

New localities of Late Cenozoic faunas from Przemyłowice in the Cracow-Wieluń Upland, Poland

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Abstract. Sediments in six new fossil-bearing localities of the quarry in Przemyłowice near Olsztyn are described and correlated. Twelve faunas representing four faunal assemblages of Upper Villanyian (Late Pliocene; snails and vertebrates), Lower Biharian (Early Pleistocene; vertebrates), post-Biharian (? Middle Pleistocene; bats), and Holocene (vertebrates) age were detected and their preliminary faunal lists are presented.

Key words: Pliocene, Pleistocene, Holocene, *Vertebrata*, *Molusca*, Poland.

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I. INTRODUCTION

The Cracow-Wieluń Upland, a belt of Upper Jurassic limestones, is well known from accumulations of fossil-bearing deposits, especially in caves and karst fissures. More than 50 faunal assemblages of Pliocene and Quaternary age have been recorded from this region (NADACHOWSKI et al. 1989). The majority of fossil-bearing localities from the central part of the Cracow-Wieluń Upland, S of Częstochowa, were found in the vicinity of Olsztyn, e.g. Zamkowa Dolna Cave, Kielniki 1, and Kielniki 3 (Fig. 1).

The quarry in Przemyłowice near Olsztyn (Fig. 1) is situated E of the village in the central part of an Upper Jurassic (Oxfordian) limestone hill (321 m above sea level). The southern, western, and northern walls of the quarry show several karst fissures and fragments of destroyed caves, partly filled with sediments. Some of these karst forms were geologically documented by LEWANDOWSKI and ZIELIŃSKI (1980). The first fossils from the quarry were collected by A. BEDNARCZYK and J. GŁAZEK in 1984. Further more numerous remains of vertebrates and snails were supplied as a result of a short visit in the

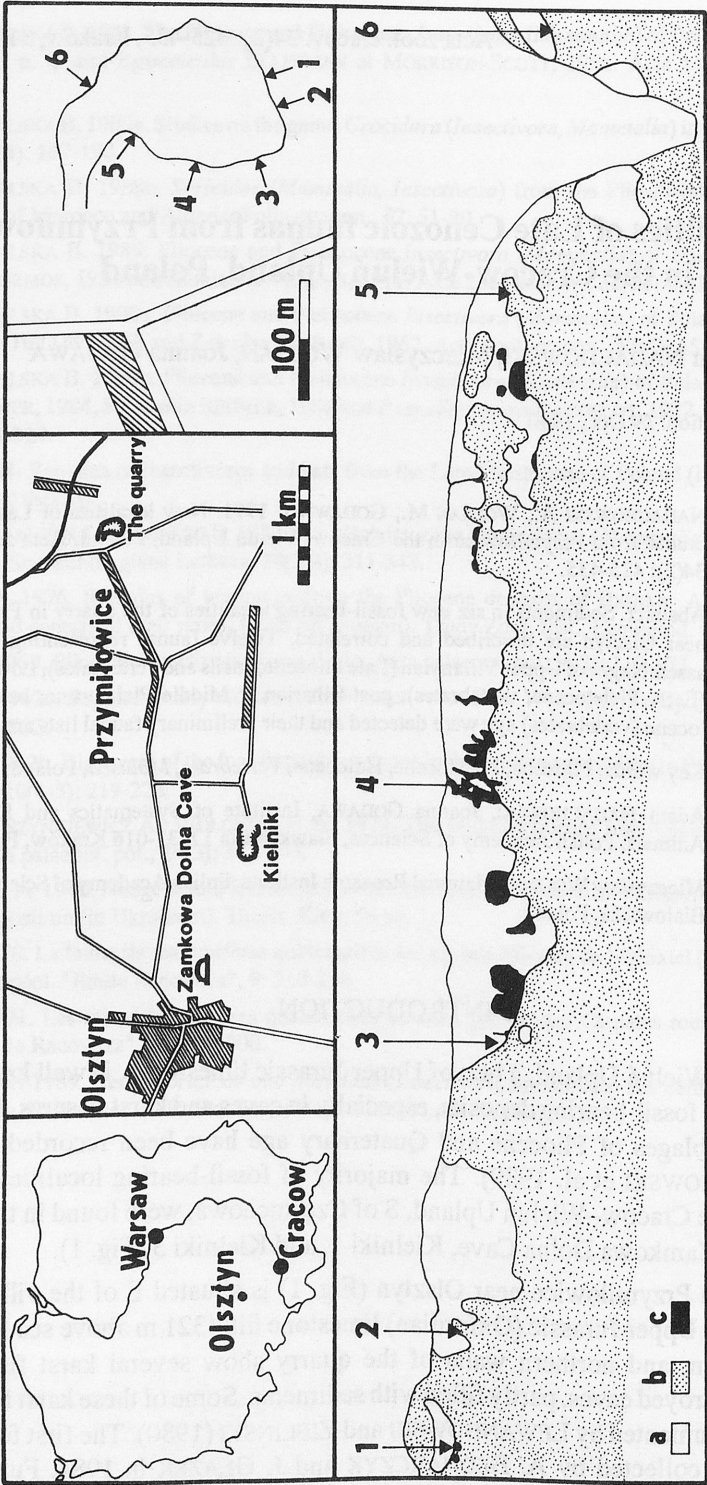


Fig. 1. Location of the Przymitowice quarry (above) and, below, view of its southern (left), western (middle), and northern (right) walls; a - limestone walls, b - limestone scree, c - visible karst forms. Arrows indicate the fossil fauna localities according to their numbers.

quarry in 1985 (A. BEDNARCZYK, A. NADACHOWSKI, and M. WOLSAN). Most of the fossil material mentioned in this paper was collected during excavations undertaken in July 1989 by the Institute of Systematics and Evolution of Animals the Polish Academy of Sciences at Cracow.

The subject of the present paper is to describe new fossil-bearing karst localities. Attempts were also made to correlate their deposits and to determine the biostratigraphical position of the faunas. Faunal lists are of preliminary character.

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II. DESCRIPTION OF LOCALITIES

Przemyłowice 1 (PE1)

Geological setting. The locality is situated in the upper part of the southern wall of the quarry (Fig. 1) and consists of the east karst fissure facing NE and the west rock-shelter facing NW, both filled with sediment. Two units were distinguished in the deposits (Fig. 2): the lower one, named unit 3, composed of brown- and dark-gray clay of thickness up to 40 cm in the east opening and up to 25 cm in the west one; and the upper one (unit 5), of thickness up to 40 cm in both openings, built up of sharp-edged limestone rubble with light-brown clay matrix and containing fossils.

Fauna. Unit 5⁽¹⁾ (fauna B): *Amphibia*; *Reptilia*: *Serpentes*; *Insectivora*: *Beremendia* sp., *Talpidae*; *Chiroptera*: *Myotis* sp., *M. bechsteini* (KUHLE, 1818), *M. helleri* KOWALSKI, 1956, *M. cf. podlesicensis* KOWALSKI, 1962, *Vespertilio murinus* LINNAEUS, 1758, *Plecotus abeli* WETTSTEIN-WESTERSHEIMB, 1923; *Rodentia*: *Clethrionomys* sp., *Lemmus* sp., *Microtus (Allophaiomys) pliocaenicus* ssp. (Fig. 6a), *Mimomys cf. pusillus* (MEHELY, 1914).

Przemyłowice 2 (PE2)

Geological setting. The upper part of the southern wall of the quarry, about 20 m W of locality PE1, shows a destroyed cave (Fig. 1). At least six units may be distinguished in the sediment filling the cave (Fig. 3). The bottom part of the section is composed of brown- and dark-gray clay of thickness up to 40 cm (unit 3). This clay is covered by sharp-edged limestone rubble with light-brown clay matrix, intercalations of manganese compounds, and fossils (unit 5); the thickness of this unit ranges between 5 and 25 cm. The next unit (no. 6) is built up of sharp-edged limestone rubble with yellowish sandy matrix; its thickness is about 20 cm. This unit is overlain by a thin layer (4 cm) of

⁽¹⁾No significant differences in faunal composition of unit 5 were found between the fissure and the rock-shelter. Hence, the pooled data are presented.

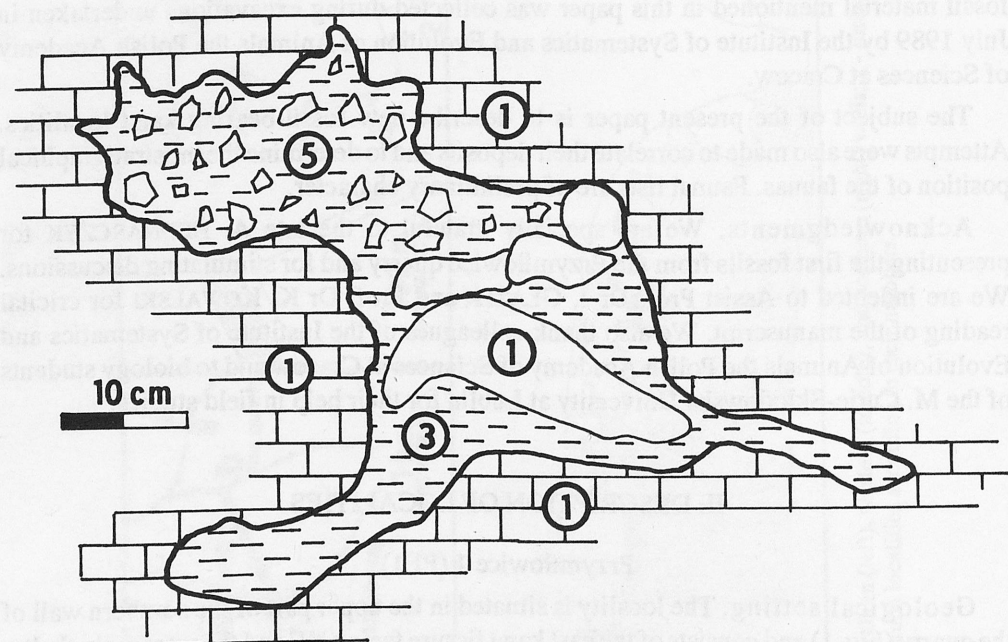


Fig. 2. Section of sediments in the west opening of the Przemyłowice 1 site: 1 - Oxfordian limestones, 3 - brown- and dark-gray clay, 5 - sharp-edged limestone rubble with light-brown clay matrix with fauna B.

orange-brown sands (unit 7). The sequence continues by gray sands about 40 cm thick with a high amount of limestone debris (unit 8). The top of the sequence is formed by corroded limestone rubble and humus, constituting unit 9, about 50 cm thick, with a subfossil fauna of vertebrates deposited in its lowermost part. About 80 cm E of the described sequence, on the same level, there occur two rounded openings of karst channels; their longest diameters are 18 and 15 cm. The bigger (western) opening is completely filled with light-brown clay, 13 cm thick, with bands of manganese compounds and fossils (unit 5), while the smaller (eastern) one consists of 5 cm thick brown- and dark-gray clay at the bottom (unit 3) and 7 cm thick fossil-bearing light-brown clay, containing bands of manganese compounds, at the top (unit 5).

Fauna. Unit 5⁽²⁾ (fauna B): *Reptilia: Serpentes; Insectivora: Beremendia* sp., *Talpidae: Chiroptera: Rhinolophus* sp., *Myotis* sp., *M. bechsteini* (KUHL, 1818); *Rodentia: Clethrionomys* sp., *Lemmus* sp., *Microtus* ex gr. *oeconomus* (Fig. 6c), *M. (Allophaiomys) pliocaenicus praehintoni* (RABEDER, 1981) (Fig. 6b), *Mimomys* cf. *pusillus* (MEHELY, 1914).

Unit 9 (fauna D): *Amphibia; Reptilia: Serpentes; Aves; Insectivora: Erinaceus* sp., *Talpa europaea* LINNAEUS, 1758; *Chiroptera: Myotis bechsteini* (KUHL, 1818), *M.*

⁽²⁾No significant differences in faunal composition of unit 5 were found among the cave and both neighbouring channels. Hence, the pooled data are presented.

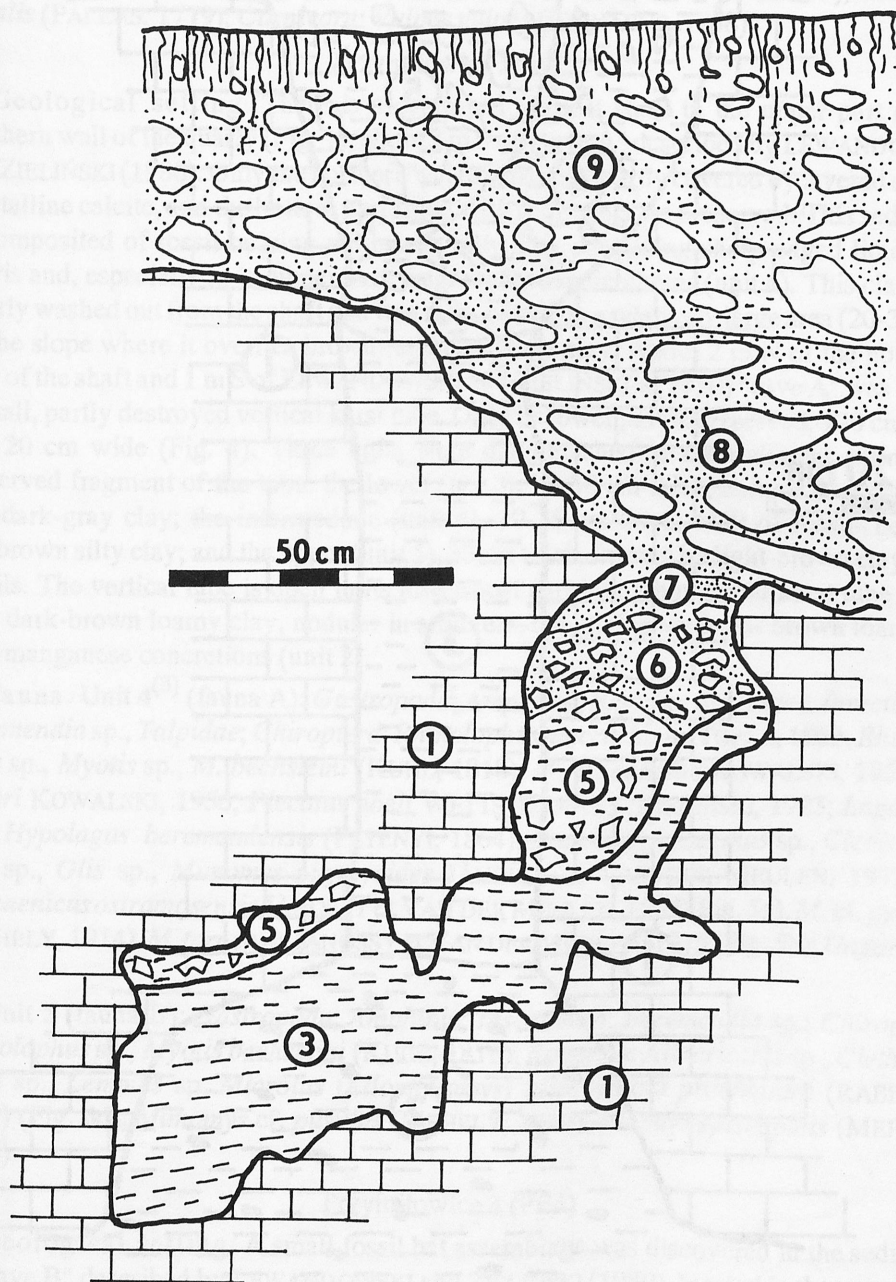


Fig. 3. Section of sediments in the destroyed cave of the Przemyłowice 2 site: 1 - Oxfordian limestones; 3 - brown- and dark-gray clay; 5 - sharp-edged limestone rubble with light-brown clay matrix, bands of manganese compounds, and fauna B; 6 - sharp-edged limestone rubble with yellowish sands; 7 - layer of orange-brown sands; 8 - gray sands with limestone debris; 9 - corroded limestone rubble with humus and fauna D.

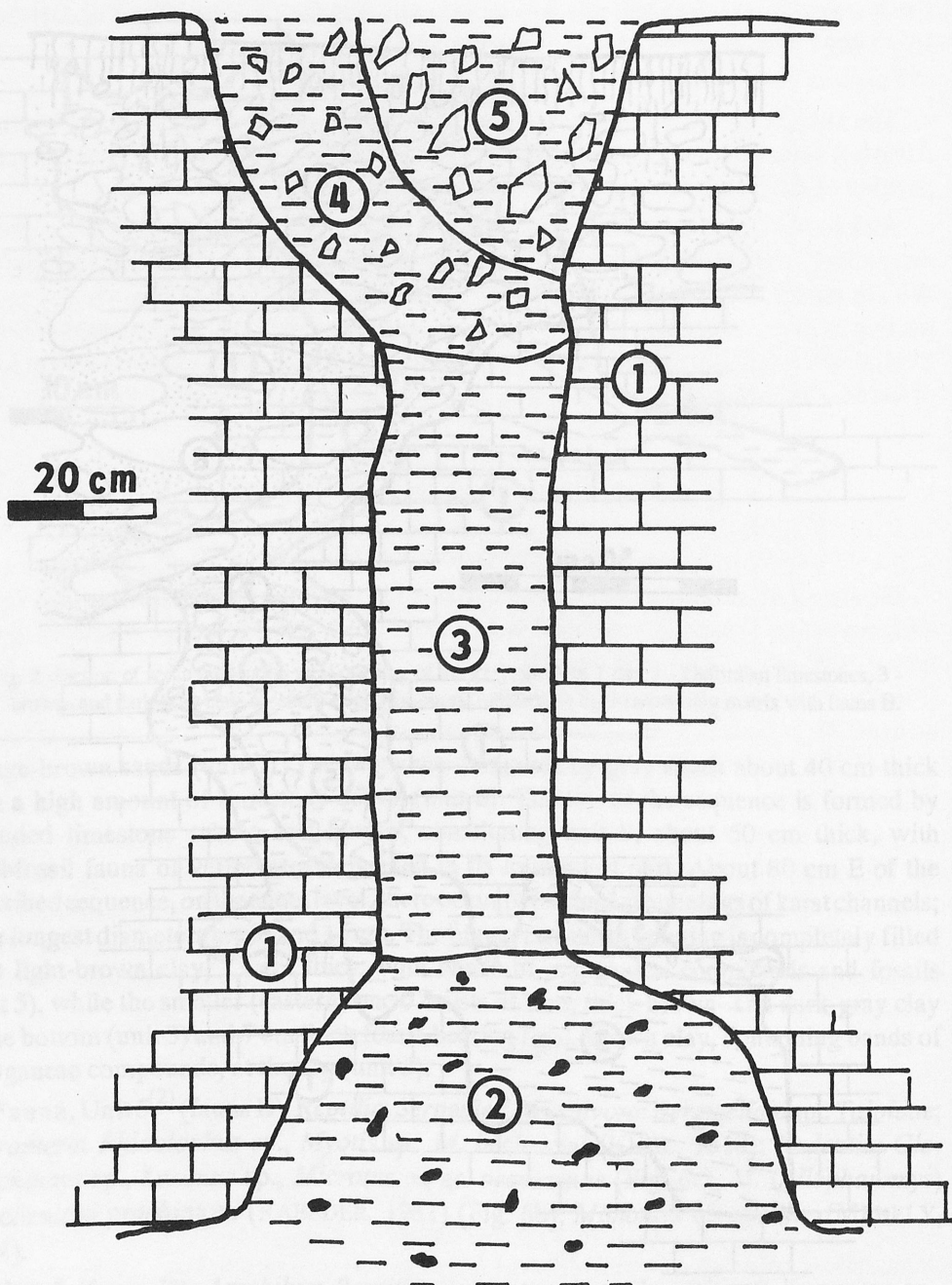


Fig. 4. Section of sediments in the preserved part of the vertical tube (top and middle) and in the horizontal channel (bottom) of the Przemytówice 3 site: 1 - Oxfordian limestones, 2 - dark-brown loamy clay (nodular in structure) with scraps of brown loam and iron-manganese concretions, 3 - brown and dark-gray clay, 4 - red-brown silty clay with fauna A, 5 - light-brown clay with fauna B.

nattereri (KUHL, 1818); *Lagomorpha*: *Lepus* cf. *europaeus* PALLAS, 1778; *Rodentia*: *Arvicola terrestris* (LINNAEUS, 1758), *Cricetus cricetus* (LINNAEUS, 1758), *Microtus arvalis* (PALLAS, 1779); *Carnivora*: *Vulpes vulpes* (LINNAEUS, 1758).

Przemyłowice 3 (PE3)

Geological setting. There is a destroyed vertical shaft in the upper part of the southern wall of the quarry (Fig. 1), about 3 m S of "cave A" described by LEWANDOWSKI and ZIELIŃSKI (1980). Only the northern wall of this shaft partly covered by layered coarse crystalline calcite, and the bottom part filled with sediments are preserved. This sediment is composed of fossil-bearing red-brown silty clay containing sharp-edged limestone debris and, especially in its upper part, fragments of speleothems (unit 4). This clay is clearly washed out from the shaft and was redeposited on a relatively large area (20-30 m²) on the slope where it overlies brown- and dark-gray clay. About 2 m N of the northern wall of the shaft and 1 m S of LEWANDOWSKI and ZIELIŃSKI's (1980) "cave A" was found a small, partly destroyed vertical karst tube. Only its lower part is preserved, 120 cm high and 20 cm wide (Fig. 4). Three units were distinguished in the sediment filling the preserved fragment of the tube: the lower (no. 3), 75-80 cm thick, composed of brown- and dark-gray clay; the intermediate (unit 4), 10-35 cm thick, built of fossil-bearing red-brown silty clay; and the upper (unit 5), 35 cm thick, formed by light-brown clay with fossils. The vertical tube is open in its lowermost part into a horizontal karst tube filled with dark-brown loamy clay, nodular in structure, containing scraps of brown loam and iron-manganese concretions (unit 2).

Fauna. Unit 4⁽³⁾ (fauna A): *Gastropoda*; *Amphibia*; *Reptilia*: *Serpentes*; *Insectivora*: *Beremendia* sp., *Talpidae*; *Chiroptera*: *Rhinolophus macrorhinus* TOPAL, 1963, *Rhinolophus* sp., *Myotis* sp., *M. bechsteini* (KUHL, 1818), *M. cf. danutae* KOWALSKI, 1956, *M. helleri* KOWALSKI, 1956, *Plecotus abeli* WETTSTEIN-WESTERSHEIMB, 1923; *Lagomorpha*: *Hypolagus beremendensis* (PETÈNYI, 1864); *Rodentia*: *Apodemus* sp., *Clethrionomys* sp., *Glis* sp., *Mimomys pitymyoides* JÁNOSSY et VAN DER MEULEN, 1975, *M. pliocaenicus ostramosensis* JÁNOSSY et VAN DER MEULEN, 1975 (Fig. 5a), *M. cf. pusillus* (MEHELY, 1914), *M. tornensis* JÁNOSSY et VAN DER MEULEN, 1975 (Fig. 5b), *Ungaromys* sp.

Unit 5 (fauna B): *Gastropoda*; *Amphibia*; *Insectivora*: *Beremendia* sp.; *Chiroptera*: *Rhinolophus* sp., *Myotis bechsteini* (KUHL, 1818); *Rodentia*: *Allocricetus* sp., *Clethrionomys* sp., *Lemmus* sp. *Microtus (Allophaiomys) pliocaenicus praehintoni* (RABEDER, 1981) (Fig. 6d), *Mimomys cf. pusillus* (MEHELY, 1914), *Pliomys episcopalis* (MEHELY, 1914).

Przemyłowice 4 (PE4)

Geological setting. A small fossil bat assemblage was discovered in the sediment of "cave B" described by LEWANDOWSKI and ZIELIŃSKI (1980), located in the upper part of the western wall of the quarry (Fig. 1). The fossils were found in packages of yellowish

⁽³⁾No significant differences in faunal composition of unit 4 were found between the shaft and the tube. Hence, the pooled data are presented.

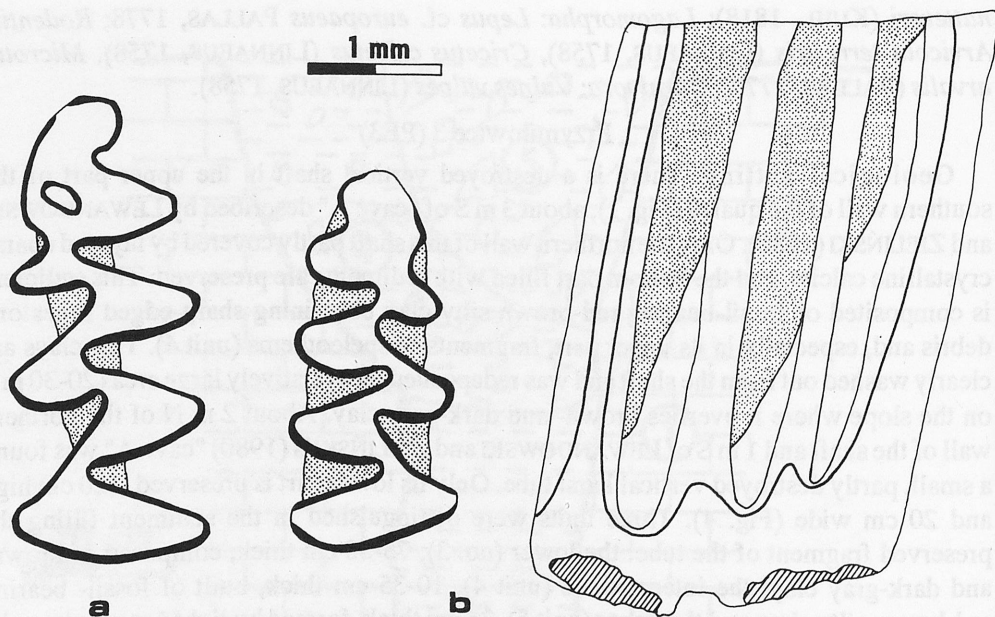


Fig. 5. Index fossils for fauna A of the Przemytówice faunal complex: a - *Mimomys pliocaenicus ostramosensis* JÁNOSSY *et VAN DER MEULEN*, 1975, occlusal aspect of left M_1 from unit 4 of Przemytówice 3; b - *Mimomys tornensis* JÁNOSSY *et VAN DER MEULEN*, 1975, occlusal and buccal aspects of right M_1 from unit 4 of Przemytówice 3.

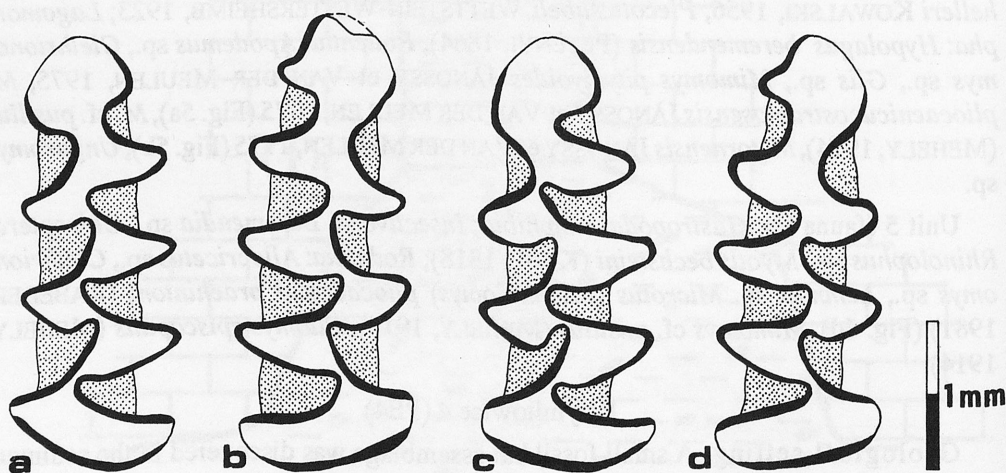


Fig. 6. Index fossils for fauna B of the Przemytówice faunal complex: a - *Microtus (Allophaiomys) pliocaenicus* ssp., occlusal aspect of left M_1 from unit 5 of Przemytówice 1; b - *Microtus (Allophaiomys) pliocaenicus praehintoni* (RABEDER, 1981), occlusal aspect of right M_1 from unit 5 of Przemytówice 2; c - *Microtus* ex gr. *oeconomus*, occlusal aspect of left M_1 from unit 5 of Przemytówice 2; d - *Microtus (Allophaiomys) pliocaenicus praehintoni* (RABEDER, 1981), occlusal aspect of right M_1 from unit 5 of Przemytówice 3.

sands occurring among sharp-edged limestone rubble (unit 6) in the upper and middle parts of LEWANDOWSKI and ZIELIŃSKI's (1980) unit 8, as figured on their Fig. 2 (sic!), corresponding lithologically to a description of their unit 7.

Fauna. Unit 6 (fauna C): *Chiroptera: Myotis emarginatus* (GEOFFROY, 1806).

Przemyślówice 5 (PE5)

Geological setting. A rich fossil fauna of bats was excavated from the deposits of "cave D" described by LEWANDOWSKI and ZIELIŃSKI (1980), situated in the upper part of the western wall of the quarry (Fig. 1). The fauna was deposited in packages of yellowish sands filling crevices among sharp-edged limestone rubble (unit 6) corresponding to unit 7 of LEWANDOWSKI and ZIELIŃSKI (1980: Fig. 3).

Fauna. Unit 6 (fauna C): *Chiroptera: Rhinolophus ferrumequinum* (SCHREBER, 1774), *Myotis bechsteini* (KUHL, 1818), *M. emarginatus* (GEOFFROY, 1806), *M. nattereri* (KUHL, 1818).

Przemyślówice 6 (PE6)

Geological setting. The site is located in the upper part of the northern wall of the quarry above the entrance into it (Fig. 1). Numerous remains of bats were found in the lower part of a 15 cm thick layer (named 6b) of yellowish sands intercalated between a big limestone block (above) and a layer (6a) of sharp-edged limestone rubble (below), of thickness up to about 20 cm, overlain a level of crumbled limestones.

Fauna. Unit 6, layer 6b (fauna C): *Chiroptera: Myotis* sp., *M. bechsteini* (KUHL, 1818), *M. emarginatus* (GEOFFROY, 1806), *M. nattereri* (KUHL, 1818).

III. BIOSTRATIGRAPHY AND CORRELATION OF THE DEPOSITS

The oldest faunal assemblage is deposited in unit 4 of the PE3 locality (fauna A). This relatively rich community contains several index taxa of Upper Villanyian (Late Pliocene) age (Fig. 5). The predominance of *Mimomys pliocaenicus ostramosensis*, *M. tornensis*, and *M. pitymyoides* as well as the absence of *Microtus (Allophaiomys)* in the assemblage indicates biozone MN 17 (HORÁČEK, LOŽEK 1988).

Fauna B was found in unit 5 of the PE1, PE2, and PE3 sites. The presence of *Microtus (Allophaiomys) pliocaenicus* indicates the Lower Biharian (Early Pleistocene) age of the fauna (Fig. 6). This species shows an extensive range of variation characteristic of populations from the Betfia phase. The samples from localities PE2 and PE3 show features typical for "*Allophaiomys praehintoni*" described by RABEDER (1981) from Deutsch-Altenburg 4B. The presence of this taxon, treated here as subspecies (Fig. 6b, d), and of a primitive representative of the *Microtus oeconomus* group (Fig. 6c) indicate the uppermost Betfia phase or even Betfia/Nagyharsanyhegy boundary (HORÁČEK 1981, FEJFAR, HORÁČEK 1983, NADACHOWSKI 1990).

The biostratigraphic position of bat assemblages (fauna C) discovered in sandy fraction of unit 6 in localities PE4, PE5, and PE6 is difficult to determine. They are most probably of post-Biharian age (? Middle Pleistocene) but more precise designation is not possible

Age	Unit	PE 1	PE 2	PE 3	PE 4	PE 5	PE 6	Lewandowski Zieliński 1980	Present study
Holocene	9							Late Pleistocene	Holocene
	8								
	7								
Pleistocene	6							Middle Pleistocene	Upper
	b								
	a								
Pliocene	5							Middle Pleistocene	Middle
	4								
	3								
Pliocene	2							Middle Pleistocene	Lower Biharian
Pliocene								Middle Pleistocene	Upper Villanyian

Fig. 7. Correlation of the deposits filling the fossil-bearing karst forms in the Przemyłowice quarry. Units: 2 - dark-brown loamy clay (nodular in structure) with scraps of brown loam and iron-manganese concretions; 3 - brown- and dark-gray clay; 4 - red-brown silty clay; 5 - sharp-edged limestone rubble with light-brown clay; 6 - sharp-edged limestone rubble (layer 6a) with yellowish sands (layer 6b); 7 - yellow, orange, red, and brown sands of different lithology; 8 - gray sands with limestone debris; 9 - limestone rubble with humus. The presence of faunas A-D in the units is indicated by corresponding letters in circles. Numbers in squares mark LEWANDOWSKI and ZIELIŃSKI's (1980: Figs 2 and 3) units.

because of absence of suitable index fossils. The faunas of PE5 and PE6 consist of several hundred specimens with predominance of *Myotis emarginatus* (55% and 31 %, respectively) and *M. bechsteini* (32% and 50%, respectively). The former thermophilous taxon suggests an interglacial character of the faunas.

Fauna D of unit 9 in the PE2 site is composited of Holocene species only, the present-day inhabitants of the nearest vicinity.

Fig. 7 shows the correlation of the PE1-PE6 sediments based on their lithology and occurrences of fossil fauna, as well as composition of stratigraphic assignation of investigated deposits according to LEWANDOWSKI and ZIELIŃSKI (1980) and present study. It shows, that the lithological speculations of mentioned authors gave much younger age of investigated deposits than presented here biostratigraphic evidences.

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