



A dendrochronological reassessment of three Roman boats from Utrecht (the Netherlands): evidence of inland navigation between the lower-Scheldt region in *Gallia Belgica* and the *limes* of *Germania inferior*



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ABSTRACT

This study addresses the provenance of two Roman river barges and a Roman punt excavated along the *limes* of *Germania inferior* near the Dutch city of Utrecht (*De Meern 1, 4* and *6*). To establish the geographical origin of these vessels, their tree-ring series are compared to 1452 dated oak (*Quercus robur/petraea*) growth patterns from Roman-period sites in the current Netherlands and Belgium. The strong resemblance to patterns of oak used in the *civitas Menapiorum* and the bordering region of *civitas Nerviorum* in *Gallia Belgica* indicates that the ships were built with oak from the lower-Scheldt region in present-day Flanders (north-western Belgium). Given the absence of Flemish oak in Roman land-based constructions along the Dutch *limes*, this provenance implies that the vessels were constructed in the lower-Scheldt region. The geographical location of the final wreck sites of *De Meern 1, 4* and *6* points at inland-navigation between this region and the Rhine-based *limes* of *Germania inferior*.

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1. Introduction

The northern frontier of the Roman empire along the Rhine in the current Netherlands was established in AD 47 and abandoned around AD 270. Ships were used to transport troops and supplies to the frontier zone. This has resulted in many ship-archaeological finds in the central Netherlands dating to the Roman Period (e.g. Aarts, 2012; Blom and Vos, 2008; Bockius, 2002; Brouwers et al., 2013; De Groot and Morel, 2007; Haalebos, 1997; Jansma and Morel, 2007; de Weerd, 1988).

In 2003, the Cultural Heritage Agency of the Netherlands (RCE) and the municipality of Utrecht excavated a Roman river barge, which was termed '*De Meern 1*' after the district in which it was found (Fig. 1A; Jansma and Morel, 2007). Next in 2005, they performed a limited excavation of a second barge discovered at this location, '*De Meern 4*' (Fig. 1B; De Groot and Morel, 2007). Both

barges are Zwammerdam-type flat-bottomed vessels, which were built from the bottom up and consist of bottom planks, L-shaped chine blocks and boards, held together with frames (Fig. 2). Partial remains of a smaller punt, '*De Meern 6*', were excavated in this area in 2008 (Fig. 1C; Aarts, 2012).

In general, river barges from the Roman Period are 2.5–4 m wide and have a length of 25–40 m, with a width:length ratio of 1:7 to 1:10 (Jansma and Morel, 2007). The timbers of Zwammerdam-type barges are connected with iron nails. However *De Meern 4* differs in this respect, with dowel-and-tongue joints being used in addition to nails. The use of these joints has been interpreted as tracing back to the Roman construction of sea-faring ships in the Mediterranean region (De Groot and Morel, 2007). The construction of *De Meern 6* does not resemble that of other Roman ships excavated in the Netherlands (Dallmeijer and Morel, 2012). Based on comparisons with more recent ship types it has been concluded that *De Meern 6* belongs to the typological 'family' of punts (Dallmeijer and Morel, 2012).

Dendrochronology has shown that the oaks providing the timbers of *De Meern 4* were felled around AD 100 and those of *De*

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Fig. 1. Field observations of *De Meern 1*, 4 and 6; A: *De Meern 1* during its excavation in 2003 (from: Jansma and Morel, 2007); B: limited excavation of *De Meern 4* in 2005, filmed at that time by Time Team (Channel 4, UK; from: De Groot and Morel, 2007); C: the excavation of *De Meern 6* in 2008 (from: Dallmeijer and Morel, 2012).

Meern 1 around AD 148 (Jansma, 2007a,b). The single timber of *De Meern 6* that could be dated, was cut from a tree felled after AD 158 (Dallmeijer and Morel, 2012). Based on dendrochronological matches with available tree-ring reference chronologies, at that time it was concluded that the timbers of these ships were derived from trees that grew in the Netherlands (Jansma, 2007a,b;

Dallmeijer and Morel, 2012). Consequently, the interpretation was that all three ships had been built locally.

Recently the accuracy of dendrochronological wood provenancing in the Low Countries has improved considerably through the development of the 'Digital Collaboratory for Cultural Dendrochronology' (DCCD), an international data infrastructure for

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