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Letters

### **Taxonomy of the Dmanisi Crania**

The recent discovery of two hominid crania (D2280 and D2282) from the Georgian early Pleistocene site, Dmanisi, by L. Gabunia and colleagues (Research Article, "Earliest Pleistocene hominid cranial remains from Dmanisi, Republic of Georgia: taxonomy, geological setting, and age," 12 May, p. 1019) is exciting because it expands both the sample from the region and the picture of human taxonomic diversity. At about 1.7 million years old, these specimens are roughly contemporaneous with African *Homo ergaster* and Asian *Homo erectus*, to which Gabunia et al. compare the Dmanisi crania. They suggest allocation of the crania to the former species. In light of the significance of this discovery, the following is of potential relevance.

The type specimen of *H. ergaster* is KNM ER 992, a mostly complete lower jaw from northern Kenya (1). Although three crania from this region, KNM ER 3733 and 3883 and KNM WT 15000, are also regarded as *H. ergaster*, only the last is associated with a mandible. In terms of the details of dental morphology, ER 992 and WT 15000 are not comparable (2). WT 15000 preserves upper teeth, but of ER 3883 and 3733, only the latter retains a tooth, a right upper second molar. This tooth is not morphologically comparable with that of WT 15000, which is consistent with notable differences between the two in cranial morphology. ER 3883 lacks the lower face but otherwise differs in preserved morphology from ER 3733 and WT 15000 (2). Thus, in addition to none of these crania being morphologically linked to ER 992, they collectively do not appear to represent the same taxon. But neither do any represent *H. erectus* (another taxon sorely in need of revision). Comparisons of African and Asian fossil hominid crania with the apomorphically configured calotte (skull cap) of the type specimen from Trinil, Indonesia, indicates that only the specimens from Sangiran (not, for example, from Ngandong or Zhoukoudian) are plausibly allocated to this species (2). The dental specimens from Sangiran also differ noticeably in morphology from the African ones. Further, because the Sangiran 2 and 4 crania are so unique among primates in having arborizing sigmoid sinuses, it is unlikely that *H. erectus* was ancestral to any known hominid.

What to do with the Dmanisi crania? The mandible previously found at the site (3) was analyzed metrically as being like *H. erectus* (wherein the African and Asian specimens were all included in that species) (4), but Gabunia and colleagues have now associated it with the two new crania in *H. ergaster*. Detailed morphological studies will surely follow, but photographs of the mandible (4) demonstrate lack of morphological comparability with ER 992. As for the crania, the photographs in Gabunia et al.'s article not only depict the metrically determined size difference between D2280 and D2282, but also indicate that there are detailed morphological differences to be noted: for instance, in cranial outline and cross section; in the supraorbital, mastoid, and nuchal regions; and in the course of the vault sutures that would reflect intertaxic rather than intrapopulation differences. Perhaps future studies will conclude that D2280 and D2282, and the mandible if it cannot be associated with either cranium, add even more to the picture of human evolutionary diversity than expected.

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## *Response*

Schwartz highlights some important issues concerning the systematics of early Pleistocene hominids. We agree that the relationship between the type specimen of *H. ergaster* (KNM ER 992), KNM ER 3733 and 3883, and KNM WT 15000 remains unclear. In particular, differences in morphology and in dentition between the mandibles of WT 15000 and ER 992 are obvious, as are differences between the skulls ER 3733 and WT 15000. We also agree that only the specimens from Sangiran should be attributed to *H. erectus*, but it is possible that these specimens could be ancestors of hominids from Ngandong or Zhoukoudian.

Concerning the Dmanisi findings, we would like to stress their geological context and dating. The depositional nature of the site, the orientation of the bones, and the presence of the axial skeletons indicate rapid burial of the fossils and a lack of postdepositional movement. The two skulls (D2280 and D2282) were found in the same stratum within a 4-square-meter area, suggesting that these specimens belong to a single population [see our Research Article and (1)]. We interpret that these remains represent individuals who died during a single event and were buried together. The morphological differences between the Dmanisi specimens mentioned by Schwartz cannot be explained, we believe, on taxonomic grounds, but rather can be attributed to sexual dimorphism, age differences, or individual variation.

Although we agree with Schwartz that the Dmanisi mandible differs from type specimen ER 992, the taxonomic significance of these features is not well understood. The similarities between these specimens should be stressed, which include narrow width and robustness, the anterior position of the ascending ramus, and reduction of the retromolar space, as well as lack of a trigonum mentale and some other traits (2, 3).

The interdisciplinary study of the Dmanisi site indicates an age of 1.7 million years ago, which means that these fossils represent the oldest hominids yet found in Eurasia. We suggest that these specimens represent the first lineage from which the Sangiran specimens are derived. A detailed comparative study of Dmanisi skulls with specimens from Java is in progress and should help clarify this issue.

In conclusion, we agree with Schwartz that the Dmanisi hominids show human evolutionary diversity, which typically is overlooked in current, generalized hominid systematics.

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