

First records of breeding *Sympecma paedisca* (Brauer, 1877) (Odonata Lestidae) in Italy

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ABSTRACT

Oviposition in Italian populations of *Sympecma paedisca* (Brauer, 1877) (Odonata Lestidae) was observed for the first time. This species is listed as Endangered (EN) in the Mediterranean Basin and as Critically Endangered (CR) in Italy. Several ovipositing tandems were observed for the years 2014, 2015 and 2016, from the 17th of May to the 10th of June, in the “Riserva Naturale Orientata della Baraggia di Candelo” (=Heathlands Oriented Natural Reserve) (North Piedmont), a protected area and a military zone too, in a pond at the edge of the heathland. Oviposition substrates are vertical living *Juncus effusus* L. stems, preferably the isolated ones or those on the external side of the tufts, rather than inside them; eggs are laid about 20 to 50 cm above the water level. In the heathland, around the breeding site, tens of adults were seen every autumn and winter, also in December and January sunny days. Reproductive *S. paedisca* were also occasionally observed in other two localities, namely the lake of Viverone and the “Riserva Naturale Orientata Palude di Casalbeltrame” (=Casalbeltrame Fen Oriented Natural Reserve). Notes on breeding behaviour and a description of both breeding and overwintering area of *S. paedisca* are provided, since knowledge of its breeding and overwintering sites is needed to ensure their protection and therefore the conservation of Italian populations of this damselfly.

KEY WORDS

Sympecma; Odonata; Heathland; Italy; Military area.

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INTRODUCTION

The Siberian Winter Damselfly *Sympecma paedisca* (Brauer, 1877) (Odonata Lestidae), sometimes reported as *S. braueri* or *S. annulata braueri* (Bianchi, 1904) is a lestid dragonfly ranging from Western Europe through central Asia to Japan. In Europe it is still common in the north-east (Poland, Baltic States, southern Finland), rare and very localized elsewhere. It is supposedly extinct in France and parts of Germany (Jurzitza, 1961; Bilek, 1964; Boudot et al., 2009), as well as in the north-east of

Italy (Canovi et al., 2014; Riservato et al., 2014a), because of habitat loss due to human influence (Riservato et al., 2009; Ceballos et al., 2015). In Italy recent records are mainly for north-eastern Piedmont (Sindaco et al., 2003; Boano et al., 2007; Battisti, 2014; Riservato et al., 2014b), with a recent confirmation for Lombardy (Canovi et al., 2014). These southern European populations, the only ones still extant south of the Alps, are highly disjunct from the main range. *Sympecma paedisca* is accordingly listed as Endangered (EN) in the Mediterranean Basin and as Critically Endangered

(CR) in Italy (Riservato, 2009, 2014b). It is also included in Annex IV of the Habitat Directive 92/43/CEE.

Despite of being *S. paedisca* in Piedmont regularly occurring in several sites, until recent years no reproductive biotope was actually known (Riservato et al., 2014a).

Below is reported the first record of breeding *S. paedisca* in Italy.

RESULTS AND DISCUSSION

A potentially suitable site in Piedmont (NW Italy), namely the SCI IT1130003 “Baraggia di Candelo”, within the “Riserva Naturale Orientata delle Baragge” (= Heathlands Oriented Natural Reserve) (RNOB), was investigated. The RNOB is a natural reserve and a military area too. It is a plateau of about 1600 ha, characterized by moorland open areas surrounded by oak forests, inside a traditional agricultural landscape matrix. The SCI IT1130003 “Baraggia di Candelo” is included in the “Natura 2000” network, because of the presence of some European priority habitats, such as: “European dry heaths”, “*Molinia* meadows (*Molinion caeruleae*)”

and “Depressions on peat substrates of the *Rhynchosporion*”(Sindaco et al., 2003). Here a large population of *S. paedisca* occurs, with tens of adults seen from September up to the following spring. Adults overwinter inside the heathland and the *Molinia* grassland and are active also in December and January sunny days (Battisti, 2014; Battisti & Soldato, 2014). Tens of waterbodies are scattered through the heathland, ranging from fairly large permanent ponds to smallest temporary bogs; some of them are man-made, to ensure cattle watering. Researches particularly focused on a permanent, spring-fed pond at the very edge of the heathland, close to the cultivated area (Fig. 1). It is located about 12 km southeast of Biella, 240 m a.s.l., not far from the village of Villanova Biellese. It is partly bordered by more or less dense *Juncus* formations, with a sector of reed belt along the shore with deeper water. The side with shallower water is surrounded by bare soil or very short grass, because of the use of the pond for grazing and watering by cattle. The site is outside the Natura2000 SCI, yet it is included in the RNOB and close to the boundary of the military area.

On 1.VI.2014, several (> 20) ovipositing tandem (Fig. 4), as well as very few copulae, were

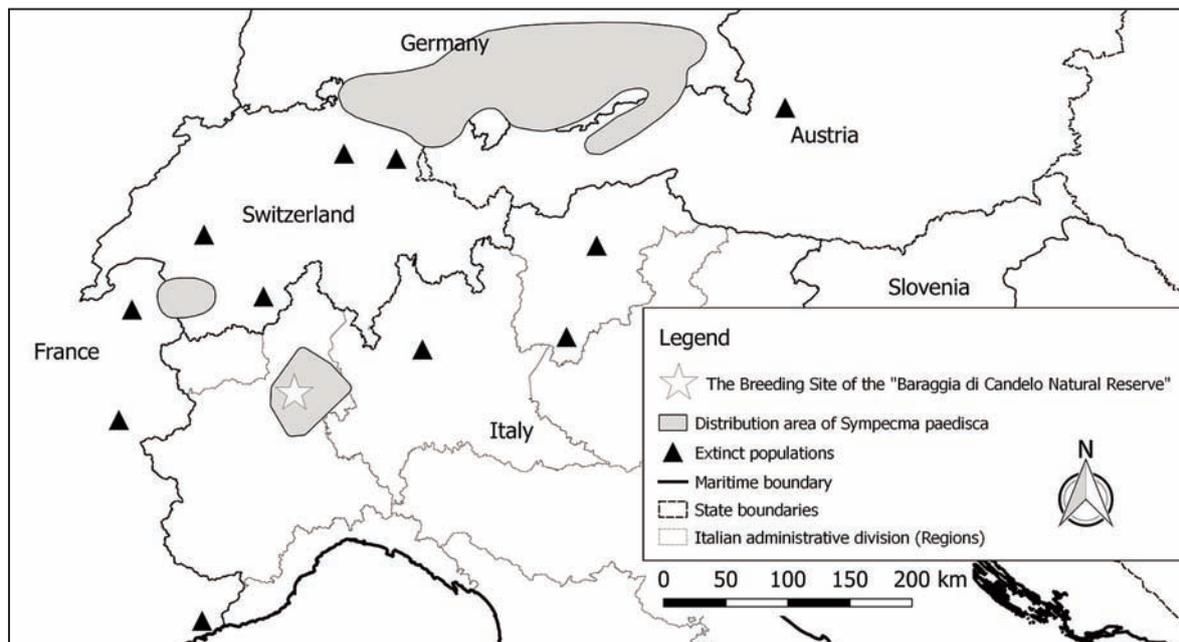


Figure 1. Occurrence of *Sympecma paedisca* in Italy and in adjacent areas, after Dijkstra (2006), changed according to Riservato et al. (2014) and personal observations for Italy and according to Boudot & Kalkman (2015) and to Siesa (2017) for adjacent states.



Figures 1–3. SCI “Baraggia di Candelo”, Riserva Naturale Orientata delle Baragge (= Heathlands Oriented Natural Reserve) (Biella, NW Italy). Fig. 1: the monitored pond, breeding biotope of *Sympecma paedisca* (by M. Pavesi). Fig. 2: *Juncus effusus* L. tuft, oviposition site (by A. Battisti). Fig. 3: *Molinia* meadow, maturation and overwintering biotope; in the foreground a small temporary bog (by A. Battisti).

observed; decreasing numbers of ovipositing tandems (up to 3) were noticed until 7.VI.2014. Observations were repeated on 17-18.V.2015, 28.V.2016 and 10.VI.2016, with smaller numbers of tandems (< 10 each time) and a unique unaccompanied ovipositing female. The oviposition substrates are, almost always, living *Juncus effusus* L. stems (Fig. 2), where the eggs are laid about 20–50 cm above the water level (Fig. 3). Only one tandem was seen ovipositing, or at least attempting to do so, in a dead standing stem. Oviposition seems to take place preferably on isolated stems of *Juncus* or on the external ones of the tufts, rather than inside them. Despite of repeated visits in the weeks following each oviposition record, no emerging adults, exuviae or larvae could ever be noticed.

In Italy, at present, this is the only site, at least in recent times, where *S. paedisca* breeding was

regularly observed over more years. We report two further recent records of ovipositing *S. paedisca*. One unaccompanied female was photographed when laying eggs in a stem, most likely of *Carex* or *Phragmites*, at the Lake of Viverone (Azeglio, Province of Turin) on 24.V.2015 (post by Gianni Cattin, “willy98”, on Forum Natura Mediterraneo: http://www.naturamediterraneo.com/forum/topic.asp?TOPIC_ID=252132, determination by MP, “gomphus”). This site is included in the Natura2000 network as SCI/SPA IT1110020 “Lago di Viverone”, and is located about 15 km from the breeding site of the RNOB. Here the species is not common; there are only few records of non-breeding adults before 2000 (Riservato et al., 2014a), and some recent records (R. Sindaco pers. comm.).

E. Subrero (pers. comm.) observed few tandems at the “Riserva Naturale Orientata Palude di Casal-



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Figures 4, 5. Oviposition of *Sympecma paedisca*. Fig. 4: ovipositing tandem (by A. Battisti). Fig. 5: detail of oviposition, showing ovipositor blade piercing the stem, at the end of a row of previous oviposition holes (by M. Pavesi).

beltrame" (= Casalbeltrame Fen Oriented Natural Reserve) (Province of Novara) on 7.V.2013, as well as very few copulae and one ovipositing tandem, laying eggs into living stems of unspecified aquatic plants, on 11.VI.2014. This site is included in the Natura2000 network as SCI IT1150003 "Palude di Casalbeltrame" and is located about 30 km from the breeding site of the RNOB.

During a research in the Netherlands, marked individuals of *S. paedisca* were observed 40 km away from the breeding sites (Ruiter et al., 2007). It is possible that dispersal of vagrant individuals outside the regular breeding area may occasionally result in oviposition in more or less unsuitable biotopes, with possible temporary breeding sites, yet without any permanently established populations. We therefore wait for further records, before con-

firming the other two sites as permanent breeding ones. Conversely, the high winter presence of adults throughout the heathland of the RNOB, the presence of several breeding individuals (copulae and ovipositing tandems) for three consecutive years and the variety of potentially suitable habitats, such as ponds and moorlands, most of them not yet adequately investigated, argue for being this place of greatest importance as both a breeding and an overwintering area.

Ruiter et al. (2007) hypothesize that *S. paedisca* can move many kilometres from the breeding sites to the wintering ones, selecting heathlands to overwinter; we can add *Molinia* meadows (Fig. 3) and other types of high grass meadows as overwintering areas too, regardless of the presence of water in the winter time. On the other hand, some observations (Canovi et al., 2014) suggest that, as for studied populations, vagility in *S. paedisca* may be by far lesser than in the congeneric and syntopic *S. fusca* (Vander Linden, 1820). Mark/recapture programs will be needed to solve the question.

Reproductive behaviour of *S. paedisca*, from our observations, seems to differ from that of *S. fusca*. The latter is reported to mate and oviposit early in spring, already in March, and to lay eggs in floating debris at the water surface. All tandems of *S. paedisca*, as well as the very few unaccompanied females, were seen to lay eggs into vertical, all but one living, stems, well over water surface. Moreover, recorded oviposition time is distinctly later. On 25.IV.2009, 29.III.2014, 20.III.2015, 27.III.2015 and 25.IV.2015, within 6 km of the studied pond, several *S. paedisca* were found, yet no sign of reproductive behaviour was noticed at, or close to, the small waterbodies here existing. On 29.IV.2017, at the same pond, 2 males were seen at the water edge, 2 males and 3 females in the close surroundings, again with no sign of reproductive behaviour. All the latter males, and those observed on 25.IV.2009, were seemingly not fully mature, having only a small area on the top of the eyes turned blue, instead of the whole dorsal face. The earlier observation of oviposition at the Baraggia di Candelo is on 17.V, the later on 10.VI (at Casalbeltrame on 11.VI). It is to be stressed that no emerging adults, exuviae or larvae were noticed in the weeks following each oviposition record, possibly because of a wrong estimation of life cycle time. Only one fresh, recently emerged individual was

recorded on 16.VIII.2012. The first maturing adults, in heathland and *Molinia* meadows, were noticed already away from water at the end of August.

Sympecma paedisca oviposition in vertical substrates is also reported for eastern Kazakhstan (Reinhardt & Gerighausen, 2001). Manger (2007) conversely observed in the Netherlands oviposition in floating debris, starting from 14.IV; the same author also states he could observe at the same site no ovipositing tandems nor mating pairs of the co-occurring *S. fusca*, despite the presence of mature individuals, thus seeming to confirm a non-synchronous oviposition of the two species.

NW Italian population of *S. paedisca* is the only one still extant south of the Alps and of the parallel 45°48'N. Information on breeding behaviour and a description of a both breeding and overwintering area of *S. paedisca* herewith provided are a first step towards a better knowledge of its ecological requirements and life cycle, as well as a more extensive detection of breeding and overwintering sites, in order to ensure adequate protection, all of them essential for the conservation of this southern population. We suppose that several other reproductive sites, besides those above described, may exist in NW Italy, and that lack of information may be largely due to a wrong estimation of the oviposition period, this resulting in surveys carried out in inappropriate periods. Future investigations throughout the known Italian range will hopefully fill the gaps.

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