

**Steps:**

1. Alignment with MUSCLE in MEGA
2. UPGMA tree in MEGA (export in .newick format)
3. Visualization in iTOL
4. Calculation using BioPython

Mutations rate taken from:

Lower rate ( $1.26 \times 10^{-8}$ ) - <https://pmc.ncbi.nlm.nih.gov/articles/PMC2694979/>

Upper rate ( $2.8 \times 10^{-8}$ ) - <https://pubmed.ncbi.nlm.nih.gov/25341783/>

**Results:**

Estimated separation time between Neanderthals and Denisova (lower bound): 929796 years ago

Estimated separation time between Neanderthals and Denisova (upper bound): 418408 years ago

Estimated separation time between Neanderthals and Denisova (average bound): **674102 years**

Mitochondrial Eve age (lower bound): 210414 years ago

Mitochondrial Eve age (upper bound): 94686 years ago

Mitochondrial Eve age (average bound): **152550 years**

**Additions:**

Code and tree images provided in github repository