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The occurrence of *Rhinolophus ferrumequinum* in Poland and its new locality in the Pieniny Mountains

Abstract

We present a comprehensive overview of the distribution of the greater horseshoe bat *Rhinolophus ferrumequinum* (Schreber, 1774) in Poland and report a new record of this rare species from the Pieniny Mountains. Prior to this study, the species had been confirmed from seven localities in the southern part of the country. During a long-term winter bat monitoring programme, a single individual was found hibernating on 11 February 2017 in the cave Walusiowa Jama in the Polish part of the Carpathians. This record represents the first confirmed occurrence of *R. ferrumequinum* in this mountain range and extends the wintering area of the species within the Carpathian region. Historical data combined with the new findings presented here deepen our knowledge of the occurrence of this Mediterranean–Pontic species in Central Europe.

Keywords: Chiroptera, greater horseshoe bat, distribution, Carpathians, hibernation

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Introduction

The greater horseshoe bat *R. ferrumequinum* (Schreber, 1774) is the largest European representative of the family Rhinolophidae. It is a characteristic Pontic–Mediterranean species with a broad distribution extending from the Iberian Peninsula and the British Isles, across southern and central Europe, north Africa to the Caucasus, Central Asia, south-eastern China and Japan (Gaisler, 2001; Ransome, 2023). Within Europe, its range covers much of the continent south of approximately 52°N, including Portugal, southern England, France, Germany, Austria, the Czech Republic, Slovakia, and southern Poland, and continues eastwards to Ukraine and the Caucasus Mountains (Gaisler, 2001; Ransome, 2023).

In Poland, *R. ferrumequinum* reaches the northern limit of its continuous range and occurs only locally and sporadically (Sachanowicz et al., 2006). The species typically

inhabits temperate landscapes with a mosaic of woodland and open areas, and it roosts in caves, mines, and occasionally buildings during the winter (Ransome, 2023).

The aim of this paper is to summarize the current knowledge on the distribution of *R. ferrumequinum* in Poland and to present a new record of this species from the Pieniny Mountains. These data provide new insights into the species' range limits and contribute to a better understanding of the distribution patterns of this thermophilous bat in Central Europe.

Material and Methods

Data presented in this paper were obtained during a long-term winter monitoring programme of bats conducted in the Polish part of the Carpathians between 2007 and 2025. Surveys were carried out annually from December to March in caves and other underground sites. The monitoring followed the standard methodology used in Poland for winter bat censuses, involving visual inspection of accessible parts of the roosts with the aid of headlamps. Species were identified without disturbance, based on external morphological features.

Historical and published data on the occurrence of *R. ferrumequinum* in Poland were compiled from the literature to provide an updated overview of the distribution of this species.

Results and Discussion

To date, *R. ferrumequinum* has been recorded in Poland in four regions at eight localities, including seven caves and one attic of a religious building (Fig. 1).

Kraków–Częstochowa Upland

The majority of *R. ferrumequinum* records in Poland come from this region, probably because of its mild microclimate and the abundance of suitable hibernation sites, especially caves.

1. Nietoperzowa Cave (50°11'38"N 19°46'28"E; Fig. 1) – An adult female was captured during hibernation on 16 December 1962, representing the first confirmed record of *R. ferrumequinum* in Poland (Harmata, Wojtusiak, 1963). Although the authors reported that the individual had been released, all available evidence indicates that it actually died. A specimen bearing a label with the same date and locality was later found in the private collection of Prof. W. Harmata (Ruprecht et al., 2008). Examination of this specimen revealed that it was an adult female, as indicated by the presence of para-anal protuberances (so-called pseudonipples).

The degree of tooth wear and the absence of senile changes in the skeleton suggest that it was a relatively young adult female. Despite regular winter monitoring conducted in this cave for several decades (Nowak et al., 2002; Nowak, Grzywiński, 2007, 2012, 2017, 2022), the species has not been recorded there again.

2. Na Tomaszówkach Dolnych Cave (50°11'32"N 19°46'42"E; Fig. 1) – An adult female was captured on 25 May 2005 outside the hibernation period (Kohyt, Postawa, 2007).
3. Łokietka Cave, Ojców National Park (50°12'06"N 19°49'07"E; Fig. 1) – The species was observed for the first time hibernating in this cave on 5 February 2002 (Nowak et al., 2001) and was subsequently recorded during the following 21 winter censuses, the last one in 2022 (Grzywiński et al., 2015; Nowak, Grzywiński, 2007, 2012, 2017, 2022).
4. Sąspowska Cave (50°12'18"N 19°48'41"E) – A hibernating individual was observed on 6 February 2015 (Nowak, Grzywiński, 2017). In the following years, the species was not observed there during winter surveys (Nowak, Grzywiński, 2022).
5. Wierna Cave (50°40'30"N 19°24'24"E; Fig. 1) – A hibernating individual was recorded on 22 February 1992 (Labocha, Postawa, 1992).

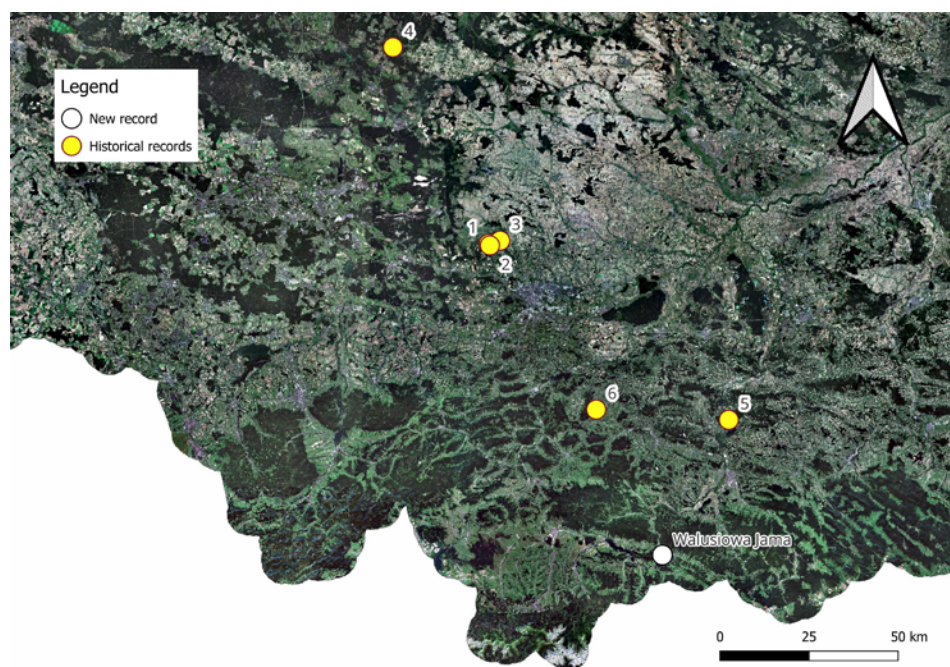


Fig. 1. Distribution of *Rhinolophus ferrumequinum* in southern Poland, with the location of Walusiowa Jama; 1–7 – numbers correspond to localities mentioned in the text.

Różnowskie Foothills

6. Szkieletowa Cave (49°45'27"N 20°41'50"E; Fig. 1) – A hibernating individual was recorded on 8 March 1992 (Mleczek, 1992). The species has not been observed there since then.

Beskid Wyspowy

7. Szczyrzyc Monastery (49°47'06"N 20°11'13"E; Fig. 1), attic – A dead individual was found in July 2003 (Szkudlarek et al., 2003). Analysis of the mummified remains of this specimen indicated that it was a female (Ruprecht et al., 2008). This is the only known record of the species from outside a cave environment in Poland. The attic of the Szczyrzyc Monastery has been inspected regularly since 2003, but the species has not been recorded there again.

Pieniny Mountains – new record

8. Walusiowa Jama (49°25'23"N 20°25'42"E; Fig. 1), Pieniny National Park – During a long-term winter monitoring programme (2007–2025), a single individual of *R. ferrumequinum* was observed hibernating on 11 February 2017 in this cave. Walusiowa Jama is a small natural karst cavity located in the Pieniny Mountains in southern Poland. The length of known corridors is 32 m and its altitudinal range is 8 m (Amirowicz et al., 1995; Polonius, 2022). The cave consists of a spacious main chamber measuring approximately 11 m in width, 14 m in length, and up to 8 m in height, situated above a rocky threshold, and two small crevice-like chambers, each located on a different level. The bat was found roosting on the wall of a small upper chamber of the cave. No other bat species were recorded during this survey. The air temperature inside the cave was 4°C, while the ambient temperature outside was –2°C. Identification was based on diagnostic morphological features. Photographic documentation was obtained (Fig. 2).

This observation represents the first confirmed occurrence of *R. ferrumequinum* in the Polish part of the Pieniny Mountains. Until this report, the species had not been recorded there, either during summer activity or in winter (Sitowski, 1922; 1948; Paszkiewicz et al., 1995; 1998; Gubała, Wołoszyn, 2010; Gubała, Piksa, 2012). Its presence in this area was to be expected, as the species is known to occur in the Slovak part of the Pieniny Mountains throughout the year, both during the breeding season (Danko et al., 2000) and in caves during hibernation (Pjenčák, Danko, 2002). The individual recorded in Walusiowa Jama was most likely a migrant originating from a nearby Slovak population rather than a member of a resident Polish population. The air temperature inside the cave (4°C) was lower than the typical hibernation range of the species, which in Europe usually prefers underground objects with temperatures between 6°C and 8°C (Gaisler,

Hanák, 1969; Szatyor, 1997; Pandurska, Beshkov, 1998; Park et al., 2000). Such relatively cool conditions, together with the absence of the species in this cave in both earlier and later years, suggest that the site was used only temporarily, further supporting the interpretation of an irregular migrant.



Fig. 2. *Rhinolophus ferrumequinum* hibernating in the Walusiowa Jama (Photo. Wojciech J. Gubała)

Conclusions

We report a new record of the greater horseshoe bat *R. ferrumequinum* from the Polish part of the Pieniny Mountains, representing the first confirmed occurrence of this species in this mountain range. Historical and contemporary records show that *R. ferrumequinum* remains rare and locally distributed in Poland, with the Kraków–Częstochowa Upland being the most important area for its occurrence.

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Conflict of interest

The authors declare no conflict of interest related to this article.

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Występowanie *Rhinolophus ferrumequinum* w Polsce oraz jego nowe stanowisko z Pienin

Streszczenie

W pracy podsumowano dane dotyczące występowania podkowca dużego *Rhinolophus ferrumequinum* (Schreber, 1774) w Polsce oraz przedstawiono nowe stwierdzenie tego rzadkiego gatunku w Pieninach. Do czasu niniejszego opracowania gatunek ten był obserwowany na siedmiu stanowiskach położonych w południowej części kraju. Podczas wieloletniego zimowego monitoringu nietoperzy prowadzonego w Pienińskim Parku Narodowym pojedynczy hibernujący osobnik obserwowany był 11 lutego 2017 r. w Walusiowej Jamie. To pierwsze stwierdzenie *R. ferrumequinum* w polskiej części tego pasma górskiego. Dane historyczne, w połączeniu z nowymi wynikami przedstawionymi w niniejszej pracy, pogłębiają wiedzę o występowaniu tego pontyjsko-śródziemnomorskiego gatunku w Europie Środkowej.

Słowa kluczowe: Chiroptera, podkowiec duży, występowanie, Karpaty, hibernacja

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