

## FURTHER OBSERVATIONS OF *MACROMIA SPLENDENS* (PICTET) IN ANDALUCIA, SPAIN (ANISOPTERA: MACROMIIDAE)

D. CHELMICK

31 High Beech Lane, Haywards Heath, West Sussex, RH16 1SQ, United Kingdom; --  
dgc@davidchelmick.com

**Abstract** – CHELMICK (2006, *Notul. odonatol.* 6: 69-72) provided information on the status of *M. splendens* in Andalucia. This paper outlines further information on the distribution, habitat and behaviour of this species in southern Spain. The paper concludes with discussion on the conservation and threats to the habitat of this internationally important sp.

### Introduction

*Macromia splendens* is classified as vulnerable in the Global Red List and is included in the EU Habitat Directive, Appendix II and IV. Following earlier visits to Andalucia between Oct. 2002 and June 2005 where the occurrence of *M. splendens* was established in the region (CHELMICK, 2006), I made a further visit to the Guadiaro river system between 28 May and 8 June 2007. The previous visits con-

centrated upon the Rio Hozgarganta, which is a tributary of the Rio Guadiaro. The intention of this trip was to investigate potential sites for *M. splendens* on the Rio Guadiaro itself and on another of its main tributaries the Rio Genal.

### Rio Guadiaro

I visited the Rio Guadiaro on 4 occasions between 28 May and 4 June. I found neither exuviae nor adults of *M. splendens* at any of the 3 locations visited. As for other species a total of 16 exuviae of *Gomphus simillimus* were collected at Cortes. Apart from these, there was very little odonate activity along this river.

### Observations of exuviae

Exuviae of *M. splendens* were found at two new locations: the first was on the Rio Genal approximately 3 km east of Algotocin. The second

location was on the Rio Almarchal immediately to the south of Genalguacil. The exuviae collected at these two sites is shown below:

- *M. splendens*: 4 (Genal, Algotocin 31-V-07), 2 (Almarchal 31-V-07), 1 (Genal, Algotocin 7-VI-07);
- *Boyeria irene*: 13;
- *Oxygastra curtisii*: 8;
- *Gomphus graslini*: 1;
- *Calopteryx haemorrhoidalis*: 1.

The *M. splendens* exuviae at both these sites appeared quite fresh with no evidence of spiders' webs indicating that emergence had been taken place recently. The river substrate at the Algotocin site on the Rio Genal was mud. In contrast the Rio Almarchal site consisted of large rocks and stones with very little mud. The common feature in both cases and with other *M. splendens* emergence sites of previous years, was depth of water, which, in both cases, was approximately 1.60 m. Both emergence sites were vertical rock cliffs. Exuviae were found approximately 0.4 m above the water surface

#### Observations of adults

On 29 May and 5 June, I visited the Rio Hozgarganta at Jimena de la Frontera in order to establish whether any adult activity was present on the river. On 29 May, the weather conditions were nearly perfect with strong sun and little wind. There was no sign of *M. splendens*. Other species were present in small numbers with *Oxygastra curtisii* holding territory in one area. It is of note that river levels were far higher than in 2005 and it would appear that the drought problems of earlier years had been resolved.

On 5 June, I re-visited the Rio Hozgarganta at Jimena. I spent the morning on a sheltered pool where I had observed *M. splendens* in previous years. Unfortunately the wind was very strong and hardly any adult activity was observed; *Trithemis annulata* was virtually alone in braving the conditions. In the afternoon, we moved further up the Hozgarganta to the Puente de las Canillas. The river here is in a deep cutting (approximately 20 m) with vertical rock sides. The sun was shining onto the river through the cutting but the wind had dropped. At about 17:00 hours I was situated in the river and observed a male *M. splendens* holding ter-

ritory over a deep water stretch of the river. It returned on two further occasions and then disappeared. I left the river at 17:30 hours.

On 7 June I re-visited the Rio Genal at Algotocin. I arrived at the river at 12:15 hours and immediately observed a male *M. splendens* holding territory over a typical deep river stretch. The territory appeared to extend over a length of approximately 100 m and this stretch was being patrolled regularly by the male insect flying approximately 1.0 m above the water. I walked upriver where the rocky banks were replaced by overhanging trees and encountered another male insect holding territory again over a deep river stretch. At this altitude the river consists of short fast stretches which link deep slow moving waters which probably become isolated pools in late summer. These latter pools are deep (minimum 1.0 m) and bordered either by steep rocks and/ or trees shading the water. It is these pools that form the territories of *M. splendens*. There were three quite distinct pool stretches in this location each with a resident male *M. splendens*.

#### Discussion

On arriving in Andalucia, I was clear that the rivers were much fuller than in my previous visit in 2005. The higher water levels appeared to have no effect upon the flight season of *M. splendens* which appears to commence (as fully adult sexually mature insects) in the first week of June as in 2005. I saw no evidence of oviposition and it may be that the females appear at the river somewhat later. My decision to look at the selected sites on the Almarchal and the Genal at Algotocin was based simply upon accessibility. The fact that *M. splendens* was present at both sites indicates that it is probably widespread in western Andalucia and present in suitable habitat.

The occurrence of *M. splendens* on the rivers of Andalucia is summarised here:

Rio Guadiaro:

- 1 observation (adult male in 2005)
- distance from coast of observation, (measured on river) 38 km
- altitude of river at observation, 200 m a.s.l.
- altitude of river source, 1200 m a.s.l. (approx.)

Rio Hozgarganta:

- many observations larvae, exuviae and adults
- distance from coast of observations, 22-32 km
- altitude of river at observations, 30-140 m a.s.l.
- altitude of river source, 700 m a.s.l.

Rio Genal:

- many observations exuviae and adults
- distance from coast of observations, 28-40 km
- altitude of river at observations, 80-240 m a.s.l.
- altitude of river source, 1000 m a.s.l.

Rio Almarchal:

- 2 exuviae found in 2007
- Distance from coast of observations, 38 km
- Altitude of river at observations, 240 m a.s.l.
- Altitude of source of river, 1000 m a.s.l.

Rio Tavizna:

- 2 larvae found in 1983
- Distance from coast of observations, 90 km
- Altitude of river at observations, 250 m a.s.l.
- Altitude of source of river, 1250 m a.s.l.

In summary, my observations suggest that *M. splendens* occurs on rivers where:

- Waters rise at an altitude no greater than 1500 m a.s.l. and whence cold melt waters hardly ever occur.
- There is a minimum distance from the coast of at least 30 km. The coastal lowlands are often subject to intensive agriculture and habitat is not suitable.
- Altitudinal range appears to be between 30 and 250 m above sea level; suitable habitat is less likely to be found at higher altitudes

LEIPELT & SUHLING (2005) based upon observations made in southern France state that larvae occur mainly in sandy substrates in shallow water and in smaller numbers on substrates dominated by coarse detritus or on bedrock in deeper water. My experience in Andalusia based upon larval and exuviae observations is that *M. splendens* does not occur in waters less than 1.0 m deep. In most cases the substrate was mud with some leaf litter but in one case (Rio Almarchal) the substrate was large boulders with no mud present. Depth would appear to be the most important feature. Pools with shallow sloping sides are also avoided. *M. splendens* will only emerge vertically or when the larvae are suspended.

**Conservation implications**

Many Spanish rivers have been dammed at high

altitude to provide water and power resources. In northern Spain (CORDERO RIVERA, 2000) *M. splendens* has been recorded from such dammed waters and is able to tolerate these conditions. In many parts of its range *M. splendens* benefits from small barrages placed in rivers which maintain and increase the deep slow flowing stretches favoured by the species. However, the very large southern reservoirs are generally very sterile areas with only very resistant dragonfly species such as *Trithemis anulata* able to cope; the rivers which flow from these reservoirs suffer from irregular flow and very variable temperature which discourage the development of deep slow stretches. With ever increasing demands for both water and power in southern Spain and not least from the ever increasing numbers of tourist developments, it is important to consider the three rivers covered in this paper from a conservation perspective.

The Rio Guadiaro is the main river: the Hozgarganta and Genal are tributaries. The Guadiaro is, without doubt the least interesting of the three rivers and from recent history this is hardly surprising. Ronda is a large town of some 40,000 people; it is situated on the headwaters of the Guadiaro. In 1985 its sewage treatment plant closed down and has only been replaced very recently (BOYD, 2004). For more than twenty years the Guadiaro was little more than an open sewer and is only now recovering its biodiversity. The water quality may now be improving. However, a large pipeline has now been installed south of Cortes which removes from the Rio Guadiaro up to 9 m<sup>3</sup> of water per second. This is transported to the Rio Majaceite which feeds into the Embalse de los Hurones providing water for the province of Cadiz (LA VOZDIGITAL, 2006). The future of this river in its lower reaches remains uncertain.

The Rio Hozgarganta is an important river for *M. splendens* and must be considered reasonably safe as it is largely contained within the Parque Natural Los Alcornocales. This is one of Andalusia's regional parks which limits major development.

Finally, the Rio Genal (which includes the Rio Almarchal) is situated in one of the least developed, remote and most beautiful parts of Andalusia. BOYD (2004) states that "Hydro-

graphers cast a greedy eye over the Genal some 10 years ago with a view to damming it..." Fortunately local opposition from the valley Pueblos prevailed "against tremendous odds" and this wonderful natural river remains. The fact that *M. splendens*, one of Europe's rarest and most threatened dragonflies, breeds here should be a further contributory factor to be considered if threats are made in the future to this river.

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