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Local host ant usage of scarce large blue *Phengaris teleius* and dusky large blue *P. nausithous* (Lepidoptera: Lycaenidae) at Goričko Nature Park (NE Slovenia)

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Abstract. In our contribution we report on the local host ants of two threatened and protected butterfly species, the scarce large blue (*Phengaris teleius*) and the dusky large blue (*P. nausithous*) at Goričko (NE Slovenia), which hosts one of the largest and the most important metapopulation for both species of large blues in Slovenia. Larvae of both species are developing in *Myrmica* ant nests and different ant species may be used as larval hosts in different parts of the species range. During our study, seven species of potential host ants of the genus *Myrmica* were found at 12 selected sampling sites. A total of 142 ant nests were examined for the presence of *Phengaris* larvae. Larvae of *P. teleius* were found in 25 nests of three ant species: *M. scabrinodis*, *M. rubra* and *M. gallienii*, while larvae of *P. nausithous* were found in 9 nests, all of *M. rubra*. The results of the present study provide the first insight into the local host ants of the two *Phengaris* species in Slovenia and could serve as an important source for active conservation of both species in Slovenia.

Key words: *Phengaris,* Slovenia, host ants, Goričko, *Myrmica*

Izvleček. Gostiteljske vrste mravelj strašničinega mravljiščarja *Phengaris teleius* in temnega mravljiščarja *P. nausithous* (Lepidoptera: Lycaenidae) v Krajinskem parku Goričko (SV Slovenija) – V prispevku predstavljamo rezultate prve raziskave gostiteljskih vrst mravelj dveh ogroženih in zavarovanih vrst dnevnih metuljev, strašničinega (*Phengaris teleius*) in temnega mravljiščarja (*P. nausithous*) v Sloveniji. Mravljišča in potencialne gostiteljske vrste mravelj smo vzorčili na Goričkem (SV Slovenija), kjer je središče razširjenosti obeh vrst v Sloveniji. Na dvanajstih lokacijah smo našli sedem vrst mravelj iz rodu *Myrmica*, ki so potencialne gostiteljske vrste gosenic mravljiščarjev. Prisotnost gosenic mravljiščarjev smo preverili v 142 mravljiščih. V 25 mravljiščih vrst *Myrmica scabrinodis*, *M. rubra* in *M. gallienii* smo našli gosenice strašničinega mravljiščarja, v devetih mravljiščih, vsa vrste *M. rubra*, pa gosenice temnega mravljiščarja. Rezultati raziskave dajejo prvi vpogled v gostiteljske vrste mravelj strašničinega in temnega mravljiščarja v Sloveniji in bodo lahko rabili kot pomembno izhodišče pri aktivnem ohranjanju teh dveh ogroženih vrst metuljev.

Ključne besede: mravljiščarji, *Phengaris*, Slovenija, gostiteljske mravlje, Goričko, *Myrmica*

Introduction

Butterflies of the genus *Phengaris* Doherty, 1891 (syn. *Maculinea* van Ecke, 1915) are among the most studied insects in Europe, mainly due to their highly specific myrmecophilous life cycle, vulnerability and endangerment (e.g. Settele et al. 2005). All four European *Phengaris* species, i.e. *P. arion* (Linnaeus, 1758), *P. alcon* (Denis & Schiffermüller, 1775), *P. teleius* (Bergsträsser, 1779) and *P. nausithous* (Bergsträsser, 1779), live in Slovenia (Verovnik et al. 2012). The scarce large blue (*P. teleius*) and the dusky large blue (*P. nausithous*) occur sympatricaly in northeastern Slovenia, where they often live syntopically. The range of the *P. nausithous* in Slovenia is limited to the northeastern part of the country, while the range of the *P. teleius* also extends to the western parts. Both species live on extensively used humid meadows that are among the most threatened habitats, mainly due to agricultural intensification, fragmentation and abandonment of traditional management (e.g. van Swaay et al. 2012). As such, they have become flagship species for nature conservation and both are protected by the Habitats' Directive (Annex II, IV) as a key instrument for biodiversity conservation in Europe (OJ EC 1992).

Although both species use the same host plant, the great burnet (*Sanguisorba officinalis* L.), and share some general characteristics of their habitat, there are differences in their ecology, including lifecycle, microhabitat preferences and use of host ants (e.g. Nowicki et al. 2005). The females lay their eggs only on the *S. officinalis* and the early instar of larvae feed on host plant's flowers and seeds. When the larvae reach the fourth instar, they leave the host plant. On the ground, they have to be adopted by ants of the genus *Myrmica* Latreille, 1804, which take the larvae into the ant nest. There they predate on ant brood and/or mimic ant larvae and are fed by ant workers (Elmes et al. 1992). They overwinter (one or two winters) in ant nests and pupate in late spring (Thomas et al. 1998).

Pioneering work on the adoption by *Myrmica* ants had suggested that each *Phengaris* species parasitizes a specific *Myrmica* species (Thomas et al. 1989). Later, it was shown that larvae can be adopted by different *Myrmica* species (the so-called primary and secondary host: Elmes et al. 1998) and host species and colony size have an important impact on larval survival (Witek et al. 2010). However, several recent studies raise doubts on a high host ant specialization of *Phengaris* species across Europe (e. g. Pech et al. 2007, Tartally et al. 2019). The most recent and comprehensive survey across Europe (Tartally et al. 2019) showed that each *Phengaris* species is predominantly specialised to a single, basically the most abundant *Myrmica* species found on *Phengaris* site. However, there is a geographic mosaic as a difference; populations of the same *Phengaris* species, sometimes in close proximity, often use different host ant species.

Most data on the host specificity of *Phengaris* were obtained in Central and Eastern Europe, especially in Poland, Hungary and Romania (e.g. Stankiewicz et al. 2005, Tartally & Varga 2008, Witek et al. 2008, Pech & Sedlachek 2016). The term host specificity usually refers to the ability of *Phengaris* butterflies to develop within the nests of particular host ant species. To quantify specificity, ideally the number of *Phengaris* larvae adopted by each *Myrmica* ant species, should be known, as well as the number that survive in ant nests and develop into adults (Thomas et al. 2005). Although the level of specialisation and the character of the *Phengaris–Myrmica* host system is now better understood, local data on hosts are still needed, and are useful for site

management and species conservation at the local scale. Knowledge of host ant specificity is essential for the conservation of these two butterfly species.

Although the host ant specificity of *Phengaris* species (especially for *P. teleius* and *P. nausithous*) is relatively well known in Europe, there are no published data on this topic for Slovenia. Only a basic survey of *Myrmica* ants in the habitat of *P. teleius* and *P. nausithous* was conducted in the central area of Slovenske Gorice in 2003 and 2004 (Zakšek 2004). The study revealed that *M. scabrinodis* and *M. rubra* are the commonest species in the vicinity of *S. officinalis*, although none of the ant nests were opened and examined for the presence of *Phengaris* larvae. To fill this gap, we studied host ant specificity of *P. teleius* and *P. nausithous* in the Goričko region and the pattern of their local variability. Our results are of high importance for establishing site-specific management of the habitat of the two threatened butterfly species in the region.

Materials and methods

Study area and study sites

Goričko is a predominantly rural hilly countryside in NE Slovenia and most of it is included at Goričko Nature Park and the Goričko Natura 2000 site (SI3000221) designated to maintain a favourable conservation status of *P. teleius* and *P. nausithous* and other selected species and habitat types (Ur. l. RS 2004). Humid meadows in the valleys are home to the largest populations of *P. teleius* and *P. nausithous* in Slovenia (Zakšek et al. 2005). Twelve sampling sites were selected in the eastern part of Goričko NP (Fig. 1), where the population density of both species is the highest (Zakšek et al. 2012). All sampling sites hosted *P. teleius*, while *P. nausithous* was present at ten of the selected sites (see Tab. 1 for details).

Table 1. Detailed information on study sites in the Goričko region, NE Slovenia, together with occurrence data of *Phengaris teleius* and/or *P. nausithous* prior to the sampling in 2011.
Tabela 1. Podrobnejše informacije vzorčnih lokacijah na Goričkem skupaj s podatki o prisotnosti strašničinega (*Phengaris teleius*) in/ali temnega mravljiščarja (*P. nausithous*), zabeleženih pred vzorčenjem v letu 2011.

Study site code	Locality	Coordinates (WGS84)		Presence of *Phengaris* species
		Lat (°N)	Long (°E)	
NER1	Ženavlje, meadow at Koritiški potok, 600 m NW from hamlet Vreja	46.844218	16.180123	*P. teleius, P. nausithous*
NER2	Neradnovci, meadow 460 m NE from village Ženavlje, on the left bank of Koritiški potok	46.838818	16.185550	*P. teleius, P. nausithous*
ČEP	Čepinci, meadow 440 m SW from hamlet Smodin Breg	46.840992	16.215897	*P. teleius, P. nausithous*
STAN	Gornji Petrovci, meadow 320 m SE from hamlet Džešarni	46.804415	16.205508	*P. teleius, P. nausithous*
KUŠ	Kuštanovci, meadow at Kmetov potok 200 m NE from homestead Dirdin	46.779013	16.190457	*P. teleius, P. nausithous*
DOL	Dolenci, meadow 550 NE from hamlet Šoštarne Grabe	46.852637	16.271801	*P. teleius, P. nausithous*
ŠAL	Šalovci, meadow at Krplivniški potok SE from hamlet Vrvji Breg	46.804811	16.280853	*P. teleius*
IVAN1	Ivanjševci, meadows between hamlets Kotov Kraj in Balaškin Kraj	46.766287	16.292941	*P. teleius, P. nausithous*
IVAN2	Ivanjševci, meadow 400 m NE from hamlet Kotov Kraj	46.763510	16.296618	*P. teleius, P. nausithous*
MOT1	Motvarjevci, meadow NE from house Motvarjevci 73	46.706049	16.351857	*P. teleius, P. nausithous*
MOT2	Motvarjevci, left bank of the stream Kobilje affluent at Motvarjevci	46.704889	16.353332	*P. teleius, P. nausithous*
KOB	Kobilje, meadow 640 m SW from gravel pit at the western part of Kobilje village	46.689622	16.375921	*P. teleius*

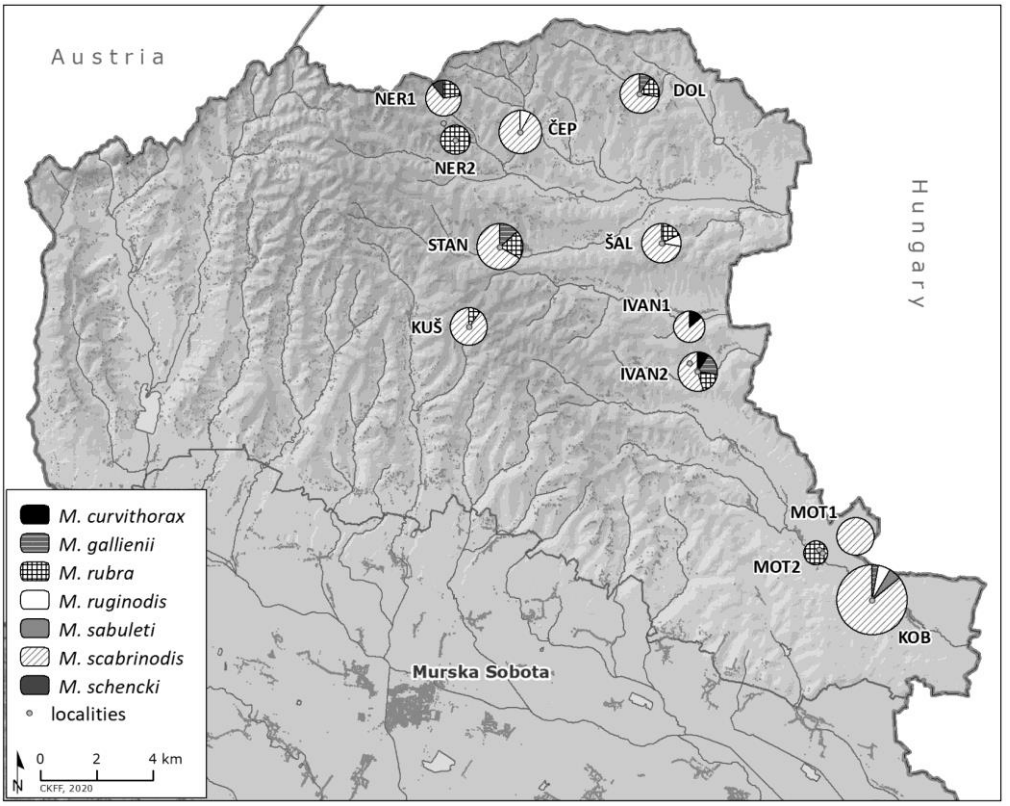

Figure 1. Map of Goričko Nature Park (dark line represents its southern border) showing the position of the sampling sites of our study in 2011 and 2012. The proportion of *Myrmica* species ant nests at each sampling site is shown with pie charts. The size of the circle corresponds to the number of examined *Myrmica* ant nests (see Tab. 3 for details). The small circles »localities« represents accurate location of sampling site, as the position of pie charts is moved to avoid their overlap.

Slika 1. Zemljevid Krajinskega parka Goričko (temna linija ponazarja njegovo južno mejo) z lokacijami vzorčnih mest v tej raziskavi v letih 2011 in 2012. Delež mravljišč mravelj iz rodu *Myrmica* na vsakem vzorčnem mestu je prikazan s tortnim grafikonom. Velikost kroga je sorazmerna številu pregledanih mravljišč mravelj iz rodu *Myrmica*. Majhne točke lokalitet prikazujejo natančne lokacije vzorčnih lokacij (v primerih prekrivanja so prikazi deležev mravljišč nekoliko premaknjeni).

Field work

Field sampling was carried out in 2011 and 2012, from mid-May to mid-June when *Phengaris* larvae were at the pre-pupal stage. At selected sites, we searched for *Myrmica* ant nests within one-metre radius of *S. officinalis*, which is likely within a foraging distance of *Myrmica* ants (Elmes et al. 1998). All *Myrmica* ant nests found were marked and carefully excavated. The nest material was placed on a white sheet, where the nests were opened to check for the presence of *Phengaris* larvae. After excavation, the nest material and vegetation were restored to their original condition as much as possible. Five to ten ant workers were collected from each nest and preserved in 70% ethanol for later identification. In addition, a random sample of foraging

Myrmica ant species was collected on sampling sites when searching for ant nests using the hand collection method. *Myrmica* species were identified according to Seifert (2018) and Radchenko & Elmes (2010). *Phengaris* larvae were identified at the site using a 20× magnifier lens and determination key by Śliwińska et al. (2006) and afterward returned to the nests.

Results

Ant species on the study sites

A total of 142 *Myrmica* nests were surveyed revealing presence of seven species at twelve sites hosting *P. teleius* and/or *P. nausithous* in the eastern Goričko NP: *M. curvithorax* Bondroit, 1920, *M. gallienii* Bondroit, 1920, *M. rubra* (Linnaeus, 1758), *M. ruginodis* Nylander, 1846, *M. sabuleti*, Meinert, 1861, *M. scabrinodis* Nylander, 1846 and *M. schencki* Viereck, 1903 (Tab. 2). The total number of *Myrmica* nests found on each locality varied from 4 at MOT 2 to 35 at KOB (Tab. 3). *Myrmica scabrinodis* was the commonest species of the genus found on ten sites with 105 recorded nests. It was followed by *M. rubra*, found on eight sites (22 nests), and *M. gallienii*, found on four sites (6 nests) (Tab 3). On all sites where it occurred, *M. scabrinodis* had the highest proportion of the total nests found (Fig. 1).

Table 2. All *Myrmica* ant species recorded on selected sampling sites at Goričko Nature Park during this study in years 2011 and 2012. For codes of sampling sites see Tab. 1. In species marked with asterisk only individual ant workers were recorded on the study site (no nests were found and excavated).

Tabela 2. Vse vrste mravelj iz rodu *Myrmica* najdene na izbranih vzorčnih mestih v Krajinskem parku Goričko tekom te raziskave v letih 2011 in 2012. Oznake vzorčnih mest so enake kot v Tab. 1. Pri vrstah označenih z zvezdico so bile med vzorčenjem najdene samo posamezne delavke na vzorčnem mestu.

Sampling site	***Myrmica* species found**
NER1	*M. rubra*, *M. scabrinodis*, *M. schencki*
NER2	*M. rubra*
ČEP	*M. ruginodis*, *M. scabrinodis*
STAN	*M. gallienii*, *M. rubra*, *M. scabrinodis*
KUŠ	*M. rubra*, *M. scabrinodis*
DOL	*M. gallienii*, *M. rubra*, *M. scabrinodis*
ŠAL	*M. rubra*, *M. ruginodis*, *M. scabrinodis*
IVAN1	*M. curvithorax*, *M. scabrinodis*, *M. schencki**
IVAN2	*M. curvithorax*, *M. gallienii*, *M. rubra*, *M. sabuleti**, *M. scabrinodis*, *M. schencki**
MOT1	*M. sabuleti**, *M. scabrinodis*
MOT2	*M. rubra*
KOB	*M. gallienii*, *M. rubra**, *M. ruginodis*, *M. sabuleti*, *M. scabrinodis*

Table 3. Number of *Myrmica* ant nests and number of *Phengaris teleius* and *P. nausithous* larvae found in nests at each sampling site in Goričko Nature Park during our study in 2011 and 2012. For codes of sampling sites see Tab. 1.
Tabela 3. Število mravljišč rodu *Myrmica* in število najdenih gosenic strašničinega (*Phengaris teleius*) in/ali temnega mravljiščarja (*P. nausithous*) na posameznih vzorčnih mestih v Krajinskem parku Goričko tekom te raziskave v letih 2011 in 2012. Oznake vzorčnih mest so enake kot v Tab. 1.

Sampling site	***Myrmica* species**	**No. of nests**	**No. of nests with *P. teleius***	**No. of *P. teleius* larvae**	**No. of nests with *P. nausithous***	**No. of *P. nausithous* larvae**
NER 1	*M. scabrinodis*	6	1	1	0	0
	M. rubra	2	0	0	0	0
	M. schencki	1	0	0	0	0
NER 2	*M. rubra*	6	3	6	5	57
ČEP	*M. scabrinodis*	12	2	2	0	0
	M. ruginodis	1	0	0	0	0
STAN	*M. scabrinodis*	10	3	10	0	0
	M. rubra	3	1	2	0	0
	M. gallienii	2	0	0	0	0
KUŠ	*M. scabrinodis*	9	2	2	0	0
	M. rubra	1	1	1	0	0
DOL	*M. scabrinodis*	8	2	3	0	0
	M. rubra	2	2	4	2	4
	M. gallienii	1	1	1	0	0
ŠAL 1	*M. scabrinodis*	8	0	0	0	0
	M. rubra	2	0	0	0	0
	M. ruginodis	1	0	0	0	0
IVAN 1	*M. scabrinodis*	6	1	2	0	0
	M. curvithorax	1	0	0	0	0
IVAN 2	*M. scabrinodis*	6	0	0	0	0
	M. rubra	2	0	0	0	0
	M. gallienii	2	0	0	0	0
	M. curvithorax	1	0	0	0	0
MOT 1	*M. scabrinodis*	10	4	10	0	0
MOT 2	*M. rubra*	4	1	11	2	26
KOB	*M. scabrinodis*	30	1	1	0	0
	M. gallienii	1	0	0	0	0
	M. ruginodis	2	0	0	0	0
	M. sabuleti	2	0	0	0	0
Total		**142**	**25**	**56**	**9**	**87**

Host ants

P. teleius larvae were found in 25 *Myrmica* ant nests and *P. nausithous* in 9 nests (Tab. 3). Altogether, 56 larvae of *P. teleius* and 87 larvae of *P. nausithous* were found (Tab. 3). *P. nausithous* larvae were found exclusively in *M. rubra* nests, while *P. teleius* larvae were recorded in ant nests of three *Myrmica* species: *M. scabrinodis*, *M. rubra* and *M. gallienii*. The highest proportion of all infested nests with *P. teleius* was in *M. scabrinodis* (64%), while the proportion of infestation with *P. teleius* per investigated ant nest and species was the highest in *M. rubra.* A different species of host ants were found on three locations. The co-occurrence of both butterfly species larvae in the same ant nest was observed in six ant nests, in all cases *M. rubra* was a host species.

In general, *P. teleius* was recorded in a larger number of ant nests compared to *P. nausithous*, while *P. nausithous* larvae were found in a larger number per ant nest. The median value of *P. teleius* larvae found per ant nest is 1, while the median value of *P. nausithous* larvae number found per ant nest is 3. In three *M. rubra* nests, larger numbers of larvae (more than 20) per nest were found. The largest number of larvae in a single nest was counted in *M. rubra* nest in the locality MOT2 – a total of 35 larvae, 11 larvae of *P. teleius* and 24 larvae of *P. nausithous*. In the locality NER2, 26 and 22 larvae of *P. nausithous* were found, respectively, accompanied by a single *P. teleius* larva in each nest. Altogether, more than half of all larvae of both species were found in the three *M. rubra* nests mentioned above.

Discussion

During our study, a total of seven species of *Myrmica* ants were recorded in meadows with *P. teleius* and/or *P. nausithous* at Goričko Nature Park, which is half of all *Myrmica* ant species known for Slovenia (Bračko 2007).

The fact that 19.7% of all *Myrmica* nests examined contained *Phengaris* larvae and most of these contained only a few larvae, follows the pattern of ant nests infestation on *Phengaris* sites across Europe (e.g. Witek et al. 2010). As ant nests vary greatly in their susceptibility to larval parasitism, typical *Phengaris* sites include many uninfested nests, several with moderate infestation, and a few with high infestation (Tartally et al. 2008). According to our results, we can consider *M. rubra* as the primary and most important ant host of *P. nausithous* at Goričko. A high specificity in relationship of *P. nausithous* with *M. rubra* has also been reported across Europe (Witek et al. 2008, 2010), including western Hungary, which is closest to our Goričko study region (Tartally & Varga 2005, Tartally et al. 2019). For *P. teleius*, *M. rubra* and *M. scabrinodis* can be considered as primary hosts at Goričko. *P. teleius* has the most diverse hosts among European *Phengaris* species and often uses the locally most abundant *Myrmica* species (e.g. Tartally & Varga 2008, Witek et al. 2010, Tartally et al. 2019). This is in line with our observations, as the two primary host *Myrmica* species were also the most abundant in our study area, and with observations at the Őrség National Park in Hungary (Tartally & Varga 2008). Among the other five *Myrmica* species recorded, we found only one larva of *P. teleius* in an ant nest of *M. gallienii*. Larvae of *P. teleius* were found in nests of *M. gallienii* also in Poland (Stankiewicz & Sielezniew 2002).

Although the number of *M. scabrinodis* nests discovered was much higher than that of *M. rubra* (105 vs. 22), the percentage of nests parasitized by *Phengaris* was higher in *M. rubra* (41% vs. 24%), as was the total number of larvae detected (111 in *M. rubra* vs. 31 in *M. scabrinodis*). Three nests of *M. rubra* contained more than 20 *Phengaris* larvae. Moreover, co-occurrence of both *Phengaris* species larvae was detected exclusively in *M. rubra* nests. We found six cases of co-occurrence out of total 8 or 9 nests found infected by *P. teleius* or *P. nausithous,* respectively. The large number of larvae and co-occurrence of the two *Phengaris* species in *M. rubra* nests was previously reported by Tartally & Varga from western Hungary (2005). In their study, they found a *M. rubra* colony with 36 larvae of both *Phengaris* species, which is comparable to our colony from MOT2 (35 larvae). Since *M. rubra* forms the most populous colonies of all Central European *Myrmica* species (Seifert 2018), the highest numbers of parasitizing larvae in their colonies is not surprising. Such large colonies have a higher carrying capacity to host and survive a large number of *Phengaris* larvae. Although *M. scabrinodis* nests were parasitized in lower percentage and contained lower total number of larvae, this species still represents an important host for *Phengaris* larvae at Goričko, mostly as it is the most frequent ant species in *Phengaris* sites. It is particularly important host for *P. teleius*, which as mentioned above, often uses locally most abundant *Myrmica* species.

Conservation implications

The nest of *Myrmica rubra* hosting the largest number of *Phengaris* larvae was found at Motvarjevci (MOT2), along an abandoned road verge. This finding indicates and confirms the importance of road verges and grassland margins as larval habitat for *P. teleius* and, in particular, for *P. nausithous* (e.g. Wynhoff et al. 2011). *Myrmica rubra,* as the main host ant of *P. nausithous*, is known to be less thermophilic than *M. scabrinodis,* preferring sheltered and more overgrown habitat for its nests (Wynhoff et al. 2011). According to Seifert (2018), *M. rubra* gains optimum in mesophilic to moist conditions, and is absent only from most xerothermic and sparsely-vegetated habitats. It is often the only ant in very high-grassy lowland meadows and tall herb communities. Therefore, it is important to maintain parts of more dense vegetation with the larval host plant along meadow margins, which could be beneficial for *M. rubra* and both target butterfly species (see also Tartally & Varga 2005). *Myrmica scabrinodis* is a hygrophilous to moderately thermophilic species and reaches highest densities in meadows or ecotones with moderate height of grasses (Seifert 2018). Each host ant species has its own niche and, according to current knowledge, the two *Myrmica* species require different mowing regimes (Wynhoff et al. 2011), which should be taken into consideration in practical management, especially on smaller, isolated sites where both ant species occur together. *Myrmica scabrinodis* seems to benefit from mowing in early June, while *M. rubra* benefits from mowing in late autumn which should be combined with some annually unmown parts/verges that are alternated among years to prevent overgrowing especially by invasive plants (Wynhoff et al. 2011). The general recommendation for habitat management should thus consider mosaic mowing offering many different microhabitat opportunities. However, at least in the last decade, the habitat and populations of both species in NE Slovenia have been declining (Zakšek et al. 2020), so moving towards more active conservation of both species is essential for their long term survival. With basic knowledge on their larval ecology in hand, potential restoration of new habitats or focusing on a conservation of the most important parts of the larval habitat of both species will enable a first step to halt their decline. It should be emphasised that there is no active habitat restoration possible without knowledge and monitoring of ant communities (e.g. Wynhoff et al. 2017).

Povzetek

Strašničin (*Phengaris teleius*) in temni mravljiščar (*P. nausithous*) sta ozko specializirani vrsti dnevnih metuljev. Gosenice obeh vrst se razvijajo v mravljiščih mravelj iz rodu *Myrmica*, izbira gostiteljskih vrst mravelj pa se lahko geografsko (npr. v različnih delih Evrope) ali lokalno razlikuje. Njun razvoj je vezan na zdravilno strašnico (*Sanguisorba officinalis*), na katero samice odlagajo jajčeca in kjer se razvijajo prvi stadiji gosenic. Po posvojitvi, od četrtega larvalnega stadija naprej, se gosenice obeh vrst razvijajo v mravljiščih mravelj iz rodu *Myrmica*. Tam se prehranjujejo na dva načina: plenijo zarod mravelj ali pa jih hranijo mravlje kot svoj zarod (t.i. kukavičji način prehranjevanja); ali pa uporabljajo kombinacijo obojega. Zaradi specifičnega razvojnega cikla in življenja na mokrotnih travnikih sta vrsti tako v Sloveniji kot drugod v Evropi ogroženi in tudi zavarovani. V letih 2011 in 2012 smo na Goričkem v severovzhodni Sloveniji ugotavljali, katere so gostiteljske vrste mravelj strašničinega in temnega mravljiščarja. To je prva raziskava gostiteljskih vrst mravelj v Sloveniji. Gostiteljske mravlje smo vzorčili na dvanajstih lokacijah na Goričkem, ki je eno največjih in najpomembnejših območij razširjenosti za obe vrsti mravljiščarjev v Sloveniji.

Na območju raziskave smo zabeležili sedem vrst mravelj iz rodu *Myrmica*, kar je polovica vseh znanih vrst tega rodu v Sloveniji. Prisotnost gosenic mravljiščarjev smo preverjali v 142 mravljiščih mravelj iz rodu *Myrmica*. Gosenice strašničinega mravljiščarja smo našli v mravljiščih treh različnih vrst mravelj, *M. scabrinodis*, *M. rubra* in *M. gallienii*, medtem ko so bile gosenice temnega mravljiščarja najdene izključno v mravljiščih *M. rubra*. Skupaj smo gosenice strašničinega mravljiščarja našli v 25 mravljiščih, gosenice temnega pa v devetih mravljiščih. Kljub manjšemu številu mravljišč je bilo skupno število najdenih gosenic temnega mravljiščarja višje, saj so bile gosenice te vrste v mravljiščih številnejše. Razlogov za to je lahko več: *M. rubra* je znana po svojih velikih kolonijah in kot take lahko gostijo večje število gosenic; temni mravljiščar v nasprotju s strašničinim, ki se hrani izključno plenilsko, uporablja obe strategiji prehranjevanja. Zanimivo je, da je bilo najvišje število najdenih gosenic v enem mravljišču *M. rubra* kar 35, zastopane pa so bile gosenice tako strašničinega kot temnega mravljiščarja. O tako visokem številu gosenic v enem mravljišču so v literaturi podatki tudi iz sosednje zahodne Madžarske.

Rezultati naše raziskave dajejo prvi vpogled v gostiteljske vrste mravelj za strašničinega in temnega mravljiščarja v Sloveniji. Ugotavljamo, da je temni mravljiščar tudi v Sloveniji glede izbire gostiteljskih mravlje ozko specifičen, medtem ko je za strašničinega mravljiščarja značilna večja plastičnost glede gostiteljskih vrst mravelj. Glede na to, da se ohranitveno stanje obeh vrst v Sloveniji slabša, bodo rezultati lahko pomembna osnova pri aktivnem ohranjanju teh dveh ogroženih vrst mravljiščarjev v Sloveniji.

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