

CAGT

Centre d'Anthropobiologie et de Génomique de Toulouse  
CAGT UMR 5288 CNRS

# L'ADN fossile, une machine à remonter le temps

*Les tests ADN en archéologie*

Ludovic Orlando | [ludovic.orlando@univ-tlse3.fr](mailto:ludovic.orlando@univ-tlse3.fr)

# "THE NEANDERTHAL MAN

He held them  
all in the grip of  
deadly terror  
... nothing could  
keep him from  
this woman he  
claimed as  
his own!

STARRING  
ROBERT SHAYNE  
RICHARD CRANE  
DORIS MERRICK  
JOYCE TERRY

Directed by E. A. DUPONT  
Written and Produced by  
AUBREY WISBERG and  
JACK POLLEXFEN

A WISBERG POLLEXFEN PRODUCTION  
PRESENTED BY GLOBAL PRODUCTIONS  
RELEASED THRU UNITED ARTISTS

HALF MAN... HALF BEAST...

# Les Néanderthaliens

Nos Plus Proches Cousins







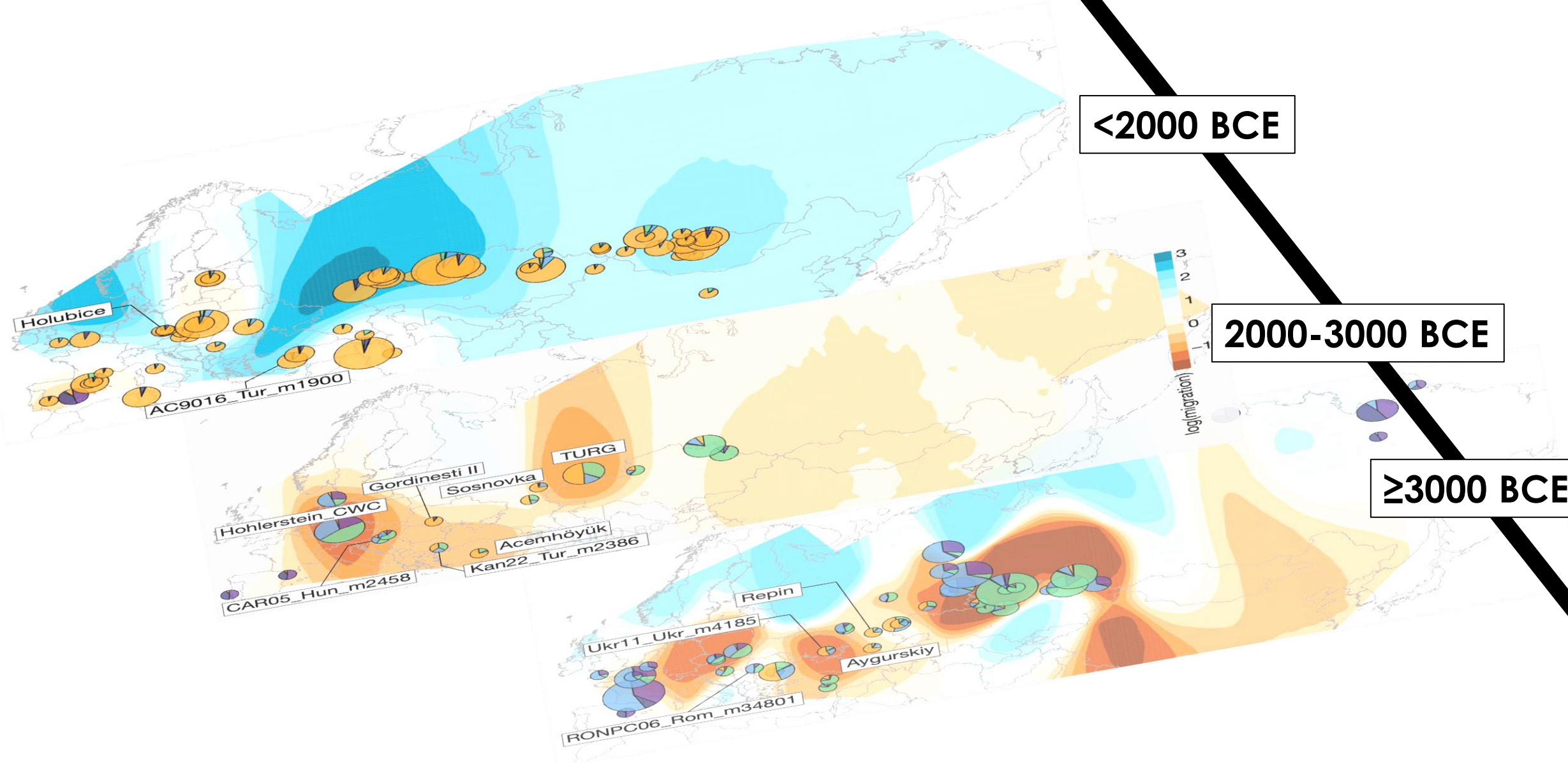
**QUI? QUAND? OÙ? COMMENT?**

Aujourd'hui

<2000 BCE

2000-3000 BCE

≥3000 BCE









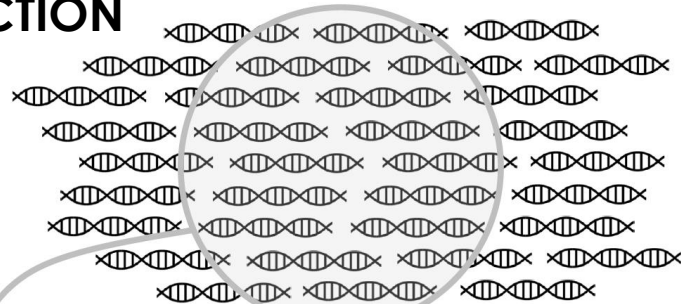




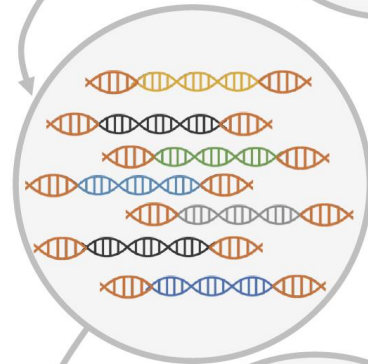
# Approche Méthodologique

Séquençage Aléatoire en Rafale

**EXTRACTION**

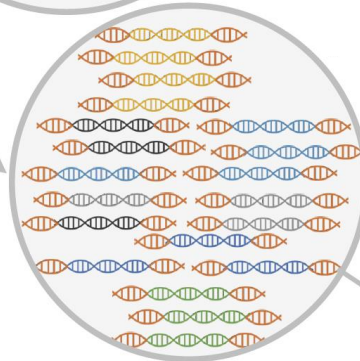


**BANQUE D'ADN**



**AMPLIFICATION**

[PCR]



**SÉQUENÇAGE**

[NGS]



**GÉNOME**

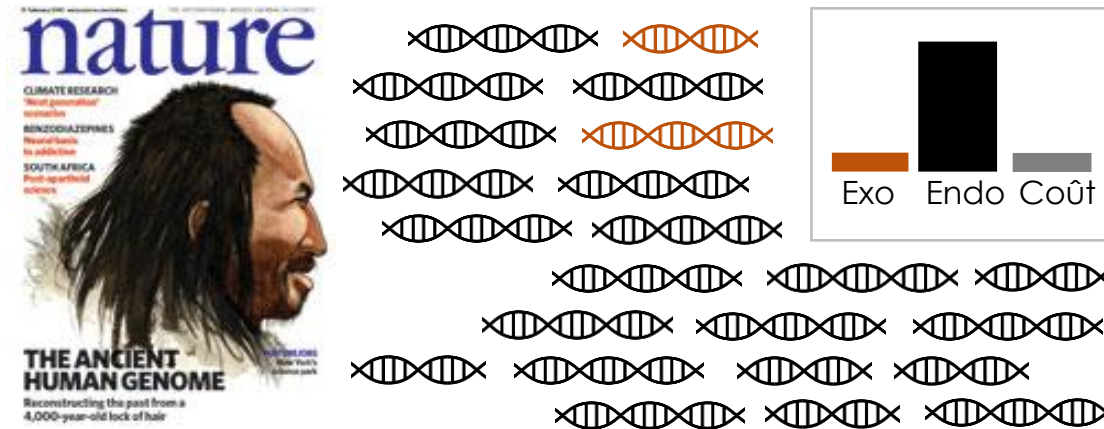
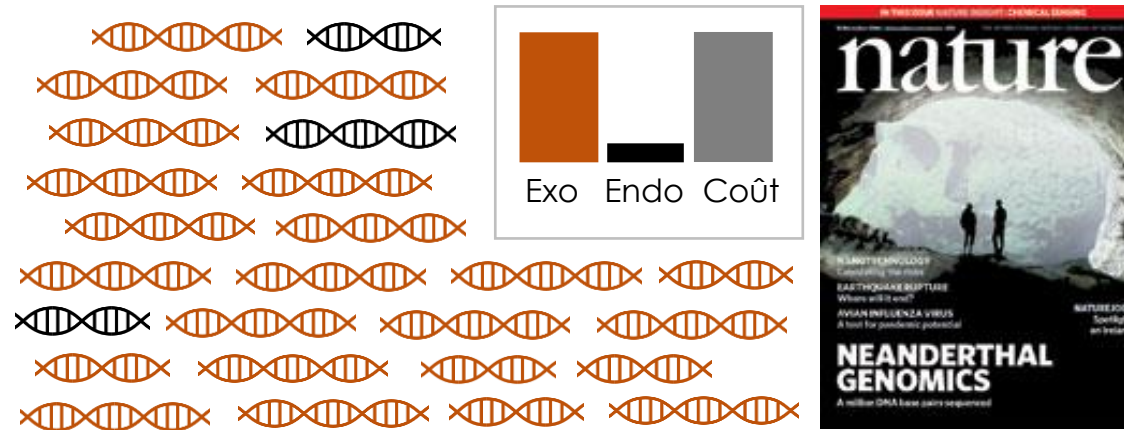
[Référence]



# Approche Méthodologique

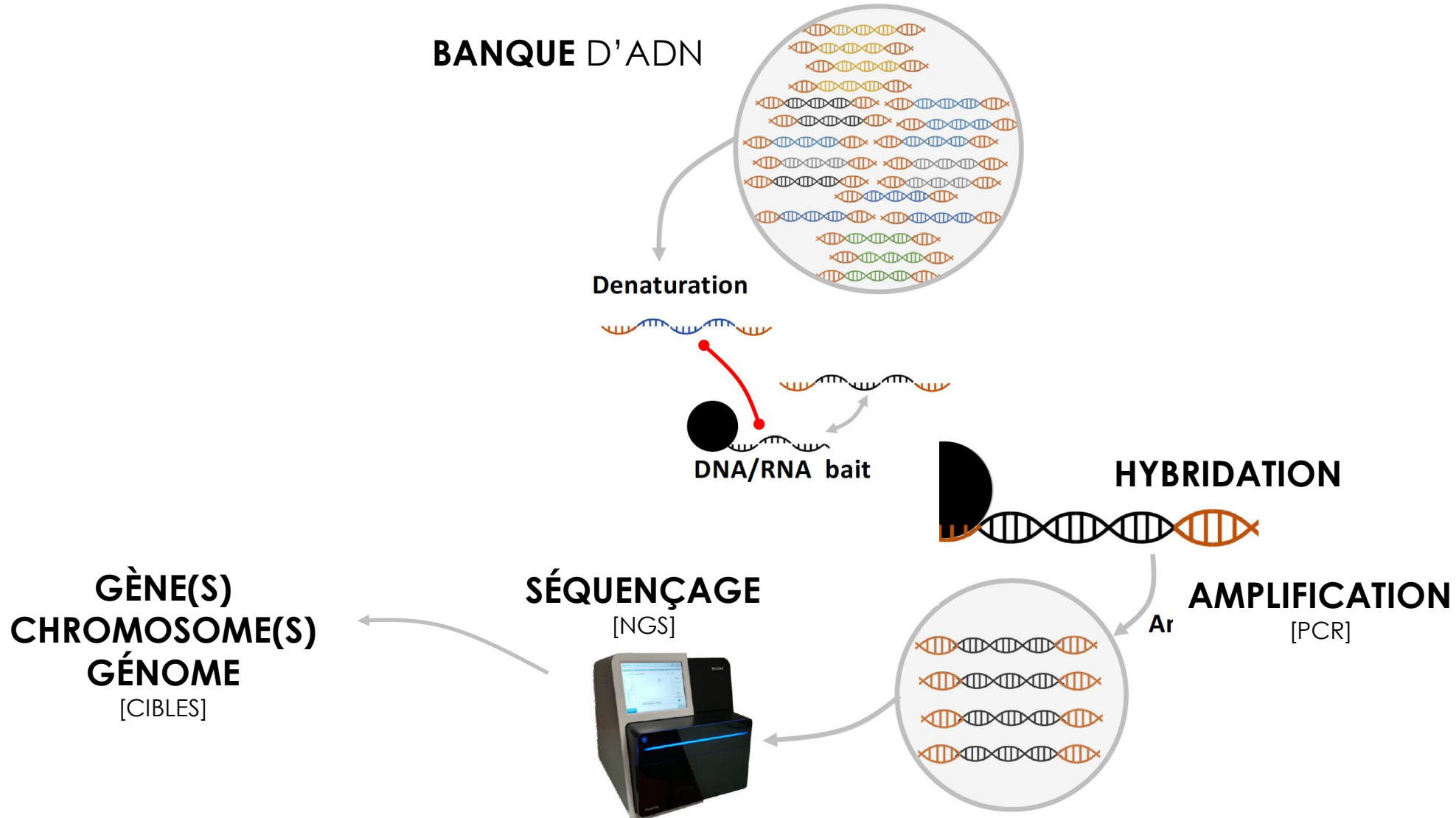
Une Soupe Métagénomique

Endogène  
Exogène



# Approche Méthodologique

## Capture Génique



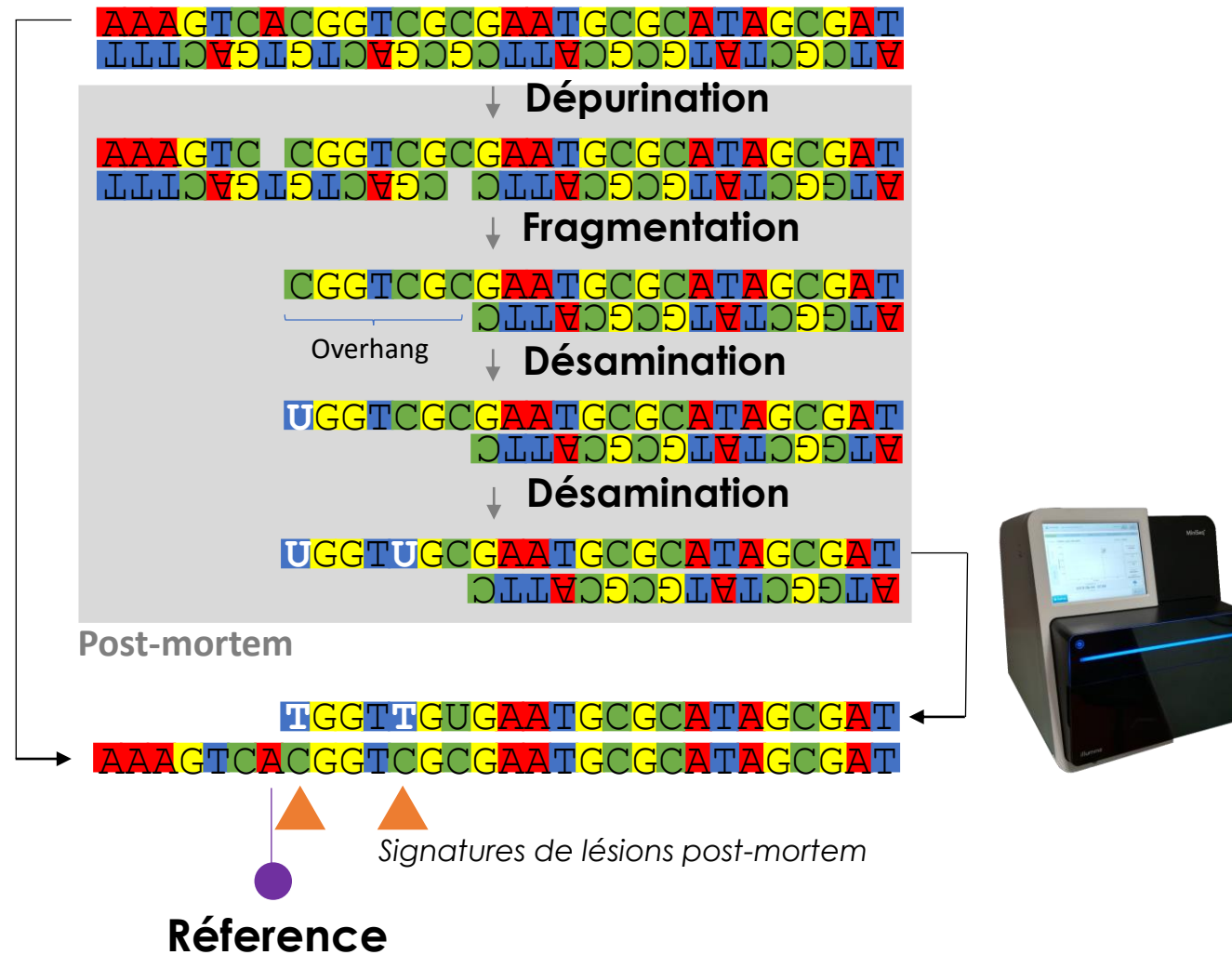


Phenotype reconstruction based on mammoth nuDNA (possibly contaminated)

Hunter EMBO Rep 2006

# Approche Méthodologique

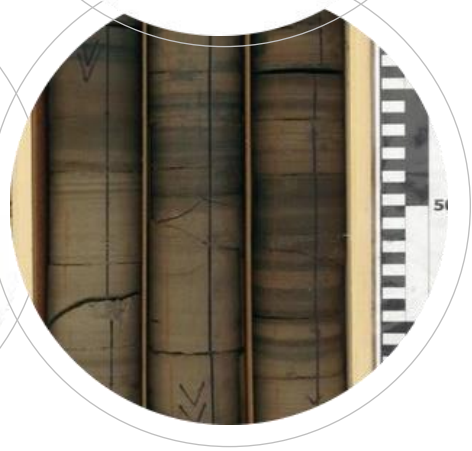
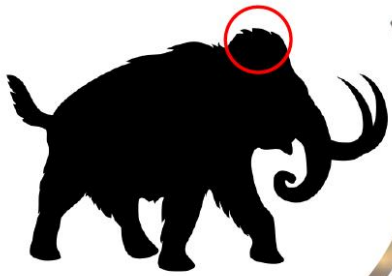
Authentification





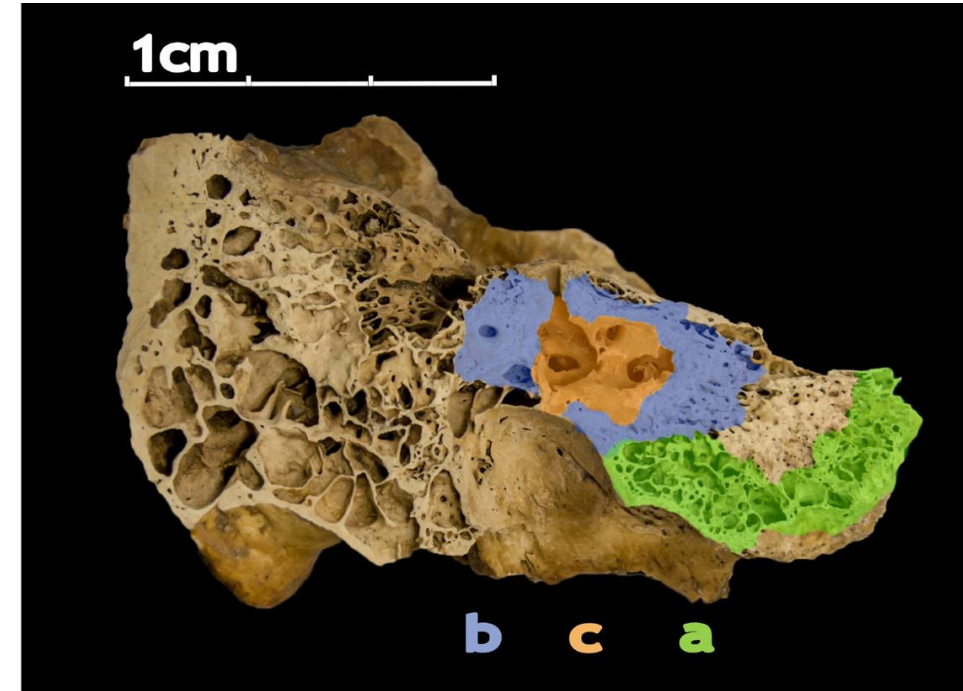
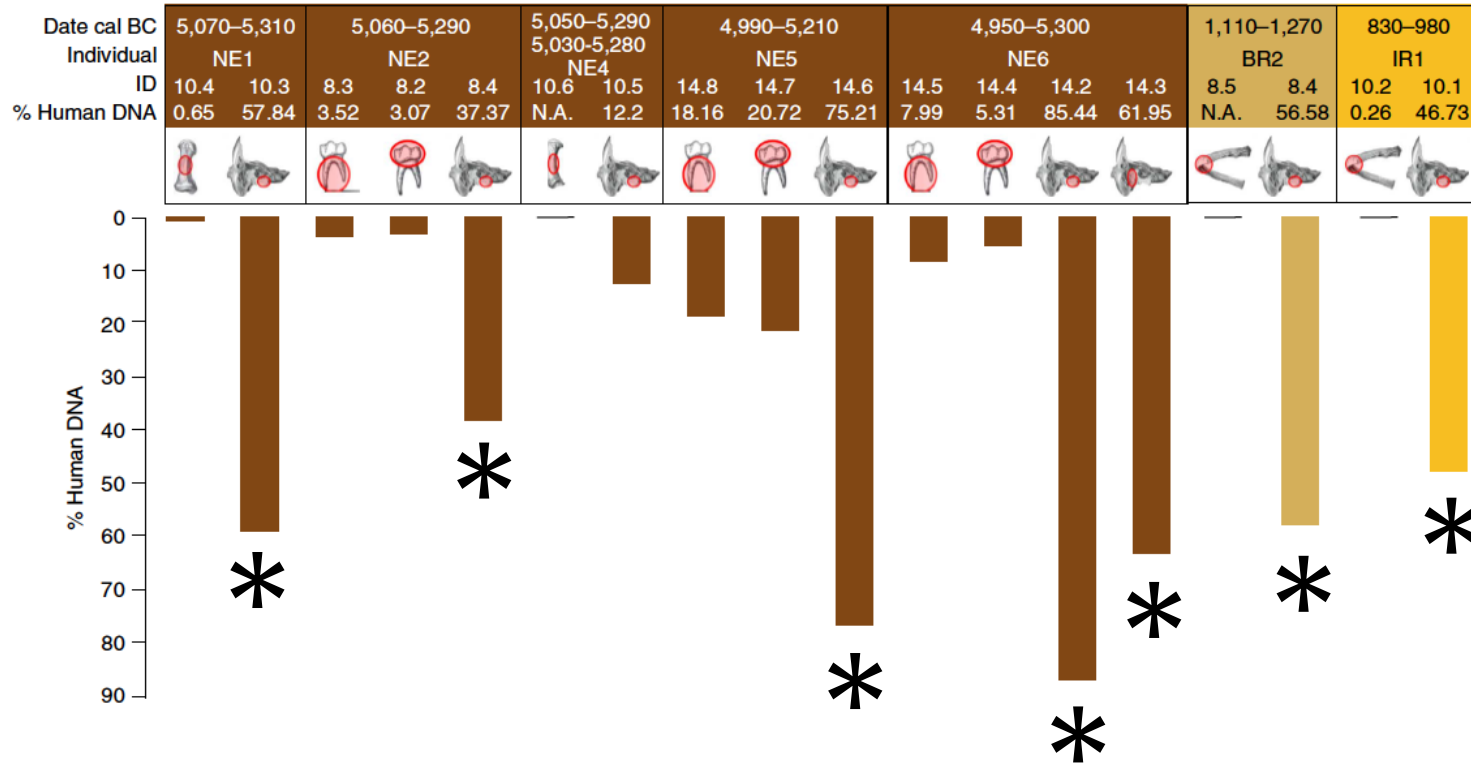
# Les Sources d'ADN Ancien

Subfossiles



# Les Sources Préférées d'ADN Ancien

L'Os Pétreux



# Les Nouvelles Sources d'ADN Ancien

Le Bois

Wagner et al. Mol Ecol 2018 / Wanger et al. Mol Ecol 2023

# Les Limites Temporelles de Préservation

Le Pléistocène Moyen



**560-780 kBP**

Permafrost

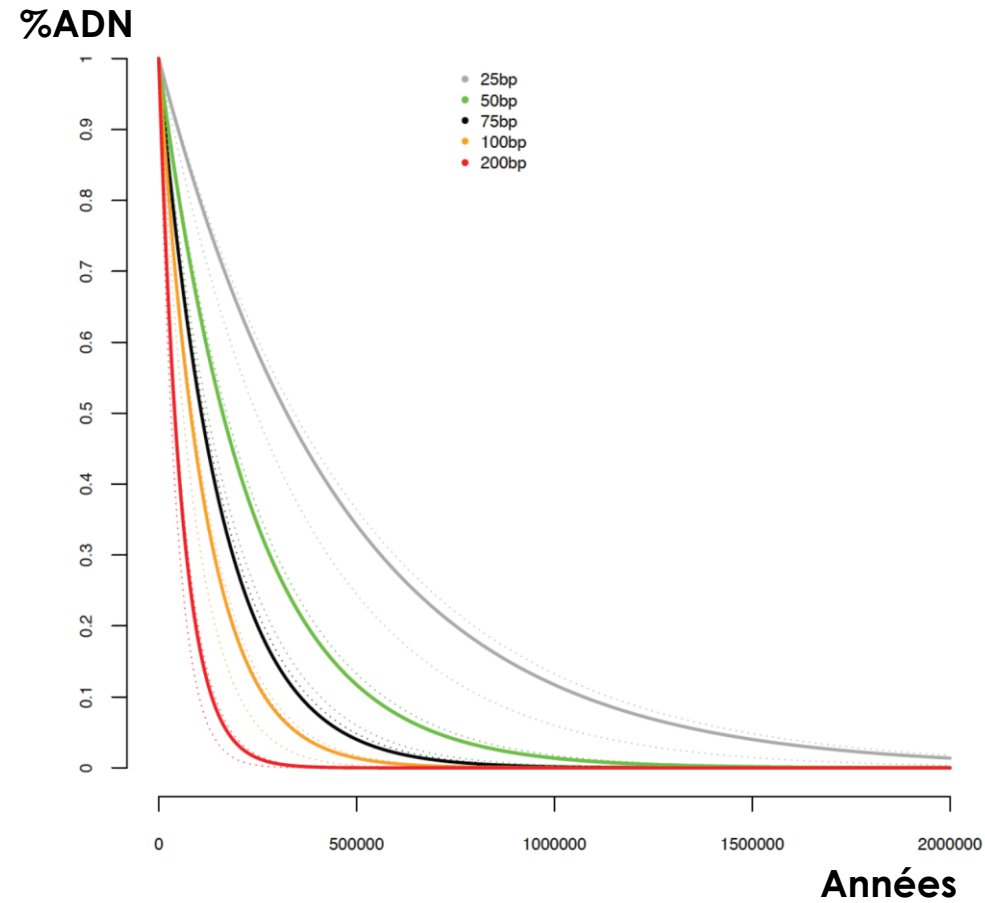
1.1X Génome

Orlando et al. Nature 2013



# Les Limites Temporelles de Préservation

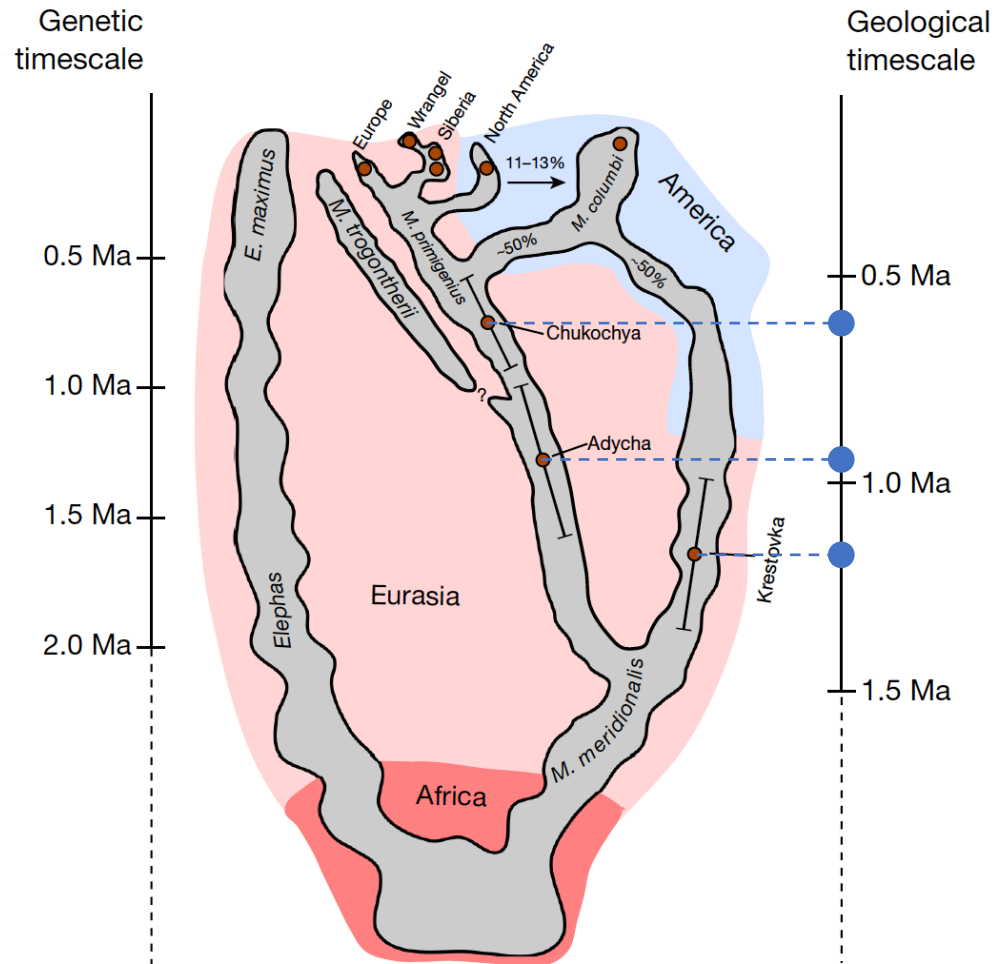
Le Pléistocène Moyen



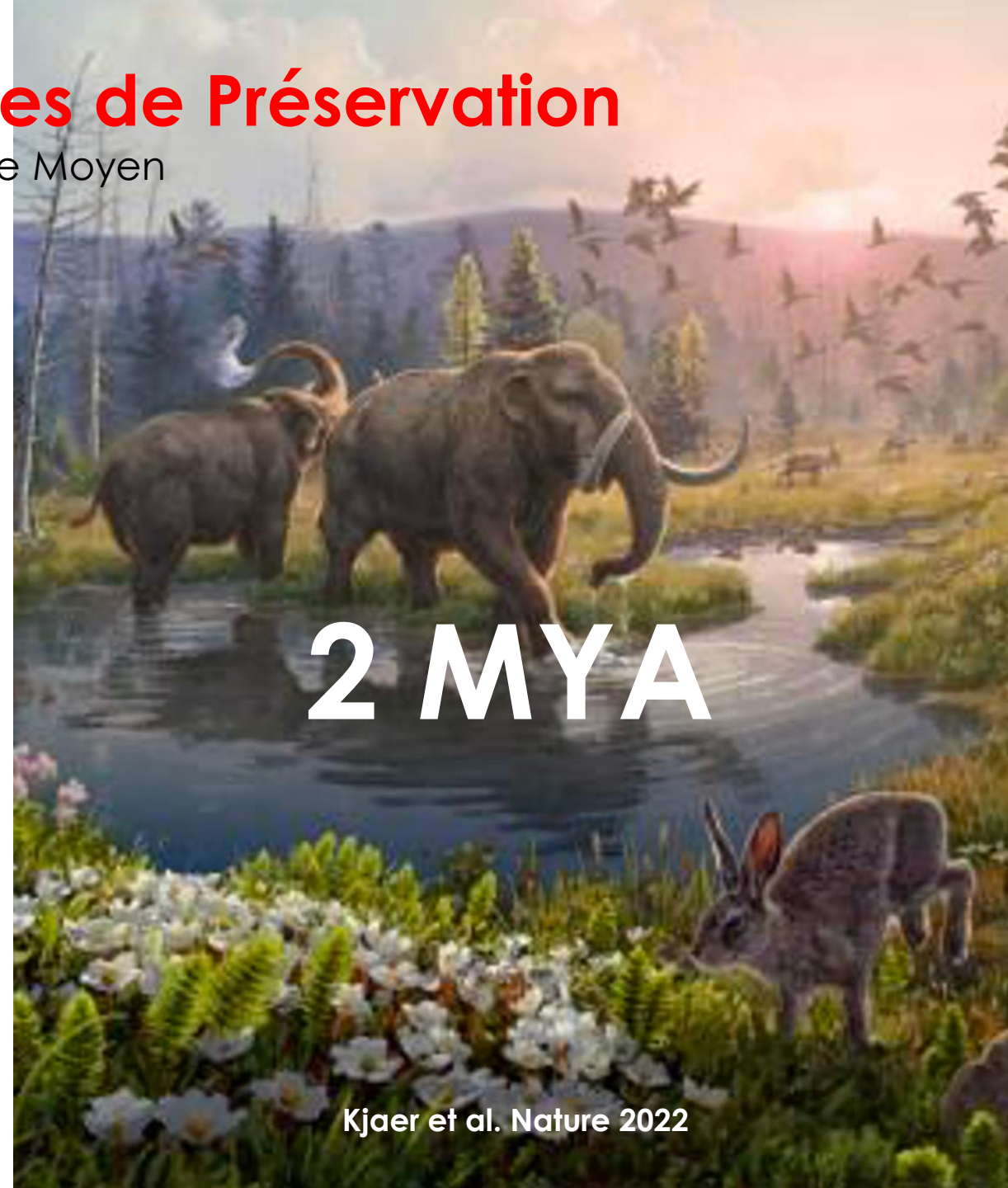
Orlando et al. Nature 2013

# Les Limites Temporelles de Préservation

Le Pléistocène Moyen



Van der Valk et al. Nature 2021



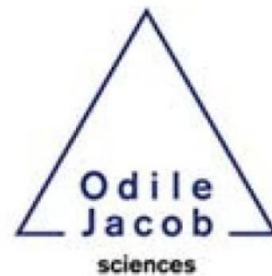
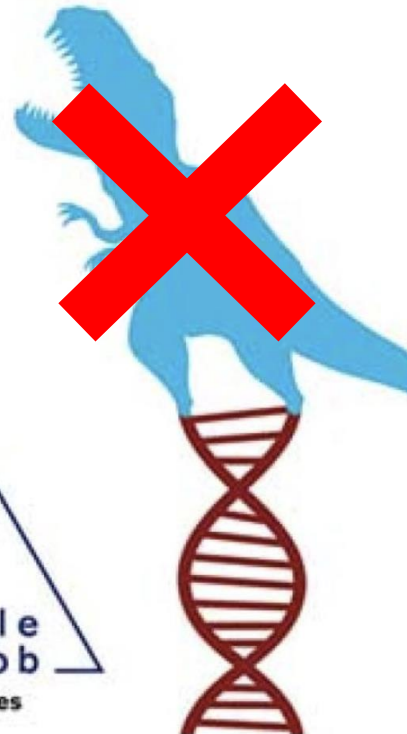
2 MYA

Kjaer et al. Nature 2022

Ludovic Orlando

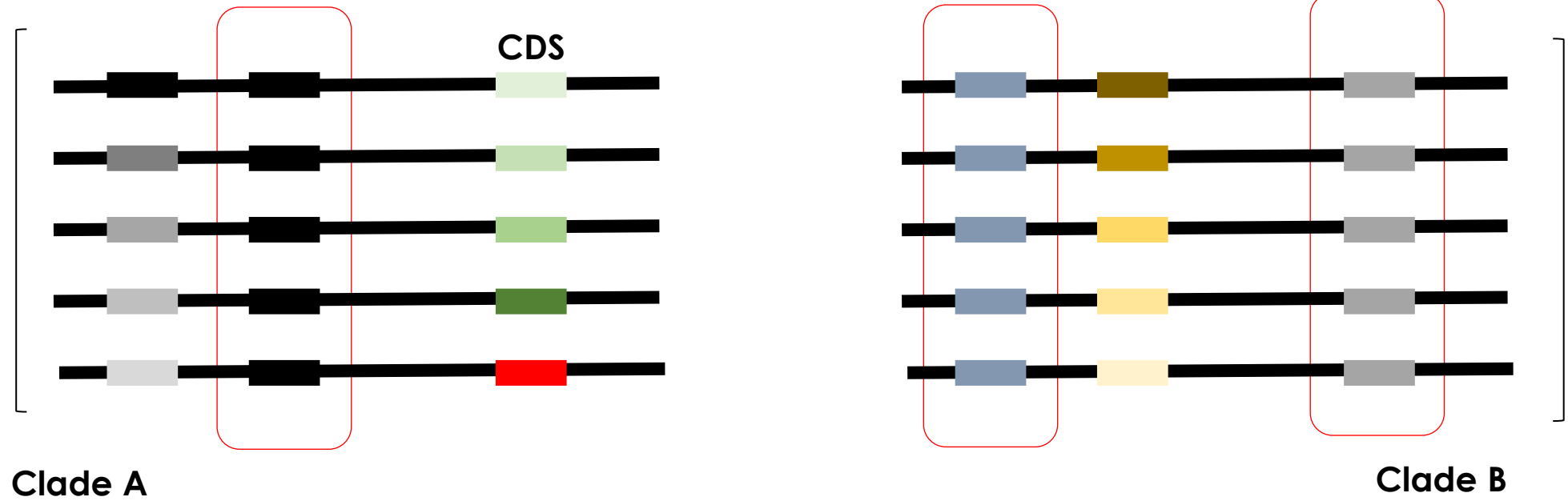
# L'ADN fossile, une machine à remonter le temps

préface de  
Jean Guilaine

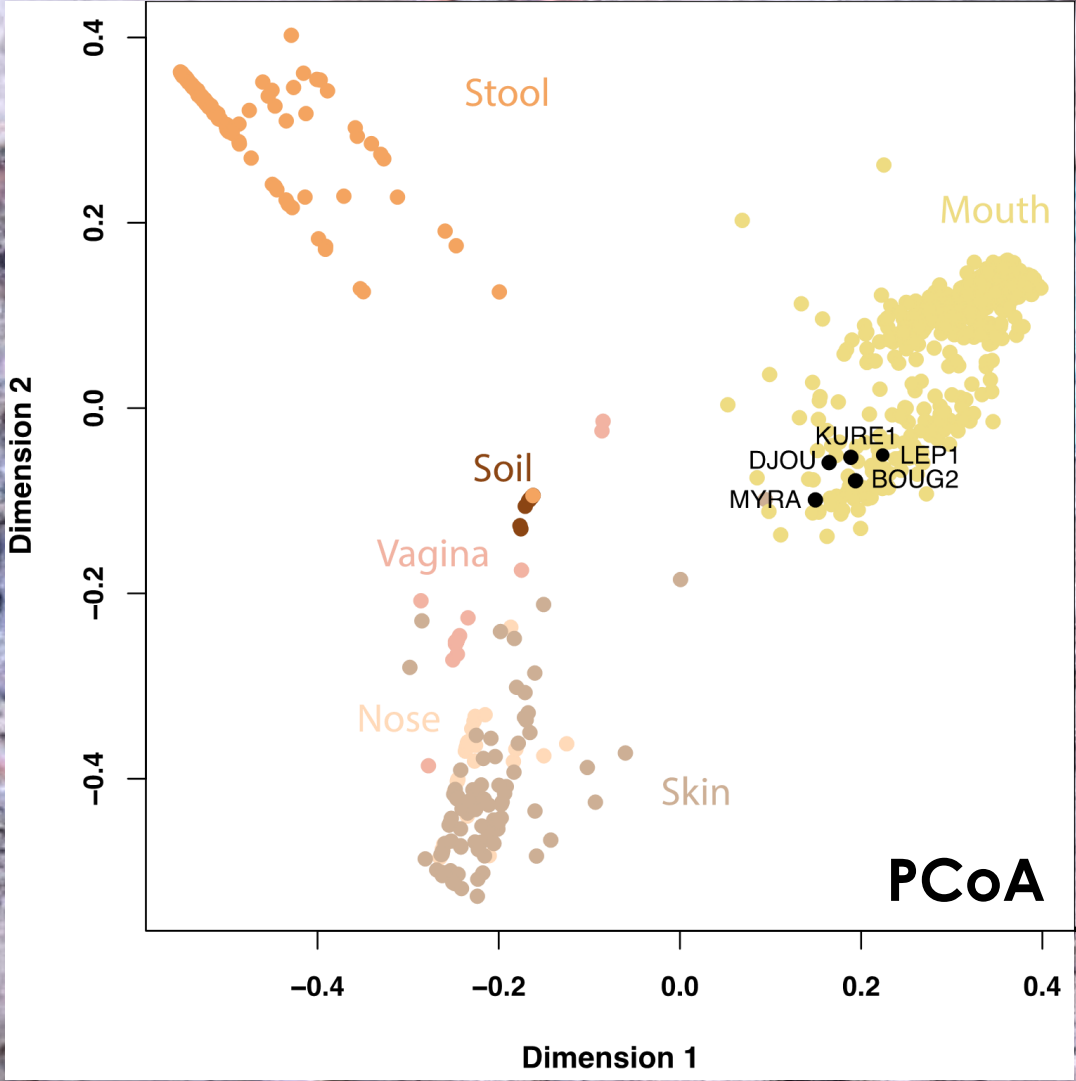
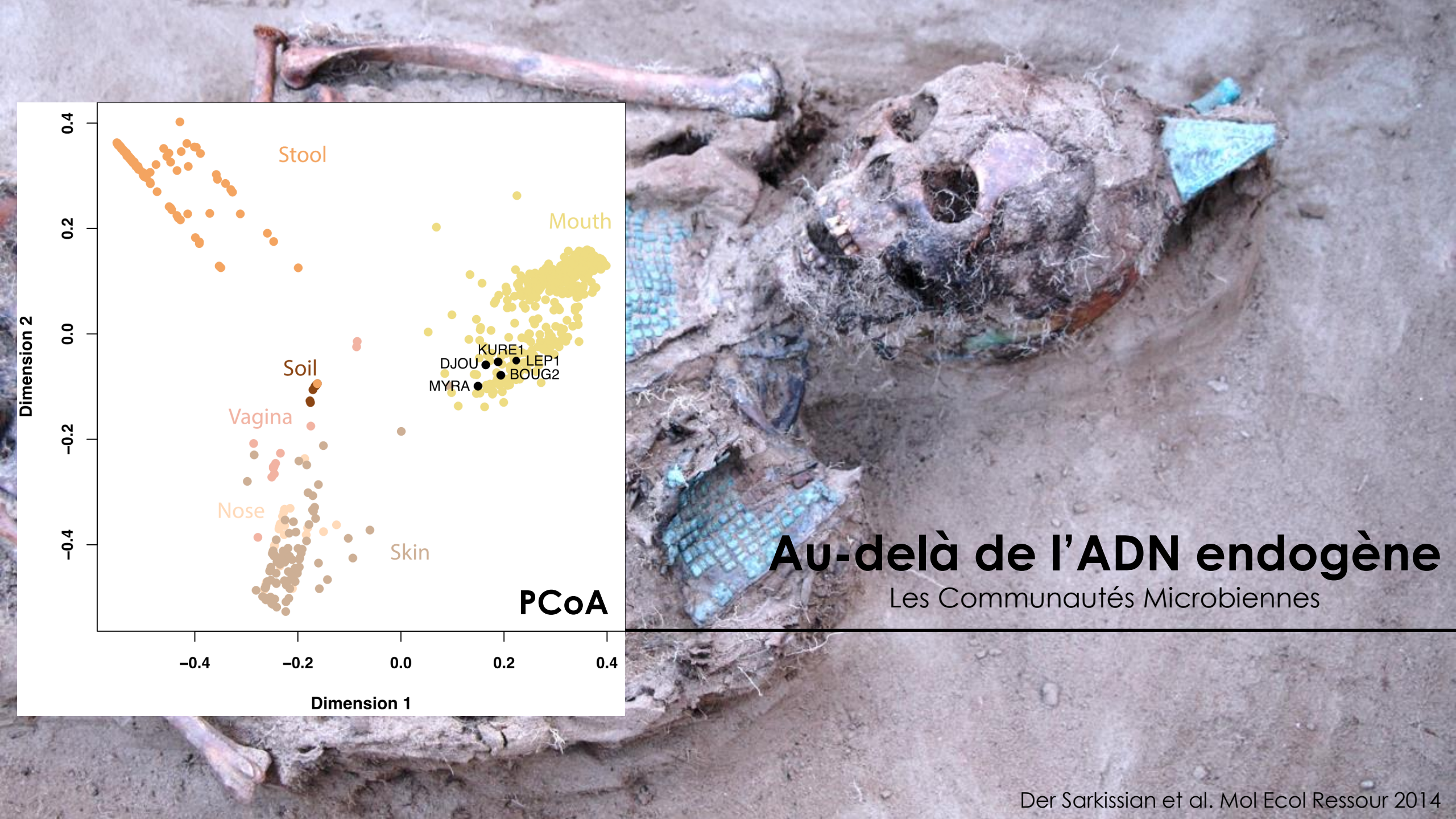


# Au-delà de l'ADN endogène

Les Communautés Microbiennes





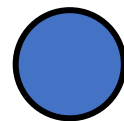
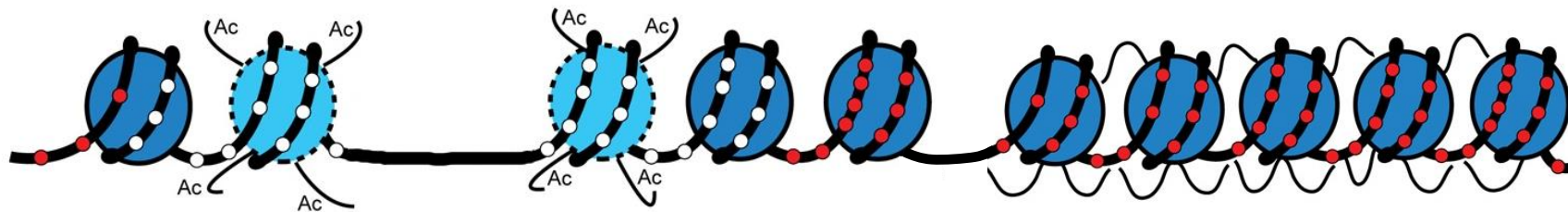


# Au-delà de l'ADN endogène

Les Communautés Microbiennes

# Au-delà des Séquences ADN

L'état Chromatinien



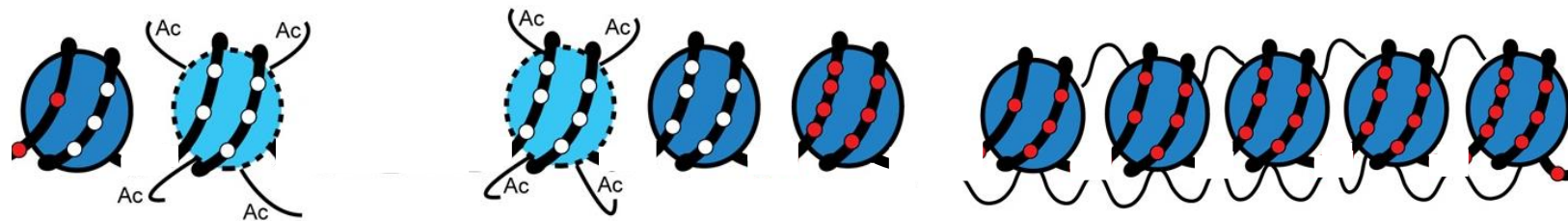
Nucleosome

● mCpG

○ CpG

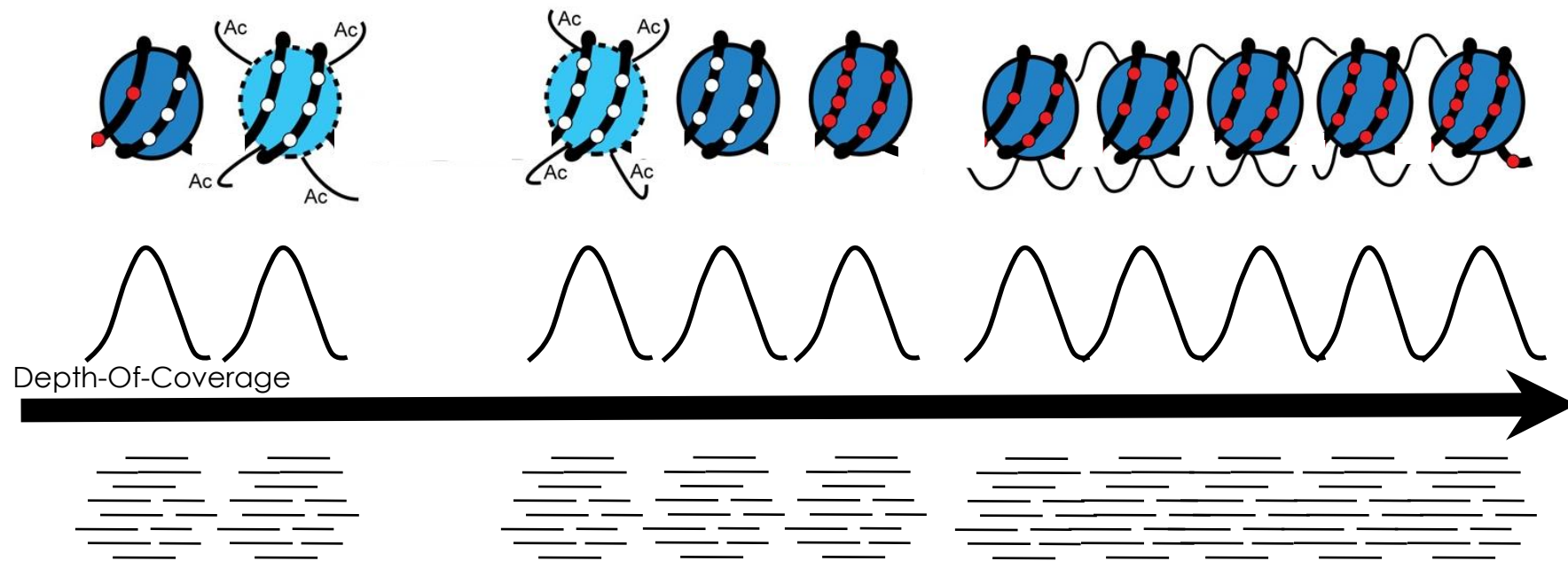
# Au-delà des Séquences ADN

L'état Chromatinien



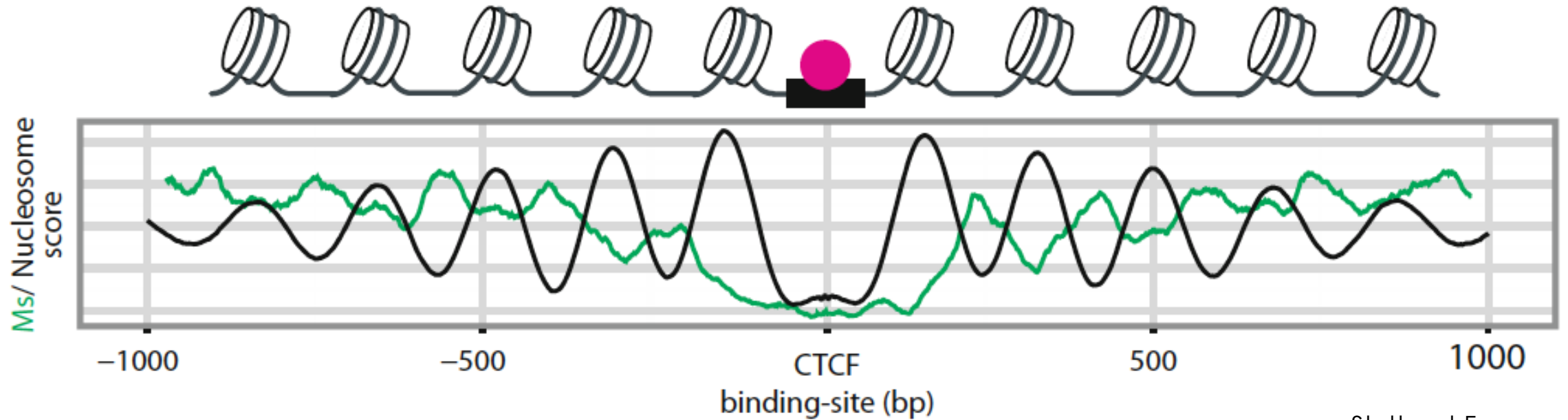
# Au-delà des Séquences ADN

L'état Chromatinien



# Au-delà des Séquences ADN

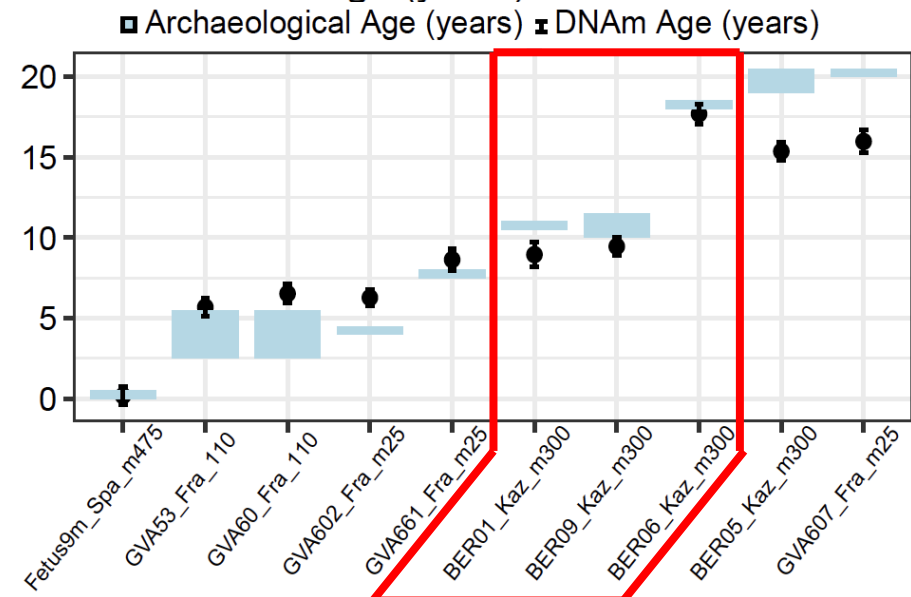
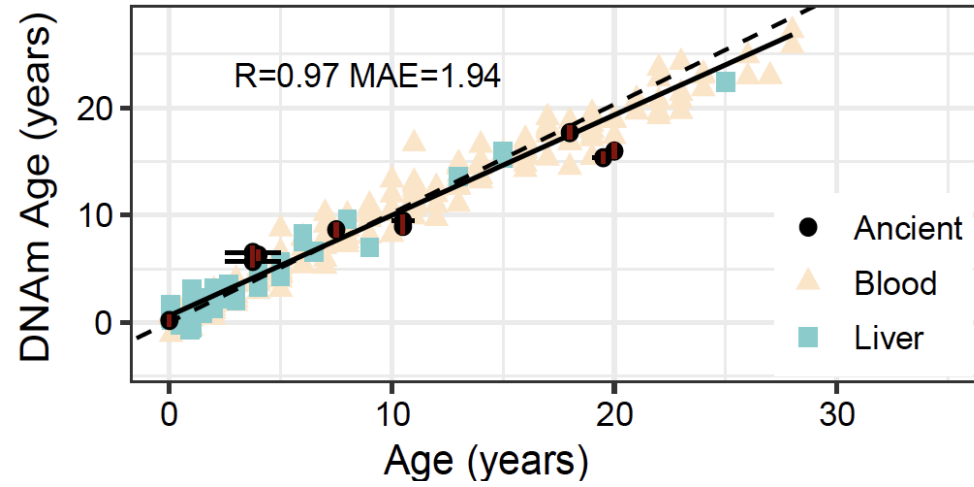
L'état Chromatinien



Stuttgart Farmer  
7 KYA

# De Nouveaux Phénotypes dans le Passé

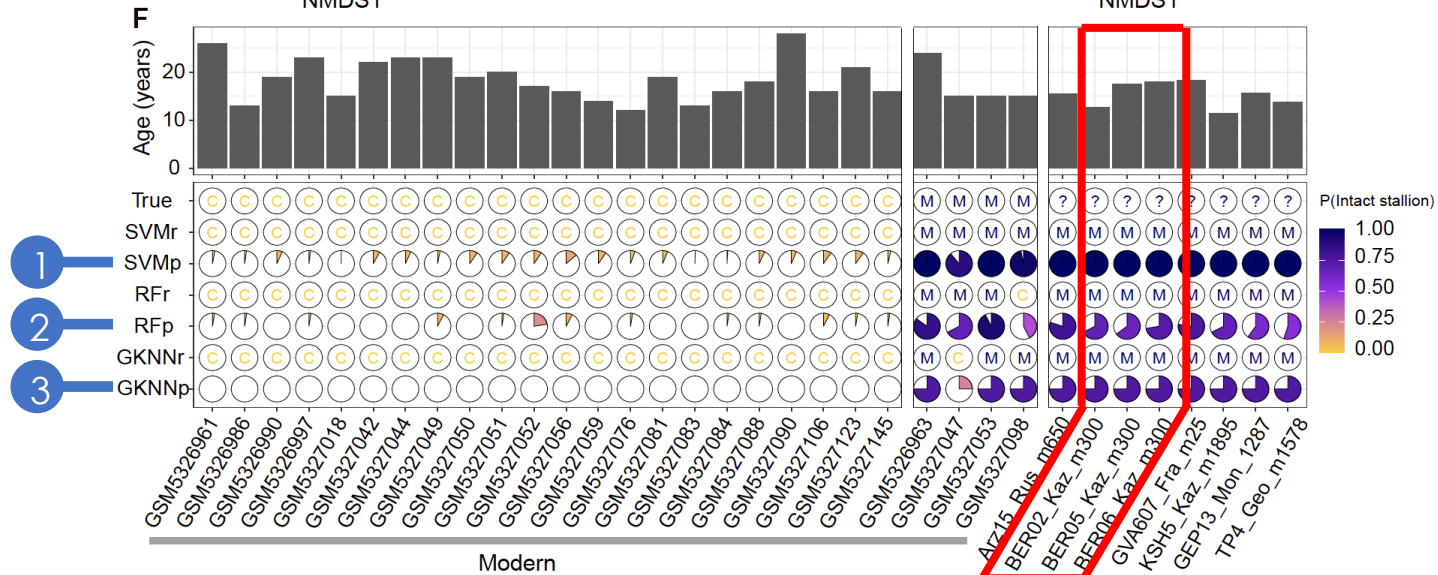
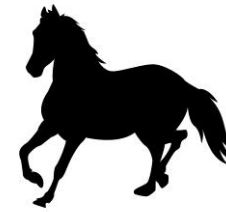
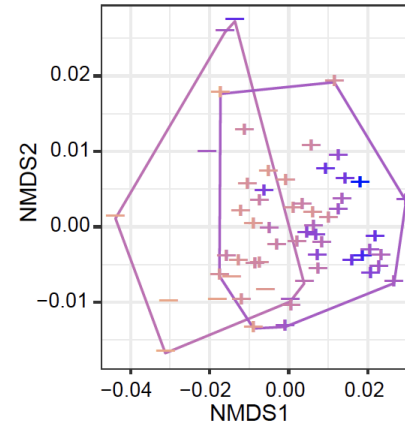
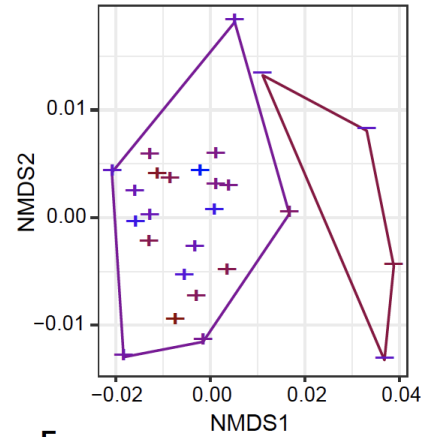
L'Âge à la mort



Liu et al. iScience 2023

# De Nouveaux Phénotypes dans le Passé

## La Castration



# L'ADN fossile, Révélateur de normes sociales

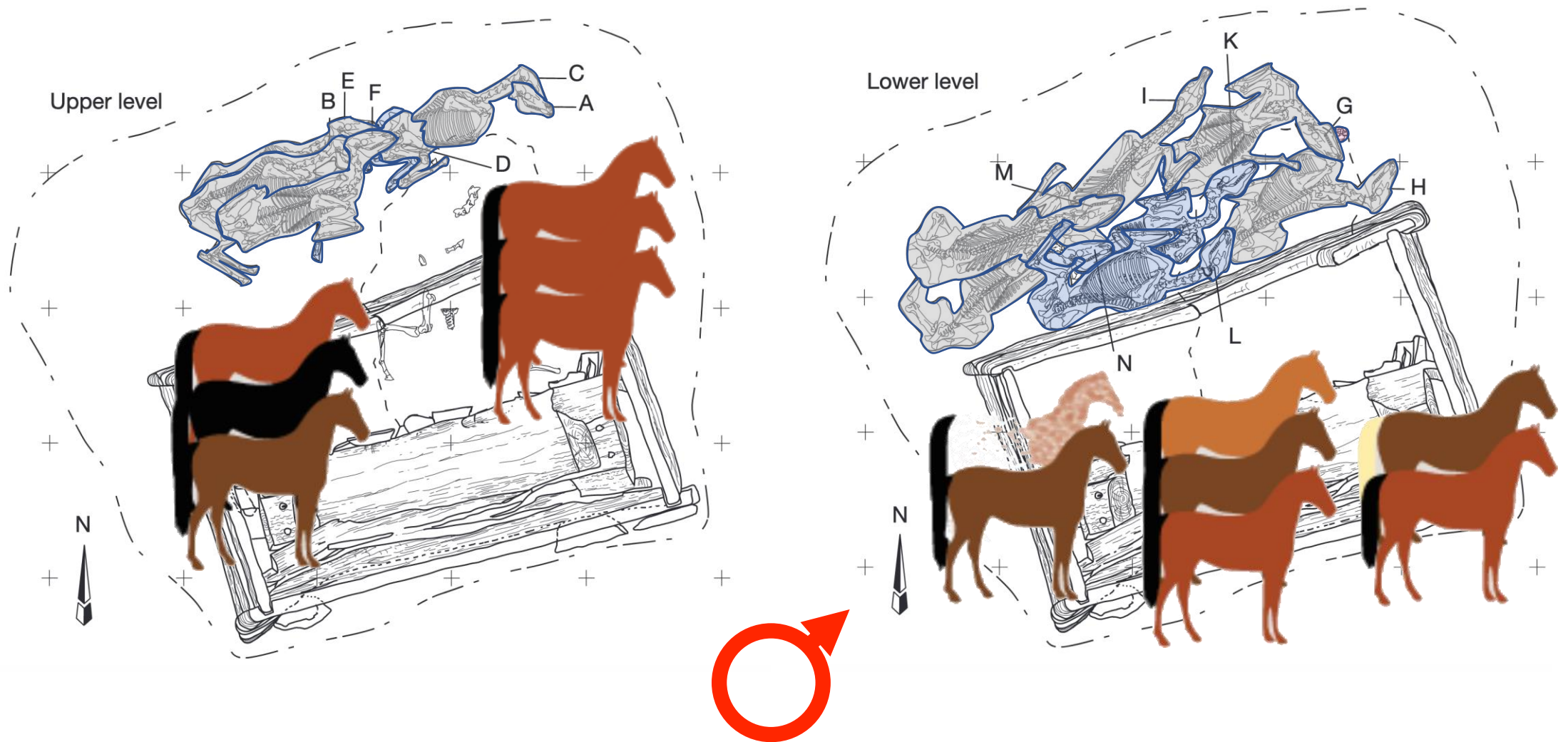
Les Pratiques Rituelles Sacrificielles





# L'ADN fossile, Révélateur de normes sociales

Sexe / Appareusement (1<sup>er</sup> degré) / Couleur / Âge / Entiers





# **L'ADN fossile... sans fossile!**

L'ADN Environnemental Ancien

# L'ADN fossile... sans fossile!

L'ADN Environnemental Ancien



New Zealand, 600 ya

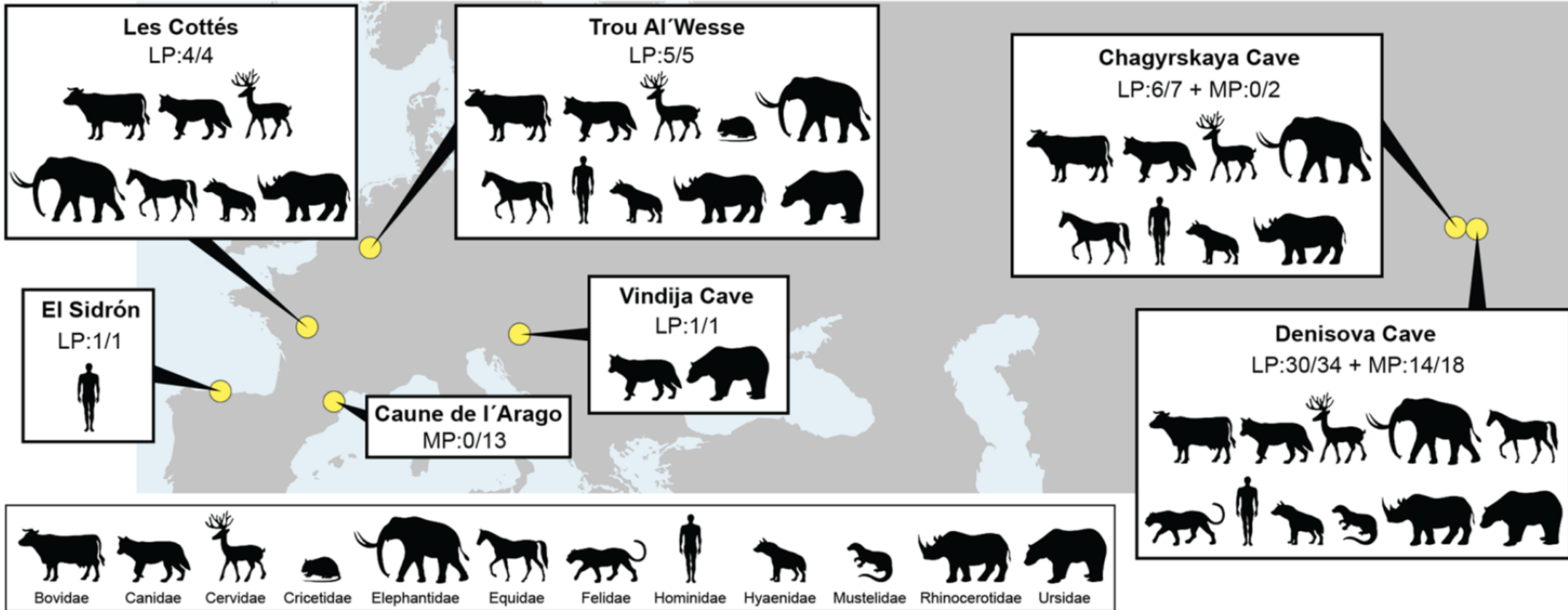


Siberia, 10.4-30 kya

Willerslev et al. Nature 2003

# L'ADN fossile... sans fossile!

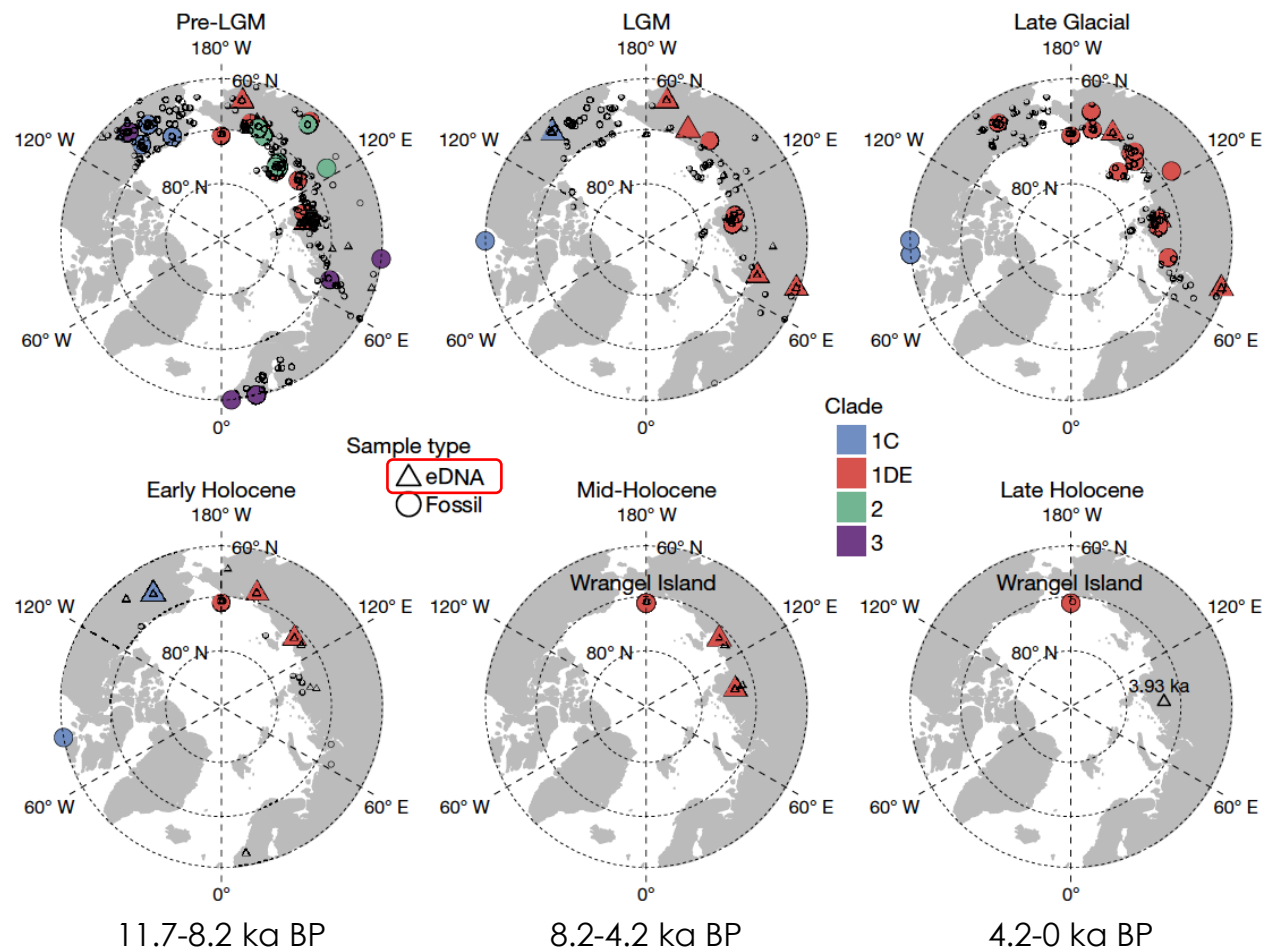
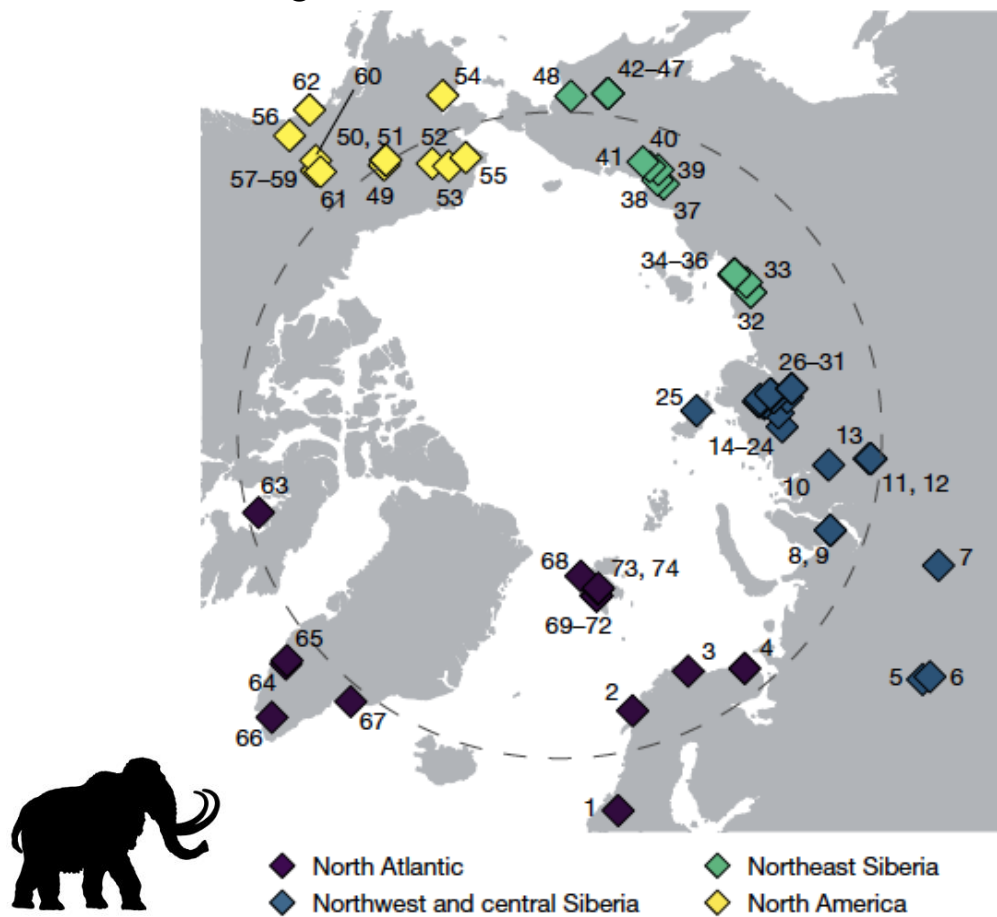
L'ADN Environnemental Ancien



# L'ADN fossile... sans fossile!

L'ADN Environnemental Ancien

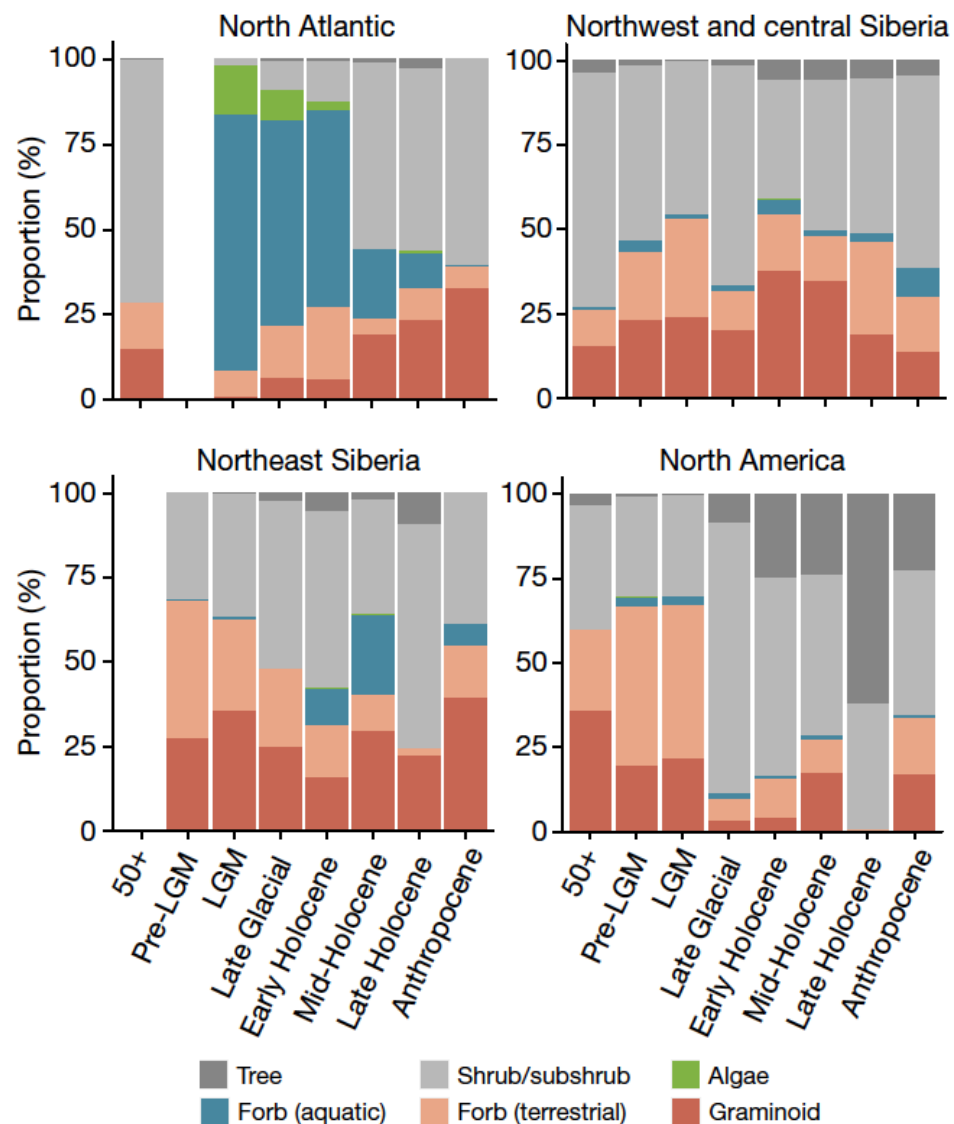
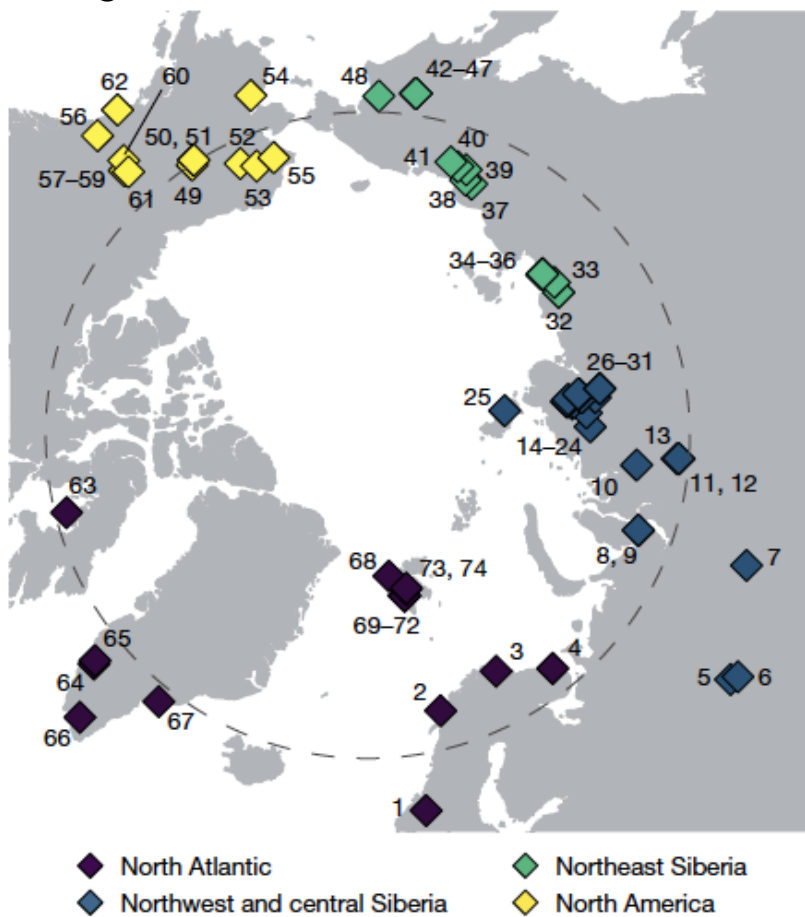
Wang et al. Nature 2021



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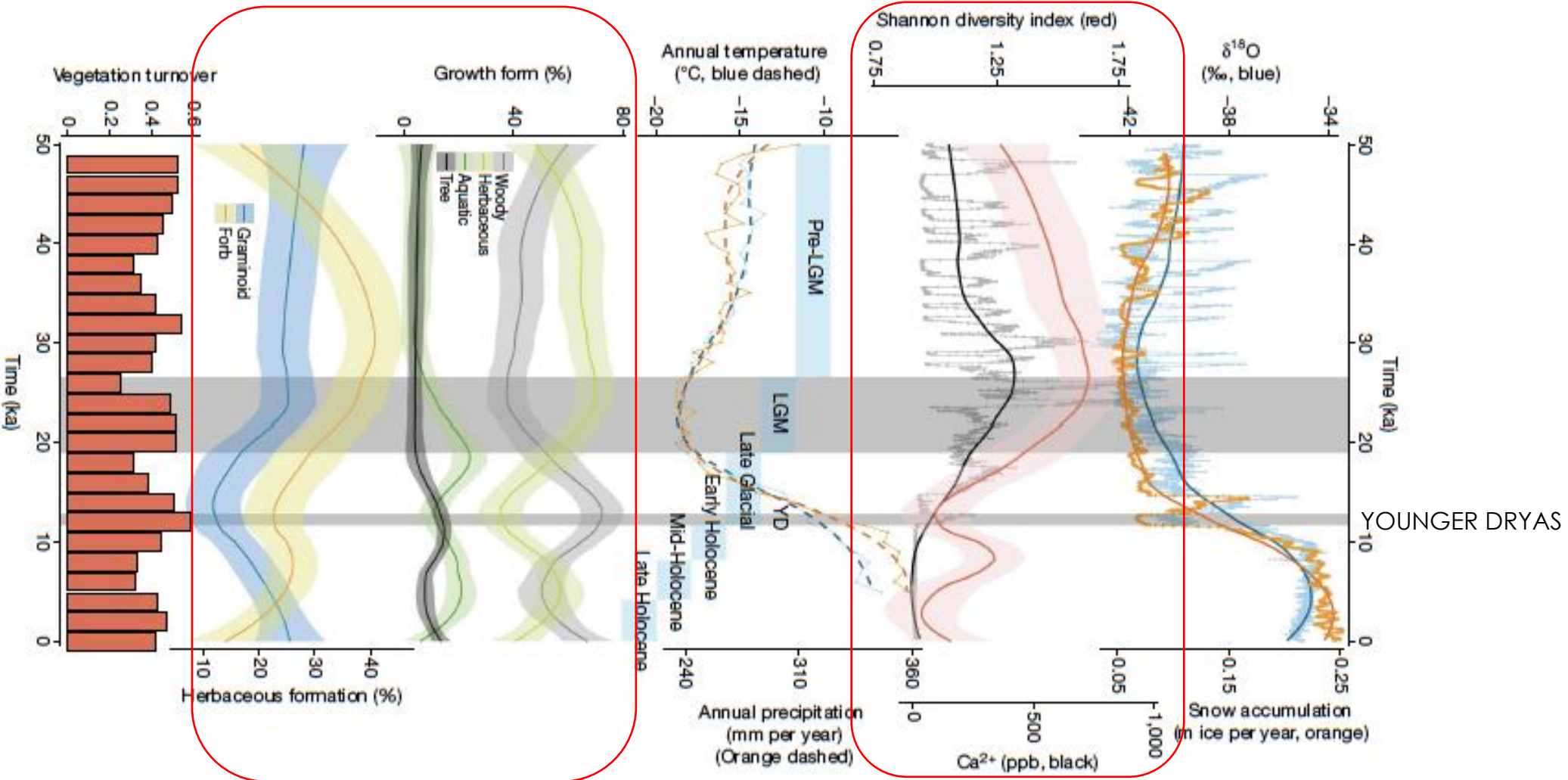
L'ADN Environnemental Ancien

Wang et al. Nature 2021



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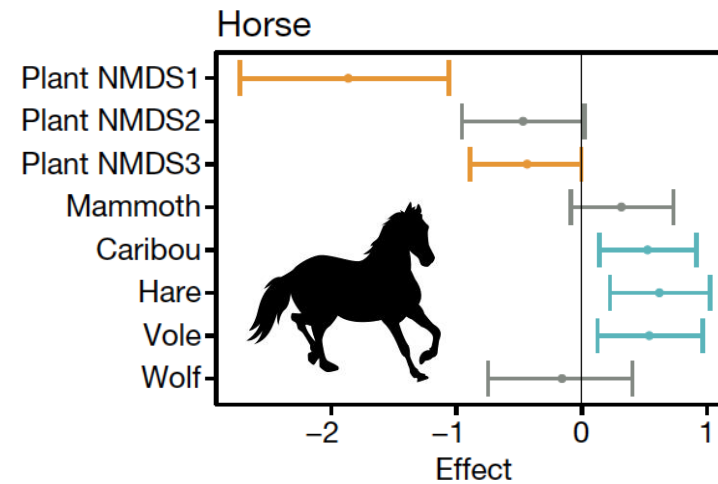
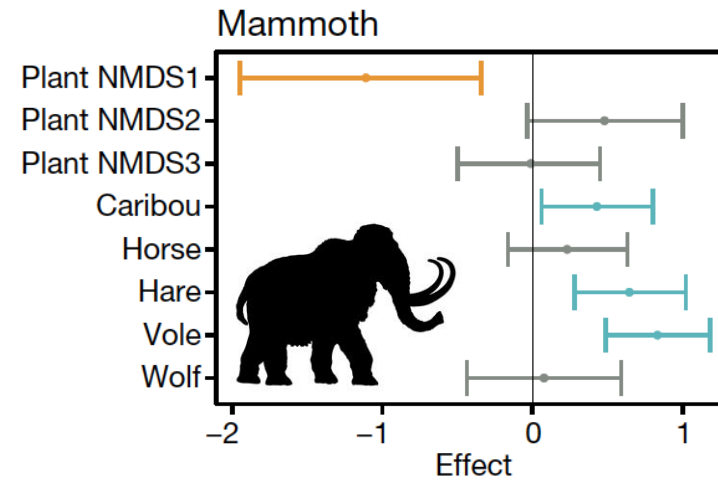
L'ADN Environnemental Ancien





# L'ADN fossile... sans fossile!

L'ADN Environnemental Ancien



Wang et al. Nature 2021



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