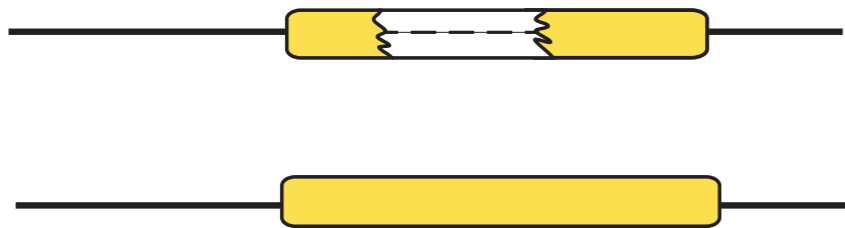


New Gene Formation and Evolution

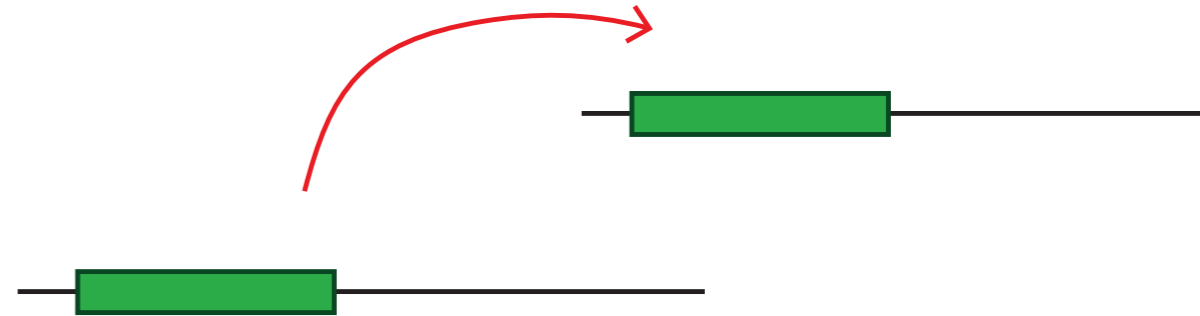
Rebekah L. Rogers
Dept of Bioinformatics and Genomics
UNC Charlotte

Genetic Novelty

Deletions



Translocations



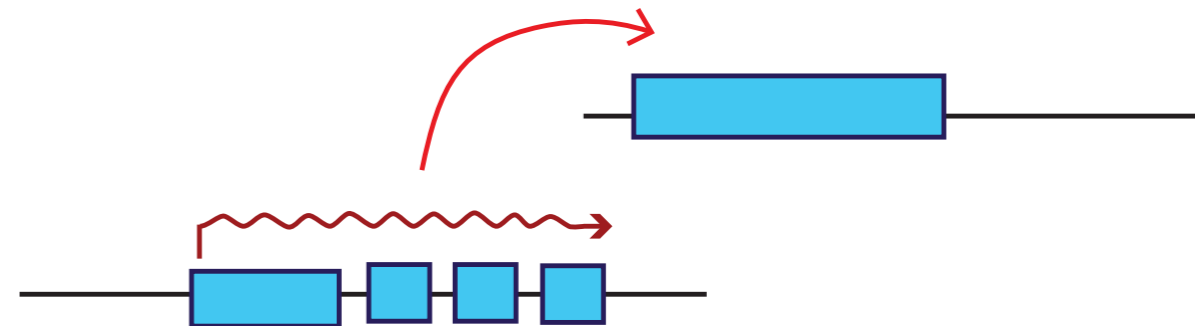
Chimeric Genes



Duplicates



Retrogenes



Florence, Alabama (Muscle Shoals, AL)



The Washboard Mussel
Megalonais nervosa





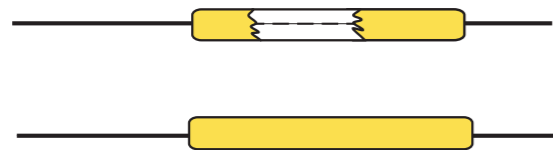
Rich Meagher
“Nuclease Ace”

sequenced \sim 1000 bp

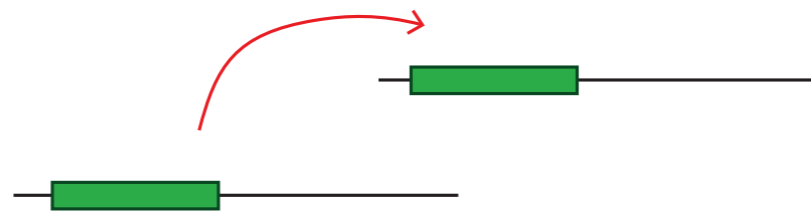


Jeff Bennetzen Maize genetics

Deletions



Translocations



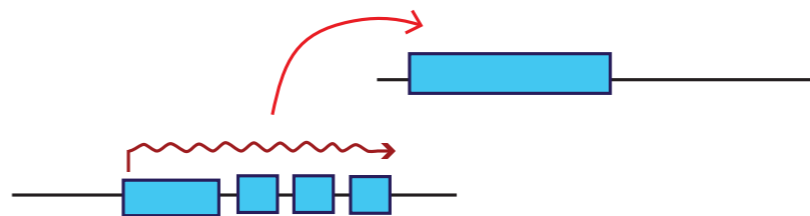
Chimeric Genes



Duplicates

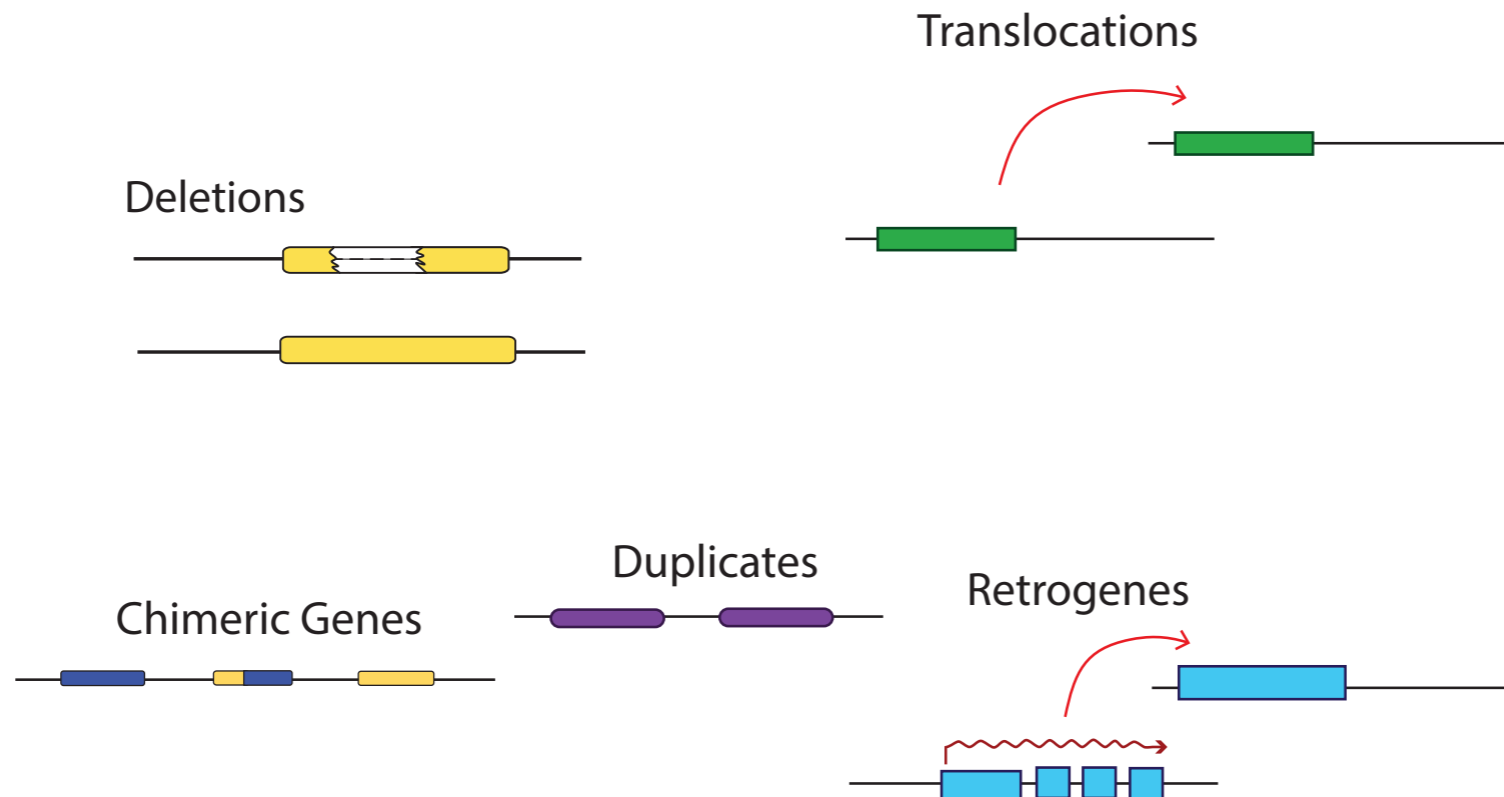


Retrogenes





Dan Hartl Drosophila Genetics





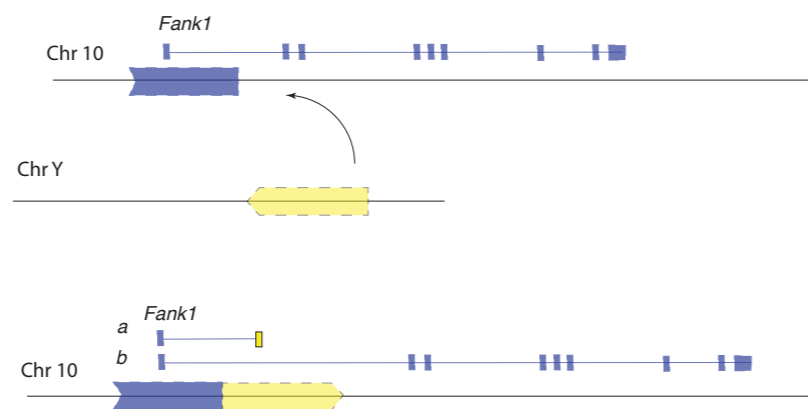
Monty Slatkin

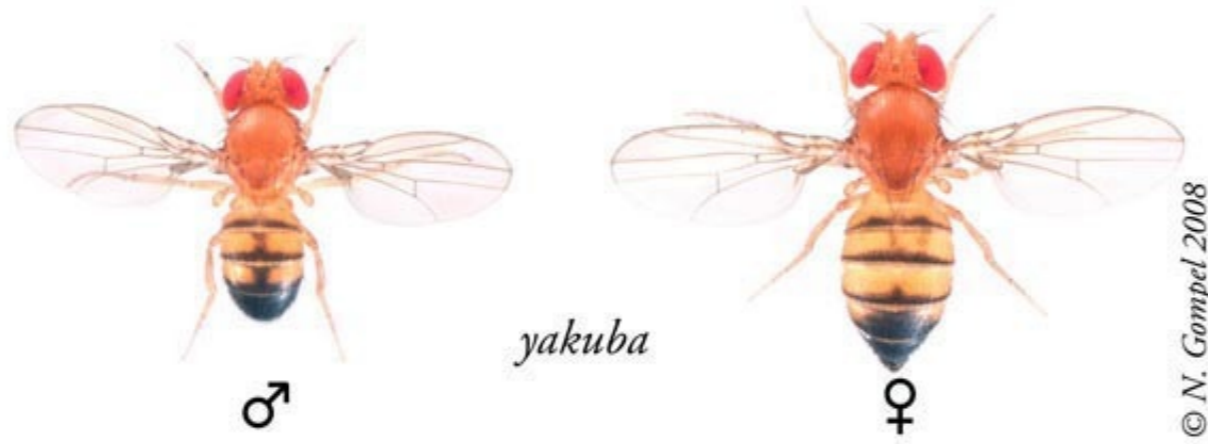
Computational Genetics



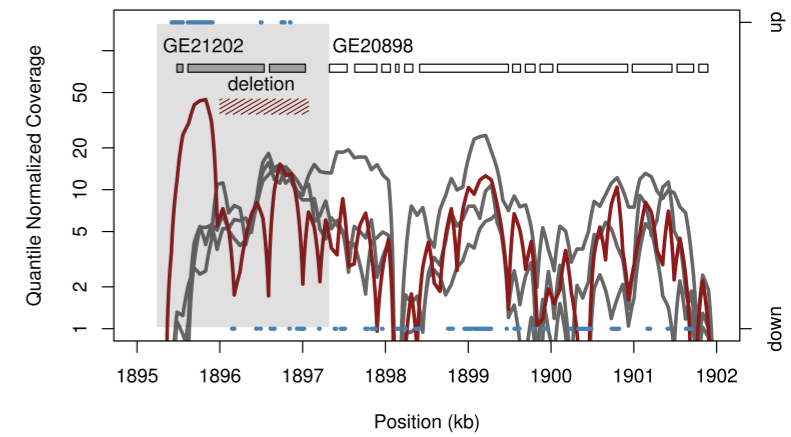
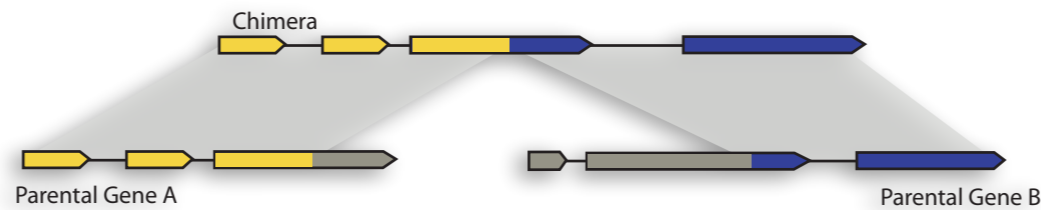
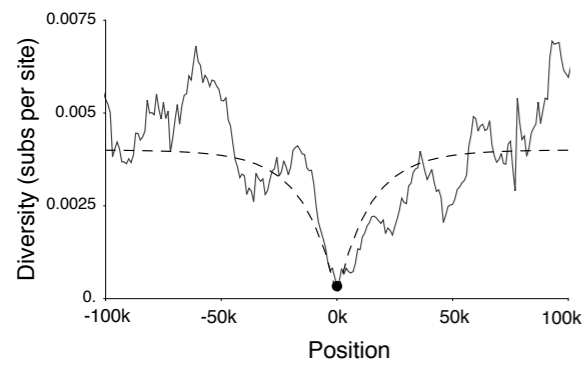
Monty Slatkin Computational Genetics

Neanderthals



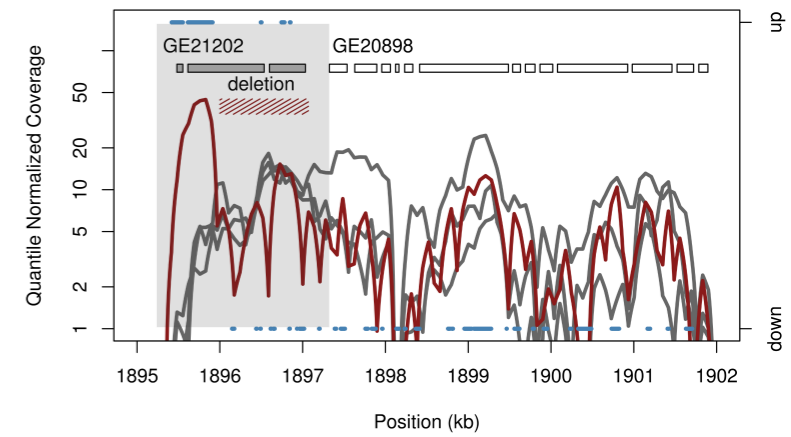
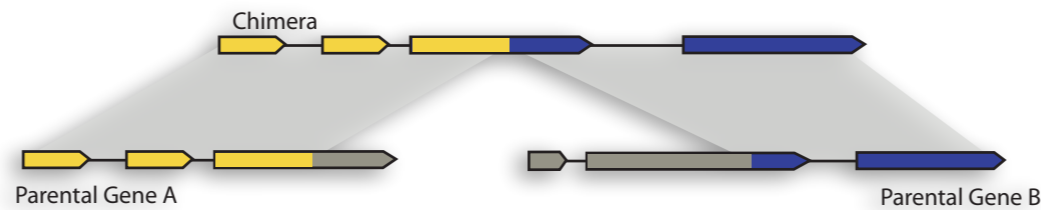
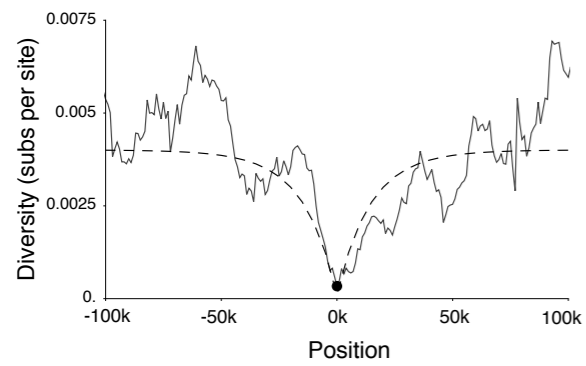


Drosophila

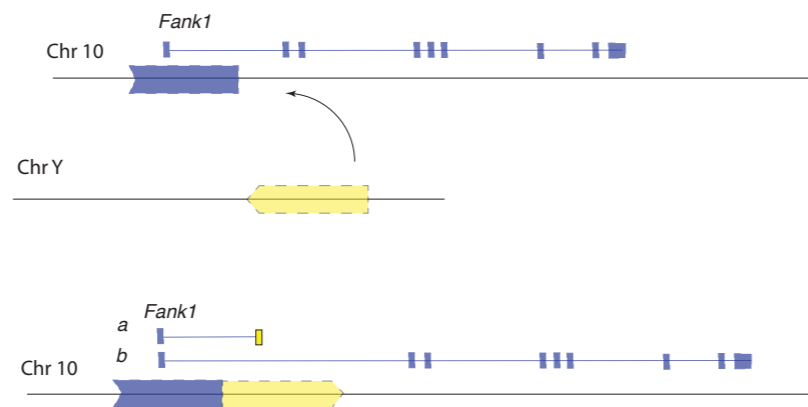




Drosophila

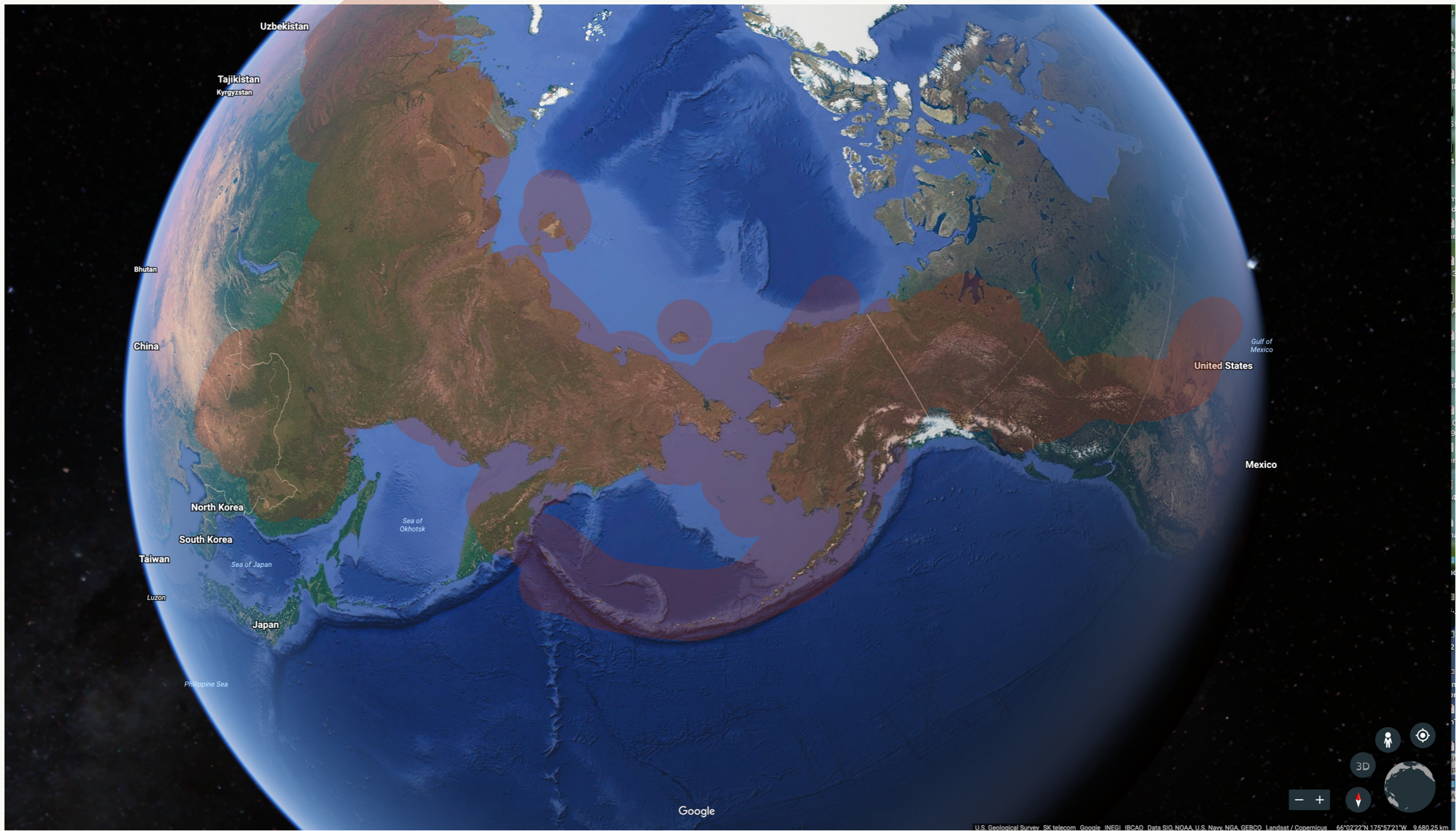


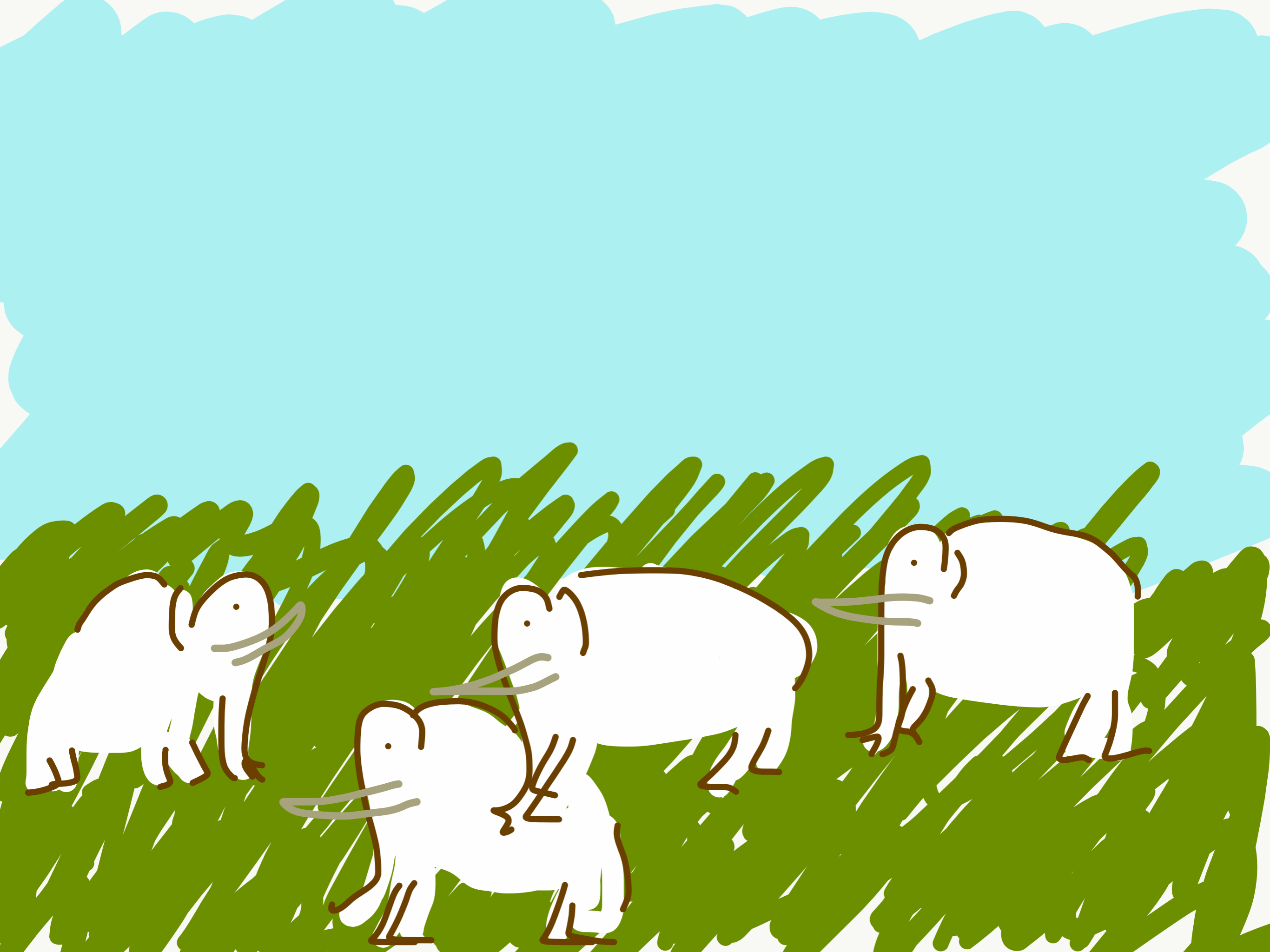
Neanderthals

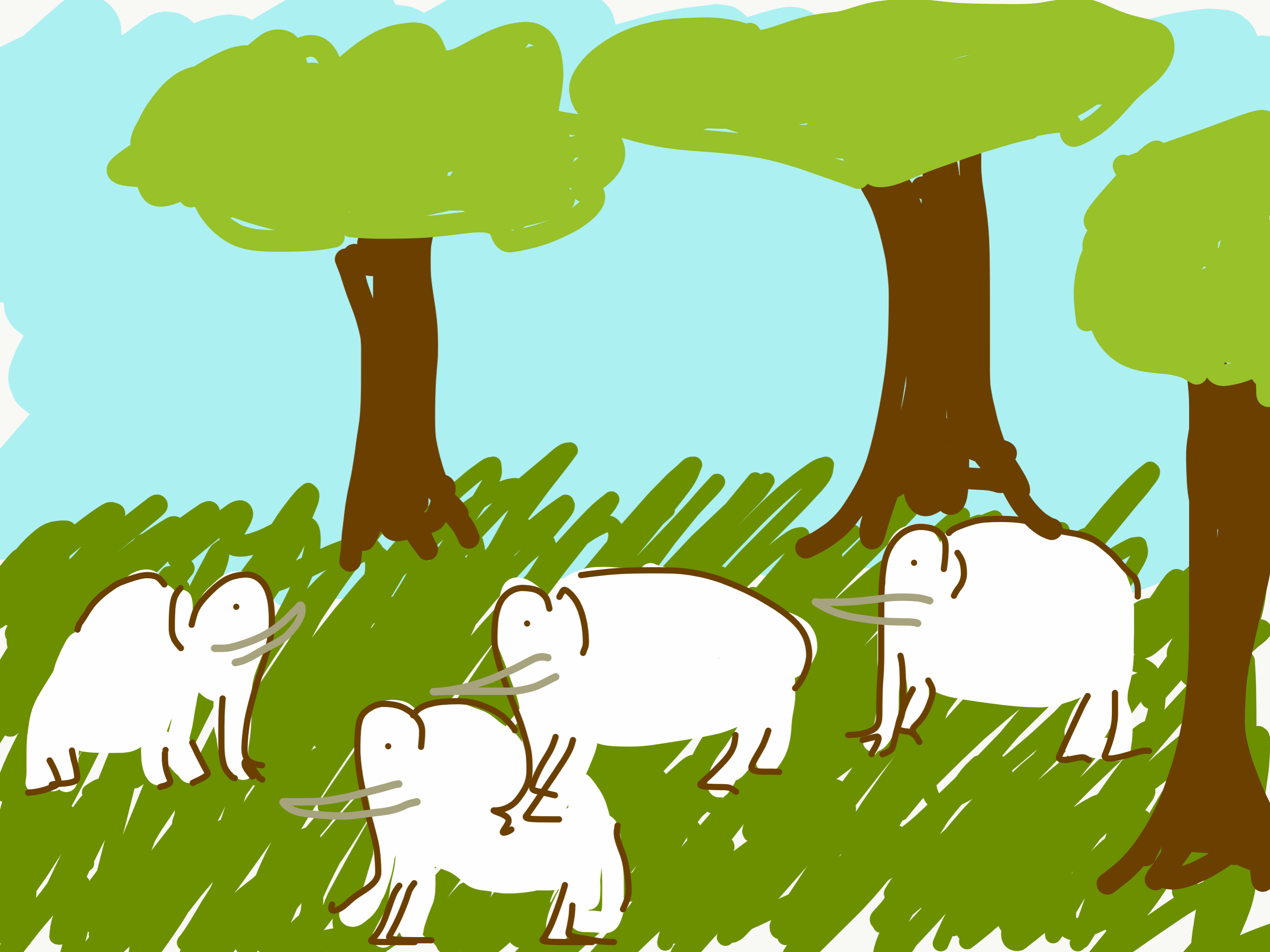


Genomic Disintegration in Woolly Mammoths on Wrangel Island

Rebekah L. Rogers
Montgomery Slatkin









Well Preserved Remains



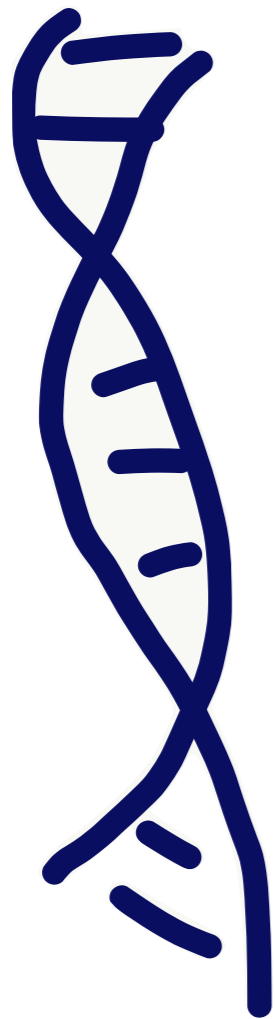
Hey! Bro! Can you help a guy out?



Eleftheria Palkopoulou + Love Dalen (et al.)

***Current Biology* 2015**

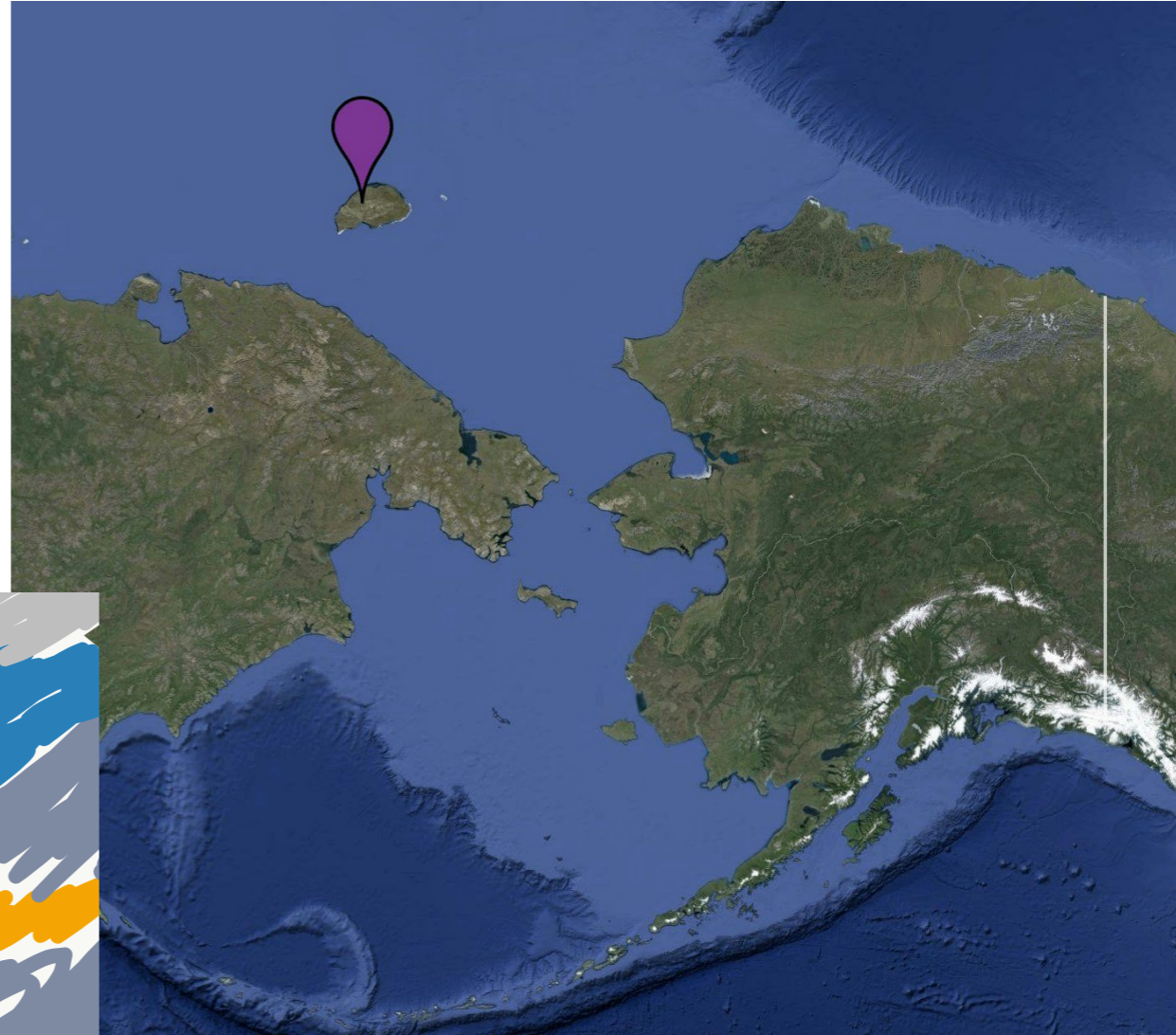
ATGCCGATA



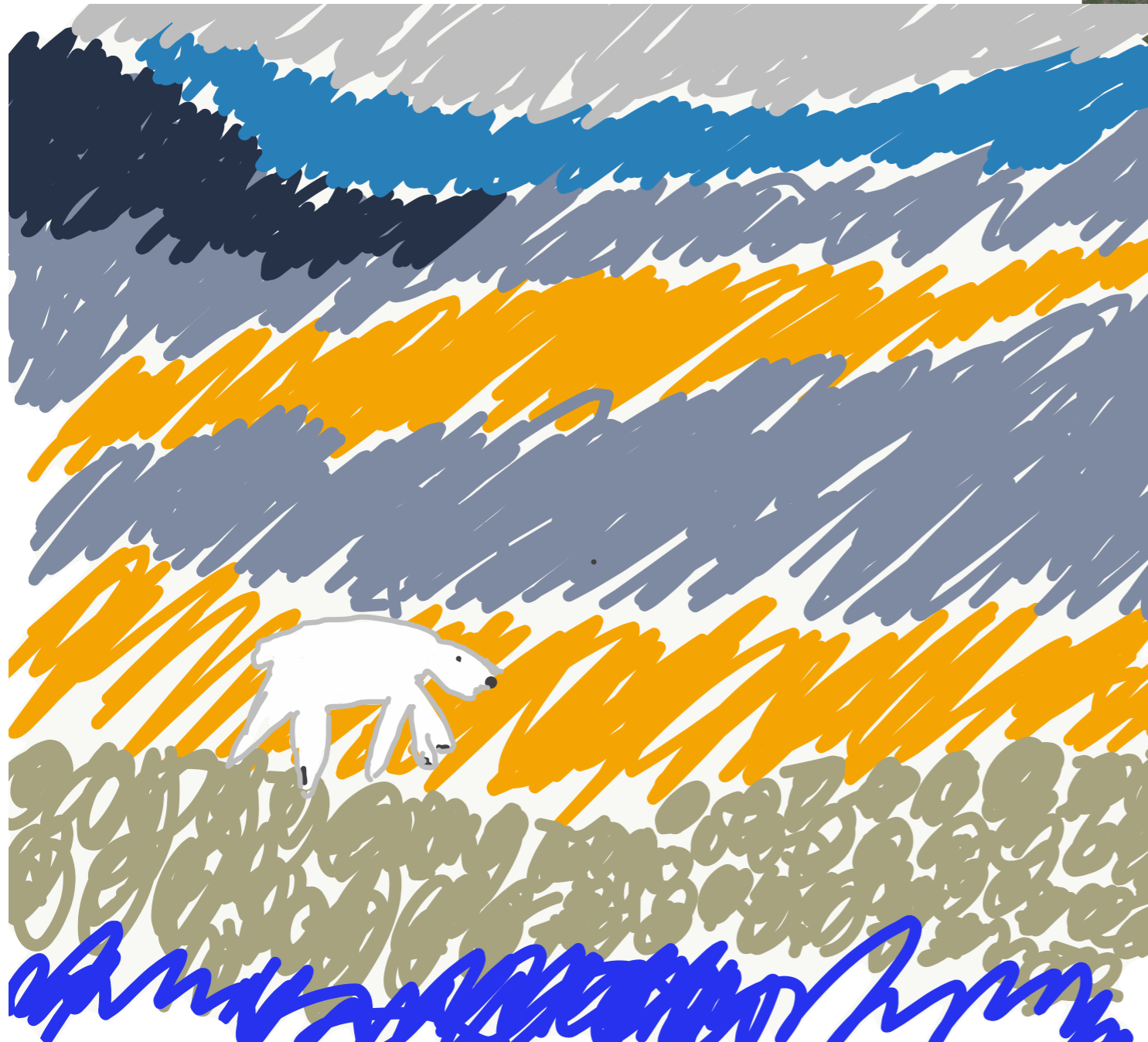
**High Coverage Genomic DNA
for 2 mammoths**

Wrangell Island

~9000-3700 yrs ago



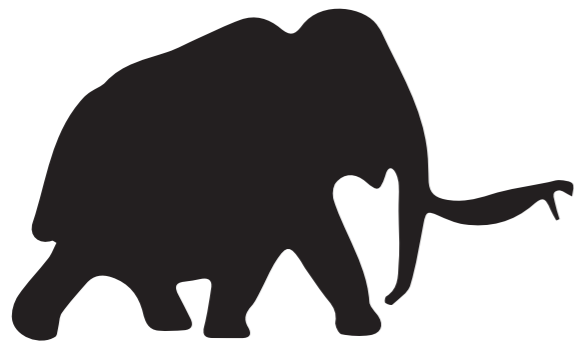
Google maps



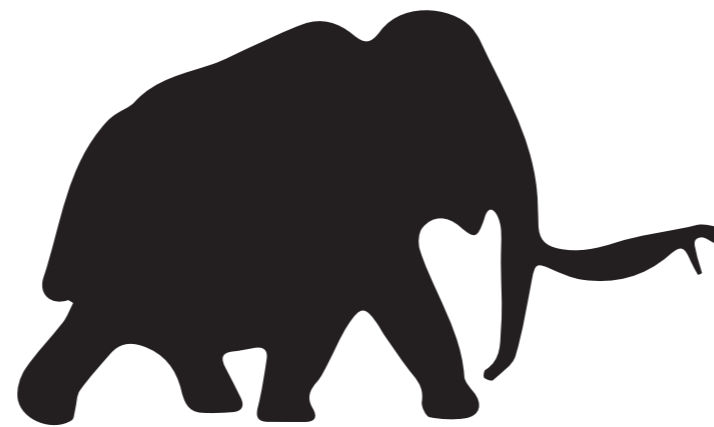
NOT Nat Geographic

Island Dwarfism

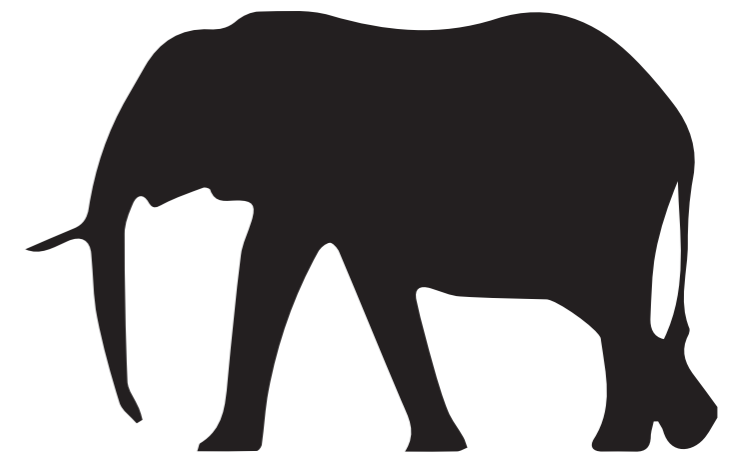
(Drawn to scale)



Wrangel Island Mammoth



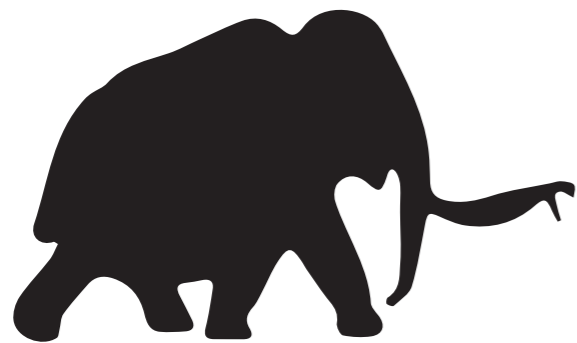
Mainland Mammoth
(*Mammuthus primigenus*)



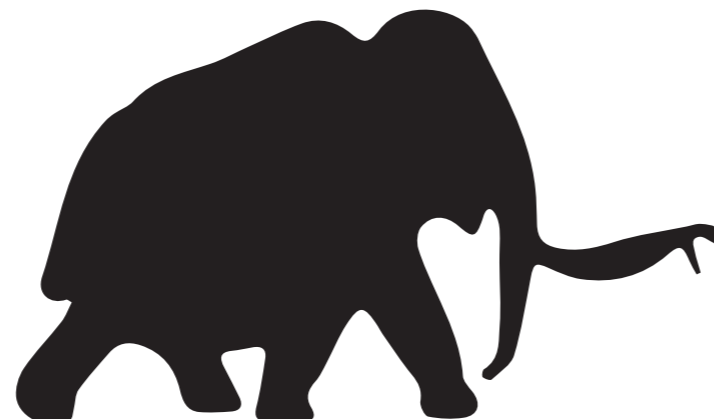
African Elephant
(*Loxodonta africana*)

Island Dwarfism

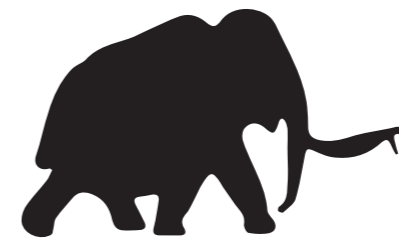
(Drawn to scale)



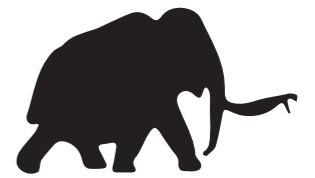
Wrangel Island Mammoth
(*Mammuthus primigenus*)



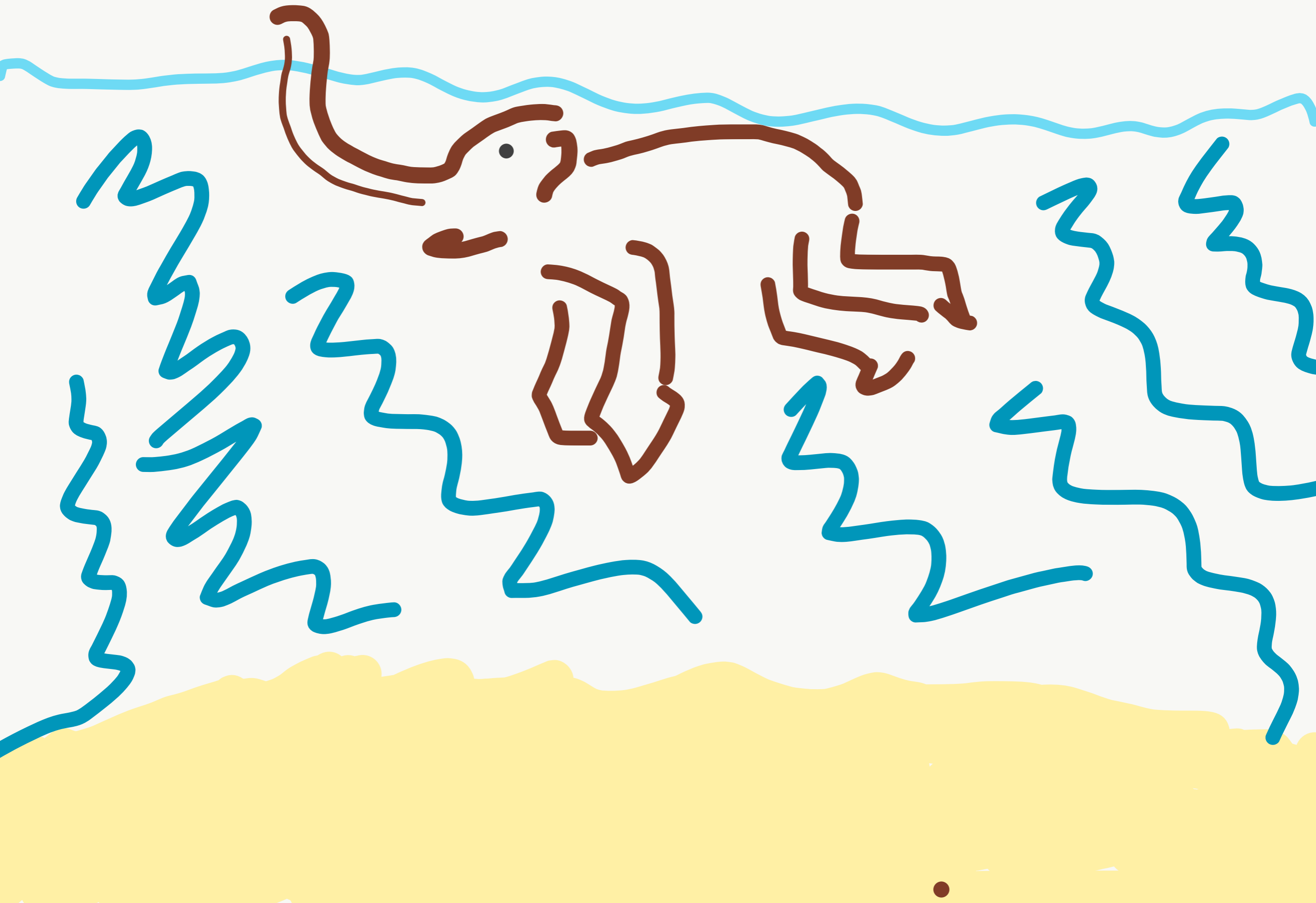
Mainland Mammoth
(*Mammuthus primigenus*)



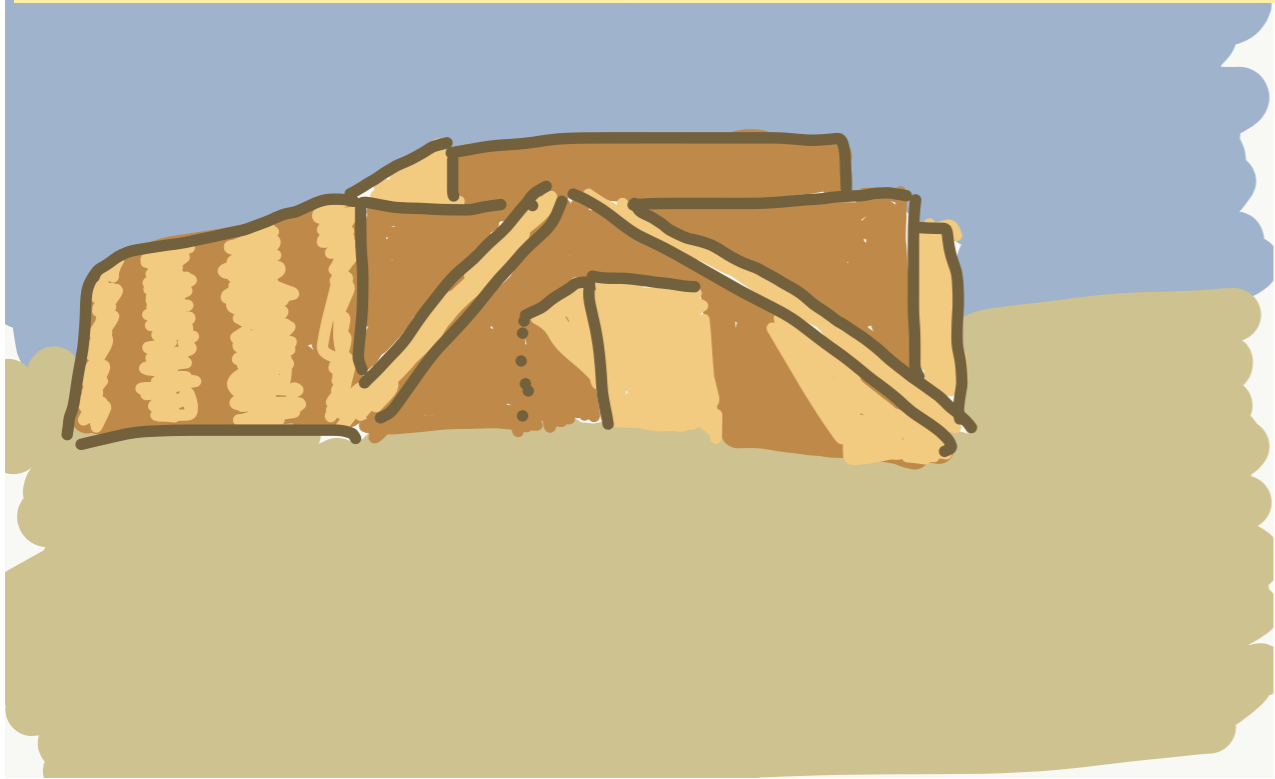
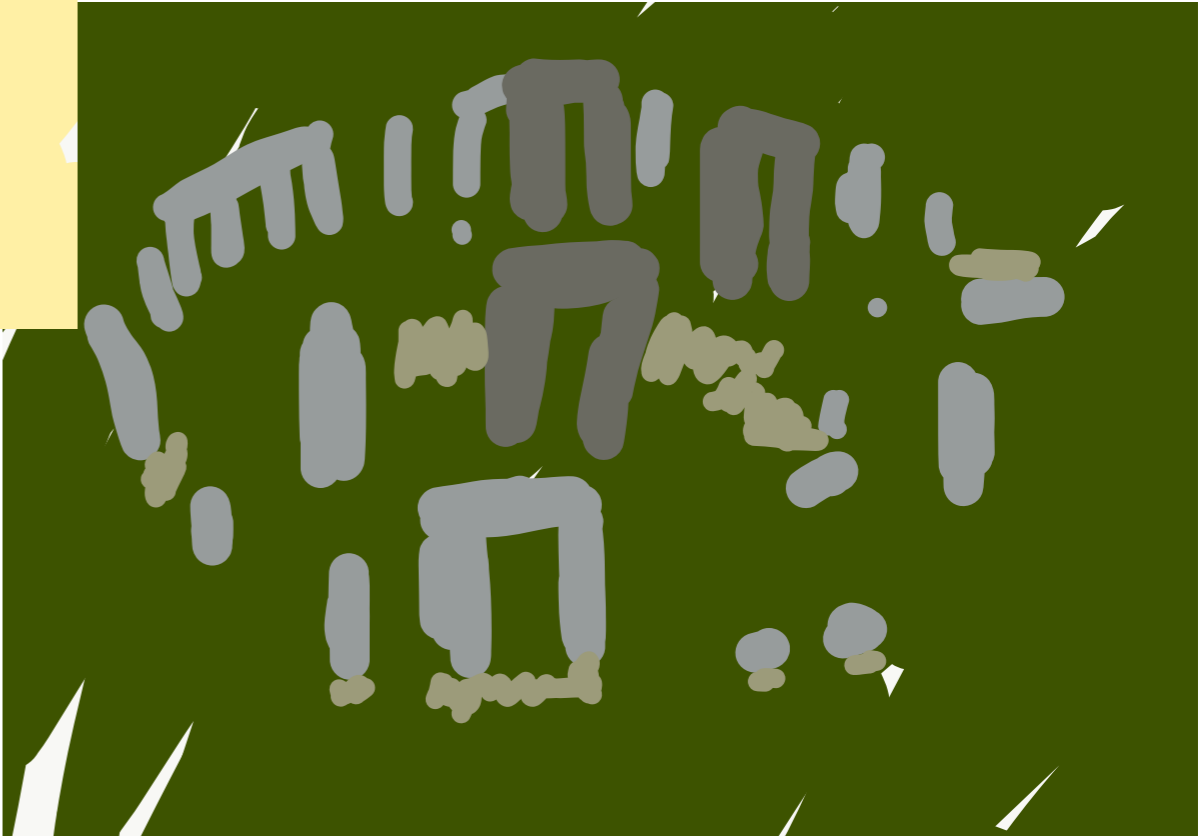
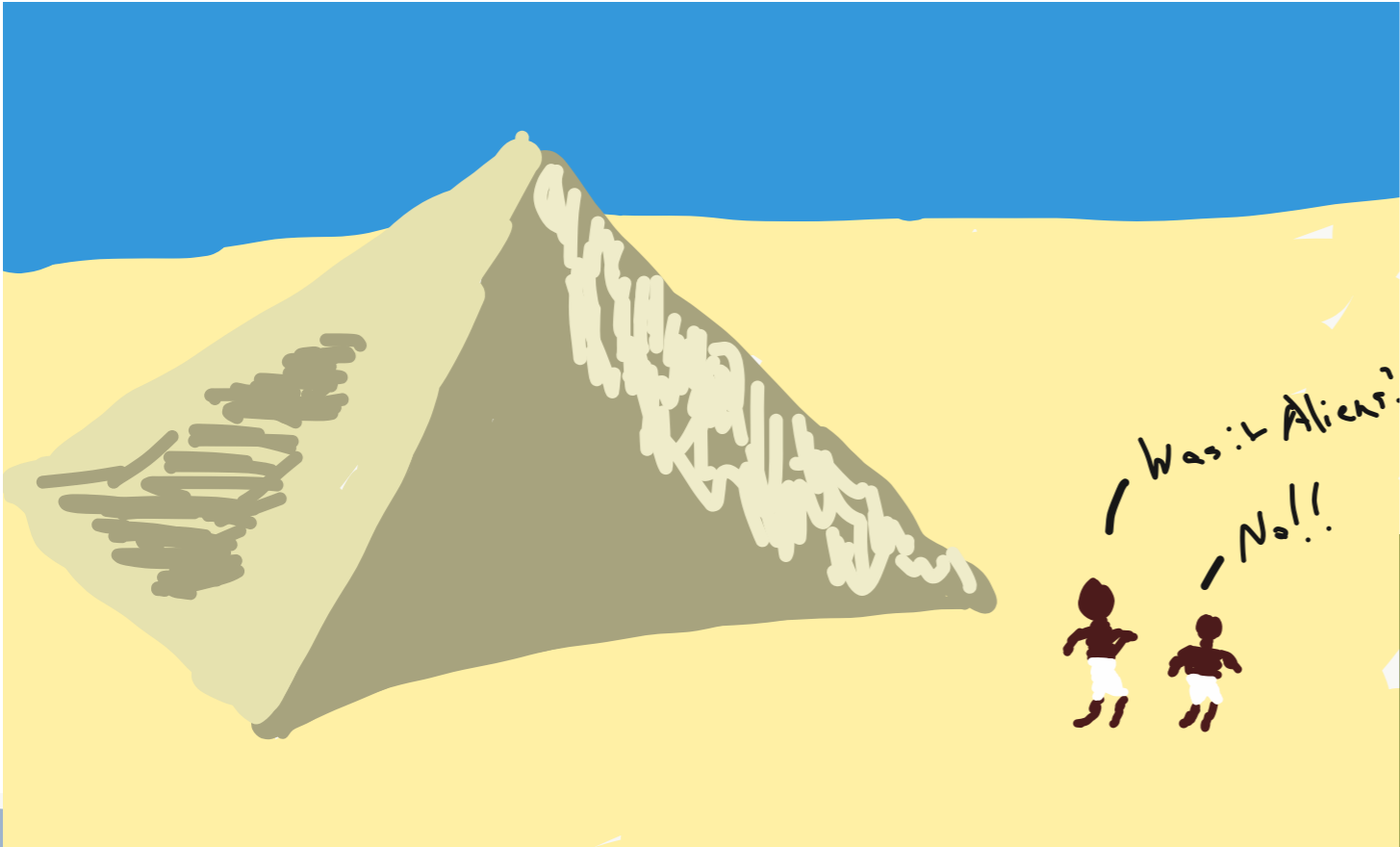
Channel Island Mammoth
(*Mammuthus exilis*)

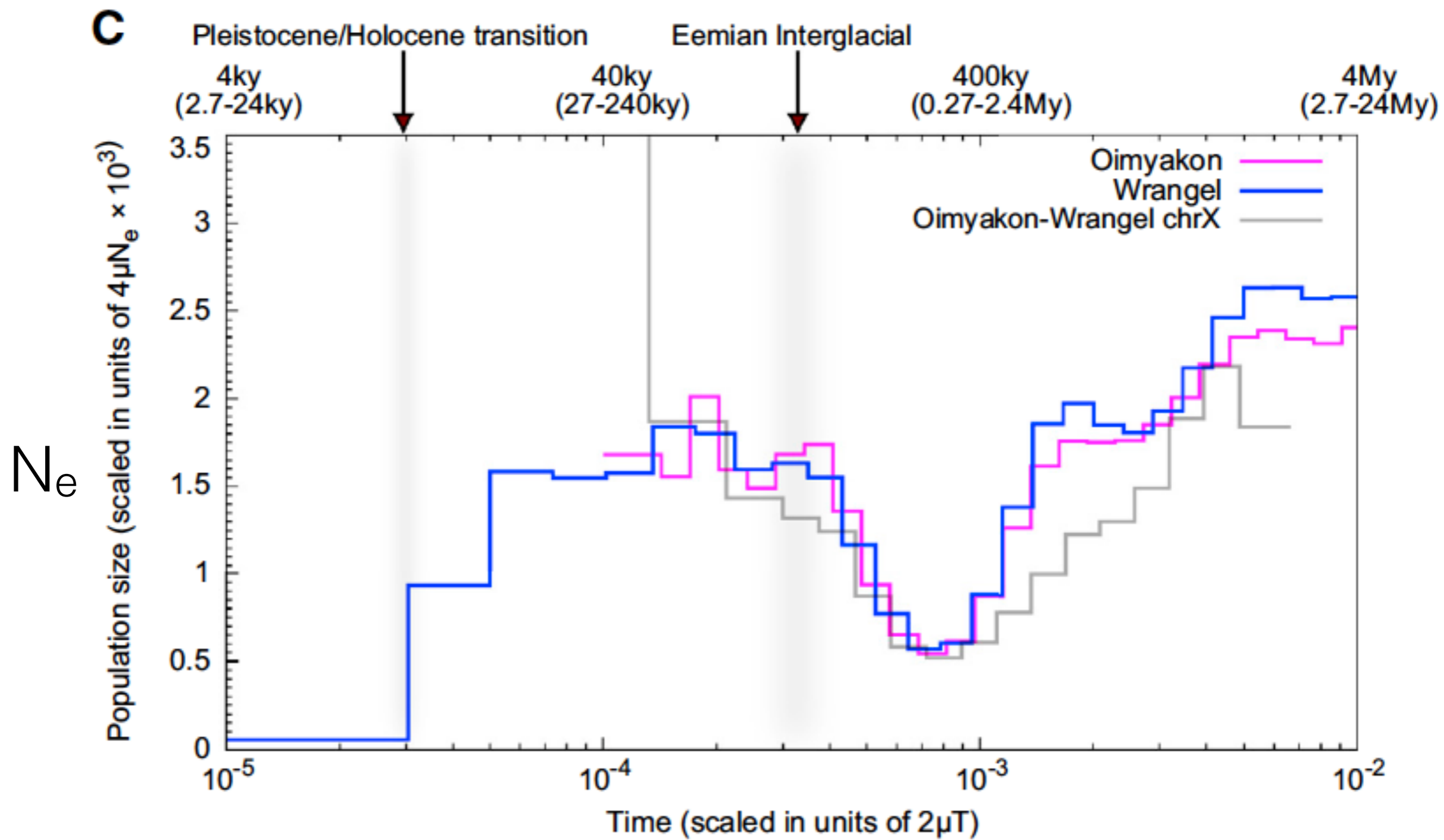


Cretan Mammoth
(*Mammuthus creticus*)



Extinction as late as 3700 yrs ago (1700 BCE)



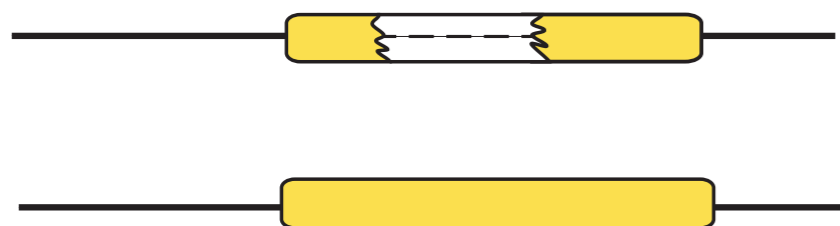


Palkoupoulo et al. 2015

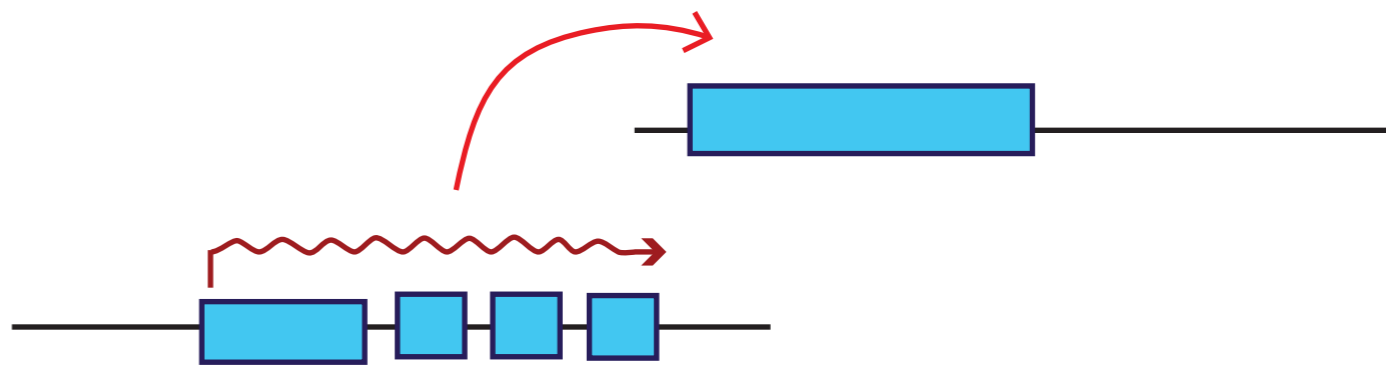
Nearly-neutral
models of
genome
evolution

BAD things happen when
population sizes are small.

Deletions



Retrogene formation



Stop codons



Oimyakon

Wrangel Island

Deletions

8573

13363

Retrogenes

2130

2853

Stop Codons

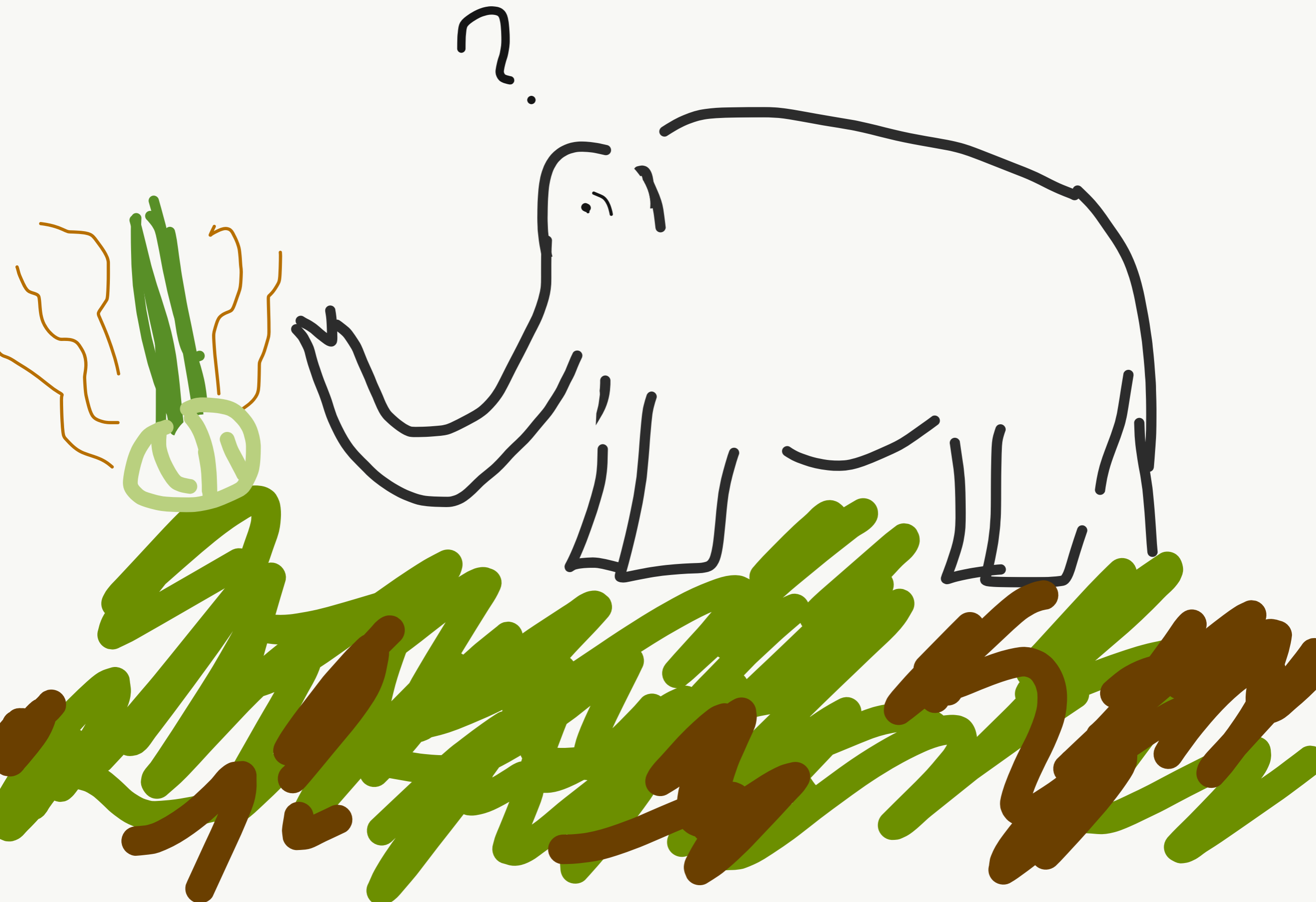
457

819

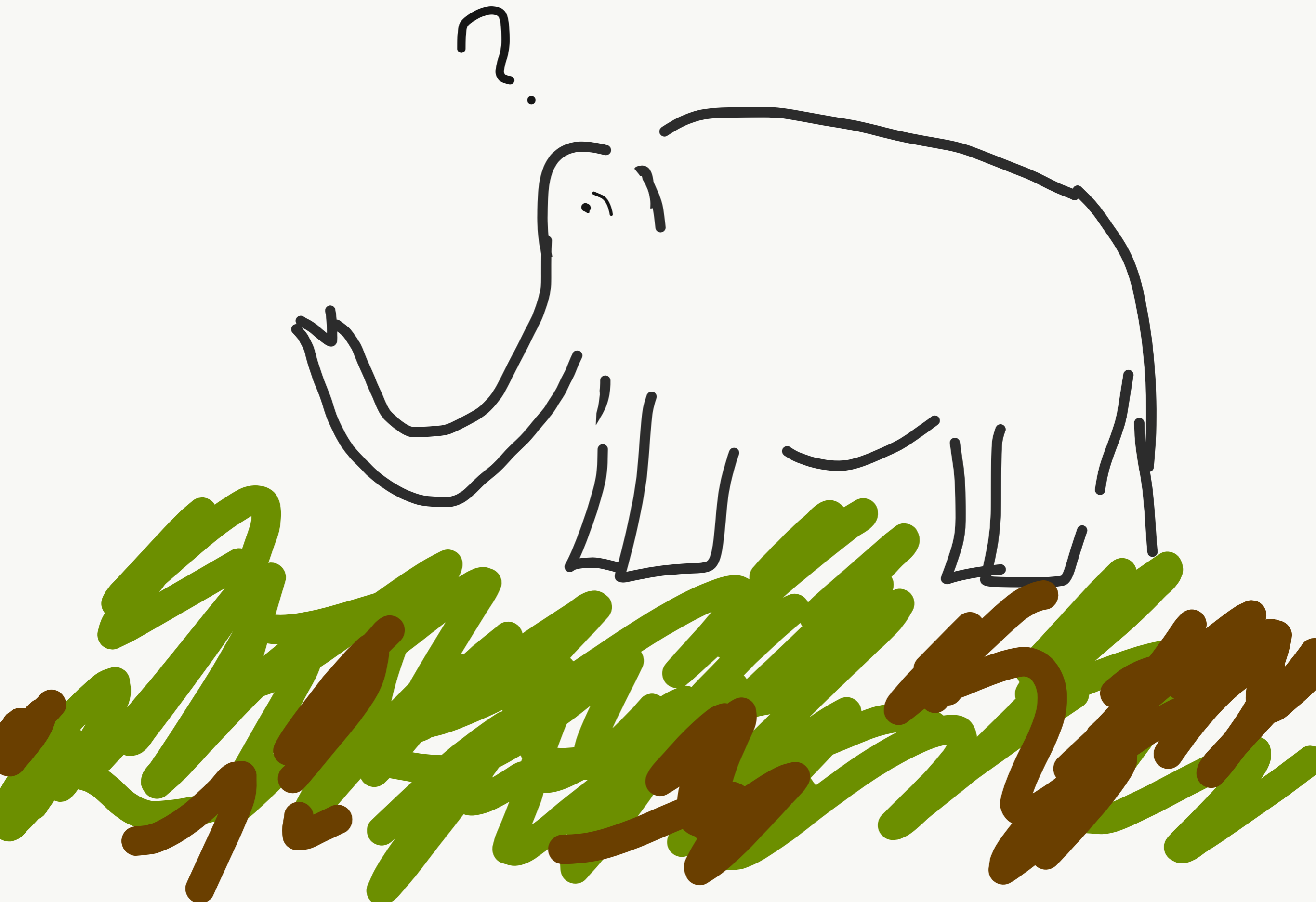
Ne

~15,000

~300

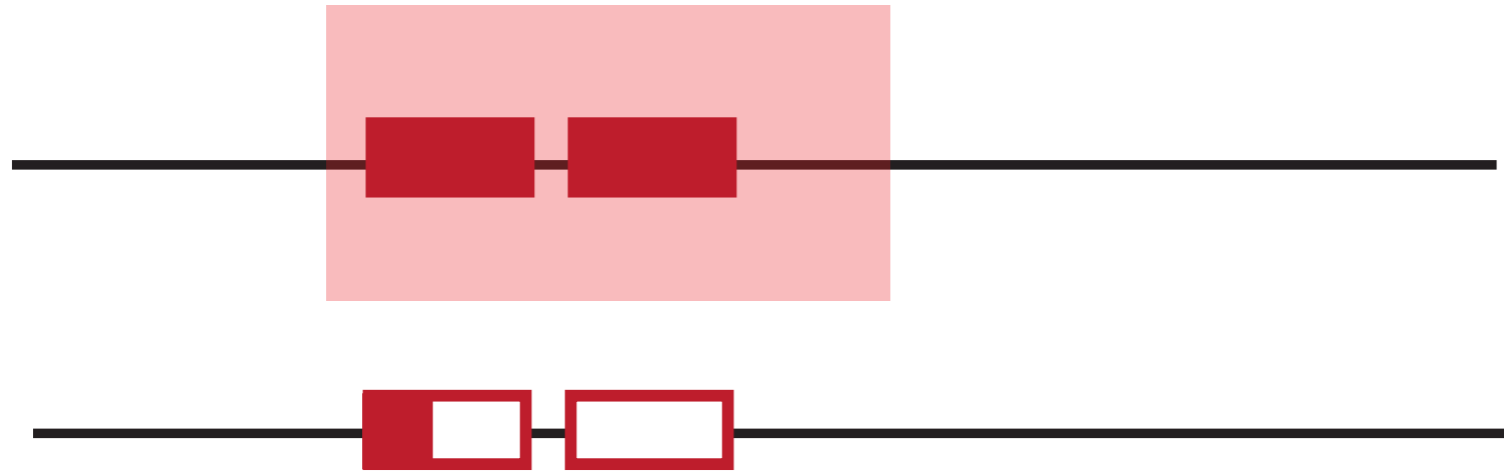






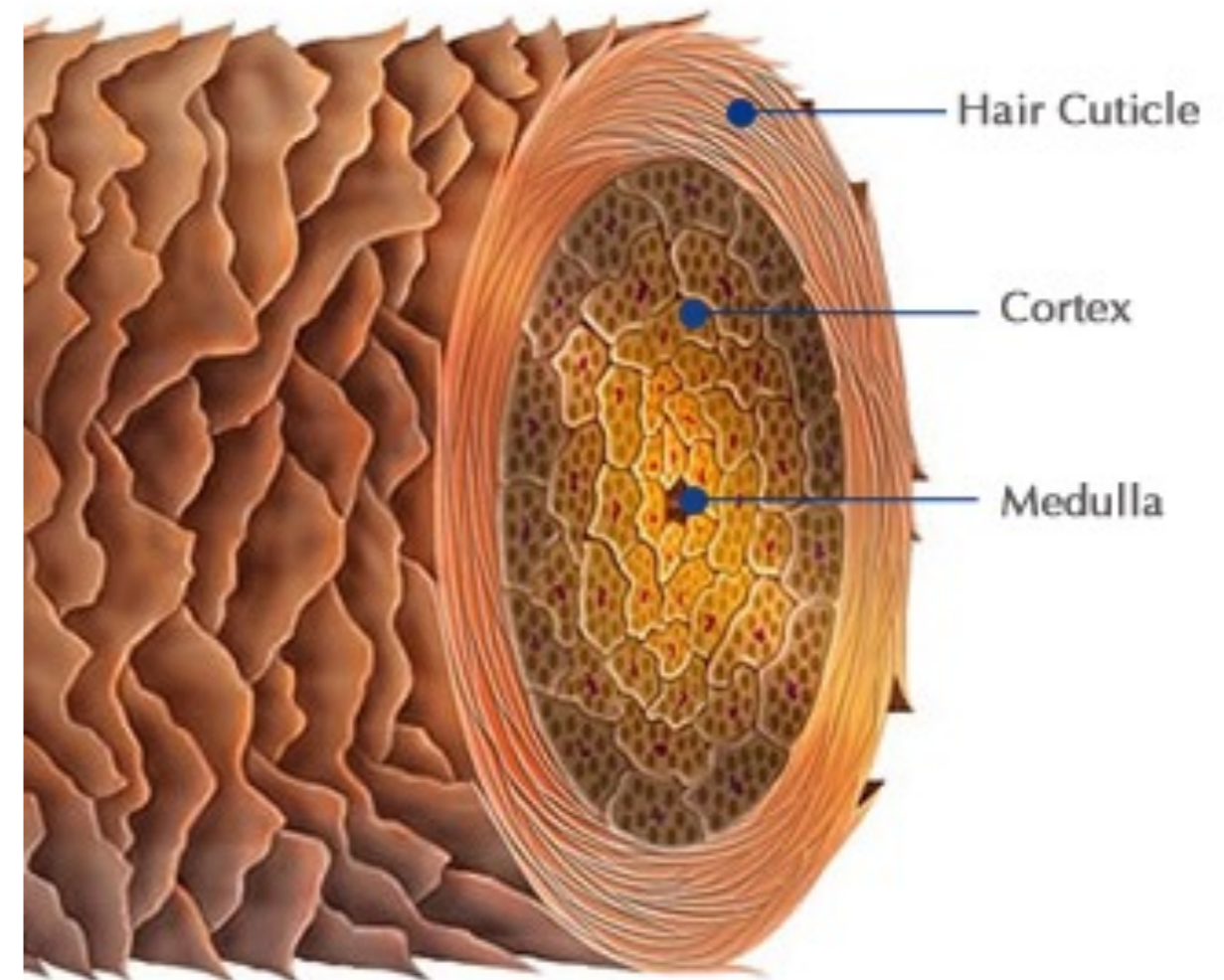


FOXQ1

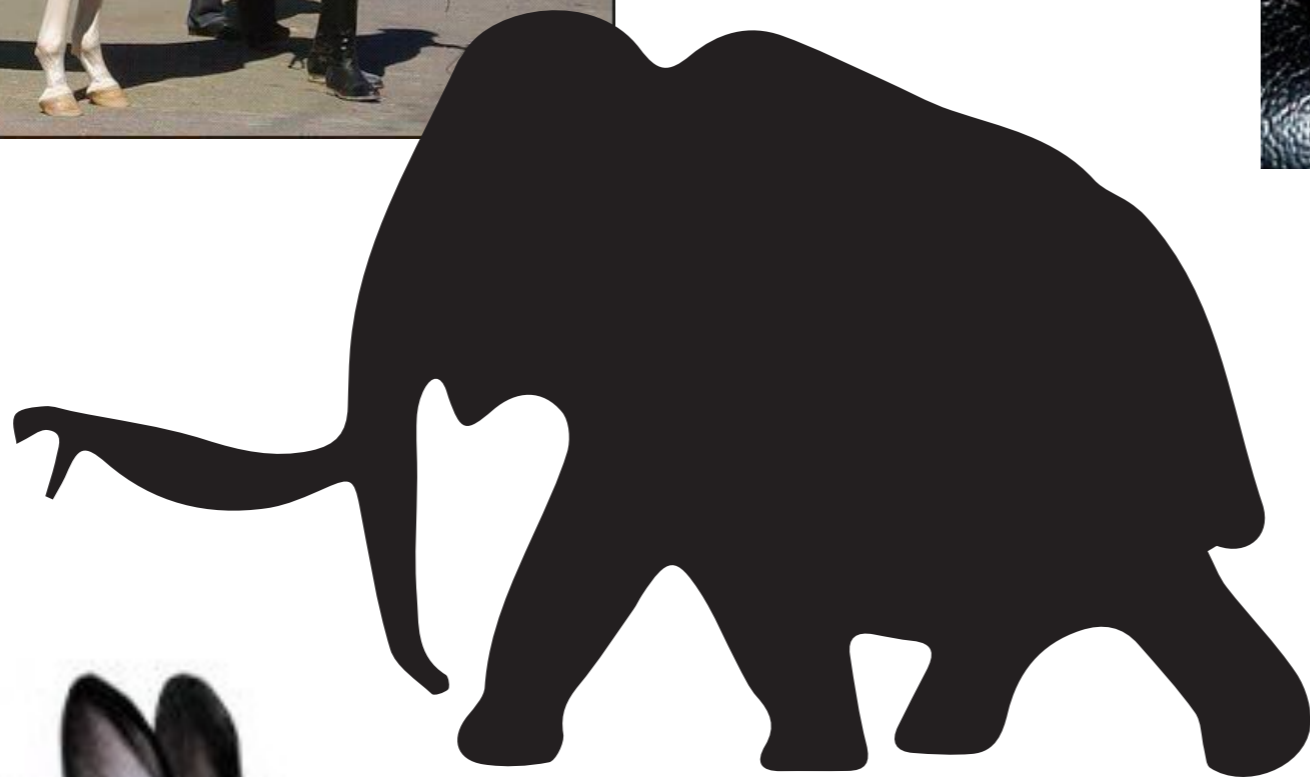


FOXQ1 forms medulla during hair formation

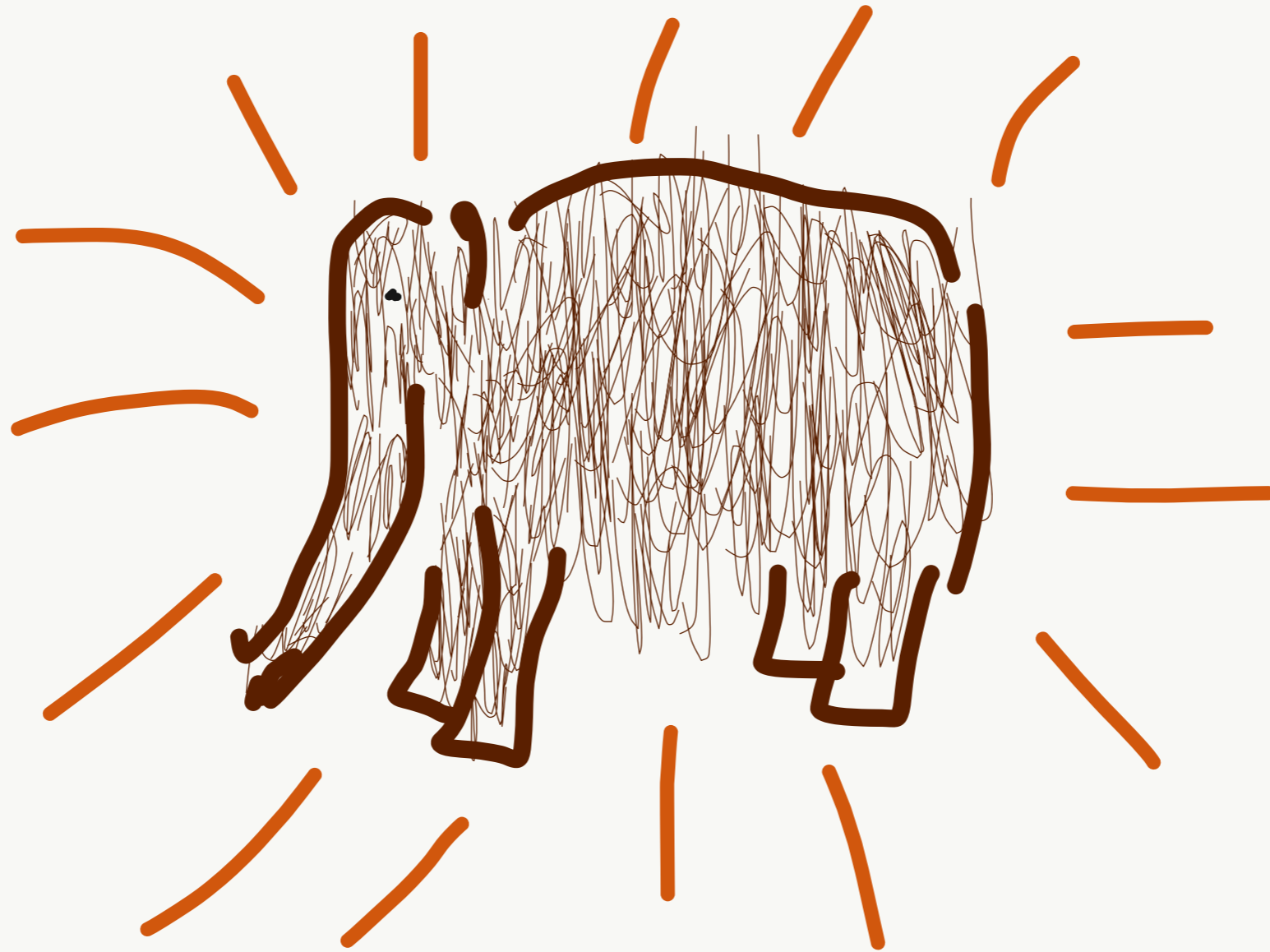
Hair Shaft - Cross section





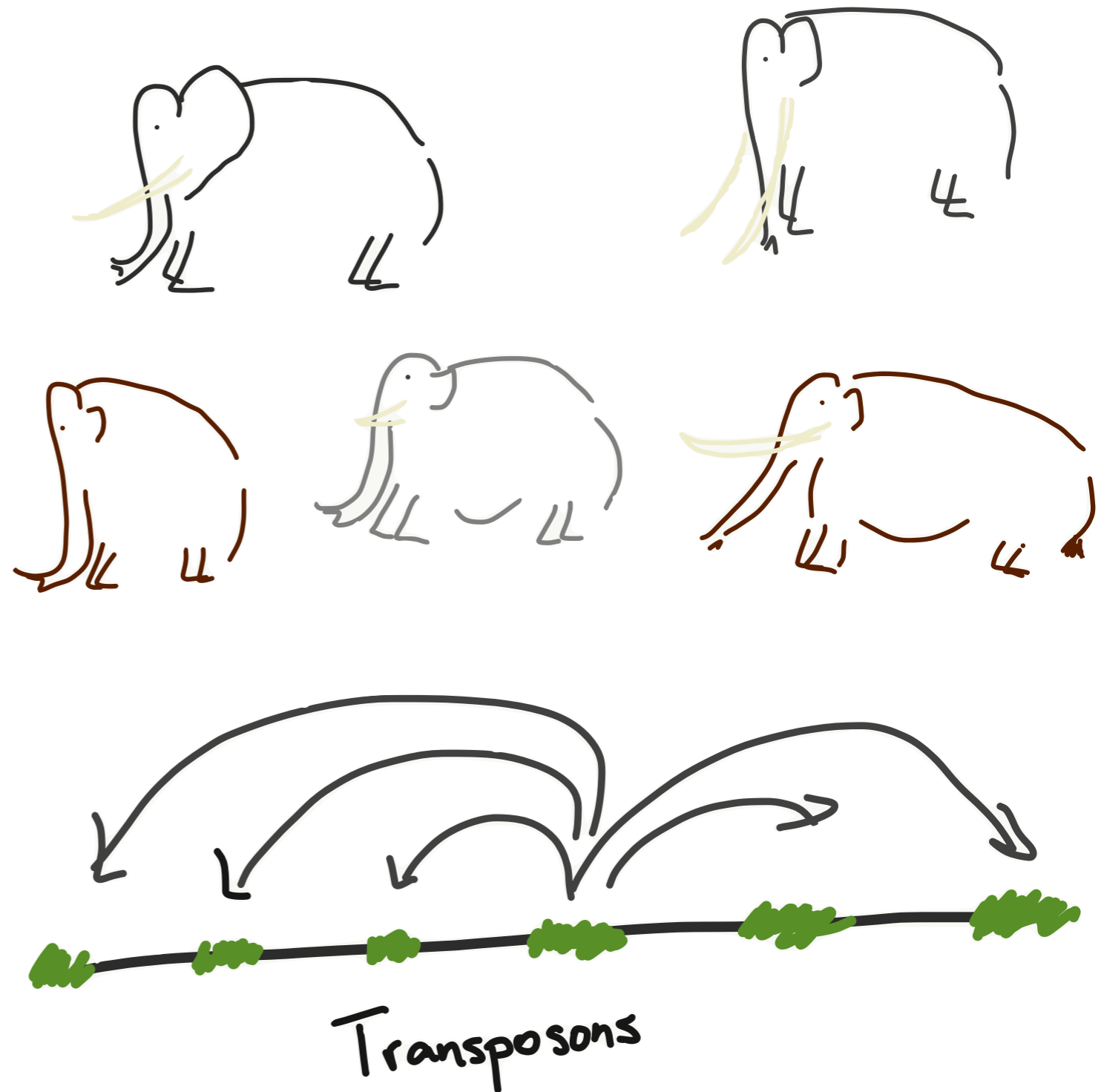


SHINY!





Rittika Mallik



What is happening to the genomes of other endangered species?

Muscle Shoals, Alabama



over 90 species of freshwater bivalves

Muscle Shoals, Alabama



over 90 species of freshwater bivalves

70% are endangered or extinct

Nearly-neutral
models of
genome
evolution

BAD things happen when
population sizes are small.

Natural Selection

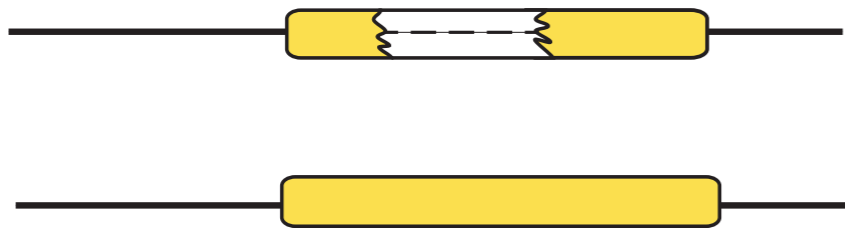
Are new genes helping
them adapt?

The Washboard Mussel
Megalonais nervosa

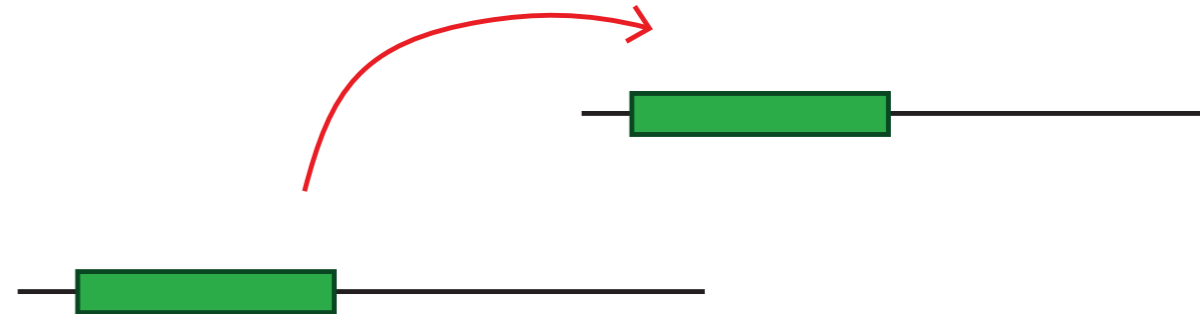


Genetic Novelty

Deletions



Translocations



Chimeric Genes



Duplicates



Retrogenes

