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INSECTIVORES, BATS AND RODENTS FROM THE EARLY  
PLEISTOCENE BONE BRECCIA OF PODLESICE NEAR KROCZYCE  
(POLAND)

*Abstract.* — The writer gives a description of Insectivora, Chiroptera and Rodentia yielded by the bone breccia discovered by him at Podlesice near Kroczyce, in the district of Olkusz, Poland. The breccia is referred to the Günz-Mindel Interglacial. Out of the 21 forms collected there, the following have been identified as new: *Sorex alpinoides* n. sp., *Sorex dehneli* n. sp., *Myotis podlesicensis* n. sp., *Myotis danutae* n. sp., *Myotis dasycneme subtilis* n. subsp., *Glis sackdillingensis minor* n. subsp. *Baranomys langenhani* Heller is shown to be synonymous with *Baranomys łóczyi* Kormos.

## INTRODUCTION

The mammalian fossil remains described in this paper have been collected from a bone breccia discovered at the village of Podlesice near Kroczyce in the district of Olkusz (19°32' E, 50°34' N). This locality is centrally situated in the Kraków-Wieluń Highlands, which stretch along the eastern margin of the Upper Silesian Depression. The breccia, about 4 m in thickness, infilled a funnel-like pit in Jurassic limestone, passing downwards as a wide fissure. The pit was found on the ridge of a limestone monadnock abt. 410 m a. s. l. The walls of the pit as well as those of the fissure which forms its continuation were covered with calcite concretions, products undoubtedly older than the breccia itself. At the time of its discovery the breccia had practically all been excavated from the pit and heaped on the adjacent dump-hill. Some slight remnants only were there on the walls to indicate the original site of the breccia. Under the circumstances, no stratigraphic sequence could be determined within the breccia which must, therefore, be regarded as one whole.

The Podlesice bone breccia was discovered accidentally during calcite working. The piercing of the breccia down to the bottom of the funnel-like pit disclosed the entrance to a cave. The cave stretches far into the rock and contains thick beds of calcite crystals, which attracted industrial exploitation.

The author came across the breccia in 1949 and then collected an important part of it, i. e. about 500 kg in weight. Soon after he published a note reporting his discovery (K. Kowalski, 1951a) and recapitulated it in a paper on the caves of the Kraków-Wieluń Highland area (K. Kowalski, 1951 b). In 1954, in the course of research studies, done at the Institute of Palaeontology of the Warsaw University, under the guidance of Prof. Dr. Roman Kozłowski, head of the Institute, the author became acquainted with the method of preparing the breccia by treatment in acetic acid. This method allowed minute mammalian remains to be freed from the hard matrix cementing them, thus making possible further investigation work. Fragments of breccia were dissolved in 10% acetic acid, bone remains thus separated from the matrix were washed, dried and, when dry, soaked in saturated solution of shellac in alcohol.

Up to the present about 100 kg of the breccia material has been worked out. The specimens thus recovered are now deposited in the collection of the Cracow Branch of the Institute of Zoology of the Polish Academy of Sciences where this paper has been written.

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#### ORIGIN OF THE PODLESICE BRECCIA

The breccia here considered shows very marked petrographic differentiation. All of its portions, however, yield abundant bone remains of small mammals, mostly bats, embedded in a clay matrix with a high content of lime carbonate. In some layers the matrix consists of almost pure crystalline calcite, while clay elements predominate in other layers. Some thin layers display a dark colouration probably due to the presence of organic matter. The whole breccia is so hard that mechanic means proved of no use for the recovery of small mammalian bones. There are hardly any limestone fragments in the breccia, only few were encountered by the author in the studied material. Concretions, fairly abundant, occur, consisting of thin concentric lime carbonate layers with some silt content.

The lithological character of the discovered breccia clearly indicated that it had formed at the floor of the cave, some considerable distance from the cave entrance. The cave floor was covered by clay. It constituted the insoluble limestone residuum and is still now the essential component of the cave deposits in those parts of the cave further away from the entrance. The clay was impregnated by water dripping down from the cave ceiling and containing a saturated solution of calcite carbonate.

At times and again the surface of the cave dried up and cracks formed where calcite crystallized. Signs of these cracks are readily detectable on some fragments of the breccia. The complete lack of lime debris, commonly accumulating on floor of caves in places exposed to thermic variations which are responsible for mechanical weathering, is a proof of the formation of the breccia at some distance from the cave entrance.

Numbers of bats must have lived on the site of the breccia's formation. Dead bodies of these animals, which usually form large colonies on the ceiling of caves, dropped down onto the floor of the cave. Upon decomposition of organic matter, their bones were buried in the soft clay of the cave floor. At times of flood or of heavier rainfall the lower parts of the cave may have been inundated and the bone remains carried away by water. Consequent sorting of the bone material ensued. While skulls clearly predominate in some samples, long bones, frequently in a parallel arrangement, prevail in others. Similar concentration of skulls or long bones of bats has many a time been encountered by the present author on the floor of Tatra caves, for example in the Miętusia Cave or the Zimna Cave in Western Tatra Mts. Excellent preservation of the delicate skulls of bats and perfect condition of their long bones suggest that, as regards the material here studied, water transport could have been neither long nor very rapid.

The colony of bats, whose fossil remains occur in the Podlesice breccia was a hibernating colony. Though bats flock together in caves during the summer too, these are reproductive colonies and remains of many young individuals are always found directly underneath. Among the copious fossil material from the Podlesice breccia but one single fragment was collected of a bat mandible with milk dentition. All the other bone fragments are referable to adult individuals. Furthermore, large quantities of guano always accumulate in places directly below the summer colonies of bats and fossilized traces of it should certainly be detectable, whereas there is always complete lack of guano under hibernating colonies. The specific differentiation displayed in the bat remains from the Podlesice breccia indicates that it was a mixed hibernating colony. Besides the predominant species of *Myotis* cf. *aemulus* Heller, four other species of genus *Myotis* made up this colony. They were: *Myotis podlesicensis* n. sp., *M. dasycneme subtilis* n. subsp., *M. danutae* n. sp. and *M. cf. exilis* Heller. In addition to these, sporadic occurrence is noted of individuals belonging to other genera: *Rhinolophus* cf. *ferrumequinum* (Schreber), *Miniopterus schreibersi* (Kuhl) and *Plecotus crassidens* Kormos. Mixed colonies of this type are also very common in recent cave faunas. A very numerous one has for instance been recorded from the Korallowa Cave near Częstochowa, in the northern section of the Cracow-

Wieluń Highlands, consisting of *Myotis myotis* (Borkhausen), with detached specimens of *M. daubentoni* (Kuhl), *M. nattereri* (Kuhl) and *M. dasycneme* (Boie). Long-eared bats (*Plecotus auritus* (Linnaeus)) and lesser horse-shoe bats (*Rhinolophus hipposideros* (Bechstein)) (K. Kowalski, 1953) also hibernate in the said cave.

Fair abundance of rodent incisors is a most characteristic feature of the studied breccia. These teeth are found in quantities disproportionately high to other rodent remains. They are also recovered from layers yielding no other bone remains except those of bats. Similar occurrences have frequently been recorded by the writer from Tatra caves where detached incisors of Microtinae will be encountered among bat bones in cave deposits quite distant from the cave addit. These teeth have probably been transported by water from the ground surface through the rock fissures. Rodent incisors are markedly resistant against agents of destruction both chemical and mechanical. They are known to persist under conditions leading to complete destruction of bones and even of other teeth.

Finally, in the way of exception, among bones of bats from the Podlesice breccia, detached bones of weasels have been collected, though not yet specifically identified. This occurrence finds its analogy in recent cave faunas. Weasels, such as the marten *Martes martes* (Linnaeus) and the weasel *Mustela nivalis* Linnaeus in the Tatra Mountains venture into caves for a distance of several hundred meters from the cave entrance, where their bone remains are occasionally encountered. Similar facts have also been mentioned in a most interesting paper by H. Zapfe (1954).

Different origin is ascribed to animal remains represented by some fragments extremely rare in the Podlesice breccia, recovered from a thin layer showing dark colouration and with matrix consisting of crystalline calcite and an important admixture of clay elements. It has not been possible either to determine whether the Podlesice breccia contained only one or more of these layers, or to ascertain their stratigraphic position. The discovered layer has yielded numerous bat bones conspecific with others collected elsewhere in the breccia, but besides them we also encounter numerous bones of insectivore mammals and rodents, very rare bones of birds and finally a detached specimen of a lizard mandible (*Lacerta* sp.). The condition of preservation of the remains of small mammals, the absence of remains referable to larger forms and the dark colouration of the layer — due probably to organic matter — suggest that owls have caused their accumulation. Owls do, indeed, frequently seek day shelter in caves and the pellets, indigestible remnants of hair and bones of animals they have devoured and spat out, are always found in abundance directly beneath their places of shelter. Numerous finds of

mammalian remains of this origin, both from recent and later Pleistocene time, have been recorded and described, so that their composition and state of preservation are well known. The material derived from these food remnants spat out by owls is always strongly differentiated; it is referable to quite small animals only, with a predominance of skulls and mandibles over other skeletal bones; in the skulls the braincases have not been preserved. All these features agree with those of the Podlesice material.

Thus, both the lithology and faunal composition of the Podlesice breccia indicate that it is a fossilized cave deposit which had formed at considerable distance from the cave entrance.

#### AGE OF BRECCIA

The geology of the Podlesice breccia does not suggest any important clue as to its age. It is known that the breccia had undoubtedly formed within the cave, while its present site is in an open surface pit. Since the land relief of the Cracow-Wieluń Highlands is essentially referable to pre-Pleistocene times, while the pit containing the breccia occurs on the ridge of a lofty monadnock, it does not seem possible to ascribe the destruction of the roof in the cave to the action of water, at a time subsequent to the glaciation of this terrain. It is more probable that the ceiling of the cave suffered destruction and all its remains were removed by action of land-ice which had but once traversed the Podlesice area, namely during the Mindel glaciation period. This would assign a pre-Mindel age to the breccia.

Closer dating of the breccia is possible on its fauna which shows the following composition:

#### Insectivora

|                                   |  |
|-----------------------------------|--|
| <i>Talpa minor</i> Freudenberg    | <i>Sorex</i> sp.                             |
| <i>Desmana nehringi</i> Kormos    | <i>Petenyia hungarica</i> Kormos             |
| <i>Sorex alpinoides</i> n. sp.    | <i>Soriculus kubinyi</i> Kormos              |
| <i>S. dehnelti</i> n. sp.         | <i>Suncus</i> cf. <i>pannonicus</i> (Kormos) |
| <i>S. cf. praeearaneus</i> Kormos |  |

#### Chiroptera

|   |  |
|---|--|
| <i>Rhinolophus</i> cf. <i>ferrumequinum</i><br>(Schreber) | <i>M.</i> cf. <i>aemulus</i> Heller    |
| <i>Miniopterus schreibersi</i> (Kuhl)                     | <i>M. dasycneme subtilis</i> n. subsp. |
| <i>Plecotus crassidens</i> Kormos                         | <i>M. danutae</i> n. sp.               |
| <i>Myotis podlesicensis</i> n. sp.                        | <i>M. cf. exilis</i> Heller            |

#### Rodentia

|   |  |
|---|--|
| <i>Mimomys</i> cf. <i>pusillus</i> (Méhely) | <i>Parapodemus coronensis</i> Schaub         |
| <i>Baranomys lóczyi</i> Kormos              | <i>Glis sackdillingensis minor</i> n. subsp. |

Out of the 20 small mammalian forms which have been specifically determined and are here described, two only seem indentifiable with recent species, still living, though not now encountered in Poland. The remaining forms are either completely new to science or have previously been recorded from early Pleistocene and Pliocene fossil faunas in Europe:

Of marked significance in determining the age of small mammalian Quaternary faunas are remains of the Microtinae subfamily. The Microtinae were then undergoing rapid evolution and yield good index fossils for even quite short geologic periods in Europe. In Podlesice this subfamily has but one representative belonging to genus *Mimomys* F. Major which made its appearance in Europe during the late Pliocene and finally disappeared during the Mindel glaciation period (A. Papp & E. Thenius, 1949). Besides *Mimomys*, other Microtinae genera with closed tooth roots, such as *Evotomys* Coues, *Dolomys* Nehring etc. are recorded by earlier finds from the older Pleistocene. Later, in the middle of the Günz-Mindel Interglacial, other Microtinae genera make their appearance, characterized by teeth with roots not closed and by persisting growth. These are: *Arvicola* Lacépède, *Pitymys* McMurtrie and *Microtus* Schrank, represented by other species than those now living. The fact that genus *Mimomys* is the sole representative in Podlesice of the Microtinae, and the absence there of forms belonging to genera of this group with more advanced specialization are indeed of some significance, even though greatest caution should always be exercised in the consideration of negative palaeontological data. Species *Mimomys pusillus* (Méhely), to which the Podlesice remains are most probably referable, has thus far been recorded from Püspökföld in Rumania (L. Méhely, 1914), from Villany Kalkberg in Hungary (T. Kormos, 1937a), from Lateiner Berg (Stranska Skala) near Brno in Czechoslovakia (F. Heller, 1936a), from Gaisloch (G. Brunner, 1950), from Sackdillinger Höhle (G. Brunner, 1934) and Gundersheim (F. Heller, 1936a) in Germany, from borings in several localities in Holland (A. Schreuder, 1933, 1936, 1943) and from Senèze in France (T. Kormos, 1931). All these sites have been assigned early Pleistocene age or defined as „Preglacial”.

*Baranomys lóczyi* Kormos, an interesting rodent, has thus far been recorded from Csarnota in Hungary (T. Kormos, 1933a), from Gundersheim in Germany (F. Heller, 1936a) and from Wojcieszów in Poland (F. Heller, 1937).

*Parapodemus coronensis* Schaub is up to now known only from Brasso in Rumania (S. Schaub, 1938). Genus *Parapodemus* Schaub is represented by several species from the Pliocene deposits of Europe and Mongolia,

while species *P. coronensis* Schaub is the sole Pleistocene form of this genus. According to S. Schaub (1938) the Brasso specimen is referable to the Mindel glaciation period.

*Glis sackdillingensis minor* n. subsp. is a new form, but specimens of the typical form of *Glis sackdillingensis* Heller have been recovered from early Pleistocene fauna of the Sackdillinger Höhle in south Germany (F. Heller, 1930a, 1933; G. Brunner, 1934), later also from the Gaisloch cave (G. Brunner, 1950).

*Talpa minor* Freudenberg is known from a number of early Pleistocene sites in central Europe. It has been recorded from Püspökfördö and Brasso in Rumania (T. Kormos, 1937a), from Beremend, Villany Kalkberg and Nagyarsanyberg in Hungary (T. Kormos, 1937a) from Gundersheim (F. Heller, 1936 a), Sackdillinger Höhle (F. Heller, 1933; G. Brunner, 1934) and Erpfinden (F. Heller, 1936b) in Germany, from Hundsheim in Austria (W. Freudenberg, 1914; T. Kormos, 1937b). This species is also mentioned in the fauna from Mauer (F. Heller, 1939), probably referable to a later period, i. e. the Mindel-Riss Interglaciation.

*Desmana nehringi* Kormos is known from Beremend and Villany Kalkberg in Hungary (T. Kormos, 1913, 1938). A form recorded from Gundersheim in Germany (F. Heller, 1936a) and ascribed to this species, is probably referable to *Desmana tegelensis* Schreuder (A. Schreuder, 1943).

*Sorex alpinoides* n. sp. is a species new to science, but it most closely approaches *Sorex praealpinus* Heller from Sackdillinger Höhle (F. Heller, 1930a, 1933) and from Gaisloch (G. Brunner, 1950), whereas *Sorex dehneli* n. sp. is a rather isolated species, on whose relationships only very little can be said.

*Sorex praeareneus* Kormos has been described from Villany Kalkberg in Hungary (T. Kormos, 1934) and has not been recorded from elsewhere.

*Petenya hungarica* Kormos is recorded from Villany Kalkberg and Csarnota in Hungary (T. Kormos, 1934, 1937a), from Püspökfördö in Rumania (T. Kormos, 1937a) and from Gundersheim in Germany (F. Heller, 1936a). *Petenya suavensis* Pasa, very closely approaching it, has been described from northern Italy (A. Pasa, 1948).

*Soriculus kubinyi* Kormos has been described from Villany in Hungary and has not thus far been recorded from other sites. It belongs to a genus now extinct in Europe but still living in East Asia.

*Suncus pannonicus* Kormos has been described from Beremend in Hungary (T. Kormos, 1934) and has not since been recorded from other sites.

*Rhinolophus ferrumequinum* (Schreber) is noted from early Pleistocene sites in Wojcieszów, Poland (F. Heller, 1937), in Gundersheim, Germany (F. Heller, 1936a) and in Choukoutien, China (W. C. Pei, 1934). The present distribution of this species ranges over western, central and southern Europe, northern Africa, central and southern Asia and Australia. Though encountered in the vicinity of the southern boundaries of Poland it never occurs within Polish territory.

*Miniopterus schreibersi* (Kuhl) is recorded already from the early Pleistocene deposits of Püspökfördö in Rumania (T. Kormos, 1937a), of Gundersheim (F. Heller, 1936a) and Moggaster Höhle (F. Heller, 1930b) in Germany and from Choukoutien in China (W. C. Pei, 1934). Its present range stretches over southern Europe, northern Africa, central and southern Asia and Australia. It has never been recorded from Poland but is known to occur in such close proximity as the Slovakian area of the Pieniny range.

*Plecotus crassidens* Kormos has hitherto been recorded from Püspökfördö in Rumania only (T. Kormos, 1930a).

Of genus *Myotis* Kaup, in addition to species new to science and a new subspecies, we have here two forms, probably identical with those described from Gundersheim in Germany (F. Heller, 1936a), to say: *Myotis aemulus* Heller and *M. exilis* Heller.

Generally, one can see that it is almost exclusively fossil forms that are recovered from the Podlesice fauna. The two only species that have been identified with forms still living today, though over a somewhat modified range of distribution, belong to bats, commonly known for their conservatism and recorded from other early Pleistocene sites. Numerous mammalian remains noted in the Podlesice breccia have been previously recovered from fossiliferous deposits of Rumania, Hungary and Germany and are referred to as „Preglacial” or Pliocene. More recent studies, however, have disclosed that most of these faunal assemblages are referable to early Pleistocene times. A new attempt at determination of the geological age of the faunistical finds of that period was taken up by A. Papp & E. Thenius (1949) who based it mostly on an analysis of the presence in these finds of rodents from the subfamily of Microtinae. The faunas from Villany Kalkberg, Csarnota, Beremend, Gundersheim, Püspökfördö and Sackdillinger Höhle have by these authors all been referred to the Günz-Mindel Interglacial. On the evidence of its distinct analogies with the fauna from the above mentioned sites it is thought justifiable to refer also the Podlesice fauna to the Günz-Mindel Interglacial, called Tegelian by W. Szafer (1953).

Far greater difficulties are encountered in establishing the location of the Podlesice fauna within the Tegelian Interglacial. On the absence of

Microtinae with open molar tooth roots, which make their appearance at the beginning of this interglaciation, it may be presumed that here, in the taphocoenosis of the Podlesice breccia, we are dealing with a fauna belonging to the initial stage of this interglaciation, though negative evidence of this type cannot be regarded as decisive.

#### ZOOGEOGRAPHIC AND PALAEOCLIMATIC PROBLEMS

Both, palaeozoological and palaeobotanical studies disclose that the Tegelian Interglacial (Günz-Mindel) was a period characterized by the extinction of a number of Tertiary, Pliocene forms. As shown by investigation of the flora from Mizerna in the sub-Carpathian area of Poland (W. Szafer, 1953), referable to that same Interglacial, one third of the plant remains collected at that site belongs to species now extinct; one half does not occur in Europe but is found in North America and Asia and the rest only have persisted in Europe until now. Thus, it is inferred that the oldest Pleistocene glaciation has not been the decisive factor, either in southern Europe or even in the warmer zones of central Europe for any essential faunal or floral changes. It should not, therefore, be surprising that it was formerly the common practice, particularly so in Hungary and Rumania, to refer faunal assemblages from the first interglaciation period to „pre- glaciation” and to assign them the Pliocene age. It was not until the second glaciation that havoc was wrought among forms then living in Europe.

Representatives are also found in the Podlesice breccia of archaic forms which were on the eve of extinction in that interglacial fauna. Among them is an interesting species of the Rodents, i. e. *Baranomys lóczyi* Kormos, whose nearest relatives are recorded from Pontian deposits of Mongolia (*Microtodon* Miller). The structure of its molars is strikingly like that of the cheek teeth of the Microtinae though it developed after a structural pattern typical of the dentition of hamsters. The extinction of genus *Baranomys* Kormos was probably brought about by the evolution of the Microtinae whose molars had at that time acquired the ability for persistent growth. In the course of later Pleistocene and Recent times this was the essential factor enabling the Microtinae to spread over all the continents of the globe and to thrive in unsurpassed numerical abundance.

*Parapodemus coronensis* Schaub is another archaic form yielded by the Podlesice breccia. It belongs to an extinct genus *Parapodemus* Schaub which is represented in the Pleistocene deposits by this single form, hitherto recorded from two sites only. *Desmana nehringi* Kormos is a further archaic form here. Of the numerous and well differentiated

Pliocene and later Pleistocene species from subfamily Desmaninae but two are now living, i. e. *Galemys pyrenaicus* (Geoffroy) in the Iberian Peninsula and *Desmana moschata* (Linnaeus) in the southern zones of European Russia.

*Plecotus crassidens* Kormos, a bat from the Podlesice fauna, represents probably a faunal analogy with the numerous species from the flora of the Tegelian Interglacial, now extinct in Europe, but still persisting in North America. It is probable that this species placed within genus *Plecotus* Geoffroy in reality more closely approaches the North American genus *Corynorhinus* Allen. We may suppose that further research work which ought by all means give more attention to analogous American material, will not fail to discover additional comparable early Pleistocene forms still living in America, as has been the case in respect to the flora of that period.

On evidence of the above description of Podlesice species, recorded from other European sites of the same period, the Podlesice fauna is shown closely allied to faunas from central Europe, Hungary, Rumania and southern Germany. On the other hand, one is struck by the complete absence of species occurring in the Cromer Forest Beds of Great Britain, which also used to be assigned to this period (F. Zeuner, 1954, p. 260). Perhaps, as suggested by H. Gams (1952), the Cromer Forest Beds are actually of a younger age, or we may here have a geographical differentiation of faunas.

What was the climatic background of the taphocoenosis of the Podlesice breccia? As stated above, this taphocoenosis is composed of two tanatocoenoses: the relicts of the winter colony of bats and the pellets of owls seeking shelter in the cave.

The specific composition of the bat colony does not supply any important clue with regard to climate: forms identical with recent species, such as *Rhinolophus ferrumequinum* (Schreber) and *Miniopterus schreibersi* (Kuhl) and those congeneric with the extinct forms *Myotis* Kaup and *Plecotus* Geoffroy as well, today range from the tropics to zones with moderate climate. But the mere fact of the existence of a winter colony of bats indicates the occurrence in those times of a distinctly chilly season. The presence of *Rhinolophus ferrumequinum* (Schreber) and *Miniopterus schreibersi* (Kuhl) suggests, however, that the climate at the time of the formation of the breccia was somewhat warmer than that now prevailing in the Podlesice area.

The other tanatocoenosis of the Podlesice breccia, which is due to the owl pellets, is entirely made up of extinct species only. We can make but indirect inferences as to the climatic needs of these forms. All the species here present belong to forest animals. The sylvian genus *Glis*

Brisson bears special testimony to the existence there of forest environment. On the other hand, the absence is noted of such typically steppe forms as *Spalax* Gueldenstaedt, known from other sites of this period. It may therefore be inferred that at the time of formation of the Podlesice breccia the vegetation of the Cracow-Wieluń Highland was sylvian, while the climate was moderate, somewhat warmer than that of recent time. This agrees with W. Szafer's (1952) studies on the Mizerna flora from the same interglacial. Forests with a number of Pliocene forms predominate in the flora of the second successive stage of the interglacial deposits. It is the later period of the interglacial that brings about a cooling down of the climate which eliminates xerothermic species and leads to the predominance of many species of trees up to now existing in Europe.

## SYSTEMATIC DESCRIPTIONS

**Insectivora** Bowdich, 1821

Family **Talpidae** Gray, 1825

Subfamily **Talpinae** Murray, 1866

Genus *Talpa* Linnaeus, 1758

*Talpa minor* Freudentberg, 1914

(pl. I, fig. 1)

1914. *Talpa europaea* var. *minor* n. subsp.; W. Freudentberg, Die Säugetiere..., p. 209, pl. 19, fig. 7, 32, 33, 35-37.
1930. *Talpa gracilis* n. sp.; T. Kormos, Diagnosen..., p. 239.
1930. *Talpa europaea* L. (partim); F. Heller, Eine Forest-Bed Fauna..., p. 253.
1933. *Talpa gracilis* Kormos; F. Heller, Ein Nachtrag..., p. 60-61, fig. 1, 2.
1934. *Talpa gracilis* Kormos; G. Brunner, Eine präglaziale Fauna..., p. 308.
1936. *Talpa gracilis* Kormos; F. Heller, Eine oberpliozäne Wirbeltierfauna..., p. 105.
1936. *Talpa gracilis* Kormos; F. Heller, Eine Forest-Bed Fauna..., p. 5.
1937. *Talpa gracilis* Kormos; T. Kormos, Revision..., p. 26-27, fig. 1a.
1938. *Talpa europaea* var. *minor* Freudentberg; M. Kretzoi, Die Raubtiere..., p. 91.
1939. *Talpa gracilis* Kormos; F. Heller, Kleinsäugerreste..., p. 10, fig. 4.

*Material.* — A damaged mandible with  $M_2$  and  $M_3$ , the posterior part of the mandible showing complete processes, but toothless; 5 humeri, one scapula.

*Description.* — The ramus of the mandible slight and delicate. Coronoid process narrowing towards the end, with end somewhat curved backwards. Anterior edge of processus coronoideus forms an obtuse angle with the mandibular ramus, whereas in *Talpa europaea* Linnaeus it is a right angle. The posterior mental foramen is situated beneath the posterior root of  $M_1$ . Both preserved molars show no difference from the teeth of *T. europaea* Linnaeus.

The shoulder blade has a construction characteristic of genus *Talpa* Linnaeus, with a tubercular acromion and margo superior rimmed by a thickening of the bone. Neither does the construction of the humerus show any difference from that of *T. europaea* Linnaeus.

*Dimensions* (in mm): height of mandibular ramus between  $M_1$  and  $M_2$  1.7, thickness of same 1.0 and 1.0; length of  $M_2$  1.7; length of  $M_3$  1.5; length of shoulder blade 17.6, minimum breadth of same 1.1. The following are the dimensions of four complete humeri: length 10.9, 10.8, 11.0, 11.0; breadth 3.5, 3.2, 3.2, 3.4.

*Systematic position.* — The size of the fossil specimens together with the characteristic structure of coronoid process refer them to *Talpa minor* Freudentberg, the smallest of the early Pleistocene moles.

In 1916 „*Talpa europaea* var. *minor* n. subsp.”, a new mole subspecies was described by Freudentberg from the lower Pleistocene deposits of Hundsheim in Austria. Its description, as given by that author, is very inadequate, while of the drawings said to represent its remains, a part only refer to this species, the remainder being referable to *Talpa fossilis* Petenyi and *Beremendia fissidens* (Petenyi). In 1930, the same form was by T. Kormos named *Talpa gracilis*. Later on it was recorded from many early Pleistocene sites in central Europe. In 1938, M. Kretzoi states that *T. europaea minor* Freudentberg and *T. gracilis* Kormos are synonymous. Owing to considerable differences of size and structure, *T. minor* Freudentberg is to be specifically separated from *T. europaea* Linnaeus.

#### Subfamily **Desmaninae** Thomas, 1912

##### Genus *Desmana* Guldenstadt, 1777

##### *Desmana nehringi* Kormos, 1913

(pl. I, fig. 2, 3)

1913. *Desmana* (?) *Nehringi* n. sp.; T. Kormos, Trois nouvelles espèces.... p. 138, pl. 6, fig. 1a-f.
1938. *Desmana Nehringi* Kormos; T. Kormos, Zur näheren Kenntnis.... p. 164, fig. 1-4.
1940. *Desmana nehringi* Kormos; A. Schreuder, A revision..., p. 313, fig. 4, 32b, 35, 41, 50, 62, 67, 80; pl. 8 fig. 3, pl. 9 fig. 7-11, pl. 10 fig. 8, 11-13, pl. 11 fig. 3, 4, 14, 19, 23.

*Material.* — Fragments of cranial calotte, 2 fragments of maxilla: one with  $M^2$ , the other with  $P^4$  and  $M^1$ , fragment of mandible with  $P^2$  and  $P_4-M_2$  two detached  $I^1$ . All these specimens were found together and belong to the same individual with teeth only slightly worn. The notation of teeth is after the pattern given in a paper by A. Schreuder (1940).

*Description.* — Bridge over the infraorbital canal narrow, obliquely placed but somewhat less inclined than in the recent *Desmana moschata* (Linnaeus). Its lower end placed between  $M^1$  and  $M^2$ .

Both specimens of  $I^1$  are badly damaged. They are large, strongly flattened, with a triangular section.  $P^2$  is with three roots, its cingulum is well developed. In  $P^4$  the protocone shows strong development, the deutocone is also of considerable dimensions, it infills the inner convexity of the crown. The tritocone is low, poorly isolated, joint to the protocone by a sharp ridge. Cingulum well developed, it forms a well marked hump on the front wall of the tooth but is also quite clearly indicated on the back wall. The anterior margin of the protocone is conical without the sharp ridge characteristic of genus *Galemys* Kaup.  $M^1$  badly damaged. Its metacone joint to the metastyle by a robust sharp ridge. The posterior mezocone, joint to the metacone by a short ridge curving to the front, is less strongly developed than the anterior mezocone. Cingulum on the anterior margin of the tooth well developed, the parastyle forms a distinct isolated notch.

The lower mandibular margin is nearly horizontal. A slight downward curve at the lower margin of the mandible beneath the posterior margin of  $P_2$  indicates the beginning of the symphyseal swelling. A large mental foramen is below the anterior root of  $M_1$ , the margin of the second mental foramen has been preserved below the anterior root of  $P_2$ .

In  $P_2$  the cingulum is well developed, somewhat less so on the frontal part of the tooth, and forming a small notch at the back. In the anterior margin the paraconid is not distinguishable as it is completely fused with the ridge descending the protoconid towards the front.  $P_3$  is broken off, roots only have been preserved. They are flattened, closely arranged, the posterior root protruding from the tooth row and pushed outwards. This indicates that  $P_3$  was placed obliquely and partly external to the tooth row.  $P_4$  is relatively large. Its paraconid is rather poorly developed. Of the cusps in the posterior tooth margin the endoconid is the strongest, the others being poorly developed. The cingulum is developed all round the crown. The molars are somewhat damaged. Their cingulum is well developed. The endoconids are broad, separated from the metaconids by deep grooves. All the teeth have a yellowish colouration.

*Dimensions* (in mm): thickness of the bone bridge over the infraorbital canal 0.75; larger diameter in  $I^1$  at the base of the crown is (in both specimens) 3.0, smaller diameter of same 1.2; length of  $P^2$  2.25, breadth of  $P^2$  1.5, height of  $P^2$  2.0; outer length of  $P^4$  2.75, posterior margin breadth of  $P^4$  2.25; outer length of  $M^1$  3.5, anterior breadth of  $M^1$  about

2,7; inner height of the mandibular ramus behind  $P^2$  4.0, thickness of same 2.0; height of the mandibular ramus behind  $P^4$  (from the inner side) 4.0, thickness of the mandibular ramus behind  $P^4$  2.0; height of the mandibular ramus behind  $M_1$  (from the inner side) 4.1, thickness of the mandibular ramus behind  $M_1$  2.1; length of  $P_2$  2.0, breadth of  $P_2$  1.25, height of  $P_2$  1.8; length of  $P_4$  2.25, breadth of  $P_4$  1.25, height of  $P_4$  2.0; length of  $M_1$  3.0, breadth of  $M_1$  (measured at the protoconid) 1.8, breadth of  $M_1$  (measured at the hypoconid) 2.2; length of  $M_2$  2.8, breadth of  $M_2$  1.8.

*Systematic position.* — The assignment of the fossil remains to genus *Desmana* Guldenstadt is based on the characteristic structure of the molars, of the bone bridge over the infraorbital foramen as well as on a number of other characters. A related genus, the *Galemys* Kaup, now occurring in the Pyrenees, is distinguished by the lack of cingulum in the lower molars, a broad bone bridge over the infraorbital foramen and a sharp ridge in  $P^4$ .

Genus *Desmana* Guldenstadt is represented by a single recent species the *Desmana moschata* (Linnaeus), encountered within the southern territories of European Russia, also by a number of extinct species, one of which is Pontian and several others Pleistocene. The fossil specimens found at Podlesice are distinguished by small dimensions, which bar them from being referred to forms assigned to species *Desmana moschata* (Linnaeus) and *D. thermalis* Kormos. The question is therefore open as to their identity with one of the small sized species recorded from the early Pleistocene, namely: *Desmana nehringi* Kormos, *D. kormosi* Schreuder, *D. tegelensis* Schreuder and „*Galemys*” *semseyi* Kormos. This latter species, which is only very superficially known, may possibly also belong to genus *Desmana* Guldenstadt. The fossil remains of „*Galemys*” *semseyi* Kormos differ, however, from the Podlesice specimen by smaller dimensions and the complete absence of cingulum on the lower molars.

*Desmana kormosi* Schreuder and *D. tegelensis* Schreuder, two closely related forms, differ by smaller dimensions from the Podlesice specimens. In both these forms there is no dislocation of  $P_3$ , which is very distinct in our material. Finally, *D. kormosi* Schreuder is differentiated by a characteristic shortening of  $P^4$  which is not to be noted in the Podlesice specimen.

On the other hand, the Podlesice remains very closely agree with the description, dimensions and sketches of genus *Desmana nehringi* Kormos. Their dimensions are identical, both also show a characteristic projection of  $P_3$  from the mandibular tooth row and a strongly developed cingulum in the lower molars.

Family **Soricidae** Gray, 1821  
 Subfamily **Soricinae** Murray, 1866  
 Genus *Sorex* Linnaeus, 1758

*Sorex alpinoides* n. sp.

(pl. I, fig. 7, 8; text-fig. 1d)

*Holotype*. — Anterior part of skull with  $P^1$  and  $M^1$ - $M^3$ , also both mandibular rami with complete dentition,  $P_1$  excepted.

*Stratum typicum*. — Günz-Mindel Interglacial.

*Locus typicus*. — Podlesice near Kroczyce, Olkusz district.

*Derivatio nominis*. — *alpinoides*-close to *Sorex alpinus* Schinz.

*Material*. — Besides the type specimen, 6 imperfect skulls and 15 complete or damaged halves of mandibulae, also fragments of skulls and mandibles. All the teeth, with the exception of  $I^1$ , are represented in the material available to the author.

*Description*. — The rostrum is shortened. The infraorbital foramen is small, with a round contour (not oval and elongate as it is in *Sorex araneus* Linnaeus). Lacrymal foramen is placed above the point where  $M^1$  and  $M^2$  meet (notation of teeth after M. Friant, 1949).

There are 5 unicuspid beyond the first incisor.  $I^1$  has not been preserved.  $I^2$  and  $I^3$  are rather large.  $P^1$  is considerably smaller than the incisors, never attaining half their length.  $P^2$  is half the size of  $P^1$ ,

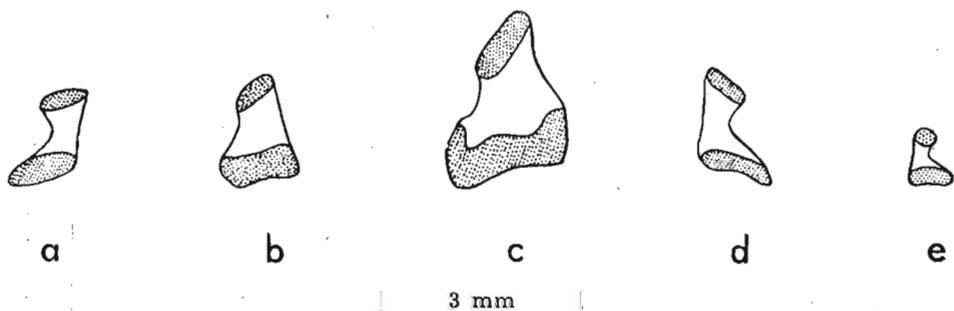


Fig. 1. — Surface of articular processes of mandible (*processus articularis*); a *Sorex* cf. *praeearaneus* Kormos, b *Petenya hungarica* Kormos, c *Sorex dehneli* n. sp., d *Sorex alpinoides* n. sp., e *Suncus* cf. *pannonicus* (Kormos).

it is broader than long, being squeezed in between  $P^1$  and  $P^4$  and thus compressed.  $P^3$  is completely pushed out of the maxillary tooth-row and almost entirely hidden under the crown of  $P^4$ . The posterior margin of  $P^4$ ,  $M^1$  and  $M^2$  is medially rather strongly curved to the front, so much so as to leave a free space between this latter margin and the anterior margin of the next tooth.  $M^3$  is not more reduced than *Sorex araneus* Linnaeus.

The mandible is short, the mandibular ramus fairly high. The coronoid process slender, narrow, somewhat curving to the front. Its anterior margin reaches the mandibular ramus at an obtuse angle. The articular process shows a most characteristic shape of the joint surface, the lower joint surface is fairly narrow, in the centre ventrally arcuately emarginated, pointing to the lingual end. The upper joint surface is strongly oblique, fairly short. The bone bridge uniting these two joint surfaces is narrow, elongated, almost linear on the labial side, on the lingual side strongly arching inwards. The angular process is long, narrow, not curving.

The mental foramen is placed below the mid-length of  $P_1$ . The teeth either show very pale pigmentation or are altogether without it.

The first lower incisor is short, besides the terminal cusp it shows, as a rule, only two low cusps separated by shallow valleys. Occasionally, a third cusp is very poorly marked.  $P_1$  is elongated, distinctly two-cusped in specimens with little worn teeth.  $P_4$  also shows two distinct cusps.  $M_3$  has 5 tubercles without signs of reduction.

*Dimensions (in mm):*

| Skulls   | <i>type</i> | 1    | 2   | 3   | 4   | 5   |     |
|--|-------------|------|-----|-----|-----|-----|-----|
| interorbital constriction                              | —           | —    | 3.4 | —   | —   | —   |     |
| molars   | 4.7         | 5.0  | 4.6 | 4.7 | 4.7 | —   |     |
| length from $P^1$ to $M^2$                             | 4.0         | 3.75 | 3.9 | 4.0 | 4.0 | 4.0 |     |
| length of tooth-row (alveolar) without $I^2$           | 5.1         | 4.9  | 5.0 | 5.1 | 5.1 | 5.1 |     |
| Mandibles  | <i>type</i> | 6    | 7   | 8   | 9   | 10  |     |
| mandibular length                                      | 6.9         | 7.0  | 7.5 | 7.2 | 7.5 | 7.0 |     |
| length of tooth-row with $I_2$                         | 5.8         | 5.6  | 5.7 | 5.9 | 5.6 | 5.7 |     |
| same without $I_2$                                     | 4.1         | 4.1  | 4.1 | —   | —   | 4.3 |     |
| length from $M_1$ to $M_3$                             | 3.3         | 3.2  | 3.2 | 3.1 | 3.2 | 3.2 |     |
| height of mandibular ramus below $M_2$ from the inside | 1.2         | 1.1  | 1.1 | 1.2 | 1.2 | 1.2 |     |
| Mandibles (continued)                                  | 11          | 12   | 13  | 14  | 15  | 16  | 17  |
| mandibular length                                      | 6.7         | 7.4  | —   | —   | 7.0 | 7.0 | —   |
| length of tooth-row with $I_2$                         | 5.4         | 5.7  | —   | —   | —   | —   | 5.6 |
| same without $I_2$                                     | —           | —    | —   | —   | —   | 4.2 | —   |
| length from $M_1$ to $M_3$                             | 3.0         | 3.2  | 3.2 | 3.2 | —   | 3.3 | 3.2 |
| height of mandibular ramus below $M_2$ from the inside | 0.9         | 1.1  | 1.2 | 1.2 | 1.1 | 1.1 | 1.2 |

*Systematic position.* — The assignment of the here described form to genus *Sorex* Linnaeus is beyond doubt since it has 5 maxillar unicuspid, pigmented points of the teeth and the area connecting the two facets of the articular process without marked narrowing. Within genus *Sorex* Linnaeus it is *S. alpinus* Schinz, which comes closest to *S. alpinoides* n. sp. Their common characters are: indistinct lobes on first mandibular incisor, two-cusped  $P_1$ , position of the lacrymal foramen at the junction of  $M^1$  and  $M^2$ , and a narrowing of the area between two facets of the articular process. By these characters *Sorex alpinus* Schinz differs from all other fossil and recent species of genus *Sorex* Linnaeus, species *S. praealpinus* Heller excepted. From *S. alpinus* Schinz, however, *S. alpinoides* n. sp. differs by considerably smaller dimensions, distinct shortening of the rostral part of the skull and by shape of the articular process. The other species of the *S. alpinus* Schinz group, namely *S. praealpinus* Heller, described by F. Heller (1930a) from the early Pleistocene of Sackdillinger Höhle in Germany, is known on its mandible only. This mandible is of considerably larger dimensions than that of *S. alpinoides* n. sp.; moreover there also exist differences of proportions, the height of the mandibular ramus being similar in both forms, but in *S. alpinoides* n. sp. we note a strong shortening of the mandible, particularly so in its anterior portion, correlating with the above mentioned shortening of the rostral part of the skull. There are also some differences in the shape of the articular process.

The cardinal features which make *S. alpinoides* n. sp. differ from all its related forms and lead to its establishment into a separate species of the *S. alpinus* Schinz group are as follows: small dimensions (mandibular length is from 10.0 to 11.0 mm in *S. alpinus* Schinz, from 9.2 to 9.3 mm in *S. praealpinus* Heller, and from 6.7 to 7.5 mm in *S. alpinoides* n. sp.), exceptionally shortened rostral part of the skull, and the form of the articular process which is distinguished by a more conspicuous narrowing of the area between the two facets than in other species of *Sorex* Linnaeus.

*Sorex dehneli* n. sp.

(pl. I, fig. 5, 6; text-fig. 1c)

*Holotype.* — Fragment of the mandible with complete dentition, without processes.

*Stratum typicum.* — Günz-Mindel Interglacial.

*Locus typicus.* — Podlesice near Kroczyce, Olkusz district.

*Derivatio nominis.*— *dehneli*- in honour of Prof. dr August Dehnel, an outstanding Polish scientist known for his research works on the family Soricidae.

*Material.* — 15 fragments of the mandible, 3 detached upper molars ( $P^4$ ,  $M^1$ ,  $M^2$ ). The preserved fragments of mandible represent the complete dentition and processes.

*Description.* —  $P^4$ ,  $M^1$ ,  $M^2$ , the only preserved upper teeth, are developed in a manner similar to those of *Sorex araneus* Linnaeus. They also show similarly embayed posterior coronal margin.

The mandibular ramus is robust but low. Anterior margin of coronoid process united with mandibular ramus at an obtuse angle. The upper end of the coronoid process is narrow, somewhat curved backwards. The fossa pterygoidea is deep, low, rounded at top. Its lower margin is strongly inflated. The articular process shows two facets, of which the lower one is broad, short, blunt at the lingual end. The upper facet is short, markedly obliquely placed. The area uniting them is broad, somewhat arching inwards on the lingual side. The angular process is thin, directed slightly downwards, not very long. The mental foramen is set below  $P_4$ , at two thirds of its length counting from the front.

Apically the teeth are strongly pigmented to a dark-brown colour with orange tints. The lower incisor has three lobes besides the terminal, they are, however, very poorly marked. As a rule, only two lobes are distinguishable in addition to the terminal one, the third lobe being either very slight or completely lacking.  $P_1$  and  $P_4$  are robust, the former having but one cusp, the latter two cusps. A strong cingulum is developed round the molars. The third molar shows 5 tubercles.

*Dimensions* (in mm):

| Mandibles                              | type | 1   | 2   | 3   | 4   | 5   |
|--|------|-----|-----|-----|-----|-----|
| length of tooth-row with $I_2$         | 8.4  | 7.9 | —   | —   | —   | —   |
| same without $I_2$                     | 6.1  | 5.3 | —   | —   | —   | —   |
| length of $M_1$ - $M_3$                | 4.6  | 4.4 | 4.5 | 4.5 | 4.4 | 4.5 |
| height of mandibular ramus below $M_2$ | 1.9  | 1.6 | 1.9 | 1.7 | 1.7 | 1.8 |

*Systematic position.* — The lack of the posterior maxillary teeth greatly hinders the determination of the systematic position of this new species. The apical pigmentation of teeth, the presence of 5 tubercles on the coronal surface of  $M_3$ , the form of the articular process and finally the presence of three lobes (though very indistinct) on the margin of the lower incisor — justify their sure assignment to genus *Sorex* Linnaeus. The size itself of the remains found in Podlesice bars them from being referred to any recent or most of the extinct species within this genus. The only forms approaching our form are those of *Sorex savinii* Hinton from the early Pleistocene deposits of Great Britain, *S. margaritodon* Kormos from the „Preglacial” of Hungary and *S. tasnadii* Kretzoi from Gombasek in Czechoslovakia. *S. dehneli* n. sp. differs considerably from

*S. savinii* Hinton. While in the British species the posterior margin of the coronoid process meets the mandibular ramus at a right angle, in *S. dehneli* n. sp. it is an obtuse angle. In *S. dehneli* n. sp. the fossa pterygoidea is low and rounded at top, while in *S. savinii* Hinton it is high. The form of the surface of the articular process is also quite different and the mental foramen in the British species is placed further back. Finally, the dimensions of the Podlesice specimens are larger.

The description of the mandible of *Sorex margaritodon* Kormos in papers by T. Kosmos (1930a, 1935) is inexact and not figured. I had, however, the opportunity of comparing my specimens with those collected by T. Kormos in Püspököfördö, now deposited in the palaeontological collections of the Geological Institute at Budapest. The dimensions of the species from Hungary are somewhat smaller than those of *S. dehneli* n. sp., i. e. in *S. margaritodon* Kormos the  $M_1$ - $M_3$  length is from 3.9 to 4.3 mm, an average of 4.0 mm, while in *S. dehneli* n. sp. it is from 4.4 to 4.65 mm, an average of 4.5 mm. The length of the mandibular tooth-row without the incisor is from 5.6 to 6.0 mm in *S. margaritodon* Kormos while in the only available specimen of *S. dehneli* n. sp. the length of the complete tooth-row is 6.1 mm. In *S. margaritodon* Kormos the mental foramen is set below the posterior margin of the  $P_4$  crown, while in *S. dehneli* n. sp. it is at two thirds of its length. In *S. margaritodon* Kormos the upper facet of the articular process is either parallel to the margin of the lower facet of that process, or weakly inclined, while in *S. dehneli* n. sp. it is strongly oblique. Finally, fossa pterygoidea, which both in *S. margaritodon* Kormos and in *S. savinii* Hinton is triangular and gradually passes into a canal stretching almost to the apex of the coronoid process, in the *S. dehneli* n. sp. is lower, rounding upwards.

*Sorex tasnadii* Kretzoi has been described very inexactly and without dimensions, M. Kretzoi (1941) only states that it is of the size of *S. savinii* Hinton. Its diagnostic character is said to be the presence of distinct lobes on  $I_2$  in which it differs from *S. dehneli* n. sp.

*S. dehneli* n. sp. occupies an isolated position among the Quaternary species of genus *Sorex* Linnaeus. In size it exceeds all hitherto known species and is also differentiated by the form of its fossa pterygoidea and the oblique position of the posterior margin of the coronoid process.

These latter characters together with its large dimensions bring it somewhat closer to the extinct genus *Beremendia* Kormos. In the early Pleistocene deposits of Europe this form is represented by one species, the *Beremendia fissidens* (Petenyi), recorded from Hungary, Rumania, Germany and Italy, recently also discovered by the present author in the caves of Kadzielnia Quarry near Kielce, Poland. From *B. fissidens* (Petenyi), however, *S. dehneli* n. sp. differs by its smaller dimensions, the

presence of a fifth cusp on  $M_3$  and by numerous structural details of the mandible. It is some future discovery of a complete skull of *Sorex dehneli* n. sp., that will lead to the sure determination of its systematic position.

*Sorex* cf. *praeareaneus* Kormos, 1934

(pl. I, fig. 4; text-fig. 1a)

*Material.* — 4 incomplete mandibles or mandibular fragments representing the complete dentition.

*Description.* — The mandibular ramus similar to that in *S. araneus* Linnaeus. The coronoid process meets the mandibular ramus at the same angle as in this species, but its terminal portion is narrower. The fossa pterygoidea is large, rounding upwards and passing into a shallow canal reaching the joint portion of the coronoid process. The articular process shows a fairly large lower facet, weakly pointed lingually, medially somewhat indented. The upper facet is virtually parallel to the lower, short and rather broad. The area uniting them is slightly emarginated and broad. The angular process is long, slender, at the end curving upwards. The mental foramen is set between  $P_1$  and  $M_1$ .

The teeth show pale pigmentation.  $I_2$  has three distinct lobes in addition to the terminal lobe.  $P_1$  has one cusp,  $P_2$  two cusps. In  $M_3$  the talonid is well developed, with two tubercles.

*Dimensions.* In the most complete fragment of mandible the mandibular length is 9.5 mm, length of tooth-row without the incisor 5.25 mm, length of  $M_1$ - $M_3$  3.6 mm, height of mandible on the inner side under  $M_2$  1.4 mm.

*Systematic position.* — The remains preserved in Podlesice come very near to *Sorex araneus* Linnaeus which they also resemble in respect to size. With respect to the coronoid process it is not so, it being narrower in the case of the Podlesice specimens than that in recent form. The position of the mental foramen is also different, in *S. araneus* Linnaeus it is placed at midpoint of  $M_1$ , while in the fossil specimens it is between  $P_1$  and  $M_1$ .

Of the early Pleistocene European fossil forms belonging to genus *Sorex* Linnaeus, the following also come near *S. araneus* Linnaeus: *S. praeareaneus* Kormos, *S. araneoides* Heller and *S. pachyodon* Pasa. *S. araneoides* Heller, recorded from the Sackdillinger Höhle and from Erpfingen in Germany (F. Heller, 1930a, 1936b), differs from the Podlesice specimens by somewhat smaller dimensions (length of mandibular ramus being 8.9 mm, height 1.2 mm), while the  $M_1$ - $M_3$  length is markedly greater, being 3.75 mm. This form also shows a slightly different shape of the articular process. *S. pachyodon* Pasa from northern Italy has not

been described with much exactitude since no comparisons were drawn with other living or extinct species. Its dimensions agree with those of our form but the shape of the articular process seems to differ considerably. Finally, *S. praeearaneus* Kormos from the „Preglacial” of Hungary comes closest to the here considered fossil remains. Regretfully, the drawing given by T. Kormos (1934) represents the skull only, without the mandible, though it is accompanied by a detailed description of the differences found between the skull of his form and that of *S. araneus* Linnaeus. In any case, the description of the mandible leads to the conclusion that the position of the mental foramen in the Podlesice specimens agrees with that in *S. praeearaneus* Kormos, also that their fossa pterygoidea terminates lower down than in *S. araneus* Linnaeus. The dimensions of the Hungarian and the Podlesice species fully agree too. Yet a sure identification cannot be determined until the fossil remains here considered have been compared with specimens of all other fossil species from the *S. araneus* Linnaeus group. The holotype of *S. praeearaneus* Kormos is wanting in the collection at the Zoological Department of the National Museum in Budapest, where most of the types of species described by T. Kormos are deposited. M. Kretzoi (personal communication) believes this species to be identical with *S. runtonensis* Hinton.

*Sorex* sp.

(pl. II, fig. 1)

*Material.* — Fragment of mandible without processes, with a broken  $I_2$  and perfect  $P_2$ ,  $P_4$ ,  $M_1$  and  $M_2$ .

*Description.* — Mandibular ramus very slight and thin. The mental foramen set between  $P_4$  and  $M_1$ .

Tooth points pigmented to a pale yellowish tint. The found specimen of  $I_2$  has its end broken off. There are three clearly shown lobes on the preserved portion.  $P_1$  is elongated, probably two-cusped, one of the two cusps being very poorly marked.  $P_4$  is distinctly two-cusped.  $M_1$ - $M_3$  have a well developed cingulum.

*Dimensions.* The height of mandible below  $M_2$  is 0.77 mm, the thickness at this point being 0.5 mm. Length of tooth-row without  $I_2$  is about 3.8 mm.

*Systematic position.* — The presence of 3 lobes on the margin of the upper incisor refers the preserved specimen to genus *Sorex* Linnaeus. The lack of mandibular processes and of a complete tooth row is in the way of a closer determination of its systematic position. In what size is concerned the found mandible approaches the mandible of *S. minutissima* Heim de Balsac, recorded from the late Pleistocene of France

(H. Heim de Balsac, 1940). The Podlesice remains, however, differ from the French form by the position of the mental foramen.  $P_1$ , so characteristically elongated in the Podlesice form, cannot be compared with that of the French form, since it is lacking in the only specimen of mandible belonging to *S. minutissimus* Heim de Balsac, which has hitherto been discovered.

Genus *Petenyia* Kormos, 1934

*Petenyia hungarica* Kormos, 1934

(pl. I, fig. 9, 10; text-fig. 1b)

1930. *Petenyia hungarica* n. gen. & n. sp.; T. Kormos, Beiträge..., p. 57 (nomen nudum).  
 1934. *Petenyia hungarica* n. gen. & n. sp.; T. Kormos, Neue Insectenfresser.... p. 301-303, fig. 34, 35.  
 1936. *Petenyia hungarica* Kormos; F. Heller, Eine oberpliocäne Wirbeltierfauna.... p. 108-109, pl. 7, fig. 3, 4.  
 1949. *Petenyia hungarica* Kormos; M. Friant, Les Musaraignes.... p. 254, fig. 16.

*Material.* — 3 fragments of mandible, one with almost perfect processes and  $M_1$ - $M_3$ , the second with processes and dentition badly damaged, the third with  $M_1$ - $M_3$ .

*Description.* — The anterior margin of the coronoid process meets the mandibular ramus at a highly obtuse angle, the upper portion of the process, however, is somewhat curved upwards. The upper surface of the coronoid process is parted by a groove separating the cardinal area of the joint surface from its widened out portion pointing backwards. The fossa pterygoidea is triangular, low, elongating upwards into a shallow, poorly distinct canal. The two facets of the articular process are united by a broad area. The upper facet is placed markedly obliquely in relation to the lower one. Of the angular process only the basal part, relatively broad, is preserved. The mandibular ramus shows a slightly convex lower margin, it is robust and massive. In the only perfect mandibular ramus two mental foramina occur, one below the paraconid, the other one below the protoconid of  $M_1$ .

Points of teeth are pigmented to a dark-brown colour. The terminal part of  $I_2$  is curved inwards. In addition to the terminal lobe there are also two other low lobes on the incisor.  $I_1$  is short, with one cusp.  $P_4$  bears one distinct cusp, beyond it an indistinct weakly marked elevation is visible on the cutting surface. Most characteristic is the structure of  $M_3$  with 4 cusps only, since the metaconid is altogether wanting. The posterior portion of this tooth is very narrow, in form distinctly different from genera *Sorex* Linnaeus and *Neomys* Kaup.

*Dimensions* (in mm):

|  |     |     |     |
|--|-----|-----|-----|
| Mandibles  | 1   | 2   | 3   |
| length of mandibular tooth-row with $I_2$                | --  | 8.4 | .   |
| same without $I_2$                                       | --  | 5.0 | --  |
| length of $M_1$ - $M_3$                                  | 3.6 | 3.6 | 3.9 |
| height of mandibular ramus on the inner side below $M_2$ | 1.4 | 1.6 | 1.6 |

*Systematic position.* — Within the subfamily of Soricinae, characterised by pigmentation of tooth points, *Petenyia* Kormos and *Beremendia* Kormos only, two extinct genera, have  $M_3$  with four tubercles. This brings them nearer to representatives of the subfamily Crocidurinae, whose teeth, however, lack pigmentation. Genus *Beremendia* Kormos contains but one species, the *B. fissidens* (Petenyi) with very large dimensions. The preserved fragments of mandibles from Podlesice, distinguished by strong pigmentation of teeth,  $M_3$  with four tubercles, and small size, are referable to genus *Petenyia* Kormos. This genus was established in 1934 by T. Kormos for the species *Petenyia hungarica* Kormos recorded from the „Preglacial” of Hungary. In 1936, F. Heller also recorded this species from Gundersheim in Germany (F. Heller, 1936 a). In 1943 M. Kretzoi described two new species of this genus, *P. neglecta* Kretzoi and *P. stehlini* Kretzoi. These descriptions lack completeness, the differences given are so slight and little pronounced, that the names may probably be considered synonymous. Finally, in 1948, A. Pasa described *P. suavensis* Pasa, a new species of this genus from early Pleistocene deposits of north Italy. This latter species differs from *P. hungarica* Kormos by its somewhat smaller dimensions.

The dimensions of the Podlesice specimens approach those of *P. hungarica* Kormos. Assignment to that species is also suggested by the characteristic structure of the coronoid and articular processes. Height of mandible of *P. hungarica* Kormos has without doubt been erroneously stated by that author to be 2.3-2.5 mm. These figures should probably read 1.3-1.5 mm and would thus agree with the dimensions in the drawing. The Podlesice specimens seem to be somewhat larger than those from Hungary.

Genus *Soriculus* Blyth, 1855*Soriculus kubinyi* Kormos, 1934

(pl. II, fig. 3)

1934. *Soriculus kubinyi* n. sp.; T. Kormos, Neue Insectenfresser..., p. 303-304, fig. 36.1938. *Soriculus kubinyi* Kormos; M. Friant, Les Musaraignes..., p. 246-247, fig. 12.

*Material.* — 3 fragments of mandibles without processes, two with complete tooth-row.

*Description.* — The mental foramen is set at mid-length of  $M_1$ . The teeth are large, their points pigmented to a pale orange-brown hue. The second lower incisor has one flat lobe besides the terminal one. This tooth is relatively short.  $P_1$  is elongated, indistinctly two-cuspidate.  $P_4$  is with two cusps.  $M_3$  has five tubercles. The cingulum round the molars is well developed.

*Dimensions* (in mm):

|  |      |     |
|--|------|-----|
| Mandibles  | 1    | 2   |
| length of mandibular tooth-row with $I_2$                | 6.3  | 6.4 |
| same without $I_2$                                       | 4.65 | 4.8 |
| length of $M_1$ - $M_3$                                  | 3.55 | 3.6 |
| height of mandibular ramus on the inner side below $M_2$ | 0.7  | —   |

*Systematic position.* — Pigmentation of teeth suggests the assignment of the found remains to subfamily Soricinae, while the presence of five tubercles on  $M_3$  and the simple structure of the  $I_2$  make them referable either to genus *Neomys* Kaup or *Soriculus* Blyth. The essential differences between these two genera consist in the number of upper teeth, while their identification on fragments of mandible meets with some difficulties. An exceptionally short  $I_2$  is, however, suggestive of genus *Soriculus* Blyth which is represented in the early Pleistocene deposits of Europe by *Sorex kubinyi* Kormos of Hungary. A comparison of the Podlesice specimens with the holotype and other early Pleistocene specimens from Hungary shows them to be conspecific. T. Kormos (1934) states the length of the tooth-row with the incisor as from 6.6 to 6.7 mm, our specimens are therefore somewhat smaller.

Subfamily **Crocidurinae** Milne Edwards, 1868-1874

*Suncus* cf. *pannonicus* (Kormos, 1934)

Genus *Suncus* Ehrenberg, 1832

*Suncus* cf. *pannonicus* (Kormos, 1934)

(pl. II, fig. 2; text-fig. 1e)

*Material.* — Mandibular ramus with almost perfect processes, with damaged  $I_2$  and complete  $P_4$ - $M_3$ ; also fragment of mandible with perfect processes and  $M_1$  preserved.

*Description.* — The mandible slight but with rather massive ramus. The coronoid process meets the mandibular ramus at a slightly obtuse angle. Its terminal portion is narrow, pointed, gently inclined to the front. The fossa pterygoidea is deep, rounded at top, elongating upwards into a shallow canal. The lower facet of the articular process is strongly convex, elongated, obliquely placed, pointed on the lingual side. The upper

facēt is short, almost parallel to the lower surface with which it is united by means of a narrow area, rather deeply arcuately embayed on the lingual side. The angular process is thin, straight, elongated. The mental foramen is set at half-length of the  $M_1$ .

Teeth without pigmentation. In the available specimen  $I_2$  has its tip broken off, but the preserved portion shows that there were no accessory lobes on the cutting surface.  $P_1$  is not preserved.  $P_4$  is uni-cuspidate.  $M_1$ - $M_3$  have a strongly developed cingulum. In  $M_3$  the talonid is greatly reduced, one cusped. This tooth consists almost entirely of the trigonid, the talonid being but one fourth of the length of tooth and considerably lower than the trigonid.

*Dimensions.* The perfect mandibular ramus is 5.75 mm long. Its height measured below  $M_2$ , on the inner side, is 0.85 mm; length of tooth-row without the  $I_2$  about 3.2 mm, length  $M_1$ - $M_3$  2.6 mm, thickness of mandibular ramus below  $M_2$  0.8 mm. The preserved fragment of another mandible shows the height of the ramus under the second lower molar to be 0.92 mm, thickness 0.6 mm. The  $M_1$  is about 1.0 mm long and 0.6 mm broad.

*Systematic position.* — The lack of tooth pigmentation and the absence of the third tubercle in  $M_3$  suggest the assignment of the found specimens to the subfamily of Crocidurinae. On their extremely small dimensions they are referable to no other genus but *Suncus* Ehrenberg. From *S. etruscus* (Savi), the only recent representative of genus *Suncus* Ehrenberg, encountered within Europe, our form differs by its smaller dimensions and unusually strong reduction of talonid in  $M_3$ . Furthermore, in Podlesice specimens, the coronoid process is gently inclined to the front, and the mental foramen is placed at midpoint of  $M_1$ , instead of between  $P_4$  and  $M_1$ , as it is in *S. etruscus* (Savi).

• In 1934 species *Suncus pannonicus* (Kormos) was described by T. Kormos from the „Preglacial” of Hungary, on 3 fragments of mandible. This description agrees with the features of our specimens, the length of the perfect mandibular ramus from Hungary, however, was 6.3 mm, while that in our specimen was hardly 5.75 mm. The height and thickness of the mandible are also somewhat greater in the Hungarian specimen, but the length of the row of molars is identical, being in both cases 2.6 mm. On comparing with holotype in the collection at the Zoological Department of the National Museum in Budapest, it was found that the coronoid process in Podlesice specimens is lower and shorter than that in the holotype. Material available from Podlesice and Hungary being scanty, it is impossible to ascertain whether these differences range beyond individual variability.

T. Kormos (1934) is of the opinion that the exceptional reduction of the third lower molar may suggest the inclusion of *S. pannonicus* (Kor-

mos) described by him, to a new genus which should then be called „*Allopachyura*“. But unfortunately, our material also confined to fragments of mandible, is by no means more adequate, so as to lead to a solution of this problem. All the subfamily of Crocidurinae show a tendency to reduce their  $M_3$ ; we also encounter this tendency, with varying intensity, in other species of genus *Suncus* Ehrenberg. The evidence, therefore, for the establishment of a new genus „*Allopachyura*“ is not too strong.

**Chiroptera** Blumenbach, 1779

Family **Rhinolophidae** Bell, 1836

Genus *Rhinolophus* Lecépède, 1799

*Rhinolophus* cf. *ferrumequinum* (Schreber, 1774)

(pl. II, fig. 5, 6)

*Material.* — The anterior portion of the skull, with preserved  $P_1$ - $M_3$ , of both sides of the jaw (teeth notation after G. S. Miller, 1907), 20 fragments of maxilla, 27 mandibles and their fragments.

*Description.* — The form of the rostral part of skull is similar to that in recent specimens of *R. ferrumequinum* (Schreber). The upper canine is large, but its cingulum is somewhat less strongly developed than in studied recent specimens. The anterior premolar is always present, though it is slight and projecting outwards from the maxillary tooth-row.  $P^4$  resembles that in recent specimens.  $M^1$  shows a broadened out coronal base which forms a characteristic embayment on the lingual side, directed backwards. In the second molar this embayment is less distinct though it is more strongly developed than in recent specimens. Outside of this detail, the upper molars agree with those in recent skulls available to the writer.

The coronoid process is low, rounded, passing by a gently sloping margin backwards into the articular process. The angular process is elongated, narrow. The mental foramen is placed below  $P_1$ . The surface of the symphysis is ovate, somewhat pointed at the ends. The first incisor is not perfectly preserved in any of the found mandibles. The second incisor is with three distinct uniseriate tubercles. The canine is lower than in recent specimens available to the writer for examination; it is also less strongly curved.  $P_2$  is low, conical.  $P_2$  and  $P_4$  do not unite as in the examined specimens of recent forms; a fissure is seen intervening into which  $P_3$  is squeezed which has been pushed out of the tooth-row.  $P_3$  generally displays weaker reduction than that in recent specimens available to the author for the sake of comparison.  $P_1$ - $M_3$  have developed as those in recent specimens.

*Dimensions* (in mm):

| Maxilla   | 1    | 2    | 3    | 4   | 5    | 6   |
|---|------|------|------|-----|------|-----|
| length of P <sub>4</sub> — M <sub>3</sub>                   | 6.4  | 6.5  | 6.4  | 6.5 | 6.5  | 6.9 |
| „ M <sub>1</sub> — M <sub>3</sub>                           | 5.3  | 5.3  | 5.3  | 5.2 | 5.3  | 5.7 |
| Mandibles   | 7    | 8    | 9    | 10  | 11   |     |
| mandibular length   | 16.2 | 16.3 | 16.4 | —   | 16.3 |     |
| length of tooth-row   | 10.0 | 9.8  | 9.9  | 9.5 | 10.0 |     |
| „ C — M <sub>3</sub>  | 9.2  | 9.1  | 9.2  | 9.5 | 9.5  |     |
| „ M <sub>1</sub> — M <sub>3</sub>                           | 6.0  | 6.0  | 5.9  | 5.2 | 6.3  |     |
| height of mandibular ramus from inside under M <sub>2</sub> | 2.1  | 2.0  | 2.1  | 2.1 | 1.9  |     |
| thickness of mandibular ramus below M <sub>2</sub>          | 0.9  | 0.9  | 1.0  | 1.1 | 1.0  |     |
| Mandibles (continued)                                       | 12   | 13   | 14   | 15  | 16   |     |
| mandibular length   | —    | —    | —    | —   | —    |     |
| length of tooth-row   | 10.2 | 10.5 | 10.2 | 9.8 | —    |     |
| „ C — M <sub>3</sub>  | 9.5  | 9.8  | 9.5  | 8.9 | —    |     |
| „ M <sub>1</sub> — M <sub>3</sub>                           | 6.3  | 6.3  | 6.2  | 6.0 | 6.1  |     |
| height of mandibular ramus from inside under M <sub>2</sub> | 2.1  | 2.1  | 2.0  | 2.0 | 2.0  |     |
| thickness of mandibular ramus below M <sub>2</sub>          | 1.0  | 1.0  | 1.1  | 1.0 | 1.0  |     |

*Systematic position.* — The here described remains do not in any essential way differ from recent specimens of *Rhinolophus ferrumequinum* (Schreber) from central Europe, available for comparison to the author. The morphological differences that have been observed, such as a somewhat different form of the second upper molar, lower mandibular canine and weaker reduction of the third lower premolar, are probably no more than individual variations, and closer examination and investigation in this respect of numerous series of fossil and recent specimens would be needed to determine if they are different. A most peculiar feature is the persistence until now of M<sub>3</sub>, a tooth displaying such extreme slightness in fossil specimens that it must have, in all probability, been completely hidden in the gum and should be regarded as a vestigial organ. The dimensions of the fossil specimens are somewhat smaller than those given by G. S. Miller (1912), for recent specimens, but approaching those cited by F. Heller (1936a) for both fossil and recent material. In any case, these differences of size are quite unimportant.

Remains of a bat referred to as "*Rhinolophus* aff. *ferrumequinum* Schreber" are recorded from early Pleistocene deposits of Germany, Po-

land, Hungary, Rumania and China. From Choukoutien, C. C. Young (1934) describes a new form, *R. pleistocaenicus* Young, approaching *R. ferrumequinum* (Schreber). The description of this new form is not sufficiently detailed and lacks a comparison with recent forms which makes difficult the determination of its systematic position.

Family **Vespertilionidae** Gray, 1821

Subfamily **Miniopterinae** Miller, 1907

Genus *Miniopterus* Bonaparte, 1837

*Miniopterus schreibersi* Kuhl, 1819

(pl. II, fig. 4)

*Material.* — Four perfect mandibles and one fragment of mandible. The teeth represented by this material are  $P_3$ - $M_3$ .

*Description.* — The coronoid process is low, curving frontally. The margin between it and the articular process runs almost horizontally. The articular process is mound-like, set perpendicularly to the long axis of the mandibular ramus. The articular process is directed obliquely outwards. The mental process is large, it lies between C and  $P_2$ .

No incisors or canines are preserved. The alveolar of the canine is rather small, ovate.  $P_2$  is fairly large, with one root.  $P_3$  was larger than  $P_2$ , with two roots, pyramidal, showing a distinct cingulum.  $P_4$  is one and a half times as large as  $P_3$ , also prismatic, with its apex in line with tips of molars.

*Dimensions* (in mm):

| Mandibles  | 1    | 2   | 3    | 4    | 5   |
|--|------|-----|------|------|-----|
| mandibular length                                  | 10.5 | —   | 10.3 | 10.5 | —   |
| length of tooth-row                                | 7.0  | 7.0 | 6.9  | 6.7  | —   |
| „ C — $M_3$  | 6.1  | —   | —    | 6.2  | —   |
| „ $P_4$ — $M_3$                                    | 4.3  | —   | —    | 4.5  | —   |
| „ $M_1$ — $M_3$                                    | 3.8  | 3.9 | —    | 3.7  | —   |
| height of mandibular ramus from inside below $M_2$ | 1.4  | 1.4 | 1.4  | 1.4  | 1.4 |
| thickness of mandibular ramus under $M_2$          | 0.6  | 0.7 | 0.7  | 0.6  | 0.8 |

*Systematic position.* — Number of premolars, their increasing size from  $P_2$ - $P_4$  and two roots of  $P_3$  all suggest their assignment to genus *Miniopterus* Bonaparte. A comparison of recent specimens of *M. schreibersi* (Kuhl) with fossil specimens from Podlesice has shown them to agree perfectly in form of mandibular ramus, dentition and size.

*Miniopterus schreibersi* (Kuhl) now has a wide range of distribution within the tropics and the warmer belts of the moderate zone of the Old World. From earlier Pleistocene deposits it has thus far been recorded from Germany, Rumania and China. The described fossil remains have displayed no differences as compared to living forms.

Subfamily **Vespertilioninae** Miller, 1879

Genus *Plecotus* Geoffroy, 1813

*Plecotus crassidens* Kormos, 1930

(pl. III, fig. 1, 2)

1930. *Plecotus crassidens* n. sp.; T. Kormos, Diagnosen..., p. 238.

**Material.** — Two damaged skulls with destroyed braincases, two other fragments of skull, 6 mandibles. The teeth represented in this material are  $P^4-M^3$  and  $P_1-M_3$ .

**Description.** — The rostrum is broad, much more so than in *Plecotus auritus* (Linnaeus). The notch at the front of the rostrum is differently shaped than that in *P. auritus* (Linnaeus), it is broader and its palatal aspect is cordate and not rounded. The bony palate reaches backwards beyond the tooth-row to a distance equal to one molar breadth. The rostrum is flattened, distinctly depressed in the cranial axis, without lacrimal ridge.

In  $P^4$  the labial portion is broader and not so obliquely set as that in *P. auritus* (Linnaeus).  $M^1-M^3$  are larger and more massive than in living form.

The coronoid process is distinctly pointed. Its posterior margin curves arcuately downwards to the articular process which is in shape of a mound. The angular process curves backward to the outside, it is broad, with a blunt end. The horizontal portion of the mandibular ramus is low, broad, rounded from the outside. In most mandibles the mental process is placed between the canine and  $P_2$ , or under the latter, in one of the mandibles it is between  $P_2$  and  $P_3$ . The symphysis is broadly oval.

The alveolus of the canine indicates its small size. On evidence of the alveolus  $P_3$  was not large, smaller than  $P_2$ . In  $P_4$  the coronal base is subquadrate with a strong cingulum. Its crown does not extend to the level of molar tips. The molars are large, with sharply pointed cusps and a strong cingulum. In  $M_3$  the talonid is narrower than the trigonid. The molars are broader and more robust than those in *Plecotus auritus* (Linnaeus).

*Dimensions (in mm):*

| Skulls                             |     |     |     |  |  |  |
|------------------------------------|-----|-----|-----|--|--|--|
|                                    | 1   | 2   | 5   |  |  |  |
| length of tooth-row (alveolar)     | 6.4 | 6.3 | 6.5 |  |  |  |
| .. P <sup>1</sup> — M <sup>3</sup> | 4.4 | 4.1 | 4.3 |  |  |  |
| .. M <sub>1</sub> — M <sub>3</sub> | 3.5 | 3.2 | 3.2 |  |  |  |
| interorbital constriction          | 4.6 | 4.7 | —   |  |  |  |

| Mandibles                          |      |      |      |     |     |      |
|------------------------------------|------|------|------|-----|-----|------|
|                                    | 4    | 5    | 6    | 7   | 8   | 9    |
| mandibular length                  | 10.6 | 10.8 | 10.8 | —   | —   | 10.7 |
| length of tooth-row                | 6.7  | 6.7  | 6.7  | —   | —   | 6.8  |
| .. C — M <sub>3</sub>              | 5.6  | —    | —    | —   | —   | —    |
| .. P <sub>4</sub> — M <sub>3</sub> | 4.3  | —    | —    | —   | —   | —    |
| .. M <sub>1</sub> — M <sub>3</sub> | 3.7  | —    | —    | —   | —   | —    |
| height of mandibular ramus         | 1.5  | 1.2  | 1.5  | 1.5 | 1.1 | 1.4  |
| thickness of same                  | 0.7  | 0.7  | 0.7  | 0.7 | 0.7 | 0.8  |

*Systematic position.* — In the specimens of bats recovered from the Podlesice material, skulls and mandibles are detached without anatomic connection. This makes it extremely difficult to fit in skulls to their proper mandibles. The skulls here described differ distinctly from those of *Myotis* Kaup, which predominate numerically. They show but two maxillary premolars, while the *Myotis* Kaup have three. In the mandibular material a group of mandibles is well differentiated, showing a different shape of the coronoid process and a low and broad mandibular process. From among eligible genera, only *Myotis* Kaup, *Miniopterus* Bonaparte and *Plecotus* Geoffroy are with three premolars. Genus *Miniopterus* Bonaparte can readily be distinguished on proportions of its P<sub>2</sub> and P<sub>3</sub>, and the presence of two roots in P<sub>3</sub>. Taking into consideration the shape of the coronoid process, the smaller height of P<sub>4</sub> as compared with that of the molars and the strong differentiation shown by the proportions of the mandibular ramus from those in the majority of other mandibles, the here mentioned group of mandibles is doubtlessly referable to genus *Plecotus* Geoffroy. By the skulls these also approach genus *Plecotus* Geoffroy, though they do show a number of important differences from *P. auritus* (Linnaeus), the only living representative of that genus.

The conspecific identity of the here described skulls and mandibles is confirmed by the numerical correlation of the found specimens: 4 skulls, 6 halves of mandibles (4 right-side ones), by the agreement in dimensions, particularly so the identical molar breadth and similar length of tooth row, namely from 6.3 to 6.5 mm in the maxilla and from 6.7 to

6.8 mm in the mandible, these being in agreement with proportions shown by the living species, *P. auritus* (Linnaeus).

Upon ascertaining conspecific identity of the here described skulls and mandibles we may give its dental formula as follows:

$$\begin{array}{cccc} 2 & 1 & 2 & 3 \\ \hline 3 & 1 & 3 & 3 \end{array}$$

Among the Old World bats this formula is found in genera *Plecotus* Geoffroy and *Miniopterus* Bonaparte only. Genus *Miniopterus* Bonaparte, however, may not be here taken into consideration owing to differences of cranial and mandibular structure as here above mentioned. We may therefore refer the described bat to genus *Plecotus* Geoffroy.

In recent fauna genus *Plecotus* Geoffroy is represented by one species only, the *P. auritus* (Linnaeus) with several subspecies. It was also mentioned by T. Kormos (1937a) from Püspökfördö and Brasso from the „Preglacial“ of Rumania, by F. Heller (1930b, 1936a) from the early Pleistocene of Moggaster Höhle and Gundersheim in Germany, and from the German cave Gaisloch by G. Brunner (1950). In addition to these, a new species, the *Plecotus abeli* Wettstein was described by O. Wettstein-Westersheim (1931) from the younger Pleistocene deposits of Drachenhöhle in Austria, and *P. crassidens* Kormos by T. Kormos (1930a) from the „Preglacial“ of Püspökfördö in Rumania.

The here described Podlesice remains differ from the living species by a number of diagnostic characters mentioned above. These differences are most striking in the structure of skull, less distinct in that of the mandible. The latter, however, is distinctly more robust and provided with larger dentition in the fossil form. A comparison of the Podlesice specimens with the Pleistocene finds identified with *Plecotus auritus* (Linnaeus), from Moggaster Höhle, Gaisloch, Püspökfördö and Brasso is impossible owing to lack of a description of these remains. F. Heller (1936a) gives the description, dimensions and photograph of the mandible of “*Plecotus* aff. *auritus* L.” from Gundersheim, which he thinks identical with recent specimens, but want of clearness in the photograph and the superficial description do not allow a comparison with the Podlesice specimens. The dimensions of the mandible from Gundersheim are within the range of variations shown by the Podlesice form.

The late Pleistocene *Plecotus abeli* Wettstein is believed to be somewhat smaller than *P. auritus* (Linnaeus), the measurements, however, cited in the paper, do not confirm this. The skull of *P. abeli* Wettstein is asserted to be more narrow than that of the living species. This latter character bars it from relationship with the distinctly broader Podlesice

form. It would appear that *P. abeli* Wettstein may only be regarded as a subspecies of *P. auritus* (Linnaeus).

*Plecotus crassidens* Kormos has been reported on one detached mandible, very superficially described, with one dimension given only ( $P_4-M_3$  being 4.45 mm) and not figured at all. In addition to unimportant and vaguely described differences in the structure of processes, this form is believed to differ from *P. auritus* (Linnaeus) by a lower crown of  $P_4$  (which, however, is a feature dependent on the age of the individual), a more oblique position of this tooth and the breadth of  $M_3$ , regarded as the essential point of differentiation. This tooth believed to be equally broad, posteriorly and anteriorly, thus being far more massive. In the described Podlesice form it is true that  $M_3$  shows a certain posterior narrowing, but it is actually more massive than that in *P. auritus* (Linnaeus). A comparison with the holotype in the palaeontological collection of the Geological Institute in Budapest shows that the characters of this holotype lie within the range of individual variability of the Podlesice specimens. The systematic position of the Polish specimens is, therefore, certain.

Cranial structure of the Podlesice specimens, so markedly differing from that in *P. auritus* (Linnaeus), may be suggestive of a species related to the American genus *Corynorhinus* Allen, which some writers, G. G. Simpson (1945) for example, do refer to genus *Plecotus* Geoffroy. Genus *Corynorhinus* Allen is distinguished by the absence of the lacrimal ridge, this being also the characteristic feature of the Podlesice specimens. Since the Americano-Eurasian connexions are decisively strong in the early Pleistocene, as referred to in the introduction to this paper, a suggestion of this kind does not seem devoid of probability. It, however, calls for confirmation on comparative material from genus *Corynorhinus* Allen.

#### Genus *Myotis* Kaup, 1829

#### *Myotis podlesicensis* n. sp.

(pl. II, fig. 7, 8)

*Holotype*. — Mandible with perfect processes and dentition,  $P_3$  excepted.

*Stratum typicum*. — Günz-Mindel Interglacial.

*Locus typicus*. — Podlesice near Kroczyce, Olkusz district.

*Derivatio nominis*. — *podlesicensis* - from Podlesice, name of locality at which the here described bone breccia was discovered.

*Material*. — 1 skull, almost complete, 4 others damaged, also numerous cranial fragments, 12 almost complete mandibles and numerous mandibular fragments.

*Description.* — Skull fairly broad, the breadth of the braincase slightly exceeding that of the rostrum and attaining nearly half of the maximum cranial length. Dorsal section of skull gently ascending. The sagittal crest low but distinct, as is also the lambdoidal.

The upper incisors attaining half the length of the canine apply very close to each other, but are separated from the canine by a well marked diastema. They are both two-cusped, with a distinct cingulum on the second one. The upper canine is high, but narrow, strongly curving backwards. Its cingulum is low, yet it is distinct, not uniformly developed all round. The two first premolar teeth are crowded but to a varying extent in the several skulls; between the canine and P<sup>2</sup> or between P<sup>3</sup> and P<sup>4</sup> there may be a slight diastema. On P<sup>2</sup> and P<sup>3</sup> the cingulum is strongly developed. P<sup>3</sup> is slight, occasionally somewhat projected lingually from the tooth-row. On P<sup>4</sup> the cingulum does not develop accessory tubercles. The crown of P<sup>4</sup> protrudes strongly above the crowns of molars. The protoconule is absent from the cheek teeth. M<sup>3</sup> shows no signs of reduction, its metacone is well developed. The surface of M<sub>3</sub> is about three fourths that of M<sup>2</sup>.

The coronoid process of the mandible is rather low, with its apex flattened. The angular process is pointed. The symphysis is broad, not too long. The mental foramen lies beneath the commissure of the canine with P<sub>2</sub> or beneath P<sub>2</sub>.

The mandibular incisors are strongly imbricated. The I<sub>1</sub> shows three distinct tubercles and a fourth weaker one on the posterior end of the crown. This latter tubercle disappears in more worn teeth. The I<sub>2</sub> is slightly thicker than I<sub>1</sub> and in the principal axis of the tooth also shows four tubercles, their number being reduced to three in teeth which are more worn. There is another accessory tubercle on that tooth, lower than the other tubercles, placed on the lingual side. On the labial side this tooth has a distinct cingulum. The I<sub>3</sub> is twice as broad as I<sub>2</sub> and also displays a distinct cingulum both on the labial and the caudal side. There are two large tubercles on its outer side and from two to three lower ones, less distinct on the lingual side.

The canine is not large, gently curving backwards, with a distinct cingulum whose anterior margin is ascending. The first two premolars are loosely set, the second one being slightly smaller than the first. P<sub>4</sub> is with a distinct cingulum, its apex is flush with the apexes of the molars. The length of P<sub>4</sub> is about 1.1 mm, its breadth 0.7 mm, so that it has a slender elongate form. The talonid of M<sub>3</sub> does not show distinct reduction though it is narrower and lower than the trigonid.

*Dimensions (in mm):*

| Skulls  | 1    | 2    | 5    | 4    | 5    |
|---|------|------|------|------|------|
| condylobasal length   | 17.6 | 16.7 | —    | —    | —    |
| interorbital constriction                                     | 4.9  | —    | —    | —    | —    |
| breadth of braincase  | 8.5  | 8.4  | —    | —    | —    |
| length of tooth-row   | 8.6  | 8.2  | 8.6  | 8.2  | 8.6  |
| Mandibles   | 1    | 2    | 5    | 4    | 5    |
| mandibular length   | 13.9 | 14.2 | 14.2 | 13.9 | 14.0 |
| length I <sub>1</sub> — M <sub>3</sub>                        | 9.2  | 9.4  | 9.2  | 9.2  | 8.8  |
| „ C — M <sub>3</sub>  | 7.8  | 8.1  | 8.5  | 7.8  | 8.2  |
| „ P <sub>1</sub> — M <sub>3</sub>                             | 5.4  | 5.4  | 5.7  | 5.5  | 6.0  |
| „ M <sub>1</sub> — M <sub>3</sub>                             | 4.4  | 4.4  | 4.7  | 4.4  | 4.9  |
| height of mandibular ramus on the inside under M <sub>1</sub> | 2.1  | 1.8  | 2.4  | 2.1  | 2.1  |
| thickness of mandibular ramus under M <sub>1</sub>            | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  |
| length of symphysis   | 3.2  | 3.0  | 3.2  | 3.2  | 3.2  |
| Mandibles (continued)   | 6    | 7    | 8    | 9    | 10   |
| mandibular length   | 13.7 | 13.9 | 14.3 | 14.0 | —    |
| length I <sub>1</sub> — M <sub>3</sub>                        | 9.0  | 9.0  | 9.4  | 9.4  | 9.2  |
| „ C — M <sub>3</sub>  | 7.8  | 7.4  | 8.4  | 8.0  | 8.4  |
| „ P <sub>1</sub> — M <sub>3</sub>                             | 5.4  | 5.5  | 5.8  | 5.7  | 5.7  |
| „ M <sub>1</sub> — M <sub>3</sub>                             | 4.4  | 4.4  | 4.7  | 4.5  | 4.6  |
| height of mandibular ramus on the inside under M <sub>1</sub> | 1.9  | 2.0  | 1.9  | 1.8  | 2.0  |
| thickness of mandibular ramus under M <sub>1</sub>            | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  |
| length of symphysis   | 3.0  | 3.1  | 3.2  | 3.2  | 3.3  |

*Systematic position.* — Genus *Myotis* Kaup has the widest distribution and in all probability is the predominant genus of bats as respects number of forms, at the same time being one of the most primitive and most ancient genera. Nine species of this genus are now living in Europe, some of them have also been recorded from the Pleistocene; 13 extinct species have been described from Pleistocene deposits of Europe, partly perhaps referable also to the younger Pliocene. 8 of them have been collected in one site at Gundersheim, Germany (F. Heller, 1936a). Unfortunately, the descriptions of these forms made on evidence of mandibles only, do not give a clear picture of their mutual relationships and their connections with the living species. In any case it seems that representatives of genus *Myotis* Kaup have displayed considerable variability during

the Quaternary period, contrary to other markedly more conservative genera of bats.

It was not until quite recent years that G. H. Tate (1941) made an attempt at splitting up genus *Myotis* Kaup into subgenera, at the same time trying to determine their mutual relationships. It is to be regretted that his classification is based essentially on soft parts and therefore hardly applicable with respect to fossil material. In principle it is concerned with Old World forms only, though it may also be used in respect to American species. Some species, however, are not assignable to any of the subgenera described by G. H. Tate. Lately, A. P. Kuzjakin (1947), without referring to Tate's work and to his division into subgenera, has presented an endeavour at determining the relationship of the palaeartic species belonging to genus *Myotis* Kaup, essentially in agreement with the suggestions of the American writer. None of the papers, however, concerned with fossil bats, have thus far been based on the subgeneric systematics of genus *Myotis* Kaup.

According to G. H. Tate (1941), *Selysius* Bonaparte is the original and central subgenus within genus *Myotis* Kaup. It contains among others species *M. mystacinus* (Kuhl) and *M. emarginatus* (Geoffroy). The various lines of specialization are represented by the following subgenera: *Paramyotis* Bianchi (with the only Eurasian species *M. bechsteini* (Kuhl)); *Myotis* Kaup s. str. (including the species *M. myotis* (Borkhausen) and *M. oxygnathus* (Monticelli)); *Isotus* Kolenati (with species *M. nattereri* (Kuhl)); and *Leuconoe* Boie (species *M. daubentoni* (Kuhl), *H. dasyncneme* (Boie)). The tropical subspecies *Chrysopteron* Jentink and *Rickettia* Bianchi are not here taken into account.

It is characteristic that the specialized subgenus of *Myotis* Kaup s. str. is rare in the Pleistocene, the only sure site of occurrence being that at Sutto (T. Kormos, 1937a) in Hungary, from rather late Pleistocene deposits. On the other hand, *Myotis bechsteini* (Kuhl), a relatively primitive form and very rare today, is one of the most abundant Pleistocene forms. Some of the fossil forms apparently represent intermediate links between the subgenera that have now been separated, for example *Myotis baranensis* Kormos displays initial characters of specialization common in subgenus *Myotis* s. str. The majority, however, of the fossil forms cannot be surely referred to any of the established subgenera.

The identification of material belonging to genus *Myotis* Kaup from Podlesice has met with considerable difficulties in spite of its satisfactory state of preservation and its great numerical abundance, i. e. several hundreds of well preserved mandibles. Skulls as well as mandibles were readily differentiated into four groups of various size, which enabled the specific correlation of skulls and mandibles. One of the size groups,

however, was found to contain two forms differing from each other by structure of dentition both maxillar and mandibular. The correlation of skulls and mandibles was also possible through a comparative analysis of the extent of reduction in  $M_3$  and  $M^3$ , the degree of tightness in the premolars, the breadth of molars, the shape of  $P^4$  and  $P_4$ . It is regretted that a comparative study of the here considered forms with other fossil species was greatly hindered by the inadequateness of the available descriptions based solely on mandibles.

*Myotis podlesicensis* n. sp., which is the largest species belonging to genus *Myotis* Kaup from Podlesice, cannot be surely identified with any recent European species. Its assignment to subgenus *Myotis* Kaup s. str., which is also very closely approached by the extinct species *M. baranensis* Kormos, is barred by its size being too small and by the weak reduction of its  $M^3$  and of the talonid of  $M_3$ . Neither is it referable to subgenus *Leucnoe* Boie owing to lack of protocones on maxillar molars, while the only species of subgenus *Isotus* Kolenati, i. e. *M. nattereri* (Kuhl) displays markedly smaller dimensions and a different structure of the mandibular incisors. From *M. bechsteini* (Kuhl) *M. podlesicensis* n. sp. differs by different position of the mental foramen and by larger dimensions. Finally, all the recent species of genus *Selysius* Bonaparte are considerably smaller.

Among the early Pleistocene forms, similarity of dimensions to *M. podlesicensis* n. sp. are shown by *M. wüsti* Kormos from the „Preglacial“ of Hungary (T. Kormos, 1934) and three species described by F. Heller (1936a) from Gundersheim in Germany, namely: *M. kormosi* Heller, *M. rapax* Heller and *M. aemulus* Heller. *M. wüsti* Kormos is distinguished by a thickening of the mandibular ramus beneath  $P_2$  and  $P_3$  (this character, seen in the drawing as well as in the specimen itself, is surprisingly not mentioned in the description), further by an embayment between the coronoid and the articular processes which is weaker than that in the Podlesice form, finally by difference in structure of  $I_3$ . *M. kormosi* Heller is with a strongly characteristic, extremely high coronoid process, different from that in *M. podlesicensis* n. sp. *M. rapax* Heller, by F. Heller (1936a) asserted as related to *M. nattereri* (Kuhl), is known but fragmentally owing to lack of a number of teeth in the mandible from Gundersheim, but from identity with *M. podlesicensis* n. sp. it is barred by the different proportions of  $P_4$ . In the species from Germany this tooth is broad (0,8 mm broad and 1.0 mm long), while in *M. podlesicensis* n. sp. it is markedly elongated, being 0.7 mm broad and 1.1 mm long. Finally, *M. aemulus* Heller is with the coronoid process lower than that in *M. podlesicensis* n. sp. and with somewhat smaller dimensions, the proportions of teeth in this species being nearly the same as in our form.

All this is evidence for the establishment of a new species, the *M. podlesicensis* n. sp., possibly closely related to *M. aemulus* Heller and in all probability constituting an intermediary link between genera *Selysius* Bonaparte and *Myotis* Kaup s. str.

*Myotis* cf. *aemulus* Heller, 1936

(pl. III, fig. 5, 6)

*Material.* — 10 skulls and 10 complete mandibles have been worked out. In addition, the material contains fragments representing some dozen skulls and several hundred mandibles or their fragments.

*Description.* — The skull is rather broad, the braincase distinctly broader than the rostrum, its breadth being somewhat less than half the maximum cranial length. The dorsal profile shows a distinct breaking in beyond the rostrum, and then steeply ascends. The sagittal crest is not uniformly developed, being distinct and rather high in some of the specimens. The lambdoidal crest is low.

The upper incisors attain two thirds of the canine length. They are set close to one another and are separated from the canine by a conspicuous diastema. The first of them is larger than the second. Both incisors are with two cusps, a cingulum is to be seen on the second of them. The canine is relatively broad, not too high, gently curving backwards. Its cingulum is low but distinct, fairly evenly developed around the crown. The two first premolar teeth apply very closely to one another, the second of them being pushed somewhat inwards from the line of the tooth-row. The second upper premolar ( $P^3$ ) is half the size of the first ( $P^2$ ). On both these teeth the cingulum is well developed. The crown in  $P^4$  is not large, its cingulum has not developed accessory tubercles. The molars are without protoconules.  $M^3$  is not reduced, with metacone well developed; its surface is almost two thirds that of  $M^2$ .

The coronoid process of mandible is moderately high, the ridge between it and the articular process being either nearly straight or gently curving upwards in the upper portion, while in its lower portion it is curving upwards. The angular process is moderately long, pointed at the end. The mental foramen is between the canine and  $P_2$ . The symphysis is large, broadly ovate.

The imbrication of the lower incisors extends over from one fourth to one third of their length. The first of them is with 4 tubercles arranged in a row, the second, in addition to 4 similar tubercles (of which the fourth posterior one is the smallest) has a fifth accessory tubercle on the lingual side. The latter incisor is somewhat broader than the former and displays a distinct cingulum on the labial side. The third incisor is twice

as broad as the second one. Its crown consists of two anterior tubercles and three low posterior ones, indistinctly indicated. There is a well marked cingulum on the labial side of this tooth. The canine is not large, gently curving backwards, with a distinct cingulum, the margin of which strongly ascends from the front of the tooth. Of the first two premolars, the second is somewhat smaller. The cingulum on  $P_2$  overlaps the cingulum of the canine, while in  $P_3$  the posterior margin touches the margin of  $P_4$ . In the last premolar the apex is flush with the molars, somewhat curving backwards. Its crown is about 1.00 mm long, its breadth 0.65 mm, so that it is distinctly elongated. The talonid of  $M_3$  shows no distinct reduction.

*Dimensions (in mm):*

| Skulls                    | 1    | 2    | 3    | 4    | 5   |
|---------------------------|------|------|------|------|-----|
| condylobasal length       | 16.6 | 16.5 | 16.4 | 16.2 | —   |
| zygomatic breadth         | 11.1 | 11.5 | 11.1 | —    | —   |
| interorbital constriction | 4.2  | 4.6  | 4.2  | 4.2  | 4.3 |
| breadth of braincase      | 7.7  | 8.8  | 7.8  | 8.0  | 8.0 |
| length of tooth-row       | 8.1  | 8.1  | 7.9  | 7.9  | —   |
| Skulls (continued)        | 6    | 7    | 8    | 9    | 10  |
| condylobasal length       | —    | —    | —    | —    | —   |
| zygomatic breadth         | —    | —    | —    | —    | —   |
| interorbital constriction | 4.3  | 4.2  | 4.2  | 4.0  | 4.1 |
| breadth of braincase      | —    | —    | —    | —    | —   |
| length of tooth-row       | 8.2  | 8.2  | 8.3  | 8.0  | 8.2 |

(continued on p. 369)

*Systematic position.* — The described Podlesice species is shown to agree perfectly in dimensions with those of the mandible of *M. aemulus* Heller recorded from Gundersheim (F. Heller, 1936a). The morphology of this mandible and of the teeth preserved with it is also in agreement with that of the Podlesice remains, the coronoid process excepted, as this seems somewhat lower than in specimens from Germany. Unfortunately, *M. aemulus* Heller is only very superficially known on evidence of the mandible and part of dentition as preserved with it, i. e. the canine and  $P_2$ - $M_3$ , so that it is impossible to compare the incisors which are of such taxonomic importance. From *M. podlesicensis* n. sp. the remains of *M. cf. aemulus* Heller from Podlesice differ in slightly but distinctly smaller dimensions. The skull of *M. podlesicensis* n. sp. is more elongated and its profile more flattened, not depressed beyond the rostrum, also the canine

is here higher and narrower, more curving backwards. The other characters agree perfectly in both species so that the differences given in the description of *M. podlesicensis* n. sp. in respect to other recent and

Dimensions in mm (continued from p. 368)

| Mandibles   | 1    | 2    | 3    | 4    | 5    |
|---|------|------|------|------|------|
| mandibular length   | 13.1 | 12.6 | 13.3 | 13.4 | 13.2 |
| length I <sub>1</sub> — M <sub>3</sub>                      | 8.8  | 8.6  | 9.0  | 8.9  | 8.9  |
| „ C — M <sub>3</sub>  | 7.6  | 7.3  | 7.7  | 7.6  | 7.7  |
| „ P <sub>4</sub> — M <sub>3</sub>                           | 5.3  | 5.3  | 5.4  | 5.3  | 5.2  |
| „ M <sub>1</sub> — M <sub>3</sub>                           | 4.3  | 4.3  | 4.4  | 4.2  | 4.2  |
| height of mandibular ramus from inside under M <sub>1</sub> | 1.8  | 1.7  | 2.0  | 1.8  | 2.0  |
| thickness of same under M <sub>1</sub>                      | 0.9  | 0.8  | 0.9  | 0.8  | 0.9  |
| length of symphysis   | 3.0  | 2.7  | 2.8  | 3.0  | 2.9  |
| Mandibles (continued)                                       | 6    | 7    | 8    | 9    | 10   |
| mandibular length   | 13.0 | 13.0 | 13.3 | 12.8 | 12.9 |
| length I <sub>1</sub> — M <sub>3</sub>                      | 9.0  | 8.9  | 8.9  | 8.6  | 8.8  |
| „ C — M <sub>3</sub>  | 7.6  | 7.6  | 7.6  | 7.5  | 7.7  |
| „ P <sub>4</sub> — M <sub>3</sub>                           | 5.4  | 5.4  | 5.3  | 5.2  | 5.6  |
| „ M <sub>1</sub> — M <sub>3</sub>                           | 4.4  | 4.4  | 4.3  | 4.2  | 4.5  |
| height of mandibular ramus from inside under M <sub>1</sub> | 2.0  | 1.8  | 1.9  | 1.8  | 1.9  |
| thickness of same under M <sub>1</sub>                      | 0.9  | 0.8  | 0.9  | 0.8  | 0.9  |
| length of symphysis   | 2.9  | 2.8  | 2.9  | 2.8  | 2.8  |

fossil forms also refer to *M. cf. aemulus* Heller. It would be admissible that we have to deal here with individuals of different sex, and not with two separate species; in the living forms of genus *Myotis* Kaup, however, differences of sex are not very clearly indicated by cranial structure. The simultaneous occurrence of two markedly similar species of bats, as for instance in the case of *M. myotis* (Borkhausen) and *M. oxygnathus* (Monticelli), is quite common.

*Myotis dasyncneme* (Boie, 1823)

*Myotis dasyncneme subtilis* n. subsp.

(pl. III, fig. 3, 4)

*Holotype*. — Mandible with perfect processes and teeth C-M<sub>3</sub>.

*Stratum typicum*. — Günz-Mindel Interglacial.

*Locus typicus*. — Podlesice near Kroczyce, Olkusz district.

*Derivatio nominis*. — *subtilis* - of a more delicate structure than that of *M. dasyncneme* (Boie).

*Material.* — 12 fragments of skulls, 3 halves of mandibles. The preserved remains represent the whole dentition, the third upper incisor excepted.

*Description.* — Of the skull the rostrum only is recorded. It is very broad. The orbits are delimited at the front and top by a conspicuous lacrimal crest. The posterior palatal region is broad, with its hind end pushed outside of the tooth-row to a distance equal to one breadth of the molars.

The first upper incisor ( $I^2$ ) is two-cusped, with a conspicuous cingulum forming two small accessory tubercles on the posterior tooth margin. The second incisor is not preserved in the considered material. The diastema between the incisors and the canine is not great. The canine is fairly large, nearly straight, with a low cingulum. Its alveolar is broadly ovate. The two first premolars are very minute, loosely arranged. The second of them ( $P^3$ ) is pushed somewhat inside of the tooth-row, it is smaller than the first, its apex hardly extending to the height of the cingulum of the last premolar.  $P^4$  is triangular, with the apex exceeding in height the crowns of the molars. A distinct protoconule is displayed by the molars. Large free spaces are to be seen between the last premolar and the first molar, also between the molars, as these teeth are very loosely set. The last molar is not reduced, its metacone is well developed.

The shape of the coronoid process is variable, but it is never too high, rounded at top, in its hind part flatly arching downwards to the articular process. The articular process is pointed and narrow. The mental foramen is set between the canine and  $P_2$ . The symphysis is ovate, elongate.

The incisors are inconspicuously imbricated. The first lower incisor is with four tubercles uniserially arranged. In the second lower incisor three tubercles are arranged in one row, while the fourth large tubercle has developed at the termination of the tooth on the inside. The third lower incisor is very broad, nearly three times as broad as the second incisor, with two larger tubercles on the outside and anteriorly and two smaller tubercles on the inside and posteriorly. This tooth is with a conspicuous cingulum and is placed so as to contact the canine at one point only. The canine is not large, weakly curved. Its cingulum forms an indistinctly indicated accessory tubercle on the antero-lingual margin. The two first premolars are small, rather loosely spaced. In spite of the loose arrangement the second molar ( $P_3$ ) is distinctly flattened. It is conspicuously smaller than  $P_2$ . The cingulum in the two first premolars is quite distinct.  $P_4$  is almost quadrate, 0.7 mm broad and 0.75 mm long. The molars are broad, the talonid in  $M_3$  is but slightly narrower than the trigonid.

| <i>Dimensions (in mm):</i>               |      |      |      |      |
|--|------|------|------|------|
| Skulls                                   |      |      |      |      |
|  | 1    | 2    | 3    | 4    |
| interorbital constriction                | 5.0  | —    | —    | —    |
| length of tooth-row                      | 7.0  | 7.3  | 7.3  | 7.4  |
| Mandibles                                |      |      |      |      |
|  | 1    | 2    | 3    | 4    |
| mandibular length                        | 11.8 | 11.9 | 11.5 | 11.9 |
| length I <sub>1</sub> — M <sub>3</sub>   | 7.8  | 7.8  | 7.8  | 7.8  |
| „ C — M <sub>3</sub>                     | 6.8  | 6.5  | 6.6  | —    |
| „ P <sub>3</sub> — M <sub>3</sub>        | 5.0  | 4.6  | 4.5  | —    |
| „ M <sub>1</sub> — M <sub>3</sub>        | 4.1  | 3.9  | 3.8  | —    |
| height of mandibular ramus on the inside |      |      |      |      |
| below M <sub>1</sub>                     | 1.5  | 1.6  | 1.4  | —    |
| thickness of same below M <sub>1</sub>   | 0.8  | 0.8  | 0.8  | 0.7  |
| length of symphysis                      | 2.6  | 2.4  | 2.5  | 2.6  |

*Systematic position.* — On the presence of protoconules of maxillary molars the described species is readily referable to subgenus *Leucomoe* Boie. This subgenus may be further subdivided into a number of separate sections (G. H. Tate, 1941), among which the *dasyncneme* section is distinguished by the reduction and displacement to the inside of the central maxillary premolar. This character is clearly seen in the Podlesice form, and suggests its assignment to the *dasyncneme* section, containing the European species of *Myotis dasyncneme* (Boie) and two tropical species, the *M. macrotarsus* Waterhouse and *M. stalker* Thomas. The two last species cannot be here taken into account owing to the greater reduction of the central premolar of the maxilla. All these suggests the assignment of the described remains to species *M. dasyncneme* (Boie). On the somewhat smaller dimensions, however, of the Podlesice specimens, most particularly on the distinctly narrower and more delicately built molars, it is possible to differentiate them from the typical living form of the species as a subspecies called *subtilis* n. subsp.

Of fossil forms, known on the mandible only, and therefore rather difficult as regards closer systematic determination, the species *M. delicatus* Heller and *M. praeivius* Heller from Gundersheim (F. Heller, 1936a) approach by their size the Podlesice specimens. *M. delicatus* Heller is known from a rather fragmentary description and photographs. In this species the central mandibular premolar is half the size of the first, while in *M. dasyncneme subtilis* n. subsp. it attains two thirds of the height of that tooth. In *M. delicatus* Heller the premolars are closely applied to each other, and P<sub>3</sub> is partly overlapped by P<sub>4</sub>, while in *M. dasyncneme subtilis* n. subsp. P<sub>4</sub> does not overlap P<sub>2</sub>. Finally, the last premolar (P<sub>4</sub>) is 0.8 mm long and 0.6 mm broad in the case of *M. delicatus*

Heller, thus being distinctly elongated, while in the case of *M. dasycneme subtilis* n. subsp. it is almost quadrate. In *M. praeivius* Heller the shape of the coronoid process differs from that in the Podlesice form; it is larger and with a distinctly elongated  $P_4$ , its length being 1.0 mm against 0.6 mm breadth. Other fossil species recorded from the Pleistocene and Pliocene of Europe cannot be here taken into consideration owing to great differences of size.

*Myotis danutae* n. sp.

(pl. IV, fig. 1, 2)

*Holotype*. — Mandible with  $I_1$ - $I_2$ , C,  $P_3$ - $M_3$ .

*Stratum typicum*. — Günz-Mindel Interglacial.

*Locus typicus*. — Podlesice near Kroczyce, Olkusz district.

*Derivatio nominis*. — *danutae*-from Danuta, the name of the author's wife.

*Material*. — 4 skulls in fragments, 7 halves of mandibles, the full dentition being represented by the preserved material.

*Description*. — Skull elongated, rostrum rather narrow. The bone palate is narrow, extending backwards beyond the tooth-row for a distance one and a half times as large as the width of molars. The cranial profile is flat, without the depression on the profile between the rostrum and the braincase. The sagittal and lambdoidal crests are wanting. The lacrimal crest is inconspicuous.

The first upper incisor is with two cusps. In addition to the principal cusp on the lingual side, the second incisor is provided with a small tubercle on its indistinctly marked cingulum. There is a small diastema between the incisors and the canine. The incisors reach two thirds of the height of the canine. The canine is small, very gently curving backwards. Its cingulum is weak, uniformly developed around the crown of the tooth, without accessory tubercles. The first two premolars are slight, loosely spaced. In both of them the cingulum is distinctly marked, neither of them is displaced from the tooth-row.  $P^3$  is smaller than  $P^2$  and but quite slightly exceeds the height of the cingulum in  $P^4$ . The last premolar is triangular, provided with a conspicuous cutting edge which descends from the apex towards the parastyle of  $M^1$ . The apex of  $P^4$  only slightly exceeds the height of the molar apices. The molars lack protoconules,  $M^3$  bears traces of reduction, but its metacone still persists.

The coronoid process is rather high, pointed at top. The margin between it and the angular process is gently arcuately curving upwards. The angular process is somewhat arched, narrow, pointed. The mental foramen is between the canine and  $P_2$ . The symphysis is ovate, moderately broad.

The crown of  $I_1$  has four tubercles arranged in one row.  $I_2$  is much like the first, but on the outside it is provided with an accessory tubercle

showing, however, only weak development.  $I_3$  is more than twice the breadth of the second; on the labial side it has three larger tubercles, while on the lingual side there are two larger tubercles centrally and two very slight ones on the outside. The canine is slender, gently curving backwards. Its cingulum has a thickening in the form of a tall but indistinctly differentiated cusp, at the front of the tooth. The two first premolars are freely set, in line with the tooth-row. The second is quite inconspicuously smaller than the first. The last premolar is of a height equal to that of the molars. It is strongly elongated, 0.8 mm long and 0.5 mm broad. The molars are fairly broad, the talonid in  $M_3$  is not reduced, though it is narrower and lower than the trigonid.

*Dimensions* (in mm):

| Skulls                    | 1   | 2   | 5   | 4   |
|---------------------------|-----|-----|-----|-----|
| interorbital constriction | 4.0 | —   | —   | —   |
| length of tooth-row       | 7.3 | 7.4 | 7.2 | 7.5 |

| Mandibles  | 1    | 2    | 5    | 4    | 5    | 6    | 7   |
|--|------|------|------|------|------|------|-----|
| mandibular length                                      | 11.6 | 11.5 | 11.9 | 11.5 | 11.5 | 11.3 | —   |
| length $I_1$ — $M_3$                                   | 7.6  | 7.6  | 7.8  | 7.5  | 7.5  | 7.4  | 7.7 |
| „ C — $M_3$  | 6.4  | 6.5  | 6.7  | 6.3  | 6.3  | 6.4  | 6.2 |
| „ $P_4$ — $M_3$  | 4.6  | 4.7  | 4.7  | 4.4  | 4.5  | 4.6  | 4.5 |
| „ $M_1$ — $M_3$  | 3.8  | 3.8  | 3.9  | 3.7  | 3.7  | 3.8  | 3.8 |
| height of mandibular ramus from the inside below $M_1$ | 1.6  | 1.7  | 1.4  | 1.6  | 1.4  | 1.4  | 1.5 |
| thickness of same below $M_1$                          | 0.9  | 0.8  | 0.8  | 0.9  | 0.8  | 0.8  | 0.8 |
| length of symphysis                                    | —    | 2.6  | 2.5  | 2.5  | 2.4  | 2.4  | 2.5 |

*Systematic position.* — The species here described cannot be identified with any one of the recent or Pleistocene Eurasiatic species from genus *Myotis* Kaup. Lack of reduction in  $M_3$  at first sight bars it from being referred to subgenus *Myotis* Kaup s. str., while the absence of protoconule on the maxillary molars prohibits its assignment to subgenus *Leuconoe* Boie. From the other recent species of genus *Myotis* Kaup, *M. danutae* n. sp. differs by its dimensions. Among fossil forms all early Pleistocene species of genus *Myotis* Kaup from Hungary are of larger size. Thus, the only comparable species are those described by F. Heller (1936a) from Gundersheim in Germany. From these, the species *M. praeivus* Heller and *M. delicatus* Heller fall into the same size group as *M. danutae* n. sp. The former, however, differs from *M. danutae* n. sp. by its distinctly greater dimensions, higher coronoid process and larger canine, while the latter comes in size near the Podlesice form, but its  $P_2$

and  $P_3$  are tightened,  $P_3$  is extremely slight attaining hardly half of the height of  $P_2$ . In *M. danutae* n. sp.  $P_2$  and  $P_3$  are freely spaced and  $P_3$  is almost of equal size with  $P_2$ .

*M. danutae* n. sp. comes closest to the recent species *M. emarginatus* (Geoffroy), being, however, of smaller size, and to *M. nattereri* (Kuhl) which it exceeds in size.

*Myotis* cf. *exilis* Heller

(pl. IV, fig. 3, 4)

*Material.* — 21 fragments of skulls, numerous mandibles, preserved completely or in parts. The preserved material represents all the mandibular and maxillary teeth.

*Description.* — The breadth of the braincase is equal to half the maximal cranial length. The dorsal profile gently ascends from the rostrum to the braincase. The sagittal and lambdoidal crests lacking completely.

The first upper incisor is with two cusps, the second, in addition to the principal cusp, shows on the inside two small tubercles developed on the cingulum. The height of the incisors attains half that of the canine. Between the incisors and the canines there is a distinct break. The canine is not large, gently curving backwards, with a uniform, not very conspicuous cingulum. The first two premolars are rather small, in contact with each other, but not crowded together, with a conspicuous cingulum. These teeth are distinctly curved backwards.  $P^3$  is slightly smaller than  $P^2$ .  $P^4$  is not large, with its crown protruding somewhat above the points of the molars, and without accessory tubercles in its cingulum. There is a low but distinct protoconule on the maxillary molars.  $M^3$  is not reduced, with well developed metacone, and the surface of the crown equal to three fourths of the surface in  $M^2$ .

The coronoid process is not particularly high, with a pointed apex. Its posterior margin extends perpendicularly to the horizontal mandibular ramus, towards the top bending a little to the front. The posterior margin of the coronoid process is almost straight, weakly bent. The angular process is short, pointed at the end and curving towards the top. A large mental foramen is placed below the point of contact between C and  $P_2$ . The symphysis is narrow and long.

The mandibular incisors are weakly imbricated.  $I_1$  is three cusped, with an inconspicuous fourth tubercle on posterior margin of the crown.  $I_2$  is with four cusps arranged in one row and a fifth accessory one on the lingual side.  $I_3$  is not large, twice as thick as  $I_2$ , nearly quadratic. The crown of this tooth is with four tubercles: in addition to the largest, placed in the middle, we see a smaller posterior one, another anterior, of the same size as the posterior, and finally the fourth which is larger than the others and internal. Occasionally there may be accessory tubercles on the cin-

gulum, which is very strongly developed on the inside of this tooth. The mandibular canine is not large, gently curving backwards, with a stout cingulum which has developed anteriorly a rather small but characteristic tubercle. The first two premolars are in close contact with each other, this character being, however, individually variable.  $P_3$  is somewhat smaller than  $P_2$ .  $P_4$  is gently elongated, somewhat widened out posteriorly. It is from 0.5 to 0.6 mm broad, 0.7 mm long.  $M_3$  shows no reduction.

*Dimensions (in mm):*

| Skulls  | 1    | 2    | 5    | 4    | 5    |
|---|------|------|------|------|------|
| condylobasal length                                     | 13.8 | —    | —    | —    | —    |
| interorbital constriction                               | 3.8  | 4.0  | 3.9  | 4.0  | 4.0  |
| breadth of braincase                                    | 6.9  | —    | 7.1  | —    | —    |
| length of tooth-row                                     | 6.8  | 6.7  | 6.6  | —    | 6.5  |
| Skulls (continued)                                      | 6    | 7    | 8    | 9    | 10   |
| condylobasal length                                     | —    | —    | —    | —    | —    |
| interorbital constriction                               | 4.0  | —    | —    | 4.0  | —    |
| breadth of braincase                                    | —    | —    | —    | —    | —    |
| length of tooth-row                                     | 6.4  | 6.4  | 6.6  | 6.4  | 6.8  |
| Mandibles   | 1    | 2    | 5    | 4    | 5    |
| mandibular length                                       | 10.0 | 10.3 | —    | 10.2 | —    |
| length $I_1$ — $M_3$                                    | 7.1  | 6.8  | —    | 6.9  | 6.9  |
| „ C — $M_3$   | 5.8  | 5.7  | 5.9  | 5.8  | 6.1  |
| „ $P_4$ — $M_3$   | 4.2  | 4.2  | 4.4  | 4.2  | 4.2  |
| „ $M_1$ — $M_3$   | 3.5  | 3.6  | 3.7  | 3.4  | 3.5  |
| height of mandibular ramus on the inside<br>below $M_1$ | 1.4  | 1.5  | 1.3  | 1.3  | 1.4  |
| thickness of same below $M_1$                           | 0.7  | 0.7  | 0.7  | 0.7  | 0.7  |
| length of symphysis                                     | 2.1  | 2.5  | —    | 2.3  | 2.2  |
| Mandibles (continued)                                   | 6    | 7    | 8    | 9    | 10   |
| mandibular length                                       | —    | 9.9  | 10.3 | —    | 10.3 |
| length $I_1$ — $M_3$                                    | —    | 6.8  | 6.9  | 7.2  | 7.0  |
| „ C — $M_3$   | 5.8  | 5.6  | 5.7  | 6.2  | 5.9  |
| „ $P_4$ — $M_3$   | 4.2  | 4.0  | 4.2  | 4.3  | 4.4  |
| „ $M_1$ — $M_3$   | 3.4  | 3.4  | 3.5  | 3.6  | 3.6  |
| height of mandibular ramus on the inside<br>below $M_1$ | 1.4  | 1.3  | 1.6  | 1.4  | 1.6  |
| thickness of same below $M_1$                           | 0.6  | 0.7  | 0.7  | 0.7  | 0.8  |
| length of symphysis                                     | —    | 2.1  | 2.1  | 2.1  | 2.5  |

*Systematic position.* — The presence of protoconule in maxillary molars refers the described form to subgenus *Leuconoe* Boie, while the position of  $P^3$ , not pushed out to the inside from the tooth-row, suggests its assignment to the *daubentoni* or *capaccinii* section. The Podlesice specimens are somewhat larger than *M. daubentoni* (Kuhl) but slightly smaller than *M. capaccinii* (Bonaparte). They also differ from *M. daubentoni* (Kuhl) in the weaker reduction of their  $P^3$  and  $P_3$  and in greater breadth between the inner margins of  $M^3$  of the right and left maxilla. The difference from *M. capaccinii* (Bonaparte), whose specimens were regrettably not available to the writer for the sake of comparison, lies, according to the description of the living form given by A. P. Kuzjakin (1950), in that the breadth between the inner upper canine margins is equal to or greater than the breadth of the interorbital constriction as respects the living species, while in the fossil species the breadth here referred to is smaller.

Of the fossil forms, *Myotis exilis* Heller and *M. insignis* Heller from Gundersheim in Germany (F. Heller, 1936a) are the only ones to approach by size the Podlesice specimens. From our form, however, *M. insignis* Heller differs in that its first two mandibular premolars are of nearly the same height as that of the canine and of the last premolar, while in the Podlesice specimens they are distinctly smaller. On the other hand, however, the description of the species *M. exilis* Heller agrees perfectly with that of the remains collected at Podlesice. Most of their dimensions and the structure of processes are the same in these forms. They differ slightly by the proportions of some teeth only, i.e. in the German specimens the length of  $I_1$ - $M_3$  is somewhat greater, while the length of  $C$ - $M_3$ ,  $P_4$ - $M_3$  and  $M_1$ - $M_3$  slightly less which would suggest a greater length of  $I_1$ - $I_3$ , both absolute and proportionate. Similarly, the height of the mandibular ramus is also smaller in the specimens from Germany. In spite of these differences, which to some extent may be accounted for by different techniques used for measurements, the Podlesice specimens may in all probability be referred to the form of *M. exilis* Heller, which would justify the assignment of this form to subgenus *Leuconoe* Boie, as related to *M. daubentoni* (Kuhl) and *M. capaccinii* (Bonaparte).

**Rodentia** Bowdich, 1821

Family **Cricetidae** Rochebrune, 1883

Subfamily **Microtinae** Miller, 1896

Genus *Mimomys* F. Major, 1902

*Mimomys* cf. *pusillus* (Méhely, 1914)

(pl. IV, fig. 7; text-fig. 2 a-e)

*Material.* — Complete mandible with  $M_1$ - $M_3$ , mandible lacking the anterior portion with  $M_1$ - $M_3$ , mandible with  $M_1$  and  $M_3$ , damaged, detached teeth  $M^1$  and  $M^2$ .

*Description.* — The only preserved  $M^1$  belonged to an individual considerably younger than that which yielded the here described mandibles. Nevertheless, the roots here are already clearly indicated. On both sides of the crown three convexities and two concavities are visible. All the inner surfaces are broadly confluent.

$M^2$  is probably referable to the same individual as is  $M^1$ , since the extent of the wear is similar in both teeth. On the inner side this tooth has two salient angles, on the outer side three. All the loops are confluent with each other.

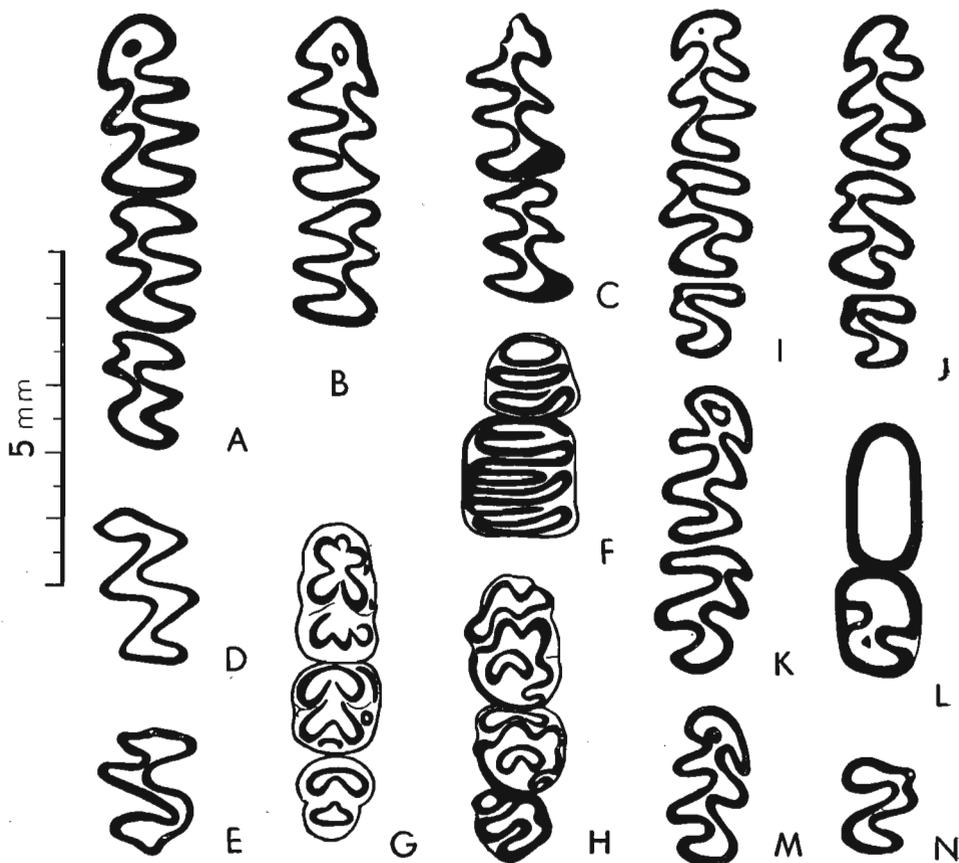


Fig. 2. — Enamel pattern of molar teeth. *Mimomys* cf. *pussilus* (Méhely): a left side of mandible ( $M_1$ - $M_3$ ), b-c right side of mandible ( $M_1$ - $M_2$ ), d  $M^1$ , e  $M^2$ ; *Glis sackdillingensis* minor n. subsp.: f  $P_4$ - $M_1$ ; *Parapodemus coronensis* Schaub: g  $M_1$ - $M_3$ , h  $M^1$ - $M^3$ ; *Baranomys loczyi* Kormos: i-j left side of mandible ( $M_1$ - $M_3$ ), k right side of mandible ( $M_1$ - $M_2$ ), l right  $M_1$ - $M_2$  of a very old individual, m  $M_1$ , n  $M_3$ .

The coronoid process descends to the mandibular ramus at the posterior loop of  $M_1$ . The alveole of the incisor extends to above the level of the dental foramen, and terminates by conspicuous tubercles on the outer mandibular surface.

In the re-entrant folds of molars, cement is fairly abundant. Besides the posterior loop  $M_1$  has three triangles in the enamel pattern, which are narrowly confluent with each other and more widely confluent with the anterior loop. The anterior loop is strikingly short and with simplified pattern. In both of the investigated specimens it possesses a large islet of enamel. The only trace, besides the islet, of more complex loop structure, is a shallow concavity in one of the specimens and a vertical line on the surface of enamel in another, both seen on the outside. In two specimens the teeth are with two roots, in a third specimen there is an accessory slender median root. In the studied specimens the crowns are rather low, the roots clearly indicated.  $M_2$  has three salient angles and two re-entrant folds on the inside as well as on the outside. All the loops are confluent with each other. The anterior loop is rounded frontally.  $M_3$  has three salient angles and two deep re-entrant folds on the inner side. On the outer side there are also three salient angles and two re-entrant folds, but these are more shallow, the anterior one being quite inconspicuous.

*Dimensions.* The only preserved  $M^1$  is 2.3 mm long, the only preserved  $M^2$  1.8 mm long. The mandibular dimensions are as follows (in mm):

| Mandibles   | 1   | 2   | 3   |
|---|-----|-----|-----|
| length of $M_1 - M_3$                                 | 6.0 | —   | 5.5 |
| „ $M_1$   | 2.5 | —   | 2.4 |
| breadth of $M_1$                                      | 1.2 | 1.3 | 1.2 |
| length of $M_2$                                       | 1.7 | 1.7 | 1.7 |
| „ $M_3$   | 1.1 | —   | 1.3 |
| height of mandibular ramus between $M_1$<br>and $M_2$ | 3.4 | 3.0 | 3.4 |
| thickness of same                                     | 2.9 | 2.6 | 2.7 |

*Systematic position.* — The well differentiated genus *Mimomys* F. Major is readily separable into two specific groups. One of them, the *M. majori* Hinton group, comprises forms in which the reduction of the posterior loop is attained by being shallowed and not by insulation and formation of an islet of enamel (*M. A. Hinton*, 1926). The other group, that of *M. pliocaenicus* F. Major, forms an islet of enamel on the surface of the first loop. A part of the 10 forms belonging to the second group — among which we should search for species corresponding to the

Podlesice form — are probably synonyms of the variable species. Of no account to us are all large forms, such as *M. pliocaenicus* F. Major, *M. intermedius* (Newton), *M. hassiacus* Heller, *M. rex* Kormos and others. In *M. reidi* Hinton, a form approaching the Podlesice specimens, the islet of enamel becomes vestigial prior to the development of roots, moreover the first loop of enamel shows here extreme complexity. Perfect agreement of dimensions with those in the here described remains is displayed by *M. pusillus* (Méhely). In this species, characterized by its extensive variability, the islet of enamel disappears very soon, while in our specimens, in spite of strongly worn teeth, it is, nevertheless, quite distinctly indicated. Moreover, unusual shortening and simplification of the first loop of  $M_1$  is a peculiar feature of the here described Podlesice specimens. Such simplicity of loop occurs in but one known species of this genus, i.e. in *M. moldavicus* Kormos, which, however, as compared against the Podlesice form, displays considerable difference of size (T. Kormos, 1932).

The Podlesice species of genus *Mimomys* F. Major thus shows closest similarity to the variable species *M. pusillus* (Méhely) though it does rather seem that it cannot be included within the variations of this form thus far known. Closer determination calls for investigation of mandibles belonging to young individuals with little worn molars. Distinct occurrence of the islet of enamel and its long persistence during the process of dental wear indicate that the here described specimens are more primitive than the greater part of the material representing *M. pusillus* (Méhely).

#### **Cricetidae** incertae sedis

Genus *Baranomys* Kormos, 1933

*Baranomys lóczyi* Kormos, 1933

(pl. IV, fig. 5; text-fig. 2 i-n)

1933. *Baranomys lóczyi* n. gen. & n. sp.; T. Kormos, *Baranomys lóczyi*..., p. 45-54, fig. 1-3.
1936. *Baranomys lóczyi* Kormos; F. Heller, *Eine oberpliozäne Wirbeltierfauna*..., p. 127-128, pl. 10 fig. 3.
1937. *Baranomys langenhani* n. sp.; F. Heller, *Revision*..., p. 245-246, fig. 1.

*Material.* — 6 mandibles, three of them with complete molars, two with  $M_1$ - $M_2$ , one with  $M_3$ , also a detached  $M_1$ .

*Description.* — The coronoid process descends to the mandibular ramus at half length of  $M_2$ . The articular process is rather narrow and elongated. The angular process is arched, curving upwards.

The incisor is long, robust, weakly bent. Its cutting surface is long, somewhat depressed and sloping obliquely inwards. The enamel delimits

by a wide area the anterior margin of the incisor and descends on its outer wall.

The molars are low-crowned and have two long roots. The angles and folds of the enamel are rounded, the enamel is of uniform, rather considerable, thickness. Cement is found in the re-entrant folds.  $M_1$  has, besides the two terminal loops, also three median triangles. The first loop is short, obliquely placed, subcrescent. Its pointed labial end is directed posteriorly. Extensive variability is to be noted in the structure of this loop. It may either be completely closed or confluent with the other loops by a wide pass, it may possess a barely distinguishable trace of an enamel islet or an islet taking up a greater part of the loop. The further three triangles in  $M_1$ , very exactly alternate, usually confluent with each other by rather wide passes. The terminal loop is slightly domed posteriorly, with its end pointing to the labial side.  $M_2$  has three salient angles and two re-entrant folds on both, the outer and the inner side. The anterior inner fold is quite inconspicuous. The anterior loop is usually completely closed, a narrow isthmus being here visible in but one specimen.  $M_3$  is very short, consisting of three loops. On the inner side it shows two salient angles with one central fold, on the outer side there are three salient angles and two folds, the anterior one of the latter being, however, barely distinguishable. The first loop is usually completely delimited, being united with the second one by a narrow isthmus in one specimen only. Two further loops in  $M_3$  are broadly confluent, in one specimen they are separated by a narrowing.

One of the mandibles with preserved  $M_1$ - $M_2$  belonged to a senile individual. Its teeth are worn off down to the coronal base.  $M_1$  shows a uniform surface of cement fringed by a belt of enamel. In  $M_2$  there are two confluent loops, on the surface of the posterior loop an enamel islet is poorly indicated.

*Dimensions (in mm):*

| Mandibles                                   | 1    | 2    | 3    | 4   | 5    | 6    | 7   |
|---|------|------|------|-----|------|------|-----|
| mandibular length                           | 13.3 | 13.5 | 13.7 | —   | 13.9 | —    | —   |
| length $M_1$ — $M_3$                        | 3.6  | 3.6  | 3.6  | —   | —    | —    | —   |
| „ $M_1$                                     | 1.4  | 1.5  | 1.25 | 1.5 | —    | 1.4  | 1.4 |
| breadth $M_1$                               | 0.75 | 0.8  | 0.9  | 0.9 | —    | 0.75 | 0.8 |
| length of $M_2$                             | 1.1  | 1.1  | 1.1  | 1.2 | —    | 1.1  | —   |
| „ $M_3$                                     | 1.0  | 1.0  | 1.0  | —   | 1.0  | —    | —   |
| height of mandible<br>between $M_1$ — $M_2$ | 2.2  | 2.2  | 2.4  | 2.2 | 2.2  | 2.2  | —   |
| thickness of same                           | 1.6  | 1.7  | 1.7  | 1.5 | 1.6  | 1.5  | —   |

*Systematic position.* — The here described Podlesice specimens agree well with the description of the species *Baranomys łóczyi* Kormos, established by T. Kormos (1933) on one incomplete mandible collected from „Preglacial“ beds at Csarnota in Hungary. In the opinion of T. Kormos, this species displays a structure intermediary between that of Cricetinae and Microtinae. Its bunodontism and length of roots suggest appartenance with the Cricetinae, while the arrangement of the enamel loops one with the Microtinae. A detached molar of *Baranomys łóczyi* Kormos was collected at Gundersheim in Germany (F. Heller, 1936a). One year after that, on evidence of a single M<sub>1</sub> from the cave of Wojcieszów in the Sudeten, F. Heller (1937) described *Baranomys langenhani* Heller as a new species of genus *Baranomys* Kormos. The characters distinguishing the new species from *B. łóczyi* Kormos were said to consist in the presence of an enamel islet on the surface of the first loop, a more extensive rounding of the loop and the broad confluency of the first loop with the further triangles. As is shown by the here above described Podlesice material, all these characters display such extensive variations that this differentiation is not based on any sound evidence. *Baranomys langenhani* Heller must, therefore, be regarded as synonymous with *B. łóczyi* Kormos. And thus, this species which is the sole representative of genus *Baranomys* Kormos, occurs in early Pleistocene and possibly also late Pliocene beds in Hungary, Poland (the Sudeten and the Cracow-Wieluń Highland), also Germany.

In 1924 the species *Sigmodon atavus* Schlosser was described by M. Schlosser from Pontian beds of Ertemte in Mongolia. G. S. Miller (1927), when revising Schlosser's determination, proved this fossil rodent not to be related with the living American genus *Sigmodon* Say & Ord, and asserted the need for placing it as a separate genus which he named *Microtodon* Miller. S. Schaub (1934) gives a more detailed description of species *Microtodon atavus* (Schlosser) and separates from it fossil remains incorrectly referred to this form by earlier investigators. From Schaub's figures and description (1934) it is to be inferred that the molars of this species are strikingly similar to the teeth of *Baranomys łóczyi* Kormos. They only noticeable difference are the larger dimensions of *Microtodon atavus* (Schlosser). The separation, therefore, of genus *Baranomys* Kormos from *Microtodon* Miller does not appear as justifiable. Still it is difficult to arrive at a decision in this matter without original material of the Asiatic form. In their monograph on the molars of the Simplicidentatae H. G. Stehlin and S. Schaub (1951) mention both the cited genera as representatives of the Cricetidae with microtoidal tooth structure and uncertain systematic position.

M. Kretzoi (1955) creates a new subfamily Baranomyinae within the Arvicolidae to which it refers the genera *Baranomys* Kormos and *Microtodon* Miller.

Family **Muridae** Gray, 1821  
 Subfamily **Murinae** Murray, 1886  
 Genus *Parapodemus* Schaub, 1938  
*Parapodemus coronensis* Schaub, 1938

(pl. IV, fig. 6; text-fig. 2 g, h)

1938. *Parapodemus coronensis* n. sp.; S. Schaub, Tertiäre und quartäre Murinae, p. 37, fig. 17c.

*Material.* — Fragment of maxilla with all the molars, showing rather strong wear, two damaged mandibles with  $M_1$ - $M_2$ , a damaged mandible with  $M_1$  and  $M_3$ , two badly damaged mandibles with  $M_1$ , four damaged mandibles without dentition, three detached  $M_1$ .

*Description.* — In  $M^1$  the confluent cusps 1, 2 and 3 (the notation here used is that adapted in the pattern from Schaub's paper of 1938) form an unsymmetrically developed arch, since cusp 1 has been strongly pushed backwards and passes caudally into a narrow crest. Cusp 7 is not developed. On the labial side, beyond cusps 6 and 9, an accessory cusp is developing, separated from cusp 9 by a notch extending far to the centre of the tooth. Terminal cingulum is poorly developed.

$M^2$  is broad and short. The anterior accessory tubercles are fairly well developed, the lingual is larger. Beyond these has been formed a uniform wreath of confluent tubercles. Tubercle 4 is pushed to the back. Tubercle 7 is wanting. On the labial side, beyond cusps 6 and 9, has developed, as in the first molar, a conspicuous accessory tubercle. In the hind part of the tooth the cingulum is weak.

$M^3$  has developed similarly as in *Apodemus sylvaticus* (Linnaeus). Anteriorly, on the lingual side, there is a strong asymmetric cusp. Beyond it the further tubercles united into one uniform loop with two digitations on the lingual side. On the labial side a thickening is distinguishable on the enamel, corresponding to the worn apex of the tubercle.

The mandible is slight and delicate, much more so than in *Apodemus sylvaticus* (Linnaeus). The height of the mandibular ramus below the molars is not great. In  $M_1$  the unpaired anterior cusp is rather poorly developed. It may occur isolated, but more often is confluent with the pair of the next cusps. The two next pairs of cusps are usually united by a narrow pass. On the lingual side there usually occur three accessory cusps showing different stages of development, sometimes only just distinguishable on the cingulum, elsewhere quite conspicuous. The last

most caudal cusp is always the strongest. The posterior pair of tubercles and the unpaired terminal tubercle have developed as in *Apodemus* Kaup.

In  $M_2$  the two transverse ridges form an angle more obtuse than that in *A. sylvaticus* (Linnaeus). On the labial side of the second ridge there is a strong accessory tubercle which becomes confluent with the ridge when rather badly worn. The unpaired terminal cusp is very poorly developed, shaped as a flattened oval.

$M_3$  is with two transverse ridges. The first of these has a but indistinct notch on the caudal side, the second is simple. Both are clearly asymmetric.

*Dimensions.* The only preserved fragment of the maxilla shows the following dimensions (in mm): length of the molar tooth-row 3.5; length of  $M^1$  1.75, breadth of  $M^1$  1.0; length of  $M^2$  1.2; length of  $M^3$  0.8.

| Mandibles   | 1    | 2    | 3    | 4   | 5   | 6    | 7   | 8    |
|---|------|------|------|-----|-----|------|-----|------|
| mandibular length                                     | 13.5 | —    | —    | —   | —   | —    | —   | —    |
| length of molar tooth-row                             | 3.5  | —    | —    | —   | —   | —    | —   | —    |
| „ $M_1$   | 1.6  | 1.7  | 1.4  | 1.7 | 1.4 | 1.6  | 1.5 | 1.4  |
| breadth of $M_1$                                      | 0.9  | 0.9  | 0.75 | 1.0 | 0.8 | 1.0  | 1.0 | 0.75 |
| length of $M_2$                                       | —    | —    | 1.0  | —   | —   | 1.2  | —   | —    |
| „ $M_3$   | 0.76 | —    | —    | —   | —   | —    | —   | —    |
| height of mandibular ramus<br>between $M_1$ and $M_2$ | 2.2  | 2.25 | 2.0  | —   | —   | 2.2  | —   | 2.2  |
| thickness of mandible<br>between $M_1$ and $M_2$      | 1.4  | 1.4  | 1.3  | —   | —   | 1.45 | —   | 1.4  |

*Systematic position.* — The structure of the molars, particularly those of the upper jaw, agrees perfectly with the definition of genus *Parapodemus* Schaub. From *Apodemus* Kaup, a related genus common in the recent fauna of Asia and Europe, but already recorded from the early Pleistocene, *Parapodemus* Schaub differs in the absence of cusp 7 on the two first molars of the upper jaw. Moreover, this genus is distinguished by the presence of an accessory tubercle on the labial side at the posterior margin of  $M^1$  and  $M^2$ , by flatness of form and weaker development of the terminal unpaired tubercle on  $M_2$ , finally by additional less conspicuous features.

Genus *Parapodemus* Schaub contains, as a generic type, the species *P. schaubi* Papp. This species was described by S. Schaub (1938) on fossil remains from Polgardi in Hungary, but that writer believed the remains studied by him to belong to a species known as *Mus gaudryi* Dames, and thence called it *Parapodemus gaudryi* (Dames) A. Papp (1947) has

proved that the remains of *Mus gaudryi* Dames, recovered from Pliocene beds of Pikermi and Samos, differ from those described by S. Schaub and he therefore changed the name of the form described by S. Schaub (1938) to *Parapodemus schaubi* Papp, retaining the name of „*Mus*“ *gaudryi* Dames for the remains from Greece. Their generic identity cannot be more closely determined owing to their fragmentary condition. We must, therefore, retain their generic name of *Mus* Linnaeus. By its size „*Mus*“ *gaudryi* Dames comes near the here described Podlesice form, differing from it in another form of the second transverse cusp in  $M_3$  and in structure of  $M_2$ . The Pleistocene *Parapodemus schaubi* Papp from Polgardi is of considerably larger size than the here described Podlesice remains, which it does indeed approach very closely in structure of molars. Other Pliocene species of genus *Parapodemus* Schaub, described (by S. Schaub (1938) from western Europe and Mongolia (Ertemte), are also of larger size than the Podlesice remains. Fully agreeing with them in dimensions are, on the other hand, the remains of *P. coronensis* Schaub from Brasso in Rumania, found in an early Pleistocene faunistic assemblage, probably referable to the Mindel glaciation period. *Parapodemus coronensis* Schaub has thus far been recorded on evidence of a fragment of maxilla with  $M^1$  and  $M^2$ , but the structure of these two teeth agrees perfectly with those of the Podlesice remains.

Family **Gliridae** Thomas, 1897

Subfamily **Glirinae** Thomas, 1897

Genus *Glis* Brisson, 1762

*Glis sackdillingensis* Heller, 1930

*Glis sackdillingensis minor* n. subsp.

(pl. IV, fig. 8; text-fig. 2 f)

*Holotype*. — Incomplete mandible with  $P_4$  and  $M_1$ .

*Stratum typicum*. — Günz-Mindel Interglacial.

*Locus typicus*. — Podlesice near Kroczyce, Olkusz district.

*Derivatio nominis*. — *minor*-smaller than the type form.

*Material*. — Right mandibular ramus with damaged processes and with the lower fourth premolar and first molar. Also a detached  $M^1$ .

*Description*. —  $M^1$  displays similar extent of dental wear and condition of preservation as the type mandible described here below, it, therefore, probably belongs to the same individual. It possesses three roots; a thick one on the lingual side and two weaker on the labial side. The four chief ridges of enamel run slightly obliquely, being bent lingually backwards. The accessory ridges are markedly less worn than the upper ridges which indicates their small height.

The mandible does not display any differences of morphology as against the mandible of *Glis glis* (Linnaeus), being only distinguished by considerably smaller dimensions.

$P_4$  is with basal ridges strongly developed. They have an arcuate course, the central layer being particularly curved backward in its median portion. Owing to rather strong tooth wear of the studied specimen the central and posterior ridges have the appearance of double skein of enamel separated by a skein of dentine. The accessory ridges are poorly developed.

$M^1$  is with the posterior ridge rather less well developed than the remaining cardinal ridges, without, however, showing signs of reduction. Three further basal ridges run almost perpendicular to the mandibular axis. Owing to wear they duplicate. The accessory ridges are probably somewhat less well developed than those in *Glis glis* (Linnaeus). The  $M_2$  alveolars indicate lack of any extensive reduction in this tooth.

*Dimensions* (in mm):

|                                  |     |                              |      |
|----------------------------------|-----|------------------------------|------|
| height of mandible between $P_4$ |     | large diameter of incisor at |      |
| and $M_1$                        | 4.5 | base of enamel               | 2.0  |
| thickness there                  | 2.0 | small diameter at same point | 1.0  |
| length of mandibular tooth-row   |     | length of $P_4$              | 0.95 |
| (partly measured on alveoles)    | 5.6 | „ $M_1$                      | 1.5  |
| length of diastema               | 4.0 | breadth of $M_1$             | 2.5  |
|                                  |     | length of $M^1$              | 1.5  |
|                                  |     | breadth of $M^1$             | 1.6  |

*Systematic position.* — The structure of teeth and of the mandibular ramus suggests that the collected remains are referable to *Glis* Brisson, 1762. The genus is represented in the living fauna by one species only, namely *Glis glis* (Linnaeus), whose fossil remains have already been recorded from the early Pleistocene. The above described Podlesice remains differ from *Glis glis* (Linnaeus) foremost by their considerably smaller dimensions, to say, after G. S. Miller (1912), length of the lower molar tooth-row is from 6.6 to 8.2 mm in living specimens, while in our form it is 5.6 mm.

From younger Pleistocene beds, fossil forms have been recorded belonging to genus *Glis* Brisson, namely *G. glis süssenbornensis* Soergel, *G. antiquus* Kormos, *G. hofmanni* Kormos (*nomen nudum*) and *G. sackdillingensis* Heller. *G. glis süssenbornensis* Soergel, described from Süßenborn in Germany (W. Soergel, 1919), shows the same dimensions as those in the living species, but it is distinguished by the reduction of its anterior ridges on  $M_1$  and  $M_2$ . Both their size and the lack of reduction as here mentioned in the Podlesice specimens prevent their assignment to this form.

*Glis antiquus* Kormos, described by T. Kormos (1930a) from the „Pre-glacial” of Hungary, and subsequently mentioned by M. Kretzoi (1938) as *G. glis antiquus* Kormos, differs from the living form in its smaller dimensions (length of lower molar tooth-row being from 6.2 to 7.0 mm), reduction in  $M_3$  and the presence of two roots only in  $P_4$ . Thus this form also differs from the Podlesice remains by its larger size. The species *Glis hofmanni* is mentioned by T. Kormos (1937a) without any description.

In 1930 F. Heller described the subspecies *G. glis sackdillingensis* Heller from the early Pleistocene of the Sackdillinger Höhle in Germany. In 1933, upon acquirement of further materials, F. Heller raised this form to the rank of species. Its characters are as follows: smaller dimensions (length of lower molar tooth-rows is from 5.9 to 6.4 mm), tendency to the accessory ridges being reduced in  $M_3$  and more particularly so in  $P_4$ , also curving of the central basal ridge in  $P_4$  stronger than in *G. glis* (Linnaeus).

The Podlesice form agrees with *G. sackdillingensis* Heller as respects the curving of the central ridge in  $P_4$  and weak development of the accessory ridges. Its dimensions, however, are distinctly smaller than all the corresponding dimensions of specimens from Germany, which strongly suggests its establishment as a separate subspecies. It is in fact the smallest form of genus *Glis* Brisson thus far recorded from Pleistocene beds.

A mandible belonging to genus *Glis* Brisson, smaller than any mandible of this genus so far recorded, was in 1940 described by T. Kormos from Villany in Hungaria. T. Kormos (1940) gives its description and dimensions, but owing to the fragmentary condition of the specimen he does not give it a systematic name. The dimensions of the Villany specimen are almost identical with those of *Glis sackdillingensis minor* n. subsp., so that it may, with great probability, be referred to this subspecies.

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KAZIMIERZ KOWALSKI

OWADOŻERNE, NIETOPERZE I GRYZONIE WCZESNOPLEJSTOCENSKIEJ  
BREKCIJI KOSTNEJ Z PODLESIC KOŁO KROCZYC

*Streszczenie*

Opisywane tutaj szczątki kostne ssaków znalezione zostały w miejscowości Podlesice koło Kroczyca w pow. Olkuskim, w połowie długości Wyżyny Krakowsko-Wieluńskiej. Wydobyto je z brekcji kostnej, która wypełniała otwarte u góry, lej-kowate zagłębienie krasowe. Charakter litologiczny brekcji wskazuje, że jest ona sfosylizowanym namuliskiem jaskiniowym. Zawarte w brekcji kości pochodzą z dwu źródeł: częściowo są to kości nietoperzy, które tworzyły liczną kolonię przy stropie jaskini, częściowo zaś resztki zrzutek sów. Kolonia nietoperzy, której szczątki znajdujemy w Podlesicach, była kolonią zimową. Składała się ona z kilku gatunków nietoperzy, przeważnie należących do rodzaju *Myotis* Kaup. Oprócz opisanych w niniejszej pracy szczątków drobnych ssaków, znaleziono w brekcji nieliczne resztki nie oznaczonych bliżej Mustelidae, kości ptaków i szczękę *Lacerta* sp.

Sytuacja geologiczna brekcji wskazuje na to, że pochodzi ona sprzed zlodowacenia Mindel. Dokładniejsze datowanie umożliwia poznanie składu faunistycznego, który przedstawia się następująco:

Insectivora

|                                   |  |
|-----------------------------------|--|
| <i>Talpa minor</i> Freudenberg    | <i>Sorex</i> sp.                             |
| <i>Desmana nehringi</i> Kormos    | <i>Petenya hungarica</i> Kormos              |
| <i>Sorex alpinoides</i> n. sp.    | <i>Soriculus kubinyi</i> Kormos              |
| <i>S. dehnelti</i> n. sp.         | <i>Suncus</i> cf. <i>pannonicus</i> (Kormos) |
| <i>S. cf. praeearaneus</i> Kormos |  |

Chiroptera

|   |  |
|---|--|
| <i>Rhinolophus</i> cf. <i>ferrumequinum</i><br>(Schreber) | <i>M.</i> cf. <i>aemulus</i> Heller    |
| <i>Miniopterus schreibersi</i> (Kuhl)                     | <i>M. dasynceme subtilis</i> n. subsp. |
| <i>Plecotus crassidens</i> Kormos                         | <i>M. danutae</i> n. sp.               |
| <i>Myotis podlesicensis</i> n. sp.                        | <i>M.</i> cf. <i>exilis</i> Heller     |

## Rodentia

*Mimomys cf. pusillus* (Méhely)*Parapodemus coronensis* Schaub*Baranomys lóczyi* Kormos*Glis sackdillingensis minor* n. subsp.

Na 20 oznaczonych gatunkowo form, tylko dwie — *Rhinolophus ferrumequinum* (Schreber) i *Miniopterus schreibersi* (Kuhl) — są prawdopodobnie identyczne z gatunkami żyjącymi do dziś. Pozostałe są albo nowe dla nauki (*Sorex alpinoides* n. sp., *S. dehneli* n. sp., *Myotis podlesicensis* n. sp., *M. danutae* n. sp., *M. dasycneme subtilis* n. subsp., *Glis sackdillingensis minor* n. subsp.), albo znane są z innych faun kopalnych wczesnego plejstocenu Europy środkowej. Porównanie fauny z Podlesic z innymi faunami drobnych ssaków wczesnego plejstocenu wskazuje na to, że pochodzi ona z interglacjalu Günz-Mindel.

Fauna z Podlesic zawiera niektóre elementy archaiczne, pliocenijskie, które przeżywają schyłek swego istnienia w interglacjale Günz-Mindel. Do takich należą: *Baranomys lóczyi* Kormos, znany dotychczas z trzech znalezisk w Europie środkowej i blisko spokrewniony z *Microtodon atavus* (Schlosser) z pontu Mongolii, oraz *Parapodemus coronensis* Schaub, należący do rodzaju licznego w pliocenie a ginącego we wczesnym plejstocenie. Interesującą formą jest również *Plecotus crassidens* Kormos, który wykazuje podobieństwo z amerykańskim rodzajem *Corynorhinus* Allen i który, być może, reprezentuje w faunie interglacjalu Günz-Mindel Europy element amerykański, analogiczny do amerykańskiego elementu we florze tego okresu. Fauna z Podlesic wykazuje, jako całość, ściśle analogie z faunami tego samego okresu ze środkowej Europy (Węgry, Rumunia, południowa i zachodnia część Niemiec). Wskazuje ona na klimat umiarkowany, nieco cieplejszy od dzisiejszego, i na roślinność typu leśnego.

Część szczegółowa pracy zawiera opisy wszystkich znalezionych gatunków ssaków, wymiary ich szczątków i uwagi systematyczne. Znalezione materiały przyczyniają się do lepszego poznania niektórych form, znanych dotychczas z izolowanych szczątków. Dokładniejsze zbadanie zmienności gatunku *Baranomys lóczyi* Kormos pozwoliło wykazać, że gatunek *B. langenhani* Heller jest jego synonimem.

## OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 345)

Powierzchnia wyrostków stawowych zuchwy (*processus articularis*); a *Sorex cf. praeraneus* Kormos, b *Petenya hungarica* Kormos, c *Sorex dehneli* n. sp., d *Sorex alpinoides* n. sp., e *Suncus cf. pannonicus* (Kormos).

Fig. 2 (p. 377)

Powierzchnia zębów trzonowych. *Mimomys cf. pusillus* (Méhely): a lewa połowa zuchwy (M<sub>1</sub>-M<sub>3</sub>), b-c prawa połowa zuchwy (M<sub>1</sub>-M<sub>2</sub>), d M<sup>1</sup>, e M<sup>2</sup>; *Glis sackdillingensis minor* n. subsp.: f P<sub>1</sub>-M<sub>1</sub>; *Parapodemus coronensis* Schaub: g M<sub>1</sub>-M<sub>3</sub>, h M<sup>1</sup>-M<sup>3</sup>; *Baranomys lóczyi* Kormos: i-j lewa połowa zuchwy (M<sub>1</sub>-M<sub>3</sub>), k prawa połowa zuchwy (M<sub>1</sub>-M<sub>2</sub>), l prawa M<sub>1</sub>-M<sub>2</sub> osobnika bardzo starego, m M<sub>1</sub>, n M<sub>3</sub>.

## Pl. I

- Fig. 1. *Talpa minor* Freudenberg; fragment żuchwy *a* od wewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 2. *Desmana nehringi* Kormos; fragment żuchwy z  $P_2$  i  $P_4-M_2$  *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 3. *Desmana nehringi* Kormos; fragment szczęki z  $P^4$  i  $M^1$  *a* z zewnątrz, *b* od wewnątrz;  $\times 4$ .  
 Fig. 4. *Sorex cf. praeearaneus* Kormos; żuchwa *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 5. *Sorex dehnelti* n. sp.; fragment żuchwy (holotyp) bez wyrostków stawowych *a* od wewnątrz, *b* z góry, *c* z zewnątrz;  $\times 4$ .  
 Fig. 6. *Sorex dehnelti* n. sp.; fragment żuchwy (z wyrostkami stawowymi) i z  $M_1-M_3$  *a* z zewnątrz, *b* z góry, *c* od wewnątrz;  $\times 4$ .  
 Fig. 7. *Sorex alpinoides* n. sp.; żuchwa (holotyp) *a* od wewnątrz, *b* z góry, *c* z zewnątrz;  $\times 4$ .  
 Fig. 8. *Sorex alpinoides* n. sp.; część rostralna czaszki *a* z góry, *b* z boku, *c* z dołu;  $\times 4$ .  
 Fig. 9. *Petenya hungarica* Kormos; żuchwa (bez wyrostków stawowych) *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 10. *Petenya hungarica* Kormos; żuchwa z zewnątrz (z wyrostkami stawowymi) i  $M_1-M_3$ ;  $\times 4$ .

## Pl. II

- Fig. 1. *Sorex* sp.; fragment żuchwy *a* z zewnątrz, *b* z góry;  $\times 6,6$ .  
 Fig. 2. *Suncus pannonicus* (Kormos); żuchwa *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 3. *Soriculus kubinyi* Kormos; fragment żuchwy *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 4. *Miniopterus schreibersi* Kuhl; żuchwa *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 5. *Rhinolophus ferrumequinum* (Schreber); żuchwa *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 6. *Rhinolophus ferrumequinum* (Schreber); część rostralna czaszki *a* z dołu, *b* z boku;  $\times 4$ .  
 Fig. 7. *Myotis podlesicensis* n. sp.; żuchwa (holotyp) *a* z zewnątrz, *b* z góry, *c* od wewnątrz;  $\times 4$ .  
 Fig. 8. *Myotis podlesicensis* n. sp.; czaszka *a* z boku, *b* z dołu;  $\times 4$ .

## Pl. III

- Fig. 1. *Plecotus crassidens* Kormos; *a* czaszka z boku, *b* część rostralna czaszki z dołu;  $\times 4$ .  
 Fig. 2. *Plecotus crassidens* Kormos; żuchwa (z zachowanymi  $P_4$  i  $M_1$ ) *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 3. *Myotis dasycneme subtilis* n. subsp.; żuchwa (holotyp) *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 4. *Myotis dasycneme subtilis* n. subsp.; część rostralna czaszki *a* z boku, *b* z dołu;  $\times 4$ .  
 Fig. 5. *Myotis cf. aemulus* Heller; żuchwa *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 6. *Myotis cf. aemulus* Heller; czaszka *a* z boku, *b* z dołu;  $\times 4$ .

## Pl. IV

- Fig. 1. *Myotis danutae* n. sp.; żuchwa (holotyp) *a* z zewnątrz, *b* z góry, *c* od wewnątrz;  $\times 4$ .  
 Fig. 2. *Myotis danutae* n. sp.; część rostralna czaszki *a* z boku, *b* z dołu;  $\times 4$ .  
 Fig. 3. *Myotis cf. exilis* Heller; żuchwa *a* z zewnątrz, *b* z góry;  $\times 4$ .  
 Fig. 4. *Myotis cf. exilis* Heller; czaszka *a* z boku, *b* z dołu;  $\times 4$ .

- Fig. 5. *Baranomys lóczyi* Kormos; zúchwa z boku,  $\times 4$ .  
 Fig. 6. *Parapodemus coronensis* Schaub; zúchwa z boku,  $\times 4$ .  
 Fig. 7. *Mimomys* cf. *pussilus* (Méhely); zúchwa z boku,  $\times 4$ .  
 Fig. 8. *Glis sackdillingensis minor* n. subsp.; zúchwa (holotyp) z boku,  $\times 4$ .

КАЗИМЕРЖ КОВАЛЬСКИ

НАСЕКОМОЯДНЫЕ, ЛЕТУЧИЕ МЫШИ И ГРЫЗУНЫ  
 НИЖНЕ-ПЛЕЙСТОЦЕНОВОЙ КОСТНОЙ БРЕКЧИИ ИЗ ПОДЛЕСИЦ  
 ОКОЛО КРОЧИЦ (ПОЛЬША)

Резюме

Описываемые здесь костные остатки млекопитающих были найдены в местности Подлесье около Крочиц в Олькушском уезде, в половине длины Краковско-Велюньской Возвышенности. Они залегали в костной брекчии, которая заполняла воронкообразное карстовое углубление открытое сверху. Литологический характер брекчии указывает на то, что она представляет собой fossilizированный наносный пещерный ил. Кости, которые содержит брекчия, происходят из двух источников: частично это кости летучих мышей, образовавших некогда богатую колонию у свода пещеры, отчасти же — отбросы пищи сов. Колония летучих мышей, остатки которых находятся в Подлесьях, была зимней колонией. Она состояла из нескольких видов летучих мышей, принадлежавших преимущественно к роду *Myotis* Каур. Рядом с описанными в статье остатками мелких млекопитающих были найдены в брекчии немногочисленные остатки ближе не определенных *Mustelidae*, кости птиц и челюсть *Lacerta* sp.

Геологическая позиция брекчии указывает, что она была отложена в период предшествующий оледенению Миндель. Более точное датирование возможно в результате определения ее фаунистического состава, который представляется следующим образом:

Insectivora

|  |  |
|--|--|
| <i>Talpa minor</i> Freudenberg           | <i>Sorex</i> sp.                             |
| <i>Desmana nehringi</i> Kormos           | <i>Petenyia hungarica</i> Kormos             |
| <i>Sorex alpinoides</i> n. sp.           | <i>Soriculus kubinyi</i> Kormos              |
| <i>S. dehnelti</i> n. sp.                | <i>Suncus</i> cf. <i>pannonicus</i> (Kormos) |
| <i>S.</i> cf. <i>praeearaneus</i> Kormos |  |

Chiroptera

|  |  |
|--|--|
| <i>Rhinolophus</i> cf. <i>ferrumequinum</i> (Schreber) | <i>M.</i> cf. <i>aemulus</i> Heller    |
| <i>Miniopterus schreibersi</i> (Kuhl)                  | <i>M. dasynceme subtilis</i> n. subsp. |
| <i>Plecotus crassidens</i> Kormos                      | <i>M. danutae</i> n. sp.               |
| <i>Myotis podlesicensis</i> n. sp.                     | <i>M.</i> cf. <i>exilis</i> Heller     |

Rodentia

|  |  |
|--|--|
| <i>Mimomys</i> cf. <i>pussillus</i> (Méhely) | <i>Parapodemus coronensis</i> Schaub         |
| <i>Baranomys lóczyi</i> Kormos               | <i>Glis sackdillingensis minor</i> n. subsp. |

Из 20-ти видово определенных форм, только две — *Rhinolophus ferrumequinum* (Schreber) и *Miniopterus schreibersi* (Kuhl) — вероятно тождественны видам живущим до ныне. Остальные либо новы для науки (*Sorex alpinoides* n. sp., *S. dehnli* n. sp., *Myotis podlesicensis* n. sp., *M. danutae* n. sp., *M. dasynceme subtilis* n. subsp., *Glis sackdillingensis minor* n. subsp.), либо известны из других ископаемых фаун раннего плейстоцена средней Европы. Сравнение фауны из Подлесиц с другими фаунами мелких млекопитающих раннего плейстоцена указывает на ее происхождение из интергляциала Гюнц—Миндель.

Фауна из Подлесиц содержит некоторые древние элементы плиоцена, которые переживают закат своего существования в интергляциале Гюнц—Миндель. К ним принадлежат: *Baranomys łoczyi* Kormos, известный до сих пор из трех местностей в средней Европе, а близкий родственник *Microtodon atavus* (Schlosser) из понтического яруса Монголии, далее *Parapodemus coronensis* Schaub, который принадлежит роду многочисленному в плиоцене, а исчезающему в раннем плейстоцене. Интересной формой является также *Plecotus crassidens* Kormos, который проявляет сходство с американским родом *Corynorhinus* Allen и который, быть может, представляет в фауне интергляциала Гюнц—Миндель Европы американский элемент, аналогично американскому элементу представленному во флоре этого периода. Как целость, фауна из Подлесиц проявляет тесные аналогии с одновременными фаунами средней Европы (Венгрия, Румыния, южная и западная часть Германии). Она указывает на умеренный климат, несколько более теплый чем современный, и на растительность лесного характера.

Специальная часть статьи содержит описание всех найденных видов млекопитающих, размеры их остатков и систематические замечания. Найденные материалы позволяют лучше ознакомиться с некоторыми формами, известными до сих пор лишь на основании изолированных остатков. Более детальное изучение изменчивости вида *Baranomys łoczyi* Kormos позволило доказать, что вид *B. langenhani* Heller является его синонимом.

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## Pl. I

- Fig. 1. *Talpa minor* Freudenberg; fragment of mandible *a* inner view, *b* top view;  $\times 4$ .
- Fig. 2. *Desmana nehringi* Kormos; fragment of mandible with  $P_2$  and  $P_3-M_2$  *a* outer view, *b* top view;  $\times 4$ .
- Fig. 3. *Desmana nehringi* Kormos; fragment of maxilla with  $P^1$  and  $M^1$  *a* outer view, *b* inner view;  $\times 4$ .
- Fig. 4. *Sorex cf. praeareaneus* Kormos; mandible *a* outer view, *b* top view;  $\times 4$ .
- Fig. 5. *Sorex dehnelti* n. sp.; fragment of mandible (holotype) without processes *a* inner view, *b* top view, *c* outer view;  $\times 4$ .
- Fig. 6. *Sorex dehnelti* n. sp.; fragment of mandible with processes and with  $M_1-M_3$  *a* outer view, *b* top view, *c* inner view;  $\times 4$ .
- Fig. 7. *Sorex alpinoides* n. sp.; mandible (holotype) *a* inner view, *b* top view, *c* outer view;  $\times 4$ .
- Fig. 8. *Sorex alpinoides* n. sp.; rostral part of skull *a* top view, *b* side view, *c* bottom view;  $\times 4$ .
- Fig. 9. *Petenyia hungarica* Kormos; mandible (without processes) *a* outer view, *b* top view;  $\times 4$ .
- Fig. 10. *Petenyia hungarica* Kormos; outer view of mandible with processes and with  $M_1-M_3$ ;  $\times 4$ .

## Pl. II

- Fig. 1. *Sorex* sp.; fragment of mandible *a* outer view, *b* top view;  $\times 6.6$ .
- Fig. 2. *Suncus pannonicus* (Kormos); mandible *a* outer view, *b* top view;  $\times 4$ .
- Fig. 3. *Soriculus kubinyi* Kormos; fragment of mandible *a* outer view, *b* top view;  $\times 4$ .
- Fig. 4. *Miniopterus schreibersi* Kuhl; mandible *a* outer view, *b* top view;  $\times 4$ .
- Fig. 5. *Rhinolophus ferrumequinum* (Schreber); mandible *a* outer view, *b* top view;  $\times 4$ .
- Fig. 6. *Rhinolophus ferrumequinum* (Schreber); rostral part of skull *a* bottom view, *b* side view;  $\times 4$ .
- Fig. 7. *Myotis podlesicensis* n. sp.; mandible (holotype) *a* outer view, *b* top view, *c* inner view;  $\times 4$ .
- Fig. 8. *Myotis podlesicensis* n. sp.; skull *a* side view, *b* bottom view;  $\times 4$ .

## Pl. III

- Fig. 1. *Plecotus crassidens* Kormos; *a* side view of skull, *b* bottom view of rostral part of skull;  $\times 4$ .
- Fig. 2. *Plecotus crassidens* Kormos; mandible (with preserved  $P_1$  and  $M_1$ ) *a* outer view, *b* top view;  $\times 4$ .
- Fig. 3. *Myotis dasycneme subtilis* n. subsp.; mandible (holotype) *a* outer view, *b* top view;  $\times 4$ .
- Fig. 4. *Myotis dasycneme subtilis* n. subsp.; rostral part of skull *a* side view, *b* bottom view;  $\times 4$ .
- Fig. 5. *Myotis cf. aemulus* Heller; mandible *a* outer view, *b* top view;  $\times 4$ .
- Fig. 6. *Myotis cf. aemulus* Heller; skull *a* side view, *b* bottom view;  $\times 4$ .

## Pl. IV

- Fig. 1. *Myotis danutae* n. sp.; mandible (holotype) *a* outer view, *b* top view, *c* inner view;  $\times 4$ .
- Fig. 2. *Myotis danutae* n. sp.; rostral part of skull *a* side view, *b* bottom view;  $\times 4$ .
- Fig. 3. *Myotis cf. exilis* Heller; mandible *a* outer view, *b* top view;  $\times 4$ .
- Fig. 4. *Myotis cf. exilis* Heller; skull *a* side view, *b* bottom view;  $\times 4$ .
- Fig. 5. *Baranomys lóczyi* Kormos; side view of mandible;  $\times 4$ .
- Fig. 6. *Parapodemus coronensis* Schaub; side view of mandible;  $\times 4$ .
- Fig. 7. *Mimomys cf. pussilus* (Méhely); side view of mandible;  $\times 4$ .
- Fig. 8. *Glis sackdillingensis minor* n. subsp.; mandible (holotype) side view;  $\times 4$ .

