

Early Pliocene terrestrial fauna with *Glirulus* (Mammalia) from Pańska Góra (Częstochowa Upland, Poland)

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Received: 20 March 1993

Accepted for publication: 4 May 1993

BEDNARCZYK A. 1993. Early Pliocene terrestrial fauna with *Glirulus* (Mammalia) from Pańska Góra (Częstochowa Upland, Poland). Acta zool. cracov. 36(2): 233-240.

Abstract. A description of a new Early Pliocene locality from Poland is given. The fauna from Pańska Góra consists mainly of small mammals (*Insectivora*, *Chiroptera*, *Rodentia*). The paper contains a detailed description of *Glirulus pusillus* remains and a discussion of the origin and evolution of the genus *Glirulus*.

Key words : Pliocene, snails, vertebrates, *Glirulus*

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I. INTRODUCTION

The Early Pliocene fossil-bearing localities are rarely found in Poland. The most important one is Podlesice (KOWALSKI 1956, 1989), the reference locality of Zone MN 14 (DE BRUIJN et al. 1992). The fauna from Mała Cave, layer 4+5 (SULIMSKI et al. 1979), and some species found in the mixed assemblages from Zamkowa Dolna Cave (fauna B) (NADACHOWSKI 1989) are probably of similar age.

The Pańska Góra locality was discovered during a field study undertaken by the author in the vicinity of Olsztyn near Częstochowa in 1974. The only data published on the fauna are those given by NADACHOWSKI (1989, 1990b) and they contained an incomplete list of the rodent fauna according to personal information of the author. Recently, the remains of *Gliridae* from Pańska Góra were studied in detail by DAOUD (1993).

The excavated fossils were determined by E. STWORZEWICZ (*Mollusca*), A. SULIMSKI (*Rodentia*), I. HORÁČEK (*Insectivora*, *Chiroptera*) and the author. The materials are in the possession of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow, Poland.

¹The Author (1954-1990) died in consequence of a road accident, and thus this paper has been prepared for publication by J. GŁĄZEK (geology and field information) and A. NADACHOWSKI (palaeontology) from the Polish manuscript.

The aim of the present paper has been to describe locality and its fauna with special reference to *Glirulus pusillus*.

Acknowledgments. I am most grateful to dr E. STWORZEWICZ (Cracow), dr A. SULIMSKI (Warsaw) and dr I. HORÁČEK (Prague) for their determining the specimens of the fauna cited here. I greatly appreciate discussions with prof. dr J. GŁĄZEK (Poznań), dr A. DAOUD (Cracow) and dr A. NADACHOWSKI (Cracow).

II. LOCALITY AND FAUNA

Pańska Góra ($19^{\circ}15'31''\text{E}$, $50^{\circ}45'21''\text{N}$) is a broad dissected hill (333.2 m a. s. l., ca. 50 m in relative height) lying to the west of the village of Olsztyn on the southern side of the Częstochowa – Olsztyn road. This hill is built of layered white limestones with flints of Middle Oxfordian age (transition between *trensversarium* and *bifurcatus* zones). An abandonet quarry is situated in the broad NE arm of this hill, about 250 m to the west of the nearest buildings of Olsztyn and 50 m south of the above-mentioned road (Fig. 1).

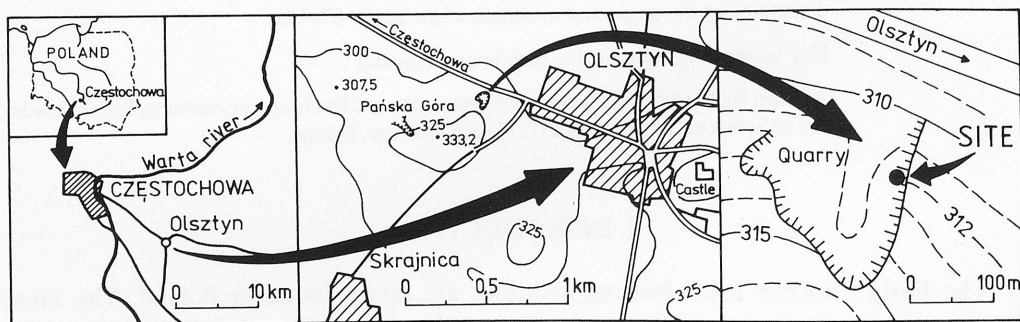


Fig. 1. Location of the Pańska Góra palaeontological site within the territory of Poland.

A few small bones were found in the scree on SE wall of the quarry in 1974. Several pieces of speleothems and an overturned block of flowstone (1.5 m long and 0.5 m thick) were exposed in the scree in the excavation made in 1980. This block was composed of: (1) white laminated flowstone with overturned stalagmites, (2) bone-bearing loams attached to this flowstone and (3) white, soft fine crystalline calcite (Fig. 2).

A layer (5 cm thick) of orange-brown loam (2a) and irregular pieces of yellow-brown loam (2b) filling the cavities in the soft calcite layer could be distinguished in the loam (layer 2). In layer 2a there were numerous bones which formed a bonebed, whereas loams 2b contained less numerous bones. These deposits represent remnants of the filling of a destroyed vadose cave. It is unclear when that cave was destroyed, whether at the time of periglacial weathering in the Pleistocene or during rock exploitation by the inhabitants of Olsztyn.

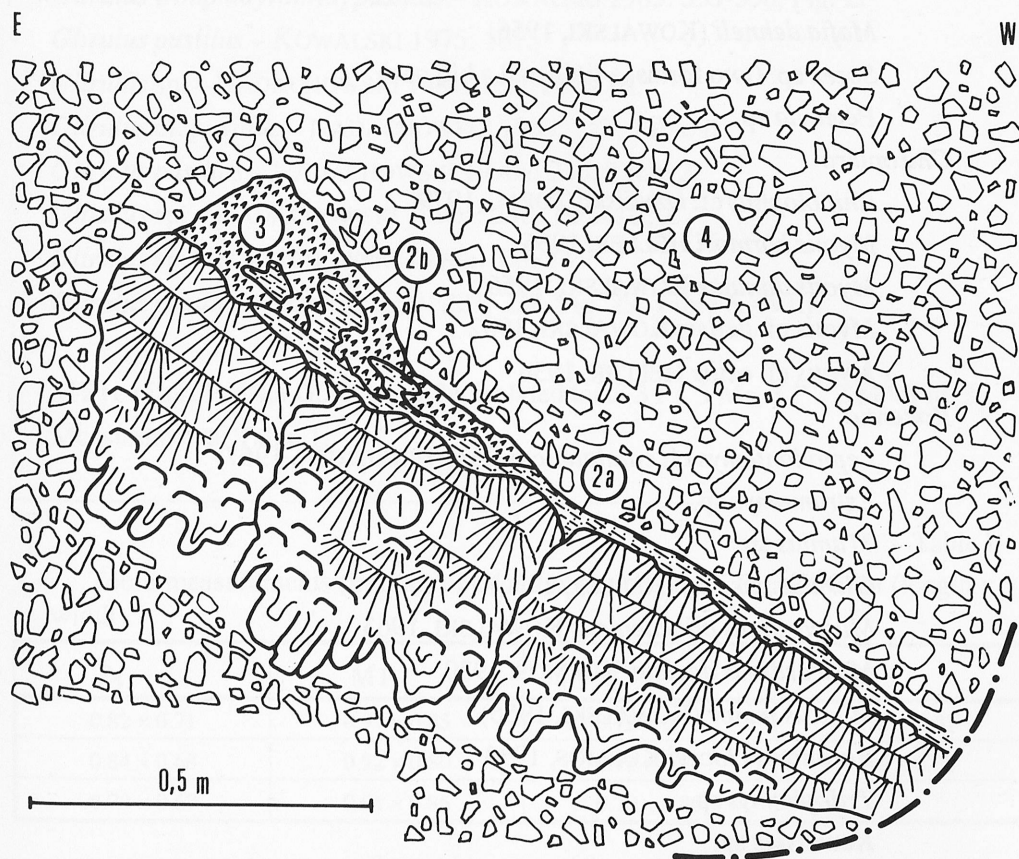


Fig. 2 Bone-bearing loams (2a) attached to the overturned flowstone block (1) excavated within the quarry scree (4), field sketch 1980; heavy and dotted line (right lower corner) marks the limit of excavation.

The following taxa have been identified up to now in the material collected from layer 2a:

Gastropoda:

Pupilla muscorum (LINNAEUS, 1758)

Vallonia costata (MÜLLER, 1774)

Vallonia pulchella (MÜLLER, 1774)

Amphibia: indet.

Reptilia: indet.

Mammalia:

Insectivora:

Episoriculus sp.

Blarinoides sp.

Mafia dehnelli (KOWALSKI, 1956)

Sorex sp. (two forms, a little and a big one)

Petenya sp.

Chiroptera

Rhinolophus cf. *kowalskii* TOPAL, 1979

Myotis kormosi HELLER, 1936

Myotis danutae KOWALSKI, 1956

Myotis cf. *helleri* KOWALSKI, 1962

Myotis cf. *exilis* HELLER, 1936

Rodentia

Leptodontomys cf. *catalaunicus* (HARTENBERGER, 1967)

Estramomys sp.

?*Tamias* sp.

Glirulus pusillus (HELLER, 1936)

Muscardinus pliocaenicus KOWALSKI, 1963

Muscardinus dacicus KORMOS, 1930

Myoxus minor (KOWALSKI, 1956)

Baranomys loczyi KORMOS, 1933

Trilophomys sp.

Kowalskia sp.

Mimomys ? sp.

Apodemus sp.

Prospalax sp.

This fauna is dominated by bat remnants and represents the taphocoenosis of that vadose cave, in which it accumulated far from the entrance. It closely resembles the fauna of Podlesice (KOWALSKI 1956, 1989). Its stratigraphic position has been determined as Early Ruscinian, probably Zone MN 14 (NADACHOWSKI et al. 1989).

III. DESCRIPTION OF *GLIRULUS* FROM PAŃSKA GÓRA

Family *Gliridae* THOMAS, 1897

Subfamily *Dryomyinae* DE BRUIJN, 1967

Genus *Glirulus* THOMAS, 1905

Glirulus pusillus (HELLER, 1936)

Amphidyromys pusillus n.g. n.sp. – HELLER 1936: 125-126, Taf. X:1

Amphidyromys pusillus – DEHM 1962: 44-46, Abb. 3-6, Taf. 6: 10-13.

Glirulus (Amphidyromys) pusillus – KOWALSKI 1963: 535-538, Fig. 2.

Glirulus pusillus – KOWALSKI 1975: 101.

Glirulus sp. – NADACHOWSKI 1989: 161, Table III.

Glirulus cf. *pusillus* – NADACHOWSKI 1989: 157, Table II.

Glirulus pusillus – NADACHOWSKI 1990a: 235, Table 2.

Glirulus sp. – NADACHOWSKI 1990a: 240, Tables 2, 3.

Glirulus sp. – NADACHOWSKI 1990b: Table 2.

Glirulus pusillus – DAOUD 1993: 223, 228, Fig. 29, Table XXVIII.

Material: Pańska Góra, layer 2a, isolated teeth 3 P₄, 3 M₁, 3 P⁴, 2 M³ (Fig. 3).

Measurements: Table 1.

Table I

Tooth measurements (in mm) of *Glirulus pusillus* from Pańska Góra (length x width)

P ₄	M ₁	P ⁴	M ³
0.82 × 0.71	0.97 × 0.85	0.72 × 0.74	0.78 × 1.01
0.84 × 0.68	0.92 × 0.80	0.73 × 0.75	0.86 × 0.88
0.79 × 0.67	0.91 × 0.85	0.70 × 0.80	

Description: The lower premolars and molars are two-rooted. The anterolophid, endolophid and posterolophid form a protruding edge surrounding the tooth crown on at least three sides. In P₄ the anterolophid and metalophid (sometimes also mesolophid) are often interconnected labially. In the other lower teeth the main ridges are free labially and their ends are distinctly curved forward. The centrolophid is short, its length is greater than a half of the tooth width.

The upper premolars and molars are three-rooted. The lingual side is wide, often with a kind of cingulum. The endoloph is connected with the main ridges. The anteroloph and protoloph as well as metaloph and posteroloph are interconnected, respectively, on the labial side. The centroloph develops in various ways and occupies different positions.

Remarks: The first description of remains of *Glirulus pusillus* in Poland concerns Podlesice (KOWALSKI 1963). This species was also mentioned from Kielniki 3A (KOWALSKI 1975), Zalesiaki 1B, Zamkowa Dolna Cave B, Mokra I and Żabia Cave (NADACHOWSKI 1989, 1990a, b). A revision of *Glirulus* from the Polish localities was undertaken by DAOUD (1993) who studied relatively abundant materials from Podlesice and some additional teeth from Pańska Góra which have not been taken into account in the present paper.

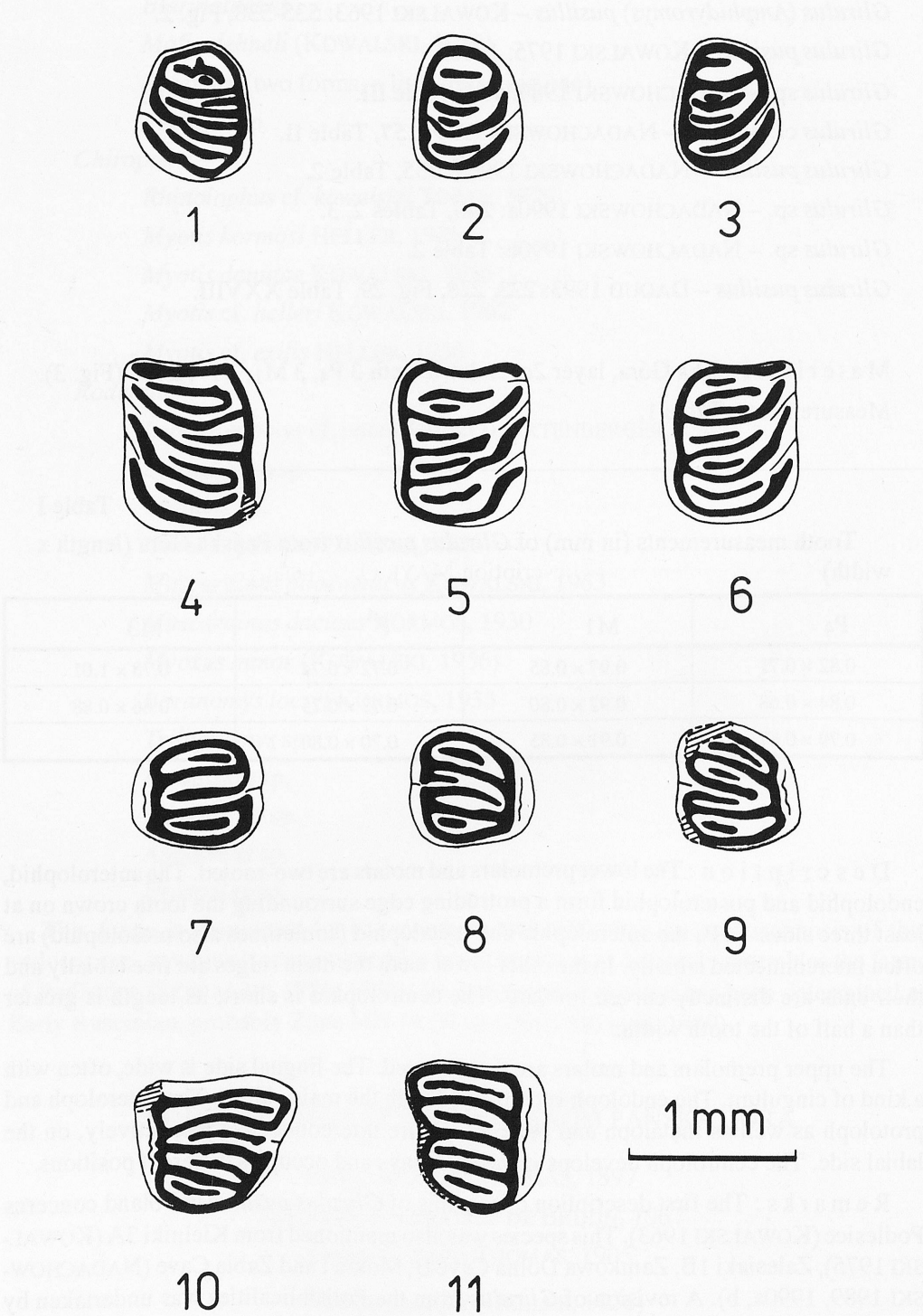


Fig. 3. Morphology of the occlusal surface of cheek teeth in *Glirulus pusillus* from Pańska Góra. 1-3: P₄; 4-6: M₁; 7-9: P₄⁴; 10-11: M₃³.

IV. DISCUSSION

The genus *Glirulus* THOMAS, 1905 was first proposed for the modern species *G. japonicus* (SCHINZ, 1845), inhabiting Japan. HELLER (1936) described a new genus and species *Amphidyromys pusillus* on the basis of M₃ from a Pliocene fissure-filling at Gundersheim in Germany. DEHM (1962) included the specimens from Schernfeld in Bavaria in the same taxon. A close resemblance of *Glirulus* and *Amphidyromys* was noted by KOWALSKI (1963), who classified the latter as a subgenus of the former. At present most authors are of the opinion that *Amphidyromys* is a synonym of *Glirulus* (DAAMS 1981; MEULEN, DE BRUIJN 1982; KAWAMURA 1989).

The origin of *Glirulus* is relatively well known. From Wintershof-West in Bavaria DEHM (1950) described two new species under the names *Glirulus gracilis* and *G. modestus*, which later appeared to belong to another genus, *Glirudinus* DE BRUIJN, 1966, from the subfamily *Glirinae*. A new species of the actual *Glirulus* from Lissieu was named *Glirulus lissiensis* (HUGUENEY, MEIN 1965). On the basis of materials from Sansan, Anwil and Can Llobateres ENGESSER (1972) erected a new genus, *Paraglrirulus*, in which he included the species from Lissieu. According to him, the genera *Glirulus* and *Paraglrirulus* differ in the number of roots (*Glirulus* - 3, *Paraglrirulus* - 2) and the shape of the endolophid. In a complementary description MAYR (1979) stated some additional diagnostic features which distinguish both these genera, especially the number of extra ridges in the upper and lower molars and the structure of the anteroloph. On the basis of the material from Southern Germany he described two new species of *Paraglrirulus*: *P. diremptus* MAYR, 1979 and *P. conjuctus* Mayr, 1979, potential ancestors of *Glirulus*.

DAXNER-HÖCK and DE BRUIJN (1981) included the specimens from Eichkogel in Austria in *Glirulus lissiensis*, indicating that the differences between *Paraglrirulus* and *Glirulus* are not sufficient to treat them as separate genera. On the basis of the morphological similarity and measurements of the remains they included two species in *Glirulus*: *Paraglrirulus diremptus* and *P. conjuctus*, preserving the generic name *Paraglrirulus* exclusively for *P. werenfelsi* ENGESSER, 1972, which differs distinctly in size. These authors synonymized *P. conjuctus* MAYR, 1979 with *Glirulus lissiensis* HUGUENEY et MEIN, 1965 and criticized the phylogeny of the *Paraglrirulus* - *Glirulus* group presented by MAYR (1979). In the opinion of DAXNER-HÖCK and DE BRUIJN (1981) the pattern of morphological variation and morphometry of the teeth suggest that we deal here with one lineage. Particular species can be distinguished on the basis of a few stable morphological features (e.g. structure of the endolophid). Besides, according to MEULEN and DE BRUIJN (1982), the taxonomic rank of *Paraglrirulus* should be reduced to subgeneric level, with two species: *G. (Paraglrirulus) werenfelsi* and *G. (P.) agelakisi* MEULEN et DE BRUIJN, 1982. The development of the genus *Glirulus* (*Glirulus*) was thus often reconstructed by the lineage: *G. diremptus* - *G. lissiensis* - *G. pusillus* - *G. japonicus*. Two first species evolved in Europe during the Miocene. Recent discovery of fossilised soft parts of the body of *Glirulus lissiensis* (MEIN, ROMAGGI 1991) showed the adaptation to the gliding mode of life. Thus, this species cannot be considered an ancestor of recent *G. japonicus*. *G. pusillus* appeared at the beginning of the Pliocene. It survived in Europe to the Early Pleistocene (CHALINE 1972). In KAWAMURA's opinion, (1989) in the Late Pliocene or slightly later *G. pusillus* or the ancestral form of *G. japonicus*, may have immigrated to Japan from Europe and here survived up to the recent times.

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