

## Short communication

### *Gentiana cruciata* as an additional host plant of *Maculinea alcon* on a site in eastern Poland (Lycaenidae)

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The Alcon Blue *Maculinea alcon* ([Denis & Schiffermüller], 1775) inhabits wet grasslands or wet heaths throughout its European range (Wynhoff 1998). Females lay their eggs on the upper parts of *Gentiana pneumonanthe* (Gentianaceae), especially buds and flowers. *G. asclepiadea* and *G. germanica* have also been reported as alternative or additional food resources (Munguira & Martin 1999). Initially endophytic caterpillars feed on developing seeds but after their third moult they leave the flower heads to be adopted by *Myrmica* workers. In the ant nests, *M. alcon* caterpillars mimic ant larvae and are fed with regurgitation, insect prey and occasionally prey on ant brood (Thomas 1995). Host-ant relationships of *M. alcon* show geographical variation across Europe. Four *Myrmica* species have been identified as rearing this butterfly so far, although rarely more than one species is successfully exploited as host per site (Elmes et al. 1994; Als et al. 2002; Sielezniew & Stankiewicz 2002 and unpublished data). Habitat, host-plants and host-ants are regarded as the most important traits enabling distinction between *M. alcon* and its close relative *M. rebeli* (Hirschke 1904) (Settele et al. 2000).

At the end of August 2003 we investigated a *M. alcon* site at 'Brzeźno' reserve near Chełm (51°09'N 23°36'E, 170 m a.s.l.) in east Poland. The protected habitat, with calcium-rich soils, covers an area of 165 ha and consists of a unique mosaic of fen communities (dominant), moist grasslands and xerothermic grasslands. Two gentian species occur at 'Brzeźno': *G. pneumonanthe* which most commonly occurs in the *Molinietum medioeuropaeum* association but occasionally grows in adjoining habitats, and *G. cruciata* which is confined to drier patches of *Inuletum ensifoliae* vegetation (Kucharczyk 1996).

On one 0.25 ha xerothermic meadow we recorded eggs of *M. alcon* on both *G. pneumonanthe* and *G. cruciata*. In case of the less numerous *G. pneumonanthe* (about 20 individuals), eggs were present on every shoot but generally in lower numbers than on moist grasslands ( $11.6 \pm 3.7$ , N=18 and  $37.4 \pm 20.3$ , N=17, respectively). On the more abundant *G. cruciata* (nearly 100 individuals) we recorded eggs on 23 of the plants. Presence or absence of eggs depended mainly on the physiological condition of plants. Those that looked fresher (with flowers and green leaves) carried up to 15 eggs per shoot ( $5.1 \pm 3.7$ ) while completely withered plants never had eggs. We dissected occupied *G. cruciata* plants but in most of them we found neither *M. alcon* larvae nor any damage and/or faeces. Eggs had apparently

hatched, but it seemed that caterpillars failed to establish on the plants. Just in 10 flowerheads we found traces of feeding and two *M. alcon* larvae of the third instar inside the single bud. We searched the ground for *Myrmica* nests within two meters of every plant bearing eggs. The dense soil of this place seemed generally not to be favourable for ants, and we detected only four nests in the total area of about 100 m<sup>2</sup>: three of *My. scabrinodis* Nylander, 1846 and one of *My. sabuleti* Meinert, 1861 (Czechowski et al. 2002). One *M. alcon* larva, slightly bigger than a freshly adopted one, was present in a colony of *My. scabrinodis*, which is known as the true host-ant of *M. alcon* in this region (Sielezniew & Stankiewicz 2002). Since the nearest *G. pneumonanthe* plant was 10 m away, the caterpillar undoubtedly had passed successfully endophytic development on *G. cruciata*, which indicates that *G. cruciata* may serve as an additional host-plant of *M. alcon* on the site.

Until now *G. cruciata* has been attributed exclusively to *M. rebeli*, which is recorded in Poland in only a few sites, in the south. Use of *G. cruciata* by *M. alcon* has been probably more widespread in the past. We found eggshells in a herbarium on plants collected in the 19th century on a few sites in the region of present studies (Lubelska Upland). Considering the existence of *M. rebeli* populations using *G. germanica* in Switzerland (Jutzeler 1988) and *G. asclepiadea* in Bulgaria (Kolev 2002) our finding provides another argument against the assumption of clear-cut differences between these two butterfly species. Moreover *My. scabrinodis* is also an important host-ant of *M. rebeli* in Poland.

However the flight period seems to be the most distinctive feature differentiating Polish populations of *M. alcon* and *M. rebeli*: mid July to end of August and mid June to mid July, respectively (Sielezniew et al. 2003). At Brzeźno first butterflies are on the wings when the last *G. cruciata* plants are suitable for oviposition in some seasons. In previous years we did not observe eggs on *G. cruciata* which can be explained by different weather conditions (early spring and subsequent drought in 2003). For a change some *G. pneumonanthe* plants each year were still suitable for *M. alcon* even long time after the end of flight period. The earlier appearance of *M. rebeli* in Poland coincides with the flowering phenology of *G. cruciata*. Observed differences in pre-hibernation growth rate between caterpillars of both species in ant nests (Sielezniew et al. 2003) might serve as an adaptation to using different plants rather than the exploitation of different ant species.

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