Man,
What a Journey!

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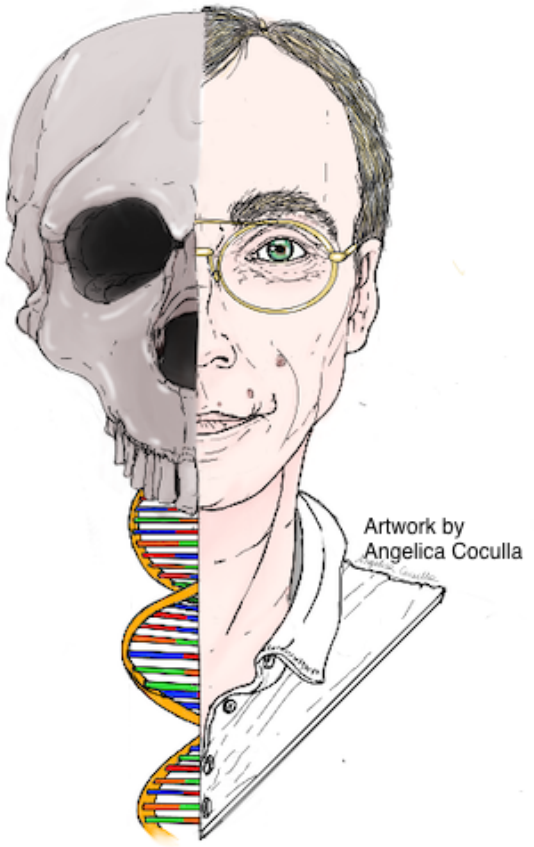


Where do we come from?
What makes us human?
Who came before us?

Such questions have enthralled mankind for millennia.

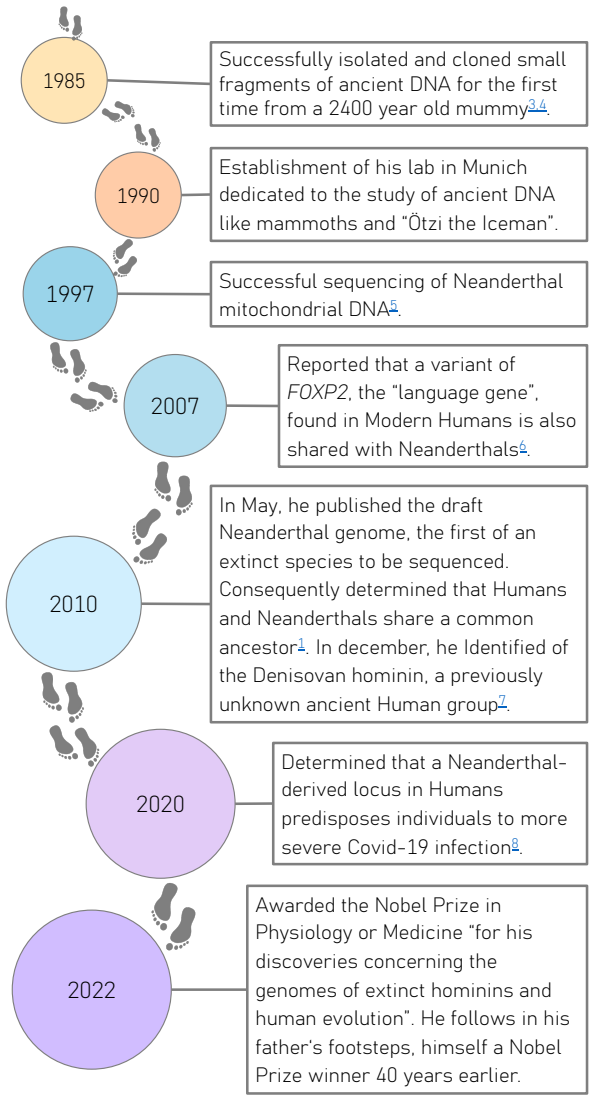
Through a career of ground-breaking research, culminating in him winning the 2022 Nobel Prize for Physiology or Medicine, Swedish geneticist Svante Pääbo has helped peel back the curtain on humanity's origins and address these burning questions.

Spearheading the Max Planck Institute for Evolutionary Anthropology in Leipizig since 1997, the "Father of Palaeogenomics" has worked to develop a toolset to isolate, clone, and sequence DNA from extinct organisms, subsequently reconstructing entire genomes. Notably, in 2010, his group announced a draft of the Neanderthal genome[1] and later identified the offspring of a Denisovan father and a Neanderthal mother, establishing that interbreeding of ancient hominins occurred[2].

Boasting a decorated career, we celebrate his achievement in winning the 2022 Nobel Prize by highlighting some of his key career milestones.

Palaeogenomics and its Relevance for the Modern Day

Palaeogenomics is the study of ancient organisms via analysis of their preserved DNA. In his 1985 paper describing the successful extraction of DNA from ancient mummies, Pääbo opines that DNA analysis of ancient, preserved tissues "might prove to be a fruitful area of research"[4]. Indeed, his founding of the palaeogenomic discipline has permitted exploration of the late, ancient hominin tree on a new scale, with resounding implications for Modern Humans. Freely available, the genomes of a number of extinct hominins are now amenable to analysis and comparison to Modern Humans. For instance, a haplotype of the hypoxia pathway gene, *EPAS1,* found in modern day Tibetans and linked to altered blood haemoglobin concentration at high altitude, is Denisovan in origin[9]. Additionally, a large segment of chromosome 3, Neanderthal in origin, is a major genetic risk factor for poor prognosis following hospitalisation with Covid-19 and doubles patient mortality[8]. Evidently, remnants of our long-extinct hominin kin are harboured within the Human genome with tangible effects.



What Makes us Human?

It is these advances made possible by Pääbo that bring us closer to defining what it is to be Human. Whilst cultural phenomena exist that are unique to *Homo sapiens*: farming practise, advanced tool use, complex social communities, and art, we now also have a genetic argument. 30,000 positions in the Modern Human genome differ from that of Neanderthals and today's great apes, by Pääbo's estimates. By the same token, his work also enables us to identify commonalities amongst hominins and hence map our shared evolutionary history. His team are now working to develop more potent techniques to isolate genomic DNA from yet older biological remains and present in even smaller amounts. It might therefore be possible to investigate ancient DNA found in more humid environments, currently inaccessible due to advanced decomposition. Pääbo anticipates in the near future additional entries to the three current, high coverage, Neanderthal genomes. Other ongoing projects further probe the influence of Neanderthal-derived loci on human health, including susceptibility to HIV and complications during pregnancy – a particular Neanderthal variant, for instance, lessens risk of miscarriage.

What makes up a human being, then? Neanderthal DNA, it seems. At least partially.

References

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