How ancient humans can help us better understand ourselves

Most scientists hope to use advancements in knowledge and technology to shape the future; others look to the past. Modern humans' presence on Earth dates back about 200,000 years, and much of what went on during that time remains completely unknown. Recent discoveries in evolutionary genetics may bring us one step closer to understanding how modern humans came into existence, and what made us into what we are today.

Studying early humans often evokes comparison to Neanderthals – our misfortunate cousins who coexisted with our *Homo sapiens sapiens* ancestors for some thousands of years before going extinct about 30,000 years ago. (Although, small traces of Neanderthals' DNA are still present today in the genomes of many non-African peoples thanks to interbreeding.)

In a paper published in PLOS ONE, archaeologists Paolo Villa of the University of Colorado Museum and Wil Roebroeks of Leiden University question what made Neanderthals so different from us that they went extinct while modern humans thrived. They dismiss the common belief that Neanderthals had the brawn, but lacked the brains to compete with intellectually superior humans.

> *For some authors replacement and supposedly rapid extinction of Neanderthals can be explained only in terms of substantial cognitive, technological and demographic differences between the Neanderthals and anatomically modern humans. But the Neanderthal archaeological record was not different enough to explain their demise in terms of inferiority in archaeologically visible domains. Thus, if Neanderthals were not technologically and cognitively "disadvantaged," how can we explain that they did not survive?*

The answer to this question may lie in epigenetics. In a National Geographic blog post, journalist Virginia Hughes explains that some scientists speculate the epigenome accounts for most of the differences between modern humans and Neanderthals, whose genomes were approximately 99.7 percent identical. Researchers have identified a few vital epigenetic patterns in Neanderthals' genes that were "nearly twice as likely to be linked to diseases, and particularly brain disorders" compared to those in modern humans.

While this finding is significant, it is hard to know what to make of it. Can epigenetics fully explain modern humans' evolutionary success? Or are there other forces also at play? Hughes cautions that the sheer complexity of epigenetics prevents us from drawing any conclusions just yet.

> *Scientists still don't really know how to interpret epigenetic changes in living people (whose diet, exposures and medical history can be tracked, however crudely). What epigenetic differences say about ancient species is even more mysterious. All the same, it's pretty incredible to think of the long biological histories that scientists manage to dig out of ice and rock.*

Another theory implicates hormones as the driving factor behind modern human evolution. Apparently, as

the population grew and humans became more civilized – exhibiting greater technological advancement, cooperative social structures, and the use of fire – they also underwent hormonal changes. Specifically, they experienced a decrease in levels of the “male” hormone testosterone, which is associated with aggression.

One recent study published by the University of Chicago Press demonstrates this correlation by showing that as civilization advanced, human skulls adopted a shorter and rounder shape: “feminized” features that are related to lower testosterone. Lead author Robert Cieri of the University of Utah explains:

> *If population density starts increasing, not only are there more people in your immediate environment that you have to get along with, but all land would be occupied with human groups. You wouldn’t just go across to the other side of the valley to hunt bison by yourself; you’d go to the other side of the valley and maybe make a treaty with the other people who live there.*

So, why are these new developments in evolutionary genetics research important? Understanding what drove us to evolve apart from Neanderthals and other now-extinct hominid species will help explain why we look and behave the way we do, and the essence of what makes us human.

The rate at which genetics research is expanding to answer the most intimate questions about human beings is astounding. With the constant influx of new information, it’s impossible to predict what more we will know in just a year from now. The gaps in our knowledge of our own remarkable history go to show that the past holds just as much mystery as the future.

Additional Resources:

- Were Neanderthals a different species? Genetic Literacy Project
- Sherpas inherited ability to thrive in high altitudes from extinct humans, Genetic Literacy Project
- Epigenetics might explain how humans differed from Neanderthals despite very similar genes, Nature