

Ovibos moschatus from the pleistocene of the Dutch Tidal Flats (Wadden Shallows)

A.J. de Vries

SUMMARY

Description, with figures and measurements, of a right metacarpal of *Ovibos moschatus* found in the western part of the Dutch Wadden shallows. The specimen is part of the author's private collection.

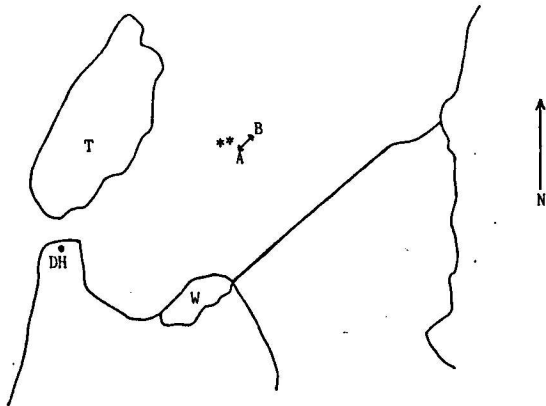
SAMENVATTING

Beschrijving, met afbeeldingen en maatopgaven, van het rechter metacarpale van een muskusos, gevonden in het westelijk deel van de Nederlandse Waddenzee. Het exemplaar maakt deel uit van de privé-verzameling van de schrijver.

Description

In the latter quarter of the year 1987 J.B. Bakker, a fisherman from Den Oever and owner of the vessel WR 106, fished from the western part of the Dutch Wadden shallows north of the former island of Wieringen (see Map 1), several bones, some of which he knew by their size to be remains of the woolly mammoth.

Mr Bakker generously placed his finds at my disposal. Amongst material of *Mammuthus primigenius*, and part



Map 1 Northern part of North Holland; ** = location of *Ovibos* find. DH = Den Helder; W = Wieringen; T = Texel. AB = direction of the geological profile in Fig. 3.

Kaart 1 Noordelijke deel van Noord Holland; ** = vindplaats van de *Ovibos* vondst. DH = Den Helder; W = Wieringen; T = Texel. AB = richting van het geologische profiel van Fig. 3.

of a left metacarpal of *Megaloceros giganteus* was, interestingly enough, a right metacarpal of *Ovibos moschatus* (ZIMMERMANN, 1780) (Fig. 1).

The location at which these bones were found is 53° 4' North latitude and 5° 2'-5' East longitude (north of a tidal gully called the Texelstroom), at a depth of approximately 15 to 18 metres (NAP).

The specimen (catalogued as W-1988-1) is exceptionally well-preserved. Its colour varies from dark grey-

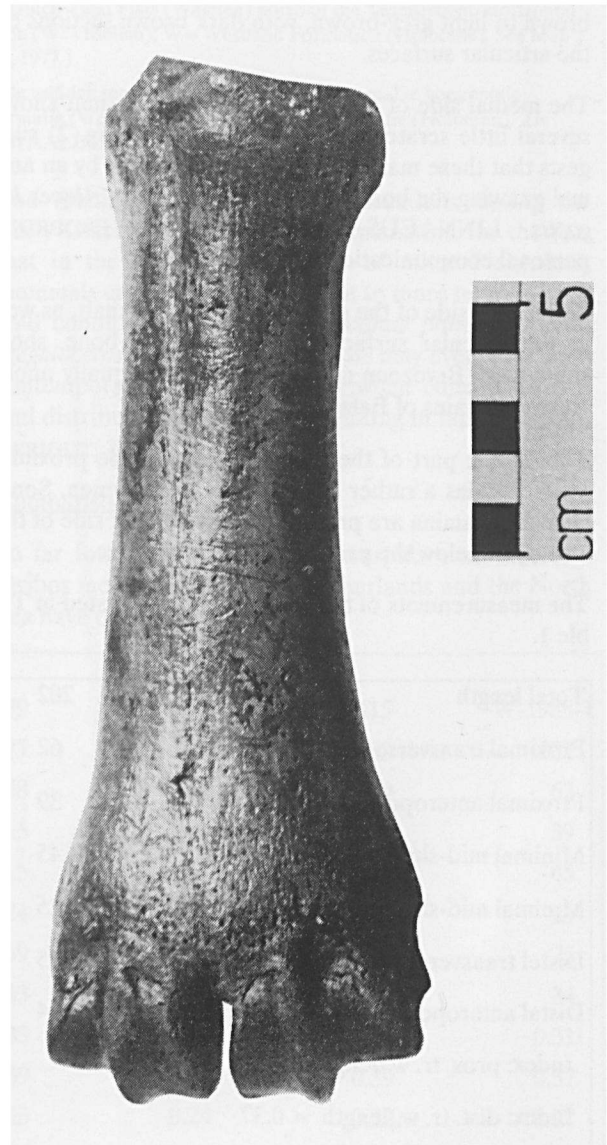


Fig. 1a Right metacarpal of *Ovibos moschatus*.

Fig. 1a Rechter metacarpale van *Ovibos moschatus*.

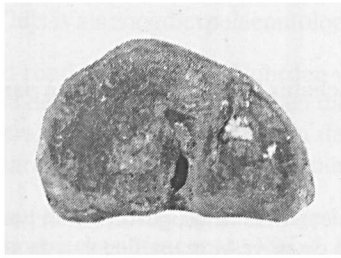


Fig. 1b Proximal view.

Fig. 1b Proximaal aanzicht.

brown to light grey-brown, with dark brown sections on the articular surfaces.

The medial side of the anterior part of the shaft shows several little scratches. Their distribution (Fig. 2) suggests that these marks may have been caused by an animal gnawing the bone, possibly an arctic fox, *Alopex lagopus* LINNAEUS, 1758 (BOSSCHA ERDBRINK, personal communication).

The lateral side of the proximal part of the shaft, as well as the articular surface for the unciform bone, show some small Bryozoan colonies and a few, equally unobtrusive, remains of *Balanus*.

The middle part of the posterior edge of the proximal joint contains a rather large nutritional foramen. Some smaller foramina are present at the posterior side of the bone, just below the proximal articular surface.

The measurements of this cannon-bone are listed in Table 1.

Total length	202
Proximal transverse width	62
Proximal anteroposterior width	39
Minimal mid-shaft transverse width	45
Minimal mid-shaft anteroposterior width	25
Distal transverse width	75
Distal anteroposterior width	34
Index: prox. tr. w./length = 0.31	
Index: dist. tr. w./length = 0.37	

Table 1: measurements of *Os. metacarp. dex.* W-1988-1

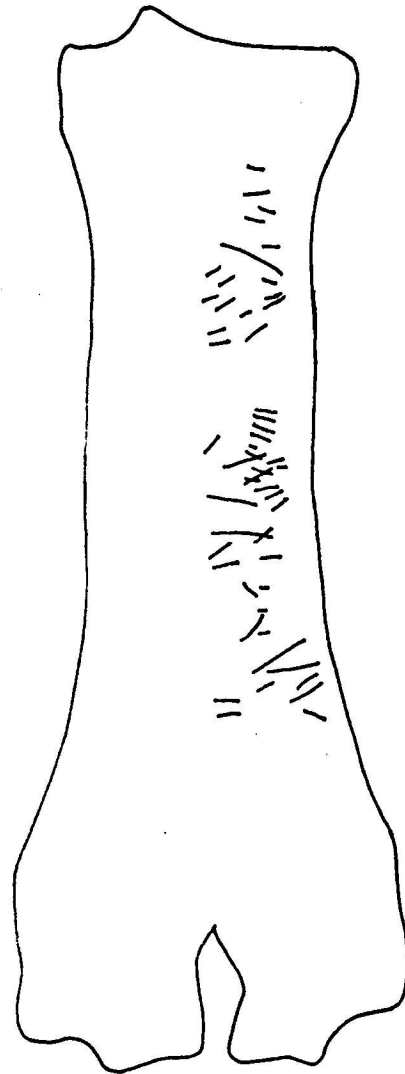


Fig. 2 Gnawing marks on the anterior part of the bone.

Fig. 2 Knaagsporen op het anterieure deel van het bot.

Geology

The geological deposits surfacing in the vicinity of the site where the specimen was found, range from the Holocene Westland Formation, the Twente Formation (aeolian, periglacial, fluvial as well as peat deposits from the Weichselian), to the till (boulder clay) of the Saalian glaciation (Drente Formation). Deposits from the so-called Eemian interglacial are not present. (Van STAALDUINEN, 1977; cf. Fig. 3)

The uppermost Pleistocene deposit is the Twente Formation 15 to 20 m below NAP. Between 9 and 20 m the Twente Formation consists of fluvial deposits, the filling of truncated meanders and of riverbeds formed by stagnant or sluggish waters (ZANDSTRA, 1977). These were formed during the Early Weichselian and the early part of the Middle Weichselian. On top of this lie the aeolian cover-sands from the latter part of the Middle and Late Glacial.

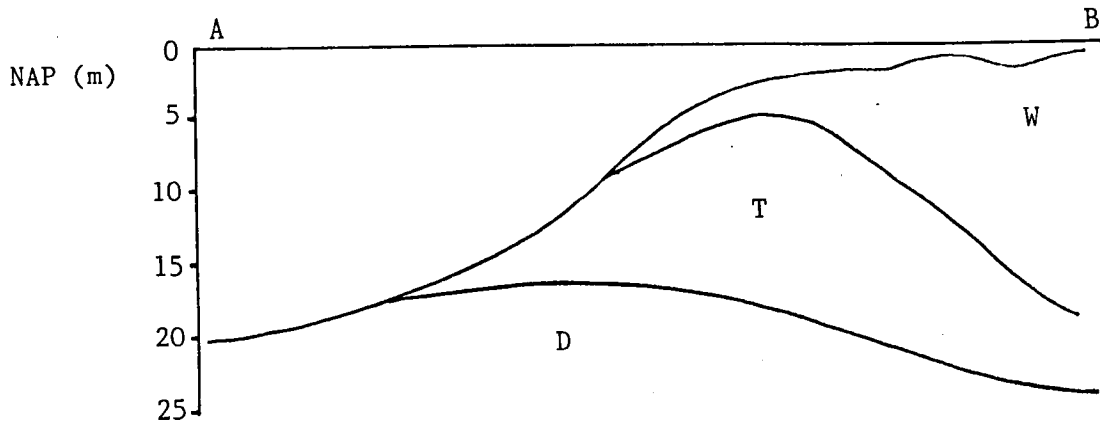


Fig.3 Schematic section through Holocene and upper Pleistocene deposits of The Dutch Tidal Flats (Wadden) north of the Texelstroom. Horizontal distances not to scale. D = Drente Formation (Late Saalian); T = Twente Formation (Weichselian); W = Westland Formation (Holocene). See Map 1 for direction and location of profile AB. (Simplified after VAN STAALDUINEN, 1977.)

Fig. 3 Schematische doorsnede door holocene en laat pleistocene afzettingen van de wadden ten noorden van de Texelstroom. De horizontale afstanden zijn niet op schaal. D = Drente Formatie (Laat Saalien); T = Twente Formatie (Weichselien); W = Wetsland Formatie (Holoceen). Zie Kaart 1 voor de richting en de plaats van profiel AB. (Vereenvoudigd naar VAN STAALDUINEN, 1977)

Ovibos indicates a cold climate; its present-day habitat is the tundra, where the average temperature in July does not exceed 10 C. In view of the state of preservation of the fossil, and the nature of the deposits at the depth at which the fossil was found, it is highly probable that the specimen dates from one of the stadials of the Early Weichselian, represented by peat-containing gyttja (organic mud) which occurs between 12 and 20 m below NAP.

Its age can therefore be estimated at ca. 70 - ca. 58.10³ yr. (Cf. Fig. 4). This result is consistent with data on other *Ovibos*-finds from the Netherlands and the North Sea (cf. BOSSCHA ERDBRINK, 1983, 1986; HOOLJER, 1984).

The relatively large climatic fluctuations during the Early Glacial also provide an explanation for the fact that in the same area remains of other Pleistocene mammals can be found, that point to more temperate or cold conditions, such as *Mammuthus primigenius* and *Megaloceros giganteus*. The animals may even have been contemporaries due to a lag between climatic change and distributional responses, resulting in faunal mixture (WRIGHT, 1937; WEST, 1979).

Comparison

So far four other finds of metacarpals attributable to *Ovibos moschatus* from the Netherlands and the North Sea have been registered:

	52733	172279	119427	16415	W-1988-1
total length	176	177	178	188	202
Prox. tr. w.	52.5	58	56	59	62
Prox. ant.-pst.w.	31.5	36.5	33.5	38	39
Mid-sh. tr.w.	41	41.5	43	42	45
Mid-sh. ant.-pst.w.	21	24	22.5	26	25
Dist.tr.w.	66	69	68	74	75
Dist.ant.-pst.w.	31	33	33	33	34
Index: prox.tr.w/l.	0.30	0.33	0.315	0.31	0.31I
Index: dist.tr.w/l.	0.375	0.39	0.38	0.39	0.37
Index: mids.tr.w/l.	0.23	0.23	0.24	0.22	0.22
Mean value of total length:	184.2				
Mean value of mid-sh.tr.w.:	42.5				
Mean value of Index: mid-sh.tr.w/l.:	0.228				

Table 2: Comparative measurements of metacarpals of *Ovibos moschatus* from the Netherlands and North Sea (mm)

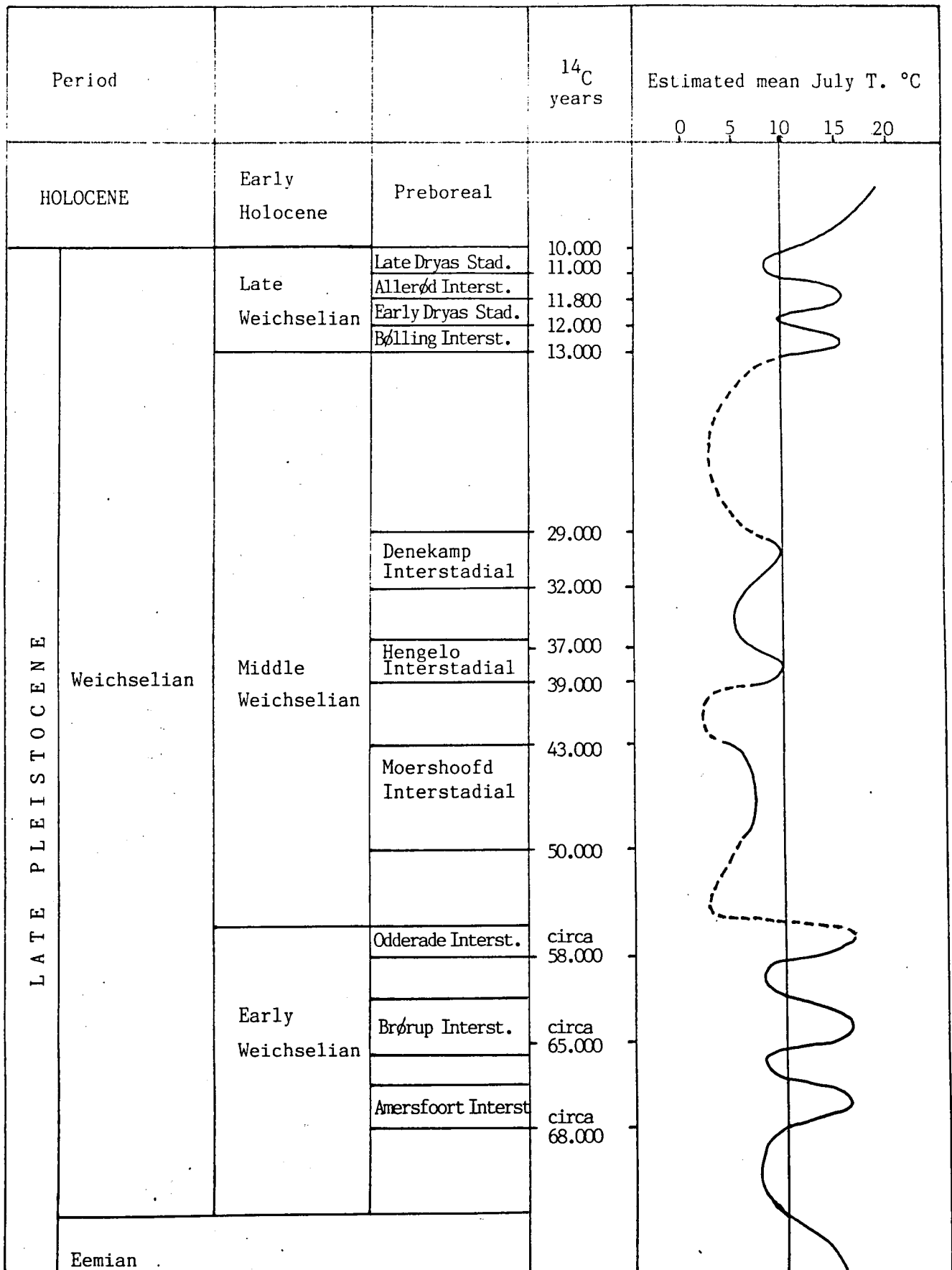


Fig. 4 Survey of the Weichselian (after ZAGWIJN, 1975), from ZONNEVELD, 1980.

Fig. 4 Overzicht van het Weichselien (naar ZAGWIJN, 1975) uit ZONNEVELD, 1980.

1. a right cannon-bone from Ellewoutsdijk, no. 16415 in the collection of Teyler's Museum in Haarlem (HOOIJER, 1960);

2. a right cannon-bone from the bottom of the North Sea (Brown Ridge area), no. 152733 in the collection of the Rijksmuseum van Geologie en Mineralogie, Leiden (BOSSCHA ERDBRINK, 1983);

3. a left cannon-bone, also from the Brown Ridge area, no. 172279 in the same collection (o.c.);

4. a right cannon-bone from Ellewoutsdijk, no. 119427, also part of the collection of the Rijksmuseum in Leiden (o.c.).

I give the measurements of these metacarpals as BOSSCHA ERDBRINK (1983) has listed them, adding the measurements of the Wadden specimen, in Table 2.

These measurements show that the tidal flats specimen is quite long in comparison to the other examples. A thorough statistical analysis does not result in an unambiguous identification of the Wadden shallows specimen. On the basis of its robustness (Index) it can be interpreted as belonging to the same group, but the difference in length precludes such a classification.

Conclusions

Mathematical analysis of the characteristics of the metacarpal from the Dutch Wadden shallows shows that it does not compare too well with the zoometric group consisting of the four other Weichselian metacarpals from the Low Countries and the North Sea.

LITERATURE

- ERDBRINK, D.P. BOSSCHA, 1983: More fossil material of *Ovibos* from the Low Countries and the North Sea, in: Proceedings Kon. Ned. Akad. v. Wetensch. B86, 1, 39-53.
- ERDBRINK, D.P. BOSSCHA, 1986: Twee nieuwe muskusos-fossielen uit het Bruine Bank gebied, in: Cranium 3e jrg. nr.1 (april 1986), 40-44.
- GRAY, D.R., 1987: The muskoxen of Polar Bear Pass, Markham (Ontario): Fitzhenry & Whiteside, 1987.
- HOOIJER, D.A., 1960: New records of Pleistocene mammals from the Netherlands, in: Geologie en Mijnbouw 39, 43-46.
- HOOIJER, D.A., 1984: *Mammuthus meridionalis* (Nesti) and *M. armeniacus* (Falconer) from the North Sea, in: Proceedings Kon. Ned. Akad. v. Wetensch. B87, 3, 335-359.
- LATOUR, P., 1987: Observations on demography, reproduction and morphology of muskoxen on Banks Island, Northwest Territories, in: Canadian Journal of Zoology, 65.
- LERBERGHE, L. & GAUTIER, A., 1981: Zoogdieren uit het Onder-Würmiaan te Poperinghe (West-Vlaanderen, België) en de fossiele verspreiding van de muskusos (*Ovibos moschatus* Zimmerman) in Europa, in: Natuurwet. Tijdschr. 62, 72-85.
- Van STAALDUINEN, C.J., (red.), 1977: Geologisch onderzoek van het Nederlandse Waddengebied, Haarlem: Rijks Geologische Dienst.
- WEST, R.G., 1979: Pleistocene geology and biology, London: Longman.
- WRIGHT, W.B., 1937: The Quaternary ice age, 2nd ed., London: Macmillan.
- ZAGWIJN, W.H., 1975: Chronostratigrafie en biostratigrafie. Indeling van het Kwartair op grond van veranderingen in vegetatie en klimaat, in: Toelichting bij geologische overzichtskaarten van Nederland o. red. v. W.H. ZAGWIJN en C.J. van STAALDUINEN, Haarlem: Rijks Geol. Dienst, 109-114.
- ZANDSTRA, J.G., 1977: Geologische opbouw van het Pleistoceen, in: van STAALDUINEN 1977, o.c.
- ZONNEVELD, J.I.S., 1980: Tussen de bergen en de zee. De wordingsgeschiedenis der Lage Landen, Utrecht: Bohn, Scheltema & Holkema.

Muskoxen exhibit various sexual dimorphic traits (GRAY, 1987; LATOUR, 1987). The size of the metacarpal from the Wadden shallows suggests that it belonged to an adult male muskox that lived here during one of the dry and cold stadials of the Early Weichselian.

The fact that it dates from a relatively young geological period refutes the opinions of LERBERGHE & GAUTIER (1980), who state that the short and stocky shape of recent *Ovibos* metacarpals is a Late Pleistocene adaptation to much colder climatic circumstances. It is not evident that a more squat form of metacarpals is necessarily indicative of adaptation to a cold climate. The relationships between climate, body-size, and squat or slender metapodials remain to be demonstrated. They cannot be obtained by deductive reasoning from general principles alone, without recourse to a more secure empirical basis.

ACKNOWLEDGEMENTS

I would like to express my gratitude to Dr. A. Lister (University of Cambridge), Dr. D.P. Bosscha Erdbrink, and the editors of Cranium (especially Mr. F. Spoor) for their useful comments on earlier drafts of this paper; and to Mr. C.J. Pot (Den Oever) for the excellent photography.

Author's address:

De Dolven 20
1778 JR Westerland
The Netherlands