

Short scientific note

Diplacodes lefebvrei in Sardinia, a new species for the Italian fauna (Odonata: Libellulidae)

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Abstract

Diplacodes lefebvrei (Rambur, 1842) is a libellulid dragonfly, which is common and widespread in Africa and across the Indian Ocean. While this species is fairly common in the south and east of the Mediterranean, its European range is confined to Cyprus, the island of Rhodes and the south of the Iberian Peninsula. Here we report the first record of *D. lefebvrei* for Italy, which was captured near Cagliari (Sardinia) on 11.IX.2013. In October 2014, a population of the same species was observed at a small wetland on the island "Isola di San Pietro" (Sardinia). Here the observed sex ratio of *D. lefebvrei* was strongly biased in favour of females and only a single male was observed.

Key words: *Diplacodes lefebvrei*, Libellulidae, Odonata, Sardinia, Italy.

Introduction

Diplacodes lefebvrei (Rambur, 1842), a libellulid dragonfly, is common throughout Africa, widespread across the Indian Ocean and reaches into Eurasia and Europe (Dijkstra 2006; Dow 2013); with regard to the Mediterranean it is fairly common on the south and east coast. Its European range is confined to Cyprus, the Greek island of Rhodes and the southern half of the Iberian Peninsula (Boudet et al. 2009; Dow 2013). The species had never been reported from Italy (Riservato et al. 2014). We present the first record of *Diplacodes lefebvrei* which was caught on September 2013 in Sardinia and also report on a population of *D. lefebvrei*, which was found on October 2014 on the little island "Isola di San Pietro".

Records of *Diplacodes lefebvrei*, accessory odonate fauna and habitat description

A single male of *Diplacodes lefebvrei* (Fig. 1) was captured in Sardinia near Cagliari (Coordinates 39.12.11N, 09.09.06E) on 11 Sep 2013 (A. Rattu leg.). Together with *D. lefebvrei* the following other species of Odonata were observed: *Anax parthenope* (Selys, 1839), *Orthetrum trinacria* (Selys, 1841), *Sympetrum striolatum* (Charpentier, 1840), *Sympetrum meridionale* (Selys, 1841), *Sympetrum*

fonscolombii (Selys, 1840) and *Brachythemis impartita* (Karsch, 1890). The individual of *D. lefebvrei* which was discovered around 11.00 am on a sunny but windy day, was clearly disturbed by the wind and preferred to rest on the vegetation, and only flew up when approached. The air temperature was about 25° C. The site (Fig. 2), which is approximately 1 m a.s.l, borders the vast brackish wetland area of Molentargius and is prone to seasonal flooding. The vegetation consists mainly of species which are salt-tolerant and xerophile: *Arthrocnemum macrostachyum*, *Sarcocornia perennis*, *Suaeda vera*, *Suaeda maritima*, *Halocnemum strobilaceum*, *Atriplex portulacoides*, *Lygum spartum*, *Dittrichia viscosa*, *Limbardia crithmoides*, *Limonium dubium*, *Limonium retirameum*.

On 7 Oct 2014, during a warm (> 25° C) and sunny day with light wind, a few dozen mature *D. lefebvrei*, all females, were observed (vidit R. Moratin, Fig. 3) at a small wetland on the island "Isola di San Pietro" which is called "Stagno di Cala Vinagra" (Coordinates 39.09.21N, 08.14.28E). As only a part of the habitat was visited it seems likely that many more individuals of the species were present. The site was visited again on 18 Oct 2014 (by P. Leo) and a minimum of 150 individuals of *D. lefebvrei* were observed. About 60 specimens were captured and examined. Among these a single male was observed with the remainder being females. All individuals observed were black and no immatures with a lighter colour



Fig. 1 – *Diplacodes lefebvrei* ♂, Sardinia, Cagliari, 11.9.2013 (photo: P. Leo).

were seen. After 12:00 o'clock the number of individuals present decreased noticeably and this might have been caused by the increasing heat of the day. Together with *D. lefebvrei* the following other species of Odonata were observed: *Lestes barbarus* (Fabricius, 1798) (7 Oct, 18 Oct), *Lestes virens* (Charpentier, 1825) (18 Oct), *Ischnura genei* (Rambur, 1842) (18 Oct), *Aeshna affinis* (Van der Linden, 1820) (18 Oct), *Aeshna mixta* (Latreille, 1805) (7 Oct, 18 Oct), *Anax parthenope* (7 Oct, 18 Oct), *Orthetrum trinacria* (7 Oct, 18 Oct), *Sympetrum fonscolombii* (7 Oct, 18 Oct), *Sympetrum meridionale* (Sélys, 1841) (7 Oct, 18

Oct). The wetland is situated in a depression in hills of volcanic origin, at an altitude of 114 m and is fed by rainwater. It has an extension of approximately 240 m x 110 m, but only a small central part (approximately 20 m x 40 m) is permanent, open water (Fig. 4). The wetland is covered by a dense stand of *Phragmites australis*, with the only exception of the central part, and the borders of the site are dominated by *Cyperus* sp. and *Dittrichia viscosa*. A number of other sites (e.g. Salina di Carloforte, Stagno della Vivagna) were visited on the island “Isola di San Pietro” in October, without encountering *D. lefebvrei*.



Fig. 2 – Habitat where a single male of *Diplacodes lefebvrei* was found in Sardinia, Cagliari (photo by A. Rattu).

Discussion

The dragonfly *Diplacodes lefebvreii* is reported for the first time for Italy (Riservato et al. 2014) and seems to have established a local population in Sardinia. Previously, the species was known for Europe from the southern part of the Iberian Peninsula since the first half of the last century (Anonymous 1910; Seabra 1937, 1938) and a number of new discoveries documented its northward expansion in recent years (Conesa Garcia 1985; Sanchez et al. 2009; Knijf & Demolder 2010; Loureiro 2011). The findings reported here confirm this expansion also for Italy and this is in accordance with other reports of a northward expansion of Odonata in Europe, presumably as a consequence of the changing climate (Hickling et al. 2005; Ott 2007, 2010). In recent years several other species of Anisoptera from North Africa have expanded their range across the Mediterranean sea. *Brachythemis impartita* was first recorded for Sardinia in 1979 (Crucitti et al. 1981) and is now very common on this island (Hardersen & Leo 2011). Recently, a specimen of *Trithemis kirbyi* (Selys, 1891) has been caught in the south of Sardinia (Holuša 2008) and *Pantala flavescens* (Fabricius, 1798) and *Simpetrum sinaiticum* Dumont, 1977 have recently been reported for the island of Lampedusa (Corso et al. 2012). Similarly, *Selysiothemis nigra* (Van der Linden, 1825), which had been known only from southern Italy (Conci & Nielson 1956), has recently expanded its range into the regions Veneto, Friuli-Venezia Giulia (Zandigiaco & Buian 2010) and Piedmont (Subrero 2014). It is interesting that all these expansions were observed for members of the family Libellulidae, which live in lentic waters, as lentic dragonflies of southern Europe are known to shift their range boundaries more than those from north-



Fig. 3 – *Diplacodes lefebvreii* ♀, Sardinia, Isola di San Pietro, Stagno di Cala Vinagra, 07.10.2014 (photo by R. Moratin).

ern zones (Grewe et al. 2013). The northward expansion of *D. lefebvreii* was expected and Dijkstra & Lewington (2006) already wrote about this species “May be expected to expand northwards in the Mediterranean region”. It remains to be seen if *D. lefebvreii* will establish permanent populations in Sardinia, as has been observed for *B. impartita* (Hardersen & Leo 2011). It seems highly probable that the northward expansion of Odonata will continue as climate change is progressing (e.g. Dawson et al. 2011; Bellard et al. 2012) and documenting the associated biological responses is important to enable us to forecast and evaluate the effects which are to be expected in the future. During both visits to the site “Stagno di Cala Vinagra” the sex ratio of the observed *D. lefebvreii* was strongly biased in favour of females and only a single male was observed.

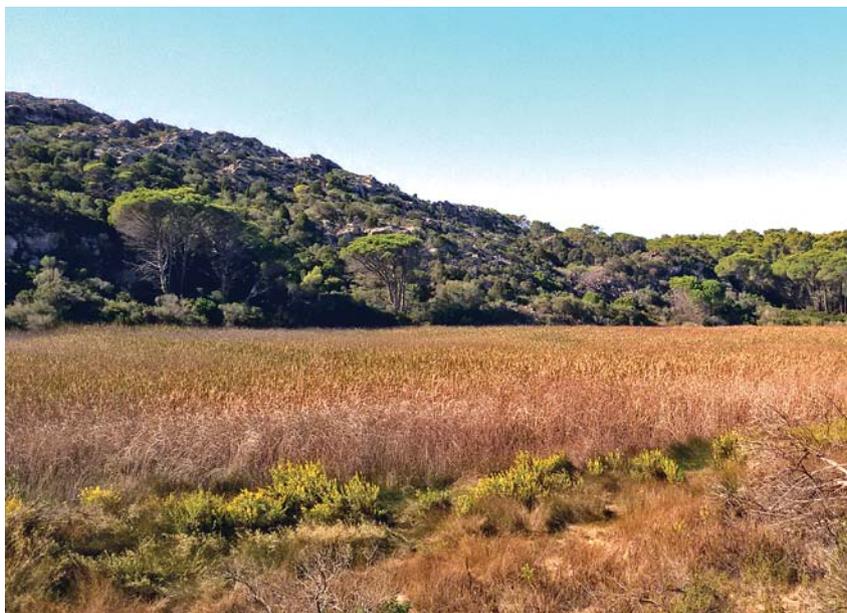


Fig. 4 – Habitat where a population of *Diplacodes lefebvreii* was found in Sardinia, Isola di San Pietro, Stagno di Cala Vinagra (photo by P. Leo).

This observation is in stark contrast with the sex-ratios observed in other libellulids. For example Boano & Rolando (2003) found that for *Libellula fulva* Müller, 1764 the sex-ratio was strongly biased in favour of males and Kerry & Juillerat (2004) observed that mature males outnumbered mature females by a factor of 1.67 in *Orthetrum coerulescens* (Fabricius, 1798). Khelifa et al. (2012) reported for *Orthetrum nitidinerve* (Sélys, 1841) a sex ratio at a mating area to be highly male biased, with a daily average of 91% males counted. Female-biased sex-ratios are exceedingly rare in dragonflies and only a few cases are documented (Van Gossum et al. 2007). There are two possible explanations for the fact that we observed almost exclusively females. The first explanation is related to the site where we observed *D. lefebvrei*, at the outer margin of the reed stands, approximately 20-30m from the edge of the open water. Males might concentrate at and near the open water during the hot part of the day and therefore we only encountered females. Alternatively, males might disperse much more widely than females and thus close to the wetland we observed a female-biased sex-ratio.

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