

## SMALLER MAMMALS (INSECTIVORA AND RODENTIA) FROM THE EARLY MESOLITHIC SITE OF BEDBURG-KÖNIGSHOVEN, GERMANY

THIJS VAN KOLFSCHOTEN

University of Leiden

Leiden, The Netherlands

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The early Holocene (Preboreal) smaller mammal fauna from Bedburg-Königshoven (Nordrhein Westfalen, Germany), found in association with larger mammal remains and artefacts, consists of *Sorex* cf. *minutus* Linnaeus, 1766, *Sorex araneus* Linnaeus, 1758, *Talpa europaea* Linnaeus, 1758, *Arvicola terrestris* (Linnaeus, 1758), *Microtus arvalis* (Pallas, 1779) and/or *Microtus agrestis* (Linnaeus, 1761) and *Microtus oeconomicus* (Pallas, 1776), species which inhabited the area during deposition of the gyttja from which they have been collected. Remarkable is the occurrence of a mandible of *Talpa europaea* with five premolars; available humeri of this species are comparatively large, which confirms the early Holocene age of the fauna.

Key words — Mammals, Insectivora, Rodentia, early Holocene, Germany.

Dr T. van Kolfschoten, University of Leiden, Institute of Prehistory, P.O. Box 9515, NL-2300 RA Leiden, The Netherlands.

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### INTRODUCTION

The locality Bedburg-Königshoven (20 km southeast of Mönchengladbach, Nordrhein Westfalen, Germany) is situated in an area where Tertiary lignite is excavated in large opencast mines. The site was located in the Garzweiler lignite pit, in the old valley of the River Erft, a tributary of the River Rhine (Fig. 1).

The section exposed at this pit generally shows lignite deposits at the base, which are covered by Tertiary and Quaternary fluvial and lacustrine sediments. The upper part of the section exposes late Pleistocene sands and gravels, covered by fluvial silt, upon which rests an organic freshwater mud (gyttja) that yielded the fossil material described in this paper. Overlying the gyttja are a series of peat deposits (Street, 1989, 1991).

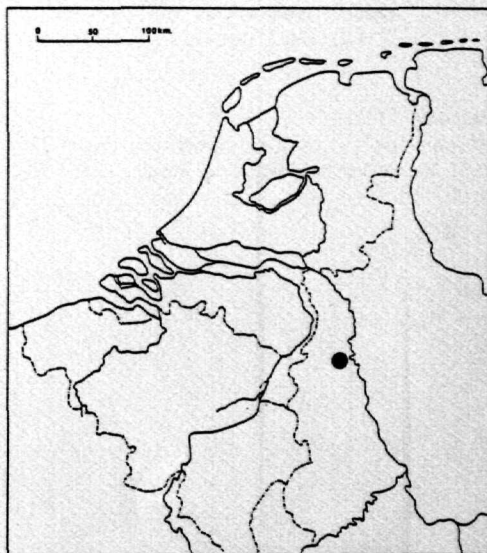


Fig. 1. The site of Bedburg-Königshoven in the Erft valley, near Mönchengladbach, Nordrhein Westfalen (Germany).

The discovery of an *in situ* artificially worked incomplete red deer skull led to an archaeological excavation in the winter of 1987/1988, during which large amounts of bird remains and larger mammal fossils (Table 1) as well as flint artefacts were recovered (Street, 1990a, b). The excavated sediment also yielded smaller mammal remains of which only dental material has been studied; postcranial remains, with the exception of talpid humeri, have not been considered.

TERMINOLOGY AND MEASUREMENTS

The soricid dental elements and lower jaw are measured and described following Reumer (1984), talpid material following Rümke (1985), and arvicolid remains following van der Meulen (1973). All measurements are in millimetres.

A number of standard abbreviations are used such as: dext. = dextral; sin. = sinistral; N = number of observations; SD = standard deviation.

SYSTEMATIC DESCRIPTIONS

Order Insectivora Bowdich, 1821  
 Family Soricidae Gray, 1821  
 Genus *Sorex* Linnaeus, 1758

*Sorex cf. minutus* Linnaeus, 1766  
 (Pygmy Shrew; Fig. 2)

*Material* — P<sup>4</sup> sin.

*Measurements* — Length to posterior emargination (PE): 0.82; lingual length: 0.94; buccal length: 1.18; width: 1.17

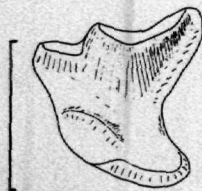


Fig. 2. *Sorex cf. minutus* Linnaeus, 1766, P<sup>4</sup> sin. (Bed-Kö 165). Scale bar equals 1 mm.

*Description and discussion* — This premolar is small, has a well-developed parastyle and a small hypocone. It does not show any trace of pigmentation which is so typical of the teeth of genera such as *Sorex* and *Neomys* Kaup, 1829. The pigmentation most probably disappeared during fossilisation. Because of its small size and the morphological similarity to the P<sup>4</sup> of living *Sorex minutus*, the specimen is identified as *Sorex cf. minutus*.

*Sorex araneus* Linnaeus, 1758  
 (Common Shrew; Figs 3, 4)

*Material* — Maxilla fragment with P<sup>4</sup>, M<sup>1</sup> sin. (Fig. 3) and P<sup>4</sup> dext., mandibula fragment with M<sub>1</sub> and M<sub>2</sub> dext. (Fig. 4), M<sub>2</sub> dext.

*Measurements* —

P <sup>4</sup>	N	range	mean
PE	2	1.02-1.12	1.070
lingual length	2	1.21-1.27	1.240
buccal length	2	1.57-1.58	1.575
width	2	1.58-1.58	1.580

M <sup>1</sup>	
PE	1.21
lingual length	1.43
buccal length	1.40
anterior width	1.57
posterior width	1.61

M <sub>1</sub>	
trigonid width	0.87
talonid width	0.95
length	1.63

M <sub>2</sub>	N	range	mean
trigonid width	2	0.79-0.85	0.820
talonid width	2	0.73-0.85	0.790
length	2	1.28-1.37	1.325

(PE = length to posterior emargination)

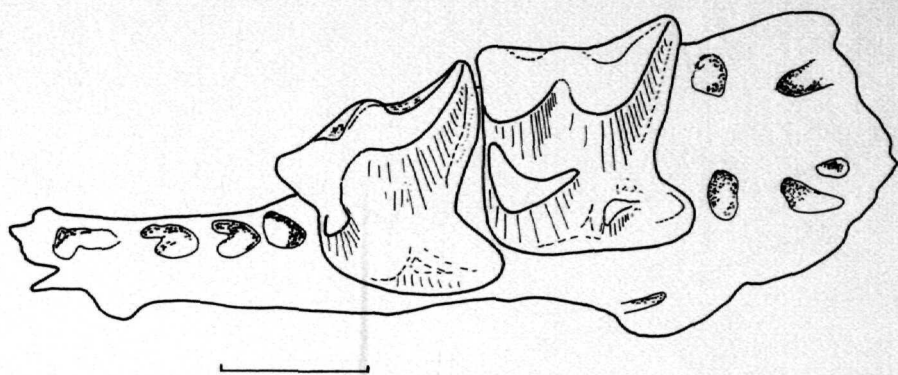


Fig. 3. *Sorex araneus* Linnaeus, 1758, maxilla with P<sup>4</sup> and M<sup>1</sup> sin. (Bed-Kö 4). Scale bar equals 1 mm.

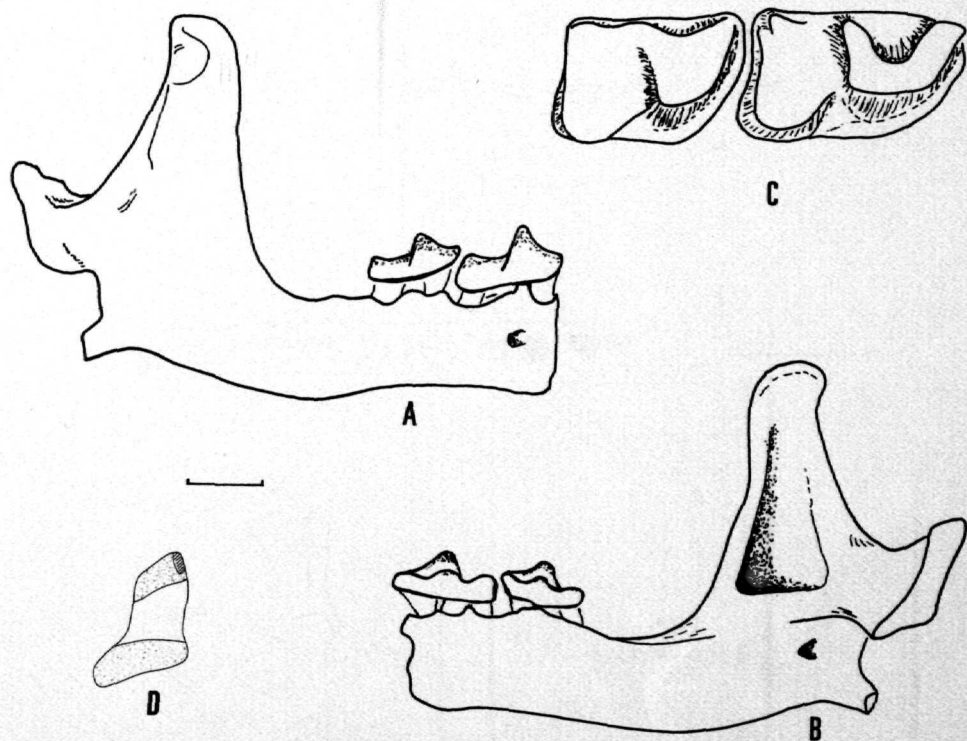


Fig. 4. *Sorex araneus* Linnaeus, 1758, mandibula with M<sub>1</sub> and M<sub>2</sub> dext. (Bed-Kö 1); a - buccal view; b - lingual view; c - occlusal view of M<sub>1</sub> and M<sub>2</sub>; d - posterior view of the condylar facets. Scale bar equals 1 mm.



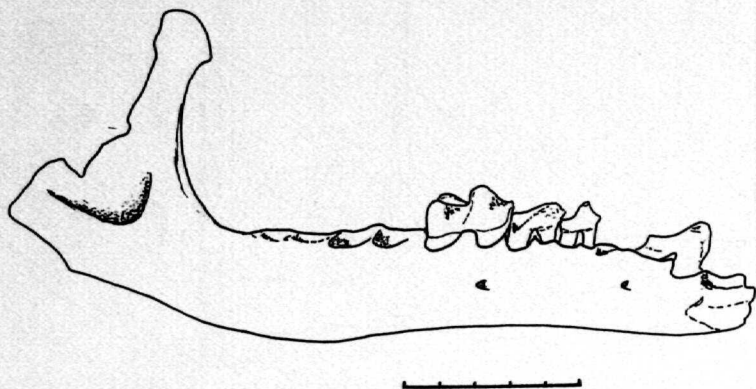


Fig. 5. *Talpa europaea* Linnaeus, 1758, buccal view of mandibula with P<sub>1</sub>, P<sub>3</sub>-M<sub>1</sub> dext. (Bed-Kö 2). Scale bar represents 5 mm.

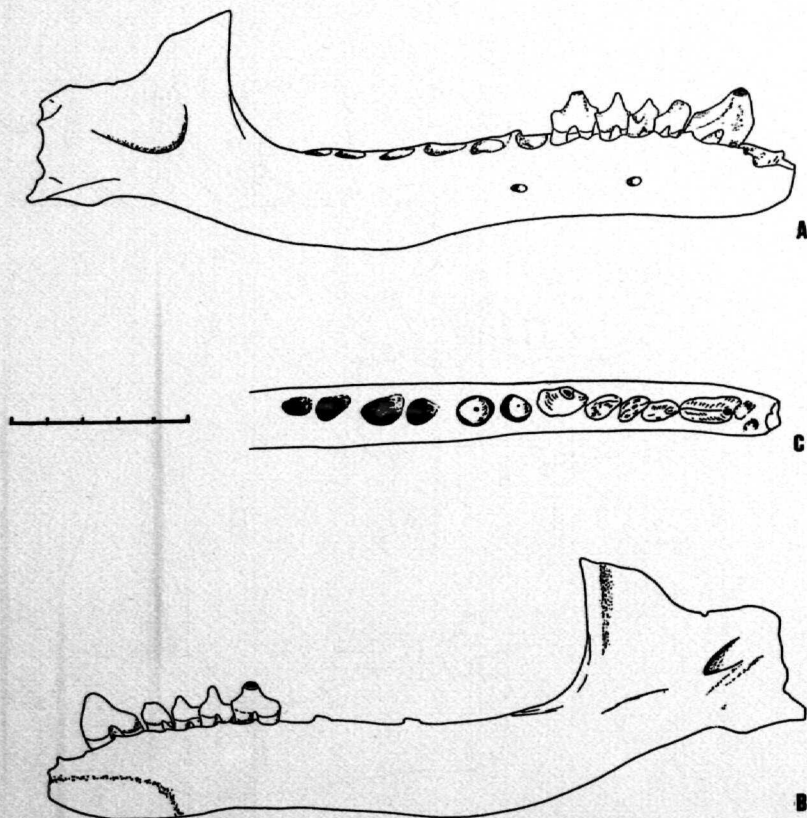


Fig. 6. *Talpa europaea* Linnaeus, 1758, mandibula dext. with 5 premolars (Bed-Kö 3); a - buccal view; b - lingual view; c - occlusal view of the premolars. Scale bar represents 5 mm.

**Mandibula**

height coronoid process	4.77
height of the condyle	1.92
length of the condylar upper facet	0.87
length of the condylar lower facet	1.31

**Description and discussion** — The (pre)molars are pigmented; the upper (pre)molars are worn quite intensively. Both  $P^4$  have a poorly developed parastyle. Based on the number of alveoli in the maxilla it can be stated that originally 5 antemolars were present, which characteristic precludes assignment to *Neomys fodiens* (Pennant, 1771).

The shape of the condyle with a relatively broad interarticular area and a relatively short lower condylar facet (Fig. 4d) is typical of the genus *Sorex*. Size and morphology correspond to those of the living *Sorex araneus*. The height of the coronoid process indicates that the specimen is relatively large when compared to the mean height of Recent populations from The Netherlands (4.32-4.78 mm; mean 4.48 mm,  $N = 7$ ) (van Kolfschoten, 1991) and from Central Europe (4.20-4.90 mm; mean 4.53 mm,  $N = 87$ ) (Heinrich, 1983). However, the lower incisors and the antemolars are missing, and thus it cannot be determined whether or not we are dealing with the robust form known from Upper Pleistocene deposits in e.g. the Brillenhöhle (southern Germany), which is characterised by very robust lower incisors and antemolars (Storch, 1974).

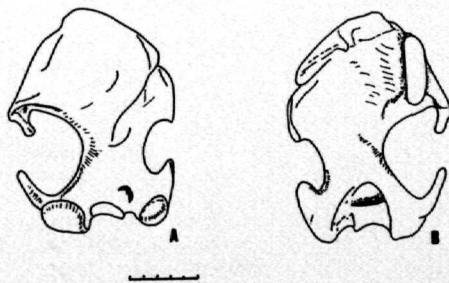


Fig. 7. *Talpa europaea* Linnaeus, 1758, humerus dext. (Bed-Kö 16-18); a - anterior view; b - posterior view. Scale bar represents 5 mm.

The lower condylar facet of the mandibula (Fig. 4d)

is too long in comparison with the upper one to justify assignment to *Sorex coronatus* Millet, 1882, a species which co-occurs with *S. araneus* in the Lower Rhine district at the present day (Handwerk, 1988).

Family Talpidae Gray, 1825  
Genus *Talpa* Linnaeus, 1758

***Talpa europaea* Linnaeus, 1758**

(Mole; Figs 5-8)

**Material** — mandibula sin. with  $P_1$  and  $P_2$ , mandibula sin., mandibula dext. with  $P_1$ ,  $P_3$ - $M_1$  (Fig. 5), mandibula dext. with 5 premolars (Fig. 6), mandibula with  $P_3$ - $M_2$ , mandibula dext., 4 humeri dext. (Fig. 7), 2 humeri sin.

**Measurements** — **$M_1$** 

	N	range	mean
length	2	2.25-2.27	2.263
trigonid width	2	1.15-1.19	1.170
talonid width	2	1.30-1.39	1.346

 **$M_2$** 

length	1	2.42	—
trigonid width	1	1.39	—
talonid width	1	1.36	—

**humerus**

length	3	16.2-16.7	16.53
width diaphysis	7	4.2-4.9	4.47
distal width	7	8.6-10.2	9.17

**Description and discussion** — Remarkable is the occurrence of a mandibula with 5 premolars (Fig. 6). Between the larger  $P_1$  and  $P_4$ , there are three obliquely oriented small premolars, the morphology of which is more or less identical. The protoconid is well developed, the paraconid small (on the middle premolar almost absent) and a posterocristid connects the top of the protoconid with the entoconid. The middle of the three smaller premolars has about the same length as the other two but is narrower.

Deviation in the number of premolars, in particular the presence of a larger number of these (polyodontism), is fairly common in the mandibula of *Talpa europaea* in present-day populations from the lowlands

of Holland and Flanders where 7.97 % of the specimens show such anomalies (van Heurn & Husson, 1960). However, the frequency of this feature varies geographically. Only 2.30% of a population from W. Germany shows the occurrence of polyodontism while this phenomenon is unknown from a large population from the former Soviet Union (Stein, 1963).

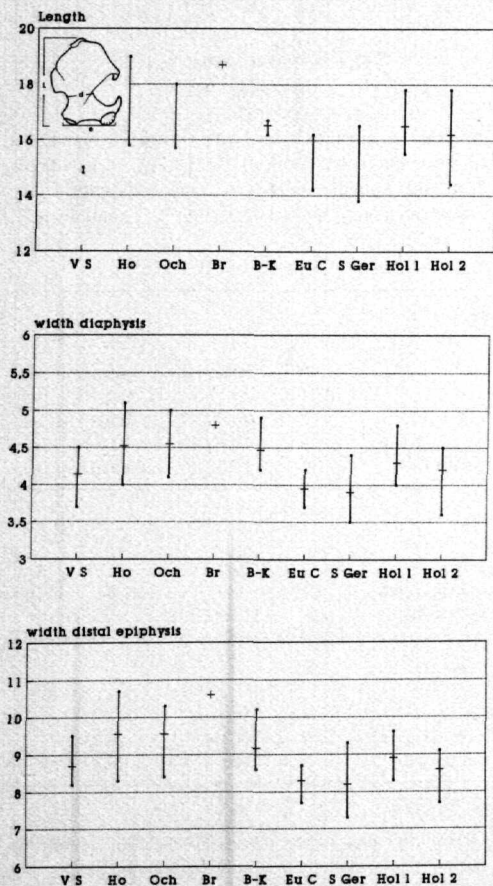


Fig. 8. Range and mean of length (L), width of diaphysis (d) and width of epiphysis (e) of humeri of *Talpa europaea* Linnaeus, 1758 from fossil and Recent populations. VS = Villa Seckendorff; Ho = Hohlenstein; Och = Ochtendung (von Koenigswald, 1985); Br = Brillenhöhle (Storch, 1973); B-K = Bedburg-Königshoven (this paper); Eu C = Euerwanger Bühl-level C; S.Ger = southern Germany (Recent) (von Koenigswald, 1985); Hol1 = Oude Mirrum, northern Netherlands (Recent); Hol2 = Bergen op Zoom, southern Netherlands (Recent) (Roders, 1987).

The dimensions of the molars from Bedburg-Königshoven are within the range of variation of the measurements of living *Talpa europaea* from The Netherlands (Roders, 1987), whereas some of the humeri are remarkably large in comparison with those from The Netherlands and with a Recent population from southern Germany (Fig. 8). Their dimensions correspond more closely to large late Weichselian forms from e.g. Hohlenstein-Stadel, Ochtendung (von Koenigswald, 1985) and Brillenhöhle (Storch, 1973). Of note is the fact that the humeri from Bedburg-Königshoven are distinctly larger than humeri from Euerwanger Bühl-level C, which, with an absolute age of  $9,225 \pm 110$  (von Koenigswald & Rähle, 1975), are only slightly younger than a Bedburg specimen with an age of  $9,600 \pm 100$  /  $9,780 \pm 100$  (Street, 1990a). This may be the result either of geographical differences in the dimensions (a phenomenon which can be observed in living populations; see Fig. 7), or of a rapid decrease in size or most probably a combination of both options.

Order Rodentia Bowdich, 1821  
Family Arvicolidae Gray, 1821  
Genus *Arvicola* Lacépède, 1799

***Arvicola terrestris* (Linnaeus, 1758)**  
(Water Vole; Figs 10-12, 16)

**Material** — 2 M<sup>1</sup> sin., 3 M<sup>1</sup> dext., M<sup>2</sup> sin., 2 mandibula with M<sub>1</sub> and M<sub>2</sub> dext., 10 M<sub>1</sub> sin., 9 M<sub>1</sub> dext., M<sub>2</sub> sin., M<sub>2</sub> dext.

**Measurements** —

	N	range	mean	SD
M <sup>1</sup> length	1	—	3.04	—
M <sup>1</sup> width	1	—	1.79	—
M <sup>2</sup> width	1	—	1.51	—
M1 L	18	3.45-4.25	3.845	0.198
M <sub>1</sub> W	18	1.21-1.43	1.316	0.067
M <sub>1</sub> a	18	1.47-1.92	1.691	0.116
M <sub>1</sub> b	18	0.24-0.52	0.407	0.086
M <sub>1</sub> c	18	0.17-0.36	0.268	0.064
M <sub>2</sub> length	3	1.26-1.54	1.443	0.075
M <sub>2</sub> width	3	0.77-0.99	0.900	0.054

**Description and discussion** — The molars are rootless, and their re-entrant folds are partly filled with crown-cementum.



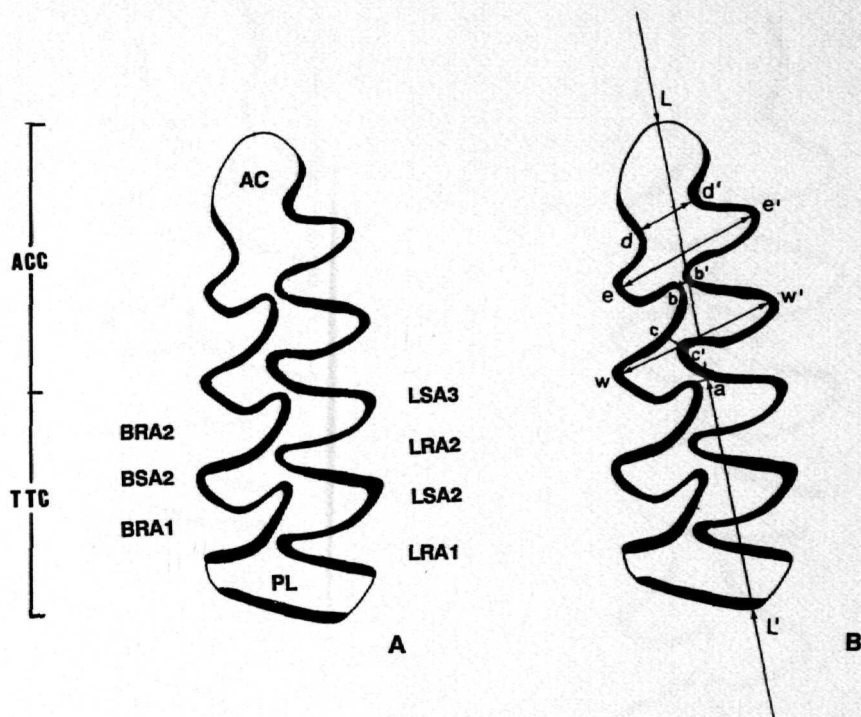


Fig. 9. Occlusal surface of *Microtus*  $M_1$  sin. illustrating the terminology (A) used in this paper (AC = anterior cap; ACC = anteroconid complex; BRA = buccal re-entrant angle; LRA = lingual re-entrant angle; LSA = lingual salient angle; PL = posterior lobe; TTC = trigonid-talonid complex and the measured parameters (B) ( $L-L' = L$ ;  $W-W' = W$ ;  $a-L = a$ ;  $b-b' = b$ ;  $c-c' = c$ ;  $d-d' = d$ ;  $e-e' = e$ ).

The molars show a clear differentiation in the thickness of the enamel on both sides of the dentine fields. The enamel of the so-called trailing edges (in the lower molars the posterior, concave edges) is thinner than that of the so-called leading edges. This type of differentiation of the enamel corresponds to that of Recent NW European populations.

The morphology of the anterior loop is fairly uniform. Most of the loops have a long symmetrical shape with shallow re-entrant angles (Figs 10, 11); only a few specimens have deeper re-entrant angles (Fig. 12). None of the  $M_1$  molars shows the presence of a *Mimomys*-ridge or a *Mimomys*-island.

Based on the length of the  $M_1$  (Fig. 16) it may be observed that *Arvicola* from Bedburg-Königshoven is rather small in comparison with living populations from England and northern Sweden belonging to *A. t. amphibius* (Linnaeus, 1758) and *A. t. terrestris* (Lin-

naeus, 1758), respectively. Polish *Arvicola t. terrestris* appears to be slightly larger than the Bedburg material as well. The dimensions correspond more closely to those of *A. t. exitus* Miller, 1910 from Poland and to *A. t. sherman* (Shaw, 1801), a subspecies slightly smaller than the northerly *A. t. terrestris* and at the present day inhabiting central and southern Germany (Reichstein, 1982; Röttger, 1987).

The dimensions of the  $M_1$  correspond very well to the Preboreal *Arvicola* molars from Euerwanger Bühl-level C (von Koenigswald & Rähle, 1975) and to the early Holocene molars from Dietfurt (von Koenigswald in Brunacker *et al.*, 1981). Late glacial material from south German localities such as Brillenhöhle and Euerwanger Bühl-level H indicate that *Arvicola* molars of Weichselian age are larger (Storch, 1973, 1974; von Koenigswald & Rähle, 1975).



10



11



12

Figs 10-12. *Arvicola terrestris* (Linnaeus, 1758), 10 - M<sub>1</sub> and M<sub>2</sub> dext. (Bed-Kö 170); 11 - M<sub>1</sub> dext. (Bed-Kö 167); 12 - M<sub>1</sub> dext. (Bed-Kö 154). Scale bar equals 1 mm.



These large forms are characterised by prodontism and an  $M^1$  with a highly variable anterior loop, with very often a well-developed LSA 4 and/or BSA 3 (Storch, 1973, 1974). These morphotypes are rare in the Bedburg-Königshoven fauna. The large Weichselian forms were assigned by Storch (1973, 1974) to *Arvicola antiquus* Pomel, 1853; other authors prefer placement of the larger forms with a subspecies of *A. terrestris* (von Koenigswald & Rähle, 1975; van Kolfschoten, 1990).

#### Genus *Microtus* Schrank, 1798

**Remarks** — The genus *Microtus* is represented by a number of molars from Bedburg-Königshoven, which are characterised by the absence of roots, the presence of abundant crown-cementum in the syncline and differentiation in the thickness of the enamel on both sides of the triangles. *Microtus* molars differ from the corresponding elements of *Arvicola terrestris* in size and in the occlusal patterns of the  $M^3$  and  $M_1$  (Fig. 9). *Microtus* molars are smaller and the occlusal patterns of their  $M^3$  and  $M_1$  are more intricate.

Within the genus *Microtus* only the occlusal patterns of the  $M_1$  and partly those of the  $M^2$  and  $M^3$  are useful for specific identification. Amongst the  $M_1$  from Bedburg-Königshoven two different morphotypes, representing two or three species (*Microtus arvalis* and/or *M. agrestis* and *M. oeconomus*) may be distinguished. The morphology of the remaining molars is not characteristic for any species, which makes a specific identification of such dental elements impossible.

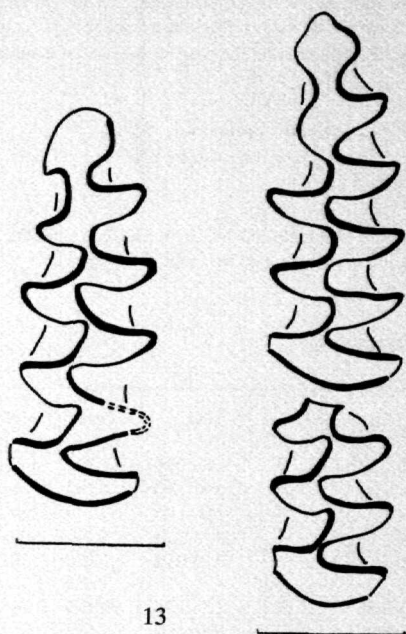
#### *Microtus arvalis* (Pallas, 1779) and/or *M. agrestis* (Linnaeus, 1761)

(Short-tailed Vole and/or Common Vole;  
Figs 13, 14)

**Material** — mandibula with  $M_1$  and  $M_2$  sin. (Fig. 14), 3  $M_1$  sin., 2  $M_1$  dext.

#### Measurements —

	N	range	mean	SD
$M_1$ L	6	2.37-2.79	2.625	0.159
$M_1$ W	6	0.81-0.95	0.865	0.049
$M_1$ a	6	1.30-1.54	1.467	0.084
$M_1$ b	6	0.01-0.03	0.023	0.008
$M_1$ c	6	0.02-0.03	0.022	0.004
$M_1$ d	6	0.09-0.26	0.155	0.075
$M_1$ e	6	0.58-0.77	0.673	0.062



Figs 13, 14. *Microtus arvalis* (Pallas, 1779) or *M. agrestis* (Linnaeus, 1761); 13 (left) -  $M_1$  sin. (Bed-Kö 156); 14 (right) -  $M_1$  and  $M_2$  sin. (Bed-Kö 157). Scale bar represents 1 mm.

**Description and discussion** — The  $M_1$  have five closed triangles and a well-developed T6 and T7. All the  $M_1$ , except for a single specimen, have a well-developed T6 and anterior loops with rather deep re-entrant angles (Fig. 13). The single molar has a small T6 (Fig. 14). This type of morphology is typical of the Recent species *M. agrestis* and *M. arvalis*.

These two species can be distinguished on the basis of the morphology of the  $M^2$ : that of the latter species has an extra postero-lingual salient angle. This extra part may also be present in the  $M^1$  of *M. agrestis*. In addition, the  $M_1$  of *M. arvalis* usually is more symmetrical with a somewhat simpler anterior loop in comparison with that of *M. agrestis*. However, there is a considerable overlap in the range of morphological variation. The other dental elements of both species are indistinguishable.

None of the  $M^1$  or  $M^2$  show features which are held diagnostic for *M. agrestis*. The morphology of the  $M_1$

too is rather symmetrical, which suggests the presence of *M. arvalis*. However, the occurrence of *M. agrestis* cannot be ruled out on the basis of the available molars.

***Microtus oeconomus* (Pallas, 1776)**  
(Northern Vole; Fig. 15)

*Material* — mandibula with  $M_1$  and  $M_2$  sin. (Fig. 15),  
mandibula with  $M_1$  and  $M_2$  dext., 2  $M_1$  sin.

*Measurements* —

	N	range	mean	SD
$M_1$ L	4	2.66-2.91	2.742	0.113
$M_1$ W	4	0.92-1.00	0.960	0.034
$M_1$ a	4	1.26-1.45	1.340	0.080
$M_1$ b	4	0.14-0.25	0.215	0.05
$M_1$ c	4	0.02-0.02	0.020	0.003
$M_1$ e	1	—	0.550	—
$M_2$ length	2	1.54-1.76	1.650	—
$M_2$ width	2	0.98-1.00	0.99	—

*Description and discussion* — The  $M^1$  has four more or less closed triangles, a T5 which is broadly confluent with the anterior field with a well-developed (Fig. 16). This morphotype is typical of Recent *Microtus oeconomus*. The  $M^1$  are slightly larger than those of *M. arvalis*/*M. agrestis*. The dimensions correspond very well with those of late glacial first lower molars from Poland (Nadachowski, 1982).

DISCUSSION

The smaller mammal fauna from Bedburg-Königshoven (Fig. 17) comprises species with different habitats. Species such as glirids, which are indicative of interglacial conditions, or species such as *Dicrostonyx torquatus* (Pallas, 1779), indicative of glacial conditions, are absent.

*Sorex minutus* inhabits both dry and humid areas covered with vegetation, e.g. fringes of woods. *Sorex araneus* and *Talpa europaea* have a wide range of habitats. *Arvicola terrestris* is closely associated with water, frequenting lakes and slow-flowing rivers with well-overgrown banks. *Microtus arvalis* and *M. agrestis* are widely distributed in Europe, with the former

inhabiting open country such as pastureland, while the latter prefers moist areas such as upland rough pastures and peat moors. *Microtus oeconomus* has a large tolerance of wet ground, and inhabits forest-tundra and southern parts of tundra zones and in NW Europe reed-land and marshy areas.



Fig. 15. *Microtus oeconomus* (Pallas, 1776),  $M_1$  and  $M_2$  sin. (Bed-Kö 186). Scale bar equals 1 mm.

All of the smaller mammals may have lived in or close to the excavated area. Their fossil remains are comparatively complete and no obvious traces of dissolution or damage are seen, which indicates that neither diurnal nor nocturnal avian predators are responsible for the occurrence of smaller mammal remains in the gyttja deposits excavated.

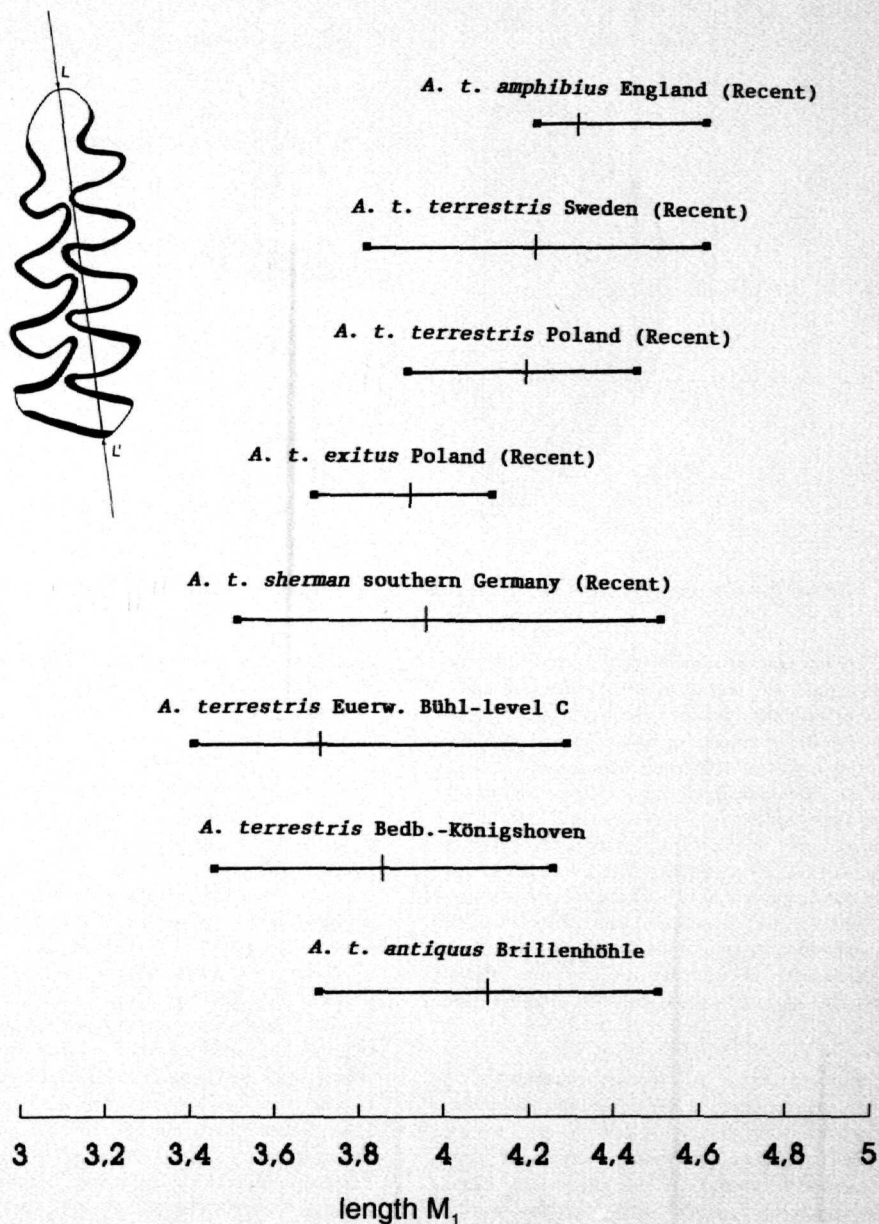


Fig. 16. Range and mean of the length of the lower  $M_1$  of *Arvicola terrestris* ssp. from a number of fossil and Recent populations. *A. t. antiquus* from Brillenhöhle (Storch, 1973); *A. terrestris* from Bedburg-Königshoven (this paper); *A. terrestris* from Euerwanger Bühl-level C (von Koenigswald & Rähle, 1975); *A. t. sherman* from southern Germany (Recent) (Storch, 1974); *A. t. exitus* and *A. t. terrestris* from Poland (Recent) (Nadachowski, 1982); *A. t. terrestris* from northern Sweden (Recent) (Storch, 1974); *A. t. amphibius* from England (Recent) (Stuart, 1982).



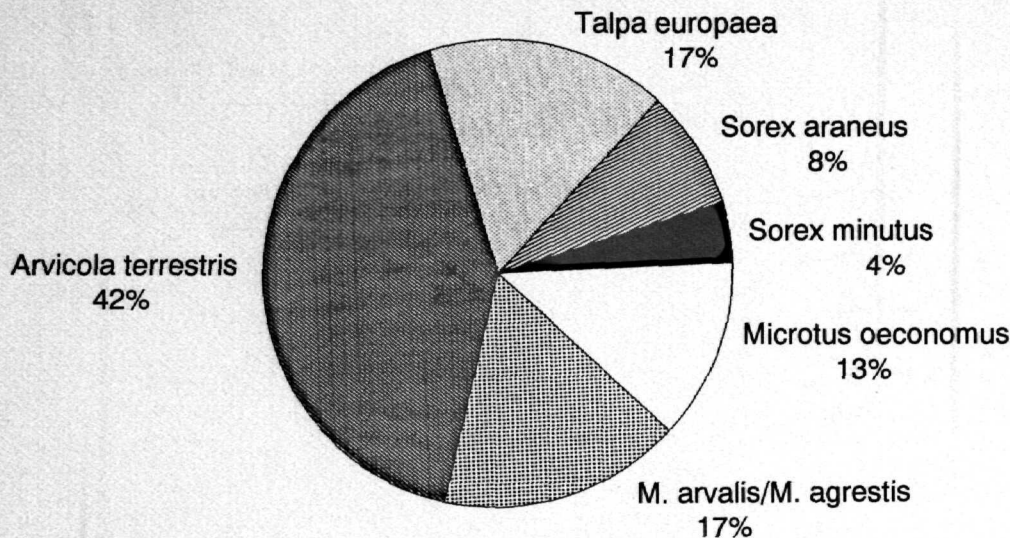


Fig. 17. Pie chart illustrating the composition of the smaller mammal fauna from Bedburg-Königshoven.

The very low concentration of smaller mammal remains also suggests that they stem from animals that most probably inhabited the area during deposition. This might explain the absence of species such as *Apodemus sylvaticus* Linnaeus, 1758 and *Clethrionomys glareolus* Schreber, 1780, which prefer a more wooded environment. These species and others as well undoubtedly occurred during the Preboreal period, during which the gyttja was deposited (Street, 1990a). It is more than likely that they would have been present in this fauna if avian predators had concentrated their pellets in the area. This indicates that one should familiarise oneself with the taphonomy of mammal fossils before drawing conclusions on large-scale environmental and climatic conditions.

*Age of the fauna* — All species represented in the present fauna are extant in NW Europe and most of them have a long stratigraphic record. *Sorex minutus* has been recorded from many late Pliocene to Holocene faunas. *Sorex araneus* first occurred during the late Middle Pleistocene, while *Talpa europaea*, *Microtus arvalis*, *M. agrestis* and *M. oeconomus* are known from early Middle Pleistocene faunas.

The water vole *Arvicola terrestris* from Bedburg-Königshoven shows an advanced enamel differentiation, typical of modern NW European water voles. This type of enamel differentiation is the result of an evolution which took place during the Middle and Late

Pleistocene. Advanced populations with modern enamel differentiation are known from the late Middle Pleistocene. However, these populations became extinct in NW Europe as a result of the extreme climatic conditions during the latest Saalian. More primitive forms re-populated the area during the Eemian and the evolution in the differentiation of the enamel is repeated during the late Pleistocene (van Kolfschoten, 1990). The result of this evolution is the occurrence in northwest and central Europe of *Arvicola terrestris* populations with an advanced enamel differentiation during the last glacial and the Holocene.

The late Pleistocene glacial faunas from southern Germany described by Storch (1974) differ from the Holocene faunas not only in composition but also in robustness of certain species. Late Pleistocene representatives of *Talpa europaea*, *Sorex araneus*, *Cricetus cricetus* (Linnaeus, 1758) and *Arvicola terrestris*, which have been referred to in the literature as *Talpa europaea magna* (Woldrich, 1893)/*T. magna* Woldrich, 1893, *Sorex* sp., *Cricetus major* Woldrich, 1880 and *Arvicola antiquus* Pomel, 1853 (Storch, 1973, 1974) are much more robust than the Recent forms. Palynological data for the gyttja unit at Bedburg which yielded the smaller mammal fauna as well as the absolute age of  $9,600 \pm 100/9,780 \pm 100$  (Street, 1990a, b) indicate an early Holocene (Preboreal) age. The relatively large dimensions of part of the fossil humeri of *Talpa europaea* confirm such an age assignment.

Aves	coot	<i>Fulica atra</i> Linnaeus, 1758
	mallard	<i>Anas platyrhynchos</i> Linnaeus, 1758
	tufted duck	<i>Aythya fuligula</i> (Linnaeus, 1758)
	white stork	<i>Ciconia ciconia</i> (Linnaeus, 1758)
	partridge	<i>Perdix perdix</i> (Linnaeus, 1758)
	crested lark	<i>Galerida cristata</i> (Linnaeus, 1758)
Rodentia	beaver	<i>Castor fiber</i> Linnaeus, 1758
Carnivora	badger	<i>Meles meles</i> (Linnaeus, 1758)
	dog	<i>Canis familiaris</i> Linnaeus, 1758
Perissodactyla	horse	<i>Equus</i> sp.
Artiodactyla	red deer	<i>Cervus elaphus</i> Linnaeus, 1758
	roe deer	<i>Capreolus capreolus</i> Linnaeus, 1758
	aurochs	<i>Bos primigenius</i> Bojanus, 1827
	wild pig	<i>Sus scrofa</i> Linnaeus, 1758

Table 1. Species of large mammals and birds described from the Bedburg-Königshoven site (Street, 1991).

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