Rijksdienst voor het Cultureel Erfgoed
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Nederlandse Archeologische Rapporten 070

Tot op het bot onderzocht

Essays ter ere van archeozoöloog Roel Lauwerier

J. Bazelmans, E. Beukers, O. Brinkkemper, I.M.M. van der Jagt, E. Rensink, B.I. Smit en M. Walrecht (red.)

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Inhoud

Archeozoölogie – analyses

Lowland monkeys

New finds from Tegelen-Maalbeek (The Netherlands)

Thijs van Kolfschoten

1 Introduction

Once in a while, archaeozoologists make unexpected, exiting discoveries; for example the pot with preserved song thrush (*Turdus philomelos*) breasts, imported from the Belgian Ardennes, found in the first century Roman fort on the Kops Plateau in Nijmegen; a find described by Lauwerier.[1] These finds are, however, extra-ordinary and as the Dutch would say: they are 'de krenten uit de pap'[2] of an archaeozoologist. For mammalian palaeontologists 'de krenten uit de pap' are fossil remains of exotic species that are rare in the fossil record. Exotics that inhabited the Dutch lowlands during the Pleistocene before the Late Pleistocene megafauna extinction wave. The Pleistocene mammalian fauna is very diverse[3] and fossils from for example the woolly mammoth (*Mammuthus primigenius*) are very abundant in the Dutch fossil record; mammoth molars can even be found in several souvenir and antique shops or in Amsterdam on the Albert Cuyp market. The same applies for remains of the woolly rhinoceros, and the Pleistocene bison and horse. The discovery of fossils of big carnivores is more exciting but the summit is, of course, the discovery of human remains and in particular of Neanderthal fossils.[4]

Taxonomically close relatives of humans and Neanderthals are monkeys and the discovery of fossils monkeys is, for that particular reason, also very special. In addition, monkeys are known to live in the tropics and one does not expect to find them in North-western Europe. Yes, they occur on Gibraltar, the most southern tip of Western Europe and in Northern Africa. But in The Netherlands? Yes, the fossil record shows that monkeys also inhabited our region. During the first half of the twentieth century several monkey fossils were found in the clay pits near Tegelen. Much later, three dental elements of a Cercopithecine monkey were found in sediments dredged from the bottom of the North Sea. Recently two *Macaca* molars were found in deposits exposed in the Tegelen-Maalbeek quarry. These, so far unpublished, new finds are presented and described in this paper.

2 The old finds

2.1 Tegelen

It was Father Bernsen, a Jesuit priest as well as a mammalian palaeontologist, who discovered in the Mission Museum at Steyl near Tegelen, among the fossil mammal remains from the Tegelen Clay, the mandible of a monkey; the first fossil monkey found in the Netherlands).[5] It is an almost complete lower jaw embedded in a clay-iron-stone concretion. All the teeth are very much worn down which indicates that we are dealing with an old individual. The canines have well developed roots and the size of the roots shows that the mandible belonged to a male.[6] Bernsen presents a detailed description of the specimen and concluded, based on the morphology of the lower jaw and the (pre) molars as well as based on the dimensions, that the mandible belongs to the Family Cercopithecidae, the Old World Monkeys.[7] He assigned the Tegelen fossil monkey to the genus *Macacus* because of the relative length of the true molars and the form of the lower jaw (for more detailed information the reader is referred to Bernsen[8]). The Tegelen mandible shows, according to Bernsen, a close resemblance with a fossil mandible from the Upper Pliocene (nowadays regarded as Early Pleistocene) deposits of Val d'Arno (Italy) described by Cocchi as *Macacus florentinus*.[9] Because of the close resemblance, despite of the observed minor difference in size, Bernsen referred the fossil mandible to as *Macacus* cf. *florentinus* Cocchi.

Shortly after Bernsen's discovery, more remains of a fossil monkey have been found in the Tegelen quarries. Antje Schreuder reported about a collection of six isolated lower teeth of a monkey found in the Tegelen Clay exploited in the clay pit Russel-Tiglia.[10] The incisor, premolar and four molars are well preserved and hardly worn and all are from a single, young individual. A few years later, well preserved upper teeth (I^2, C, P^3 and P^4) of an adult male were collected.

1 Lauwerier 1993.
2 The currants from the porridge (the best bits).
3 Van Kolfschoten 2001.
4 Hublin *et al.* 2009.
5 Bernsen 1930, 1931.
6 Bernsen 1930, 1931.
7 Bernsen 1930.
8 Bernsen 1930, 1931.
9 Cocchi 1872.
10 Schreuder 1945.

Figure 1 Reconstruction of the Tiglian landscape based on the fossil botanical and zoological remains collected from the Tegelen Clay in quarries near Tegelen with in the right upper corner, the Barbary macaque. (painted by Mr. B. Collet of the former 'Rijksmuseum van Geologie en Mineralogie').

Schreuder studied the well-preserved dental elements from Tegelen and she concluded, based on a detailed comparison with the fossil remains from the Italian site Val d'Arno, that we are dealing with the same species and assigned all the monkey remains from the Tegelen Clay to *Macaca florentina* (Cocchi) (Fig. 1).[11] A species that is nowadays regarded by e.g. Sardella *et al*. as a subspecies of the living Barbary macaque *(Macaca sylvanus)* to be referred to as *Macaca sylvanus florentina* Cocchi, 1872.[12]

2.2 North Sea (Maasvlakte-2 and Hoek van Holland)

More recently, fossil remains of a Cercopithecine monkey were found on the beaches of Maasvlakte 2 and Hoek van Holland, located to the west of the city of Rotterdam.[13] The fossils, a right mandibular fragment with a complete lower third molar (M_3), a left upper canine and a right upper second molar (M^2 dex.) are assigned to *Macaca sylvanus*.
The finds are from sediments that are dredged from the bottom of the North Sea, 10-20 km offshore, and transported to: a) the Maasvlakte 2 area to create an artificial peninsula in order to extend the Maasvlakte harbour and b) to the sandy beaches along the North Sea coast that need sediment supplementation to avoid the loss of sediment, for example the beach of Hoek van Holland. The dredged sediments yield a huge amount of Pleistocene and early Holocene fossils representing a large variety of species including the Barbary macaque.

3 New finds from Tegelen-Maalbeek

3.1 Introduction

During a field survey to explore the Early Pleistocene deposits exposed in the Tegelen-Maalbeek quarry, where the Tegelen Clay as well as the overlying sands and gravels were exploited, fossiliferous horizons that yielded small mammal remains have been discovered. The clay deposits in the Tegelen-Maalbeek quarry are known as the Tegelen Member of the Waalre Formation.[14] The base of the Tegelen Member in the Tegelen-Maalbeek quarry is formed by flood-basin clay with soil and peat horizons, a unit that is covered by laminated clays. The laminated clays are subdivided into two subunits: an oxbow-fill facies at the base and a crevasse-splay facies at the top. Small

11 Schreuder 1945.
12 Sardella *et al*. 2015.
13 Reumer, Mol & Kahlke 2018.
14 Westerhoff *et al*. 1998; Westerhoff 2009.

fossil assemblages with a limited number of mainly vole teeth, have been gathered in the upper crevasse-splay deposits. In the underlying oxbow deposits a level rich in mammalian fossils has been discovered in 2003 and during field campaigns in 2004 and 2005, a large amount of sediment from that particular level has been water screened to collect fossil vertebrate remains. The result is a large fossil assemblage with thousands of small mammal remains representing a substantial list of species including insectivores (*Talpa*, *Desmana*, *Sorex*) and rodents (*Castor*, *Trogonterium*, *Mimomys*, *Clethrionomys*, *Ungaromys*, *Apodemus*) as well as larger mammal remains from a small and from a large deer. During the sieving activity in the quarry, a molar of a monkey has been encountered and a second molar was found during screening of the sieved sediment residues.

3.2 The Macaca molars from Tegelen-Maalbeek

Both molars are bunodont and low crowned (Fig. 2); molars that display the characteristic omnivore pattern. The second left upper molar (M^2 sin.) has tree roots, one on the medial side and two on the buccal side. The molar has four well developed major cusps and at the buccal side, a small tubercle-like mesostyle that separates the anterior paracone and the posterior metacone. There are no signs of the development of a cingulum. Contact facets are visible at the anterior as well as at the posterior side of the molar. The wearing facets on the lingual cusps (protocone and hypocone) show that the molar is moderately worn; the protocone shows a dentine islet near the top. The right lower second molar (M_2 dex.) has two roots and four well developed cusps. The buccal side of the hypoconid is broken off. Contact facets are visible at the anterior as well as at the posterior side of the molar. The lingual side of the molar, with the metaconid and the entoconid, shows traces of wear; small islets of dentine are visible near the top of the two lingual cusps. The dimensions of the Tegelen-Maalbeek *Macaca* molars (Table 1) are comparable with those of the Tegelen finds presented by Bernsen[15] and Schreuder[16] and the dimensions of the North Sea *Macaca* upper M^2 reported by Reumer, Mol & Kahlke.[17] They also fit in the range of the dimensions of the second upper and lower molars of the extant *Macaca sylvanus* stored in the collection of the Musée l'Histoire Naturelle, Paris (France). Based on the observed morphological features and the dimension of the two molars, and taking into account the taxonomical arguments/data presented by e.g. Delson,[18] Fladerer[19] and Castaños *et al.*,[20] the Tegelen-Maalbeek finds are assigned to the modern *Macaca sylvanus*.

15 Bernsen 1930, 1931.
16 Schreuder 1945.
17 Reumer, Mol & Kahlke 2018.
18 Delson 1980.
19 Fladerer 1991.
20 Castaños *et al.* 2011.

Figure 2 Macaca sylvanus from Tegelen-Maalbeek. A: second left upper molar (M2 sin.); B: right lower second molar (M2 dex.). Scale bar is 1 mm.

Table 1 The dimensions of the Tegelen-Maalbeek *Macaca* molars compared with those of the Tegelen finds, the fossils remains from the North Sea, Val d'Arno, Hoxne, Suffolk, and the dimensions of the second upper and lower molars of the extant *Macaca sylvanus*.

Upper M2	Length/X	Range	N	Width/X	Range	N	Literature/collection
Tegelen- Maalbeek	9.21			7.96			
North Sea	8.9			8.3			Reumer, Mol & Kahlke 2018
Hoxne, Suffolk (UK)	9.42	8.4-10.6	5	8.44	7.5-9.5	5	Singer *et al.* 1982
M. sylvanus extant	9.94	9.02-10.49	16	9.46	8.83-9.87	11	MHN Paris
Lower M2							
Tegelen- Maalbeek	9.61			7.04			
Tegelen	11.0			7.8			Bernsen 1930, 1931
Tegelen (Russel-Tiglia)	10.2			7.6			Schreuder 1945
Val d'Arno		9.2-9.7			6.6-7.0		Ristori 1890
M. sylvanus extant	9.96	9.55-10.41	16	8.18	7.71-8.99	16	MHN Paris

4 The age of the Dutch finds

The European fossil record shows that during the Quaternary, the *Macaca* monkeys were geographically widely distributed in particular during the Early Pleistocene. But also the late Middle Pleistocene fossils remains found in Hoxne, Suffolk (UK)[21] indicate that during younger interglacial phases their range expanded far north of the Pyrenees and the Alps. The latest occurrence of the Barbary macaque in Europe (except for the living population on Gibraltar) is during the Late Pleistocene.[22] A cave (Kugelsteinhöhle II) in the Eastern Alps near Graz (Austria) yielded a (probably early) Late Pleistocene record.[23]

The stratigraphical provenance of the various Dutch *Macaca* fossils is largely uncertain. The age of the finds from the North Sea are unknow and the suggestion that we might deal with a mandible with an early Late Pleistocene (Eemian) age, based on light colour and the degree of fossilisation, and with teeth with a pre-Eemian age because of the darker (blacker) colour and heavier mineralization, is, as the authors admit,[24] speculative.

The age of the Tegelen finds is better known. The publications by Bernsen, however, do not mention the exact provenance of the fossil mandible.[25] It is known that the find came from the Tegelen Clay, deposits that were, during the first half of the twentieth century, exploited for the local ceramic industry. Workers who processed large amounts of clay discovered and collected the fossils. However, the Tegelen Clay was exploited in several quarries located east of Tegelen.[26] Schreuder reports that the six isolated lower teeth are from the clay pitt Russel-Tiglia.[27] The Tegelen Clay in Russel-Tiglia can be subdivided, just as in the Tegelen-Maalbeek quarry, into two subunits: an oxbow-fill facies at the base and a crevasse-splay facies at the top.[28] The well-known small mammal assemblage from Russel-Tiglia, studied by Rümke[29] (Desmaninae), Reumer[30] (Soricidae) and Tesakov[31] (Arvicolidae), derived from the upper subunit, the crevasse-splay facies. Tesakov states that the Russel-Tiglia small mammal assemblage has, based on the correlation with biostratigraphical data from Eastern Europe, an age of ca. two million years.[32]

The quarry Tegelen-Maalbeek, located ca. 4 km south of the Russel-Tiglia quarry, also yielded a large assemblage of small mammal remains, including fossil voles. Voles are biostratigraphically important; several vole lineages show a rather rapid evolution during the Early Pleistocene. The voles from the Tegelen-Maalbeek oxbow-fill facies (with the *Macaca* molars), are more primitive than the voles from the Russel-Tiglia crevasse-splay facies. The Tegelen-Maalbeek evolutionary stage of the fossil voles indicate a substantial

21 Singer *et al.* 1982.
22 Fladerer 1991; Elton & O'Regan 2014.
23 Fladerer 1991.
24 Reumer, Mol & Kahlke 2018.
25 Bernsen 1930, 1931.
26 Van den Hoek Ostende & De Vos 2006.
27 Schreuder 1945.
28 Westerhoff *et al.* 1998; Westerhoff 2009.
29 Rümke 1985.
30 Reumer 1984.
31 Tesakov 1998.
32 Tesakov 1998.

difference in age (100.000 years or more) between the Tegelen-Maalbeek assemblage and the one from Russel-Tiglia. An observation that implies that there is a large stratigraphical hiatus between the two subunits, between the oxbow-fill facies at the base and the crevasse-splay deposits at the top. Westerhoff, however, assumes that the upper subunit is only slightly younger than the lower subunit and that both belong to a single sedimentary cycle with an duration of far less than 40.000 years.[33] A discrepancy that still has to be solved. It can be concluded that the Tegelen-Maalbeek *Macaca* molars are at least two million years old and probably slightly older. The age of the old finds gathered during the first part of the twentieth century, might be the same, but, because the exact stratigraphical provenance is unknown, it cannot be excluded that the old finds derive from the upper subunit and, hence, that they are younger in age.

5 Summarizing conclusions

The Dutch fossil record includes, so far, in total 16 finds that indicate the occurrence of monkeys in the Dutch lowlands. Most complete is the mandible described by Bernsen,[34] which is nowadays on display in the permanent exhibition at Naturalis, the National Natural History Museum in Leiden (The Netherlands). The majority of the finds are from the so-called Tegelen Clay, deposits with an Early Pleistocene age of ca. 2 Ma or slightly older. The new finds from Tegelen-Maalbeek are the only *Macaca* fossils with a well-known stratigraphical provenance and are probably the oldest Dutch primate.

Summary

Recently discovered fossiliferous levels in the so-called Tegelen Clay, exposed in the Tegelen-Maalbeek quarry (province of Limburg, the Netherlands), yielded two molars of the Barbary macaque *Macaca sylvanus*. The new finds are so far, the only Dutch *Macaca* fossils with a well-known stratigraphical provenance and are, with an age of more than two million years, most probably the oldest Dutch primate remains.

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33 Westerhoff 2009.
34 Bernsen 1930, 1931.

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Tot op het bot onderzocht is een *liber amicorum* ter gelegenheid van de 67ste verjaardag en pensionering (in 2021) van archeozoöloog Roel Lauwerier. Het *liber* bestaat uit een rijk palet van 24 artikelen op het gebied van de archeologie, archeozoölogie en archeologische monumentenzorg, de zwaartepunten in het onderzoek van Roel. De auteurs zijn vakgenoten en (oud-)collega's, die Roel met dit boek een eerbetoon brengen. Roel is een groot pleitbezorger van helderheid en eenduidigheid. In archeologische rapportages vindt hij een inzichtelijke presentatie van onderzoeksvragen, methoden en technieken evenzeer van belang als een duidelijke scheiding tussen resultaten, discussie en conclusies. De auteurs van deze bundel hebben aan dat gedachtegoed recht willen doen.

Deze wetenschappelijke bundel is bestemd voor archeologen en andere professionals en liefhebbers die zich bezighouden met archeologie.

Met kennis en advies geeft de Rijksdienst voor het Cultureel Erfgoed de toekomst een verleden.