Review of: "A Uniformitarian Solution to the Appearance of Small-Bodied Hominins, Dwarfs, Pathologies, and Self-Domestication: Theories of New Discoveries"

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Hobbits, Self-Domestication, and Rock Art

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Niccolo Caldararo's paper presents a well-balanced summary of the current state of paleoanthropology. After decades of relative stability, the discipline is buckling under the impact of new finds, their interpretations, and the discoveries of 'Neandertal genes' in supposedly modern humans. Caldararo's calls for more evidence that *Homo floresiensis* is a separate species and more clarification concerning *Homo naledi* are entirely justified. The issues he rehearses should remind us that paleoanthropology is one of those fields whose epistemologies resemble the building of a ship whilst it travels at sea: its structures reflect learning from mistakes[1]. Whereas proper sciences can establish uniformitarian rules that apply to their processes and reactions, paleoanthropology, like archaeology, is disadvantaged, lacking rules permitting the ready falsification of propositions. Simply put, humans usually make irrational decisions, which are amply reflected in their history. Just as Parviainen et al.[1] concluded that "non-knowing must be recognized explicitly as an enduring and central condition in decision-making," the need for what they call "epistemic humility" is paramount in the soft disciplines. The second significant adversity these domains must contend with is that the historical sequence in which their discoveries are made is almost entirely chaotic, rather than conducive to the orderly development of the knowledge base as which it is perceived (well exemplified by the discovery of human remains in Rising Star Cave). However, no allowance is often made for the high probability that precipitate narratives are likely to be incorrect.

Caldararo illustrates the precarious status of several small-bodied hominins reported relatively recently, particularly LB1, the type specimen of *H. floresiensis*. Too many of the questions raised about it already in 2008 still need to be answered[2]. Many potential explanations for the specimen seem to exclude its attribution to a new species — some of which Caldararo cites. Surprisingly, he mentions the human remains from Mata Menge only in passing in his Graph 1, without addressing the implications of the ten ca. 700-ka-old hominin remains from that site in the So'a Basin of central Flores[3][4]. They are said to be smaller than those of LB1 and defined as ancestral to the Late Pleistocene specimen. Although the evidence does not prove that, it does need to be considered in the context of Caldararo's paper.

Improvements are required in the illustrations of his article. Graph 1 needs to be more consistent and transparent (meaning of the asterisk and question mark, *H. naledi* should be centered at 300 ka[5], etc.). Figure 1 needs to be tidied up, and LB1 should be identified as C. Should the Dmanisi example not also be featured in Graph 1? That would bring a different perspective to the issues raised: it seems possible that human "pygmies" have existed for the duration of the Quaternary, just as they still exist in various regions today[6]. Caldararo's "most clear and elegant explanation" for small-bodied humans involves some viral disease, which is a plausible possibility in all cases. He offers an interesting thought: that microcephaly (or any of the other proposed pathologies?) could have been expressed differently in the distant past. We need to bring this kind of epistemic humility to the task. We must accept that our constructs of the past are muddled preconceptions and conditioned beliefs that rarely meet the demand of falsifiability.

However, the main points I wish to make concern two specific issues that Caldararo broaches briefly. The first is the possibility that human domestication might have impacted hominin body size. He arrives at the valid view that there is "little potential for the features seen in the small-bodied hominins to be the result of domestication." There are vague signs of human self-domestication in the clade's earlier evolution, but the defining changes began around 50–40 ka ago[7][8], i.e., much later than the Dmanisi or Mata Menge specimens. Moreover, a significant reduction in body size is not a diagnostic of domestication syndrome[9]. This condition is facilitated by pleiotropy, which defines when consistent selection for one gene affects two or more apparently unrelated traits in a population[10].

My second main point is a response to Caldararo's observation that the interment and rock art attribution to*H. naledi* "may be inconclusive." Indeed, this is an instance of archaeological overinterpretation. The proposition that the fifteen bodies were deliberately deposited derives considerable support from various empirical circumstances. Predation seems unlikely (no predator deposits so many body parts of just one species over a long period, and no indicators of predation were observed). However, talk of mortuary rituals is premature. Hominins had more pressing reasons to dispose of cadavers (dangers from scavengers, odor) and have done so for eons by throwing them into cave shafts (e.g., Atapuerca, Mladeč Cave[11]) or burying them.

However, the purported *H. naledi* petroglyphs were made much more recently than ca. 300 ka. Having studied the speleo-weathering and accretion-forming processes in dolomite caves, including in South Africa, and based on Berger et al.'s illustrations[12], I do not consider the Dinaledi Chamber markings to be of Middle Pleistocene age. Berger et al.'s Figure 8 compares engravings from Panel A with the petroglyphs excavated on the floor of Gorham's Cave at Gibraltar[13]. The latter were covered by sediment dating ca. 39 cal ka BP (not ca. 60 ka as stated by Berger et al.), yet I consider them significantly older than the markings in Rising Star Cave. Their great antiquity is evident from the substantial accretionary deposits and patination concealing them. By comparison, patination in the South African cave chamber seems limited to a thin film of airborne dark-brown dust, and many of the engraved marks remain almost unpatinated. The authors' belief that nobody entered the cave between *H. naledi's* visits in the Middle Pleistocene and the 20th century is an unsupported assertion. Certainly, rock art can only be dated by the physical proximity of archaeological or paleoanthropological evidence if stratigraphical proof links the two entities. I acknowledge the many Middle Pleistocene examples of paleoart (rock and mobiliary art) known on three continents[14]. However, Rising Star Cave should only be listed with them if better

evidence becomes available.

Nevertheless, the engravings are of great importance and need to be thoroughly studied. This will require identifying natural linear rock markings also occurring in the chamber and separating them from the authentic anthropogenic markings. In its next stage, the project needs to involve specialists in the dating and analysis of cave petroglyphs and in differentiating between human-made and natural cave markings[15].

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