

More fossil bear remains in some Dutch collections

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Seven fossil specimens, inscribed in five different Dutch collections, are identified as remains of brown bears, *Ursus arctos* L. Three items are postcranial skeletal parts, two are isolated teeth and two are mandibular fragments. Five fossils have been collected from the North Sea bottom in the region just to the west of the Brown Ridge, while an isolated canine was found during dredging operations along the Meuse near 's-Hertogenbosch and part of a second isolated canine appeared when a ditch was cleaned near Broek in Waterland, north of Amsterdam. The age of the specimens varies from Late Pleistocene to Early Holocene.

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Introduction

Fossil remains of large mammalian carnivores from Pleistocene and Holocene deposits in or near the Low Countries are relatively rare. This is undoubtedly caused by the frequently solitary way of life of these predators, by the body weight ratio between predators and their prey, and, in consequence, by the rather slender chance of their becoming fossil. Only a small percentage of the fossilized carnivores are then found and collected. Those items that are finally collected by no means all find their way into a more or less well-organized public or private collection to be there correctly preserved and registered with re-

spect to place and date of finding. Thus, remains of large carnivores such as, in this case, bears, constitute relative rarities in such collections and a description of previously unknown specimens may form a contribution to the general knowledge about them.

The first of the specimens to be described here belongs in the collections of the Rijksmuseum van Geologie en Mineralogie at Leiden. I want to express my thanks to Mr G. Kortenbout van der Sluijs and to Dr M. Freudenthal for their aid and for the permission to study this fossil, obtained through them from the director of the said museum, Professor P.C. Zwaan. I also want to thank the following private collectors and amateurs, who gave me permission to describe one or more specimens in their collections: Mr A. Flonk of West-Terschelling, Torenstraat 40; Mr J. Mulder of Nieuwleusen, Goudenregenstraat 21; the Reverend C.F.H. van Tuyll van Serooskerken of Oostkapelle, Molenweg 36 (who acquired the described material from Mr D.J. Mol of 's-Heerenberg); and Mr A. Verhagen of Empel, Kasteeldreef 22.

The illustrations in the present paper have been made by the official artist of the Zoological Laboratory of Utrecht University, Mr H. van Kooten, and by his staff of photographers and designers, to each of whom I am much indebted.

Stratigraphy and collecting localities

Five out of the seven specimens have been collected by fishermen in the general area to the west of the Brown Ridge in the North Sea, some 80 km west of IJmuiden. Only in one case, the specimen in the collections of the Rijksmuseum van Geologie at Leiden, a more exact position has been recorded: 52° 45' N lat. and 3° 00' E long. A detailed account of the geographical and geological situation at and around the Brown Ridge has, amongst others, been given by Louwe Kooijmans (1972), who cites Jelgersma (1961), Houbolt (1968) and Oele (1969, 1971). The so-called Brown Ridge Beds, consisting of clay deposited in an extensive Early Weichselian freshwater lake, appear to contain most of the (of course Weichselian) fossil mammal bones. These beds form the bottom in the gullies and depressions in the overlying cover sands of most of the local sea bottom. It is therefore logical that the recorded site is situated in such a depression (see Fig. 1, copied from Louwe Kooijmans). Next to such Weichselian fossil bones, remains of animals from other ages, such as the Villafranchian, from the deepest depressions and usually very darkly coloured and heavily fossilized are known from the same region, as is recorded by Kortenbout van der Sluijs in an appendix to the cited paper by Louwe Kooijmans.

Specimen number 276 in the Flonk collection (which is kept in the Museum Flehite at Amersfoort, Westsingel 50) was found, more or less in situ, when a ditch was being cleaned and widened at Broek in Waterland, north of Amsterdam, approximately twenty years ago. Together with it a piece of unworked flint, some (medieval?) pottery sherds, and a satchel, made of birch bark, were recovered. The age of this fossil can safely be estimated as Holocene, probably Neolithic.

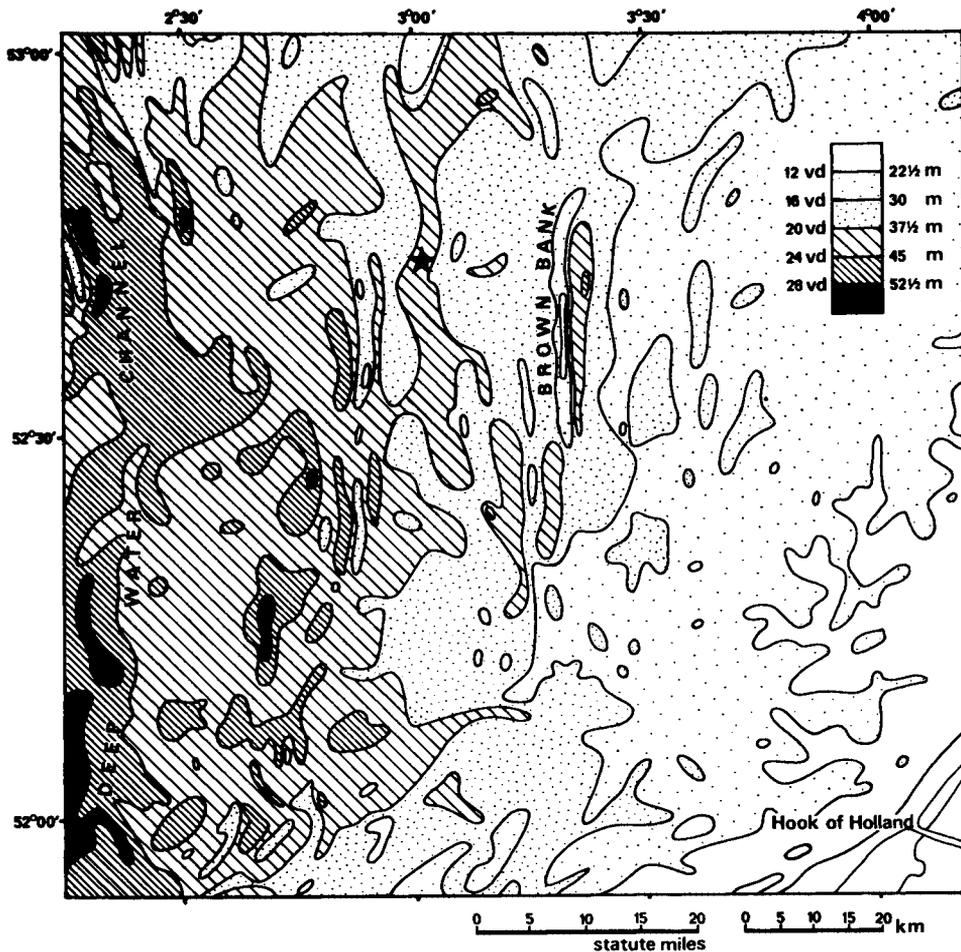


Figure 1. The location of specimen RGM 147 138 (black asterisk), to the west of the Brown Ridge (map copied from Louwe Kooijmans, 1972.)

No more exact location beyond 'West of the Brown Ridge' is known with regard to the two items from the Mulder collection or the two from the van Tuyll van Serooskerken collection. They were collected by fishermen.

The single specimen in the Verhagen collection was found during dredging for sand and gravel in flatlands of the Meuse called the Kooren Waard, near the villages of Empel and Gewande, north of 's-Hertogenbosch.

The reader is referred to the map of Figure 2 for the location of the several mentioned localities. Following Houbolt (*op. cit.*), I have used the name 'Brown Ridge' instead of 'Brown Bank' (as is done by Louwe Kooijmans), for the reasons given by Houbolt.

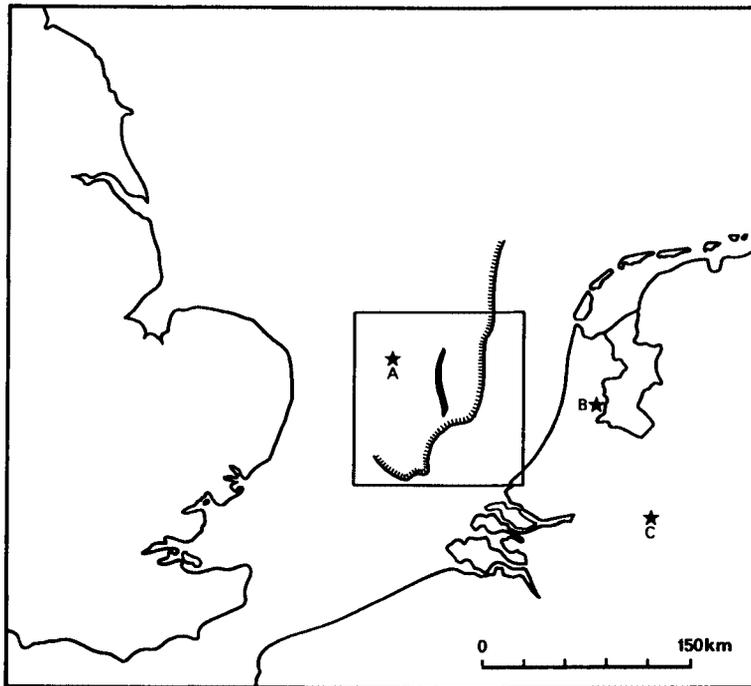


Figure 2. The location of the specimens described in the present paper: A: RGM 147 138; B: Flonk no. 276 (Broek in Waterland); C: Specimen in the Verhagen collection (Kooren Waard near Empel on the Meuse). The position of the Brown Ridge is indicated in black. The hatched line represents part of the approximate edge of the Early Weichselian freshwater lake containing the bone-bearing Brown Ridge Beds (figure after Louwe Kooijmans, 1972).

Description

RGM 147 138 in the collections of the Rijksmuseum van Geologie en Mineralogie at Leiden is an incomplete half mandible of the right side. It was obtained through the intermediary of the Central Fisheries Laboratory at IJmuiden on November 1st, 1968. According to its label it was determined as a left half mandible of *Panthera spelaea* (Goldf.). The specimen displays numerous heavily eroded areas. Its maximum length is 249 mm. Most of the vertical ramus and of the coronoid process is absent? only the lowermost 3 cm or so are still to be seen. The condylus is also much eroded. On the outside the bone has a dark brown colour with some red-brown and black spots and streaks in it. The eroded ridges and surfaces are light brown to grey. In front the mandible is broken through the alveolus of the canine. Neither that tooth, nor any other, has been preserved so that only the alveoli provide some information. The many strong ridges, crests and roughened areas, especially those on the outside of the mandible at the base of the ascending ramus, form a testimony to the unbelievably strong chewing muscles with which this animal once has been provided. At the back of the tooth row one finds a single, conical alveolus with an antero-poste-

rior long axis, for M_3 . Then follows an eroded 9 mm long spongy area where, long ago, part of the lingual mandibular edge has broken away. This is succeeded by a deep conical rounded alveolus for the talonid part of M_2 and a still deeper, slightly smaller conical alveolus for the trigonid of that molar. A large, deep, round conical alveolus lies in front of this; it contained the root below the talonid of the carnassial, M_1 . More to the front, after a 7 mm long diastema displaying some spongy bone, there is a slightly smaller but deep conical alveolus for the trigonid of M_1 . Still further anteriorly there can be seen two much smaller and shallower alveoli for P_4 . Some bone material from the vestibular edge of the mandible at this place has broken away long ago, allowing one to look obliquely into these two small holes. In front of P_4 there follows a long uneroded diastema of some 46 mm, after which the posterior edge of the alveolus of the canine is reached. Two small mental foramina lie behind each other at distances of 30.5 and 27 mm from the upper edge of this diastema. The first of the two lies quite close to the broken edge of the alveolus for the canine, and the second lies 8 mm behind the first. Each has a diameter of 4 mm. In the same level, 28.5 mm from the upper edge of the mandible and 27 mm from its lower edge, one sees a third, much larger foramen mentale with a diameter of 9 by 4 mm, situated just below the hindmost alveolus for P_4 . On the internal side of the mandible one encounters a large foramen mandibulare (diameter: 8 by 8 mm), not covered by any bone lingula and situated in a horizontal plane some 10 mm lower than that of the centre of the condylus. The height of the mandible is relatively small: only 58 mm in front of the alveolus of M_3 (on the outside) and just in front of P_4 (on the inside), 62 mm in front of M_1 (on the inside), and 55 mm in the diastema between P_4 and the canine. Estimations of the dimensions of the teeth are given in Table 1.

Some other measurements of this mandibular fragment are given there too, together with those of a second specimen, found near the Brown Ridge and now in the collection of Mr J. Mulder. This is a light brown coloured anterior part of a right half mandible still containing its canine (which can easily be taken out of its alveolus), but no other teeth. On the inside the mandible displays some black spots and streaks, while the rounded and eroded plane of breaking through the symphysis is lighter in colour and covered by Bryozoan colonies. Slivers of bone along the jaw's upper edge, on the lingual as well as on the vestibular side, have broken away long ago. Posteriorly this mandibular fragment is broken along an irregular oblique plane, from below/outside the alveolus for the talonid of P_3 to directly behind the anterior alveolus for M_2 , part of the posterior edge of which has disappeared too. Part of the alveolus for I_3 is still present; no traces remain of the alveoli of the other incisors. In the tooth row one encounters single alveoli for P_1 and P_3 (kept separate by a diastema of some 22 mm), two alveoli each for P_4 and M_1 , and the already mentioned anterior alveolus for M_2 . At some 19 mm on the vestibular side below the alveolus for the talonid of P_4 one sees an oval foramen mentale of 6.5 by 2.5 mm. At the same level, but 11 mm more in an anterior direction, below the alveolus for P_3 , there is a smaller mental foramen (2.5 by 2.5 mm), while the largest of the three foramina mentalia present in this mandible, with dimensions of 7 by 5 mm, can be found at about 25 mm below the edge of the diastema P_1 - P_3 and some 7.5 mm in front of the small middle foramen. A very small nutritional foramen, having a narrow channel-like entrance open to the

Table 1. Measurements (estimated from alveolar dimensions, and actual measurements, a.m.) of fossil ursid dental elements and of mandibular fragments (in mm).

		RGM 147 138	Coll. Mulder	Coll. Verhagen	Coll. Flonk 276
P ₁ d	length	-	6	-	-
	width	-	5	-	-
P ₃ d	length	-	6.5	-	-
	width	-	6	-	-
P ₄ d	length	12.5	16	-	-
	width	6.5	9.5	-	-
M ₁ d	length	26.5	28	-	-
	width	10.5	11	-	-
M ₂ d	length	24.5	-	-	-
	width	15	-	-	-
M ₃ d	length	23	-	-	-
	width	13.5	-	-	-
C inf d	transv. width	17.5	16.5 (a.m.)	15.0 (a.m.)	-
	mes.d. width	-	22.7 (a.m.)	21.5 (a.m.)	-
	enamel height	-	32 (a.m.)	33 (a.m.)	-
	labial side	-			
	tot. height	-	93.5 (a.m.)	80 (a.m.)	-
	height of root	-	75 (a.m.)	62 (a.m.)	55 (a.m.)
	max. tr. width of root	-	18 (a.m.)	14 (a.m.)	11 (a.m.)
	max. mes.-dist. width of root	-	31.5 (a.m.)	24 (a.m.)	19.5 (a.m.)
I ₃ d	mes.-dist. width	-	8	-	-

RGM 147 138: distance from middle of condyle to inner rim of alv. C inf.dext. : 243

distance from sigmoid notch to inner rim of alv. C inf.dext. : 225

length of tooth row P₄-M₃ : 95

length of molar row M₁-M₃ : 79.5

max. vestibulolingual thickness of horizontal ramus at M₃ : 31

vestibulolingual thickness of horizontal ramus at M₁ : 20.5

Coll. Mulder: vestibulolingual thickness of horizontal ramus at M₁ : 21.5

length of premolar row P₁-P₄ : 54

front and an opening of 2 by 2 mm, lies 12 mm further forwards again, at the same height, below the alveolus for P₁ and approximately 15 mm from the edge of the canine alveolus. Apart from a recently damaged part of the root of the canine, in front, one may discern a transverse concavity on the border of the root and the enamel, anteriorly on the inside of the canine. This must have been caused by the regular action of the antagonist of the tooth in the upper

Table 2. Measurements of postcranial fossil ursid specimens (in mm).

Proximal fragment of humerus sin., coll. van Tuyll van Serooskerken	
Total length of fragment	275
Caput, anteroposterior width	94.5
Caput, transversal width	72.5
Diaphysis, max. anteroposterior width	44
Diaphysis, max. transversal width	30.5
Proximal fragment of radius sin., coll. van Tuyll van Serooskerken	
Total length of fragment	155
Caput, anteroposterior width	32
Caput, transversal width	45
Approx. centre of diaphysis, anteroposterior width	21
Approx. centre of diaphysis, transversal width	37
Metacarpale I sin., coll. Mulder	
Maximum length	104.5
Proximal extremity, max. transversal width	31
Proximal extremity, max. anteroposterior width	27
Distal extremity, max. transversal width	26.5
Distal extremity, max. anteroposterior width	23.5
Centre of shaft, max. transversal width	18.5
Centre of shaft, max. anteroposterior width	15.5

dentition; it is highly polished. At the back some old damage areas of the root, below the enamel border, can be seen. The height of the horizontal ramus of this mandibular fragment is 54 mm below P₃, and 55 mm in the centre of the diastema P₁-P₃.

A single specimen in the Verhagen collection is a nearly complete right lower canine, found among dredged material from the Kooren Waard on the south bank of the Meuse, north of 's-Hertogenbosch. Its root is mottled light brown in colour, the enamel greyish white to blue-grey. As can be seen in Table 1, its dimensions are rather modest. There are no excrescences to be seen in the enamel, and there is hardly any angular thickening.

No. 276 in the Flonk collection, found at Broek in Waterland, consists of the root of a left lower canine (as can be concluded from the sigmoid curve formed by its axis); its colour is mottled dark brown. Part of the root, on the outside and in an oblique sense, is broken off together with the complete crown while, long ago, an artificial hole has been drilled in a transverse direction at 8 mm from the lower tip of the root. The hole is slightly conical, 3 x 3 to 4 x 4 mm in its dimensions. The (few) dimensions of this specimen, together with those of the Kooren Waard specimen, can be found in Table 1. The two mandibular specimens and the two isolated teeth have been figured in several aspects on Plate 1.

Three postcranial specimens can also be ascribed to bears (for their measurements the reader is referred to Table 2). They are figured, in different aspects, on Plate 2. The largest of these, some 26 cm long, is a part of a left humerus without its distal articulation or the shaft directly above it. It was col-

lected in the Brown Ridge area in March 1981. Through the intermediary of Mr D. Mol it is now in the van Tuyll van Serooskerken collection. Its colour is very dark brown, in some places almost black, but in others lighter brown, while the bone at the (recent) oblique break through the diaphysis displays a light brown colour. Some of the edges and borders of the robust caput humeri and the tuberosities are eroded, showing a darkly coloured materia spongiosa (which indicates that the bone has not suffered much transport). Especially in the hollows at and around these places one finds abundant Bryozoan colonies attached to the bone; numerous foramina nutricia occur there too. The surface of the diaphysis is strongly striated and covered with upwards diverging minor ridges. The deltoid ridge is very markedly developed. It has a slightly rugose surface in its upper part. A minute nutrient foramen occurs at the antero-medial side of the shaft in the same plane as the base of the deltoid ridge. The whole indicates a well-developed musculature. What is left of the shaft is strongly curved.

In the same collection and from the same locality there is a chestnut-brown proximal half of a left radius. The more or less transversal break through the approximate centre of the diaphysis has not occurred recently, as its edges are rounded and the compacta has the same colour as that on the diaphyseal surface. Some minor points of damage have been caused recently, displaying a light brown to cream-coloured bone. The posterior edge of the caput has broken off, so that brown coloured spongiosa forms the surface there. At that place, and at the robust radial tuberosity, a number of white Bryozoan colonies occur. The bone fragment, now about 15.5 cm long, has evidently belonged to a very strongly muscled animal.

The third specimen is dark yellow-brown in colour and has a somewhat rugose surface all over. It is a complete first metacarpal bone of the left side of a large and robust bear, with well-developed areas for muscular attachment. No special or pathological features can be observed. The specimen, which shows a few white Bryozoan colonies in concavities at the proximal and distal extremities, was also found in the Brown Ridge area and now forms part of the Mulder collection.

Plate 1

- Figs. A, B. A = occlusal view and B = vestibular (= external) view of the mandibular fragment from the Brown Ridge area (Collection of Mr J. Mulder, Nieuw-leusen). Each view has its own scale indication.
- Figs. C, D. C = vestibular view and D = occlusal view of the mandibular fragment RGM 147 138 from 52°45'N and 3°00'E, west of the Brown Ridge. (Collection Rijksmuseum van Geologie en Mineralogie at Leiden). Each view has its own scale indication.
- Figs. E, F. E = mesial view and F = anterior view of root of C inf sin. from Broek in Waterland. (No. 276 in the Flonk collection, Museum Flehite, Amersfoort). Both views have the same scale.
- Figs. G, H. C = anterior view and H = mesial (= internal) view of C inf dext. from the Kooren Waard along the Meuse near Empel (Collection of Mr A. Verhagen at Empel). Both views have the same scale.



Discussion and identification

The incomplete right half mandible RGM 147 138 is entirely deprived of any of its three anterior premolars; not the slightest trace of an alveolus can be seen. Such a situation is usually considered to be typical for the Cave Bear, because there the only premolar which is usually present is the P_4 . However, I indicated (1953, pp. 376-377) that presence or absence of one or more of the three anterior upper or lower premolars should not be seen as a stable character, usable for the determination of the species. Exceptional cases are known of recent grizzlies having P^4 and P_4 as the only premolars in their dentition. There even seems to be a possibility that reduction of the number of premolars in the dentition may be coupled to an increase in general size, which last situation occurs when the animals live in optimal conditions, as in Alaska and Kamchatka (Erdbrink, 1953, p. 375).

When the set of alveolar measurements of RGM 147 138 is considered, indicating the dimensions of the now absent teeth, this should be compared with the known maxima and minima for *Ursus arctos*, *U. spelaeus* and the intermediate form *U. 'deningeri'* (Erdbrink, 1953, pp. 383, 488 and 513). For the reader's convenience these values have been combined here in Table 3. It should again be stressed (Bosscha Erdbrink, 1981, p. 40) that '*deningeri*' cannot be properly defined as a species and that it therefore is not acceptable as such or as a separate subspecies, a procedure which is, nonetheless, increasingly being done nowadays.

The proposed comparison shows that the estimated values for the widths of P_4 , M_1 , M_2 , and M_3 are too low for *U. spelaeus* and that those of P_4 and M_3 are also too low for what is considered by some authors to be *U. 'deningeri'*. On the other hand, the values agree quite well with those for *U. arctos* in general. When the maxima for the lengths of P^4 , M^1 and M^2 (Erdbrink, 1967, table 2, p. 22) of recent *U. arctos* are added together, one arrives at 91.5 mm, while in RGM 147 138 the length of the opposing tooth row P_4 - M_3 is 95 mm, a quite comparable value. In the case of *U. spelaeus* the maximum total distance of P^4 - M^2 is 118.4 mm, in that of *U. 'deningeri'* one arrives at 101.2 mm from data in literature. This circumstance should be added to the occurrence of the rather slender form of what is left of the half mandible (which is 'chtamalognathous', Von Reichenau, 1906), and it should also be coupled with the relatively low value for the mandibular height and with the straight lower edge of the mandible. Gervais' opinion may perhaps once more be cited here (Erdbrink, 1953,

Plate 2

Figs. A, B, C. Metacarpale I sinister from the Brown Ridge area (Collection of Mr J. Mulder, Nieuwleusen). A = view of the side that faces MC II; B = posterior view; C = anterior view. All at the same scale.

Figs. D, E. D = internal view and E = external view of the proximal part of a humerus sinister from the Brown Ridge area (Collection van Tuyll van Serooskerken).

Figs. F, G. F = external and G = internal view of the mesial part of a radius sinister from the Brown Ridge area (Collection van Tuyll van Serooskerken). Figs. D-G all have the same scale.

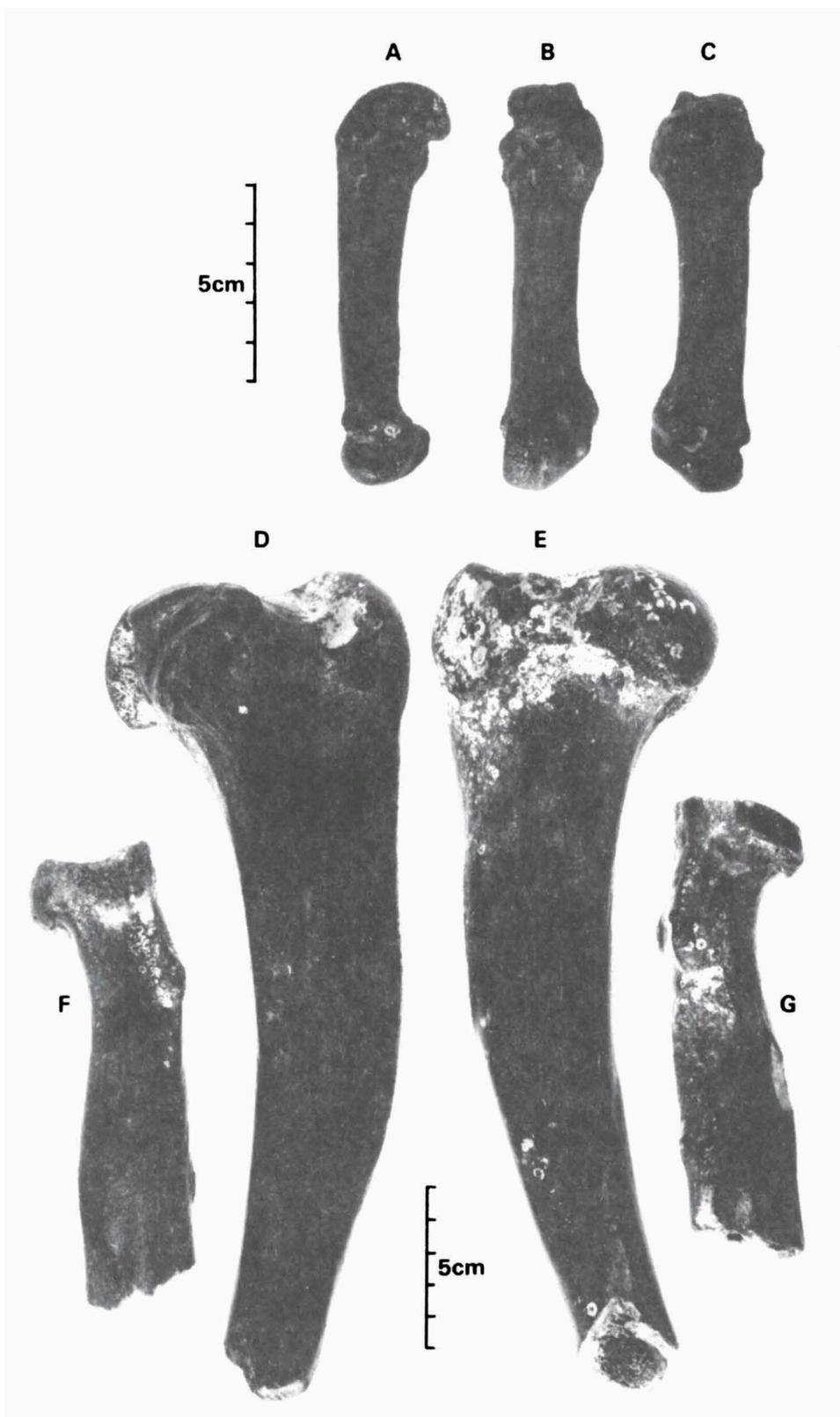


Table 3. Comparable maximum and minimum measurements (in mm) in Brown, Cave and Polar Bears.

	<i>U. arctos</i>	<i>U. spelaeus</i>	<i>U. 'deningeri'</i>	<i>U. maritimus</i>
P ₄ length	15.5- 9	20 -11	16 -14	14 -11
width	9.5- 6	12.6- 8.2	10.2- 7	8 - 6.2
M ₁ length	30 -19.5	35 -24	26.9-24.2	23 -19
width	16.2- 9	17 -11.5	14 -10	10.2- 8
M ₂ length	30 -20	35.6-25	30.2-24	22.1-18
width	18.2-12.3	22.3-16	19.2-14	12.6-10
M ₃ length	25 -14	34 -19	25 -21.5	19 -10
width	19.2-12.5	22.8-16.1	20.1-15.5	19 - 9
C inf.transv. = med.-lat.		26.5-14.3		17 -13
a.p. = mes.-dist.		39.1-20.8		28 -17.5

p. 399) that the basal edge of the mandible of *U. spelaeus* is usually more strongly convex.

All this indicates that we have here, most probably, a fossil jaw fragment of a very large, 'grizzly-like' Brown Bear, *Ursus arctos* L. This is nicely in accordance with the already recorded presence, in the Brown Ridge area, of such a very large Brown Bear, RMGM 133 128, in the same collection, reported by me in 1967 (op. cit.).

In attempting a determination of the specimen in the Mulder collection, the data in Table 3 should again be taken into account. Measurements of the Polar Bear, *Ursus (Thalarctos) maritimus* have been added (Erdbrink, 1953, p. 26, table), this being a theoretical possibility too. Once more the (alveolar) sizes of P₄ and M₁, as given in Table 1 in the present paper, practically exclude that determination, however; P₄ attaining maximum values (even surpassing the maximum length by 0.5 mm) for recent *U. arctos*. The combined presence of P₁, P₃ and P₄ in this mandibular fragment, and the relatively small size of the canine, make a determination as *U. spelaeus* very unlikely. On the contrary, as I concluded in 1953 (op. cit., p. 373), Brown Bears from N. Europe seem most often to display a presence of the three mentioned premolars, while the Siberian, Alaskan and Kamchatkan Brown Bears usually possess only P₁ and P₄ together (P₂ and P₃ being absent). The alveolar width of M₁ is 0.5 mm less than the minimum recorded value for *U. spelaeus*. The relatively slender form and low height of the 'Mulder mandible', 55 mm at the diastema (the identical value found in RGM 147 138) is an added argument for the contention that this fossil should also be identified as *Ursus arctos* L., perhaps (originally) a slightly larger specimen than RGM 147 138 when the alveolar dimensions are taken into account.

The C inf. dexter from the Kooren Waard (along the Meuse) now in the Verhagen collection is not difficult to recognize. On account of its smooth form, the absence of any important cingular thickening and the modest size (near the minimum values for *U. spelaeus* but inside those of *U. arctos*, see Table 3), I do not hesitate to pronounce it a canine of *Ursus arctos* L.

The pierced lower canine root of the left side, no. 276 in the Flonk collection, still smaller sized than the corresponding part in the Kooren Waard ca-

nine, and therefore much too small to be determined as a tooth of a Cave Bear, should also be identified as part of a C inf. sinister of *Ursus arctos* L.

The proximal part of a left humerus from the Brown Ridge area is now some 26 cm long; very roughly estimated, the complete bone may have been some 10 cm longer at most, making its entire length 36 cm. This tallies well with Gaudry's figures (1876) for the humerus of an *U. arctos* from Poland and for his 'small variety' of *U. spelaeus*. Although, as I have remarked (1953, p. 419, and footnote 119), it may be practically impossible to distinguish many of the isolated bones of *U. arctos* and of *U. spelaeus* from each other, I think that in the present case the size, combined with the less rugged appearance of the bone when compared with a (larger) humerus of an undoubted *U. spelaeus* (no. 1050 in the Flonk collection, from the Drachenhöhle near Mixnitz in Austria) may indicate that this humerus has belonged to an *Ursus arctos* L. Its very dark colour (dark brown to black) may at first suggest that it should be placed among the so-called 'Black Bone Fauna' of Villafranchian times, mentioned by Kortzenboud van der Sluijs (in Louwe Kooijmans, 1972, p. 69). In that case one could be led to assume that the bone might have belonged to a particularly large *Ursus etruscus* G. Cuvier, which seems rather unlikely. Its true colour is not intensely black, but very dark brown-black while the compacta of the diaphysis, visible in the plane of fracture, is very much lighter. A possible explanation for this dark discolouration of the bone may be found in Houbolt (1968, p. 266). That author cited van Straaten (1954) for the fact that three differently coloured zones could be distinguished in the bottom of the Waddenzee, resulting from different stages of authigenic iron in each, and he supposed that a similar difference has also occurred in the superficial sediments of the bottom of parts of the North Sea (more especially in the ridges of the Zeeland Group). In the middle of these three zones, the monosulphuric zone (M), the prevailing colour of the (anaerobic) sediment is intensely black, while an important part of the iron in the sediment is in a monosulphuric state. There is no reason why a similar situation may not be present somewhere around the Brown Ridge, whence the bone in question was collected. A number of other very darkly coloured bones from the same region to be described shortly, may very well fall in the same category.

The colour problem forms no difficulty in the case of the chestnutbrown proximal half of a left radius, also in the van Tuyll van Serooskerken collection and also from the Brown Ridge area, nor in the case of the metacarpale I sinister with its dark yellow-brown colour, in the Mulder collection. When it is assumed that the radial fragment has indeed broken through at the approximate centre of the diaphysis, the entire bone would have had a length of 31 cm. The already cited values given by Gaudry contain one for the radius of a Polish *U. arctos* of 32 cm. Added to this is the fact that, though the bone has belonged to a strongly muscled individual, it does not impress one as being equally large, rugged and heavy as the comparable radius of an undoubted *U. spelaeus*. No. 1051 in the Flonk collection, a complete right radius of a Cave Bear from the Drachenhöhle, displays an almost over-developed radial tuberosity (indicating the strength of the m. biceps), divided into two longitudinal mammae. The Brown Ridge specimen is only broadly concave but otherwise nearly smooth at this same feature. Also, the roughened area of insertion of the aequivalent of the m. flexor digitorum superficialis in human subjects, along the upper part of

the anterior linea obliqua, is very much more pronounced in the Austrian example than in the Brown Ridge fossil. These features favour a determination of this last specimen as a radial fragment of *Ursus arctos* L.

Finally, the fossil first left metacarpal in the Mulder collection is much larger than a comparable MC I sin. from Mixnitz in the Flonk collection, which has a maximum length of only 65 mm. However, this latter specimen displays much more pronounced ridges, cavities and areas of tendinous insertion than the Brown Ridge fossil. In view of Koby's (1945) arguments concerning the strong development of the paws of, especially, Brown Bears, I therefore hardly hesitate to identify this specimen as a metacarpal bone of the thumb of the left side of *Ursus arctos* L., also because no other carnivore of comparable size, such as a Cave Lion (where the first metacarpal is rudimentary) can have existed in the same area during Late Pleistocene times.

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