3rd Annual Meeting of the European Society for the Study of Human Evolution

19–21 September 2013
Vienna / Austria
Temporal lobes surface anatomy and the bony relieves in the middle cranial fossa. The case of the El Sidrón (Spain) Neandertal sample

Antonio Rosas1, Angel Peña-Melián2, Antonio García-Talavera1, Markus Basir1, Marco de la Rasilla1

1. Paleanthropology Group MNHN-CSIC, Department of Paleobiology; Museo Nacional de Ciencias Naturales-CSIC - 2. Departamento de Anatomía y Embriología Humana I; Universidad Complutense de Madrid (UCM - 3. Area de Prehistoria, Departamento de Historia; Universidad de Oviedo

The largely reasporbitive nature of growth dynamics at the cranial base (Dutroloos and Enlow, 1970) leads to the partial imprinting of relieves of the cerebral surface on the cranial fossa. On this basis, a detailed analysis of the correspondence between brain external anatomy of the temporal lobe and the bony relieves on the middle cranial base was performed in order to describe and compare new temporal bone remains found at the 49,000 years old El Sidrón neandertal site (Rosas et al., 2012). Three different methods were employed, based on the comparison of the soft (neural) and hard (bone) tissues from the same individuals. 1) We dissected two human heads and visual inspections were recorded. Once the dura mater was removed, both brain surface and middle cranial fossa were molded with resin. Positive molds were used to explore morphological correspondence. Superposition of brain and bone was also explored using optic surface scans, and computed tomography combined with magnetic resonance scans. In parallel, a large collection of dry skulls, virtual specimens, and reference books (Grimaud-Hervé, 1997; Holloway et al., 2004) were used for direct assessment of hard tissue variability. For the sake of clarity, the middle cranial fossa was divided into four regions: 1) anterior surface of the petrosal pyramid, 2) basal region around the oval foramen, 3) region of the temporal pole, and 4) temporal squama. A close correspondence among sulci and gyri (sems Ono et al., 1990) and bony relieves was detected, and a series of new anatomical details have been introduced in order to describe these correspondences. The inferior temporal sulcus and the inferior temporal gyri are the cerebral structures that most strongly influence the underlying bone surface. The superior temporal sulcus, the middle temporal gyrus, and the fusiform gyrus also leave close matching on the endocranial surface. The El Sidrón internal temporal bone features were broadly compared. A wider and larger post-acoustic fossa (new name) seems to be present in modern humans as compared with Neandertals. This area corresponds to the posterior limit of Brodmann area 20 and the anterior portion of Brodmann area 37. However, other traits of the middle cranial fossa surface do not show evidence of dissimilarity between these two large-brained human groups. Regarding dural sinus pattern, a higher incidence of petrosal sinuses is detected among Neandertal samples. Previous analyses have emphasized that modern humans present an apospermatic condition in its more anterior, lateral and superior position of the temporal lobe pole (Bastir et al., 2008, 2011), which fits with previously recognized overall endocranial scaling differences (Bruner et al., 2003). Once fine anatomical correspondence of the temporal lobe convolutions pattern on its bony base has been clarified, we put forward the hypothesis that the temporal pole is occupied by the middle and lower temporal gyri in Neandertals, while the pole is mostly defined by the superior temporal gyrus in modern humans. Further analyses need to test this proposition as well as the functional implications of these cortical cerebellar reorganisations.

Acknowledgements: We are grateful to the remainder members of the Paleanthropology Group, Dr. M. Coquerelle and the El Sidrón Cave excavation team. CGL 2012-36682 and CGL 2012-37279 (MINECO, Spain). Field work is supported by Consejera de Cultura del Principado de Asturias, Grant sponsor: Convenio Universidad de Oviedo-CSIC, Grant number: 060501040023.

References:


Regional behaviour among late Neandertal groups in Western Europe: A comparative assessment of Late Middle Palaeolithic bifacial tool variability

Karen Rubens

1 - Centre for the Archaeology of Human Origins (CAHO), University of Southampton

A growing number of studies have emerged that highlight spatio-temporal differences among Neandertal stone assemblages (Soressi, 2002; Joris, 2004; Rubens and Di Modica, 2011). This directly contradicts previous views of the Middle Palaeolithic as a period of uniformity and stasis. For example, during the later phase of the Middle Palaeolithic (MIS 3-d; ca.115,000-35,000 BP) bifacial technologies re-emerge, after a near absence in the Western European Early Middle Palaeolithic (Jovita and McPherron, 2011). These bifacial tools occur across Europe, are associated with classic Neandertals and contain a variety of types and forms. Moreover, several types seem associated with a restricted geographic occurrence. Therefore, Late Middle Palaeolithic bifacial tools provide a unique record for a data-driven, wider-scale assessment of Neandertal behavioural variability, population dynamics and regionality. Previous studies of Late Middle Palaeolithic bifacial tools were hampered by a convoluted plethora of competing terms, types and regional entities. This often obscured the assessment of genuine similarities and led to the current disjointed view on this bifacial phenomenon. This paper presents the first, large-scale comparative study of this tool type, bridging typo-technological and spatio-temporal data from across Western Europe (Britain, Belgium, the Netherlands, France and Germany). A threefold methodological framework was applied. 1. A new classificatory scheme for Late Middle Palaeolithic bifacial tools was developed, defining five bifacial tool concepts based on least common typo-technological denominators, overcoming past epistemological issues and facilitating inter-assemblage comparisons. 2. A total of 1,303 bifacial tools from 14 case study assemblages formed part of a detailed attribute analysis, recording information on artefact condition, metrics and typo-technological features. 3. The bifacial tools from an additional 67 comparison sites were also reclassified according to the new scheme, culminating in comparative bifacial tool data from 81 assemblages. Results indicate a high level of variation between individual bifacial tools and assemblages. Each bifacial tool concept is correlated with various production methods, resulting in large amounts of morphological variation. Despite such variation, a distinct three-fold typo-technological pattern was identified that correlates to three macro-regional entities: the Mousterian of Acheulean Tradition (MTA) in the southwest dominated by handaxes; the Keilmessergruppen (KMG) in the northeast typified by backed and leaf-shaped bifacial tools; and, finally a new unit, the Mousterian with Bifacial Tools (MBT), geographically situated between these two major entities, and characterised by a wider variety of bifacial tools. Differing local conditions, such as raw material or function, are not sufficient to explain this observed macro-regional tripartite. Instead, it is argued that the MTA and KMG can be viewed as two distinct cultural traditions, where the production of a specific bifacial tool concept was passed on over generations. Conversely, the MBT is viewed as a border zone where highly mobile groups of Neandertals from both the east (KMG) and west (MTA) interacted. Principally, this study presents an archaeological contribution to behavioural concepts such as regionality, culture, social transmission and population dynamics. It illustrates the interpretive potential of large-scale lithic studies, and more specifically the presence of regionalised cultural behaviour among late Neandertal groups in Western Europe. Acknowledgements: This study was funded through a doctoral grant from the Arts and Humanities Research Council (AHRC) and conducted at the University of Southampton (supervisor: Dr John McNabb, advisor: Dr William Davies).