



# Walk this way, talk this way, roll in the hay: Bringing life and humanity to extinct Neanderthals

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Teaching anthropology and human evolution involves tearing down stubborn misconceptions and stimulating students to discover and to behold their culturally-limited assumptions objectively. That's if you're skilled and if you're lucky. Shucks, let's be honest. That's if you're supernatural.

The job sometimes feels like digging a hole, deeper and deeper, never having the chance to mold something out of all that dirt, to build upon existing knowledge and insights, to move upward and onward. And I never fail to hit rock bottom with one annoyingly persistent, but ever-so educationally priceless enigma: The Neanderthals.

I just finished a semester of Anthropology 300: The Human Fossil Record, a course in which I asked my students to answer, "What happened to the Neanderthals?" for their final projects. But even a familiarity with Neanderthals from their introductory anthropology courses does not fully prepare all upper-level paleoanthropology students to consider them in a more advanced scientific framework. In fact, I think that familiarity, gripped in the claws of pop culture, can inhibit them.

Despite hosting an expert geologist to present to my students on the methods for identifying extinction and its causes in the fossil record and the issues and obstacles involved in such investigations, and despite exposing them, albeit briefly, to the cutting edge genetic evidence, some of my students went ahead and assumed they were charged to find the cause of Neanderthal extinction. Two students went so far as to rewrite my question at the top of their final paper as, "Why did the Neanderthals go extinct?" They had no idea that their revision of my question contained assumptions. It's got to have a lot to do with the fact that we kicked off the first week of class by binge-reading all about Neanderthal demise in *The Humans Who Went Extinct* (Finlayson, 2010). The book is a wonderfully broad treatment of the issues, but I was completely blind to the title's potential to inhibit nuance. If I'd anticipated this I would have discussed extinction much more during the course.

The trouble, as I see it, is it's unclear whether the Neanderthals went extinct the same way that we consider the dodo, the great auk, or the passenger pigeon to have gone extinct, or the same way that all the great dinosaurs (except some birds) did at the end of the Cretaceous, and so on.

Of course there aren't any Neanderthals alive now. But there aren't any australopiths (Lucy's genus) alive now either and nobody's talking about australopith extinction. Australopiths begat or, if you'd rather, evolved into *Homo* (one way or another). Their predecessor, *Ardipithecus*, didn't "go extinct" either. As of now we think and we say that they evolved into (or, e.g., are in an ancestor-descendant relationship with) *Australopithecus*.

Aside from Neanderthals, *Paranthropus* is probably the only other hominin taxon that we discuss in terms of extinction. If its phylogenetic position is correct (and there is no dispute that I know of beyond the debate over one or two genera (e.g. Villmoare and Kimbel, 2011)), then it left no living descendants and faded from the fossil record about a million years ago during a time when many other sub-Saharan fauna disappeared too. But these creatures were weird little bipedal apes, not stocky and muscular, big-eyed, big-nosed, big-brained, ginger-haired, complexly cultured Europeans as the Neanderthals seem to have been. It's obvious to me why we obsess over the demise of the latter and not the former.

I think we're being a bit intellectually reckless assuming Neanderthal "extinction." To me the question of their fate is more fairly posed "What happened to them?" with a strong answer being extinction but with a kind of extinction that needs to be carefully defined.

In order to hold the Neanderthal disappearance apart as special, as an exclusive story of "extinction," shouldn't we need to demonstrate that other long-dead Late Stone Age/Upper Paleolithic hominins that we don't call "Neanderthals," but that we might claim as our more direct ancestors, didn't go "extinct" or have no story of extinction to tell? [Note: Here's where questions of cultural demise vs. continuity that are being addressed by archaeologists really might help. But again, we face problems because we know from modern examples that culture change does not equal genetic change and culture stasis does not equal genetic stasis.]

Further, and probably more significant here: If Neanderthal "extinction" is the answer to our question then it needs to account for the factoid that 23andMe says I have 2.9% Neanderthal (77th percentile for site users) in my genome which, as a *Homo sapiens*, is already more than 99% the same as a Neanderthal's.

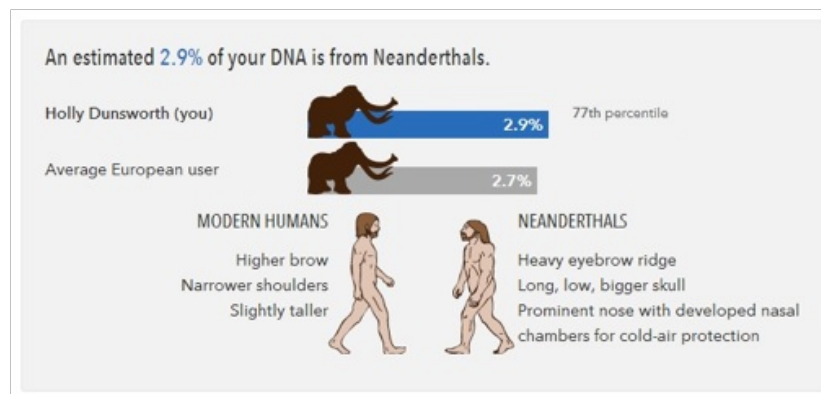


Figure 1: My Neanderthal ancestry, as reported by 23andMe.

Yes, that's confusing. I read the 23andMe methods paper (Durand, 2012), which is supposed to be simpler than the published ones referenced therein, but it's still difficult to understand how they make the estimate. Basically, it's about a percentage of SNPs (single nucleotide polymorphisms, a.k.a. mutations) that I share with dead Neanderthals but that so many live Africans (who I'm more closely related to) do not. Therefore, if the methods are generally good, my genome contains evidence that people in my ancestry mated with Neanderthals. People who do not have these mutations either (a) never had Neanderthal mutations flow into their ancestors' families, or if they did (b) those Neanderthal mutations drifted away, or were selected away, before science could capture them from descendants today. [Note: You only got one mutation from mom and one from dad, the other part of the pair in each parent that you didn't get are dead-ends unless your siblings or cousins got them. So a lot of SNPs and other variants disappear regularly, regardless of selection, and, on the other hand, everybody has new variants compared to their parents thanks to constant mutation that's perpetually *not* being selected against.]

Tendrils of my ancestry must have been much more Neanderthal than 2.9%, but those SNPs evolved

away over time. In other words, far enough back there might be at least one hominin with a 100% Neanderthal genome (by present standards, based on the few Neanderthals that have preserved ancient DNA) in my ancestry, because that's the only way the variation got to me in the first place. But now they're diluted down, drifted away, and maybe even selected against to end up at a level of only 2.9% in me. I think that's about right.

These findings-the evidence that many people like me with ancestry from the northern hemisphere share small percentages of their DNA with Neanderthals-are not at all surprising to many, including me. And that's for a couple of reasons having to do with what we know about Neanderthals at this moment in scientific history, which is reflected in the title of this article, which reflects my love of the movie *Young Frankenstein*, and I think it's fairly common to conjure up golems and Frankensteins in the same imagination space as Neanderthals.

### **WALK THIS WAY**

People are still studying Neanderthal feet and limb proportions to try to estimate energy expenditure during locomotion (Raichlen et al., 2011). But since we stopped basing all our behavioral reconstructions off an old man with arthritis, and a bunch of bone breaks that healed, we've accepted that Neanderthals are not clumsy, knuckle-draggers. They were good bipeds like we are-just coming into dangerously close contact with dinner and surviving well enough to string out their suffering before death.

### **TALK THIS WAY**

Whether they had language is more of a lingering question but still one that's lop-sided towards yes, with the caveat that it probably wasn't as diverse and therefore wasn't as complex as ours. New research on a Neanderthal hyoid (small horse-shoe shaped bone in our throats that moves when we swallow and speak) suggests that its structures reflect speech mechanics similar to humans' (D'Anastasio et al., 2013). But I enjoy reading about the work by Lieberman and McCarthy that explains how the Neanderthal throat and mouth dimensions probably did not allow for the tongue to move as much as ours does to manipulate expired air. This is how we make different vowels. Lieberman and McCarthy suggest Neanderthals couldn't have made as many distinct vowels as us and probably were as limited as human children in that regard. (Immature throat and mouth dimensions contribute to why kids sound like accented foreigners while they're developing.) Without as many vowel options their vocabulary would have been limited, but not non-existent. Which brings us to...

### **ROLL IN THE HAY**

So if it walks like a human, and sort of talks like a human, then it probably reproduces like a human too. And our imaginations needn't feel naughty for going there since, as I wrote above, if the methods are good, I carry evidence in every cell of my body that at least one of my ancestors waited until marriage to lose her virginity to a Neanderthal. This might describe you too. So if there are monsters to be named in this story, then they're us, having developed out of such a lurid and mysterious genetic cocktail.

### **NEANDERTHALS. HUMANS. WHAT'S THE DIFFERENCE?**

They're so much like us or we're so much like them that we can't always tell their bones or their artifacts from ours. For a fascinating example of this problem, see "'Neanderthal' Remains Actually Medieval Human" (Pappas, 2013). And yet you might see headlines like "Neanderthal fossil indicates incest was common" (Bigelow, 2013; which is about Prufer et al. (2014)) reporting how, "researchers examining the DNA extracted from the fossilized toe of a 50,000-year-old Siberian Neanderthal woman believe that the woman was the child of an incestuous relationship," and say, *Hey! We're not like those monsters!* But, yes we are indeed. And remember, we don't have this kind of information from fossils that we welcome into fully modern *Homo sapiens* and if we did (or when we do) I can all but guarantee

we'll be finding some skeletons in those skeletons' closets too.

Neanderthals even took time away from incest to behave in some other strikingly human ways. For a list of what scientists have discovered about Neanderthal behavior and its complexity just last year, see this 2013 research roundup by Wong (2014).

Despite the shrinking barrier between us and them, that we continue to call them "Neanderthals" sets them apart from us. It sets them apart from the real, or at least *human*, Late Stone Age and Upper Paleolithic hominins who begat us, whoever they are. We like to divvy up and compartmentalize variation, and distinguish us versus them, and this is less about biology than it is about culture, and it's something the Neanderthals probably did too. Paleoanthropology and pop culture are both rooted in such a strong tradition of differentiating Neanderthals from us that it's hard to break free of the mold and present their story any other way than cloistered off as just that: "Their" story and one that ended before any of them could write it down. *So they must have gone extinct. Poof.*

But really, which is it? Were they more like chimps are to us now, or were they like the French or The Red Sox of their time? Maybe they were something eerily in-between that we can't fully understand unless we actually encounter one another. So the best anybody can do now is bring them to life in our imaginations, from the inanimate material they left behind in the ground and the animate material they implanted into billions of us. And because this is the best we can do, and because the fascination will always fuel it, the Neanderthal enigma can only diversify and intensify with more discoveries. It will go on intriguing and stymying anthropology students for as long as there will be anthropology students.

It's so satisfying to write something conclusive about Neanderthals there at the end, especially while operating with less than a fully human genome.

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