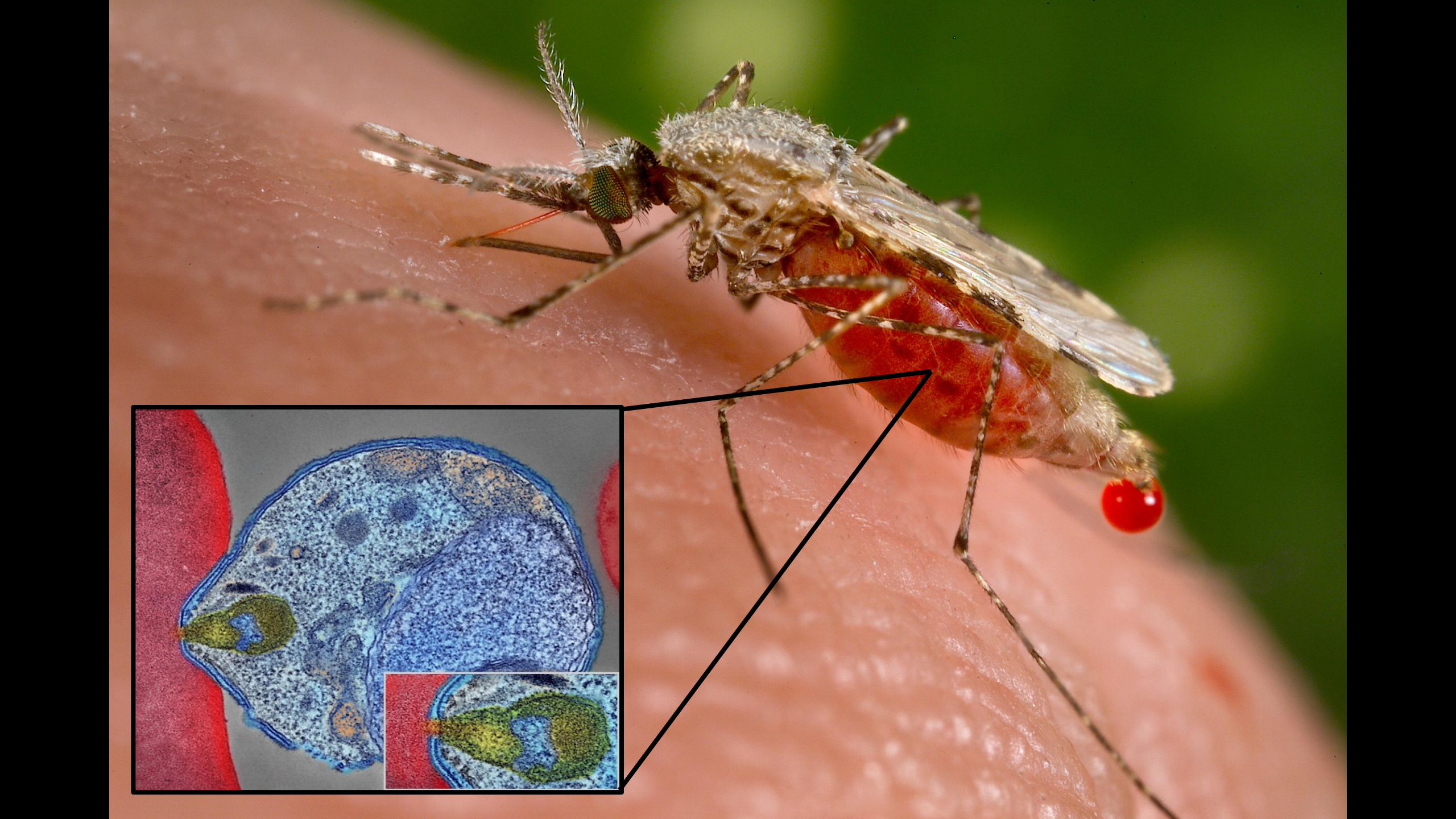
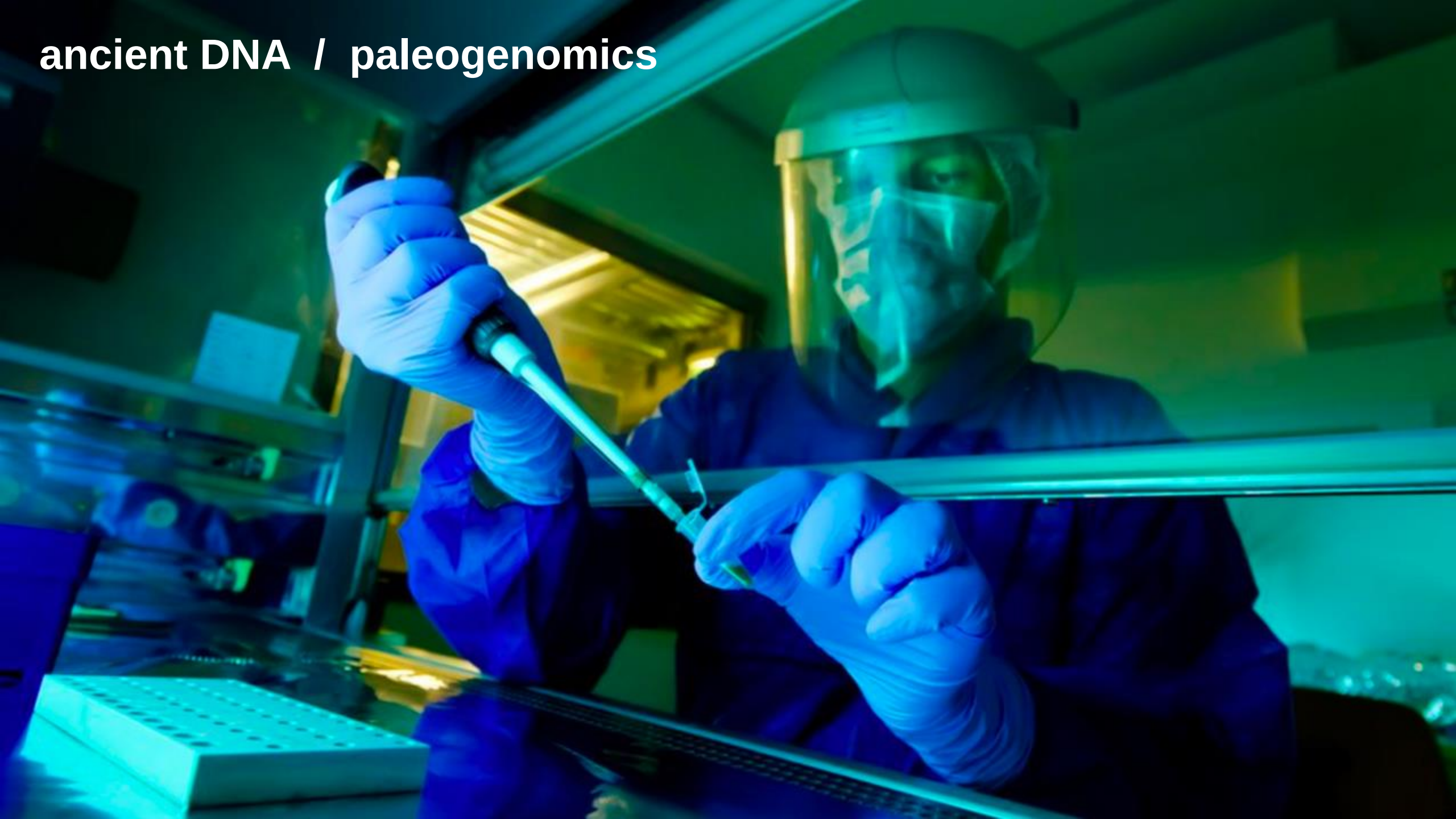
# Lawniczak Group

Evolutionary genetics

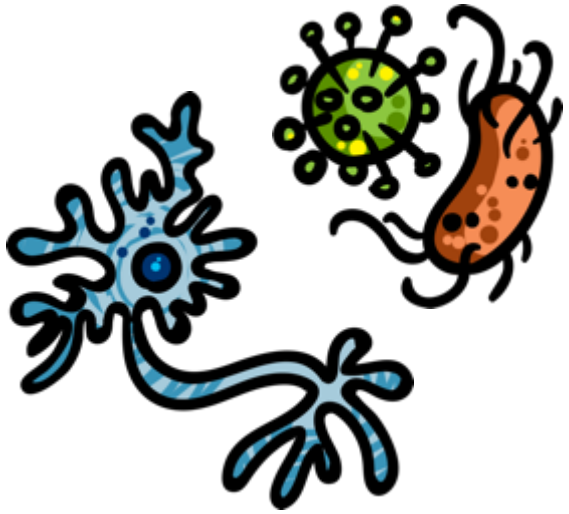


# Digging through old DNA (& genomes)

# ancient DNA / paleogenomics



# … but working with ancient DNA has its challenges



modern DNA

contaminant DNA ~99%

fragmented

backbone nicks

base modifications

ancient DNA

## How old is the oldest sequenced DNA?

1. 4,000 years (mummies)
2. 430,000 years (Neanderthals)
3. 1 million years (mammoths)
4. 65 million years (dinosaurs)

Researchers sequenced DNA from two mammoths that lived more than 1 million years ago, including a steppe mammoth (illustrated here), the direct ancestor to woolly mammoths. BETH ZAIKEN/CENTRE FOR PALAEOGENETICS

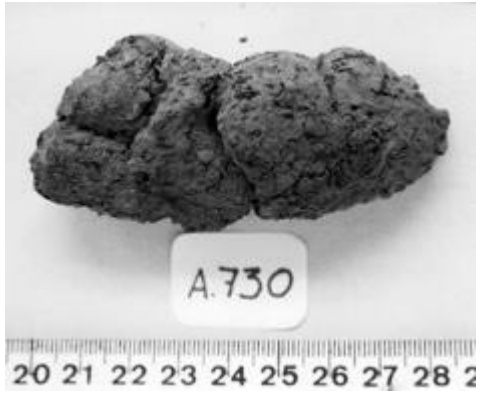
# Mammoth molars yield the oldest DNA ever sequenced

By Michael Price | Feb. 17, 2021 , 11:00 AM

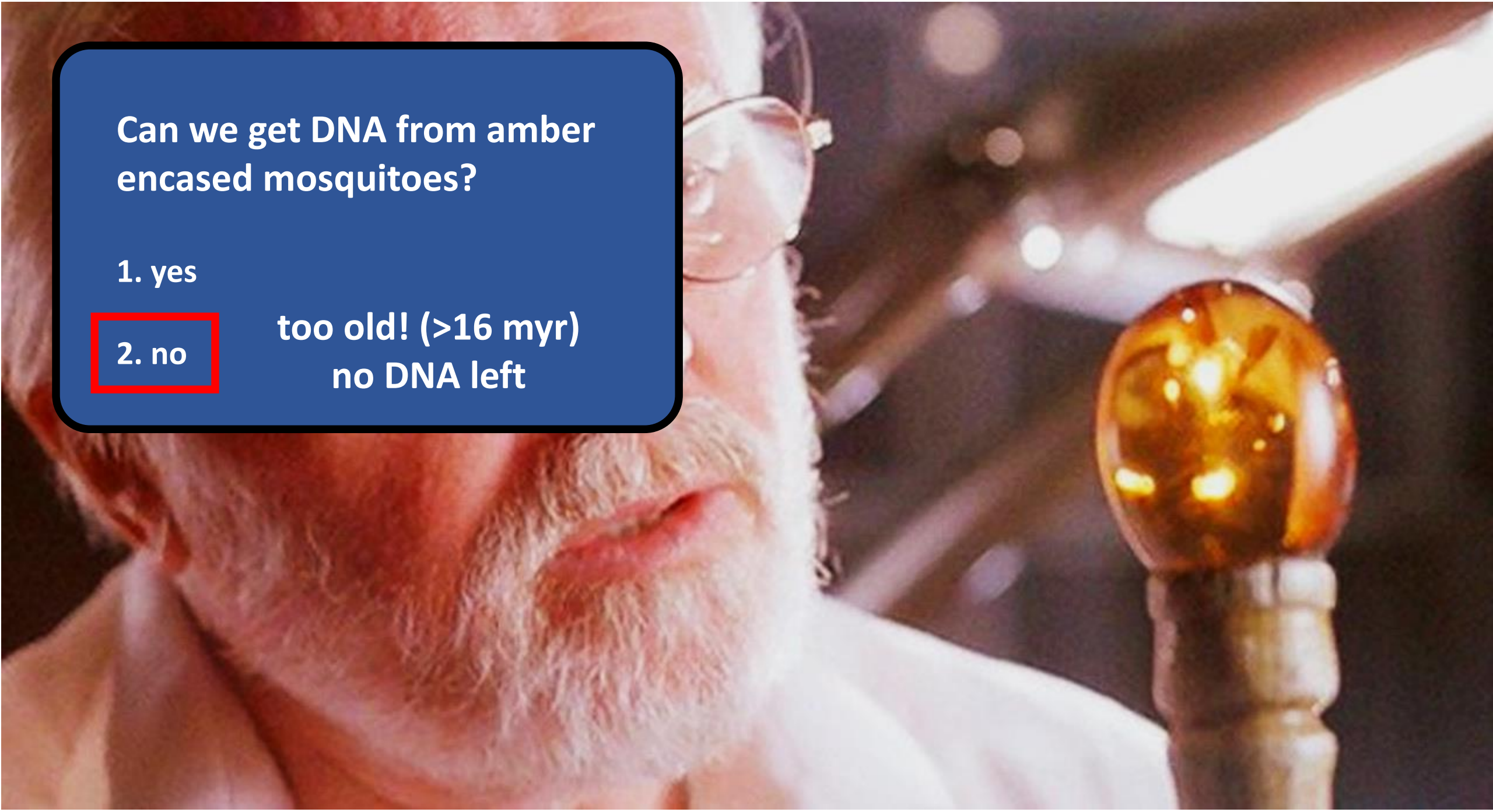
A genetic analysis of long-extinct Siberian mammoths has nearly doubled the record for the oldest DNA yet sequenced. The genetic material, from a creature that roamed frozen lands some 1.2 million years ago, pushes the study of ancient DNA closer to its theoretical limit—and reveals a new lineage of mammoth.

# ancient DNA sources

# “historic” DNA sources






Can we get DNA from amber encased mosquitoes?
1. yes
2. no
too old! (>16 myr)
no DNA left

# malaria transmitting mosquitoes
# *Anopheles* – Ancient Greek for “useless”


# A collaboration with the London NHM

**Dr Erica McAlister**
**Senior Curator, Diptera**
**Culicidae collections**

# The old insects “cleanroom”


**T222**

**HISTORIC DIPTERA LAB**

**(pre-PCR lab)**




**Please do not:**

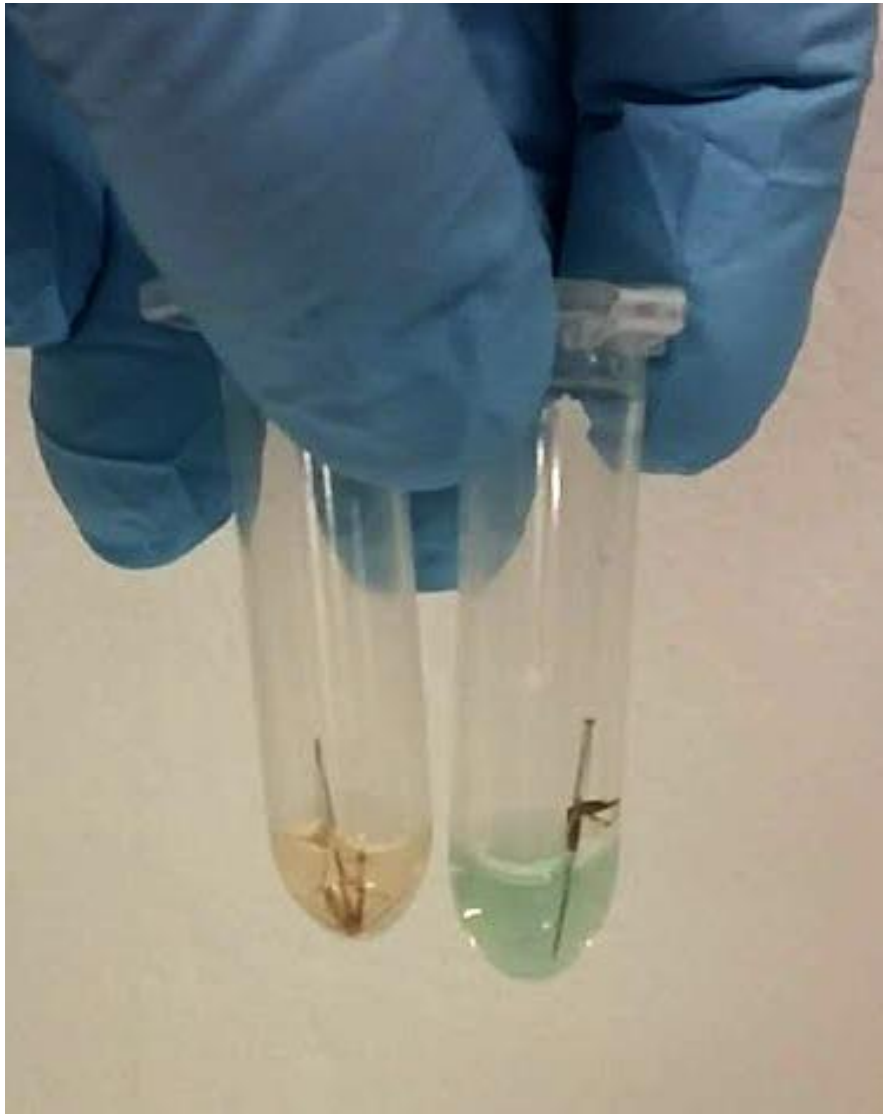
- **use equipment to process any present-day Diptera samples**
- **enter if you have worked on Diptera PCRs today**

**Thanks!**

**Petra (pk10)**

# The “Fly Spa”


rehydration in water vapour chamber



gentle incubation in DNA lysis buffer

# Minimally morphologically destructive DNA extraction

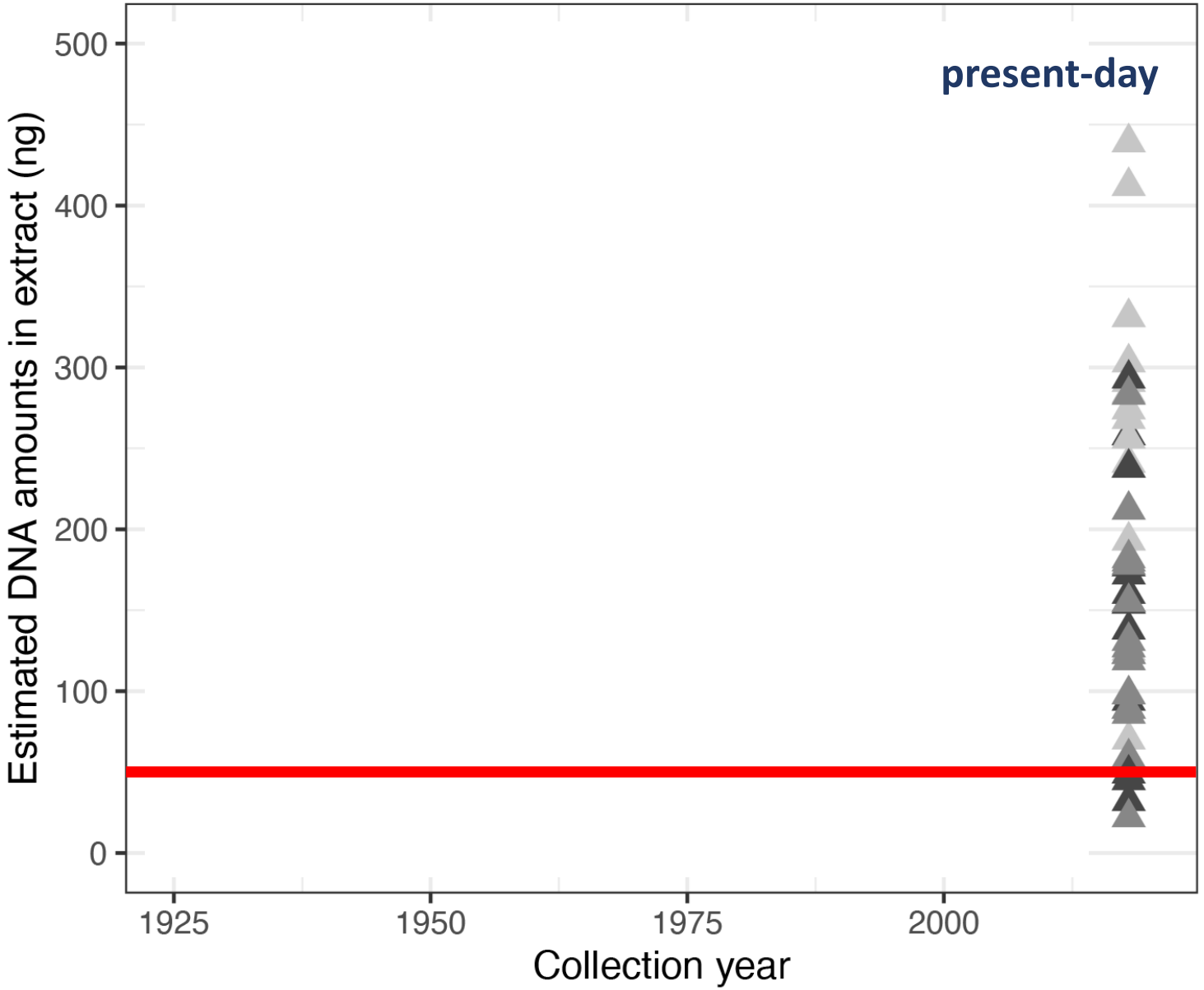
before


after

# DNA quality in historic mosquitoes (amounts)

**How much DNA can we get from these samples in nanograms (ng)?**

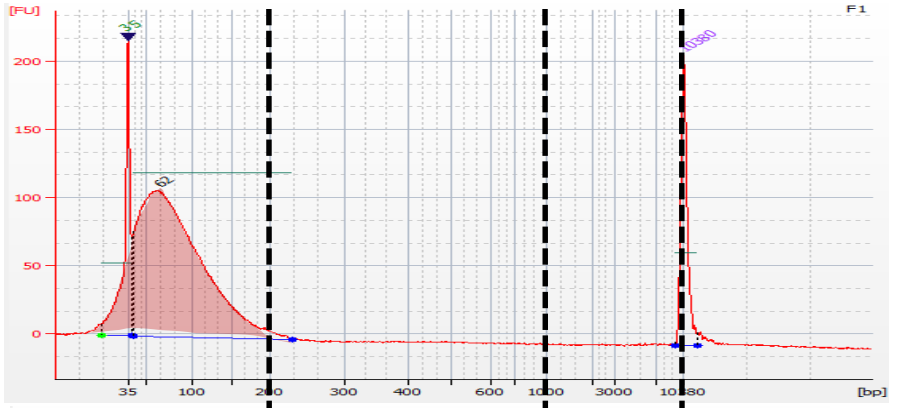
1. <50 ng
2. 50-150 ng
3. 150-300 ng
4. >300 ng



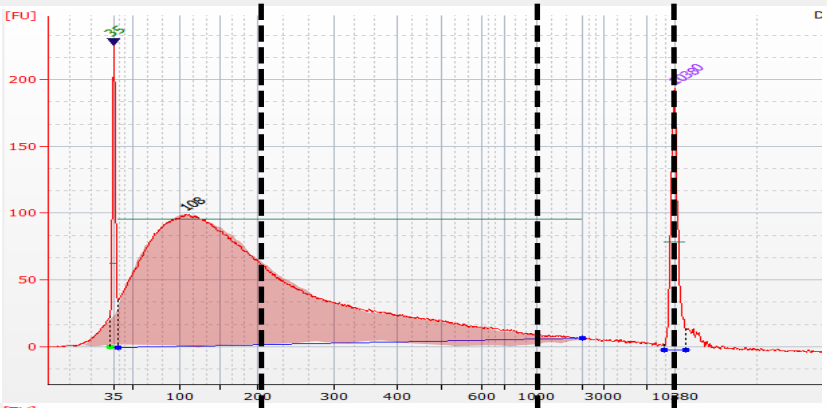
# DNA quality in historic mosquitoes (lengths)

How long is the DNA we get from these samples in base pairs (bp)?

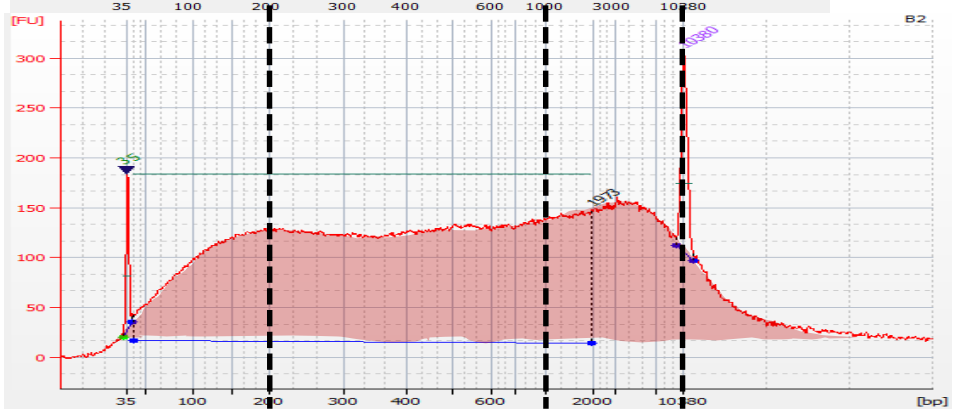
1. <200 bp
2. 200-1,000 bp
3. 1,000-10,000 bp
4. >10,000 bp




1933



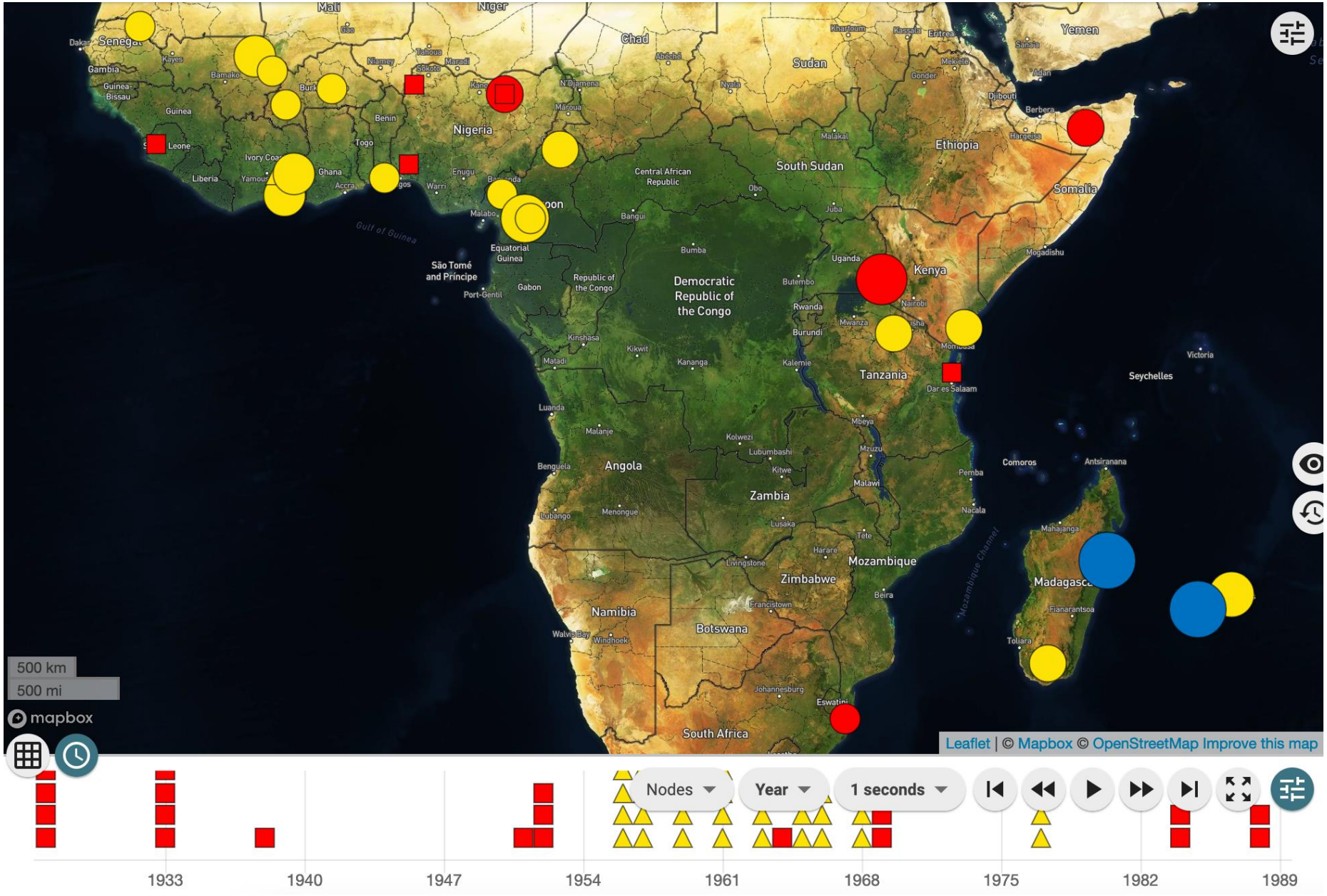

1964




1984

200 1,000 10,000

# Future steps for Project Neandersquito




**We now have ~200 historic malaria mosquitoes sequenced and plan to compare them to their present-day living great-great-(…)-grandchildren!**

# The Neandersquito Team