Integrating early hominin interbreeding with coal-HMM for mitochondrial pseudogenes

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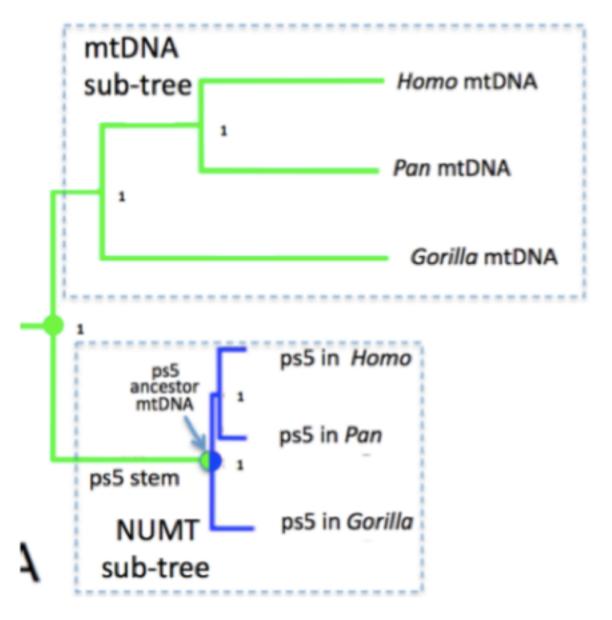
mtDNA introgression into nuclear genome

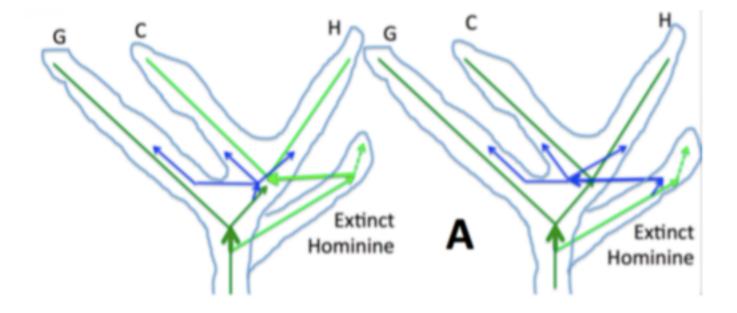
Endosymbiotic event of a-proteobacteria

Lose most of the genes and transfer to nuclear genome

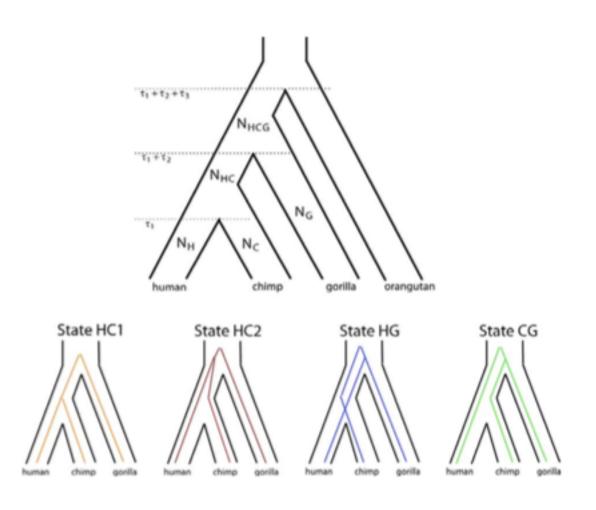
NUMT

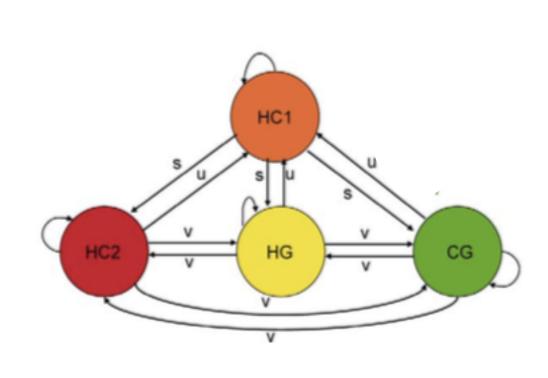
- Nuclear mitochondrial pseudogene
- ~9kb aligned pseudogene





Coal-HMM

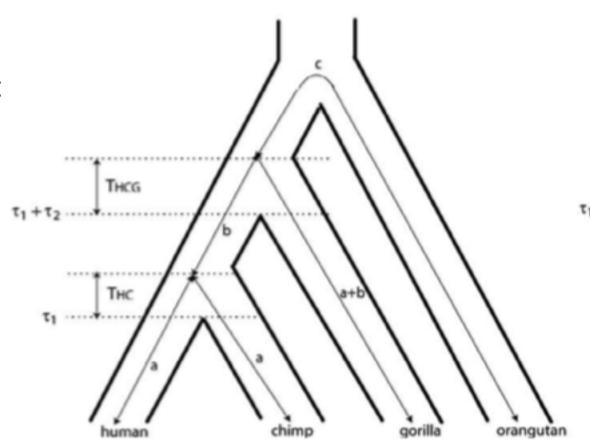




Baum-Welch

- 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

Consensus

Ht5Gor735075...059-83017636
Gorilla_beringe...ueri_A929_Kaisi
Pan_paniscus_9731_LB502
Pan_troglodyte..._A957_Vaillant
Gibbon_NC_002082.1
Pongo_abelii_A947_Elsi
Ht5Ch_Contig555
Baboon_Y18001.1
HomoSap_NC_012920.1
Gorilla_gorilla...lla_9749_Kowali
Ht5_6-15kHo9kExt
Pongo_pygmae...944_Napoleon
HomoAlt_NC_013993.1

AATGCCCATCATAATCGGAGGCTTTGGCAACTGACTAGT-CCCCTAATAA AAAGCCCATCATAATCGGAGGCTTTGGCAACTGGGTAGTTCCCCTAATAA AATGCCTATCATAATCGGAGGCTTTGGCAACTGACTAGTTCCCTTAATAA AATACCTATCATAATCGGAGGCTTCGGCAACTGACTAGTTCCCTTGATAA AATGCCTATCATAATCGGAGGCTTTGGCAACTGGCTAGTCCCCTTGATAA AATACCCATCATAATTGGGGGCTTTGGCAACTGGCTCGTCCCTCTGATAA TATACCTATTATAATCGGGGTTTCGGAAATTGATTAGTGCCTCTAATAA MATACCCATCATAATCGGAGGCTTTGGCAACTGACTAGTTCCCCTAATAA AATGCCTATCATAATCGGAGGCTTTGGCAACTGGCTAGTACCCTTAATAA AAAGCCCATCATAATCGGAGGCTTTGGCAACTGGCTAGTTCCCCTAATAA CATGCCCATTATAATTGGAGGCTTTGGCAACTGACTAGTGCCCCTGATAA 50 AATACCCATCATAATCGGAGGCTTTGGCAACTGACTAATCCCCCCTAATAA 50

• Thank you!