

The first known parasitoid of *Aricia morronensis* (RIBBE, 1910), an endemic Iberian species, and notes on the parasitoids (Hymenoptera and Diptera) of the genus *Aricia* RECHENBACH, 1817 in Europe

(Lepidoptera: Lycaenidae; Hymenoptera: Braconidae, Ichneumonidae; Diptera: Tachinidae)

by

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Abstract: A parasitoid (*Cotesia tenebrosa* WESMAEL, 1837, Hymenoptera, Braconidae, Microgastrinae) of *Aricia morronensis* (RIBBE, 1910), a species endemic to the Iberian peninsula, is recorded for the first time. Incidental details, and photos of the parasitoid-host interaction are also given. Information on the parasitoids recorded from the European species of the genus *Aricia* RECHENBACH is added.

Zusammenfassung: Erstmals wird bei der Iberischen Halbinsel endemischen *Aricia morronensis* (RIBBE, 1910) der Parasit *Cotesia tenebrosa* WESMAEL, 1837 (Hymenoptera, Braconidae, Microgastrinae) festgestellt. Hierüber wird, belegt durch Fotos, berichtet. Weitere Informationen über die bekannten Parasiten der europäischen *Aricia* RECHENBACH-Arten werden gegeben.

Introduction: Parasitism by species of Hymenoptera and Diptera are an important source of mortality of the early stages of practically all species of European butterflies (SHAW et al., in press), yet for most species insufficient research on the early stages in nature has been undertaken for parasitism to be fully revealed and recorded. In this paper we delineate the first identification of a species of parasitoid reared from *Aricia morronensis* (col-pl. 9: 11), and briefly review parasitism within the European *Aricia* in general.

As far as we know, previously the only species of *Aricia* with reliable records of hymenopterous and dipterous parasitoids are *Aricia agestis* ([DENIS & SCHIFFERMÜLLER], 1775), *Aricia (agestis) cramer* (ESCHSCHOLTZ, 1821), *Aricia artaxerxes* (FABRICIUS, 1773) and *Aricia eumedon* (ESPER, 1780) (SHAW, 1996, 2007; MENÉNDEZ et al., 2008; SHAW et al., in press). Parasitism of *Aricia* species is sometimes very heavy [*A. artaxerxes* in Britain (SHAW, 1996); *A. agestis* in England (MENÉNDEZ et al., 2008)].

Material and method: Four larvae of *Aricia morronensis* were collected by the second author in the Sierra María, N. Almería province, S.E. Spain, at an altitude of 1700 m, feeding on *Erodium valentinum* on 7 May 2008. One larva was believed to be parasitised at the time because it was marked with black spots (col-pl. 9: 13). This was confirmed a few days later when the host larva at first remained alive in a quiescent state, and a few days later 11 larvae of a *Cotesia* species erupted from it and commenced spinning cocoons in a more or less aligned mass (col-pl. 9: 13). The host larva at first remained alive in a quiescent state but died some days later. The adults wasps emerged about 10 days after the formation of their cocoons. Representative specimens were sent to the first author for identification, and have been deposited in the National Museums of Scotland collection.

Identification and host range of the parasitoid: The specimens were identified as *Cotesia tenebrosa* WESMAEL (Fig. 4). All species of *Cotesia* CAMERON (Braconidae: Microgastrinae) are endoparasitoids of lepidopterous larvae, especially (but not exclusively) those of so-called "macrolepidoptera". They are koinobionts (the host continues its life for a time after being parasitised) and different species are either solitary or gregarious with respect to each host. Usually oviposition is into an early instar of the host larva, and the fully-fed *Cotesia* larvae erupts from a later instar to spin its sometimes characteristic cocoons externally: often the host does not die immediately after parasitoid eruption, but is left in a quiescent state and dies only some days later. The genus *Cotesia* can be separated from other Braconidae through keys given by SHAW & HUDDLESTON (1991) or ACHTERBERG (1993), to subfamily level, then by reference to MASON (1981). The general features of Microgastrinae are their 18-segmented antennae, small or moderate size, usually rather robust build, and comparatively large hind coxae. *Cotesia* species have a rugose propodeum, the first metasomal tergite has more or less parallel sides or is widened behind, at least the apical part of the first and much of the second tergites are more or less rugose, they have a short ovipositor, and the areolet of the forewing open. SHAW (2007) gives a key to the species of *Cotesia* known to parasitise Lycaenidae in Britain, but in continental Europe other such species are known to occur (SHAW et al., in press). All of the species of *Cotesia* known to parasitise *Aricia* are plurivoltine.



Fig. 4: facial view of the head of *Cotesia tenebrosa* (a British specimen).

Parasitism of *Aricia* species in Europe

Cotesia tenebrosa seems to have a wide host range within low-feeding Polyommataini (SHAW, 2007) but, until now, there were no certain records of *Cotesia tenebrosa* from palaearctic *Aricia* species. In Britain, *C. tenebrosa* is widespread and known from several Polyommataini. The two *Aricia* species *A. agestis* and *A. artaxerxes*, have been extensively sampled for parasitism [SHAW, 1996; MENÉNDEZ et al, 2008] and are known to be attacked by a closely related and similarly gregarious species -*Cotesia astrarches* (MARSHALL)- which may be specialised to *Aricia*, but so far *C. tenebrosa* has not been recorded. A solitary species, *Cotesia saltatoria* (BALEVSKI), is also a parasitoid of several

species of Polyommata in Europe, and has been reared from *A. agestis*, *A. artaxerxes* and *A. cramera* (SHAW, 2007; SHAW et al., in press).

The only other species of the family Braconidae known to parasitise *Aricia* is *Aleiodes bicolor* (SPINOLA) (subfamily Rogadinae), a larval parasitoid that has been reared from both *A. agestis* and *A. artaxerxes* among a wide range of Polyommata (SHAW et al., in press). Two species of Ichneumonidae have been recorded from *Aricia* species (SHAW et al., in press): the larval parasitoid *Hyposoter notatus* (GRAVENHORST) (subfamily Campopleginae), which has been reared from *A. agestis*, *A. artaxerxes* and *A. eumedon* as well as many other Polyommata, and *Anisobas cingulatus* HORSTMANN [= *cingulatorius* (GRAVENHORST) preocc.] (subfamily Ichneumoninae) which has been reared from *A. agestis*. The latter has been recorded from other Polyommata, but is seldom reared as it is a pupal (rarely larval-pupal) parasitoid. Tachinidae (Diptera) are also important parasitoids of Lepidoptera larvae, and the oligophagous Lycaenidae specialist *Aplomya confinis* (FALLÉN) has been recorded from *A. agestis* (MENÉNDEZ et al., 2008). It is likely that relatively unspecialised parasitoids attack the egg and pupal stages of *Aricia* species, but as far as we are aware this has not been studied in detail.

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Colour plate 9 / Farbtafel 9

Fig. 11: Imago of *Aricia morronensis*.

Fig. 12: Larva of *Aricia morronensis* parasitised by *Cotesia tenebrosa*.

Fig. 13: Cocoons of *Cotesia tenebrosa* and larva of *A. morronensis*.



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