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First record of *Temnothorax unifasciatus* (Latreille, 1798) (Hymenoptera, Formicidae) from the Mazovian Lowland with an updated distribution in Poland

Franciszek Mika[1], Artur Szpalek[2], Michał Michlewicz[3,4]

[1] *Warsaw University of Life Sciences – SGGW (WULS-SGGW), Faculty of Animal Breeding, Bioengineering and Conservation, Ciszewskiego 8, 02-786 Warsaw, Poland, e-mail: franciszekmikablatto@gmail.com, ORCID 0000-0003-2638-3284*
[2] *Warsaw University of Life Sciences – SGGW (WULS-SGGW), Faculty of Animal Breeding, Bioengineering and Conservation, Ciszewskiego 8, 02-786 Warsaw, Poland, e-mail: artur.szpalek01@gmail.com, ORCID 0000-0003-1963-1083*
[3] *Poznań University of Life Sciences, Departament of Zoology, Wojska Polskiego 71C, 60-625 Poznań, Poland*
[4] *Regional Directorate for Environmental Protection in Poznań, ul. Kościuszki 57, 61-891 Poznań, Poland, e-mail: michlewiczmichal@gmail.com, ORCID 0000-0002-9749-8524*

Abstract: *Temnothorax unifasciatus* (Latreille, 1798) is recorded for the first time in the central part of Poland (Mazovian Lowland), based on morphological identification of collected individuals. Until now, this thermophilic ant – commonly nesting in stony areas – has been recorded only in southern regions of the country. In the present study, we update its distribution in Poland, extending its known range northward. So far, it remains unclear whether this new record reflects a recent expansion of its range of distribution potentially associated with global warming, or whether this species has been previously overlooked due to insufficient monitoring of the myrmecofauna in this area.

Key words: Warsaw, Vistula escarpment, Ursynów, species occurrence, distribution range

Introduction

The genus *Temnothorax* comprises over 500 species (Bolton 2025). As generally found in ants, the species of this genus are commonly found throughout the Holarctic region, with the exception of Arctic biomes.

Temnothorax unifasciatus (Latreille, 1798) is a Eurocaucasian ant species found in southern and eastern Europe, Gotland and the Channel Islands. This xerothermophilous species occupies a broad range of warm, dry habitats, including open, shrubby, or woodland environments, and it may also occur in urban areas under both low and high urban pressure (Seifert 2018). In Poland, *T. unifasciatus* is recorded in southern regions (Figure 1), where it is usually found in well-insolated deciduous forests and open areas with limestone soil (Radchenko et al. 2004, Czechowski et al. 2012). The species forms monogynous colonies, typically including around 200 workers, although colonies more than twice this size have also been reported (Seifert 2018). Nests are usually located under stones, in rock crevices, or under patches of lichenaceous vegetation. It can also readily exploit very small nesting cavities, such as rock cracks, spaces under bark, inside dry tree branches, or in empty plant stems (Czechowski et al. 2002).

Material and Methods

The study was performed in Skarpa Ursynowska Nature Reserve (52°09'46"N 21°03'12"E; UTM EC07) located in the surroundings of Warsaw, in the Mazovian Lowland region. The Skarpa Ursy-

nowska Nature Reserve was established in 1996 to protect and preserve the natural slope of Warsaw, along with its meadows and wetlands (Monitor Polski 1996 Nr 42, poz. 411). The total area under active protection and landscape conservation is over 20 hectares (Dziennik Urzędowy Województwa Mazowieckiego 2011 Nr. 138, poz. 4429). In 2024, from the beginning of April to the end of September, the area was surveyed to compile an inventory of the occurring terrestrial isopods and millipedes present (Szpalek 2025). With this aim, five different habitats type were selected: alder forest, oak-hornbeam forest on the escarpment, a place near the pond, herbaceous vegetation area, and the top of the escarpment (oak-hornbeam forest) near the SGGW allotment gardens. The soil arthropod fauna of each habitat was sampled using two Barber traps, consisting of a glass jar with a plastic funnel container of 1000 cm^3 filled with propylene glycol. As complementary methods, it was employed 5 minutes of direct search of the area and 1 litre (in volume) of soil from the topsoil layer and leaflitter was collected and placed in a Tullgren funnel for one week.

The ant specimens (Hymenoptera: Formicidae) collected during the sampling were identified to species level using the identification keys in Czechowski et al. (2012), Radchenko et al. (2004), and Salata & Borowiec (2013). Finally, the distribution map of *T. unifasciatus* was generated using the softwares MapaUTM ver. 6 (Gierlasiński 2024) and MediBang Paint.

Results

On August 19, 2024, a single worker of *Temnothorax unifasciatus* (Fig. 1) was found in one of the two Barber traps placed in the habitat referred as "top of the escarpment". This record represents the northernmost known locality of this species in Poland (Fig. 2). In addition, workers of the ant species *Myrmica rubra* (Linnaeus, 1758), *M. ruginodis* Nylander,1846, and *Lasius brunneus* (Latreille, 1798) were also captured in the same trap. The new record, along with previously published data, is summarized in Table 1.

Figure 1. Worker of *Temnothorax unifasciatus* from the nature reserve „Skarpa Ursynowska" in Warsaw. Photo by M. Michlewicz.

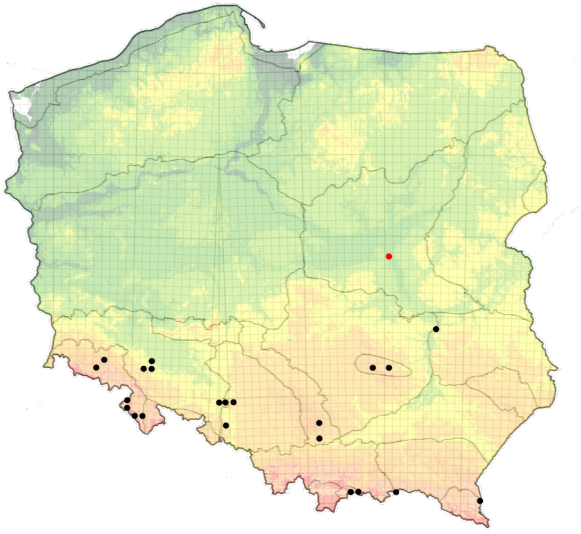

Figure. 2 Distribution of *Temnothorax unifasciatus* in Poland with red dot as a new record for Poland and black dots as a literature data; generated using the non-commercial program MapaUTM ver. 6 (Gierlasiński 2024) and MediBang Paint.

Table. 1. Summary of distribution *Temnothorax unifasciatus* in Poland. The regions are presented according to the zoogeographical region boundaries from the Catalogue of Polish Fauna [KFP] (Burakowski et al. 1973), UTM – Universal Tranverse Mercator.

Region of Poland	Type of locality	Specific locality / site	UTM	Citation
Mazovian Lowland	nature reserve	Nature reserve Skarpa Ursynowska in Warsaw	EC07	this paper
Cracow-Wieluń Upland	city	–	DA14	Wierzejski 1873
	village	Ojców village	DA16	Czechowski et al. 1998b
	village	Czajowice village, in an abandoned limestone quarry	DA16	Borowiec 2009
	village	Jerzmanowice village, on an isolated limestone outcrop "Skałka 502"	DA16	Borowiec 2009
Upper Silesia	village	Szymiszów village	CA09	Nowotny 1931
	surrounding area	Gogolin city	BA89	Nowotny 1931
	village	Ligota Mała village	BA96	Nowotny 1937
	mountain summit	"Ligocka Góra Kamienna" near Ligota Dolna village	BA99	Zięcina & Salata 2022

Pieniny Mountains	national park	Pieniny National Park	DV57	Koehler 1951
	mountain summit	Palenica	DV67	Woyciechowski 1985
	mountain summit	Zamczysko	DV57	Czechowski & Czechowska 2000
	national park	Marsh and dry grassland	DV57	Czechowska 1976
Lower Silesia	town	Sobótka	XS24	Stawarski 1966
	landscape park	Ślęża Landscape Park and buffer zone	XS13 XS23	Salata & Borowiec 2016
Western Sudetes	mountain summit	Mountain Połom near Wojcieszów city	WS64	Banert & Pisarski 1972
	city	Jelenia Góra	WS53	Czechowski et al. 1998b
	village	Huta village near Bystrzyca Kłodzka	XR07	Borowiec 2009
	national park	Stołowe Mountains National Park	WR99 WR98	Salata 2014
Świętokrzyskie Mountains	mountain summit	Święty Krzyż (Łysa Góra)	EB03	Krzysztofiak 1984
	mountain summit	Mountain summit of Klonówka, near Cedzyna village	DB83	Czechowski et al. 1998
Lublin Upland	town	Kazimierz Dolny	EB68	Czechowski et al. 1998b
Bieszczady Mountains	village	Bystre village	FV26	Salata & Borowiec 2014
Eastern Sudetes	village	Mielnik village	XR17	Salata et al. 2015
Eastern Beskids	village	Blechnarka village	EV17	Kaszyca et al. 2017

Discussion

Temnothorax unifasciatus is an ant reported in Polish myrmecological literature as rare, with records limited to a few southern regions of the country, particularly xerothermic habitats, preferably on calcareous (limestone) substrates (Czechowski et al. 2012; Czechowska 1976).

In 1976–1977, a myrmecological survey was conducted along the entire Warsaw escarpment, including the Skarpa Ursynowska reserve (then named "Ursynów"), during which four ant species were recorded (Czechowski & Pisarski 1990). More recently, the last published record of *Temnothorax unifasciatus* in Poland appeared in 2022 and was based on material collected a decade earlier from a mountain area in southern Poland (Salata et al. 2015; Zięcina & Salata 2022). The scarcity of records likely reflects not only the limited number of myrmecological surveys – especially in northern and north-eastern Poland – but also the taxonomic challenges within the genus *Temnothorax*. Long-term studies lasting several months and employing diverse invertebrate sampling methods remain particularly scarce.

In this study, the species was recorded in a semi-open, elevated area that warms up easily. The canopy consists of *Robinia pseudoacacia* L., *Acer platanoides* L., *Quercus robur* L., and *Tilia cordata* Mill. The forest floor is dominated by the invasive species *Impatiens parviflora*, whereas *Aegopodium poda-*

graria L. occurs mainly along the forest path. The hill is composed by a soil with high sand content, and the combination of strong insolation and steep slope limits water retention. This site is adjacent to allotment gardens, which results in the frequent accumulation of anthropogenic waste (bricks, plastic packaging, metal and glass fragments, cement, and green waste from gardening) often in large amounts.

Although the ecological requirements of *Temnothorax unifasciatus* are well documented in the literature, its taxonomic identification remains problematic. According to Csősz et al. (2025), it is the only member of the *T. unifasciatus* complex with a pan-European distribution, extending from Portugal to the Caucasus. This clarification of its taxonomic status and broad range may facilitate identification at a general level. However, in practice, accurate determination is complicated by the occurrence in Poland of morphologically and ecologically similar species, particularly *Temnothorax albipennis*, with which hybridization may occur. Consequently, reliable identification requires careful examination under high magnification and optimal lighting conditions, as subtle diagnostic characters – especially those relating to head sculpture and gaster morphology – are essential for distinguishing between the two species (Douves & Stille 1991; Salata & Borowiec 2013).

In summary, our study documents a new locality of *Temnothorax unifasciatus* in Poland, thereby extending its known distribution northwards. At the same time, these findings highlight the need for further faunistic surveys to update current knowledge of the distribution of ant species in Poland.

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Authors contribution

Research conceptualisation – Artur Szpalek; sample design and methodology – Artur Szpalek; investigation and data collection – Artur Szpalek, Franciszek Mika; data analysis and interpretation – Franciszek Mika, Artur Szpalek, Michał Michlewicz; original draft writing – Franciszek Mika; review and editing – Artur Szpalek, Franciszek Mika, Michał Michlewicz; figure preparation – Michał Michlewicz, Franciszek Mika.

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Streszczenie

Pierwsze stwierdzenie mrówki z gatunku *Temnothorax unifasciatus* (Latreille, 1798) (Hymenoptera, Formicidae) na Nizinie Mazowieckiej wraz z aktualizacją rozmieszczenia w Polsce.

W pracy przedstawiono pierwsze stwierdzenie występowania *Temnothorax unifasciatus* (Latreille, 1798) na Nizinie Mazowieckiej w centralnej części kraju. Zarazem jest to najbardziej wysunięte na północ znane stanowisko tego gatunku w Polsce. Dotychczas znane stanowiska koncentrowały się głównie w południowych regionach kraju (zwłaszcza w pasmach górskich), co wiązano z jego termofilnymi preferencjami siedliskowymi. Ponadto zestawiono i przeanalizowano dostępne dane literaturowe dotyczące rozmieszczenia *T. unifasciatus* w Polsce.

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