
The bony labyrinth in Aroeira 3 cranium

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Abstract

The Gruta da Aroeira site is part of the Almonda karst system (Torres Novas, central Portugal). Fieldwork in 2013 led to the discovery of a partial human cranium (Aroeira 3) encased in hard breccia and preserving the right temporal bone. The Aroeira 3 cranium most likely dates to 390–436 ka and it is approximately contemporaneous to Sima de los Huesos site (Sierra de Atapuerca, Spain). We have studied the bony labyrinth in the cranium Aroeira 3 using 3D virtual reconstructions generated from micro Computed Tomography (CT) scans. The Aroeira 3 specimen was compared with Sima de los Huesos hominins and with other Pleistocene and recent members of the genus *Homo*. Neandertals show some derived features in the bony labyrinth, including a low placement of the posterior canal, a relatively small posterior canal and a relatively large lateral canal. The Sima de los Huesos hominins show the derived canal proportions seen in Neandertals, but not the low placement of the posterior canal. In contrast, all of these features are absent in Aroeira 3, which shows a generally primitive morphology, more similar to *Homo erectus* or modern humans. Nevertheless, like the Sima de los Huesos sample, Aroeira 3 shows a low cochlear shape index, indicating a reduction in the height of the cochlea, and this may be a derived feature. Given the temporal and geographical proximity of the Sima de los Huesos and Gruta de Aroeira sites, the results of our study have potential implications for understanding microevolutionary processes and population dynamics in the Iberian Peninsula during the Middle Pleistocene.

Keywords: Human evolution, Middle Pleistocene, Iberia, Aroeira, Inner ear

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