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Provisional Checklist and Habitat Preferences of Ants (Hymenoptera: Formicidae) in Halych National Park, Ukraine

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Abstract

A total of 37 ant species were identified from Halych national park, significantly enriching knowledge of its local myrmecofauna. Combined with literature data, 48 species are now known from the national park. The most abundant taxa were *Formica cunicularia*, *Formica glauca*, *Lasius flavus*, *Lasius niger*, *Lasius platythorax*, *Myrmica rubra*, *Myrmica ruginodis*, and *Tetramorium ferox*. Four species – *Monomorium pharaonis*, *Hypoponera punctatissima*, *Aphaenogaster splendida*, and *Plagiolepis taurica* – were recorded as exceptional findings, likely linked to human introduction or climate-driven northward range shifts. Notably, only solitary reproductive individuals (males or females) of these species were found, indicating possible anthropogenic dispersal through livestock feed, building materials, or trade goods. Habitat analysis revealed that the greatest species richness occurred in human-altered ecosystems – 26 species in fallow lands and 18 in post-forest mesophilous meadows – while forests, wetlands, riparian zones, and steppes hosted fewer but distinct assemblages. Widespread, ecologically plastic species such as *L. niger*, *M. rubra*, *M. ruginodis*, and *F. cunicularia* dominated most habitats. The study highlights both the high diversity and vulnerability of the Park's ant fauna to human influence and climate change. Continued monitoring is essential for understanding invasion pathways, conserving native biodiversity, and guiding effective management strategies

Keywords: insects, biodiversity, fauna, natural habitats, invasive species, conservation areas.

1. INTRODUCTION

Halych National Park, with an area of 146.85 km^2, occupies the transitional zone between the Ciscarpathian and Podillian Uplands, which correspond to the forest and forest-steppe biomes, respectively (Shumska et al. 2012; Shumska 2018). Both biomes are separated by the Dnister River into southern Ciscarpathian and northern Podillian parts. Due to the ecotonal effect between these zones, Halych National Park is characterized by a high degree of ecosystem mosaicism, biotic interpenetration, and mixing (Shumska et al. 2012; Honcharenko et al. 2018; Shumska & Dmytrash-Vatseba 2018). Moreover, Halych National Park comprise a number of relict thermophilous habitats

rich on rare and recently described taxa (Shumska & Dmytrash-Vatseba 2018; Zamoroka et al. 2018, 2024; Dmytrash-Vatseba et al 2020; Zamoroka 2025).

A general ecological gradient extends across the territory of Halych National Park from the southwest to the northeast, encompassing variation in elevation (from 405 to 250 m a.s.l.), mean annual temperature (from 6 to 8 °C), and mean annual precipitation (from 850 to 650 mm), among other parameters. The orientation of these ecological gradients determines the spatial distribution of ecosystems. In the southernmost and highest part of Halych National Park, fir-beech forests dominate; the highest watershed ridges are covered by pure beech forests. Along the valleys of the Dnister's right tributaries, fragments of floodplain oak woods, willow stands, lowland fens, oxbow lakes, and both mesophilous and post-forest meadows have been preserved. River valleys are the most anthropogenically transformed areas, represented by settlement and agro-landscapes. On the left bank of the Dnister, thermophilous oak forests, steppe meadows, and petrophilous steppes are widespread (Shumska 2018).

Despite more than a century of research, the entomofauna of Halych National Park remains insufficiently studied (Zamoroka 2016, 2023). As of 2023, a total of 1,598 insect species belonging to 121 families, 13 orders, 3 subclasses, and 2 infraclasses have been recorded within the park's boundaries (Zamoroka 2023). The majority of these records pertain to the orders *Coleoptera* and *Lepidoptera*, whereas ants (*Formicidae*) remain virtually unexplored.

The first record of ants from the territory of the current Halych National Park was provided by Jan Kinel and Jan Noskiewicz, who listed a single species – *Formica pressilabris* Nylander, 1846 – from the relict steppe habitat of Kasova Hora near the town of Burshtyn (Kinel & Noskiewicz 1924). This information was later repeated by Jarosław Łomnicki in his review of the genus *Formica* Linnaeus, 1758 (Łomnicki 1925). All three authors emphasized the unusual nature of this record and the general rarity of the species (Kinel & Noskiewicz 1924; Łomnicki 1925). The record of *F. pressilabris* remained the only information on ants from the territories of the current Halych National Park throughout the 20th century.

New data on 14 ant species from Halych National Park appeared only in the 21st century, also originating from Kasova Hora locality (Mykytyn & Stefurak 2008). Later, Oleksandr Radchenko and colleagues (2012) added another species, *Formica foreli* Bondroit, 1918 from the same locality. A summarized list of ant species from Halych NNP was later presented in the monograph The steppe biota of Burshtyn Opillya, which included 21 species (Zamoroka et al. 2018).

In the present study, we compile the most comprehensive provisional checklist of ants recorded within Halych National Park to date, adding 37 species to the previous list. The total known diversity of Formicidae in the park now comprises 48 species.

2. MATERIALS AND METHODS

The study of ants within Halych National Nature Park was based on collections made between 2012 and 2018, which are currently preserved in the scientific collections of the Department of Biology and Ecology, Vasyl Stefanyk Carpathian National University (before 2025 – Precarpathian National University).

Sampling was carried out on general entomological plots established within the National Park. In total, 100 sampling plots were set up (Fig. 1), designed to represent all major terrestrial ecosystem types (excluding aquatic habitats), including anthropogenically transformed areas adjacent to the park's boundaries. Specifically, 7 plots were established in fir-beech forests, 17 in beech forests, 12 in mesophilous oak forests, 3 in floodplain oak forests, 5 in thermophilous oak forests, 2 in willow stands, 12 in post-forest meadows, 7 in lowland fens, 3 in karstic fens on hillside slopes, 25 in steppe meadows, 1 in petrophilous steppes, and 6 in fallow lands.

Each standard sampling plot used for insect collection had a square shape measuring 10×10 m, with a total area of 100 m^2. Five pitfall traps of the Barber type (1 L capacity) were installed per plot. The traps were arranged in a "square envelope" pattern: four at the corners, each 10 m apart, and

one at the center, approximately 7 m from each corner trap (Fig. 1). As a preservative, a mixture of crystalline sodium tetraborate and sodium chloride was used to prolong the exposure period. Samples were collected at four-week intervals.

In the field, collected material was placed in labeled zip-lock bags and transported to the Laboratory of Animal Phylogeny and Evolution, Department of Biology and Ecology. In the laboratory, samples were washed, sorted, and preserved in 96% ethanol for long-term storage.

Sorting and identification of specimens were conducted under a Nikon SMZ-1 stereomicroscope using specialized identification keys (Radchenko 2016). In total, 2,837 ant specimens were processed. The mounted material is deposited in the reference collection of the Zoological Museum of the Department of Biology and Ecology (PUIF).

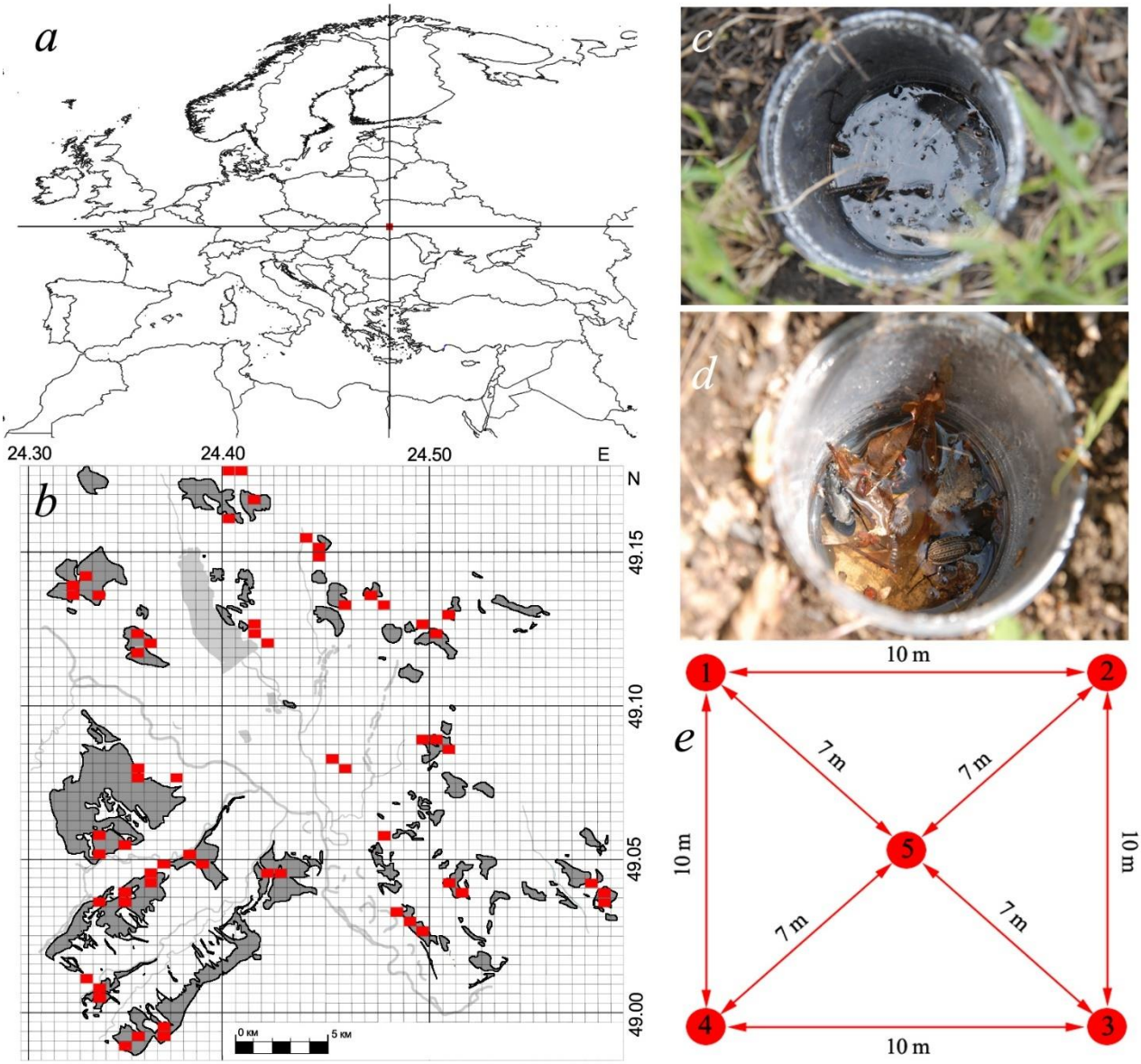

Fig. 1. Field study design showing the location of Halych National Park (*a*), clusters of sampling plots (*b*), a pitfall trap (*c*, *d*), and the general layout of a sampling plot (*e*).

3. RESULTS AND DISCUSSION

As a result of our study, 37 ant species were identified from the territory of Halych National Park, representing a significant contribution to the understanding of the local fauna. Together with published records, a total of 48 ant species are currently known from the National Park (Table 1).

Table 1. The provisional ants list of Halych National Park

№	Species	This study, specimens	References data
1.	*Aphaenogaster splendida* (Roger, 1859)	3	–
2.	*Camponotus herculeanus* (Linnaeus, 1758)	–	Mykytyn & Stefurak 2008
3.	*Camponotus ligniperdus* (Latreille, 1802)	–	Mykytyn & Stefurak 2008
4.	*Camponotus fallax* (Nylander, 1856)	17	Mykytyn & Stefurak 2008
5.	*Camponotus lateralis* (Olivier, 1792)	1	–
6.	*Camponotus piceus* (Leach, 1825)	29	–
7.	*Camponotus vagus* (Scopoli, 1763)	25	Mykytyn & Stefurak 2008
8.	*Formica bruni* Kutter, 1967	1	–
9.	*Formica cinerea* Mayr, 1853	13	–
10.	*Formica cunicularia* Latreille, 1798	194	Zamoroka et al. 2018
11.	*Formica foreli* Bondroit, 1918	–	Radchenko et al. 2012
12.	*Formica fusca* Linnaeus, 1758	–	Mykytyn & Stefurak 2008
13.	*Formica gagates* Latreille, 1798	7	–
14.	*Formica glauca* Ruzsky, 1896	103	–
15.	*Formica picea* Nylander, 1846	2	–
16.	*Formica pratensis* Retzius, 1783	–	Mykytyn & Stefurak 2008
17.	*Formica pressilabris* Nylander, 1846	–	Kinel & Noskiewicz 1924; Łomnicki 1925
18.	*Formica rufa* Linnaeus, 1761	–	Mykytyn & Stefurak 2008
19.	*Formica rufibarbis* Fabricius, 1793	5	–
20.	*Hypoponera punctatissima* (Roger, 1859)	1	–
21.	*Lasius alienus* (Foerster, 1850)	31	Zamoroka et al. 2018
22.	*Lasius bicornis* (Foerster, 1850)	2	–
23.	*Lasius brunneus* (Latreille, 1798)	7	–
24.	*Lasius emarginatus* (Olivier, 1792	33	–
25.	*Lasius flavus* (Fabricius, 1782)	48	Mykytyn & Stefurak 2008; Zamoroka et al. 2018
26.	*Lasius niger* (Linnaeus, 1758)	896	Mykytyn & Stefurak 2008; Zamoroka et al. 2018
27.	*Lasius paralienus* Seifert, 1992	37	–
28.	*Lasius platythorax* Seifert, 1991	158	–
29.	*Lasius umbratus* (Nylander, 1846)	–	Mykytyn & Stefurak 2008
30.	*Monomorium pharaonis* (Linnaeus, 1758)	2	–
31.	*Messor structor* (Latreille, 1798)	–	Mykytyn & Stefurak 2008
32.	*Myrmecina graminicola* (Latreille, 1802)	13	–
33.	*Myrmica bergi* Ruzsky, 1902	1	Zamoroka et al. 2018
34.	*Myrmica gallienii* Bondroit, 1920	1	–
35.	*Myrmica lobicornis* Nylander, 1846	–	Zamoroka et al. 2018
36.	*Myrmica rubra* (Linnaeus, 1758)	541	Mykytyn & Stefurak 2008
37.	*Myrmica ruginodis Nylander, 1846*	572	–
38.	*Myrmica scabrinodis Nylander, 1846*	2	–
39.	*Myrmica schencki* Viereck, 1903	2	–
40.	*Myrmica specioides* Bondroit, 1918	2	–
41.	*Myrmica sulcinodis* Nylander, 1846	24	–
42.	*Plagiolepis taurica* Santschi, 1920	1	–
43.	*Polyergus rufescens* (Latreille, 1798)	2	–
44.	*Solenopsis fugax* (Latreille, 1798)	1	Mykytyn & Stefurak 2008
45.	*Tapinoma erratica* (Latreille, 1798)	–	Zamoroka et al. 2018
46.	*Temnothorax crassispinus* (Karavaiev, 1926)	2	–

47.	*Tetramorium caespitum* (Linnaeus, 1758)	16	Mykytyn & Stefurak 2008
48.	*Tetramorium ferox* Ruzsky, 1903	42	–
	Total:	**2837**	**–**

The most common species in the collected samples were *F. cunicularia*, *F. glauca*, *L. flavus*, *L. niger*, *L. platythorax*, *M. rubra*, *M. ruginodis*, and *T. ferox*. Among these, three species were the most abundant: *L. niger* with 896 individuals, *M. ruginodis* with 572 individuals, and *M. rubra* with 541 individuals.

Extremely rare species included *F. burni*, *M. gallienii*, *M. bergi*, *C. lateralis*, *H. punctatissima*, *P. taurica*, *S. fugax*, *M. pharaonis*, and *A. splendida*, each represented by only 1-3 collected specimens. Notably, the occurrence of *M. pharaonis*, *H. punctatissima*, *A. splendida*, and *P. taurica* within Halych National Park is exceptional and likely associated with both anthropogenic introductions and recent northward range expansions linked to climatic changes.

Two males of *Monomorium pharaonis* were collected from the "Hora Vynohrad" locality near the village of Tustan. This species is of tropical origin and cannot survive local winters. We therefore consider *M. pharaonis* to be non-naturalized within Halych National Park, and its occurrence to result from accidental dispersal of winged males during nuptial flights. The records most likely reflect local introductions associated with a nearby pig farm, where the species may have established stable colonies, as indicated by the capture of alate males outside the farm premises.

Hypoponera punctatissima represents another tropical species recorded from the National Park. A single male was collected from a mesophilous meadow near the buildings of the Wildlife Rehabilitation Center. It was probably introduced with stored feed, where it may form stable indoor colony of colonies.

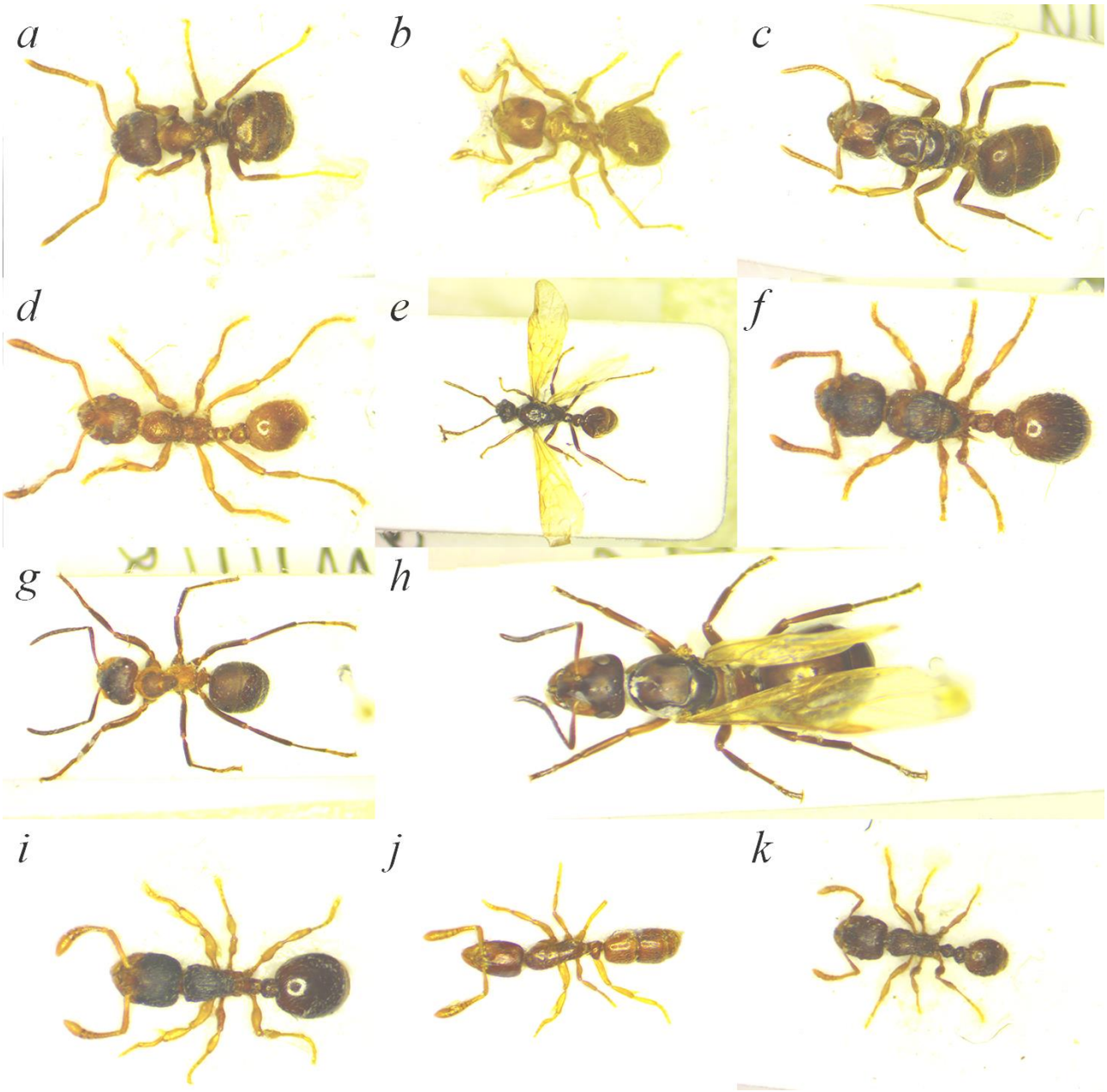

Figure 2. Selected ants' species presented in the current study: *Lasius niger* (a), *Lasius flavus* (b), *Lasius brunneus* female (c), *Myrmica rubra* (d), *Myrmica rubra* male (e), *Myrmica scabrinodis* female (f), *Formica cunicularia* (g), *Formica cunicularia* female (h), *Myrmecina graminicola* (i), *Hypoponera punctatissima* (j), *Tetramorium caespitum* (k).

Aphaenogaster splendida is an exceptionally unusual record of a Mediterranean species in Halych National Park. Three females were collected from a thermophilous oak forest on gypsum outcrops in the "Simlyn" locality near the village of Medukha. Under natural conditions in Ukraine, this species has previously been known only from the southern coast of Crimea (Radchenko 2016).

Plagiolepis taurica is a southern European species whose occurrence in Halych National Park is equally unexpected. A single male was recorded from the "Hora Vynohrad" locality near Tustan village. *Plagiolepis taurica* is distributed across southern and central Europe, and in Ukraine it was previously known only from southern regions, including Crimea (Radchenko, 2016).

While the occurrence of *M. pharaonis* and *H. punctatissima* raises no particular questions – given that their invasions in Ukraine are well documented (Radchenko 2011, 2016) – the presence of the southern species *A. splendida* and *P. taurica* is surprising. These two species have never before been recorded so far north in Ukraine (Radchenko 2016). Their presence within Halych National Park

warrants further investigation. Our findings may either indicate accidental introductions or rapid northward range shifts driven by global climate change, a phenomenon already observed for other insect species (Zamoroka & Mateleshko 2016; Viznovych & Zamoroka 2022; Babytskyi et al. 2020; Kyzym & Zamoroka 2024; Rizun et al 2025). It should be emphasized that no worker individuals of any of the four species mentioned above have yet been found in the wild, and all recorded specimens were solitary males (*M. pharaonis*, *H. punctatissima*, *P. taurica*) or females (*A. splendida*). This pattern suggests an anthropogenic mode of dispersal, likely involving transport with livestock feed, building materials, or other goods. Further studies are required to clarify these pathways.

A critical review of published sources revealed substantial discrepancies between earlier reports and our findings. For instance, Mykytyn and Stefurak (2008) reported 14 ant species from Kasova Hora, of which we were able to confirm only 7 – and even those from different parts of Halych National Park. The occurrence of species such as *C. herculeanus* and *C. ligniperdus* in the Podillian part of the National Park appears doubtful, as these are typical inhabitants of mountain forests in the Carpathians. Similar doubts regarding the presence of *C. herculeanus* near Lviv were already expressed by Jarosław Łomnicki (1928), who nevertheless confirmed *C. ligniperdus* from the Vynnyky Forest near Lviv (Łomnicki 1928). We assume that *C. herculeanus* and *C. ligniperdus* may occur in the southern, foothill part of Halych National Park.

The presence of *F. pressilabris* within Halych National Park also remains an open question. Jan Noskiewicz collected several specimens of this species from Kasova Hora near Burshtyn (Kinel & Noskiewicz 1924), which was also mentioned by Łomnicki (1925). In recent times, Oleksandr Radchenko re-examined Łomnicki's collection and reidentified his specimens as *F. foreli* (Radchenko et al. 2012). He reported 4 females, 9 males, and 1 worker from Łomnicki's collection as *F. foreli*, but he did not indicate whether *F. pressilabris* was present among them. Furthermore, Radchenko made a transliteration error when translating specimen labels from Polish into Russian (his paper was published in Russian), citing "Bushtyno" in Zakarpattia Oblast (Radchenko et al. 2012) instead of "Burshtyn" in Ivano-Frankivsk Oblast, which is in fact the locality of Kasova Hora and the site of Łomnicki's original work (Łomnicki 1925).

An important aspect of our study is the habitat distribution of ants within the Halych National Park (Table 2). The high heterogeneity of environmental conditions across this territory underlies the ecosystemic diversity (fig. 3) encompassing fir, beech, and oak forests, as well as a range of meadow types – from hygrophilous to xerophilous – thus promoting a high level of differentiation within the insect fauna (Zamoroka 2013).

Table 2. Habitat distribution of ants in Halych National Park

№	Species	Habitat							
		Meadow steppes	Mesophilous meadows	Fallow meadows	Oak forests	Beech forests	Fir forests	Fens	Willow forests
1.	*Aphaenogates splendida*				+				
2.	*Camponotus fallax*			+					
3.	*Camponotus lateralis*						+		
4.	*Camponotus piceus*			+					
5.	*Camponotus vagus*					+			
6.	*Formica burni*			+					
7.	*Formica cinerea*		+	+					
8.	*Formica cunicularia*	+	+	+		+		+	
9.	*Formica gagates*		+	+					

10.	*Formica glauca*		+	+				+	
11.	*Formica picea*		+	+					
12.	*Formica rufibarbis*			+					
13.	*Hypoponera punctatissima*		+						
14.	*Lasius alienus*				+		+		
15.	*Lasius bicornis*			+					
16.	*Lasius brunneus*		+	+	+			+	
17.	*Lasius emarginatus*			+	+				+
18.	*Lasius flavus*	+	+	+				+	
19.	*Lasius niger*	+	+	+		+			
20.	*Lasius paralienus*		+	+					
21.	*Lasius platythorax*		+	+		+			
22.	*Monomorium pharaonis*			+					
23.	*Myrmecina graminicola*		+						
24.	*Myrmica bergi*		+						
25.	*Myrmica gallienii*			+					
26.	*Myrmica rubra*		+	+	+	+	+	+	+
27.	*Myrmica ruginodis*		+	+	+	+	+	+	
28.	*Myrmica scabrinodis*	+							
29.	*Myrmica schencki*		+						
30.	*Myrmica specioides*			+					
31.	*Myrmica sulcinodis*		+	+					
32.	*Plagiolepis tauricus*			+					
33.	*Polyergus rufescens*			+					
34.	*Salenopsis fugax*			+					
35.	*Temnothorax crassispinus*					+			
36.	*Tetramorium caespitum*		+				+		
37.	*Tetramorium ferox*			+					
	Total:	**4**	**18**	**26**	**6**	**7**	**5**	**6**	**2**

Our results indicate that the main diversity of the ant fauna is concentrated in ecosystems disturbed by human activity – namely, in fallow lands and post-forest mesophilous meadows. In particular, 26 ant species were recorded from fallow lands, representing the highest species richness among all studied habitats. A distinctive feature of fallow lands is their mosaic structure within a relatively small area, where different patches simultaneously represent various stages of ecological succession – from early ruderal plant communities to late shrub-tree assemblages. This pattern is especially evident in small, abandoned arable plots of differing ownership and abandonment histories. Such conditions undoubtedly sustain a wide spectrum of ecological niches for different ant species, thereby contributing to their diversity. A similar situation is observed in post-forest mesophilous meadows, where we recorded 18 ant species. These ecosystems also exist at various successional stages – from plagioclimax communities maintained by periodic hayharvesting to those undergoing gradual overgrowth by shrubs.

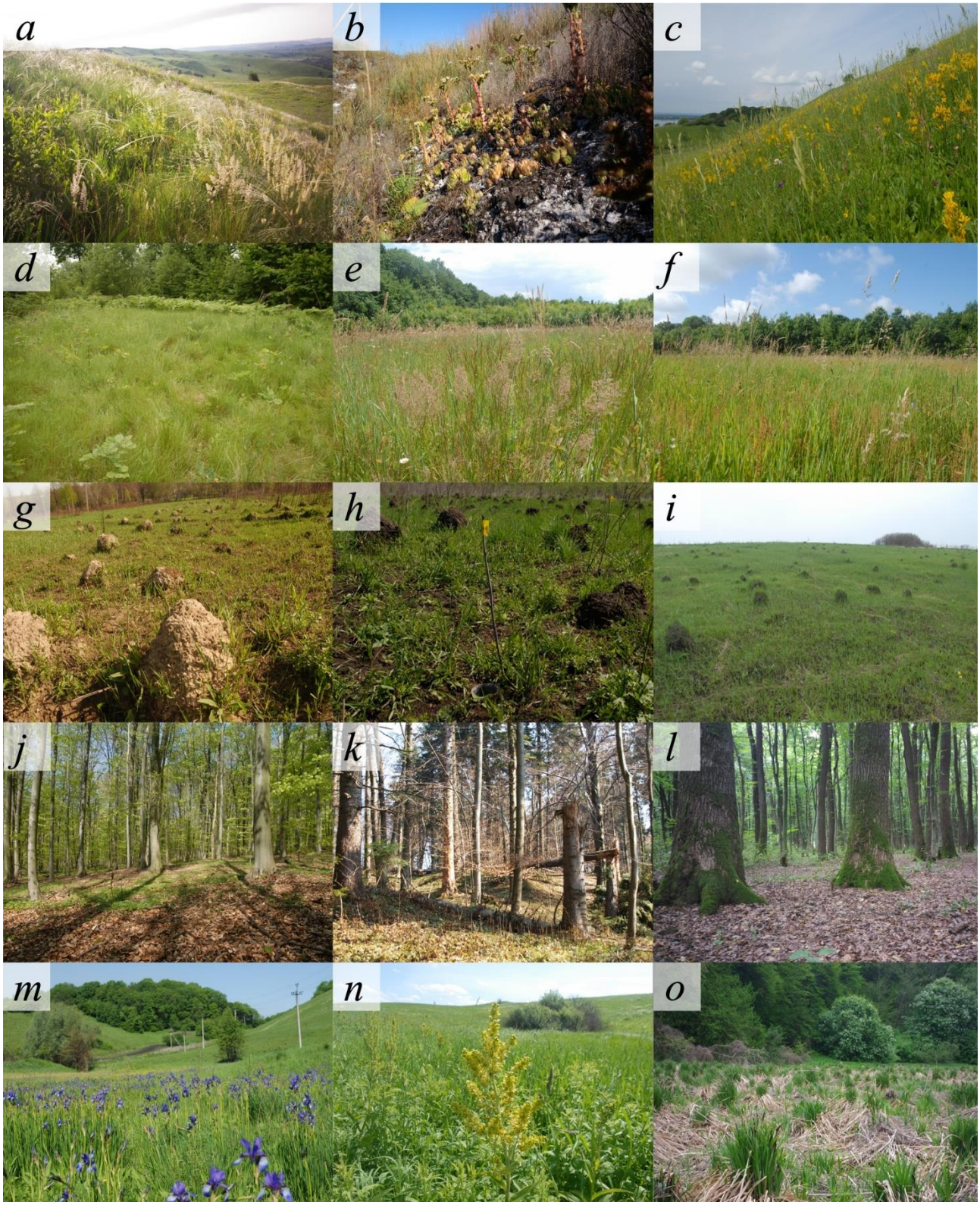

Figure 3. Representative habitat types within Halych National Park where ants were sampled, including meadow steppes (a, c), petrophilous steppes (b), post-forest meadows (d–f), fallows (g–i), beech forests (j), fir forests (k), oak forests (l), fens (m), karstic bogs (n), and floodplain swamps (o).

Forest, wetland, riparian, and steppe habitats support considerably lower species richness of ants; however, the species composition in these habitats differs markedly from that of meadow and fallow ecosystems.

We identified several ant species that occur across most habitat types. These include the dominant and ubiquitous species *L. niger*, *M. ruginodis*, *M. rubra*, and *F. cunicularia*, all of which exhibit high ecological plasticity. *Lasius niger* tends to prefer open and, particularly, anthropogenically disturbed habitats, being only rarely encountered in forest ecosystems. In contrast, semi-closed shrubland and closed forest habitats are typically inhabited by *M. ruginodis*, *M. rubra*, and *F. cunicularia*. These species are also found in mesohygrophilous meadows and hygrophilous wetland habitats. *Formica cunicularia* also occurs in the meadow steppe habitats of the National Park.

A number of ant species were found to be habitat-specific. For instance, *M. scabrinodis* was recorded exclusively in the steppe meadow habitats; *M. graminicola*, *M. bergi*, and *M. schencki* were found only in mesophilous meadows; and *F. burni*, *F. rufibarbis*, *L. bicornis*, *M. gallienii*, *M. specioides*, *P. rufescens*, *S. fugax*, and *T. ferox* were recorded exclusively from fallow ecosystems. The degree of habitat specialization and specific ecological associations among these species remains unclear. This uncertainty is primarily attributable to the strong mosaicism of natural and semi-natural habitats within Halych National Park, where interpenetration of ant species between habitats is inevitable. Further studies will undoubtedly provide a more comprehensive understanding of these relationships.

4. CONCLUSIONS

In summary, the ant fauna of Halych National Park is rich, though its study remains at an early stage. The diversity of ecological conditions and the pronounced mosaicism of natural and semi-natural habitats are key to understanding the natural species richness of ants in this area. At the same time, the high degree of human land use renders the region vulnerable to ant invasions induced both by anthropogenic activity and by ongoing climatic changes. Continued precise study will make it possible to develop and implement both conservation management strategies and invasive species management practices.

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Author contributions. Conceptualization: AZ. Methodology, data collection, figures, tables, and referencing: Ya-YuK, MB, VM, AM, OP. Writing – original draft preparation: Ya-YuK. Writing – review and editing: AZ, Ya-YuK.

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Data availability. The studied materials are preserved in the collections of the Department of Biology and Ecology at Vasyl Stefanyk Carpathian National University and are available for examination by all interested parties.

Declarations

Conflict of interest. The authors declare that the research was conducted in the absence of any commercial or other relationships that could be construed as a potential conflict of interest.

Research involving human participants and/or animals. This study did not involve any experiments on humans or animals. All data were obtained from studies that did not require direct involvement of human participants or experimental use of animals.

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Касіцкі Я.-Ю.Г., Бурейко М.Д., Маланій В.В., Мохняк А.В., Піддубний О.П., Заморока А.М. Попередній перелік та оселищні преференції мурашок (Hymenoptera: Formicidae) у Галицькому національному природному парку, Україна. Журнал Карпатського університету імені Василя Стефаника. Біологія, 12: 74-86.

Анотація. У межах Галицького національного природного парку виявлено 37 видів мурашок, що суттєво доповнює знання про місцеву мірмекофауну. Разом із літературними даними, на сьогодні для території парку відомо 48 видів. Найпоширенішими виявились *Formica cunicularia*, *Formica glauca*, *Lasius flavus*, *Lasius niger*, *Lasius platythorax*, *Myrmica rubra*, *Myrmica ruginodis* і *Tetramorium ferox*. Чотири види, включаючи *Monomorium pharaonis*, *Hypoponera punctatissima*, *Aphaenogaster splendida* і *Plagiolepis taurica*, виявлені поодиноко і є незвичайними знахідками, ймовірно пов'язаними із опосередкованими людиною занесеннями або кліматично зумовленими зміщеннями ареалів на північ. Слід зазначити, що всі знайдені особини цих видів представлені лише самцями або самицями, але не робочими, що свідчить про можливий антропогенний спосіб їх поширення – з кормами для худоби, будівельними матеріалами чи іншими товарами. Аналіз розподілу мурашок за оселищами показав, що найбільше видове різноманіття спостерігається на прелогах (26 видів) і післялісових мезофільних луках (18 видів). Натомість у лісових, болотних, заплавних та степових оселищах виявлено значно меншу кількість видів. Широко поширені екологічно пластичні види, такі як *Formica cunicularia*, *Lasius niger*, *Myrmica rubra* і *Myrmica ruginodis*, домінують у більшості вивчених оселищ. Наше дослідження засвідчує високе різноманіття та водночас уразливість фавни мурашок національного парку до впливів людини й кліматичних змін. Подальший моніторинг є необхідним для з'ясування ймовірних шляхів інвазії, збереження місцевого біорізноманіття та розроблення ефективних природоохоронних і управлінських стратегій.

Ключові слова: комахи, біорізноманіття, фауна, природні оселища, інвазійні види, природоохоронні території, кліматичні зміни