

Notes on the distribution and biology of the Splendid Cruiser – *Macromia splendens* (Pictet, 1843) – in northern Portugal (Odonata: Macromididae)

Ernestino Maravalhas¹, Paulo Pereira^{1,2}, Albano Soares & Miguel Peixoto²

¹ TAGIS – Centro de Conservação das Borboletas de Portugal Museu Nacional de História Natural, Rua da Escola Politécnica, 58, 1250-102 Lisboa (Portugal) (www.tagis.org). emsmaravalhas@gmail.com

² Ideias Sustentáveis (www.ideias-sustentaveis.net)

Abstract: *Macromia splendens* (Pictet, 1843), is considered by many odonatologists among rarest and most threatened European dragonflies. During the last few years, the authors have carried out field work to detect this species in continental Portugal, from the northern border to the river Mondego: the results are presented here.

Key words: Odonata, Macromididae, *Macromia splendens*, chorology, biology, conservation, Portugal.

Notas sobre la distribución y biología de *Macromia splendens* (Pictet, 1843) en el norte de Portugal (Odonata: Macromididae)

Resumen: *Macromia splendens* (Pictet, 1843), está considerada por muchos odonatólogos como uno de los anisópteros europeos más raros y amenazados. En los últimos años los autores han hecho trabajo de campo centrado en esta especie, intentando detectar nuevas poblaciones en Portugal continental, desde la frontera norte hasta el río Mondego, exponiendo aquí sus resultados.

Palabras clave: Odonata, Macromididae, *Macromia splendens*, corología, biología, conservación, Portugal.

Introduction

The order Odonata is represented in continental Portugal by 64 species (Ferreira *et al.*, 2006). Among them, *Macromia splendens* (Pictet, 1843) is a *taxon* that merits special attention due to its reduced range worldwide (Sahlén *et al.*, 2004) and scarcity (cf. Cordero-Rivera, 2000). The species has been reported from Portugal only on a few occasions and is apparently quite widespread but localized and rare throughout the country. Despite the protection status that the species receives, we have found environmental factors, like water pollution, clearly affecting some of the habitats, with an increased concern for the species conservation in the long term.

During the last few years the authors targeted field work to locate new populations of the species, the results being a number of findings in 11 UTM's (10x10 km), distributed in ten counties in north-western Portugal (see fig.1). Most of these records are located in areas never reported previously, the distribution being extended westwards.

Distribution

Macromia splendens (Pictet, 1843) has a reduced range, being rare and localized (Aguesse, 1968; Askew, 1988; Dijkstra, 2007). In the *Atlas of Mediterranean Dragonflies*, Boudot *et al.*, (2009) gave the distribution of the species, reported from only 61 50x50 km UTM dots (the same as *Gomphus graslinii* Rambur, 1842, another rare endemic from the west Mediterranean). In recent decades the species has been found in some Spanish regions like Galicia (Cordero-Rivera, 2000) and Extremadura (Sánchez *et al.*, 2009), where apparently it is localized but well distributed in suitable areas. The altitudinal limit for the Iberian Peninsula ranges usually from sea-level to 500-600 m (Azpilicueta Amorín *et al.*, 2009), but one population in Castilla-León region has been found at 1000 m (Weihrauch & Weihrauch, 2006).

The first report from Portugal was given for Póiares (Vila Nova de Poiares) by Longinos Navás (Navás, 1924). Malkmus (2002) compiled the available data and presented a map where the species can be found throughout Portugal, from the rivers Tâmega and Sabor (in the north) to the Guadiana river (in the southeast). With the data provided by this study we can say that the species is well distributed in northern Portugal, where we believe that several new populations are to be discovered as there are many rivers with suitable conditions for the species survival.

Results

The authors did some research targeted to this species, especially in northern Portugal during the years 2008 to 2010 and detected 48 adults and 11 larvae (see Appendix). A number of suitable rivers and dams were visited from the end of May till middle of August and from early morning to late afternoon. We checked locations from the river Coura on the north border (41° 52' N) to the river Mondego (40° 29' N). Intensive prospection has been done in some areas, like the Tâmega river near Chaves and the Beça river near Boticas but the species was

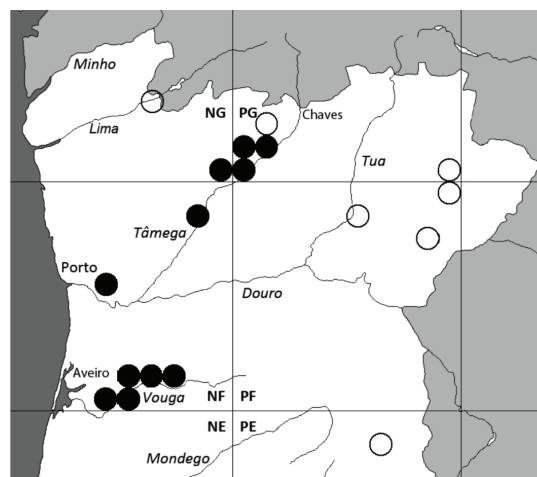


Fig. 1. Distribution of *Macromia splendens* (Pictet, 1843) in Northern Portugal (UTMs 10x10 km). Open circles: bibliographical records. Closed circles: new records. Main cities and rivers (italic) are shown. // *Distribución de Macromia splendens* (Pictet, 1843) en el norte de Portugal (UTMs 10x10 km). Círculos abiertos: citas bibliográficas. Círculos cerrados: nuevas citas. Se muestran las ciudades principales y los ríos (en cursiva).

not found there, the apparent reasons being water pollution (river Tâmega) and low temperatures (as the cold reaches the Beça river at altitudes ranging from 600 to 800 meters).

The middle Tâmega population is poorly studied, but apparently is healthy, at least in the area of Mondim de Basto and Celorico de Basto, where the water quality is quite good. The upper Tâmega has been prospected from the Spanish border to Santo Aleixo de Além Tâmega (Ribeira de Pena) where a certain degree of pollution has been detected in the last four years and where no trace of the species has been found. The Beça population seems to be one of the more important in northern Portugal, due to the interesting numbers of adults recorded by the authors in the years 2009 and 2010. The water quality there was quite good and several ditches provide adequate depth for the species. The Vouga population is well established, the species being more frequent in the middle Vouga (Sever do Vouga, Águeda and Albergaria) than in the upper Vouga (Oliveira de Frades and Vouzela). In middle Vouga, from six samples collected for macroinvertebrate inventory, randomly sampled in a 100 m river transect (INAG, 2008), we found *Macromia* larvae in three, thus indicating an important population in this part of the river.

This conspicuous dragonfly, the adult having an almost black body with small yellow dots, is easy to identify, but can be confused in flight with *Cordulegaster boltonii* (Donovan, 1807), which has a similar coloration and size. The adults prefer wide and lentic rivers where the minimal depth is 1.5 m. and the mean annual temperature is 14 °C (Cordero-Rivera, 2000, 2007). We have noticed that the water was apparently rich in oxygen and unpolluted (although with a certain degree of pollution in the Ferreira river). In the Vouga river, the observed populations survive with a depth that falls to just 1m during summer drought.

The recorded flight period was quite short, from June 5th to July 15th, and a certain protandry has been noticed. The data collected showed an apparent flight peak in the last week of June and the first half of July. Several visits to the rivers Beça and Tâmega made in the 2nd half of July and the 1st of August showed that the species was not flying by that time of the year.

The detected flight time was from 8.30 to 19.00 hrs, but most of the animals were in flight by the end of the morning, avoiding the colder hours of the day. Most of the males were patrolling river banks, but a certain number was feeding inside a forest, quite far from the water (up to 1.57 km).

In 2009 and 2010 we observed adults mating at the river Beça before noon on warm days of June and July. The pairs were visible for a while but quickly went to the tree canopy where they disappeared. Egg-laying was detected at the same place in 2009 and 2010 during hot afternoons of June and July. The females were alone and dipped the abdomen one meter apart at each egg drop, this behaviour corresponding to the observations made in Galicia (cf. Cordero-Rivera *et al.*, 1999). Several larvae have been found in the river Vouga, hidden in sandy substrates with scattered flooded roots.

Our observations clearly document reproductive behaviour at several locations and dates but more field work is needed to evaluate the species needs for breeding in the country. Some autoecological work is being done in Portugal with this species by other colleagues and soon we will have a better understanding of the distribution and biology of this species.

Discussion

The populations now confirmed are under a huge conservation threat, as there are two dams planned for the Vouga river (Ribeiradio and Ermida) and four for the Tâmega river. In the Vouga river the Ribeiradio dam will drown approximately half of the population. The ecological level of water must be sufficient to respond to the ecological needs of this species and measures should be taken to maintain and improve suitable habitat for this protected species in the areas not affected by the dam.

In August of 2010, a huge fire destroyed some 10 km of forest along the river Beça, one of the strongholds of the species in Portugal. In this area, the authors made several observations prior to the fire, namely adults feeding on the insects flying in the scrub under the canopy of *Pinus* and other tree species. We don't know the effect of the habitat loss and the eventual water pollution from burned debris, to which we have to add the terrestrial habitat lost for insects that are the only food of the dragonfly adults. We hope to visit the place during 2011 to evaluate the potential loss. The area lacks any kind of legal protection that could be helpful to sustain the populations of this legally protected dragonfly species.

Acknowledgements

We thank Armando Caldas and Eduardo J. Castro for their cooperation with field work and authorization to publish their records, Sónia Ferreira for additional bibliography and Martin Corley for the revision of the manuscript.

Appendix

Observations made during the present study (by county):

Águeda: River Vouga, Macinhata do Vouga at 25 m (29TNF40), 10-IX-2010 (1 larva, Miguel Peixoto and Paulo Pereira), (29TNF50) 10-IX-2010 (1 larva, Miguel Peixoto and Paulo Pereira).

Albergaria-a-Velha: River Vouga at 20 m (29TNF40), 10-IX-2010 (1 larva, Miguel Peixoto and Paulo Pereira).

Boticas: River Terva, Sapiãos at 525 m (29TPG11), 13-VII-2009 (1 male, Maravalhas).

Cabeceiras de Basto: River Beça, Gondiaes at 350 m (29TNG90), 12-VII-2009 (4 males, Maravalhas), 13-VII-2009 (2 males, 1 pair, female ovipositing); 15-VII-2009 (2 males, Maravalhas); 25-VI-2010 (4 males and 1 female, Albano Soares & Eduardo J. Castro); 6-VII-2010 (6 males, Albano Soares & Maravalhas); 9-VII-2010 (3 males, Maravalhas); 10-VII-2010 (3 males, Albano Soares & Armando Caldas).

Celorico de Basto: River Tâmega, Arnóia at 100 m (29TNF88), 16-VI-2010 (1 male, Armando Caldas).

Mondim de Basto: forest near the River Tâmega at 200 m (29TNF88), 5-VI-2010 (2 males, Maravalhas & Armando Caldas).

Oliveira de Frades: River Vouga, Ribeiradio at 70 m (29TNF50), 10-IX-2010 (1 larva, Miguel Peixoto); Lordelo at 70 m (29TNF51), 16-IX-2010 (2 larvae, Miguel Peixoto); Teixeira at 70 m (29TNF61), 9-IX-2010 (1 larva, Miguel Peixoto).

Ribeira de Pena: River Beça, Canedo at 470 m (29TPG00), 27-VI-2010 (2 males, Maravalhas); 30-VI-2010 (2 males, Maravalhas); River Beça, Gardunho near Melhe at 480 m, 18-VI-2010 (4 males, 1 pair, 1 female ovipositing, Albano Soares, Armando Caldas & Maravalhas); Penalonga (29TPG01), 1-VII-2010 (1 male, Maravalhas).

São Pedro do Sul: River Vouga, Porto de Areias at 130 m, (29TNF71), 22-VI-2008 (1 male, Paulo Pereira).

Sever do Vouga: River Vouga, Ribeiradio at 70m (29TNF50), 10-IX-2010 (1 larva, Miguel Peixoto); Lordelo at 70 m (29TNF51), 16-IX-2010 (2 larvae, Miguel Peixoto); Teixeira at 70 m (29TNF61), 9-IX-2010 (1 larva, Miguel Peixoto).

Valongo: River Ferreira, Campo at 50 m (29TNF45), 1-VII-2008 (2 females, Albano Soares); 3-VII-2008 (1 female, Albano Soares). All the adults have been left in the wild.

References: AGUESSE, P. 1968. *Les Odonates de l'Europe Occidentale, du Nord de l'Afrique et des Iles Atlantiques*. Masson et Cie. Ed., Paris. • AGUILAR, J. & J. L. DOMMANGET 1998. *Guide des Libellules d'Europe et d'Afrique du Nord*. Delachaux et Niestlé. Paris. • AZPILICUETA AMORÍN, M. A., C. REY RAÑO, F. D. BARRUECO, X. L. REY-MUÑOZ & A. CORDERO RIVERA 2007. A preliminary study of Biodiversity hotspots for Odonates in Galicia, NW Spain. *Odonatologica*. **36**:1-12. • AZPILICUETA AMORÍN, M.A., A. CORDERO RIVERA & F.J. OCHARAN 2009. *Macromia splendens* In: Verdu, J. R. & E. Galante, (eds). *Atlas de los Invertebrados Amenazados de España (Especies En Peligro Crítico y En Peligro)*. Dirección General para la Biodiversidad, Ministerio de Medio Ambiente, Madrid, pp. 203-209. • Askew, R. R. 1988. *The Dragonflies of Europe*. Harley Books. Colchester, England. • BOUDOT, J.P., V. C. KALMAN, M. AZPILICUETA AMORÍN, T. BOGDA-NOVIC, A. CORDERO RIVERA, G. DEGABRIELE, J.L. DOMMANGET, S. FERREIRA, B. GARRIGÓS, M. JOVIC, M. KOTARAC, W. LOPAU, M. MARINOV, N. MIHOKOVIC, E. RISERVATO, B. SAMRAOUI & W. SCHNEIDER 2009. Atlas of the Odonata of the Mediterranean and North Africa. *Libellula*, Supl. **9**:1-256. • CORDERO RIVERA, A., 2000. Distribution, habitat requirements and conservation of *Macromia splendens* Pictet (Odonata: Corduliidae) in Galicia (NW Spain). *International Journal of Odonatology*, **3**:73-83. • CORDERO RIVERA, A. 2007 (2008). *Macromia splendens*: Estado de conservación y problemática de futuro. In: J. Pérez Godillo & A. Sánchez García (eds.). *I Jornadas sobre la conservación de los artrópodos en Extremadura*, 16, 17 y 18 de Junio de 2007, Cuacos de Yuste (Cáceres). Junta de Extremadura, Badajoz, pp. 117-130. • CORDERO RIVERA, A., C. UTZERI & S. SANTOLAMAZZA CARBONE 1999. Emergence and adult behaviour of *Macromia splendens* (Pictet) in Galicia, northwestern Spain (Anisoptera: Corduliidae). *Odonatologica* **28**: 33-42. • DIJKSTRA, K. D. B. 2007. *Guide des Libellules de France et d'Europe*. Delachaux et Niestlé. Paris. • FERREIRA, S., J.M. GROSSO SILVA, M. LOHR, F. WEIHRAUCH & R. JÖDICKE 2006. A critical checklist of the Odonata of Portugal. *International Journal of Odonatology*, **9**:133-150. • INAG 2008. *Manual para a Avaliação Biológica da Qualidade da Água em Sistemas Fluviais Segundo a Directiva Quadro da Água - Protocolo de amostragem e análise para os macroinvertebrados bentónicos*. Ministério do Ambiente, do Ordenamento do Território e do Desenvolvimento Regional. Instituto da Água, I.P., Lisboa. • MALKMUS, R. 2002. Die Verbreitung der Libellen Portugal, Madeira und der Azoren. *Nachrichten des Naturwissenschaftlichen Museums der Stadt Aschaffenburg*, **106**: 117-143. • NAVÁS, L. 1924. *Sinopsis de los Paraneurópteros (Odonatos) de la península ibérica*. Sociedad Entomológica de España, Zaragoza. • SAHLÉN, G., R. BERNARD, A. CORDERO-RIVERA, R. KETELAAR & F. SUHLING 2004. Critical species of Odonata in Europe. *International Journal of Odonatology*, **7**:385-398. • SANCHEZ, A., J. PEREZ, E. JIMENEZ & C. TOVAR 2009. *Los Odonatos de España*. Junta de Extremadura, Consejería de Industria, Energía y Medio Ambiente, Mérida. • VERDÚ, J. R. & E. GALANTE (ed.) 2006. *Libro Rojo de los Invertebrados de España*. Dirección General para la Biodiversidad, Ministerio de Medio Ambiente, Madrid. • WEIHRAUCH, F. & S. WEIHRAUCH 2006. Records of protected dragonflies from Rio Tera, Zamora province, Spain (Odonata). *Boletín de la Sociedad Entomológica Aragonesa*, **38**: 337-338.