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Testing models for the beginnings of the Aurignacian and the advent of figurative art and music: The radiocarbon chronology of Geißenklösterle

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ABSTRACT

The German site of Geißenklösterle is crucial to debates concerning the European Middle to Upper Palaeolithic transition and the origins of the Aurignacian in Europe. Previous dates from the site are central to an important hypothesis, the *Kulturpumpe* model, which posits that the Swabian Jura was an area where crucial behavioural developments took place and then spread to other parts of Europe. The previous chronology (critical to the model), is based mainly on radiocarbon dating, but remains poorly constrained due to the dating resolution and the variability of dates. The cause of these problems is disputed, but two principal explanations have been proposed: a) larger than expected variations in the production of atmospheric radiocarbon, and b) taphonomic influences in the site mixing the bones that were dated into different parts of the site. We reinvestigate the chronology using a new series of radiocarbon determinations obtained from the Mousterian, Aurignacian and Gravettian levels. The results strongly imply that the previous dates were affected by insufficient decontamination of the bone collagen prior to dating. Using an ultrafiltration protocol the chronometric picture becomes much clearer. Comparison of the results against other recently dated sites in other parts of Europe suggests the Early Aurignacian levels are earlier than other sites in the south of France and Italy, but not as early as recently dated sites which suggest a pre-Aurignacian dispersal of modern humans to Italy by ~45000 cal BP. They are consistent with the importance of the Danube Corridor as a key route for the movement of people and ideas. The new dates fail to refute the *Kulturpumpe* model and suggest that Swabian Jura is a region that contributed significantly to the evolution of symbolic behaviour as indicated by early evidence for figurative art, music and mythical imagery.

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Introduction

Debate surrounds the nature and timing of the transition from the Middle to the Upper Palaeolithic in Europe. Most scholars accept that the transformation from a Neanderthal-dominated Europe to one exclusively peopled by anatomically modern humans (AMH) occurred between ~30–45,000 cal BP (calibrated

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years before present) (Mellars, 1999; Jöris and Street, 2008). Key areas of contention focus instead on the transition process, the routes by which AMH expanded across Europe, and the spatial and temporal development of the Aurignacian. Debate also continues on the extent of cultural and genetic interaction between Neanderthals and AMH and how Neanderthals went extinct (Conard, 2006). Closely related to these issues is the challenging question of behavioural modernity, a term linked solely to AMH by some (e.g., Mellars, 1999, 2005) and to both groups by others (e.g., D'Errico et al., 1998; Zilhão and D'Errico, 1999; D'Errico, 2003; Zilhão, 2006; Langley et al., 2008). More specifically, the early radiocarbon and thermoluminescence (TL) dates from Geißenklösterle have played a key role in developing the Danube

Corridor and *Kulturpumpe* hypotheses (Richter et al., 2000; Conard and Bolus, 2003). The first model hypothesises that the Danube Valley served as a main artery for migrations into Central Europe, while the second views the Swabian region as making important contributions to the evolution of complex symbolic behaviour, as indicated by the early presence of figurative art, musical instruments, mythical imagery and three-dimensionally shaped personal ornaments (Conard and Bolus, 2006; Conard, 2009; Conard et al., 2009). Testing these hypotheses is only possible via a reliable high-resolution chronology for the wider region.

Unfortunately, it is now apparent that the radiocarbon record, constructed over the last 60 years, is significantly flawed and inadequate for rigorously testing these models. This is due to the combined effects of incomplete removal of contamination and the difficulties encountered when dating samples very close to the measurement limit (Higham, 2011). This was either not recognised, or not adequately addressed, at the time of dating. In addition, many of the determinations available for the Middle to Upper Palaeolithic are often only useful in the broadest chronological sense because of measurement imprecision. The development of more refined methodological approaches has had a significant effect in improving accuracy. The application of ultrafiltration for dating bone, and ABOx-SC methods for dating charcoal have shown for some sites, even those recently dated, that a large proportion of dates may be aberrant (Jacobi et al., 2006; Higham et al., 2006a, 2009; Brock and Higham, 2009; Douka et al., 2010; Higham, 2011; Wood et al., in press).

Reliability of previous dates from Geißenklösterle: stratigraphy, taphonomy and the 'Middle Palaeolithic dating anomaly'

The Swabian Jura of Germany is of particular interest because of a concentration of Middle to Upper Palaeolithic sites including Geißenklösterle, Hohle Fels, Vogelherd and Hohlenstein-Stadel.

Geißenklösterle lies in the former Danube Valley through which the Ach River flows today (see Fig. 1 for sites mentioned in the text). The cave is situated high above the river on the southern side of the valley near Blaubeuren, in the Swabian Jura of southwestern Germany. The site was initially excavated by Eberhard Wagner in 1973. Joachim Hahn (1988) continued work at the site over 14 seasons of excavation between 1974 and 1991. Conard and colleagues renewed fieldwork at the site from 2000 to 2002 (Conard and Malina, 2003).

Geißenklösterle comprises a sequence of archaeological levels spanning the Middle Palaeolithic to the Magdalenian (Fig. 2). The site was divided into a series of 19 geological horizons (GH) and five archaeological horizons (AH, numbered I to V), which lie within them. Within the AH are further sub-units. The key Early Aurignacian layers focussed on here are within AH III. Between AH IV, the uppermost Mousterian horizon, and AH III, there is a culturally nearly sterile horizon. AH II comprises the Upper Aurignacian. Hahn (1988) originally attributed the AH III lithic corpus to the Proto-Aurignacian, but it is clear now that this is not the case. The lithic evidence comprises numerous carinated and nosed end scrapers, burins, and a small number of worked bone, ivory and antler artifacts (Hahn, 1988) typical of the Early Aurignacian (Conard and Bolus, 2006; Teyssandier et al., 2006). Although several personal ornaments were excavated, AH III lacked the range of bone and antler ornaments, artworks and flutes found in AH II. This being said, evidence for ivory working is more common in AH III than in AH II (Bolus and Conard, 2001). Although the analysis of ivory from water-screened samples has not yet been completed, the current data shows that the lower Aurignacian contains 1015 pieces of ivory weighing 2.42 kg, while the upper Aurignacian contains 478 pieces of ivory weighing 0.78 kg. Both the absolute numbers and proportions of worked ivory pieces are higher in AH III than in AH II, indicating that the intensity of ivory working was much higher during the formation of AH III (Conard et al., 2003; Münzel, in press). During the most recent phase of excavation, the presence



Figure 1. Location of the site of Geißenklösterle, Germany, and other sites mentioned in the text.

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