Tektites and the Age Paradox in Mid-Pleistocene in China

The article by Hou Yamei et al. (1), if correct, demonstrates that 800 thousand years ago (ka) people in southern China were making stone tools as sophisticated as any being made in Africa at that time. The basis for that claim is the assumed age of the artifacts found in the sediments of a terrace 25 to 100 m above the present-day Youjiang River, in the Bose basin in the Guangxi Zhuang Autonomous Region of China. The age cited for the artifacts was based on new high-quality $^{40}$Ar/$^{39}$Ar age dates for tektites found with the artifacts.

The assumption is that the tektites found in association with the artifacts were found in situ, at the place where they originally landed after the impact that produced them. The authors produce no evidence to support that assumption—and, if true, such an outcome would be highly unusual. Tektites are not commonly found in situ, but instead generally are found in deposits younger than their isotopic ages, a fact that has led to the so-called age paradox (2–4). Numerous authors have documented that tektites were often used by primitive humans to make stone implements or as talismans (5). In the case of the tektites found in Australia (australites), it has been suggested that transport by arboignes might even be at least partly responsible for the age paradox (6). As Fiske et al. (3) state, “[a]s it is sometimes difficult to establish the in situ nature of tektites with certainty, caution should be applied to their use as a stratigraphic marker.”

It will be difficult to demonstrate that the tektites found in the Bose basin were in situ at the time of discovery, as proposed by Yamei et al. One way to do so would be to find unmelted impact ejecta, such as coesite or shocked quartz exhibiting planar deformation features, in the same sediments in which the tektites and artifacts were found. Also, if Yamei et al. are correct and the tektites were actually found in situ, then one can calculate an average rate of uplift in this region of the Qinghai-Tibeten Plateau: 100 m of uplift in 803 thousand years (ky) gives an average uplift rate of 0.012 cm per year or 124 m per million years over the last 803 ky. Does that agree with other estimates of the uplift rate in this area?

Response: In the comments of Koeberl and Glass and of Keates, three principal issues are at stake: First, do the Bose tektites occur in situ and exclusively associated with the stone tools, as described by Hou Yamei et al. (1)? Second, were the tektites largely transported by fluvial processes? And, third, does the context of the tektites reflect their original chronostratigraphic position? Observations of sedimentary and stratigraphic context, tektite form, and geomorphological distribution all indicate a firm in situ and original association and a sound basis for assigning the tektite age to the tools.

Tektites and the Age Paradox in

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References

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which tektites commonly are associated with younger sediments. In response, we note that at Bose, Paleolithic stone tools and tektites were observed to occur exclusively in T4, were found in excavation, and, thus, are in situ. The apparent absence of either tools or tektites in the three terraces that formed after T4 argues against the idea that the Bose tektites form a disconformable horizon between younger and older deposits. That the Bose tektites were somehow displaced into significantly younger sediments requires special pleading as to how the tektites avoid the three younger terraces and came to have an exclusive association with the stone tools in a discrete excavated horizon.

In response to the final point of Koeberl and Glass, although river downcutting and terrace formation were related to uplift of the Tibetan Plateau (located to the northwest), the Bose basin is not located on the Plateau; thus, the elevation of Bose T4 above the river provides no direct measure of the rate of Plateau uplift.

We conclude that the tektites are conformable in T4 and that their association with the Acheulean-like artifacts provides the basis for a precise age date of the tools. We will continue to test this conclusion with analyses of the type suggested by Koeberl and Glass and with further analysis of the charcoal fragments, which also appear to have an exclusive association with the tektites and the stone tools in T4.

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