

Pecha Kucha Presentation (Virtual) Session 1, Thursday 11:30-12:45

A new face for an old species: Virtual reconstruction of the DAN5/P1 *Homo erectus* cranium

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The ~1.6-1.5 Myr DAN5/P1 fossil, from Gona, Ethiopia, comprises a relatively complete calvaria, and fragments of a face and isolated maxillary dentition. DAN5/P1 was initially described in 2020 and attributed to African *Homo erectus* [1]. Here we present a reconstruction of the face that, in combination with the calvaria, yields the first early Pleistocene *Homo* cranium from Ethiopia.

The virtual reconstruction of the DAN5/P1 face was performed in Geomagic Wrap using three-dimensional models generated from micro computed tomographic (μ -CT) scans of the left and right maxillae (hemi-palates), left infraorbital fragment of the maxilla, left zygomatic fragment containing the frontal process, right maxillary P3 (previously identified as a P4) and left maxillary P4-M3. First, the left maxillary zygomatic process was isolated and relocated to its anatomical position. Next, the pieces were joined together along natural breaks (e.g., left zygomatic root and infraorbital piece) and sutures (e.g., infraorbital and zygomatic fragments) and refined based on alignment with the supraorbital torus superiorly. The P4 and M1 were positioned in their alveoli, and the remaining teeth were added based on interdental wear facets and root orientation. Pieces were reflected across the midline to create a maximally complete face.

DAN5/P1 presents a relatively long and sloping face with a round orbit, transversely flat midface, squared-off and prognathic subnasal clivus, and anteriorly positioned zygomatic process of the maxilla. Shape analysis of facial architecture groups DAN5/P1 with classic *H. habilis* and basal Georgian *H. erectus* fossils more so than Kenyan *H. erectus*. Additionally, it does not show the widening of the nasal aperture typical of Kenyan *H. erectus* and later mid-Pleistocene *Homo* fossils [2]. Comparative analysis of the teeth confirms similarity of DAN5/P1 to early *Homo* and some Georgian *H. erectus* in its tooth proportions, including a mesio-distally elongated P4 and large M3. Yet, some derived traits align DAN5/P1 taxonomically with *H. erectus*, including an angular torus, projecting browridge and post-toral sulcus, well-developed maxillary sulcus, deep palate, and small premolars [3-4]. The combination of 'classic' *H. erectus* traits with a small brain (598 cm³) and plesiomorphic facial architecture provides a retrospective glimpse of the basal African *H. erectus* cranium, and signals high intraspecific variation in east African *H. erectus* circa 1.6-1.5 Myr.

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References: [1] Semaw, S., Rogers, M.J., Simpson, S.W., Levin, N.E., Quade, J., Dunbar, N., McIntosh, W.C., Cáceres, I., Stinchcomb, G.E., Holloway, R.L., Brown, F.H., Butler, R.F., Stout, D., Everett, M., 2020. Co-occurrence of Acheulian and Oldowan artifacts with *Homo erectus* cranial fossils from Gona, Afar, Ethiopia. *Science Advances* 6.10: eaaw4694. [2] Rightmire, P., 1993. The human cranium from Bodo, Ethiopia: evidence for speciation in the Middle Pleistocene? *Journal of Human Evolution* 31, 21-39. [3] Antón, S.C., 2003. Natural history of *Homo erectus*. *American Journal Physical Anthropology* 122, 126-170. [4] Baab, K.L., 2015. Defining *Homo erectus*. In: Henke, W., Tattersall, I. (eds) *Handbook of Paleoanthropology*. Springer, Berlin, Heidelberg, pp. 2189-2219.