Integrating early hominin interbreeding with coal-HMM for mitochondrial pseudogenes

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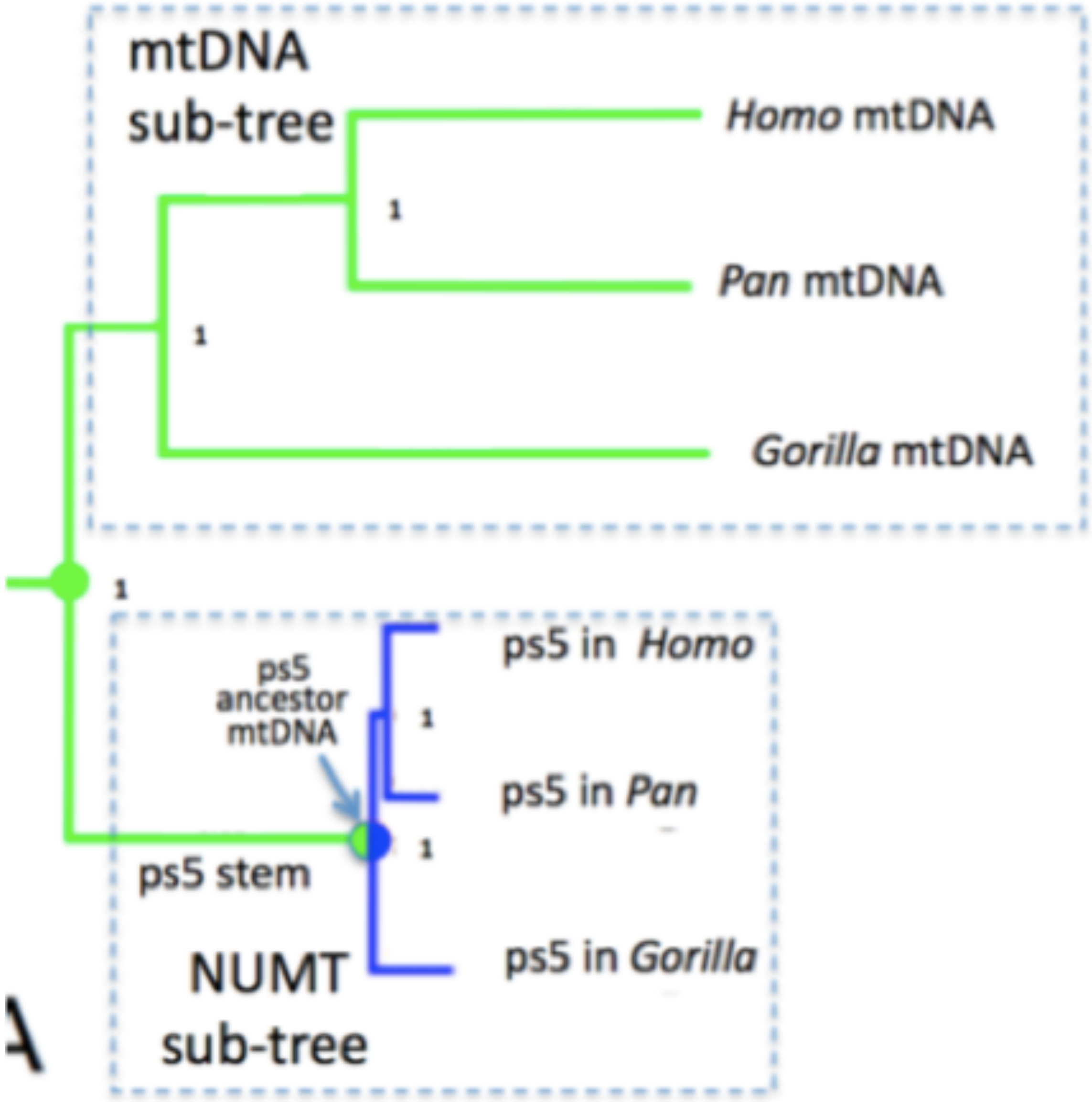
mtDNA introgression into nuclear genome

Endosymbiotic event of a-proteobacteria

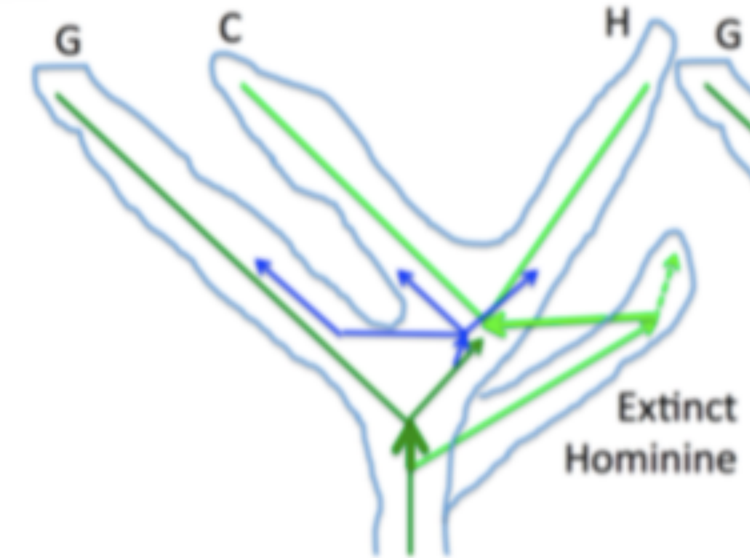
Lose most of the genes and transfer to nuclear genome

NUMT

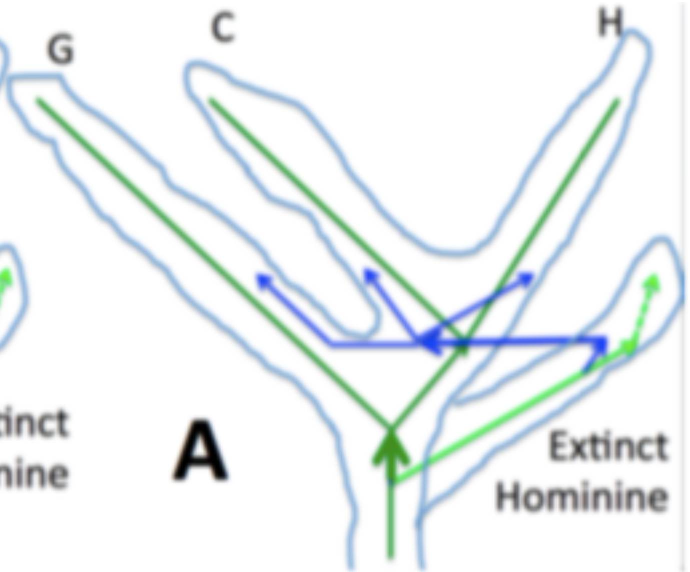
- Nuclear mitochondrial pseudogene
- ~9kb aligned pseudogene



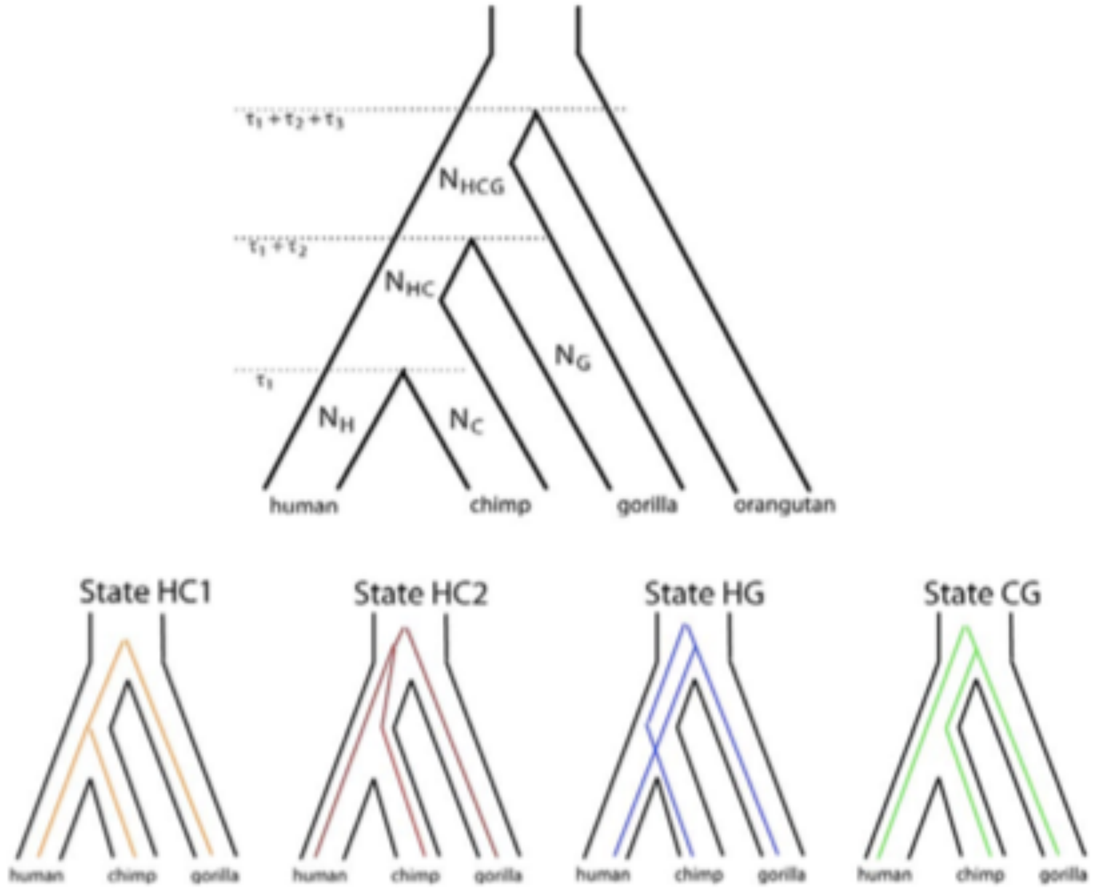
Popadin, Konstantin et al. 2017. “Mitochondrial Pseudogenes Suggest Repeated Inter-Species Hybridization in Hominid Evolution.” *bioRxiv*. http://biorxiv.org/content/early/2017/05/09/134502.abstract.

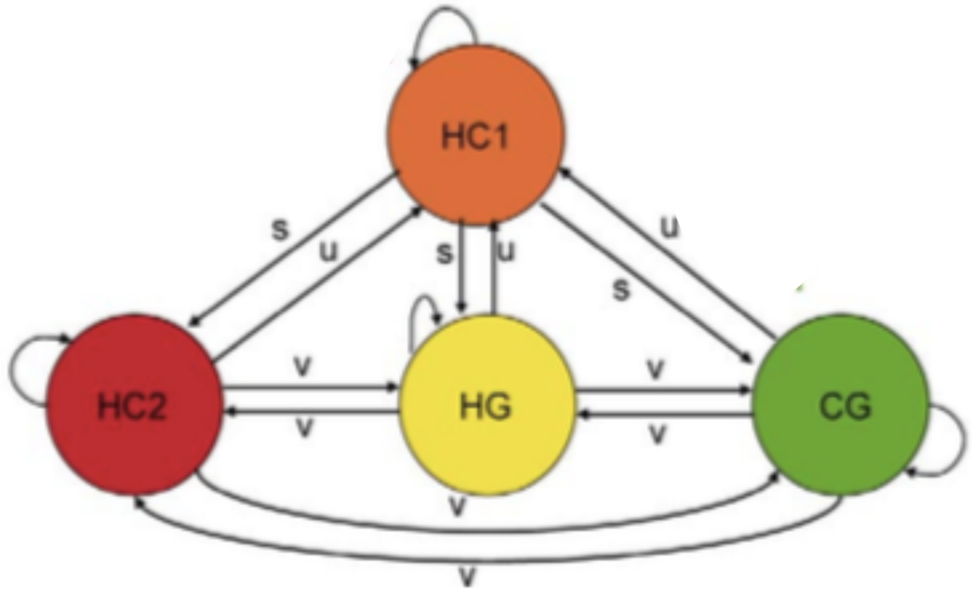


A



Coal-HMM



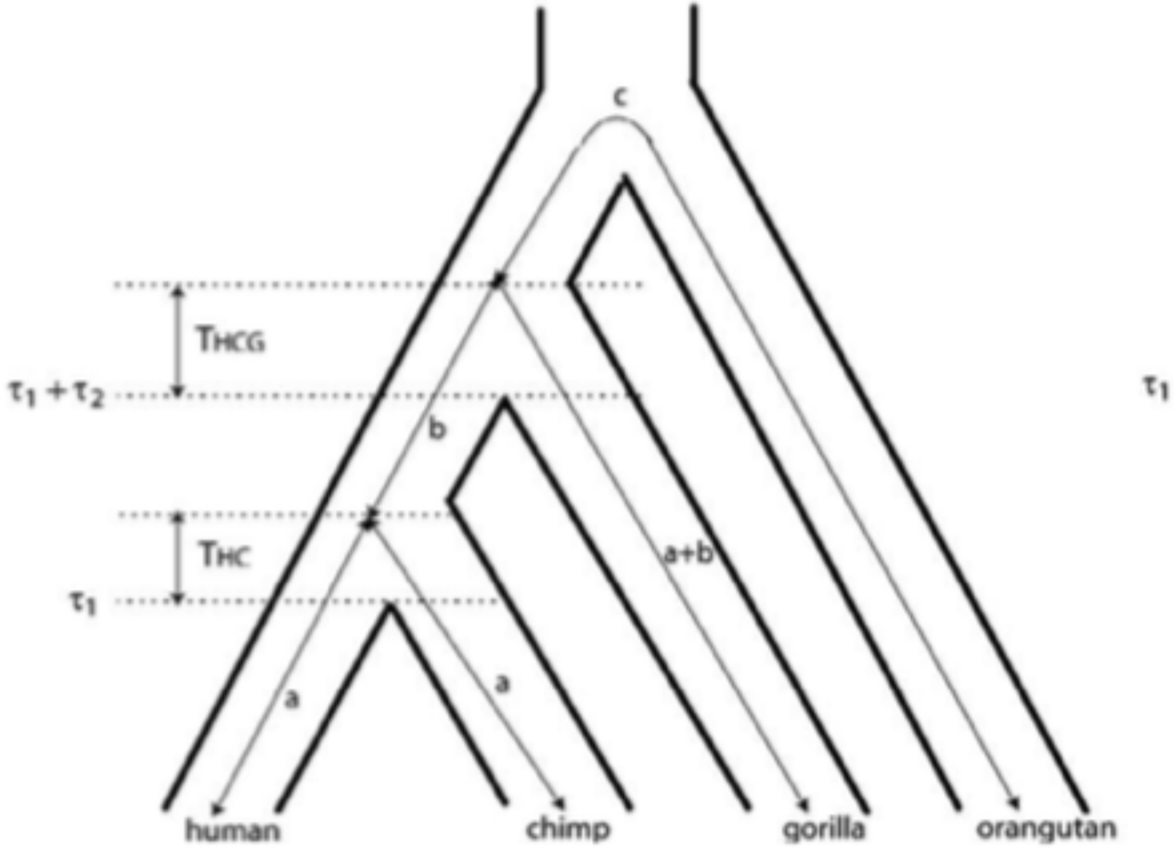


Hobolth, Asger, et al. "Genomic relationships and speciation times of human, chimpanzee, and gorilla inferred from a coalescent hidden Markov model." *PLoS genetics* 3.2 (2007): e7.

Baum-Welch

- Sequence
  - A. pseudogene of four species
  - B. MRCA of four pseudogenes + HCG mt
- Emission probability
  - Jukes-Cantor model(t)

$$\eta = (s, u, v, a, b, c, \tilde{a}).$$



Expected outcomes

- 1. Partition of the pseudogenes
- 2. Efficient population of mtgenome
- 3. statistical stability and possible introgression after known speciation time

Current progress

- 1. Aligned data for pseudogenes and mtDNA for HCGP
- 2. Integrating the free parameters and their relationships for EM

- Thank you!