Climate change is documented to affect species and biological systems in several ways, in particular causing changes in physiology, phenology, local abundance and distribution of species and altering interspecific interactions such as the ones in predator-prey, insect-plant and host-parasite systems, with effects on both biological and human communities (Parmesan, 2006; Pounds et al., 2006; Hassell & Thompson, 2008; Ludovisi et al., 2014; Pecl et al., 2017).

Distribution shifts can occur in latitude and elevation: range shifts towards the Poles and the top of the mountains have been widely documented (Parmesan, 2006). The spatial responses of species to climate change may be influenced by mode of dispersal; Odonata are found to respond so strongly to be proposed as candidate macroecological barometers for global climate change (Hassall, 2015).

In Europe, many species of Mediterranean Odonata, such as Crocothemis erythraea (Brullé, 1832), Aeshna affinis Vander Linden, 1820, Anax parthenope (Selys-Longchamps, 1839), Orthetrum brunneum (Fonscolombe, 1837), Erythromma lindenii (Selys-Longchamps, 1840), Erythromma viridulum (Charpentier, 1840) and others, have expanded their range northwards (Ott, 2001, 2010).

In this note, we report the first records of reproductive populations of Calopteryx haemorrhoidalis in Piedmont (NW Italy), suggesting a northwards latitudinal shift of the range of the species in Italy. The reports of Mediterranean dragonflies and damselflies that in the last years have been recorded for the first time in Piedmont are also outlined.

**Key words:** Dragonflies, damselflies, distribution, Piedmont, Italy, reproductive populations, climate change.
Piedmont and Aosta Valley only from isolated records (Fig. 2): a specimen labelled “Gressoney La Trinité” (Valle d’Aosta, M. Lanza leg.) collected in July 1970 is preserved in the “La Specola” Museum in Florence (Terzani, 2003). After, a male was collected in the Natural Reserve “Sorgenti del Belbo” near Montezemolo (Cuneo Province, 30.VII.1994, M. Pavesi). More recently a specimen was recorded near Bagnasco (Cuneo Province, VI.2011, Gianpiero Secco, “Giansacca”, obs.; Forum Natura Mediterraneo, 2011) and another one near Trinità (Cuneo Province, 15.VIII.2013, M. Pettavino obs.). These records, however, being based on single specimens and not confirmed by further observations, were interpreted as referable to vagrant specimens. Recently
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a male was photographed during a quick survey near Cantarana (Asti Province, 20.VI.2018, RS), but in this case it is not yet possible to establish whether it was a vagrant individual, or if there is a population in the area.

The nearest established populations are found in Liguria (Fig. 2), where the species is widespread in several streams of the Tyrrenian drainage basin (Ottonello & Oneto, 2013). Only one record in Liguria is located in the Adriatic drainage basin, the Bormida River at Altare (Savona Province, 1970; Bordoni et al., 1980), where the presence of the species has no longer been confirmed ever since.

In the Po plain, the nearest populations occur in Emilia Romagna, in the Modena province (Riservato et al., 2014).

The recently discovered Piedmontese populations of *C. haemorrhoidalis* have probably established in very recent years. The Rio Miseria was repeatedly surveyed in the last years for monitoring Odonata by the authors and other naturalists, with no observations of *C. haemorrhoidalis* before 2015. Moreover, some localities in the area around Montegrosso d’Asti were surveyed by Barbero (2005) with no evidence of the species occurrence.

In the last decade, other species of Mediterranean dragonflies and damselflies have been recorded for the first time in Piedmont: consistent field data support the newly established presence of *Coenagrion scitulum* (Rambur, 1842) (Evangelista, 2009; Barbero & Baldizzone, 2010) and *Selysiothemis nigra* (Vander Linden, 1825) (Subbero, 2014), but also *Coenagrion caerulescens* (Fonscolombe, 1838) (first record 2005; Boano et al., 2007) has likely extended its range in Piedmont in recent times.

In conclusion, this note highlights the following:

1) The Piedmont Odonatofauna has been enriched of one species, *C. haemorrhoidalis*.

2) Our findings suggest that processes acting on global scale, such as climate change, are producing biological effects detectable also on both regional and national scale; in particular, our findings suggest that distribution range of *C. haemorrhoidalis* in Italy is most likely expanding northwards as a consequence of climate change.

3) Future research effort should be focused on the inner parts of the Po plain to evaluate possible northwards range shifts of other Mediterranean species in the context of climate change.

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References


