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Middle Pleistocene hominin teeth from Biache-Saint-Vaast, France

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Providing new evidence on the diversity of the European Middle Pleistocene (MP) populations is relevant to the discussion on the origin of the Neanderthal clade. The great morphological variability in the combination of dental and cranial features in the European fossil record suggests a non-linear evolutionary scenario characterized by genetic drift, founder effect, isolation, and hybridization of the populations. Within this framework, the sink and source model with a central area of dispersal in Eurasia (CADE) has been proposed as a more parsimonious explanation for the non-linear evolution of the MP groups towards the late Neanderthals [1]. In this model, the geographical and climatic constraints of Europe constituted a driving force in the demographic dynamics [2]. Among European fossils, the Atapuerca-SH (Spain), Steinheim (Germany), Montmaurin (France), Swanscombe and Pontnewyyd (U.K.), and Fontana Ranuccio and Visogliano (Italy) exhibit in their dentitions a suite of features characteristic of the Neanderthal clade. On the contrary, in other European MP specimens, such as those of Ceprano (Italy), Aroeira (Portugal), Mala-Balanica (Serbia), and Arago (France), the Neanderthal affinities are less clear, attesting for the possible coexistence of at least two hominin lineages in the European MP [e.g., 2-3].

This work presents the outer and inner description of the remains from Biache-Saint-Vaast (BSV) and its comparison with other MP European fossils. The BSV site is located 17 km east of the city of Arras (Pas-de-Calais Department), in northern France. The total recovered hominin assemblage includes a hominin skull, cranial fragments, and dental remains. The hominin remains were associated with a rich lithic and faunal context. A recent ESR/U-series analysis of several faunal remains associated to the paleoanthropological and archaeological remains provided a mean age of ca. 240 ka [5], correlating the human occupation to MIS 7c.

High-resolution µCT images and 3D reconstruction (Amira) were employed to describe the morphological traits of the enamel and dentine, to perform geometric morphometrics of the EDJ as well as to calculate enamel thickness. In addition, we also measured the MD and BL diameters, the crown index, the total computed crown base area, and the relative occlusal polygon area.

The morphological and metric analyses place the BSV hominins within the group that shows greater affinities with Neanderthals, together with SH, Montmaurin, Fontana Ranuccio, and Visogliano. The results support the coexistence of two or more populations in Europe at this period, with this group representing the basal population of late Neanderthals, which reflects the population and settlement of human groups suggested by the CADE and sink and source model.

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