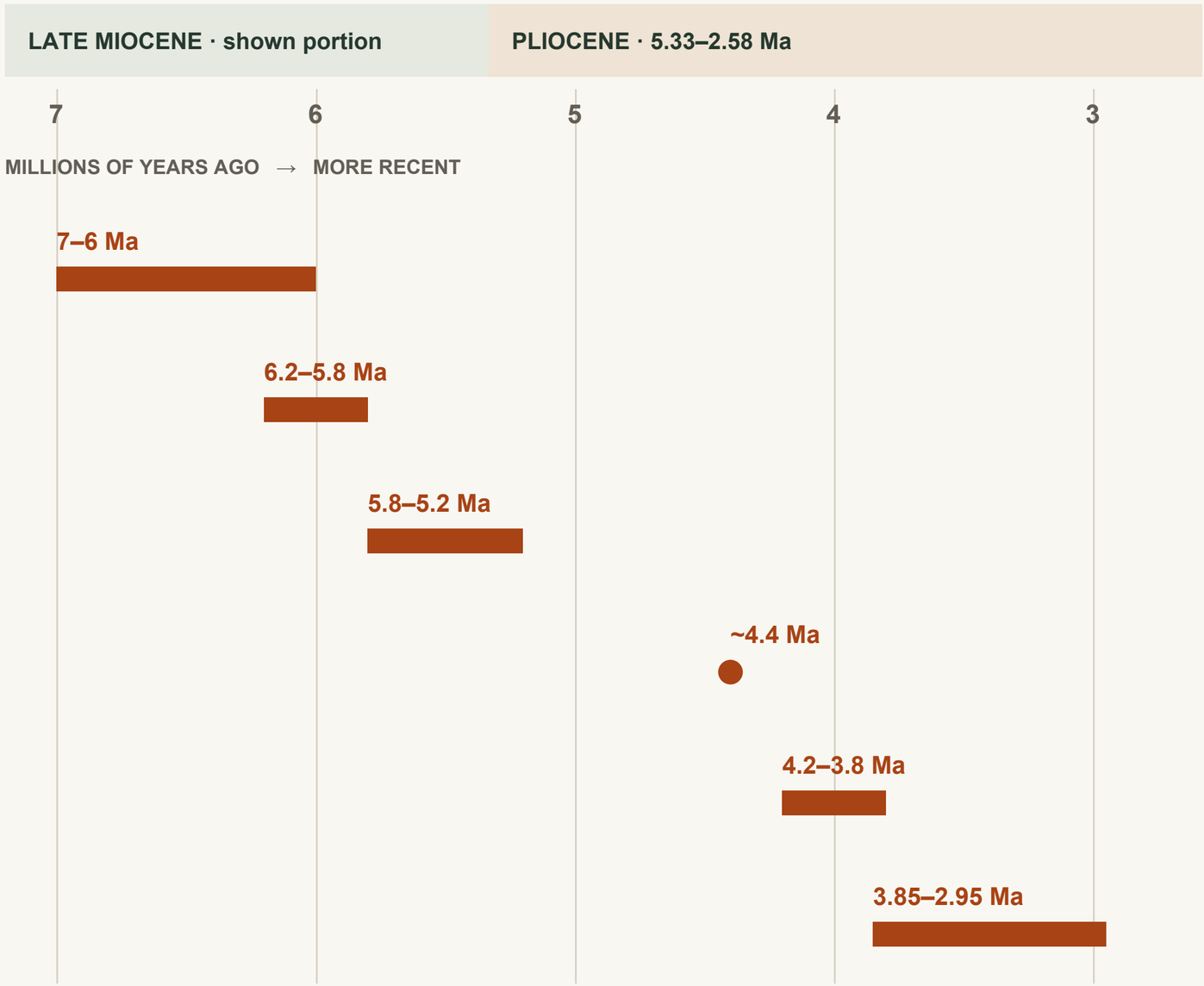
The early hominin landmarks

A dated fossil framework for the environmental and physiological story. Read alongside the manuscript-based sequence on sheet 2.

Bars show the Smithsonian’s approximate fossil age ranges; the dot marks a fossil occurrence around 4.4 Ma. These are not exact species origins or proven ancestor–descendant connections.



Sahelanthropus tchadensis

Chad · West-Central Africa

Orrorin tugenensis

Tugen Hills, Kenya

Ardipithecus kadabba

Middle Awash, Ethiopia

Ardipithecus ramidus

Middle Awash and Gona, Ethiopia

Australopithecus anamensis

Kenya and Ethiopia

Australopithecus afarensis

Ethiopia, Kenya and Tanzania

What this adds: the transition from the earliest candidate hominins through Ardipithecus to australopithecines is visible over several million years, before the later Homo narrative.

How to connect it to the theory: use these fossil landmarks to orient the reader. They do not by themselves date the origins of sweating, hair changes, carrying solutions or fallback exposure.

SOURCES • Smithsonian Human Origins Program species accounts (species names are linked in the PDF); International Commission on Stratigraphy for the 5.333 and 2.58 Ma epoch boundaries. The axis shows only the later portion of the Late Miocene. Draft for review; website and manuscript unchanged.

The evolutionary journey

Environmental stresses, physiological burdens and the responses proposed in Christopher Gomes's manuscript.

DRAFT FOR AUTHOR REVIEW • Chronological stages, not a scale of elapsed time. Broad stages overlap; species labels do not imply a single straight ancestral ladder.

WHEN • WHERE • POPULATIONS	SETTING & PHYSIOLOGICAL BURDEN	PROPOSED EVOLUTIONARY RESPONSE
01 12–3 million years ago A continent of changing habitats North Africa • Sahel • East African Rift Ancestral ape populations; later early hominins	The paper places major uplift phases at 12–3 Ma, grassland expansion at 8–4 Ma, and the Messinian Salinity Crisis at 5.96–5.33 Ma. **Pressure:** Fragmented canopy, seasonal resource shortages, rain-shadow effects and changing basin water chemistry.	A shifting Sahel–Rift habitat mosaic sets the scene for the paper's stress-driven evolutionary trajectory. Manuscript pp. 7–10
02 About 7–2.58 million years ago Increasing terrestriality creates new burdens Sahel–Rift woodland and terrestrial mosaics Sahelanthropus, Orrorin, Ardipithecus and australopithecines; see dated fossil track	Late Miocene to Pliocene: mixed arboreal and terrestrial life precedes later Homo transitions. The paper discusses Dikika at about 3.4 Ma as early animal-food context. **Pressure:** Terrestrial travel; sodium loading; locomotor and sweating-related iron costs; reduced torso hair complicating infant carrying.	Bipedalism; expanded sweating; redistribution of hair and iron; maternal scalp-hair support for carrying; early animal-food use. Exact onsets are not dated. Manuscript pp. 10–19
03 2.8 Ma climate; ~2.4 Ma proposed pulse Refuges become sites of intensified stress Ethiopian highlands; western montane refugia Emerging Homo; H. habilis in the paper's sequence	2.8 Ma dates the climatic background, not a demonstrated onset of coffee consumption. At ~2.4 Ma the manuscript discusses a possible caffeine-associated early-Homo pulse. **Pressure:** Habitat compression reduces preferred fruits. The model places fallback exposure in western refugia; its beginning is not independently dated.	Proposed fallback on ancestral caffeine-bearing Coffea, inherited tolerance and clearance changes, and intensified neural servicing strain. AHR is a candidate contributor. These mechanisms are not assigned a 2.8 Ma onset. Manuscript pp. 21–27
04 About 2.0–1.8 million years ago Cold nights and the metabolic staircase Ethiopian highlands; Melka Kunture as context Transitional early Homo → H. erectus	The paper discusses occupation at Melka Kunture around 2.0–1.95 Ma and H. erectus appearing around 1.9–1.8 Ma. **Pressure:** Highland nocturnal cold, followed by increasing tissue-maintenance costs as body size expands.	Thermal protection through fire → energetic relief and body expansion → greater iron demand and habitual hunting. Cooking supports later neural costs. This is the model's sequence, not a date for proven fire control. Manuscript pp. 25–31
05 About 800,000–600,000 years ago Regional mixing and outward dispersal African regional mosaic → Eurasia African Homo; H. heidelbergensis in the paper's terminology	The manuscript places H. heidelbergensis at roughly 800–600 ka and a proposed outward cohort near 600 ka. **Pressure:** Different exposures in western highlands, Rift lowlands and eastern refugia; new selective conditions after dispersal.	Mixing distributes expanded cranial architecture separately from AHR variants. The model uses this to explain ancestral AHR in the later Neanderthal and Denisovan lineages. Manuscript pp. 28–33
06 About 400,000–300,000 years ago The modern-human trajectory African populations; wider regional connections H. sapiens in the paper's chronology	The manuscript places anatomically modern H. sapiens within this broad interval, against recurrent climatic disruption. **Pressure:** Continuing ecological compression and regionally uneven fallback exposure within the proposed African population mosaic.	The model links continued African selection to fixation of derived Val381 AHR. The manuscript gives no independent date for that fixation. Manuscript pp. 28–33
07 Later Homo → modern humans Why the accelerated pathway diminishes African core and wider dispersal environments Later Homo and H. sapiens; archaic comparisons	The synthesis returns to the whole trajectory rather than assigning a final dated event. **Pressure:** Repeated neural demands operate within increasingly large networks and changing dietary and cultural environments.	More neurons distribute the proposed caffeine-associated burden more widely, weakening that selective impetus. Gradual connectivity-driven scaling continues within the framework. Manuscript pp. 30–36

READING THIS FIGURE • Both columns summarize the manuscript; "setting" does not certify every historical assignment as independently established. Dates are the author's placements. Undated mechanisms are deliberately not pinned to fossil first appearances.

SOURCE • A Mechanistic Model of Human Evolution Through Recursive Physiological Stress, corrected version 2, corrected website PDF. Ma = million years ago; ka = thousand years ago. Chronology and proposed mechanisms shown separately.