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The first Late Pleistocene coprolite of *Crocuta crocuta spelaea* from the North Sea

Jelle Reumer [1], Dick Mol [1,2] & Wil Borst [3]

[1] Natuurhistorisch Museum Rotterdam

[2] Musée Crozatier, Le-Puy-en-Velay

[3] Port of Rotterdam Authorities

The Port of Rotterdam Authorities are extending the Rotterdam harbour with 2,000 ha by the construction of land reclamation extending into the North Sea. This so-called Maasvlakte 2 (MV2) is made of sand that is dredged by trailing suction-hopper dredgers (TSHD) from a borrow area some 15 km West of the present Maasvlakte. The sediments are transported and subsequently deposited by 'rainbowing' or by pumping ashore through pipelines. The borrow area where the sand is dredged originally had a depth of minus 22-23 m Chart Datum (CD) and the existing seabed is lowered to an average depth of minus 40 m CD. The dredged sediments have a Late Pleistocene age (Rijsdijk *et al.* 2005; Mol *et al.* 2006). The TSHDs dredge the sand and everything contained in it, with the exception of larger bones and other objects that are too large to pass through in the opening of the dragheads (approx. 40 cm). Several times per year the Port Authorities measure sediment parameters along the Dutch coast with a fishing vessel, the Eurocutter 'Jade', BRA7. On the last day of the measuring week the vessel is fitted out for fishing for palaeontological and archaeological remains with its trawl nets. Large amounts of fossils, mostly *Mammuthus primigenius*, but also *Rangifer tarandus* and *Bos/Bison* are thus recovered, and stored in the Natural History Museum Rotterdam, the Netherlands. The trip of 18 August 2010 yielded an as yet unknown object, here identified as a *Crocuta crocuta spelaea* coprolite.

THE OBJECT

The coprolite was found at 52º 00' 51.4893" N; 3º 55' 19.6739" E and at a depth of minus 26 m CD (Fig. 1). The fossil (NMR 9991-00007071, Fig. 2) has a maximum diameter of 55 mm, a length of 44 mm, and a weight of 85.8 g; it is almost circular, provided with a depression on one side and a certain roughness on the other. It possesses a groove running around the side, dividing the object in two segments of unequal size. It has a light

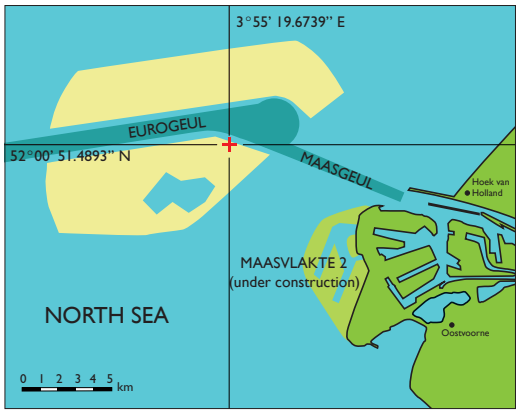

Figure 1 Location in the North Sea where NMR 9991-00007071 was found. The borrow area is yellow. [map graphics Jaap van Leeuwen]

Figure 2 The hyena *Crocuta crocuta spelaea* coprolite from the North Sea (NMR 9991-0007071) in different views. [photo Hans Wildschut]

brown colour. Size, shape, texture and the groove unequivocally identify the object as a partial coprolite of the Late Pleistocene hyena, *Crocuta crocuta spelaea*. The specimen has been desalinized in running fresh water, and was subsequently preserved in a dilute Velpon® / Acetone solution. It is kept in the collections of the Natural History Museum Rotterdam (NMR).

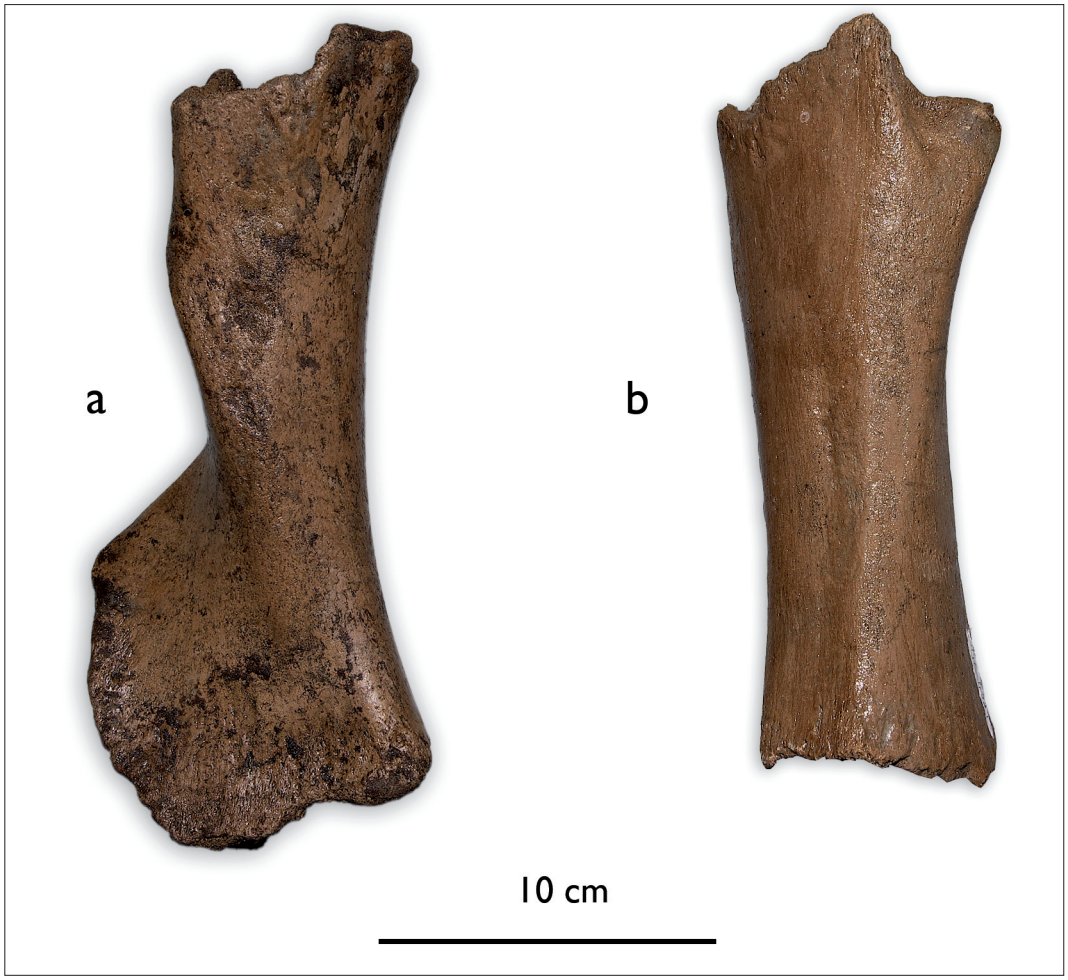

Figure 3 Right humerus (**a** NMR 9991-0007068) and left tibia (**b** NMR 9991-0006937) of juvenile *Mammuthus primigenius*, showing hyena gnawing marks. [photo Hans Wildschut]

DISCUSSION

Hyena coprolites are thus far known from the Netherlands only from sediments of Early Pleistocene age, viz. from the approximately 1.9 Ma old deposits in the Oosterschelde (Eastern Scheldt) estuary (De Vos *et al.* 1998). These considerably older fossils are heavily mineralized and have a much greater weight. They are attributed to *Pliocrocuta perrieri*. Younger hyena droppings were so far unknown; hence, our specimen is the first Late Pleistocene hyena coprolite. Van Waijjen (2002) reported on a Late Pleistocene coprolite, which was indentified as coming from *Sus scrofa*. Other fossil droppings from The Netherlands have so far not been described.

The so-called cave hyena, *Crocuta crocuta spelaea*, is well known from the mammoth steppe fauna (the *Mammuthus-Coelodonta* Faunal Complex *sensu* Kahlke 1999) that existed between roughly 100,000 and 25,000 years ago. Quite a few remains of this species have been found in the North Sea, not only bones, but more often in the form of gnawing traces on bones of larger mammals (e.g., Mol *et al.* 2008). These traces are very characteristic. Two gnawed bones of juvenile *Mammuthus primigenius*, a right humerus (NMR 9991-0007068)

and a left tibia (NMR 9991-0006937; Fig. 3), were recovered from the same MV2 locality by the same fishing vessel BRA7. The condylar parts of these bones are more or less completely gnawed away. They prove the presence of hyenas in the local Late Pleistocene ecosystem.

Due to the rarity of the specimen, being thus far the only Late Pleistocene hyena coprolite known, we have refrained from applying destructive techniques; hence, neither a pollen analysis nor a 14C dating has been performed. We hope that, as a result of this publication, more such fossil droppings will be found, and envisage a more thorough and in-depth research as soon as more material becomes available.

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REFERENCES

De Vos, J., Mol, D. & Reumer, J.W.F.,1998 - Early Pleistocene mammalian remains from the Oosterschelde or Eastern Scheldt (province of Zeeland, the Netherlands) - Mededelingen Nederlands Instituut voor Toegepaste Geowetenschappen TNO 60: 173-185

Kahlke, R.-D., 1999 - The history of the origin, evolution and dispersal of the Late Pleistocene *Mammuthus-Coelodonta* Faunal Complex in Eurasia (large mammals) - Mammoth Site of Hot Springs, Hot Springs, South Dakota

Mol, D., Post, K., Reumer, J.W.F., van der Plicht, H., de Vos, J., van Geel, B., Pals, J.P. & Glimmerveen, J., 2006 - The Eurogeul - first report of paleontological, palynological and archeological investigations of this part of the North Sea - Quaternary International 142/143: 178-185

Mol, D., de Vos, J., Bakker, R., van Geel, B., Glimmerveen, J., van der Plicht, H. & Post, K., 2008 - Kleine encyclopedie van het leven in het Pleistoceen: mammoeten, neushoorns en andere dieren van de Noordzeebodem - Veen Magazines, Diemen

Rijsdijk, K.F., Passchier, S., Weerts, H.J.T., Laban, C., van Leeuwen, R.J.W. & Ebbing, J.H.J., 2005 - Revised Upper Cenozoic stratigraphy of the Dutch sector of the North Sea Basin: towards an integrated lithostratigraphic, seismostratigraphic and allostratigraphic approach - Netherlands Journal of Geosciences / Geologie en Mijnbouw 84(2): 129-146

Van Kolfschoten, T. & Laban, C.,1995 - Pleistocene terrestrial mammal faunas from the North Sea - Mededelingen Rijks Geologische Dienst 52: 135-151

Van Waijjen, M.C.A., 2002 - Onderzoek aan een Pleistocene coproliet aangetroffen tijdens de aanleg van de Sophiaspoortunnel in het kader van de Betuweroute - Biax Consult: BIAXiaal 143: 1-14

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correspondence: Jelle Reumer, Natuurhistorisch Museum Rotterdam, P.O. Box 23452, NL-3001 KL Rotterdam, the Netherlands; reumer@nmr.nl

DEINSEA - ANNUAL OF THE NATURAL HISTORY MUSEUM ROTTERDAM
P.O.Box 23452, NL-3001 KL Rotterdam, the Netherlands
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