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Commentary

Reply to Rak et al. (2021) "The DNH 7 skull of *Australopithecus robustus* from Drimolen (Main Quarry), South Africa" [J. Hum. Evol. 151 (2021), 102913]

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We read with interest Rak et al.'s (2021) anatomical description and reconstruction of the 2.04–1.95 Ma (Herries et al., 2020) female *Paranthropus robustus* skull DNH 7 (Keyser, 2000) from Drimolen Main Quarry in South Africa. For the most part, we (Martin et al., 2021) concur with their assessment of the specimen's morphology (notwithstanding minor points of disagreement). However, we draw attention to their positioning of the specimen's face relative to the neurocranium. As reconstructed by Rak et al. (2021: Fig. 17), DNH 7 is the most orthognathic australopith on which they have measured the index of palate protrusion; according to them, only 19% of the length of the palate protrudes anterior to sellion when the cranium is aligned in Frankfort horizontal plane. Concomitantly, the anterior facial profile (i.e., as seen in lateral view) is nearly vertical (Rak et al., 2021: Figs. 4 and 5). Here we show that their placement of the face on the neurocranium is incompatible with well-preserved morphology on DNH 7.

Rak et al. (2021) depict two versions of their reconstruction (Fig. 1), one of which attempts to correct for plastic deformation (Rak et al., 2021: Fig. 4) and the other of which (Rak et al., 2021: Fig. 10) is based on a refitting of casts of the skull fragments in their present condition (Y. Rak, pers. comm.). We assume these casts are the stereolithographic copies of the bones referenced by Rak et al. (2021). Rak et al.'s (2021) claim that the DNH 7 face is exceptionally orthognathic rests on the stereolithographic reconstruction depicted in their study (Rak et al., 2021: Fig. 4).[2]

Both reconstructions by Rak et al. (2021) are incompatible with the zygomatic arch morphology of DNH 7, the configuration of which should inform reconstruction of this specimen. The arch is fractured such that its posterior portion is attached to the neurocranium, while the anterior portion is attached to the face. The two halves of the zygomatic arch join at a curved fracture that is concave facing posteriorly. Importantly, the refitting of the zygomatic arch represents a key indicator of how the face is positioned relative to the neurocranium, and the completeness of the arch and integrity of this join can be seen both in the original reconstruction by Ronald Clarke and Andre Keyser (Keyser, 2000: Fig. 1) and by

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[2] Our understanding is that Rak et al. (2021) did not directly reconstruct the DNH 7 fossil itself (i.e., they did not detach fragments from the Clarke and Keyser [2000] reconstruction and reattach them in new positions), although the caption of their (Rak et al., 2021) Figure 1 could be read to imply otherwise. For the benefit of readers, we ask Rak and colleagues to clarify whether they made any adjustments to the actual fossil.

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