

The Dusky Large Blue – *Maculinea nausithous kijeensis* (Sheljuzhko, 1928) in the Transylvanian basin: New data on taxonomy and ecology

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Abstract. *Maculinea nausithous* (Bergsträsser, 1779) was recently discovered in two parts of the Transylvanian basin. External characters of these populations completely agree with the original description of *Maculinea nausithous kijeensis* (Sheljuzhko, 1928) and show some small but constant differences against the Central European nominotypic populations. Since the habitats and host ant selection of these populations are also different from the Central European populations, we consider *M. nausithous kijeensis* **stat. rev.** as valid subspecific taxon. Specimens with the same external characters were also collected in north-eastern Romania, in Kazakhstan and in the western part of the Altai Mts. Therefore we believe that this subspecies has a wider Euro-Siberian distribution.

Introduction

The Dusky Large Blue, *Maculinea nausithous* (Bergsträsser, 1779)¹, has a Euro-Siberian distribution with a wide but sporadic range from Western and Central Europe to Kazakhstan, Southern Siberia and Mongolia (Lukhtanov & Lukhtanov 1994; Tuzov 1997; Wynhoff 1998; Munguira & Martín 1999). It is known from the North of the Balkan peninsula (Kolev 2002) and from northern Turkey (Hesselbarth et al. 1995) but unknown from the former Soviet Central Asia, Transbaikalia, Russian Far East, China, Korea and Japan (Sibatani et al. 1994; Tshikolovets 2003; Tshikolovets et al. 2002). This species has a disjunct distribution in the Carpathian basin. It is relatively widely distributed and locally frequent in the western and northern hilly and lowland regions of the basin (e.g. mostly in the areas bordering Austria, Slovenia and Hungary) but completely absent in the Pannonian lowland along and East of the river Danube.

¹ According to the phylogenetic analysis of Pech et al. (2004) and Frić et al. (2007) the generic name *Phengaris* Doherty, 1891 should be used. However, in the ecological and conservation biological publications the generic name *Maculinea* Van Eecke, 1915 is widely accepted and used. Therefore, for simplicity we follow here this most frequently used and established generic name.

Until recent times it was also unknown from Transylvania. It was discovered by Goia and Rákosy in two different parts of the steppic area Câmpia Transilvaniei near Cluj-Napoca (Râșcruci and Fânatele Clujului). The first surveys supplied new data on the ecology and host ant use of these fairly isolated populations (Tartally et al. 2008a).

Taxonomical problems of Eastern European populations of *Maculinea nausithous*

A new subspecies of *M. nausithous* was described by Sheljuzhko (1928) as *Lycaena arcas kijeensis* with type locality “gouvernement Kijev” in Ukraine. Although the original description consists of some differential characters, this taxon has been mostly neglected or synonymised with the nominotypic subspecies (Lukhtanov & Lukhtanov 1994; Sibatani et al. 1994; Tuzov 1997; Tschikolovetz et al. 2002; Tschikolovetz 2003). Some authors, however, repeatedly considered that *M. nausithous* can consist of some “cryptic species”. Molecular analyses have shown an “*unexpectedly deep diversification*” even on a local geographical scale in eastern Europe (Als et al. 2004; Fric et al. 2007).

According to the original description “the males [of *M. nausithous kijeensis*] have much darker blue colouration, with an essentially broader dark margin on all wings. Anterior margin of forewings reaches until the discus with a broad dark blue suffusion. The margin is very diffuse and the dark scales are, in many specimens, so extended that the discal spots can hardly be seen. The females do not differ from the type. The underside in both sexes is darker and the light rings around the ocelli are more obscure or even absent on the forewings.” The original description is in German and reads as follows: „Viel mehr dunkelblau gefärbte Männchen mit bedeutend breiterem Saum aller Flügeln. Der ganze Vorderrand der Vf. etwa bis zum Diskus breit dunkelblau überfossen. Die Säume sehr diffus und bei manchen Stücken ist die schwarze Beschuppung so ausgedehnt, dass alle Keilflecke auf allen Flügeln nur schwach bemerkbar sind. Die Weibchen weichen von dem Typus nicht ab. Auf der Unterseite beider Geschlechter etwas dunkler und die helle Umrandung der Ocellen ist eine Kleinigkeit weniger deutlich, besonders auf den VF-n, wo sie manchmal ganz fehlen kann.”

The specimens from Dealulire Clujului and Dejului (Fânatele Clujului and Râșcruci) also completely agree with the description of Sheljuzhko. These specimens are slightly smaller and darker on average and seem to be more acutely winged than typical *M. nausithous* from western Hungary, Slovenia and Germany. They have a darker and shiny reddish-purple-brownish colouration of the underside (Fig. 1). The tiny, often obsolescent ocellae are also different from the typical subspecies. In addition, these populations are also biologically (habitats and host ant use) clearly different from the Central European and western Hungarian populations (Tartally et al. 2008a). Similar specimens were also collected by C. Corduneanu in northeastern Romania (Jud. Suceava, Horodnic de Sus, valea Seaca), by B. Larsen in Kazakhstan (2003), N of the lake Balkhas and also by Z. Varga (coll. HNHM, Budapest) in the woody steppic habitats (near Samarka, at the river Tsharyn) in the western part of the Altai Mts.

This suggests that these differences are sufficient for the recognition of *M. nausithous kijevenensis* as a distinct subspecies. We therefore consider *M. nausithous kijevenensis* (Sheljuzhko, 1928) **stat. rev.** as a valid taxon which is morphologically, geographically and ecologically differentiated from the Central European nominotypic subspecies (Figs 1–2). It probably has a wide Euro-Siberian distribution.

We have to note that a preliminary allozyme analysis of the Transylvanian population has shown that this sample proved to be surprisingly variable compared with the western Hungarian populations, although these populations are strictly isolated from the main area of the species (Pecsenye et al. 2007 and unpublished data). This provides additional justification for the subspecies status.

Field observations: Habitats and behaviour of the “steppic”

Maculinea nausithous

Both sites where *M. nausithous* was found in the Transylvanian basin are forb-rich meadow steppes and lowland hay meadows with sporadic small boggy depressions with *Molinia* and tall forb vegetation, with dense stands of *Sanguisorba officinalis* L.. Typical plant species of these moist habitats are as follows: *Molinia coerulea* (L.) Moench, *Clematis integrifolia* L., *Ranunculus acris* L., *Thalictrum aquilegifolium* L., *Gentiana pneumonanthe* L., *Peucedanum rochelianum* Heuff., *Serratula tinctoria* L., *Iris spuria* L., *Veratrum nigrum* L., etc. (Fig. 2).

This habitat type differs strikingly from the *nausithous*-habitats in Transdanubia, Slovenia and Austria as well as other Central European countries. They have, however, numerous common features with the humid, tall grass-tall forb steppic habitats in Southern Siberia, populated also by *M. nausithous* and *M. teleius* (Bergsträsser, 1779). The behaviour of the butterflies is highly adapted to these peculiar habitat conditions. The butterflies occur at the highest density in the moderately scrubby patches within and around the humid depressions. The females proved to be rather sedentary within vegetation patches with dense stands of the initial food plant, especially near to the scrubby patches. The males had either a patrolling behaviour around the *Sanguisorba* plants within the same patches or were rapidly flying between the isolated patches of habitat. This type of behaviour is essentially different from the behaviour of *M. teleius* and *M. alcon*, co-occurring in the same habitats.

Nests of the host ant, *Myrmica scabrinodis* Nylander, 1846, were found mostly near to the scrubs in semi-shaded places within the patches densely overgrown with *Molinia* and the food plant *Sanguisorba officinalis*. Very few of the ant nests contained larvae. From a total of 107 *My. scabrinodis* nests which were found at the two sites (58 at Fânațele Clujului and 49 at Răscruți), only two nests from Răscruți were found to contain *M. nausithous*, in both cases only a single *M. nausithous* larva (Tartally et al. 2008a).

Larvae of *M. alcon* (Denis & Schiffermüller, 1775) and *M. teleius* were also found in *My. scabrinodis* nests which is not surprising since *My. scabrinodis* is a common host ant of these butterflies (e.g.: Elmes et al. 1998; Als et al. 2004; Fiedler 2006). One of the



Fig. 1. *Maculinea nausithous kijeensis* in habitat.

two nests in which *M. nausithous* was found also contained a *M. teleius* larva (Tartally et al. 2008a). Other *Myrmica* species (*My. hellenica* Finzi, 1926, *My. sabuleti* Meinert, 1861, *My. schencki* Viereck, 1903 and *My. specioides* Bondroit, 1918) have been recorded from the drier patches of these habitats (Markó 1998; Markó & Csósz 2001; Tartally et al. 2008b; B. Markó, pers. comm.), but only *My. scabrinodis* was found in the small boggy depressions where *M. nausithous* can lay eggs on *S. officinalis*.

Discussion and conclusions

The discovery of *M. nausithous* in Transylvania had been expected because of the general distribution of the species. These sites have an intermediate position between the numerous recorded sites in the western part of the Carpathian basin and the records East of the Carpathians in Bukovina. It is difficult to explain, however, the seemingly large hiatus between the central and eastern part of the Carpathian basin where many habitats of *Sanguisorba officinalis* are known with numerous records of *M. teleius*, but without *M. nausithous*. Interestingly, *M. nausithous* occurs only in western parts of Hungary where *My. rubra* (Linnaeus, 1758) is common on marshy meadows with *S. officinalis*, but this butterfly does not occur in central and eastern parts of Hungary where *My. rubra* is rare or absent from such sites (Tartally & Varga 2005a; 2008). Thus, the absence of the species is probably connected to the ecological requirements of its main host ant *My. rubra*. Although *My. rubra* occurs in the eastern part of the Carpathian Basin



Fig. 2. Habitat of *Maculinea nausithous kijevensis* at Râscruci near Cluj.

and also in Transylvania it is mostly associated with damp forested habitats. Thus, the hypothesis of Witek et al. (2008) on the possible host ant colony change can not be accepted as *My. rubra* is unknown from the sites investigated here where *M. nausithous* occurs, despite extensive surveys by local myrmecologists (B. Markó, pers. comm.). Thus, the key factor in the occurrence of *M. nausithous* might be the use of *My. scabrinodis* as a host ant. These records, of course, are not the first data on *M. nausithous* exploiting *My. scabrinodis*, since Munguira & Martín (1999) have already reported this ant as a host of *M. nausithous* in Spain and Witek et al. (2008) found it as an occasional host in Poland. However, apart from these records, this widespread *Myrmica* species has not been recorded as a host of *M. nausithous* on the other European sites studied (although *My. scabrinodis* is often common on those sites), where *My. rubra* is used almost exclusively (Thomas et al. 1989; Elmes et al. 1998; Stankiewicz & Sielezniew 2002; Tartally & Varga 2005a; Anton et al. 2007; Witek et al. 2008). However, *My. scabrinodis* is widespread and frequent in most of the Hungarian *Sanguisorba officinalis* sites investigated (Tartally & Varga 2005a, b). Hence, it is an open question why the eastern Hungarian *S. officinalis* sites have not been colonised by the *M. nausithous* from Transylvania which uses *My. scabrinodis*. One reason could be that the high mountains of Muntii Apuseni inhibit spread to eastern Hungary, acting as a barrier to the isolated Transylvanian *M. nausithous* populations. Another possible explanation is that *M. teleius* and *M. alcon* populations are in competition with *M. nausithous* in eastern Hungary through their common use of *My. scabrinodis*.

Interestingly *M. nausithous* does not occur at Şardu, about 20 km W of Cluj, where a suitable site is known near to the Câmpia Transilvaniei region, with high densities of *S. officinalis* and *My. scabrinodis* (Tartally & Varga 2008; Tartally et al. 2008b). This site is, however, used by *M. teleius* and *M.alcon* (both butterflies exploit *My. scabrinodis* and *My. vandeli* Bondroit, 1920 as the host ant), and appears more similar to the central and western European *M. nausithous* sites (with bushy forest edges) than the sites investigated in the Câmpia Transilvaniei region. Surely, the finer ecological details of these occurrences await further investigation.

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