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BEYOND THE SITE

THE SAALIAN ARCHAEOLOGICAL RECORD AT MAASTRICHT-BELVÉDÈRE (THE NETHERLANDS)

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"De wetenschap is geen perfect instrument, maar het is wel het best mogelijke instrument. Net zoals de democratie niet het perfecte, maar wel het best denkbare systeem is."
(van Springel 1999:4).

Contents

2 An introduction to Maastricht-Belvédère: geology, palaeoenvironment and dating

2.1 Intoduction

The Maastricht-Belvédère gravel- and loess pit is situated on the left bank of the river Meuse (Maas), approximately 1 km northwest of the city of Maastricht (The Netherlands, province of Limburg; Figure 2.1). The quarry is located on the northern border of the Northwest European loess-belt, on the edge of the so-called Caberg-plateau of the Meuse terrace landscape. The pit was carved into a steep cliff between the Lower and Middle terrace of the river Meuse.

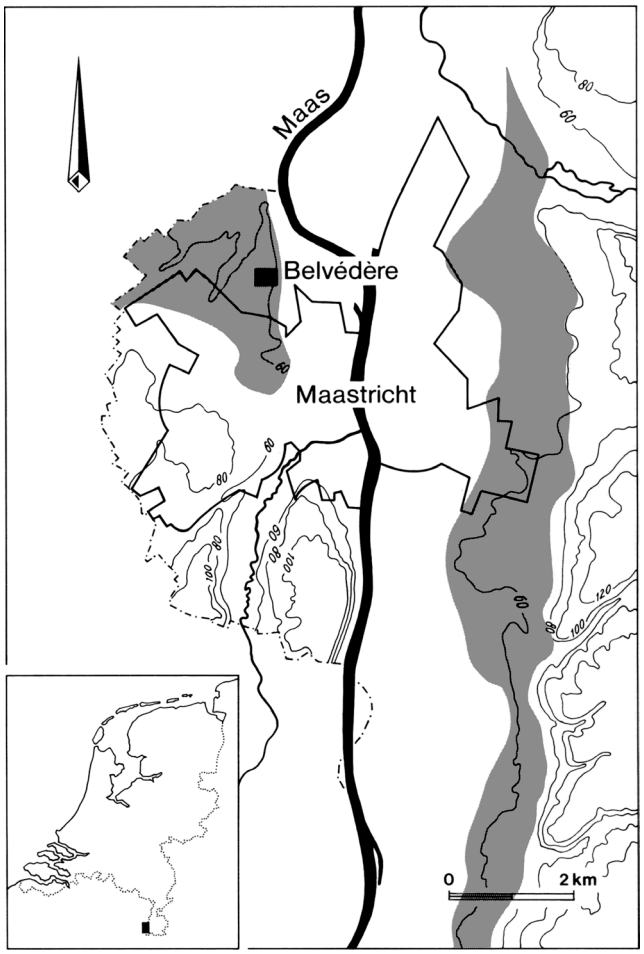

Figure 2.1: Location of the Maastricht-Belvédère pit, with shaded the distribution of the Caberg Middle Terrace sediments. The Caberg-plateau coincides with the western distribution of the Middle Terrace sediments (after Roebroeks 1988).

The complex fluviatile deposits of the river Meuse and the younger aeolian sequence at Maastricht-Belvédère have been studied for many years. This study resulted in the definition of a number of lithological and lithostratigraphical units, published by Vandenberghe *et al*. (1985, 1987, 1993) and Roebroeks (1988).

In this chapter the Middle and Late Pleistocene sequence at Maastricht-Belvédère will be described briefly, and dating and palaeoenvironmental data will be discussed. The most interesting archaeological levels at Belvédère were situated in fine-grained fluviatile sediments (Unit IV), with an approximate age of 250 ka (Roebroeks 1988; Huxtable 1993). These deposits are present on top of a complex of terrace gravels, and are overlain by a series of Saalian silt loams and Weichselian loesses. This Unit IV will be described in more detail, but first a short historical review of the interdisciplinary research at Maastricht-Belvédère will be given, based on Roebroeks (1988).

Before its identification as a Palaeolithic site, mammal fossils had been found in the Quaternary deposits of the Middle terrace Caberg-plateau since the beginning of the 19th century. The quarry became archaeologically well known during the 1920s because of Neolithic excavations by Mr J.H. Holwerda (National Museum of Antiquities, Leiden; 1926, 1927, 1928, 1929, 1930). About 50 years later, Palaeolithic archaeology became the main topic of study of the pit. During a systematic examination of the local stratigraphy and a search for the occurrence of *in situ* Palaeolithic material, Mr W.M. Felder (Geological Survey of The Netherlands, Heerlen) discovered an artefact at the boundary of the Saalian/Weichselian loess deposits in September 1980. This discovery inspired Mr W. Roebroeks, together with a small group of amateur archaeologists, to carry out a thorough investigation of the pit sections, during which several horizons containing artefacts and animal remains were found. Between 1981 and 1990 excavations took place every year. During that period the pit was being exploited by a commercial quarrying firm. Therefore, most of the archaeological sites had to be

excavated under considerable time pressure and at times right in front of the machines (Figure 2.2).

Figure 2.2: Maastricht-Belvédère Site J. Photo taken during the excavation of the Weichselian Site J (May 1986).

The Pleistocene sediments with a Saalian and Weichselian age (van Kolfschoten and Roebroeks 1985; Roebroeks 1988; Vandenberghe *et al*. 1993) exposed in the pit, contained several 'horizons' with archaeological material. By the end of 1990, excavations had uncovered a total of twelve 'sites' (Table 2.1, Figure 2.3) located within an area of approximately 6 hectares. Most of the artefacts date to an intra-Saalian interglacial period, correlated with Oxygen Isotope Stage (OIS) 7 (van Kolfschoten *et al*. 1993).

The results of the first five years (1980-1985) of Belvédère research are presented in several synthesizing publications (van Kolfschoten and Roebroeks 1985; van Kolfschoten 1990), whereas further results are presented in Roebroeks 1988 and Vandenberghe *et al*. 1993).

2.2 Geological setting of the Middle and Late Pleistocene deposits at Maastricht-Belvédère

2.2.1 Introduction

Geographically the study area is located in the southernmost part of the Dutch province of Limburg. In the east this area borders onto Nordrhein-Westfalen (Germany), and in the west and south onto the Belgian provinces of Limburg and Liège.

Geologically, the Southern Limburg area is situated within a separate tectonic unit, the 'South Limburg block', consisting of permeable Cretaceous and Tertiary deposits. These deposits are wedged between the 'Midi Aachen thrust' and the southern boundary fault zone (*Feldbiss* fault) of the 'Roer rift valley system'.

During the Quaternary the geomorphological development of the area was dominated by tectonic uplifts, fluvial activity and loess deposition. In an early stage the river Meuse had a northeasterly course, while during the Pleistocene the 'West Meuse' with a northwesterly orientation prevailed. The latter includes the present river course. Fluvial deposits, such as coarse terrace gravels of varying age, have covered most of

Site	Field designation	Date	Excavation area (m^2)	Period of excavation
A	Trench East I	Saalian	5	March 1981
B	Trench North	Saalian	19/23	July-Sept. 1981
C	Trench South	Saalian	264	1981-1983
D	Tench East II	Saalian	–	August 1982
E	Trench WG	Weichselian	50	Nov.-Dec. 1982
F	Trench East III	Saalian	42	June-July 1984
G	Site G	Saalian	50	1984-1985
H	Site H	Saalian	54	March 1987
J	Site J	Weichselian	210	May-June 1986
K	Site K	Saalian	370	Dec. 1986-July 1987
N	Site N	Saalian	765	Feb. 1988-Sept. 1989
July 1990	July 1990	Saalian	7	July 1990

Table 2.1: Survey of the main Maastricht-Belvédère sites (after Roebroeks *et al.* 1993). Some of the 'sites' consist only of small test trenches, where artefacts were recorded in a stratigraphical position.

Figure 2.3: Situation of the main Maastricht-Belvédère archaeological sites mentioned in the text (see also Table 2.1). Scale 1:2500 (the numbers refer to the coordinates of the topographical map of The Netherlands, sheet no. 61F). The aerial photograph dates from May 1986 and is published with permission of KLM Aerocarto (film 0556-photo 8528; after Roebroeks *et al.* 1992).

the Cretaceous and Tertiary formations. Only a small zone in the southeastern part and a larger area in the eastern part (the so-called '*Eiland van Ubachsberg*' along the Waubach anticline) remained outside the fluvial influence of the river Meuse. Both climatic changes and tectonic movements led to periodical changes in fluvial regimes. The Cretaceous and Tertiary plateaus were thus transformed into a terrace land-scape (van den Berg 1996). Tectonic uplift must have played a dominant role in determining terrace preservation and the actual general valley morphology. Climatic changes determined the terrace formation by causing changes in water and sediment supply. Generally the terrace system is divided into a Higher, Middle and Lower Terrace with several subdivisions (for details see amongst others Brueren 1945; Kuyl 1980; Felder and Bosch 1989; Veldkamp and van den Berg 1993; and van den Berg 1996).

During the late Saalian and, in particular, during the Weichselian, loess deposits covered large parts of the terrace landscape. At present loess covers vary in thickness from more than 20 metres on the plateaus to less than one metre on plateau edges and north-facing slopes. Already in the Weichselian, but also during the Holocene (caused by intensive land use; Bouten *et al*. 1985) the steep slopes and plateau edges were affected by erosion. Moreover, the loess cover may have disappeared completely in these landscape sections, and as a consequence older terrace gravels and Cretaceous and/or Tertiary formations may come to the surface here.

At the Maastricht-Belvédère pit mainly Quaternary deposits are exposed. The stratigraphical sequence can roughly be divided into fluvial and aeolian deposits. The lower part of the sequence has a fluvial origin, whereas the upper part is aeolian. The fluvial deposits overlie Paleogene deposits (Unit I), with on top local remnants of Oligocene marine sands (Unit II).

Geological fieldwork carried out in the period 1981-1989 has enabled Vandenberghe *et al*. (1993) to present a detailed reconstruction of the genesis of the Pleistocene sequence at Belvédère. For a general and detailed review of the Middle and Late Pleistocene deposits exposed at Maastricht-Belvédère, the reader is referred to van Kolfschoten and Roebroeks 1985; Roebroeks 1988 and Vandenberghe *et al*. 1993. Only a brief account of the local geological context of the archaeology in the pit is appropriate here. To illustrate the lithostratigraphical succession of the Pleistocene sequence Figures 2.4 and 2.5 have been added. Specific attention will be paid to the Saalian fine-grained fluviatile Unit IV sediments which were deposited by the river Meuse system.

2.2.2 Maastricht-Belvédère: stratigraphy, dating evidence and palaeoenvironment

The base of the Pleistocene deposits at Maastricht-Belvédère consists of a heterogeneous gravel body with inter-bedded small sand lenses (Unit III of the local lithostatigraphy), deposited by a braided river system (Paulissen 1973; Vandenberghe 1993). The cold stage fauna from Unit III is indicative of an open environment in a cold climate and also allows to derive a post-Holsteinian (probably Early Saalian) age for this deposit (van Kolfschoten 1985, 1990, 1993).

The various kinds of fluvial sediments (Unit IV) on top of these gravels consist of sandy and clayey deposits. They represent a striking change in the river system. The lower part of Unit IV was also formed by a braided river system, while the upper parts were deposited by a slightly incising, meandering system. The main archaeological find levels from the pit are present in the fine-grained deposits of this meandering system. The faunal remains in this unit indicate that human occupation occurred in warm-temperate conditions of an interglacial character before the maximal Saalian ice-advance in the Central Netherlands (van Kolfschoten 1985; Meijer 1985). Because the main archaeological find levels, discussed in this dissertation, are situated in Unit IV, this unit will be dealt with in more detail later on.

From the channel/gully deposits of Unit IV a very gradual lithological transition can be observed towards Subunit V-A, an alluvial deposit consisting of a mixture of sands and loams, that could be interpreted as overbank deposits. The relatively large gravels and the high sand content of Subunit V-A suggest a high energy flood-water deposition by the meandering river that had already left the Belvédère site (Vandenberghe *et al*. 1985). The gradual transition suggests that the formation of Unit IV and Subunit V-A was closely related in time, and that they were very probably formed under the same climatic conditions. The top of Unit IV and Subunit V-A have been modified by a continuous period of soil formation (Mücher 1985; Huijzer and Mücher 1993). It concerns a luvisol, generally formed under deciduous forest cover during warm-temperate climatic conditions. The water-laid Subunit V-B sediments, consisting mainly of aeolian silt loams with some admixture of sand, represent a cold phase deposit of loess which was displaced by wind after the original deposition (Mücher 1985). Another period of soil formation is indicated by the remnants of a second luvisol in the top of Subunit V-B, correlated with the so-called *Sol de Rocourt* of Eemian age (Gullentops 1954). This soil marks the boundary between the Saalian (III, IV and V) and the Weichselian Units (VI and VII).

The overlying (Weichselian) Units VI and VII are also loesses. Unit VI consists mainly of reworked loesses of Early Weichselian pleniglacial age (Vandenberghe *et al*. 1985). These sediments were mainly formed under cold humid climatic conditions. The faunal remains from this Unit may reflect an equivalent of the 'Mammoth-steppe' fauna as described by Guthrie (1990) (van Kolfschoten 1993). At the base of Unit VI traces of transported soil constituents are

found which resemble the so-called 'Warneton soil' (Paepe 1967). The cryoturbated horizon in the upper part of Unit VI strongly resembles the so-called 'Nagelbeek horizon', a widely distributed marker stratum in the West European loess belt (Haesaerts *et al*. 1981). According to thermo-luminescence (TL) analysis the 'Nagelbeek horizon' as well as overlying Unit VII are of late pleniglacial age.

In the same general period the reworked Unit VI deposits were covered by a typical/pure *in situ* aeolian loess (Unit VII), in which the Holocene luvisol developed.

2.2.3 *The main archaeological level (Unit IV): stratigraphy, dating evidence and palaeoenvironment*

Most of the Pleistocene units mentioned above have yielded flint artefacts, starting from two rolled flakes from the Early Saalian gravels of the braided river system of Unit III. However, the most interesting deposits exposed at Maastricht-Belvédère both from archaeological and palaeontological viewpoints are the fine-grained fluviatile Unit IV deposits, whose archaeology is central to this thesis. They have yielded archaeological remains at two different stratigraphical levels: in Subunits IV-B and IV-C (see Vandenberghe *et al*. 1993[1]).

Based on sedimentological analyses, Vandenberghe (1993) distinguished three consecutive phases of rather 'identical' development of meanders in the Belvédère sequence (Subunits IV-A, -B, -C). The faunal assemblages from the base of Unit IV (-A) indicate a steppe-like environment and rather warm and dry climatic conditions (van Kolfschoten 1993). Data from Subunit IV-B and IV-C are indicative of full interglacial conditions (Vandenberghe *et al*. 1993).

The Unit IV sediments represent a decrease of energy of the meandering river. This is a phase in which part of the underlying Unit III was eroded, followed by accumulation of sediments and a rapid migration of the meanders which resulted in the abandonment and subsequent infilling of the gullies by finer deposits: a low-energy fluviatile environment (Mücher 1985 and Vandenberghe *et al*. 1985). Sedimentary deposition in the form of levees and in backswamps is also noted (Vandenberghe *et al*. 1985). The archaeological occurrences are particularly situated on the levees along the river channel (Figure 2.6).

The presence of archaeological remains at Site A, D, F, H, K and N is confined to the so-called 'mottled zone' within the Unit 5.1 sandy siltloam. Chronostratigraphically this 'mottled zone' can be placed in Subunit IV-C-ß. According to Roebroeks (1988:79, 117) this is only one of a series of possible options. As presently there are no clear arguments that justify opting for another position, Roebroeks' ascription is followed here.

The lower-lying Subunit IV-B archaeological assemblages (sites B, C and G) are found in a greyish-olive green silty

Figure 2.4: Photo of the southern part of the Maastricht-Belvédère pit, summer 1987, showing Units III to VII. The large boulders in the front left come from the Unit III gravels. The 'white band' visible halfway up the section consists of calcareous tufas, present in the Unit IV inter-glacial deposits (after Roebroeks *et al.* 1992).

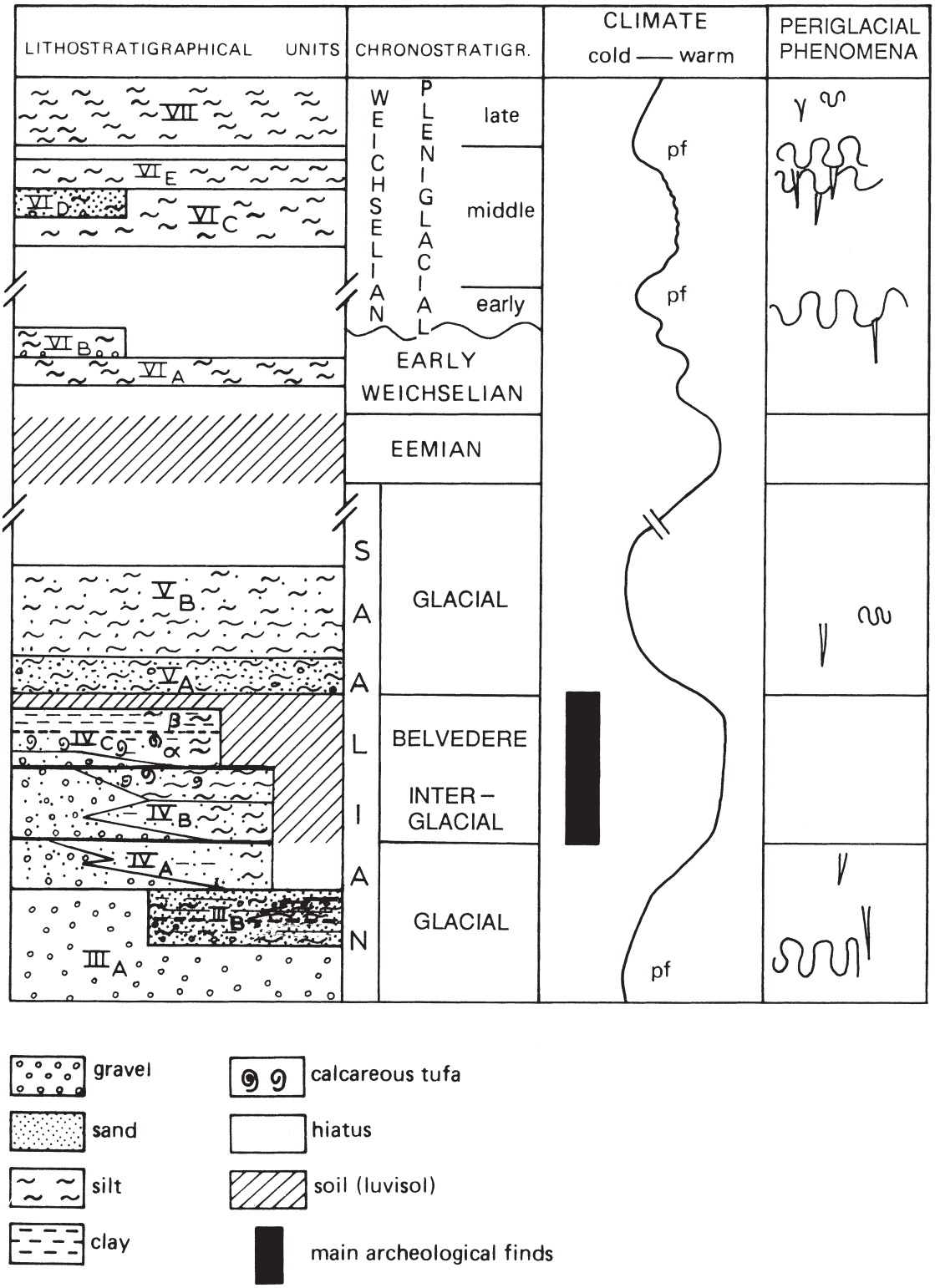

Figure 2.5: Lithostratigraphical succession of the Middle and Late Pleistocene sequence at Maastricht-Belvédère shown together with the palaeo-climatic reconstruction and situation of the main archaeological find levels. Not to scale (after van Kolfschoten *et al.* 1993).

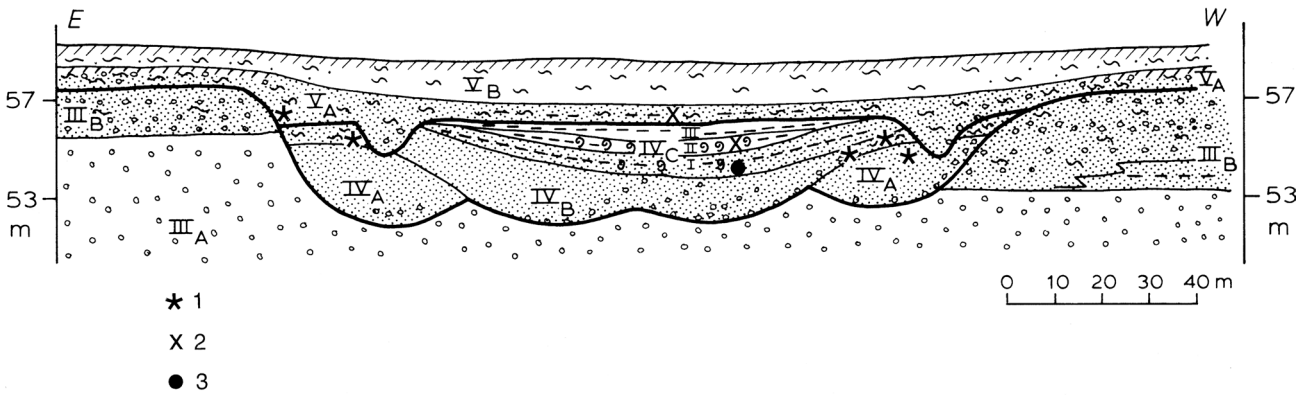

Figure 2.6: Schematic section of the Saalian deposits at Maastricht-Belvédère. The situation of the archaeological finds is indicated. 1: Finds on a high position (like point-bars). 2: Finds in channel fills. 3: Finds in flood plain depression (after Vandenberghe 1995).

clay zone (overlain by calcareous tufas) which gradually changes laterally into the previous 'mottled zone' and could be its chronostratigraphical equivalent.

The Subunit IV-B/C sediments contained a large number of faunal remains, indicating that the Subunit IV-B sites (B, C and G) were formed under full interglacial conditions (Meijer 1985; van Kolfschoten 1985, 1990; Duistermaat 1993; Huijzer and Mücher 1993). The Subunit IV-C-ß sites (A, D, F, H, K and N) have provided no significant faunal remains because their sandy and clayey matrix was decalcified. We therefore have no faunal evidence as to whether the sites were formed in the same warm-temperate phase as the lower level sites. Analysis of the sediments, however, seems to support such an interpretation (Vandenberghe 1993; Vandenberghe *et al.* 1993). Furthermore, on geological grounds the time difference between the formation of the Subunit IV-B sediments (representing infillings of depressions with sands and clays), or better between the different Subunit IV-B sites, can probably be estimated to be at most some hundreds of years (Roebroeks 1988:134). The age difference between Subunit IV-B and Subunit IV-C-ß is more difficult to estimate. There are, however, no geological arguments for assuming large time differences, i.e. thousands of years. Therefore, it is assumed that the Subunit IV-B and the Subunit IV-C-ß sites were formed under more or less the same environmental and climatical conditions and are 'contemporaneous' in Pleistocene terms. Faunal evidence from Subunit IV-B indicates that sedimentation of the upper Subunit IV-C sediments took place during a warm-temperate phase of interglacial character between the Holstein interglacial and the arrival of the Saalian glaciers in the Central Netherlands (Meijer 1985; van Kolfschoten 1985, 1990; Duistermaat 1993; van Kolfschoten *et al.* 1993). TL-dating of burned flint artefacts and Electron Spin Resonance (ESR) dating of a mollusc sample of Subunit IV-C yielded absolute dates of respectively 250 ± 20 Ka and 220 ± 40 Ka (Huxtable and Aitken 1985; Roebroeks 1988; Huxtable 1993). These well-dated sediments are correlated with OIS 7 (Roebroeks 1988; van Kolfschoten *et al.* 1993).

During the period of deposition of the upper Subunit IV-C sediments, the climate was slightly warmer and considerably wetter than is the case in the area today (Meijer 1985, van Kolfschoten 1985). Palaeoenvironmental reconstructions based on the work of Meijer (1985) and Duistermaat (1987) show the Subunit IV-B archaeological sites to have been located at a certain distance from the main river, near a shallow pool with gently flowing or stagnant water surrounded by abundant marshy vegetations, changing into alder forests with ash trees higher up in the landscape. On still higher grounds this vegetation turned into deciduous forests with a dense undergrowth and locally open areas covered with grasses and herbs (van Kolfschoten 1985; Meijer 1985; Duistermaat 1987).

These fine-grained interglacial river deposits were subsequently covered by a thick sequence of Saalian and Weichselian silt loams (*i.e.* reworked and primary loess).

notes

1 The definition of these units by Vandenberghe *et al.* 1993 differs slightly from Roebroeks 1988 and van Kolfschoten 1990.