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FIRST RECORD IN ALGERIA OF TWO EULOPHID WASPS:  
*CLOSTERO CERUS CHAMAELEON* (GIRAULT) AND ITS HOST, THE  
EUCALYPTUS GALL WASP *OPHE LIMUS MASKELLI* (ASHMEAD)  
(*Hymenoptera Eulophidae*)

SUMMARY

The endophagous parasitoid *Closterocerus chamaeleon*, released in Israel, Italy and Corsica, for classical biological control programs, and its host, the gall-maker *Ophelimus maskelli*, were recorded for the first time in Algeria, in a straight line 450 km far from the Sardinian release site and 700 km far from the closest Sicilian release site. Their presence is confirmed in Andalusia (Spain), about 2000 km far from release sites of Sicily and Campania. In about two years the parasitoid spread and established in many Mediterranean countries.

RIASSUNTO

*Prima segnalazione in Algeria di due imenotteri eulofidi: Closterocerus chamaeleon (Girault) e il suo ospite, il galligeno dell'eucalipto Ophelimus maskelli (Ashmead).* Il parassitoide endofago *C. chamaeleon*, introdotto in programmi di controllo biologico in Israele, Italia e Corsica nel 2005-2007, e il suo ospite *O. maskelli*, entrambi originari dell'Australia, sono stati ritrovati per la prima volta in Algeria, a Béjaïa, città distante in linea d'aria 450 km dal sito di rilascio in Sardegna e 700 km dal più vicino sito di rilascio in Sicilia. Si conferma la presenza dei due eulofidi in Andalusia (Spagna), a circa 2000 km dai siti di rilascio del parassitoide in Sicilia e Campania. In circa due anni il parassitoide si è diffuso ed acclimatato in molte aree del Mediterraneo.

INTRODUCTION

The eulophid gall wasp *Ophelimus maskelli* (Ashmead) (Hymenoptera Eulophidae) living on *Eucalyptus* L'Heritier has been accidentally introduced in the Mediterranean region; it was recorded in Italy, as *Ophelimus eucalypti*

(Gahan) (ARZONE & ALMA, 2000; VIGGIANI & NICOTINA 2001), as *Ophelimus* prope *eucalypti* (Gahan) (BELLA & LO VERDE, 2002) and as *Ophelimus* sp. (BAGNOLI & ROVERSI, 2004); in the meanwhile it was recorded in other Mediterranean countries (Spain: SANCHEZ, 2003; Israel: MENDEL *et al.*, 2005; Greece: KAVALLIERATOS *et al.*, 2006; France: EPPO, 2006; Turkey: DOGANLAR & MENDEL, 2007; Portugal: BRANCO *et al.*, 2009; Tunisia: DHAHRI *et al.*, in press). Until now no paper records *O. maskelli* from Algeria, while another eulophid gall-maker on *Eucalyptus*, *Leptocybe invasa* Fisher et LaSalle, was here collected since 2002 (MENDEL *et al.*, 2004).

*O. maskelli* causes galls on the leaf surface, showing a clear preference for *Eucalyptus camaldulensis* Dehnh.; leaves bearing more than 50 galls live considerably less than leaves without galls, dropping early (PROTASOV *et al.*, 2007a). Furthermore, the huge number of newly emerged wasps could induce allergic reactions and other health problems (BAGNOLI & ROVERSI, 2004; MENDEL *et al.*, 2005; LAUDONIA *et al.*, 2006; PROTASOV *et al.*, 2007a).

In 2003 the Volcani Center of Bet Dagan (Israel) and the CSIRO of Canberra (Australia) began a biological control program to search natural enemies of *O. maskelli* in Australia for their possible introduction. In 2005 *Closterocerus chamaeleon* (Girault) (Hymenoptera Eulophidae), a uniparental parasitoid species ovipositing in larvae, pupae and unemerged adults (VIGGIANI *et al.*, 2008), was introduced in Israel together with an oophagous parasitoid, *Stethynium ophelimi* Huber (Hymenoptera Mymaridae) (MENDEL *et al.*, 2007; PROTASOV *et al.*, 2007b). In 2006 Prof. Zvi Mendel (Volcani Center) kindly sent leaves with galls parasitized by *C. chamaeleon*, and in April-May of the same year the eulophid parasitoid was released in Campania (LAUDONIA *et al.*, 2006) and in five Sicilian sites (RIZZO *et al.*, 2006); in December 2006 it was also released in Calabria and Sardinia (CALECA *et al.*, 2009). In few months *C. chamaeleon* became established in all release sites, showing a remarkable dispersal rate (RIZZO *et al.*, 2006, 2007; DE MARZO, 2007; SASSO *et al.*, 2008; CALECA *et al.*, 2009), reaching Turkey from Israel (DOGANLAR & MENDEL, 2007).

Considering the quick spread of the parasitoid I tried to record whether it also reached areas far from Sicilian release sites, through occasional collecting of eucalyptus leaves in Algeria and Andalucia (Spain).

## MATERIALS AND METHODS

At beginning of March 2008 I asked to Farid Aboud, Algerian PhD student in the University of Palermo, about the possibility to collect some eucalyptus galled leaves in Algeria. On 17<sup>th</sup> March 2008 Aboud's friend Salim Ouchemoukh collected in the surroundings of the city of Béjaïa (Algeria,

36°45'23"N, 05°04'00"E) about 200 leaves of *E. camaldulensis* bearing galls caused by *O. maskelli*.

Additionally, on 10<sup>th</sup> May 2008 Prof. Maria Antonietta Germanà kindly collected some galled leaves of *E. camaldulensis*, during a visit to Alcazar de los Reyes Cristianos in Cordoba (Andalucia, Spain; 37°52'37.13"N, 04°46'56.92"W).

The collected material was maintained sealed to avoid any possible accidental introduction of arthropods from those countries into Italy. At their arrival in Palermo the leaves were placed in polyethylene transparent plastic bags with a thin cotton cloth as cover to allow transpiration and to avoid an excess of moisture; they were maintained at room temperature for one month to allow the exit of gall makers and parasitoids. Afterwards, all galls were dissected to identify adults not emerged, still inside the galls.

Parasitoids and gall makers were identified through specific characters provided by PROTASOV *et al.* (2007a, 2007b).

## RESULTS

### *Algeria*

Galled leaves collected in Béjaïa were 196 and contained 1281 galls, with  $6.5 \pm 7.1$  galls per leaf, whose 59% was already pierced by emerged wasps.

Because of the poor condition of leaves only 2 *C. chamaeleon* emerged, but through the dissection of galls without exit holes 212 adults of *O. maskelli* and 4 adults of *C. chamaeleon* were recorded inside these leaves.

To my knowledge this is the first record in Algeria for both the parasitoid and its gall-maker host.

### *Spain*

Galled leaves collected in Cordoba were 7 and contained 647 galls, with  $92.4 \pm 161.6$  galls per leaf, whose 86% was already pierced by emerged wasps.

From these leaves 3 adults of *C. chamaeleon* emerged; through the dissection of galls without exit holes other 11 adults of the parasitoid and 15 adults of *O. maskelli* were recorded inside the leaves.

These data confirm the establishment of *C. chamaeleon* recorded in Andalucia by BORRAJO *et al.* (2008) in February 2008.

## DISCUSSION

The record of the eulophid gall-maker *O. maskelli* is the first for Algeria, but its arrival probably occurred some years before 2008.



Fig. 1 — Known distribution of *C. chamaeleon* in the Mediterranean region.

The first record of the eulophid parasitoid *C. chamaeleon* in Algeria, in a straight line 450 km far from the release site in Sardinia (CALECA *et al.*, 2009) and 700 km far from the closest Sicilian release site of Santa Ninfa (RIZZO *et al.*, 2006), is another evidence of the astonishing spread in the Mediterranean region of this introduced parthenogenetic wasps. Its adult winter activity and its long life as adult (RIZZO *et al.*, 2006; PROTASOV *et al.*, 2007b; SASSO *et al.*, 2008) facilitated its spread, probably also by means of transport accidentally carrying some wasps. After its introduction in Israel ((MENDEL *et al.*, 2007; PROTASOV *et al.*, 2007b), Italy (LAUDONIA *et al.*, 2006; RIZZO *et al.*, 2006; CALECA *et al.*, 2009) and Corsica (MENDEL, *pers. comm.*), *C. chamaeleon* is now established in all release sites and reached Turkey (DOGANLAR & MENDEL, 2007), several Italian regions (DE MARZO, 2007; BAGNOLI, *pers. comm.*, LO VERDE, *pers. comm.*), Spain (BORRAJO *et al.*, 2008), Portugal (BRANCO *et al.*, 2009), Tunisia (LO VERDE *et al.*, 2010) and Algeria (present study) (Fig. 1); it is quite obvious to suppose its spread in all areas of the Mediterranean region where *O. maskelli* occurs.

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