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THE MAASTRICHT-BELVÉDÈRE PROJECT: AN INTERMEDIATE SYNTHESIS

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INTRODUCTION

In this volume of the Mededelingen Rijks Geologische Dienst a synthetic review of the Belvédère research is presented. This should be regarded as an interim publication of the ideas on the stratigraphy, palaeoenvironment and the archaeology of the site. These ideas are based on many discussions between scientists from several disciplines, which took place mainly during the joint fieldwork in the years 1980-1985.

The Maastricht-Belvédère research is still continuing and new results can be expected in the near future; a monograph dealing with the archaeology of the site is in preparation.

In this article we briefly review the results of the Quaternary research conducted at the site, mention some unsolved problems and indicate future investigations. Following a discussion of the Pleistocene Belvédère sequence special attention is given to the faunal and archaeological assemblages from Unit 4 and their place in the N.W. European stratigraphy.

THE MAASTRICHT-BELVÉDÈRE SEQUENCE

Unit 3: the Unit 3 gravels were deposited on the Palaeocene chalk subsoil (Unit 1), which is locally covered by Tertiary sands (Unit 2). From their sedimentary structure the Unit 3 gravels are interpreted as deposited by a braided river system (Vandenberghe et al., 1985). According to palaeontological assessment of mammal fossils collected from the upper part of the gravels the deposition took place in a post-Holsteinian cold phase (van Kolfschoten, 1985)*. From Unit 3 comes only one 'certain' artifact, found in the upper half.

Unit 4: in the Unit 4 'terrace sands' several facies are present, (Vandenberghe et al., 1985): in general, a fining upwards sequence can be observed in the Unit 4 fluvial deposits, but lateral transitions in grain size frequently occur, from sand (4a) to loam (4b) deposits. At the upper part of Unit 4 locally a calcareous tufa occurs. In the top of Unit 4 remnants of a truncated Luvisol ('Parabraunerde') are present.

According to Van Kolfschoten (1985) and Meijer (1985) a climate transition took place during the deposition of the Unit 4 sediments: the lowermost parts of Unit 4 yielded fossils which indicate a more continental climate, while higher upwards in the sequence mammal and molluscan faunas strongly indicating a humid warm phase of interglacial signature have been recovered. The middle palaeolithic flint assemblages from the different Unit 4 sites in the pit were all situated in the upper part of Unit 4; the major site, Site C, has to be placed in the climate optimum of this interglacial (Roebroeks, 1985).

* note: this interpretation, however, has to be confronted with a recent find (summer 1985) of a loamy layer with leaf imprints and a 'temperate' molluscan fauna in the middle of Unit 3 (see Meijer, 1985 Addendum). This find and the sedimentary structure of the particular profile suggests a bipartition of Unit 3, meaning that the gravel may have been deposited in at least two cold cycles. Work on this problem is continuing.

According to palaeontological assessment of the mammal fauna Unit 4 was deposited in a warm-temperate phase before the advance of the Saalian glaciers in The Netherlands (van Kolfschoten, 1985), while according to Meijer (1985) the molluscan assemblage from Unit 4 has to be dated in an interglacial stage between the Holsteinian and the Eemian. For the time being this interglacial stage may best be correlated with the 'warm' Hoogeveen interstadial (Zagwijn, 1973).

Unit 4 is further discussed in the next paragraph.

Unit 5: this unit consists of two subunits

Unit 5.1. a mixture of sands and loam, is interpreted as consisting of solifluction deposits formed under humid conditions with seasonal frozen ground and poor vegetation. On top of this subunit remnants of either a weakly developed or heavily truncated soil are present (Mücher, 1985). Only a few isolated flakes have been found in Unit 5.1. Whether this unit represents a distinct climatic cycle, or reflects a period of (local) instability in the palaeo-landscape is not clear at this moment.

Unit 5.2: this subunit consists essentially of redeposited loess material, which according to its heavy mineral association dates from a pre-Weichselian period (Meijs, 1985). On top remnants of a Luvisol ('Parabraunerde') are present; this palaeosol is correlated with the Eemian 'Sol de Rocourt' (Gullentops, 1954). Redeposited faunal elements and flint artifacts have been found in a pebble-layer at the base of Unit 5.2., while at site A a small concentration of flakes and blades produced in the Levallois-technique was found.

Unit 6: this unit consists mainly of redeposited loessic material and can be divided in 4 subunits (see Vandenberghe et al., 1985) Unit 6.1 (the base of Unit 6) consists of a dark humic layer, interpreted as a truncated steppe soil. On top of it, locally pebble zones occur (Unit 6.2), generally covered by fine laminated silt loams (Unit 6.3). Unit 6.4 consists of a calcareous loessic deposit on top of which the cryoturbated Nagelbeek Horizon (Haesaerts et al., 1981) is present.

A rich faunal assemblage was collected in association with flint artifacts at the base of Unit 6, below Unit 6.3 (Site E). The faunal remains from Site E indicate a tundra environment and have to be placed in a cold stage (Van Kolfschoten, 1985; Kuijper, 1985). According to Van Kolfschoten (1985) the fauna dates from an early part of the Weichselian.

Unit 7: this unit represents a typical loess deposit of the Weichselian Pleniglacial, on top of which the Holocene Luvisol is present. According to sediment dating (TL) Unit 7 has an average age of 17.5 ± 3.5 ka (Huxtable & Aitken, 1985).

THE STRATIGRAPHICAL POSITION OF UNIT 4 AND ITS ABSOLUTE AGE

There are several current approaches to date the Unit

4 deposits. In this volume Huxtable and Aitken (1985) have published a TL age determination of 7 burnt flints from Unit 4: 270 ± 22 ka ($0 \times TL$ 712k). This is in satisfactory agreement with a provisional ESR age determination on molluscs from Unit 4: 220 ± 40 ka (pers. comm. R. Grün & O. Katzenberger, Köln, 1985).

These dates indicate - independently from the biostratigraphical evidence - that the warm-temperate phase documented in Unit 4 has to be placed well before the Eemian interglacial period. Biostratigraphical analysis furthermore places the faunal assemblages from Unit 4 after the Holsteinian interglacial.

There are a number of palaeolithic sites in Northern Europe which we interpret as having about the same age as the Maastricht-Belvédère Unit 4 assemblages. One of the most well-known is Ehringsdorf (German Democratic Republic), where the Lower Travertines yielded a nearly identical fauna (van Kolfschoten, 1985); U-S dates for the Lower Travertines adjacent to the 'Brandschichten' give an average age of 225 ± 26 ka (Cook et al., 1982).

Oxford TL age determination of burnt flints from layers C and D from La Cotte St. Brelade (Jersey, United Kingdom) place the archeological assemblages from these layers in the 238 ± 35 ka time range (Callow, 1985). Based on the absolute age determinations the Maastricht-Belvédère Unit 4 assemblages might be older than the sites mentioned above, but clearly in the same stratigraphical range.

The faunal assemblage from findlayer 1 at Ariendorf (Western Germany) indicates that the assemblage was formed in a cold stage either just before or just after the Maastricht-Belvédère Unit 4 warm-temperate phase (Turner, in press; van Kolfschoten, 1985).

On biostratigraphical evidence the sites of Bilzingsleben (German Democratic Republic) and Miesenheim (Western Germany) are to be placed in an earlier warm-temperate phase (van Kolfschoten, 1985). For Bilzingsleben several dates have been published ranging from $228 + 17$ ka - 12 ka (Harmon et al., 1980) to ages greater than 350 ka (Cook et al., 1982).

Evidently younger than Maastricht-Belvédère Unit 4 is the site of Biache St. Vaast, both on biostratigraphical grounds (Chaline, 1978; van Kolfschoten, 1985) as on Oxford TL age determination: 175 ± 13 ka (Aitken et al., 1985).

CONCLUDING REMARKS

The Quaternary sequence at the Maastricht-Belvédère pit contains several artifact- and fossil bearing horizons: the most important one indicates the presence of a major climate oscillation of interglacial character within the Saalian of the Netherlands. The rich faunal assemblages found in association with primary context remains of human activities give the Maastricht-Belvédère Unit 4 sites an important place in the North European quaternary research, dated by two independent lines of evidence, biostratigraphical analysis and chronometric dating.

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