

# **Plausible Evolutionary Scenarios for a Putative Relict Homo Species**

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**Dedicated to the memory of Dr. Jeff Meldrum and Dr. Jane Goodall**

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## **Abstract**

Understanding the evolutionary origins of a possible relict *Homo* species requires integration of morphological inference, behavioral patterning, ecological context, and comparative paleoanthropology. This paper examines multiple evolutionary scenarios, including persistence of a *Homo erectus*-derived lineage, a Denisovan-related population, a late-surviving archaic *Homo sapiens* offshoot, or a hybrid or mosaic lineage resulting from interbreeding among Pleistocene hominins. Drawing on established evidence for extensive hominin diversity, ghost lineages, and hybridization during the Pleistocene, we evaluate how such a lineage could have diverged, persisted at low density, and adapted to North American environments. Behavioral and ecological evidence synthesized in earlier papers—habitual bipedalism, hominin-grade behavior, ecological flexibility, and extreme crypticity—supports the plausibility of multiple evolutionary pathways. This analysis provides a theoretical foundation for future genetic, paleoanthropological, and comparative investigations.

## 1. Introduction

Over the past two decades, paleoanthropology has undergone a substantial reassessment of hominin diversity. Discoveries of *Homo floresiensis*, *Homo naledi*, and Denisovans have demonstrated that multiple hominin lineages persisted into the Late Pleistocene, often with limited fossil representation and overlapping geographic ranges (Antón, 2003; Berger et al., 2015; Hawks et al., 2017). Genetic evidence further reveals extensive admixture among *Homo sapiens*, Neanderthals, and Denisovans, undermining earlier linear models of human evolution (Reich et al., 2010).

Within this context, the existence of a relict *Homo* lineage would not represent an evolutionary anomaly but rather an extension of a now well-established pattern of hominin survivorship and diversity. Papers 1–4 established biological plausibility, ethological coherence, ecological feasibility, and ethical considerations. Paper 5 addresses the evolutionary placement of such a lineage within the broader hominin phylogeny.

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## 2. Known Hominin Diversity and the Problem of Ghost Lineages

### 2.1 Expanding diversity within the genus *Homo*

The recognized diversity of *Homo* has expanded markedly, with lineages such as Denisovans known primarily from genetic material and fragmentary remains, yet inferred to have occupied broad geographic ranges (Reich et al., 2010; Derevianko, 2011). Similarly, *Homo floresiensis* and *Homo naledi* demonstrate that small or morphologically unusual hominins persisted alongside anatomically modern humans until relatively recently (Berger et al., 2015).

These findings support the concept of **ghost lineages**—evolutionary branches predicted by phylogenetic modeling but underrepresented or absent in the fossil record due to preservation bias (Bocquet-Appel, 2008).

### 2.2 Fossil bias and North America

The North American fossil record is shaped by taphonomic conditions unfavorable to hominin preservation, including acidic soils, high scavenger activity, and limited cave systems suitable for fossil accumulation (Bocquet-Appel, 2008). Large-bodied mammals are underrepresented, and intelligent hominins may further reduce deposition probability

through behavioral avoidance of death sites. Absence of fossils therefore cannot be taken as strong evidence against hominin presence.

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### 3. Major Evolutionary Scenarios

This paper evaluates four broad evolutionary models consistent with current paleoanthropological knowledge.

#### 3.1 Scenario A: A late-surviving *Homo erectus* descendant

*Homo erectus* exhibited exceptional geographic range, ecological flexibility, and endurance-based locomotion (Antón, 2003; Rightmire, 1990). Persistence of an erectine-derived lineage would be consistent with robust postcranial anatomy, efficient bipedalism, and generalized omnivory.

#### 3.2 Scenario B: A Denisovan-related lineage

Denisovans are inferred to have occupied a vast and ecologically diverse range, including cold and high-altitude environments, despite minimal fossil representation (Reich et al., 2010; Derevianko, 2011). A Denisovan-related lineage could plausibly have dispersed eastward and adapted to forested or montane habitats.

#### 3.3 Scenario C: A unique North American Pleistocene hominin

Some models propose one or more early dispersals into the Americas prior to the Last Glacial Maximum. While archaeological evidence remains debated, evolutionary plausibility exists for a short-lived or low-density lineage derived from such dispersals (Dennell & Roebroeks, 2005; Stewart & Stringer, 2012).

#### 3.4 Scenario D: A hybrid or mosaic lineage

Genetic evidence demonstrates repeated hybridization among Pleistocene hominins, producing mosaic populations with mixed anatomical and behavioral traits (Reich et al., 2010; Hawks et al., 2017). A relict lineage combining erectine, Denisovan, and sapiens-derived traits is therefore evolutionarily plausible.

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## 4. Comparative Anatomy and Predicted Morphology

Predicting morphology relies on inference rather than direct measurement and must therefore be framed probabilistically.

### 4.1 Cranial traits

Traits predicted for a relict *Homo* lineage include a robust cranial vault, pronounced brow ridges, expanded nuchal muscle attachments, wide zygomatic arches, and reduced chin prominence—features broadly consistent with archaic *Homo* (Rightmire, 1990; Lieberman, 2011).

### 4.2 Postcranial anatomy

Inferred postcranial features include long femora relative to tibiae, a broad pelvis, and strong axial musculature supporting endurance locomotion and load-bearing bipedalism (Lieberman, 2011; Pontzer et al., 2010).

### 4.3 Foot morphology and midfoot flexibility

Trackway-based inference suggests midfoot flexibility, a fully adducted hallux, and a broad plantar surface—traits documented in early *Homo* and inconsistent with extant non-human apes (Bennett & Morse, 2014).

### 4.4 Hair distribution and thermoregulation

Reports of dense body hair and seasonal variation are consistent with cold-adapted hominins occupying northern or montane environments over extended evolutionary timeframes.

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## 5. Behavioral Evidence in Evolutionary Context

Behavior provides a complementary line of evolutionary inference.

### 5.1 Acoustic behavior

Complex vocal repertoires, including long-range calls and percussive signaling, exceed the communicative systems of non-human apes and align with hominin-grade social coordination (Hawks et al., 2017).

## 5.2 Environmental modification

Reported construction of non-utilitarian structures is consistent with niche construction behaviors documented for archaic humans and absent in other primates (Bennett & Morse, 2014).

## 5.3 Movement ecology

Seasonal elevational shifts and corridor-based movement patterns parallel inferred Neanderthal and Denisovan foraging strategies (Stewart & Stringer, 2012).

## 5.4 Social organization

Low-density bands, loose territoriality, and seasonal aggregation fit models of archaic *Homo* social ecology (Bocquet-Appel, 2008).

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# 6. Phylogenetic Modeling and Divergence Timing

Phylogenetic modeling permits estimation of divergence windows consistent with morphology, behavior, and ecology.

- **Erectine-derived model:** ~300–800 ka (Antón, 2003; Rightmire, 1990)
- **Denisovan-related model:** ~200–500 ka (Reich et al., 2010)
- **North American dispersal model:** ~20–120 ka (Dennell & Roebroeks, 2005)
- **Hybrid/mosaic model:** variable; supported by documented admixture events (Hawks et al., 2017)

Across models, a divergence window of approximately **200–500 ka** best reconciles ecological flexibility, morphological robustness, and absence of fossil representation.

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# 7. Conclusions: Parsimonious Evolutionary Placement

Taken together, the anatomical, behavioral, ecological, and phylogenetic considerations reviewed here support a Denisovan-related or erectine-derived lineage—potentially hybridized—that entered North America during the mid-to-late Pleistocene and persisted at extremely low densities. This framework accounts for bipedal efficiency, ecological

versatility, cryptic behavior, and the lack of fossil evidence without invoking extraordinary assumptions.

This paper does not claim resolution of evolutionary identity. Rather, it establishes that several evolutionary pathways are consistent with known hominin diversity and evolutionary dynamics. Genetic investigation, addressed in a later paper, represents the most direct avenue for testing these hypotheses.

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