



First record of the cockroach *Ectobius vittiventris* (Costa, 1847) (Dictyoptera: Blattodea: Ectobiinae) from Poland and new data on its occurrence in Czechia

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Abstract: *Ectobius vittiventris* (Costa, 1847) is recorded for the first time in Poland and its identity is confirmed by the DNA barcoding. Furthermore, new data on occurrence of the species in Czechia are provided. Our findings, coming mostly from sites along busy road routes, may suggest some role of road transport in the spread of this species in Central Europe.

Key words: DNA barcoding, new records, expansion, Central Europe

INTRODUCTION

The genus *Ectobius* Stephens, 1835 (Blattodea, cockroaches), currently includes 65 species that inhabit Europe, Asia, and Africa (Beccaloni 2025). Three species have so far been confirmed to occur in Poland: *E. erythronotus* (Burr, 1899), *E. lapponicus* (Linnaeus, 1758) and *E. sylvestris* (Poda, 1761) (Bazyluk 1956, 1957, Żurawlew et al. 2022). In Czechia, however, in addition to the species recorded in Poland (Kočárek et al. 1999), a fourth species, *E. vittiventris* (Costa, 1847), was found relatively recently (Chládek 2016).

MATERIAL AND METHODS

The collected female specimen was initially identified based on the characters given by Harz & Kaltenbach (1976): tegmina not transversely truncated, covering the abdomen, unicoloured, light, yellowish-ochre, 7.5–10 mm in length; disc of the pronotum rounded, unicoloured yellowish, orange or brownish; alae in normal position, as long as the tegmina and head light between the eyes without dark marks.

To confirm the taxonomic identification of this female individual, PCR amplification, quality control and sequencing of the DNA barcoding fragment was performed with the high-

throughput Oxford Nanopore Technology, following the approach presented by Srivathsan et al. (2021, 2024). The HCO2198-JJ / LCO1490-JJ primer pair (Astrin & Stüben 2008) tailed with 9bp-long tags (Srivathsan et al. 2024) was used to amplify the 5' fragment of the cytochrome oxidase subunit I. This fragment is commonly used as a barcoding marker for Metazoa (Hebert et al. 2003). The resulting sequence was deposited and is publicly available via the Barcode of Life Datasystems (BOLD) under the dx.doi.org/10.5883/DS-BLATPL, and in GenBank (<https://www.ncbi.nlm.nih.gov/genbank/>) (acc. num. PV135976).

Additionally, the phylogenetic position of the newly sequenced individuals in relation to the other *Ectobius* species occurring (also potentially) in Poland was illustrated with the Neighbor-Joining tree (NJ; (Saitou and Nei 1987)) for the 83 COI barcode sequences downloaded from iBOL and identified as *Ectobius vittiventris*, *E. pallidus* (Olivier, 1789), *E. erythronotus*, *E. lapponicus*, *E. sylvestris* and, as outgroup, sequences belonging to *Phyllodromica* spp. All ambiguous positions were removed for each sequence pair (pairwise deletion option). There was a total of 613 positions in the final dataset. The tree was based on the K2P distance (Kimura 1980), with a bootstrap test (1000 replicates) (Felsenstein 1985), using MEGA X software (Kumar et al. 2018).

RESULTS

The records of *E. vittiventris* from Poland and Czechia in 2024 are listed below, followed by locality, coordinates, date, number of specimens/sex, habitat and collector data.

Poland

- Mazovian Lowland, Pilawa (51.955765, 21.526577), UTM EC35, 21 October 2024, 1♀, interior of a single-family house (Fig. 1, leg. A. Kapusta, P. Radzikowski).

The town of Pilawa is located about 50 kilometres from Warsaw; there is an important rail-road junction in the vicinity. An expressway with an extensive parking lot runs a few kilometres from the place where specimen was collected. The Pilawa site is about 520 km north from the nearest sites in Slovakia (Vidlička & Pecina 2021). Earlier information on the occurrence of this species in Poland (Bazyluk 1956, 1957) was incorrect (Bazyluk 1977).

In result of DNA barcoding (Fig. 2), the 658 bp-long COI sequence was obtained for the female individual from Poland. Using BOLD, it was confirmed as identical to *E. vittiventris vittiventris*, BIN BOLD: ACJ8169, found so far in Slovakia, Germany (Husemann et al. 2021), France and UK (doi.org/10.5883/BOLD:ACJ8169). Also, the NJ tree has shown that the newly sequenced individual clusters with very high support within the *E. vittiventris* clade.

Czechia

- South Moravian Region, Brno-Brněnské Ivanovice (49.162445, 16.661099), UTM XQ24, 27 September 2024, 1♀, tree canopy near the gas station and highway parking lot (leg. R. Vlk).

- South Moravian Region, Ladná (48.810698, 16.893629), UTM XQ30, 28 September 2024, 1♀, tree canopy near gas station and highway parking lot (leg. R. Vlk).

- South Moravian Region, Lanžhot (48.726340, 16.980911), UTM XP49, 28 September 2024, 1 larva, edge of riparian forest near truck parking area next to highway (leg. R. Vlk).

- South Moravian Region, Lanžhot (48.726838, 16.983941), UTM XP49, 28 September 2024, 1♀, tree canopies near a truck parking lot on the highway (leg. R. Vlk).

- South Moravian Region, Mikulov (48.797825, 16.632941), UTM XQ10, 22 September 2024, 2♀♀, tree canopy near gas station and parking lot (leg. R. Vlk).



Fig. 1. *Ectobius vittiventris* (dorsal side, ventral side, abdominal sternites), Pilawa (Poland), October 2024, female (photo by Gabriela Karlik).

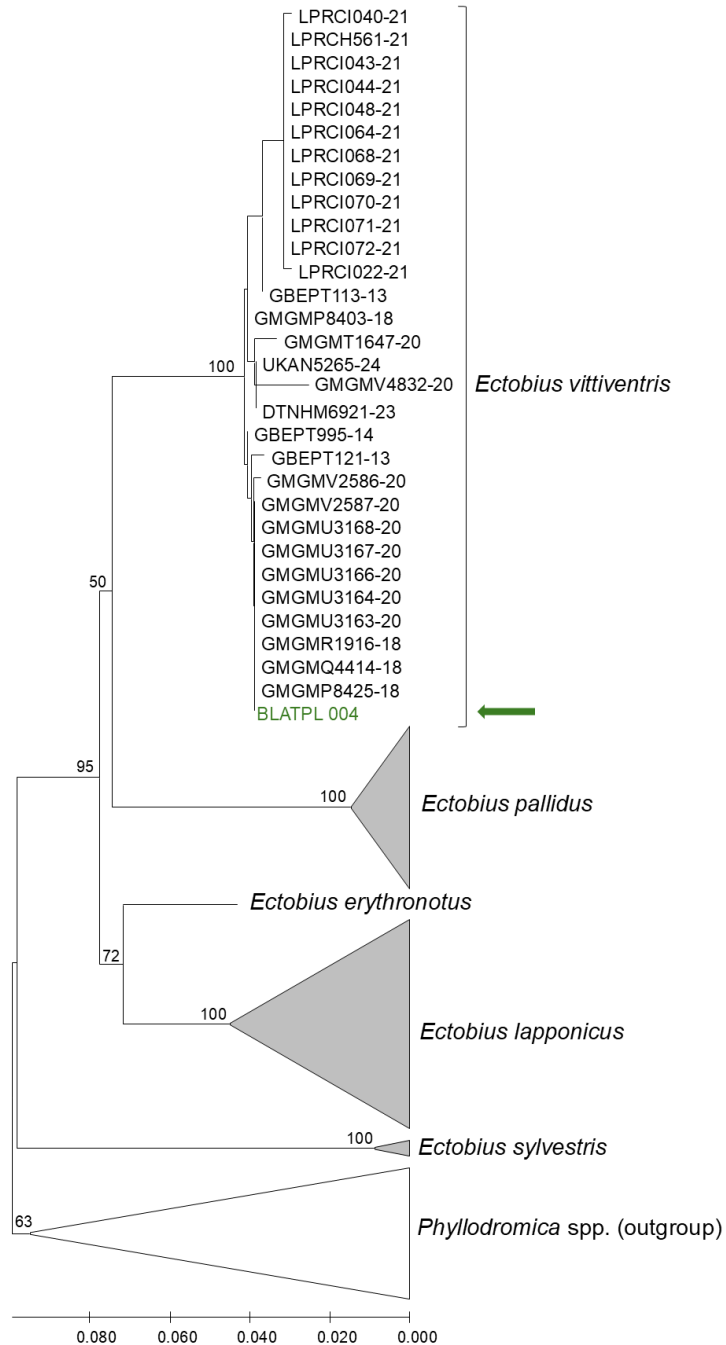


Fig. 2. Neighbor-joining topology of the analysed *Ectobius* species based on Kimura 2-parameter distances. Triangles indicate the relative number of individuals sampled (height) and sequence divergence (width). Numbers next to nodes represent bootstrap values > 50% (1000 replicates). Numbers indicate the BOLD sample ID. Green arrow indicates the newly sequenced female individual from Poland.

- South Moravian Region, Mikulov (48.8074406, 16.6277772), UTM XQ10, 22 September 2024, 1 ♀, tree canopy near gas station and parking lot (leg. R. Vlk).
- South Moravian Region, Pasohlávky (48.899470, 16.570001), UTM XQ11, 1 October 2024, 2 ♂♂, tree canopy near caravan park (leg. R. Vlk).
- South Moravian Region, Perná (48.859463, 16.609198), UTM XQ11, 22 September 2024, 4 ♀♀, tree canopy near the gas station and parking lot (leg. R. Vlk).
- South Moravian Region, Tvarožná (49.184498, 16.759177), UTM XQ24, 27 September 2024, 1 ♀, tree canopy near the gas station and parking lot (leg. R. Vlk).
- South Moravian Region, Židlochovice (49.0303347, 16.6225936), UTM XQ13, 23 September 2024, 1 ♀, wooded areas near a garden centre (leg. R. Vlk).

In Czechia, the species was found at 10 sites during a narrow time interval between 22.09.2024 and 1.10.2024. Most of the specimens came from semi-natural habitats outside cities, mainly from woodlots and forest edges. All listed sites are located in southern Moravia, mainly along international routes with heavy road transport, which includes trucks and caravans. So far, *E. vittiventris* has been recorded from Czechia only in cities, such as Prague, Brno, České Budějovice, Olomouc, Zlín and Vyškov (iNaturalist 2025).

DISCUSSION

The cockroach *E. vittiventris* is a southern European species, inhabiting an area from southern Spain and France, through Switzerland, Italy, Slovenia, Croatia, and Bulgaria, to northwest Asia and southwest Russia (Vidlička & Pecina 2021). In the late 20th century, the species began to colonize new, more northern areas in Europe: Germany (Baur & Coray 2004), Slovakia (Vidlička 2014), Austria (Zimmermann 2015), Czechia (Chládek 2016), the UK (Landau & Baur 2018), and Hungary (Puskás 2019). In Slovakia, it was recorded most often in urban areas, in home gardens, in lawns and compost heaps, and among shrubs and herbaceous plants. It was often observed inside human settlements (Vidlička & Pecina 2021).

The most likely pathways for the expansion of *E. vittiventris* in Europe include spread along the valleys of large rivers (Vidlička 2014) or by road and rail transport (Matzke & Gutzeit 2019). Furthermore, the importance of the microclimate of large cities in the functioning of the species' populations has been emphasized, as well as the increase in average air temperatures in Europe that favours its expansion (Vidlička & Pecina 2021). Given that the findings reported in this paper, mostly come from sites outside cities located along busy road routes, we may expect that road transport may play some role in the spread of this species in Central Europe.

The apparent increase in the number of sites in countries neighbouring Poland (Germany, Slovakia, Czechia) (Husemann et al. 2021, Vidlička & Pecina 2021, this paper) indicates that the species may be even more common in southern Poland. The lack of other observations is probably a result of the difficulty in identifying cockroaches and the small number of taxonomic experts specialising in Blattodea in Poland.

Thus, supporting the morphology-based identification with DNA barcoding shows the potential of the latter method for overcoming such deficiencies. Particularly, the Oxford Nanopore Technologies we used offer handy and cost-effective solutions, because they require minimal laboratory equipment and simple procedure as well as reduce the sequencing cost to <10 cents per individual (Srivathsan et al. 2021). Finally, the MinION sequencer is portable, and it can be operated with a standard laptop, also away from a molecular laboratory, and by non-professionals (Maestri et al. 2019, Schilthuizen et al. 2022).

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STRESZCZENIE

[Pierwsze stwierdzenie karaczana *Ectobius vittiventris* (Costa, 1847) (Dictyoptera: Blattodea: Ectobiinae) w Polsce i nowe dane o tym gatunku w Czechach]

W pracy podano pierwszą informację o występowaniu karaczana *Ectobius vittiventris* (Costa, 1847) w Polsce i kolejne dane o tym gatunku w Czechach. Okaz z Polski oznaczono na podstawie cech kluczowych podanych w pracy Harza & Kaltenbacha (1976), a następnie potwierdzono poprzez barkoding DNA. Stanowisko z Polski oddalone jest około 520 km od najbliższych stanowisk ze Słowacji. W Czechach niniejszy gatunek stwierdzono po raz pierwszy w roku 2016 i do tej pory znany był jedynie z miast. Podane w tym doniesieniu stwierdzenia z Czech, w większości pochodzą z miejsc poza miastami, głównie z zadrzewień i obrzeży lasów, zlokalizowanych wzdłuż ruchliwych tras drogowych. Wymienione informacje, sugerują znaczenie transportu drogowego w rozprzestrzenianiu się tego gatunku w Europie Środkowej.

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