

Records of protected dragonflies from Rio Tera, Zamora province, Spain (Odonata)

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Abstract: Breeding records of *Gomphus graslinii*, *Macromia splendens*, and *Oxygastra curtisii* are provided from Rio Tera, the outlet of Lago de Sanabria, in Zamora province, Castilla y León. With 1000 m a.s.l. this site is the highest altitude at which the three spp. have hitherto been recorded. This is most probably due to the exceptionally warm waters feeding Rio Tera at the outlet that are provided by the summer stratification of the lake.

Keywords: Odonata, *Gomphus graslinii*, *Macromia splendens*, *Oxygastra curtisii*, altitude, exuviae, Iberian Peninsula, Zamora.

Citas de odonatos protegidos para el río Tera, provincia de Zamora, España (Odonata)

Resumen: En este artículo se presenta evidencia de la reproducción de *Gomphus graslinii*, *Macromia splendens*, y *Oxygastra curtisii* en el río Tera, en su nacimiento en el lago de Sanabria, en la provincia de Zamora (Castilla y León). Con sus 1000 m s. n. m. es la localidad de mayor altitud donde las tres especies han sido halladas hasta ahora. Probablemente esto se deba a la temperatura excepcionalmente elevada del agua de los primeros tramos del río, que proviene de la estratificación térmica estival del lago.

Palabras clave: Odonata, *Gomphus graslinii*, *Macromia splendens*, *Oxygastra curtisii*, altitud, exuvias, Península Ibérica, Zamora.

Introduction

Within the Odonata, six European taxa are listed on the IUCN Red List of threatened species, assessed under 1994 categories (IUCN, 2004); four of these also inhabit the Iberian peninsula: *Coenagrion mercuriale* (Charpentier, 1840), *Gomphus graslinii* Rambur, 1842, *Macromia splendens* (Pictet, 1843), and *Oxygastra curtisii* (Dale, 1834). In addition, these four species are also protected by the Fauna-Flora-Habitat (FFH) directive of the European Union, and, with the exception of *O. curtisii*, are still regarded as threatened according to present criteria (Sahlén et al., 2004). However, distributional data regarding these species are still scarce, providing only an unsatisfactory and patchy picture, especially for Spain. In this note we record a previously unknown Spanish breeding site of *G. graslinii*, *M. splendens* and *O. curtisii* in order to document another piece of the distributional puzzle of these EU-wide protected species.

Study site and methods

On 9 August 2005, we visited Rio Tera close to its outlet from Lago de Sanabria, approximately 9 km NW of Puebla de Sanabria, Zamora province, Castilla y León (42°08'N, 06°41'W). The investigated site, at an altitude of approximately 1000 m above sea level, was an almost stagnant, warm, pool-like part of the river, ca 25 m wide and mostly shallow (average depth ca 40–50 cm, maximum depth ca 120 cm), approximately 100 m downstream of the first bridge crossing it after Lago de Sanabria. We stayed at this site for ca 2.5 h in the afternoon, watching Odonata on the wing with binoculars and collecting exuviae from ca 100 m of the shore while wading in the river.

Species list

Observed on the wing:

Platycnemis acutipennis Selys, 1841: 30
Platycnemis latipes Rambur, 1842: 20
Erythromma lindenii (Selys, 1840): 50
Anax imperator Leach, 1815: 1♂
Boyeria irene (Fonscolombe, 1838): 10♂♂
Orthetrum coerulescens (Fabricius, 1798): 20

Exuviae collected:

Platycnemis sp. 2
Boyeria irene (Fonscolombe, 1838): 1♂, 5♀♀
Gomphus graslinii Rambur, 1842: 17♂♂, 14♀♀
Gomphus pulchellus Selys, 1840: 4♂♂, 4♀♀
Onychogomphus uncatius (Charpentier, 1840): 1♂, 3♀♀
Macromia splendens (Pictet, 1843): 1♂, 1♀
Oxygastra curtisii (Dale, 1834): 6♂♂, 4♀♀
Orthetrum coerulescens (Fabricius, 1798): 1♂, 3♀♀

Emergence sites: We found the exuviae of *M. splendens* on two large rocks in the riverbed, 2 and 7 m away from the bank, where they clung at heights of 50 and 70 cm above the water in sheltered positions under projections of the rock. The substrate around the rocks was large pebbles with sand, at a water depth of approximately 1 m. At those sites they were accompanied by exuviae of *B. irene*, *O. uncatius* and *O. curtisii*. Exuviae of *G. graslinii*, *G. pulchellus* and *O. coerulescens* were collected chiefly from low vegetation, at a maximum height of 50 cm above water and a maximum horizontal distance of 30 cm from the water. Few *B. irene* and *O. curtisii* had used the same spots for emergence.

Discussion

Concerning the known distribution of *Gomphus graslinii*, *Macromia splendens* and *Oxygastra curtisii* in the Iberian peninsula, Rio Tera is not an noteworthy place as a new breeding site. The locality is situated close to Galicia where *M. splendens* is regarded as widespread and not endangered (Cordero Rivera, 2000), and not far from northeastern Portugal, where likewise it seems not to be rare (Malkmus, 1996, 2002; Vanappelghem & Fernandez 2003). Assuming that those records pertain to a more or less coherent population that is not constrained by political borders, northwestern Iberia is obviously a centre of *M. splendens* distribution of a hitherto unknown size. Zamora province is also included in the range of *G. graslinii* mapped by, e.g., Dommanget (1996). Although the situation of *G. graslinii* is probably less known than that of the more spectacular *M. splendens*, their syntopic occurrence – along with *O. curtisii* – is a typical coenosis of southwestern European streams and rivers that are close to their natural state (e.g., Bilek, 1969; Dommanget, 1996; Lohr, 2005).

However, what we regard as especially noteworthy is the evidence of a breeding site of those spp., especially *M. splendens*, at the confirmed altitude. In neighbouring Galicia, Cordero Rivera (2000) sampled 28 localities and found *M. splendens* in 11 of them at altitudes below 320 m above sea level, stating that "almost all populations occur at low-altitude rivers, up to 250–300 m". This opinion is shared by the species reviews of Lieftinck (1965: "apparently confined to the plains and hills not above 300 m") and Grand & Dommanget (1996: "up to 350 m"). To our knowledge the hitherto recorded extremes in altitude were in France at 620 m (Chaussadas & Dommanget, 1988), in Spain at 640 m (J. Cabezas Flores in Cordero Rivera, 2000) and in Portugal at 680 m above sea level (Malkmus, 2002). The Spanish record pertained to "a single larva", the other two only to sightings of single *M. splendens* adults, respectively. The next recording sites to the south of Rio Tera are situated in northeastern Portugal at 200–475 m (Malkmus, 1996, 2002), and in Extremadura at 350 m (Rio Jerte; Benitez-Donoso & García-Parrón, 1989; Benitez-Donoso, 1990). The vertical range inhabited by *G. graslinii* is obviously almost identical (Dommanget,

1996: "in France up to an approximate elevation of 400 m"). Concerning *O. curtisii*, records of imagines during maturation were taken in Switzerland at approximately 900 m, but the uppermost reproduction site there is situated at 416 m (Hoess, 2005). The highest breeding population for *O. curtisii* hitherto published was found in France at 695 m above sea level (Ladet, 1995).

Hence, the new site constitutes by far the highest records of these spp., especially for successful reproduction, ever published. But there is a simple explanation for this fact: Rio Tera flows through Spain's largest natural lake, Lago de Sanabria. Although this is an oligotrophic glacier lake with a size of 318 ha and a depth of 51 m, it develops during summer stratification a huge epilimnion of 8 m, with temperatures up to 24°C in August (Luque Marin, 2003) – meaning that warm water feeds Rio Tera at the outlet. The phenomenon that a larger, stratified lake may serve as a sort of 'continuous-flow water heater', offering at its outlet optimal temperature conditions for the development of running-water Odonata like gomphids, is well-known to us from a number of examples in Germany and explains why spp. typical of lowland streams and rivers like *G. graslinii*, *M. splendens* or *O. curtisii* are able to breed exceptionally at this altitude.

Another phenomenon that we consider worth mentioning is the discrepancy between species observed on the wing and species recorded as exuviae, especially in an extremely dry year like 2005 that allowed exuviae to remain *in situ* at emergence sites for probably several weeks. If we had not looked for exuviae even at a date late in summer – especially within the watercourse – most of the presented spp. would have stayed undetected.

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