

***Myrmica salina* (Hymenoptera: Formicidae) as a Host of *Maculinea alcon* (Lepidoptera: Lycaenidae)**

by

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ABSTRACT

Numerous overwintered *Maculinea alcon* (Denis & Schiffermüller 1775) larvae and a single pupa were found in nests of *Myrmica salina* Ruzsky 1905 in the Szatmár lowland, NE Hungary. This ant species appears to be the primary host of *M. alcon* at this site. *M. salina* has previously been recorded as a host of *Maculinea teleius* (Bergsträsser 1779) at this, and one other site. Nearby, other local populations of *M. alcon* use *Myrmica scabrinodis* Nylander 1846 as a host, so it appears that this particular *M. alcon* population has become locally adapted to use *M. salina* as a host ant because of the secondary salinization of this site.

Keywords: *Myrmica salina*, *Maculinea alcon*, host specificity, myrmecophily, new host species, local adaptation, Hungary.

INTRODUCTION

Larvae of *Maculinea* van Eecke 1915 are obligate parasites of *Myrmica* Latreille 1804 colonies during most of their development. The host ant species has been shown to be crucial for the protection of these endangered butterflies (see e.g. Elmes *et al.* 1998). *Myrmica rubra* (Linnaeus 1758), *M. ruginodis* Nylander 1846 and *M. scabrinodis* Nylander 1846 are the known hosts of *Maculinea alcon* (Denis & Schiffermüller 1775) in western Europe, where different populations of this butterfly have evolved to use these three hosts in varied proportions (Thomas *et al.* 1989; Elmes *et al.* 1994, 1998; Als *et al.* 2002). In contrast, only *M. scabrinodis* was considered a host of *M. alcon* in central Europe (Sielezniew & Stankiewicz 2002, Höttinger *et al.* 2003, Tartally & Csősz 2004). Sielezniew & Stankiewicz (2004) recently found two localities in Poland where both *M. scabrinodis* and *M. vandeli* Bondroit 1920 are the hosts of *M. alcon*, increasing the global number of known *Myrmica* host species (see: Als *et al.* 2004: Supplementary Table 10) to four.

METHODS

During 2002 and 2004 I repeatedly searched a known *M. alcon* site in a slightly salinized marshy meadow near the village of Füleöd (Szatmár lowland, NE Hungary; N 48.05°, E 22.75°) for *Myrmica* nests. Each nest (2 *M. gallienii* Bondroit 1919, 1 *M. ruginodis*, 9 *M. salina* Ruzsky 1905 and 4 *M. scabrinodis* nests; determination according to Seifert 1988) situated within 2 m of the initial host plant *Gentiana pneumonanthe* L. was investigated (see: Als *et al.* 2002) in a 20 x 50 m area. Further nests were not opened in order to minimize the disturbance to this small, protected and endangered site.

RESULTS

On 7 May 2004 two *M. salina* nests were found to contain 61 and 5 *M. alcon* larvae respectively. The nests were marked and the site was revisited on 29 June 2004 (the flying of *M. alcon* started three weeks later, Varga personal communication). At this time, the ants had vacated these disturbed nests, presumably taking the *M. alcon* larvae with them. However, a single *M. alcon* pupa and 39 prepupal larvae (which is a huge number; see: Elmes *et al.* 1994, Thomas & Elmes 1998, Als *et al.* 2002, Höttinger *et al.* 2003, Tartally & Csósz 2004) were found in another *M. salina* nest, about 25 m from the nest which contained 61 *M. alcon* larvae in May. An additional three prepupal *M. alcon* larvae were also found in another *M. salina* nest. No *M. alcon* larvae or pupae were found in the nests of other *Myrmica* species on this site. Voucher samples (revised by Csósz) are stored in the authors collection and in the Hymenoptera Collection of the Hungarian Natural History Museum/Budapest.

DISCUSSION

These results do not exclude the possibility that *M. alcon* may use other species of *Myrmica* as hosts at Füleöd because the number of *M. scabrinodis*, *M. gallienii* and *M. ruginodis* nests examined was small. However, they do show that *M. salina* is an important host ant of *M. alcon* at this site, as had already been suggested by adoption experiments (Tartally & Csósz 2004, Tartally unpublished work). Presumably, *M. scabrinodis* was the only host ant of *M. alcon* from Hungary recorded in the published literature (Tartally & Csósz 2004) and *M. salina* has never previously been implicated as a host of *M. alcon* in Hungary (Tartally unpublished work) or in Transylvania, W. Romania (Csósz personal communication). Moreover, prepupal *M. alcon* larvae were observed exclusively in *M. scabrinodis* nests at a near lying

lowland site in NE Hungary (about 32 km from Fülesd, at Hetefejércse, Bereg lowland; N 48.15, E 22.45; Tartally unpublished work). These observations suggest that *M. alcon* has locally adapted to use *M. salina* as its primary host ant at Fülesd. This is likely to be a relatively recent phenomenon, since one part of the site at Fülesd was used as a rice field during the 1950s, which may have resulted in the secondary salinization of the soil. *M. salina* is characteristic for habitats with a particularly high salinity (Seifert 1988).

Sielezniew & Stankiewicz (2004) hypothesized that *M. vandeli* (probably a temporary social parasite of *M. scabrinodis* nests, Elmes *et al.* 2003) has a similar chemical profile to *M. scabrinodis*, allowing *M. alcon* larvae to easily develop in the nests of *M. vandeli* at two Polish sites. It would also be interesting to compare the chemical signatures of *M. salina* with those of *M. scabrinodis* and *M. alcon* larvae from Fülesd.

Nests of *M. salina* from the Fülesd site and at another Hungarian site were found to have *Maculinea teleius* (Bergsträsser 1779) larvae (Tartally & Csősz 2005). These were the first records for *M. salina* as a host ant of any *Maculinea* species (see: Als *et al.* 2004: Supplementary Table 10, but see: Tartally & Csősz 2004). My observations in 2004, of a single caterpillar being found with *M. salina* on 7 May and another on 29 June, give additional support for the use of *M. salina* by *M. teleius* at Fülesd. I have never found larvae of *M. teleius* and *M. alcon* together in the same *M. salina* nest.

Under laboratory conditions a *Maculinea rebeli* (Hirschke 1904) larva from Hungary has also been raised to pupation in a *M. salina* colony (Tartally 2004). This is not surprising considering the overall genetic similarity of *M. alcon* and *M. rebeli* (Als *et al.* 2004, Bereczki *et al.* 2005), although these butterflies often have different host ant species in the same region (see: Thomas *et al.* 1989; Elmes *et al.* 1994, 1998; Als *et al.* 2002; Sielezniew & Stankiewicz 2002; Höttinger *et al.* 2003; Steiner *et al.* 2003; Sielezniew & Stankiewicz 2004; Tartally & Csősz 2004). This larva pupated only 35 days after adoption, but this laboratory result has not been confirmed by field records yet (Tartally 2005).

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