First Data on the Host Ant Usage of Large Blue from the Carpathian Basin

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Abstract

The protected *Maculinea arion* is an obligate myrmecophilous butterfly (Lepidoptera, Lycaenidae). Fourth instar larvae and pupae develop in *Myrmica* (Hymenoptera: Formicidae) ant nests. Host ant specificity varies geographically, and knowledge of the local host ant species is important to understand the biogeography and evolution of this species, and vital for its conservation. Here we report the first data on the host ant usage of *M. arion* in the Carpathian Basin, one prepupal caterpillar from a *Myrmica specioides* and one pupa from a *M. scabrinodis* nest. *Myrmica specioides* is a new host ant species of *M. arion*. It is important to collect further data on the host ant usage of *M. arion*, despite the difficulties of data collection.

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**SHORT NOTE**

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Abstract

The protected *Maculinea arion* is an obligate myrmecophilous butterfly (Lepidoptera, Lycaenidae). Fourth instar larvae and pupae develop in *Myrmica* (Hymenoptera: Formicidae) ant nests. Host ant specificity varies geographically, and knowledge of the local host ant species is important to understand the biogeography and evolution of this species, and vital for its conservation. Here we report the first data on the host ant usage of *M. arion* in the Carpathian Basin, one prepupal caterpillar from a *Myrmica specioides* and one pupa from a *M. scabrinodis* nest. *Myrmica specioides* is a new host ant species of *M. arion*. It is important to collect further data on the host ant usage of *M. arion*, despite the difficulties of data collection.
& Martin, 1999) of the butterfly were checked, as this is the approximate foraging range of *Myrmica* workers (Elmes et al., 1998). Excavations were carried out just before, or at the beginning of, the usual flying periods of the different populations. Search periods earlier in the life cycle are less suitable because ant colonies adopting young fourth-instar caterpillars may later kill them (typically around winter because of starving: Elmes et al., 2004). Five to ten workers were collected from each *Myrmica* nest and preserved in ethanol for identification in the laboratory (according to: Seifert, 1988; Radchenko & Elmes, 2010).

Altogether 289 nests of nine *Myrmica* species ([*M. lobicornis* Nylander, 1846; *M. lona* Finzi, 1926; *M. rubra* (Linnaeus, 1758); *M. ruginodis* Nylander, 1846; *M. sabuleti* Meinert, 1861; *M. scabrinodis* Nylander, 1846; *M. schencki* Viereck, 1903; *M. specioides* Bondroit, 1918; *M. vandeli* Bondroit, 1920) were opened and only two (i.e. less than 1%) were infected with *M. arion*, at two different sites. One spring arion pupa was recorded in a *M. scabrinodis* nest, and a summer arion prepupa with *Myrmica specioides* (see Table 1 and Fig 1 of Supplementary File). The identification of phenological forms was carried out based on collection date (see Table 1 of Supplementary File for details). The specific identification of these pre-adult stages was confirmed using the COI genetic barcoding gene (see Table 1 of Supplementary File for the accession numbers).

*Myrmica scabrinodis* has already been recorded as a host of *M. arion* from Western Europe, although just in a few cases (Thomas et al., 1989; Elmes et al., 1998). However, as far as we know, this is the first record of *M. specioides* as a host ant of *M. arion*.

The known host ant species of *M. arion* are: (I) *Myrmica sulcinodis* Nylander (1846) and *M. lona* from Italy (Sielezniew et al., 2010b; Casacci et al., 2011); (II) *M. hellenica* Finzi (1926); *M. lobicornis*; *M. lona*; *M. rugulosa* Nylander (1849); *M. sabuleti*; *M. scabrinodis* and *M. schencki* from Poland (Sielezniew & Stankiewicz, 2008; Sielezniew et al., 2010b; Sielezniew et al., 2010c; Sielezniew et al., 2010a) (III); *M. scabrinodis* and a *M. specioides* from the Carpathian Basin (this paper); and (IV) *M. sabuleti*, as the well-proved main host, from Western Europe (England, France and Sweden: Thomas et al., 1989; Elmes et al., 1998; Nielsen, 2012) where *M. arion* is also recorded from *M. scabrinodis* and *M. lona* nests, but only in a few cases.

According to these observations, it seems that *M. arion* shows less host ant specificity in Central than in Western European regions (similarly to the other European *Maculinea* species: Tartally, 2008). However, this does not exclude local adaptations to some host ant species in Central Europe, such as the *M. schencki* using Polish populations (Sielezniew et al., 2010c). This phenomenon could be explained by the geographic mosaic of coevolution between the butterflies and their host ants (Nash et al., 2008).

Because *M. arion* can sometimes be found with *Myrmica* species, which are not suitable to maintain populations (Thomas, 1980), we should be cautious not to place too much emphasis on single host ant records. On the other hand, it is very important to publish all host ant records, including single observations, because the greater the available data about host ant usage, the greater is our understanding of the biology and conservation potential of this endangered butterfly. At the same time, it is important to emphasize that finding *Myrmica* nests infected with *M. arion* is extremely difficult, and requires dedicated and systematic surveys (Sielezniew et al., 2010a). Therefore, building up detailed knowledge about the host ant usage of this butterfly across its range would need a much more intensive research involving numerous competent people.

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Supplementary material

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