



## Biometrical analysis of SH 4 and 5 brain endocasts (*Homo heidelbergensis* from Sima de los Huesos, Atapuerca)

Eva Maria POZA-REY, Juan Luis ARSUAGA

Centro de Investigación (UCM-ISCI) sobre la Evolución, y Comportamiento Humanos, Madrid 28029 Spain

**ABSTRACT:** Modern technologies based in the acquisition of images and virtual reconstruction of fossils, have allowed for the study of virtual brain endocasts of the most completed crania of the Sima de los Huesos sample, such as Cranium 5 (the most complete specimen in the human fossil record) and Cranium 4 (lacking the face). They are dated to the European Middle Pleistocene and have been compared with other European, Asian and African Pleistocene individuals. Eighteen measurements were considered during a complete metric analysis. In this present work, values obtained for both SH cranium 4 and 5 are available, to facilitate the data for further studies. The results indicate allometry is responsible for the different shape observed between SH 4 and SH 5. The lower volume of the brain endocast in specimen 5 shows limited frontal development but is structurally taller. The European *Homo heidelbergensis* specimens and the Neanderthals show many common features, but some differences with African Middle Pleistocene individuals. This result confirms European *Homo heidelbergensis* as a chronospecies of Neanderthals. Many divergences in endocasts dimensions have been found in contemporary groups around 500 ky from Asia and Europe, so the most likely fact is that the initial differences in brain dimensions occurred in earlier populations that occupied Europe at the end of the Lower Pleistocene or the beginning of the Middle Pleistocene. The physical differences that are observed between *Homo heidelbergensis* and the contemporary *Homo erectus* brains seem to demonstrated a complex social organization in the former group, and may reflect the care of older and sick specimens in the same clan. Finally, taking into account the complex behaviour of several dimensions in the brain endocasts considered in this work and the dependency-independency establishes among them along development, we suggest that studies that analyze the form (shape and size) of brain endocasts must consider this complexity, and results are not always due to size and the encephalization process.

## 阿塔坡卡的胡瑟裂谷海德堡人 SH4 和 SH5 号样本大脑颅腔模型的生物测量学分析

伊瓦-玛利亚·波杂-瑞, 胡安-路易斯·阿刷加

进化与人类行为研究中心, 西班牙 马德里 28029

**摘要:** 基于现代的化石图像采集和模拟重构技术, 我们能够对最完整的胡瑟裂谷的颅骨样本, 如 5 号颅骨 (人类化石记录中最完整的颅骨) 和 4 号颅骨 (缺少面部) 进行大脑颅腔的实景研究。它们发现于更新世中期的欧洲。我们比较了它们和其它欧洲、亚洲和非洲的更新世个体, 共对 18 个测量项目进行了分析。研究中去得了 SH4 和 5 号头骨的各种数值以方便进一步的研究。结果显示异速生长是造成 SH4 和 SH5 形态差异的原因。5 号标本较小的颅腔体积对应受限的正面发育, 尽管其身材更高。欧洲的海德堡人和尼安德特人表现出很多共同、但相异于非洲更新世中期个体的特征。这个结果证实欧洲的海德堡人是尼安德特人的一个年代种。在亚洲和欧洲 50 万年前的同时代组中发现很多颅腔维度的差异, 因此最可能的事实是, 在早更新世末期或者中更新世开始时占领欧洲的早期种群就已经在脑容量上有了差别。在海德堡人和同时期的直立人脑部观察到的生理差别或许证实了前者复杂的社会组织结构, 且可能反映了在一个部落内部对老年和病人的照顾。最后, 考虑到本研究中颅腔在不同尺度上的复杂特性以及它们在发育中的相关-非相关特征, 我们认为, 分析颅腔形状和大小的研究必须考虑这种复杂性, 且结果并不总是只与尺寸和脑形成过程相关。(严实 译)