

REMAINS OF *MELES HOLLITZERI* (CARNIVORA, MUSTELIDAE) FROM THE LOWER PLEISTOCENE SITE OF UNTERMASSFELD

1. Introduction

The Untermaßfeld locality is situated in south-western Thuringia, about 2 km south of Meiningen, in the valley of the Werra river near the village of Untermaßfeld. In the basal part of the Upper Fluvial Sands of the valley, a rich accumulation of invertebrate and vertebrate remnants was discovered. The age of the faunal assemblage has recently been considered to be within the latest Waalian to latest Bavelian interval of the Early Pleistocene, close to the palaeomagnetic Jaramillo event of the Matuyama reversal zone (R.-D. Kahlke 1994a, 1995a, 1995b).

Among numerous remains of carnivoran mammals collected from the fossil-rich bed of Untermaßfeld (R.-D. Kahlke 1994a, 1994b, 1995a, 1995b), only two specimens representing the family Mustelidae have been found. Although neither of the specimens has hitherto been described, one of them, a fragment of mandible, was previously mentioned and referred to as indeterminate Mustelidae (R.-D. Kahlke 1985, 227), *Meles* sp. (R.-D. Kahlke 1990, 30, 1992, 59), *Meles meles* (R.-D. Kahlke 1995b, 732), or *Meles meles atavus* (R.-D. Kahlke 1993, 39, 1994a, 361, 1994b, 108, 1995a, 7). The purpose of the present contribution is to describe and identify taxonomically both the mustelid specimens.

2. Description

The Lower Pleistocene mustelid material from Untermaßfeld is composed of two specimens catalogued under numbers IQW 1994/24619 (Mei. 24148) and IQW 1982/17971 (Mei. 17491) in the collection of the former Institut für Quartärpaläontologie Weimar (now Forschungsstation für Quartärpaläontologie Weimar, Forschungsinstitut für Naturmuseum Senckenberg, Germany).

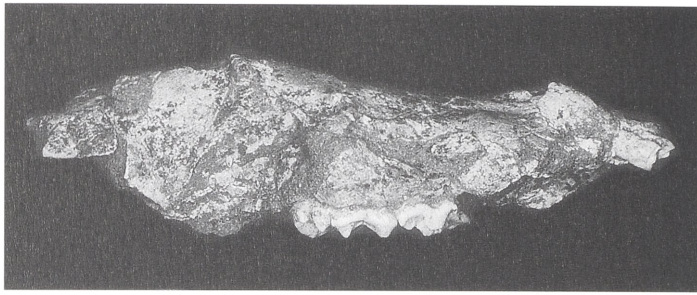
Specimen IQW 1994/24619 (Mei. 24148)

(Figs. 1-3, 4a, 4b; Tab. 1)

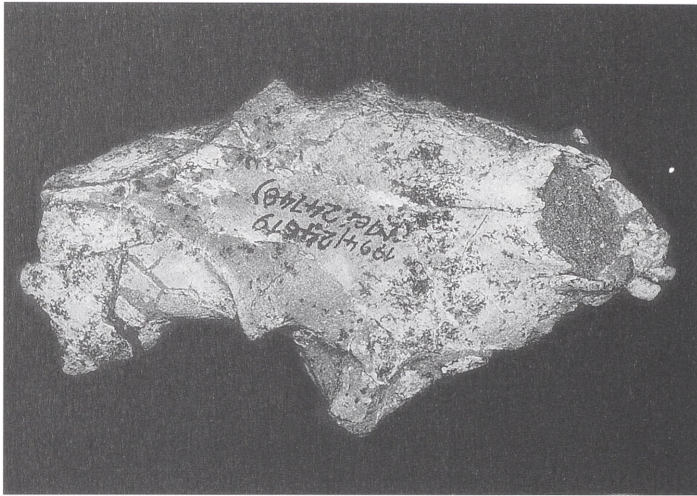
The specimen consists of the facial-palatal portion of skull and the following teeth or their fragments: the right I² and I³ without occlusal (or ventral) parts of their crowns; the left I³ with a slight damage to its mesial side; the left P¹ lacking its crown; the left P² missing its anterior root, the basal end of its posterior root, and the tip of the principal cusp; fragmentary roots of the right P² and P³; the protocone wing of the left P⁴; the right P⁴ without the occlusal part of its paracone; and the right M¹ that is cracked but complete. All the teeth remain in their alveoli except for the left I³ and P² that were found loose in matrix adjacent to the palate.

The cavities and canals of the partial skull are filled with fine and medium-grained sands. The bones are coloured yellowish-white to light-brown and black, while the tooth enamel is white. The entire specimen is dorsoventrally crushed and somewhat twisted by tectonic pressure. The distortion has caused the bones and teeth to break in many places.

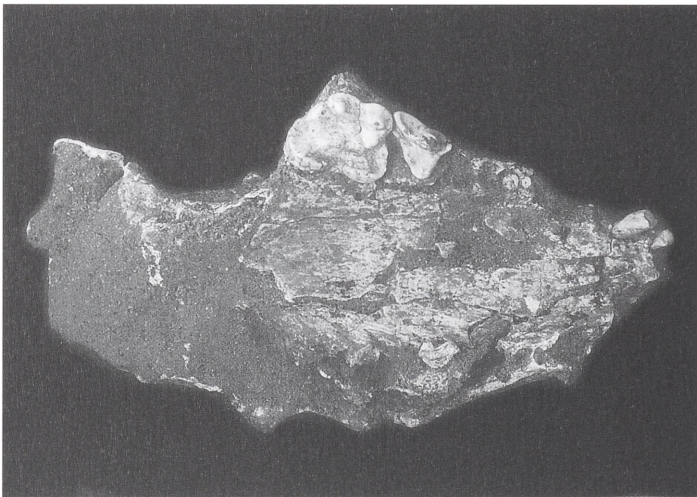
The lateral margin of the infraorbital foramen is situated above M¹. The supraorbital (or postorbital) processes are salient; their lateral ends are about 37.5 mm apart. The arcuate frontal crests and the preserved anterior part of the sagittal crest are well developed. The surface of the sagittal and frontal crests, the dorsal surface of the supraorbital processes, and the surface of the interorbital area adjacent to the processes are porous. The sutures are obliterated or obscure except the anterior part of the internasal suture.



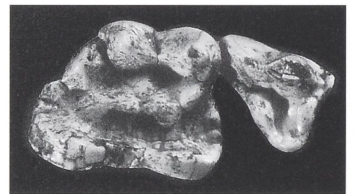
a



b



c



d



Fig. 1 *Meles hollitzeri*, Untermaßfeld. Partial skull IQW 1994/24619 (Mei. 24 148). – a Right lateral view. – b Dorsal view. – c Ventral view. – d The right P⁴ and M¹ in occlusal view. – Scale bars equal 10mm.

I² and I³ are single-rooted and labiolingually elongated. Most of the crown of I³ consists of a large cusp that is somewhat deflected linguad and compressed labiolingually, giving it a blade-like form. In occlusal view, the blade arches slightly labiad. The mesial edge of the principal cusp is about half as long as the distal one. There is a cingulum mesiolingually and distally. The mesiolingual cingulum is continuous

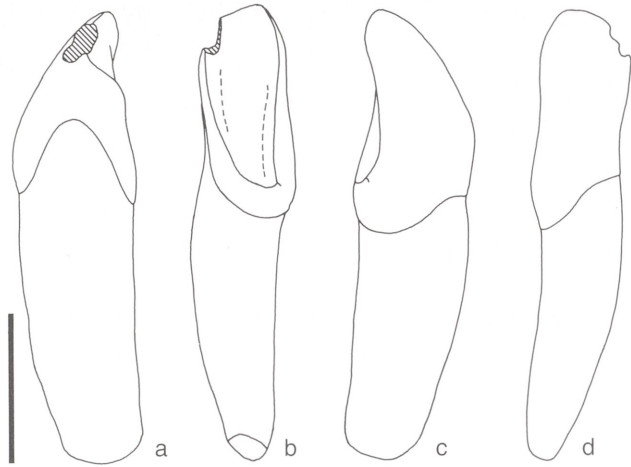


Fig. 2 *Meles hollitzeri*, Untermaßfeld. Left I³ IQW 1994/24619 (Mei. 24148). – a Mesial view. – b Lingual view. – c Distal view. – d Labial view. Scale bar equals 5 mm.

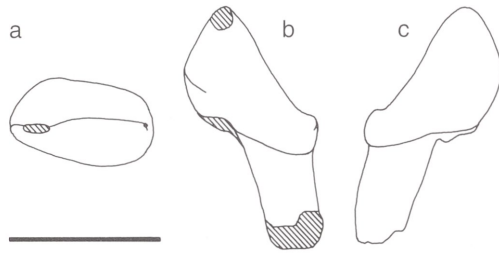


Fig. 3 *Meles hollitzeri*, Untermaßfeld. Left P² IQW 1994/24619 (Mei. 24148). – a Occlusal view. – b Lingual view. – c Buccal view. – Scale bar equals 5 mm.

with the mesial edge of the principal cusp. The distal cingulum, which is shorter and less well developed than the mesiolingual one, bulges out into a minor cuspule at the place of junction with the distal edge of the principal cusp.

P¹ is minute and has a single root that measures 0.6 mm in greatest diameter.

P² is double-rooted. Its crown is mostly formed by a large blade-like cusp that is compressed buccolingually and somewhat deflected linguad. This principal cusp culminates within the most anterior fifth of the tooth length, giving the crown a highly asymmetric appearance in side view. The posterior edge of the principal cusp is about twice as long as the anterior one. There is neither accessory cusp nor elevation on the posterior edge. A minute cingulum is present anteriorly and posteriorly. The anterior cingulum represents the basolingual ending of the anterior edge of the principal cusp. The posterior cingulum consists of a tiny cuspule that constitutes the ending of the posterior edge of the principal cusp.

The crown of P⁴ has a triangular contour with rounded vertices and concave sides when viewed from the occlusal surface. The largest and highest cusp on the crown is the paracone. This cusp is compressed buccolingually and possesses three ridges running from its tip basad. The anterolingual ridge is rounded and blunt, whereas the anterobuccal and posterior ridges are trenchant. The posterior ridge constitutes the anterior part of the carnassial blade. The posterior part of the blade, formed by the metacone and metastyle, is deflected buccad, making the carnassial blade curved in occlusal view. Although the carnassial blade is deeply worn in the area adjoining the juncture of the paracone and metacone, so that the dentine is exposed, a trace of the carnassial notch can be identified. The posterior end of the carnassial blade, which corresponds to the metastyle, is slightly swollen, giving the occlusal profile of the blade a little concave shape between the metacone and metastyle. The buccal surface of the carnassial blade is depressed. This depression is basally delimited by a fine, barely identifiable postero-buccal cingulum.

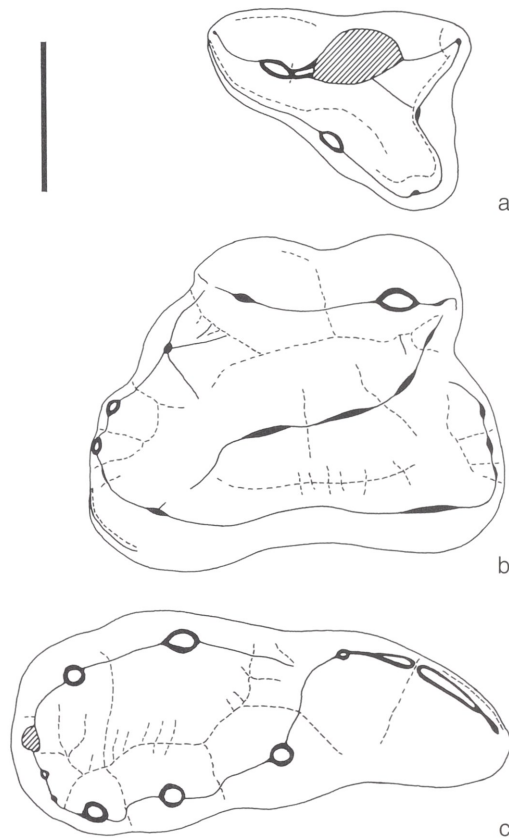


Fig. 4 *Meles hollitzeri*, Untermaßfeld. Occlusal views of the right P⁴ (a) and M¹ (b) IQW 1994/24619 (Mei. 24148), and the left M₁ (c) IQW 1982/17971 (Mei. 17491). – Scale bar equals 5 mm.

The P⁴ protocone is a prominent cusp occupying the posterior part of an extensive anterolingual (or protocone) wing of the crown. It is compressed buccolingually and set off from the paracone by a deep V-shaped valley. Its tip is worn away exposing a dentine facet. The lingual face of the protocone is steeply inclined and convex, so that the lingual outline of the crown is concave in front of and behind this cusp in occlusal view. The anterior and posterior slopes of the protocone are angulated into ridges passing from the tip of the cusp basad to continue into strong cingula. The posterior of these cingula borders the lingual face of the metacone-metastyle blade to vanish at the posterior extremity of the crown. The anterior of the cingula surrounds the rest of the protocone wing of the crown and flanks the anterolingual slope of the paracone to terminate in a small but distinct cuspule-like parastyle that is detached from the anterior end of the anterobuccal ridge of the paracone by a notch. The cingulum produces two small but well-marked elevations between the protocone and parastyle. The lingual of these elevations, which is cuspule-shaped, is positioned at the anterolingual corner of the protocone wing. The buccal elevation adjoins the basal part of the anterolingual ridge of the paracone, bordering the anterobuccal portion of the protocone wing.

M¹ has its crown shaped like a trapezoid with rounded vertices and concave sides when viewed from the occlusal surface. The buccal and largest cusps of the trigon, the paracone and the metacone, are about equal in size. The paracone was originally higher than the metacone, but its tip has been removed by wear. The paracone culminates anterior to the midpoint of its anteroposterior length, whereas the metacone culminates posterior to the midpoint of its length. Both the cusps are compressed buccolingually giving them a blade-like form. The paracone blade is anteriorly continued into a minute parastyle ridge,

while the metacone base is posteriorly contiguous to a tiny metastyle projection. The paracone and metacone are divided by a conspicuous V-shaped notch. The buccal margin of the trigon is excavated at the level of this notch in occlusal view. A fine, barely distinguishable cingulum passes round the antero-buccal base of the metacone.

The lingual crest of the M¹ trigon is long and strong. It originates from the anterior base of the paracone-parastyle wing, at the parastyle, and runs posterolingual and then posteriad, to fade away behind the level of the metastyle. The crest is composed of a row of four elevations that are separated from one another by waists. The most anterior elevation is small, whereas the remaining ones are large. Close to the smallest elevation, on the anterobuccal surface of the anterior of the large elevations, the paraconule, there is a fine, short ridge that is quite hard to make out; this ridge disappears into the lingual base of the paracone. The most posterior and largest of the elevations represents the protocone.

The M¹ metaconule, which is a large cusp corresponding to the protocone in size, stands posterobuccal to the protocone and posterolingual to the metacone. It is isolated from either of these cusps by a deep valley. The valley between the metaconule and metacone is V-shaped and slopes into the basin of the trigon, whereas that between the metaconule and protocone is much more spacious, U-shaped and constitutes a very low threshold separating the trigon basin from the posterior basin of the talon. The metaconule is angulated into four ridges sloping from its centrally located top, so that each of four walls of the cusp resembles an isosceles triangle. The posterior and most extensive wall is convex, making the posterior contour of the crown concave in front of and behind the metaconule in occlusal view. The posterior ridges, which demarcate the posterior wall, are sharper than the anterior ones. The buccal of the posterior ridges forms the saddle between the metaconule and metacone, which posteriorly borders the valley dividing both the cusps. Immediately after the passing of this saddle, the ridge vanishes into the posterior base of the metacone directly buccal to the metastyle. The buccal of the anterior ridges terminates in the lingual base of the metacone at the bottom of the valley between the metaconule and metacone, at about the midpoint of the valley length. Between the anterobuccal and posterobuccal ridges, on the basal surface of the anterior wall of the metaconule, there is a fine, barely visible, short ridge extending to the bottom of the valley between the metaconule and metacone, where it disappears into the base of the metacone. The lingual of the anterior ridges of the metaconule connects this cusp with the protocone along the threshold separating the trigon and talon basins.

The M¹ talon is anteriorly and posteriorly more expanded than the trigon. It is considerably deflected occlusad, making the basal margin of the crown notably convex when viewed from the anterior and posterior sides. In occlusal view, the lingual outline of the crown is widely concave at about the midpoint of its anteroposterior length, dividing the talon into the anterior and posterior wings. Both the wings are surrounded by a very strong, 2 to 3 mm high, continuous cingulum that begins in the anterior base of the paraconule and ends in the V-shaped notch where it meets the posterolingual ridge of the metaconule. The cingulum is occlusally produced into six small and two large elevations that are arranged one behind the other. Of the small elevations, three flank the anterior wing of the talon anteriorly, and three others border the posterior wing posteriorly. In either of these rows, the most lingual elevation is smallest, and the buccalmost one is largest. The most buccal elevation of the anterior row is shaped like a ridge, whereas that of the posterior row resembles a cone in form. The buccal and medial elevations of the posterior row, which have their tips worn out and expose dentine facets occlusally, are divided off from each other and from the adjacent projections by distinct V-shaped notches. The remaining small elevations are less well isolated. The grooves separating the most-lingual small elevations of both rows from the large cingular elevations are fine and difficult to determine. The large elevations constitute very long ridges that bound lingually the anterior and posterior wings of the talon. They are divided by a wide depression at the level of the concavity in the lingual contour of the crown. The posterior large elevation culminates sharper than the anterior one, forming a tapered tip that corresponds in its position to the hypocone. There is a weak but distinct accessory cingulum running along the base of the strong cingulum from about the level of the tip of the posterior large elevation to the level of the notch between the lingual and medial posterior small elevations.

P ² width	from labialmost to lingualmost points of crown	3.0
P ³ length	least diameter of tooth at region where crown meets root	3.0
P ³ width	from labialmost to lingualmost points of basal margin of crown	3.8
P ³ height	from occlusalmost to basalmost points of tooth	15.0
P ³ crown height	from occlusalmost point of tooth to distal part of basal margin of crown, measured in plane of distal edge of principal cusp	7.5
P ² length	from anteriormost to posteriormost points of crown	5.1
P ² width	greatest distance between buccal and lingual borders of crown perpendicular to anteroposterior length of tooth	2.6
P ⁴ buccal length	greatest distance between borders of parastyle and metastyle wings of crown	8.8
P ⁴ medial length	least distance from posteriormost point of crown to anterior border of crown between parastyle and protocone wings	8.3
P ⁴ lingual length	greatest distance between borders of protocone and metastyle wings of crown	9.7
P ⁴ width	least distance from lingualmost point of crown to line joining buccalmost points of parastyle-paracone and metastyle-metacone wings	6.8
M ¹ buccal length	greatest distance between parastyle-paracone wing and posterior border of talon	14.9
M ¹ medial length	least distance from posteriormost point of crown to anterior border of crown between parastyle-paracone wing and anterior border of talon	13.3
M ¹ lingual length	greatest distance between anterior and posterior borders of talon	13.7
M ¹ anterior width	greatest distance from buccal border of parastyle-paracone wing to lingual border of anterior wing of talon	10.7
M ¹ medial width	least distance from buccal border of crown between parastyle-paracone and metastyle-metacone wings to lingual border of crown between anterior and posterior wings of talon	9.7
M ¹ posterior width	greatest distance from buccal border of metastyle-metacone wing to lingual border of posterior wing of talon	12.0
M ₁ length	from anteriormost to posteriormost points of crown	16.4
M ₁ trigonid length	from anteriormost point of crown to basalmost point of notch between metaconid and entoconid	9.6
M ₁ width	least distance from buccalmost point of crown to line joining lingualmost points of trigonid and talonid	7.3
M ₁ blade width	least distance between buccal and lingual borders of crown across carnassial notch	4.7
M ₁ talonid width	from buccalmost point of hypoconid base to lingualmost point of entoconid base	7.4

Tab. 1 Dental measurements (mm) of *Meles hollitzeri* from Untermaßfeld. The upper teeth are of specimen IQW 1994/24619 (Mei. 24148), whereas M₁ is of specimen IQW 1982/17971 (Mei. 17491).

The talon basin of M¹ comprises three depressions. The anterior and medial depressions are separated from each other by a low threshold or saddle that links the anterior large elevation of the cingulum with the medial large elevation of the lingual crest of the trigon. The medial and posterior depressions are divided by another low threshold that connects the posterior large cingular elevation with the posterior part of the protocone. There is a fine, barely detectable ridge passing along the latter threshold from the posterolingual base of the protocone towards the tip of the posterior large cingular elevation. The medial depression of the talon is elongate anteroposteriorly and displays on its surface about 10 transverse, closely spaced, low enamel folds or ridges that run from the base of the lingual crest of the trigon to the lingual cingulum. There are no such folds within the remaining depressions of the talon.

Specimen IQW 1982/17971 (Mei. 17491)
(Figs. 4c, 5; Tab. 1)

The specimen is a fragment of the left dentary bearing M₁, which is virtually complete, and M₂ that lacks most of its crown and the buccoocclusal part of its root. The fossil differs in preservation from specimen IQW 1994/24619 (Mei. 24148). It is free of sediment and its bone and tooth surfaces are coloured yellowish-white.

The masseteric fossa as preserved, is deep and well-marked, extending anteriorly to the level of M₂. The single alveolus of this tooth is elongate anteroposteriorly and placed in the ascending portion of the dentary, so that it faces anterodorsad. The alveoli of M₁ and M₂ are in direct contact and so are their crowns, which touch each other.

The crown of M₁ is supported by two strong roots of which the posterior root is considerably larger than the anterior one. In addition, three minor accessory roots, arranged one behind the other, are visible

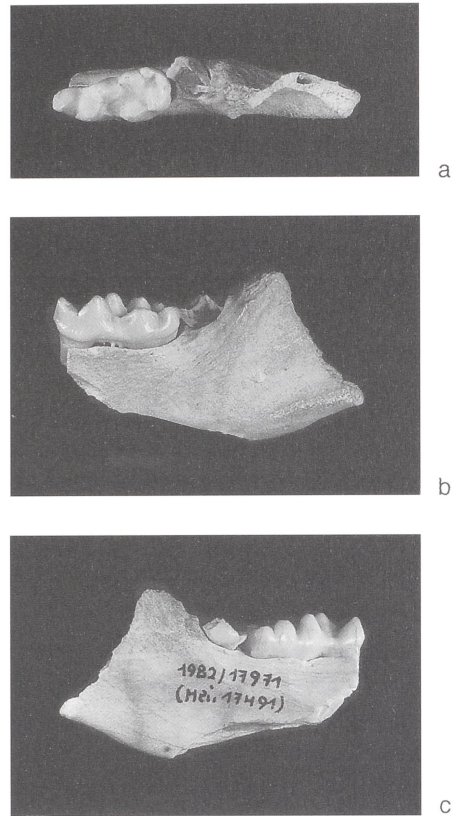


Fig. 5 *Meles hollitzeri*, Untermaßfeld. Fragment of the left dentary with M_1 and partial M_2 IQW 1982/17971 (Mei. 17491). – a Dorsal view. – b Lateral view. – c Medial view. – Scale bar equals 10mm.

on the buccal side, between the strong roots. The posteriormost of these very small roots is largest, while the anteriormost one is smallest.

A weak cingulum is present anterobuccally, encircling the buccal base of the paraconid. There is no other cingulum on M_1 .

The M_1 trigonid comprises three cusps of which the protoconid is highest, with the paraconid and metaconid about equal in height. The anterior profile of the trigonid is convex, including the steeply inclined anterior slope of the paraconid. Viewed from above, the trigonid is arched buccad, making its lingual contour concave. The carnassial blade is made up of the paraconid ridge and the anterior ridge of the protoconid, which are divided by a slit-shaped carnassial notch. The carnassial blade is heavily worn exposing dentine facets. The shearing surface on the buccal side of the paraconid and protoconid is remarkably worn in its occlusal part. The anterior portion of the carnassial edge terminates anteriorly in the tip of the paraconid, while the posterior one curves posteriorly at an obtuse angle at the tip of the protoconid to continue into a trenchant ridge that falls obliquely down until it meets the buccal ridge of the metaconid at a prominent slit-like notch. The anterior and lingual edges of the protoconid delimit the lingual wall of this cusp, which buccally flanks a deep, spacious, U-shaped valley that sets the paraconid off from the metaconid. The posterior wall of the protoconid exhibits a wear facet buccoocclusally, just above a short, low ridge that arises from the base of the protoconid and descends posteriad and slightly buccad to meet the anterior edge of the hypoconid at a slit-shaped notch. There is a minute occlusobasal groove separating this low ridge from the protoconid on the buccal side. In occlusal view, the buccal margin of the crown is concave at the level of this low ridge.

The M_1 metaconid is the smallest cusp on the trigonid. It stands for the most part, behind the protoconid, so that its occlusal portion is visible in buccal view, and the posterior wall of the trigonid is exca-

vated when viewed from above. The metaconid is stout, well detached from the protoconid and rather short anteroposteriorly. Viewed from the lingual side, it resembles an isosceles triangle with its posterior profile being more convex than the anterior one and without its occlusal end, which has been removed by wear. The lingual wall of the metaconid is slightly convex in both occlusal and anterior views. The slopes of the cusp are angulated buccally and posteriorly into two ridges, of which the buccal one is more trenchant. The buccal ridge meets the lingual ridge of the protoconid, whereas the posterior ridge is contiguous to the anterior ridge of the entoconid.

The M_1 talonid is deeply basined and buccolingually wider than the trigonid. Its largest and highest cusp is the hypoconid that forms the anterior part of the buccal wall of the talonid. The hypoconid is anteroposteriorly elongated and bears two ridges. The anterior of them is united with the low ridge extending from the posterior base of the protoconid, while the posterior one meets the anterior ridge of the hypoconulid at a slit-shaped notch. Although wear has affected the tip of the hypoconid, exposing an ovoid dentine facet, it is evident that this cusp also originally culminated at about the midpoint of its length. The hypoconid is deflected buccad, so that its buccal wall is slightly depressed in anterior and posterior views and more steeply inclined than the lingual wall. There is an extensive, continuous wear facet on the buccal surface of the hypoconid anteriorly, occlusally and posteriorly. This facet extends anteriorly into the area directly below the low ridge descending from the posterior base of the protoconid and posteriorly onto the anterior and posterocclusal parts of the buccal surface of the hypoconulid.

The M_1 hypoconulid is the third largest and highest cusp on the talonid. It is positioned at the postero-buccal corner of the crown, posterior to the hypoconid. When viewed from above, the buccal outline of the talonid is slightly concave between these two cusps. The external wall of the hypoconulid is more steeply inclined than the internal one, resembling the hypoconid in this condition, but unlike the latter it is convex when viewed from the posterior side. In occlusal view, the hypoconulid is arcuate and has two ridges that slope from a small dentine facet that marks the tip of the cusp. The anterior ridge joins to the posterior extremity of the hypoconid, whereas the posterior ridge constitutes the buccocclusal part of the posterior wall of the talonid. There is a fine, barely identifiable occlusobasal groove on the posterocclusal surface of the crown, which separates the hypoconulid from the rest of the posterior wall of the talonid.

The posterior wall of the M_1 talonid is lower than either of the buccal and lingual walls. It is occlusally produced into a single, low elevation that exposes a tiny dentine facet at its tip. Another tiny wear facet of dentine occurs somewhat lingual to this elevation, but no involved projection can be discerned. Buccal to the low elevation and close to the groove delimiting the hypoconulid lingually, the occlusal part of the posterior talonid wall has been broken off, probably including a small enamel elevation. This broken area adjoins a small and shallow, buccolingually elongate depression established in the occlusal part of the posterior face of the crown. This depression originally received the anterior surface of the M_2 crown.

The lingual wall of the talonid is anteroposteriorly shorter than the buccal wall. It bears two cusps that are divided by a deep, slit-like notch. The anterior of these cusps, the entoconid, is the second largest and highest cusp of the talonid, whereas the posterior one, the postentoconulid, is smaller than the hypoconulid. The tips of the entoconid and postentoconulid are worn away exposing dentine facets. Both of these cusps are angulated into the anterior and posterior ridges. The anterior ridge of the entoconid meets the posterior ridge of the metaconid at a deep slit-shaped notch, the posterior ridge of the postentoconulid is smoothly continued into the posterior wall of the talonid and the posterior ridge of the entoconid and the anterior one of the postentoconulid are contiguous. The lingual faces of the entoconid and the postentoconulid are convex and more steeply inclined than the buccal ones. In occlusal view, the lingual contour of the crown is concave in front of and behind the entoconid.

The talonid basin of M_1 is anteroposteriorly elongated and shows numerous, closely spaced low enamel folds or wrinkles on its surface. The majority of these folds descend the slopes of the hypoconid and hypoconulid.

M₂ has a single, anteroposteriorly elongate root. The preserved lingual cingulum of the crown has fine crenulations across its surface.

3. Taxonomic Identification

The morphology of both mustelid specimens from the Lower Pleistocene of Untermaßfeld plainly justifies their referral to the meline genus *Meles* Brisson, 1762, which has already been postulated by R.-D. Kahlke (1990, 1992, 1993, 1994a, 1994b, 1995a, 1995b) for specimen IQW 1982/17971 (Mei. 17491). Of this genus, seven species-group taxa have been recorded from the Upper Pliocene to Middle Pleistocene deposits of Europe, including the extant badger *Meles meles* (Linnaeus, 1758), *Meles atavus* Kormos, 1914, *Meles thoralis* Viret, 1950, *Meles thoralis spelaeus* Bonifay, 1971, *Meles hollitzeri* Rabeder, 1976, *Meles dimitrius* Koufos, 1992 and an unnamed new form mentioned as *Meles* n. sp. by Mais and Rabeder (1984, 221).

Meles atavus was originally described by Kormos (1914a, 241) from the »*Machaerodus*« bed of the Şomleu Hill (formerly Somlyóhegy) near Băile Episcopiei (formerly Püspökfürdő) in north-western Romania. The species was synonymized by Kretzoi (1938, 126) with *Meles meles* and regarded as a fossil subspecies of the latter, *Meles meles atavus* (see also Viret 1950, 280-282; Heller 1958, 29-32). Kretzoi (1941, 315) named this subspecies, evidently by mistake, *Meles meles praeglacialis*.

The correct name of the type locality of *Meles atavus* is Betfia 5 (formerly the locality V of Püspökfürdő), which was clearly indicated by Kormos (1914b) and Kretzoi (1941), and not Betfia 2 (formerly the locality II of Püspökfürdő) as Rabeder (1976, 47) followed by Baryšnikov and Potapova (1990, 95) and Baryšnikov (1993, 17) erroneously maintained. The fauna of Betfia 5 has been attributed to the late Menapian of the Early Pleistocene (Terzea 1994), whereas that of Betfia 2 has been referred to the Waalian (Wolsan 1993, 212). From Betfia 2, no unquestionable find of a badger has so far been reported (Wolsan 1993). An incomplete toothed dentary of a badger, catalogued under number U. P. 616 in the Naturhistorisches Museum Basel, Switzerland, assigned by Rabeder (1976, 48f., figs. 18/2, 19/3) to Betfia 2, has been labelled, in fact, as coming from Püspökfürdő, without any indication of the locality number. It is therefore uncertain which of the five localities of Püspökfürdő (Kormos 1914b; Kretzoi 1941), currently referred to as Betfia 1-5, was meant. This is also true for another fossil specimen of a badger from Püspökfürdő, stored in the Centre des Sciences de la Terre, Université Claude Bernard – Lyon I, France, where it is now numbered FSL 213794 (formerly 3322), cited by Viret (1939, 10f., fig. 1, 1950, 282).

Meles thoralis was erected by Viret (1950), based on skull and mandible materials from the fossiliferous loess bed near Saint Vallier in south-eastern France. The faunal assemblage of Saint Vallier constitutes the reference locality of zone MN 17 (Bruijn et al. 1992), being late Late Pliocene in age.

Meles thoralis spelaeus was originally described by Bonifay (1971, 325) from bone-bearing sediments in cave 1 of Mas des Caves near Lunel-Viel (locality Lunel-Viel 1) in south-eastern France. Kurtén and Poulianos (1977, tab. 7, 1981, 22) included this subspecies in *Meles meles*. The age of the fauna from Lunel-Viel 1 has been estimated to be Holsteinian, early Middle Pleistocene (Bonifay 1980).

Meles hollitzeri was named by Rabeder (1976, 43) on the basis of skull and mandible fragments and teeth collected from layer 2C₁ of Hollitzer Quarry near Bad Deutsch-Altenburg (locality Deutsch-Altenburg 2C₁) in north-eastern Austria. From the same layer, Mais and Rabeder (1984, 221) reported another new badger form, which they quoted as *Meles* n. sp. Wolsan (1993, 212) included both forms in *Meles atavus*. The fauna of Deutsch-Altenburg 2C₁ has been allocated to the Waalian (Wolsan 1993, 212).

Meles dimitrius was originally described by Koufos (1992, 218) from the upper part of the red beds near Gerakarou (locality Gerakarou 1) in northern Greece. The faunal assemblage of this site has been interpreted to be of Early Pleistocene age (Koufos 1992, 242f.).

The living members of the genus *Meles* exhibit a large amount of individual variation, both in form and size, affecting their dentition in particular (Petrov 1953; Baryšnikov and Potapova 1990). When studying larger samples of recent badgers from European and Asiatic populations, it appears that the morphological and size characteristics of the fossil badgers discussed above, especially those of Pleistocene

age, are well within the variability range observed. This justifies the conclusion that the names of the fossil representatives of the genus *Meles*, described from the Upper Pliocene to Middle Pleistocene deposits of Europe, should be placed in the synonymy of the extant species. However, it is not certain at present whether the living badgers of Europe and Asia are conspecific. Baryšnikov and Potapova (1990) have recently presented new evidence arguing for the existence of two *Meles* species in the modern fauna, namely the European *Meles meles* and the Asiatic *Meles anakuma* Temminck, 1844. This view was supported by Lüps and Wandeler (1993) and now seems to be accepted by many students of the genus (Kryštufek and Griffiths 1993). Hence, though I am well aware that *Meles thoralis*, and particularly *Meles atavus*, *Meles thoralis spelaeus*, *Meles hollitzeri* and *Meles dimitrius*, have been poorly founded, I propose to leave them unsynonymized until the question of conspecificity of the recent badgers is convincingly resolved. Consequently, in this paper I persist in using the names of the fossil European badgers as originally applied.

To determine a specific affiliation of the *Meles* remains from Untermaßfeld, I take *Meles atavus* and *Meles hollitzeri* into consideration first and foremost because they are closest to the badger of Untermaßfeld, both geographically and chronologically. The major diagnostic feature of *Meles atavus* is the presence of a prominent accessory cusp between the protoconid and hypoconid on M₁ (Kormos 1914a, 243, 245). This feature is absent in the corresponding tooth from Untermaßfeld. On the other hand, the morphological characteristics of both badger specimens from Untermaßfeld closely match those of *Meles hollitzeri* from Deutsch-Altenburg 2C₁ (Rabeder 1976). There are also no significant differences in size between the badger remains from Untermaßfeld and their counterparts from Deutsch-Altenburg 2C₁ (Rabeder 1976). Therefore, I refer the Untermaßfeld specimens IQW 1994/24619 (Mei. 24148) and IQW 1982/17971 (Mei. 17491) to the species *Meles hollitzeri*.

In addition to its type locality, Deutsch-Altenburg 2C₁, and Untermaßfeld, *Meles hollitzeri* has been recorded from Deutsch-Altenburg 4B (Mais and Rabeder 1984, 221) of late Waalian age (Wolsan 1993, 212) and from layers 6 and 4b of Treugolnaâ Cave in the Caucasus Mountains (Baryšnikov 1993, 17), considered to represent different ages within the late Early to early Middle Pleistocene interval (Baryšnikov 1993; Potapova and Baryšnikov 1993).

Summary

An abundant invertebrate and vertebrate fauna, which dates from the interval between the latest Waalian and latest Bavelian (Early Pleistocene), was excavated from the basal part of the Upper Fluvial Sands in the valley of the Werra river near Meiningen in south-western Thuringia (locality Untermaßfeld). Among numerous remains of carnivorous mammals collected from this site, two specimens representing the family Mustelidae have been identified. The specimen numbered IQW 1994/24619 (Mei. 24148) consists of a facial-palatal portion of skull with some incisor, premolar and molar teeth (Figs. 1-3, 4a, 4b), while the specimen IQW 1982/17971 (Mei. 17491) is a fragment of a left dentary bearing the molar teeth (Figs. 4c, 5). Both the specimens are housed in the former Institut für Quartärpaläontologie Weimar (now Forschungsstation für Quartärpaläontologie Weimar, Forschungsinstitut und Naturmuseum Senckenberg), Germany. They are described in this paper. Their dental dimensions are presented in Tab. 1.

The morphological characteristics of the mustelid specimens from the Lower Pleistocene of Untermaßfeld match those of the meline genus *Meles* Brisson, 1762. Of this genus, seven species-group taxa have been recorded from the Upper Pliocene to Middle Pleistocene deposits of Europe. These are: the extant badger *Meles meles* (Linnaeus, 1758) and the fossil forms *Meles atavus* Kormos, 1914, *Meles thoralis* Viret, 1950, *Meles thoralis spelaeus* Bonifay, 1971, *Meles hollitzeri* Rabeder, 1976, *Meles dimitrius* Koufos, 1992 and an unnamed new species from the locality Deutsch-Altenburg 2C₁. The size and morphological features of these fossil forms are well within the variability range observed in recent badgers, which implies their inclusion in the extant species. However, because the conspecific status of the living badgers of Europe and Asia has recently been questioned, it is proposed to leave the Late Pliocene to Middle Pleistocene European badgers unsynonymized until the question of conspecificity of the recent members of the genus is convincingly resolved.

Consequently, based on the close resemblance in morphology and size, the mustelid remains from Untermaßfeld are referred to the extinct badger *Meles hollitzeri*, known from the Austrian sites Deutsch-Altenburg 2C₁ (type locality) and 4B of Waalian age, as well as from layers 6 and 4b of Treugolnaâ Cave in the Caucasus Mountains, representing different ages within the late Early to early Middle Pleistocene interval.

Zusammenfassung

Eine reiche Fauna mit Invertebraten- und Vertebratenresten aus dem Zeitraum spätestes Waalium bis spätestes Bavelium (Unterpleistozän) wurde aus dem basalen Bereich der Oberen Fluviatilen Sande im Werra-Tal nahe Meiningen im südwestlichen Thüringen (Lokalität Untermaßfeld) geborgen. Unter den zahlreichen Resten der Carnivoren aus dieser Fundstelle konnten zwei Exemplare als zur Familie Mustelidae gehörend bestimmt werden. Das Stück IQW 1994/24619 (Mei. 24148) besteht aus dem facial-palatalen Schädelbereich mit Incisiven, Prämolaren und Molaren (Fig. 1-3, 4a, 4b). Bei Exemplar IQW 1982/17971 (Mei. 17491) handelt es sich um ein linkes Mandibelfragment mit Molaren (Fig. 4c, 5). Aufbewahrungsort beider Funde ist das ehemalige Institut für Quartärpaläontologie Weimar (jetzt Forschungsstation für Quartärpaläontologie Weimar des Forschungsinstituts und Naturmuseums Senckenberg). Sie werden in der vorliegenden Arbeit beschrieben. Ihre Zahnmaße sind in Tab. 1 dokumentiert.

Die morphologischen Merkmale der Musteliden-Funde aus dem Unterpleistozän von Untermaßfeld entsprechen denen der melinen Gattung *Meles* Brisson, 1762. Von diesem Genus wurden bislang sieben Taxa der Artgruppe aus oberpliozänen bis mittelpleistozänen Fundstellen Europas nachgewiesen. Hierbei handelt es sich um den heute lebenden Dachse *Meles meles* (Linnaeus, 1758) sowie die fossilen Formen *Meles atavus* Kormos, 1914, *Meles thoralis* Viret, 1950, *Meles thoralis spelaeus* Bonifay, 1971, *Meles hollitzeri* Rabeder, 1976, *Meles dimitrius* Koufos, 1992 und eine unbenannte neue Art aus der Lokalität Deutsch-Altenburg 2C₁. Größe und morphologische Merkmale der genannten Fossilformen befinden sich innerhalb der Variationsbreite der rezenten Dachse, was für deren Einbeziehung in die heute lebende Art sprechen würde. Vor dem Hintergrund, daß man die Konspezifität der heute auftretenden Dachse aus Europa und Asien in Frage stellt, wird vorgeschlagen, die spätpliozänen bis mittelpleistozänen Dachse Europas nicht zu synonymisieren, bis die Frage der Artzugehörigkeit für die rezenten Vertreter dieser Gattung überzeugend geklärt ist.

Wegen ihrer großen morphologischen und dimensionellen Ähnlichkeit werden die Musteliden-Funde von Untermaßfeld zu *Meles hollitzeri* gestellt, der aus den waalzeitlichen Fundstellen Deutsch-Altenburg 2C₁ (Typuslokalität) und 4B in Österreich sowie aus den Schichten 6 und 4b der Treugolnaâ Höhle im Kaukasus, die in verschiedene Abschnitte des Zeitraumes spätes Unter- bis frühes Mittelpleistozän gestellt werden, bekannt ist.

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