

More data needed for claims about the earliest Oldowan artifacts

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Recent claims about early tool making and use have proved controversial (1–4). In PNAS, Braun et al. (5) report Oldowan artifacts from Ledi-Geraru, Ethiopia. The claimed minimum age of 2.581 Ma for these artifacts would, even if accurate, imply a marginally older beginning for the Oldowan than the ~2.58 Ma previously established ~35 km to the west at Gona (6). While the Ledi-Geraru assemblage is a welcome addition to the limited number of early Oldowan occurrences, its bearing on our current understanding of the earliest tools and their makers (6, 7) is contingent on the accuracy of the inferred chronological placement and technological interpretations.

Braun et al.'s (5) minimum age estimate relies on the assumption that normal geomagnetic polarity documented above their excavation represents the Gauss Chron and hence the age of the yet-to-be locally identified Gauss-Matuyama transition. While this assumption may prove correct, a confident identification of the geomagnetic zonation must rule out aberrant normal intervals—such as the Réunion subchron ~2.14 Ma (8). Braun et al. have yet to demonstrate that the normal polarity of sediments several meters above their excavation is >2.15 Ma. At Gona, the normal-to-reversed polarity boundary at or below multiple early Oldowan sites is constrained to between 2.53 Ma and 2.9 Ma, thus enabling its confident identification as the Gauss-Matuyama reversal (6).

Braun et al. (5) describe their assemblage of artifacts as evidence for the inception of systematic flake production, albeit “more primitive in some respects” than the Oldowan. The authors' comparison of artifact attributes endorses disputed characterization of the Lomekwi assemblage emphasizing percussive

activities (2). Its contentious contexts notwithstanding (4), the Lomekwi lithic assemblage comprises successfully detached flakes. In fact, flakes and flake fragments account for more than half of the “in situ” and >23% of the total assemblage; artifacts identified as “percussor,” by contrast, account for only <5% of the Lomekwi assemblage (2). The inexplicable exclusion of Lomekwi's flake components from Braun et al.'s comparisons, therefore, renders their inference of early technological diversity suspect.

The earliest Oldowan comprehensively documented at Gona already shows relatively enhanced technological variation by ~2.58 Ma (9). Such variation may reflect flexibility in response to natural (raw material availability, size, form, quality, etc.) and behavioral (raw material selection, type of hammer, etc.) factors that would have influenced the execution of technical procedures and the technological properties of the desired sharp-edged tools. The possible candidacy of multiple hominin species for authorship of the earliest technologies (7) complicates the picture further. Braun et al.'s (5) technological analyses fail to consider the potential impact of these factors, making their claimed association between environmental changeovers, “early *Homo*” (10), and early flake production untenable. Enhancing our current understanding of the origin(s) and technological evolution of the early Oldowan demands more adequate data and fewer unwarranted inferences.

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