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New data on *Donacosa merlini* (Araneae, Lycosidae), a threatened species?

par

Mark Alderweireldt & Rudy Jocqué

Résumé: De nouvelles données ajoutent à la connaissance de la biologie et de la distribution de *Donacosa merlini* Alderweireldt & Jocqué. Puisque l'habitat spécial de cette espèce est en voie de disparition, elle doit être considérée comme en danger et devrait être mise sur la liste de la Convention de Berne.

Summary: The authors give new data on the biology and distribution of *Donacosa merlini* Alderweireldt & Jocqué. Since its special habitat is disappearing at a high rate, the species must be considered as in danger and should be added to the list of the Berne Convention.

1. INTRODUCTION

Invertebrates have usually played a minor role in nature conservation because they have hardly received any attention in assessment studies in the past. However, it was more recently shown that particular groups are good ecological indicators which can successfully be used in biomonitoring. As a consequence, an increasing number of studies were carried out in this context during the last years. For several reasons, lycosid spiders appear to be good ecological indicators (ALDERWEIRELDT & MAELFAIT 1989). They have been well investigated in western Europe, but indicators for mediterranean ecosystems have rarely been pointed out. However, this seems urgently needed in order to try to protect and manage some, often very valuable and vulnerable, mediterranean habitats in a more efficient way. For this reason we draw the attention to *Donacosa merlini*, which is likely to be a good indicator, due to its specialised habitat

requirements. *Donacosa merlini* was recently discovered and described from southwestern Spain (ALDERWEIRELDT & JOCQUE 1992), more precisely the Coto Doñana area (figure 1). This lycosid lives on coarse sandy soils, which are only slightly compacted, associated with *Pinus pinea* L. woodlands. This kind of pine woodlands still occurs in the coastal areas of southern Portugal, Spain and mediterranean France (POLUNIN & SMYTHIES 1973). The habitat is further characterized by small, open sandy places, devoid of litter. This combination of characters makes the habitat of *D. merlini* rare and is therefore supposed to be restricted to raised beach areas in southwestern Spain and perhaps adjacent Portugal. The spider exhibits a most remarkable sexual dimorphism which is partly related to burrowing behaviour (ALDERWEIRELDT & JOCQUE 1992). The life cycle of *D. merlini* was already described earlier. In this short contribution we give more information on its distribution, its burrow, the striking sexual dimorphism, its feeding ecology, the actual threats of its populations and the possibilities for protection.

2. DISTRIBUTION

Donacosa merlini is so far known from eight localities, all situated in southwestern Spain, more precisely in the Coto Doñana area near Sevilla. They are shown in fig. 1 and can be summarized as follows :

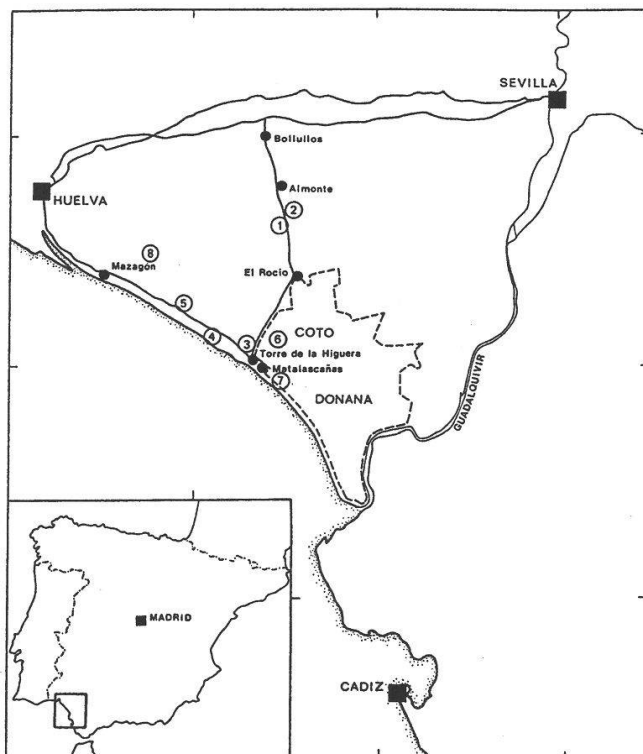


Fig. 1 - Distribution of *Donacosa merlini* in the Coto Doñana area and situation of the Coto Doñana area in southwestern Spain (inset); numbers refer to the distribution data in the text.

1. Almonte, 5 km SW, direction El Rocio;
2. Almonte, 4 km SW, direction El Rocio;
3. Torre de la Higuera, backdunes;
4. backdunes 5 km N of Torre de La Higuera, W of road to Huelva;
5. backdunes 10 km N of Torre de La Higuera, E of road to Huelva;
6. Coto Doñana National Park, control Road, 3.7 km south of main gate;
7. Coto Doñana, western margin just south of Matalascañas;
8. Mazagon, 4 km to the east, N of road to Almonte.

Two of the localities are thus situated within the limits of the Coto Doñana National Park (cf. figure 1).

3. BURROW

A detailed description of the burrow of *D. merlini* was given by ALDERWEIRELDT & JOCQUE (1992). The burrow is on average 19 cm deep with an entrance of 8-12 mm in diameter (subadults and adults). The entrance is always provided with a small turret of silk and plant debris of about 1 cm high. For 34 specimens, the depth of the burrow was measured in the field. Besides, the total body length of the respective owners of the burrows was measured. The results can be summarized as follows (all measurements in mm) :

| BODY LENGTH | MEAN DEPTH | BURROW/RANGE DEPTH | BURROW/NUMBER OF OBSERVATIONS |
|-------------|---------------|-----------------------|----------------------------------|
| 6.0 | 160.0 | (160) | 1 |
| 11.0 | 150.0 | (150) | 1 |
| 11.5 | 175.0 | (175) | 1 |
| 12.0 | 192.5 | (130-240) | 12 |
| 13.0 | 205.7 | (160-220) | 7 |
| 13.5 | 225.0 | (220-230) | 2 |
| 14.0 | 208.8 | (190-225) | 4 |
| 15.0 | 235.0 | (230-240) | 2 |
| 16.0 | 195.0 | (195) | 1 |
| 17.0 | 175.0 | (175) | 1 |
| 20.0 | 220.0 | (200-240) | 2 |

No clear relationship is found between burrow depth and total body length. This might partly be due to restricted number of observations in some size classes. Moreover, the data within one size class show a high amount of variation. The regression calculated on these data is therefore clearly insignificant ($Y = 0.439X + 14.130$, $R^2 = 0.11$).

4. SEXUAL DIMORPHISM

One of the most striking characteristics of *D. merlini* is its well established sexual dimorphism (cf. detailed description in ALDERWEIRELDT & JOCQUE 1992). Males and females differ in quite some aspects : general habitus and coloration, morphology of the cephalothorax, leg length, to mention only the most important ones. In comparison to other European Lycosidae, this degree of sexual dimorphism appears to be exceptional. As a consequence, some authors did not accept the conspecificity of the male and female described by ALDERWEIRELDT & JOCQUE (ZYUZIN, personal communication). However, recent results of laboratory rearing of *Donacosa merlini* corroborate the conspecificity of the males and females we described. From April 1990 onwards, a female with egg cocoon, brought in from the field by one of us (RJ), was held at room temperature. The resulting pulli were kept in the same conditions. Of this offspring, one male, perfectly matching the original description, reached adulthood after about 19 months which is comparable to the time it takes in field conditions.

This rearing experiment doubtlessly proves the conspecificity of both sexes as described in ALDERWEIRELDT & JOCQUE (1992). Besides this, it became clear that the male is unable to construct a new burrow whereas females and juveniles are well equipped to do so.

5. FEEDING ECOLOGY

From field and laboratory observations, it can be concluded that *Donacosa merlini* is a generalistic predator. Many different kinds of prey items offered were immediately accepted. In field conditions, Myriapoda-Diplopoda, Hymenoptera-Formicidae and Coleoptera (Carabidae and Tenebrionidae) were noted as prey of *D. merlini*. In laboratory conditions, the spiders easily accepted all kinds of Diptera (especially Muscidae and Calliphoridae, but also Drosophilidae for juvenile stages), Dermaptera and Coleoptera. Isopoda were clearly refused, as is the case in many other spider species. Other experiments demonstrated that the spider can survive long periods of food scarcity. Invertebrate predators preying upon *D. merlini* include *Scarites* sp. (Coleoptera, Carabidae).

6. THREATS AND PROTECTION OF DONACOSA MERLINI

As stated earlier, well established populations of *Donacosa merlini* are situated outside as well as inside the National Park of the Coto Doñana in southwestern Spain. The populations outside the officially protected area of the Coto Doñana are threatened by the rapidly increasing human impact, especially urbanisation for touristic and clearing agricultural purposes. The main threats are doubtlessly the plantation of vast areas with *Eucalyptus* in which *D. merlini* does not occur and the increasing

influence of week-end tourism. The declining area of *Pinus pinea* woodland is increasingly visited by picknicking parties which invariably leave ever increasing amounts of refuse. Only very thin populations of *D. merlini* were found in such frequently visited areas that otherwise appeared perfectly suited for this spider. Another threat that might even affect the populations within the boundary of the Coto Doñana National Park, is the enormous expansion of the surrounding settlements which have grown to city-size in the last decennium. Both this and the growing consumption in the agricultural sector, have resulted in an increasing need for water. The groundwater reserves are thus rapidly depleted which will undoubtedly alter the Coto Doñana ecosystem. Therefore the presently existing buffer-zones around Matalascañas are of prime importance to protect the Coto Doñana ecosystem and the populations of *Donacosa merlini* in particular.

Following this argumentation and considering the scarcity of suited habitat, it would appear necessary to include *Donacosa merlini* in the list of endangered species of the Bern convention. This would supply the Spanish Nature Conservancy authorities with a most welcome and helpful tool for protecting the complete area in a more efficient way.

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