new temperature record for Spain (Aemet, 2017). We visited more than 25 localities in the last two weeks of July 2017 in Southern Portugal. These consisted of water bodies, streams and rivers, most of which were completely dry. We were unable to find *T. kirbyi* at any of these sites other than the Riberira de Asseca. We suggest, therefore, that the heat-

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wave of 2017 was the final trigger and that *T. kirbyi* could have arrived at the Ribeira de Asseca in Tavira as recently as May 2017 and was able to reproduce locally within a short time-span of several weeks. As no exuviae were found, we have no evidence that the species successfully reproduced at the Ribeira de Asseca. However, the observation of a very young male indicates that breeding must have taken place close by. It is clear that if it did not reproduce at the investigated locality, this individual could only have originated from a nearby pond, irrigation tank or swimming pool. As several other males were present at the investigated site, we rather believe that *T. kirbyi* reproduced locally.

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Key words: Dragonfly, Iberian Peninsula, reproduction, distribution.

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Palabras Clave: Libélulas, Península Ibérica, reproducción, distribución.