

## 15. Earliest Upper Paleolithic crania from Mladeč, Czech Republic, and the question of Neanderthal-modern continuity: metrical evidence from the fronto-facial region

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### Abstract

Direct AMS radiocarbon dates of around 31 ka BP (Wild et al., 2005) for several well preserved crania and other human specimens from Mladeč, Czech Republic, confirm their association with the Aurignacian. This material, which thus represents the earliest modern European remains with archaeological associations, has long featured in discussions of regional continuity or gene flow from Neanderthal into early Cro-Magnon populations. Here, the four most complete Mladeč crania are compared with Neanderthal fossils in metrical characters of the fronto-facial region. Both univariate and multivariate analyses show no evidence of Neanderthal affinities, and thus of Neanderthal-derived genes.

### Introduction

In a commentary on the evidence from molecular biology, Gibbons (2001: 1052) stated that no-one can rule out the possibility that some of us have inherited nuclear DNA from Neanderthals, but detection of such archaic

lineages is so difficult that many geneticists despair that they will ever be able to prove or disprove whether the genetic replacement of archaic people outside of Africa was complete. A population geneticist (Rosalind Harding) is cited in this article as saying, “we’re going to have to let the fossil people

answer this one.” However, since the effects of genetic exchange are difficult to estimate with polygenic morphological features, this question is also a challenge for fossil experts. For example, there is continuing disagreement whether the presence of cranial features such as a bun-like morphology of the occiput or a supranuchal depression found in some early Cro-Magnons is the result of gene flow from Neanderthals. Also, the identification of a possible Neanderthal – Cro-Magnon hybrid from Lagar Velho (Zilhão and Trinkaus, 2002) is disputed and alternative explanations have been suggested (Tattersall and Schwartz, 1999; Stringer, 2002a; Bräuer, 2006).

Several different perspectives can currently be distinguished regarding the Neanderthal-modern transition in Europe (Bräuer, 2006): (1) an ancestor-descendant relationship as proposed by the classic Multiregional Evolution model, which sees a considerable Neanderthal ancestry for modern Europeans (Freyer et al., 1993; Wolpoff et al., 2001); (2) modern humans moved into Europe accompanied by significant assimilation of Neanderthals (Churchill and Smith, 2000; Trinkaus, 2005; Smith et al., 2005); (3) the Out-of-Africa replacement view, which allows for gene flow but sees little evidence for interbreeding in the fossil record (Bräuer and Stringer, 1997; Bräuer, 2001; Stringer, 2002b); and (4) the complete replacement view, which excludes any gene flow between Neanderthals and dispersing modern humans (e.g., Tattersall, 2003).

In order to reach further agreement on the extent of gene flow at the archaic-modern interface in Europe we feel that it is important to carefully examine all suggested indications of regional continuity (Bräuer and Stringer, 1997: 197). With this intention, the present paper examines aspects of fronto-facial morphology in the earliest anatomically modern cranial remains from the Czech Republic, and their affinities to Neanderthals. This material represents the best early modern sample from

Central Europe, and if there was either regional continuity or significant Neanderthal-derived gene flow into such a population we should expect to see traces in the morphology of these specimens. Indeed, it has been claimed by Wolpoff et al. (2001) that such traces can be recognized and even quantified.

## Material and Methods

The early modern sample from the Czech Republic examined here includes the four well-preserved crania Mladeč 1 (assumed ♀), 2 (assumed ♀), 5 (assumed ♂), 6 (assumed ♂), and the maxillary fragment Mladeč 8 (assumed ♂). Recent direct AMS dating of several Mladeč specimens including Mladeč 1 and 2, as well as Mladeč 8, yielded ages of about 31 ka BP (Wild et al., 2005) which are in agreement with the Aurignacian artifacts (Vlček, 1995) and previous AMS dates for associated calcite deposits (Svoboda et al., 2002). This confirms the Mladeč assemblage as the oldest directly dated substantial assemblage of modern human remains in Europe (Wild et al., 2005). In addition to this early sample, the three somewhat more recent Brno specimens 1 (assumed ♀), 2 (assumed ♂) and 3 (assumed ♀) have been examined. A direct AMS date for the Brno 2 skeleton, associated with the Moravian Gravettian, yielded a date of  $23,680 \pm 200$  yrs BP (Pettitt and Trinkaus, 2000). The probable female calvaria from Zlatý Kůň, formerly thought to date to the Aurignacian or Szeletian (Jelínek, 1978) has now been redated by AMS to about 13 ka BP (Svoboda et al., 2002). This specimen was also included in our Upper Paleolithic comparative sample. With the exception of Mladeč 6 and Brno 3, of which only casts survive, the originals were measured by one of us (HB).

The comparative material (Table 1) includes Neanderthals, early modern humans from Africa and the Levant, additional Upper Paleolithic Europeans, and the terminal