

## The Mesolithic and Neolithic site of Verrebroek - Aven Ackers (East Flanders, Belgium): the radiocarbon evidence

Philippe CROMBÉ, Joris SERGANT, Lien LOMBAERT, Mark VAN STRYDONCK & Mathieu BOUDIN

### Abstract

A small dating project, using single entity samples of carbonised hazelnut shells, indicates repeated occupation of a small sand dune at Verrebroek - Aven Ackers. The dates range between the Early Mesolithic and the Early/Middle Neolithic and testify of a discontinuous and probably ephemeral use of the dune. The dates also allow a further refinement of the typo-chronology of the northern Belgian Mesolithic.

*Keywords:* Mesolithic, Neolithic, radiocarbon dating, carbonised hazelnut shells, typo-chronology, Verrebroek, Aven Ackers, East Flanders (B).

### 1. Introduction

In 2006 and 2007 Ghent University in collaboration with the Archeologische Dienst Waasland (A.D.W.) conducted salvage excavations on a small, peat and clay sealed coversand dune, situated at Verrebroek - Aven Ackers in the Antwerp harbour (Sergant & Wuyts, 2006; Sergant *et al.*, 2007). These excavations revealed three distinct artefact clusters characterised by a low artefact density. The lithic tool typology points at repeated occupation of the sand dune from the Early Mesolithic till the Early/Middle Neolithic. In order to verify this typological dating, a series of samples were submitted for radiocarbon dating, the results of which will be presented below.

### 2. Typological evidence

The three excavated clusters differ considerably in size and typological composition, indicating a complex formation process.

Cluster 1 occupies a surface of approximately 225 m<sup>2</sup>. The microlith spectrum mainly includes crescents, small backed bladelets and microliths with surface retouch, indicative of resp. Early and Middle Mesolithic occupation events<sup>1</sup>. In addition the occurrence of some chamotte and flint tempered pottery sherds, as well as leaf-shaped arrowheads points to some activity during

the Final Mesolithic (Swifterbant culture) and Early/Middle Neolithic (Michelsberg culture).

Cluster 2 is much smaller covering max. ca. 50 m<sup>2</sup>. As this cluster only yielded four determinable microliths (a triangle, a point with retouched base and two fragments of points with flat retouch), a precise dating within the Mesolithic is not feasible.

Cluster 3 was partially destroyed by a medieval ditch; the western part could not be excavated as it was situated beyond the trench. The presence of a small series of trapezes clearly points to a date in the Late Mesolithic. In addition some pottery sherds were also recovered from the periphery of the cluster.

### 3. Radiocarbon evidence

In order to verify the above relative dating and to get a better grip on the formation process and occupation history of this small sand dune a series of 11 radiocarbon dates have been performed. All dates have been obtained on samples of individual carbonised hazelnut shells (single entity dates). Cluster 1 is dated by means of 8 samples, randomly sampled over the entire surface of the locus. The smaller clusters 2 and 3 are dated by resp. 1 and 2 dates (tab. 1). Calibration has been done according to Reimer *et al.*, 2004. All samples were pretreated with the acid-base-acid method, converted into graphite (Van Strydonck & van der Borg, 1990-1991) and measured by AMS (Nadeau *et al.*, 1998).

The obtained dates confirm the relative dating based on tool typology and pottery. They prove that this small sand dune was occupied repeatedly on a discontinuous basis mainly during the Early and Middle

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<sup>1</sup>The chronological division of the Mesolithic is based on Crombé & Cauwe, 2001 and Crombé *et al.*, 2009a.

<i>Ref. in fig. 1</i>	<i>1/4 m<sup>2</sup></i>	<i>Lab. n°</i>	<i>BP date</i>	<i>Cal BC date (68.2 %)</i>	<i>Cal BC date (95.4 %)</i>
<i>Cluster 1</i>					
1	VA413-303-3E	KIA-38505	9090±45	8315BC (68.2 %) 8250BC	8440BC (9.1 %) 8360BC 8350BC (86.3 %) 8230BC
2	VA412-296-3C	KIA-38499	9005±40	8280BC (68.2 %) 8225BC	8300BC (87.7 %) 8180BC 8120BC (1.8 %) 8090BC 8040BC (6.0 %) 7980BC
4	VA417-302-2E	KIA-38503	7865±35	6750BC (68.2 %) 6640BC	6830BC (95.4 %) 6600BC
5	VA413-300-1E	KIA-38497	7770±40	6650BC (61.7 %) 6560BC 6550BC (6.5 %) 6530BC	6680BC (95.4%) 6480BC
6	VA408-299-2C	KIA-38504	7755±35	6640BC (57.9 %) 6560BC 6550BC (10.3 %) 6520BC	6650BC (95.4%) 6480BC
7	VA407-294-4C	KIA-38498	7710±35	6590BC (68.2 %) 6500BC	6630BC (1.4 %) 6620BC 6610BC (94.0 %) 6460BC
8	VA417-300-4C	KIA-38500	7660±35	6570BC (8.9 %) 6540BC 6530BC (59.3 %) 6450BC	6590BC (95.4 %) 6440BC
10	VA404-300-2B	KIA-38501	5320±30	4240BC (5.1 %) 4220BC 4210BC (24.5 %) 4150BC 4140BC (38.7 %) 4060BC	4250BC (95.4 %) 4040BC
<i>Cluster 2</i>					
3	VA412-317-2D	KIA-38506	8805±40	7960BC (65.6 %) 7780BC 7770BC (2.6 %) 7750BC	8200BC (10.6 %) 8110BC 8100BC (3.3 %) 8030BC 8010BC (81.5 %) 7720BC
<i>Cluster 3</i>					
9	VA402-317-3A	KIA-37694	6785±40	5715BC (63.6 %) 5655BC 5650BC ( 4.6 %) 5645BC	5740BC (95.4 %) 5620BC
11	VA400-315-1A	KIA-37695	4725±40	3630BC (26.5 %) 3580BC 3540BC (16.1 %) 3500BC	3640BC (58.6 %) 3490BC 3470BC (36.8 %) 3370BC

Tab. 1 — List of radiocarbon dates from the site of Verrebroek - *Aven Ackers*.

Mesolithic, whereas activities were rather limited and incidental during the Later Mesolithic and Neolithic (fig. 1). The dates also clearly confirm that cluster 1 is a complex palimpsest of at least three different occupation events.

The earliest occupation of the sand dune is dated by three samples (1-3) to ca. 8450-7700 cal BC, which coincides with the main occupation of the nearby extensive Early Mesolithic settlement of Verrebroek - *Dok 1* (Van Strydonck & Crombé, 2005; Crombé *et al.*, 2009a). A second occupation phase, represented by 5 dates (4-8), occurred not before ca. 6800 cal BC, meaning that there was a possible occupation gap which might have lasted for a millennium or even a millennium and a half calendar years (fig. 2). However, as the number of dates is rather limited it cannot be fully

excluded that the occupation gap was actually smaller. Further dating might lead to a narrowing of this gap. Nevertheless the fact that the dates within each series – series 1-3 and series 4-8 – cluster rather closely might be seen as an indication of two clearly separated occupation events. The second occupation stage can be linked to the Middle Mesolithic and lasted not longer than 6600-6400 cal BC. The three remaining younger dates seem to point at incidental activities during the Atlantic period (figs 3-5). A first event (date 9) dates to the Late Mesolithic around ca. 5750-5600 cal BC. The youngest two dates probably refer to ephemeral events in which mainly pottery was left on the site. A first event (date 10) occurred during the last quarter of the 5<sup>th</sup> millennium cal BC and is probably connected to a brief presence of Swifterbant hunter-gatherers. The date matches perfectly with a series of

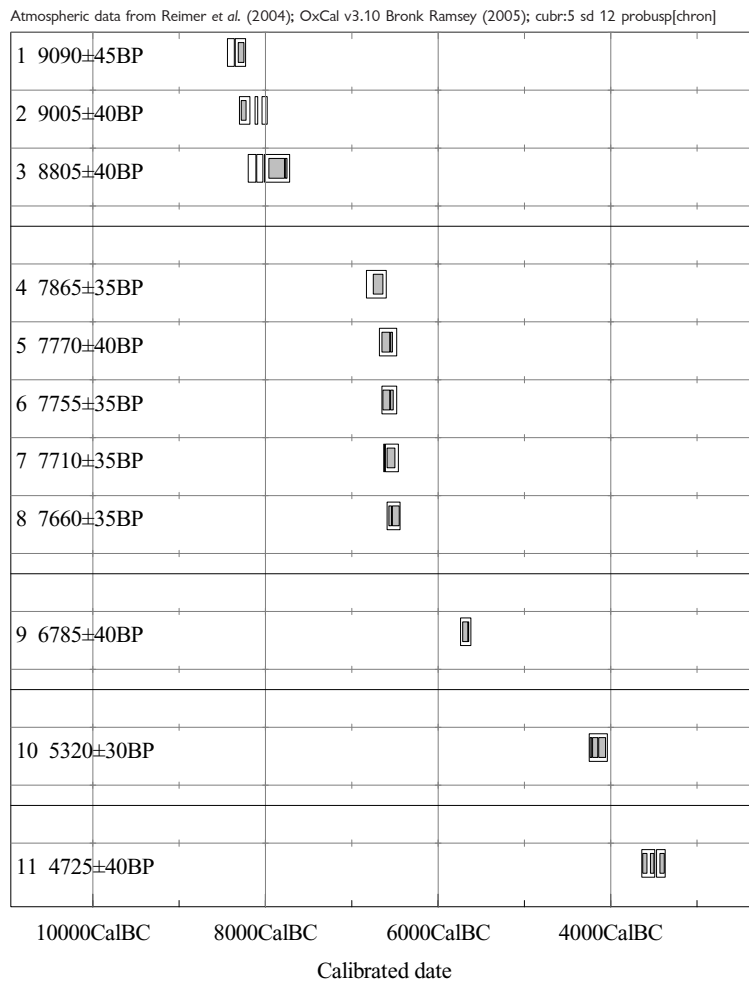


Fig. 1 – Calibration of the radiocarbon dates from Verrebroek - Aven Ackers.

dates obtained on three Swifterbant sites at Doel *Deurganckdok* some 6.5 km further northeast (Crombé et al., 2009b; Boudin et al., 2009). A second deposition of pottery occurred around the middle of the 4<sup>th</sup> millennium cal BC (date 11). The flint tempered sherds as well as the leaf-shaped arrowheads most likely belong to this latest event, which probably relates to a Michelsberg “occupation” or activity phase. The Michelsberg culture has been attested earlier on several sites in the vicinity, e.g. at Doel *Deurganckdok*, sector C, Melsele - *Hof ten Damme* and Saeftinge (Crombé & Sergant, 2008). The earliest dates go back to the first quarter of the 4<sup>th</sup> millennium cal BC.

#### 4. Typo-chronological evidence

Combining the typological and radiometric evidence some new insights into the Mesolithic chronology can be obtained. Two main conclusions can be drawn:

1 Dates 4 to 8, all coming from cluster 1, indicate that Middle Mesolithic assemblages dominated by small backed bladelets and microliths with flat retouch, corresponding to the “Sonnisse Heide” or “Gelderhorsten” assemblage-type (Crombé, 1999), lasted longer than previously thought. The dates from Verrebroek - *Aven Ackers* point to a duration at least until 6600-6400 cal BC, thus well into the beginnings of the Atlantic period. The fact that no trapezes were found in cluster 1 might indicate that this microlith type was introduced in the area later than 6600-6400 cal BC. However, as long as this observation is only based on the absence of evidence, some caution is recommended. Nevertheless it can be observed that the above dating is not contradicted by the few radiocarbon dates from assemblages dominated by trapezes in Belgium, e.g. Weelde 5, Godinne and Remouchamp - *Station Leduc* (Crombé, 1999, 2008), which are situated around 6200-6000 cal BC.

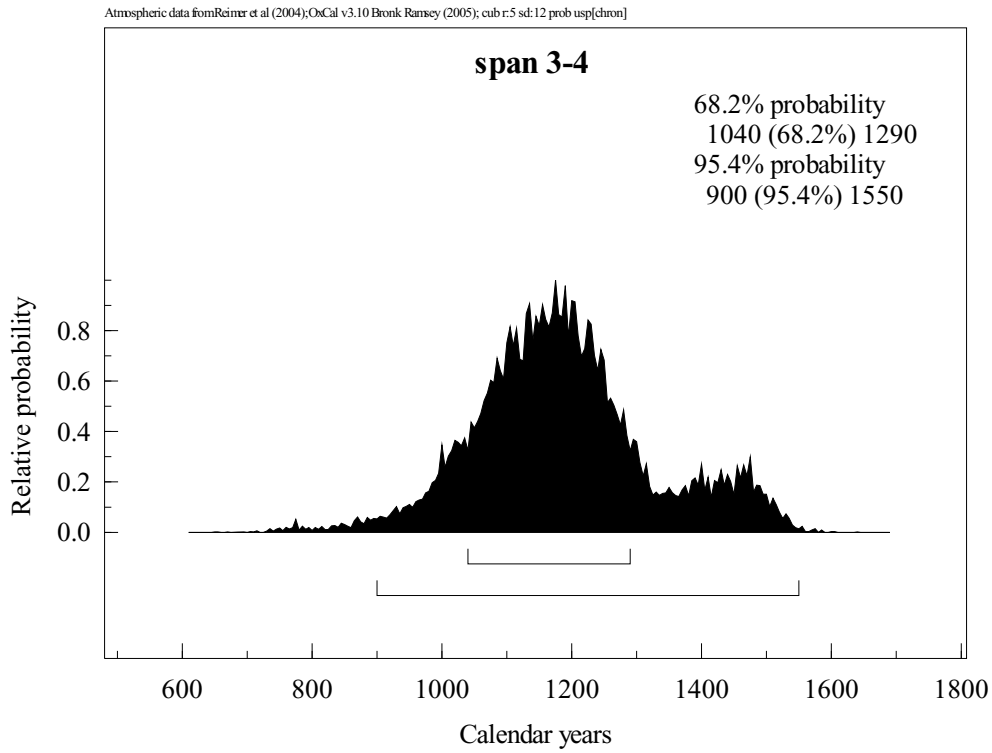


Fig. 2 – Calibrated age difference between sample 3 and 4.

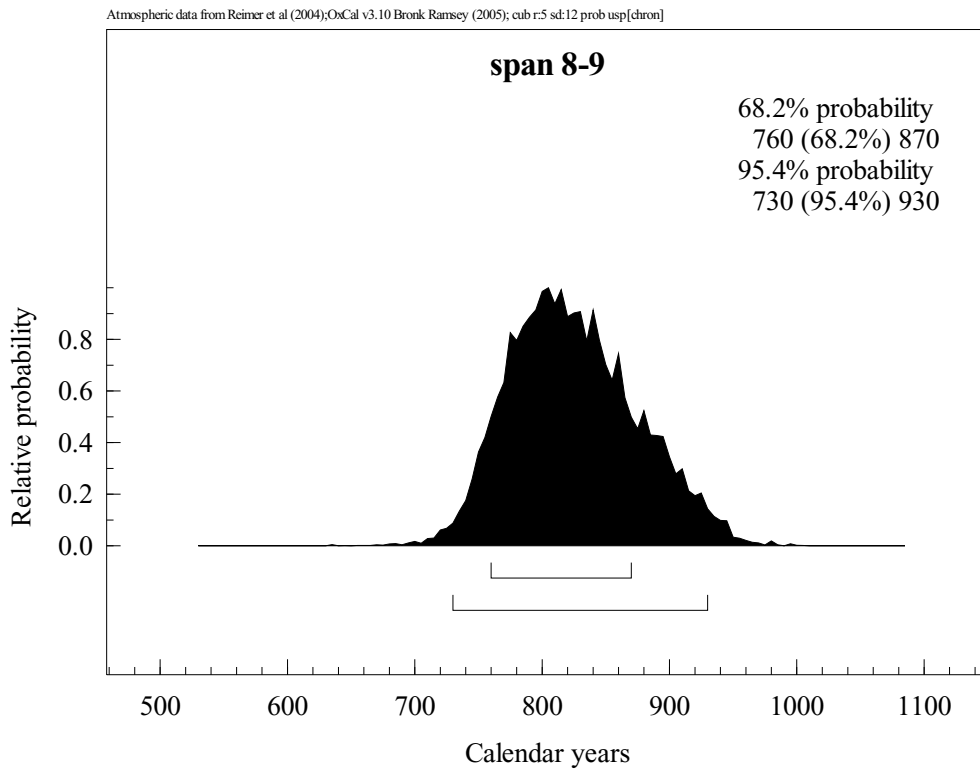


Fig. 3 – Calibrated age difference between sample 8 and 9.

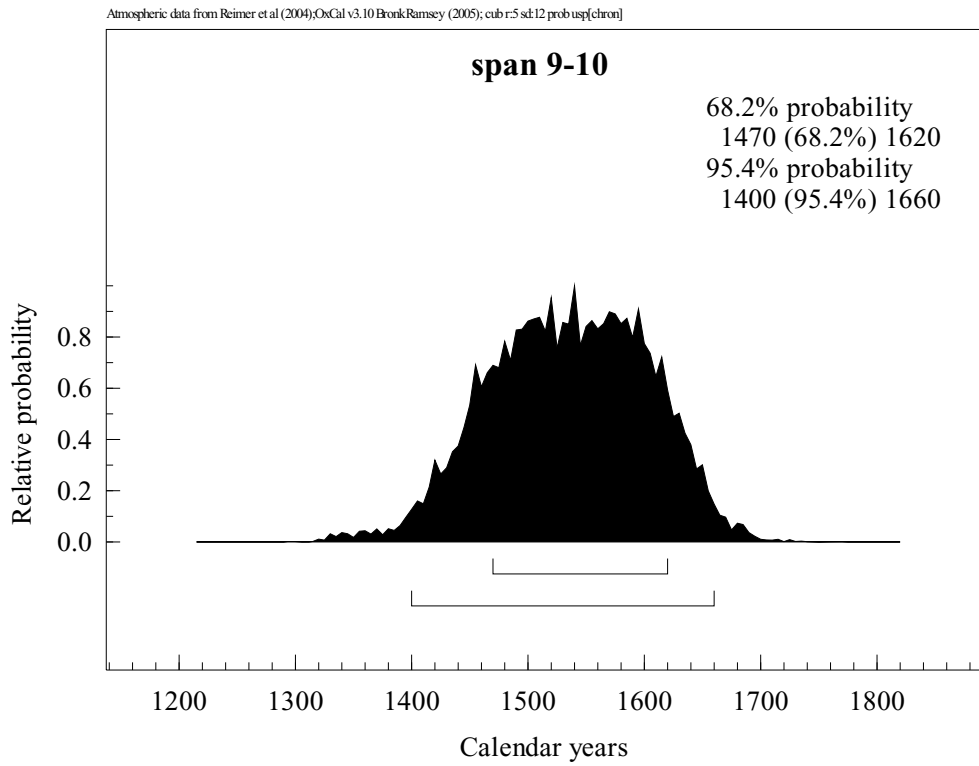


Fig. 4 — Calibrated age difference between sample 9 and 10.

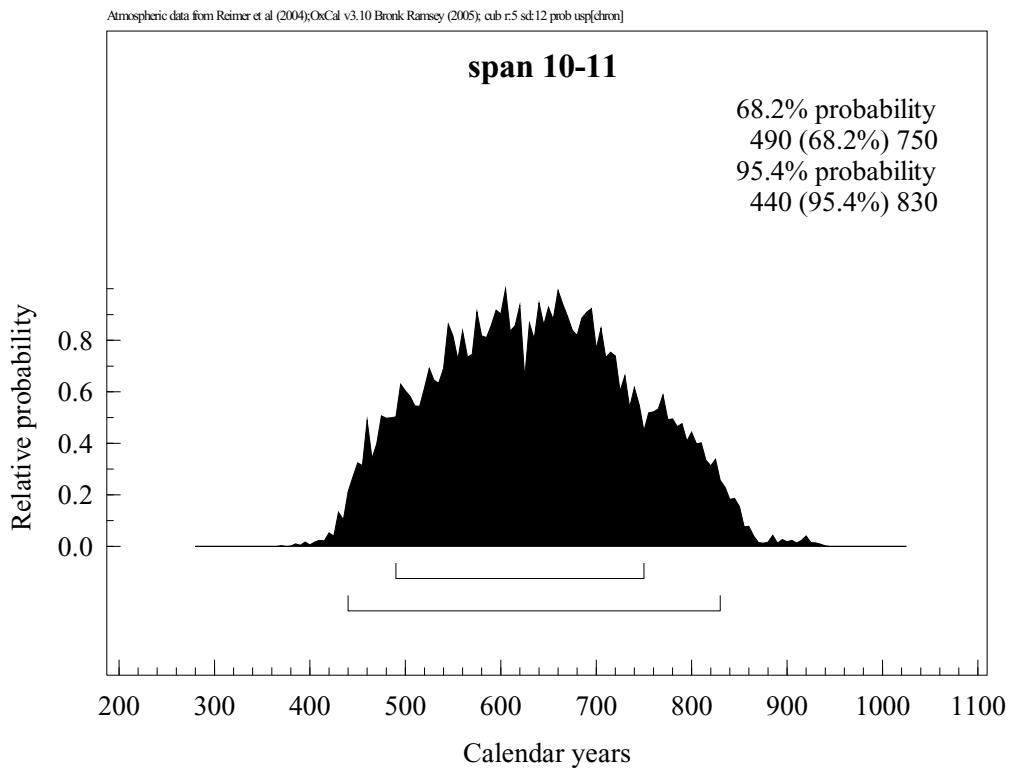


Fig. 5 — Calibrated age difference between sample 10 and 11.

2 Date 9, which is spatially connected with the trapeze bearing cluster 3, is remarkable as it situates this cluster shortly before the arrival of the first LBK farmers in the Belgian loess area. It is commonly assumed (for recent overview, see Robinson, 2008, 2009), trapezes dating to this recent/final stage of the Mesolithic are generally provided with a flat ventral retouch at their base, a technological feature which the LBK inherited and applied on their armatures. Surprisingly, this typical flat basal retouch is completely missing on the trapezes from Verrebroek. Whether this implies that this technological attribute was invented later (e.g. as a result of contact with LBK) needs to be proven. One might only stress that this feature is also missing on the Swifterbant trapezes/arrowheads from the nearby sites of Doel, dated to the second half of the 5<sup>th</sup> millennium cal BC (Crombé *et al.*, 2009b). Clearly much more dates are needed in order to get a better understanding of the technological evolution of trapezes.

## 5. Conclusion

Contrary to what is commonly assumed (Vermeersch 2006; Vanmontfort, 2008), this relatively limited dating project at Verrebroek - *Aven Ackers* nicely illustrates that, even when dealing with palimpsest situations, radiocarbon dating can offer important and reliable information on site formation, occupation history, and even typo-chronological issues, not only for the Mesolithic but also for the earlier stages of the Neolithic in the coversand area. Imperative, however, is that the dating strategy focuses on the selection of individual fragments of short lived organic material with a clear human connection, in particular charred hazelnut shells (Crombé *et al.*, 1999, 2009a). Dating of other organic samples, such as charcoal, burnt bones or food crusts from pottery, should be discouraged as these generally offer dates which are less reliable or much more difficult to interpret, due to problems with reservoir effect, carbon exchange, old wood effect, etc. (Crombé *et al.*, 2009a; Boudin *et al.*, 2009; Van Strydonck *et al.*, 2005, 2009).

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Philippe Crombé  
 Joris Sergant  
 Lien Lombaert  
 Universiteit Gent  
 Vakgroep Archeologie  
 Sint-Pietersnieuwstraat, 35  
 BE - 9000 Gent (België)  
 Philippe.Crombe@UGent.be  
 Joris.Sergant@UGent.be  
 Lien.Lombaert@UGent.be

Mark Van Strydonck  
 Mathieu Boudin  
 Koninklijk Instituut voor het Kunstpatrimonium  
 Jubelpark, 1  
 BE - 1000 Brussel (België)  
 Mark.VanStrydonck@kikirpa.be  
 Mathieu.Boudin@kikirpa.be