Neanderthals, Paleogenetics and All That

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Neanderthals: before paleogenetics

Came out of Africa 500,000 bp (before present) and spread through Europe and parts of west and central Asia.

The range occupied by Neanderthals

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Sites where Neanderthal remains have been found

Died out about 25,000 bp.

But "modern" man came out of Africa about 50,000 bp.
What we know: Bones

Which is a Neanderthal skull?
What we know: Bones

Which is a Neanderthal skull?

What they really looked like?
Paleogenetics

Basic idea: extract DNA from teeth and bone.

Problems:

1) DNA degrades over time. Small fragments (less than 50 base pairs) ⇒ Big jigsaw! (Genome is about 3 billion bases).

2) Contamination with other DNA (microbial (95% plus) and ours).

What helps:

Have complete genomes of close relatives (us and chimps). ⇒ Enables differentiation of microbial genomes.

Care (i.e. better techniques) to avoid human DNA contamination.

Also small differences from modern humans helps to differentiate the DNA. (Paleogenetics on Homo sapiens harder).

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Neanderthal genetics: Chronology

1997: First extraction of Neanderthal DNA.

Svante Pääbo (MPI for Evolutionary Anthropology)

2006 1 million base pairs sequenced
2008 mitochondrial DNA fully sequenced
2010 draft genome
2010 genome

Extracted DNA from 3 Neanderthal bones (age about 40,000 bp; all female) in Vindija Cave in Croatia.

Estimate of contamination with human DNA about 0.65% (2006 11-40% contamination)

Comparisons with five people groups: Yoruba, San, Han Chinese, Papua New Guinea, Frenchman.

Important finds:

1-4% Neanderthal DNA in non-African genomes, presumably due to interbreeding.

No evidence of Homo Sapiens DNA in Neanderthal genome.
An interspecies love child? (from Nature!)
Denisovans

A part of a finger, a tooth and part of a toe found in Denisova cave in Siberia. From different individuals.

DNA in finger bone unusually well preserved (70% microbial DNA; average DNA fragment length 60-70 bases).

2010a Mitochondrial DNA indicated different from Neanderthals.

2010b Genome sequence.

Common ancestor of Neanderthals and Denisovans: 640 000 bp.
Common ancestor of Neanderthals, Denisovans and us: 1 000 000 bp.

Comparisons to human genomes: Melanesians (Papua New Guinea and Bougainville Island) 4-6% Denisovan.
More to come? E.g. Homo floresiensis

2003: community of small homonids on Flores (survived until about 12 000 bp). Who are they?
Adam and all that

Does that a certain section of the human population has a small component of their genome directly derived from Neanderthals and Denisovans change the way we view ourselves?
Given that we already knew that we are directly descended from similar homonids (the common ancestors of us, Neanderthals and Denisovans) I don’t see why it should.

But it does have serious implications for those occupying a "middle ground" with a quasihistorical position on Genesis, who still want to hold on to a historical Adam that is the genetic progenitor of all mankind. That is certainly no longer tenable.
Made in the image of God?