Università degli Studi di Ferrara

DIVULGAZIONE E FRUIZIONE DEL PATRIMONIO ANTROPOLOGICO

Lezione 3. Evoluzione umana dall'origine africana alla diffusione di Homo sapiens

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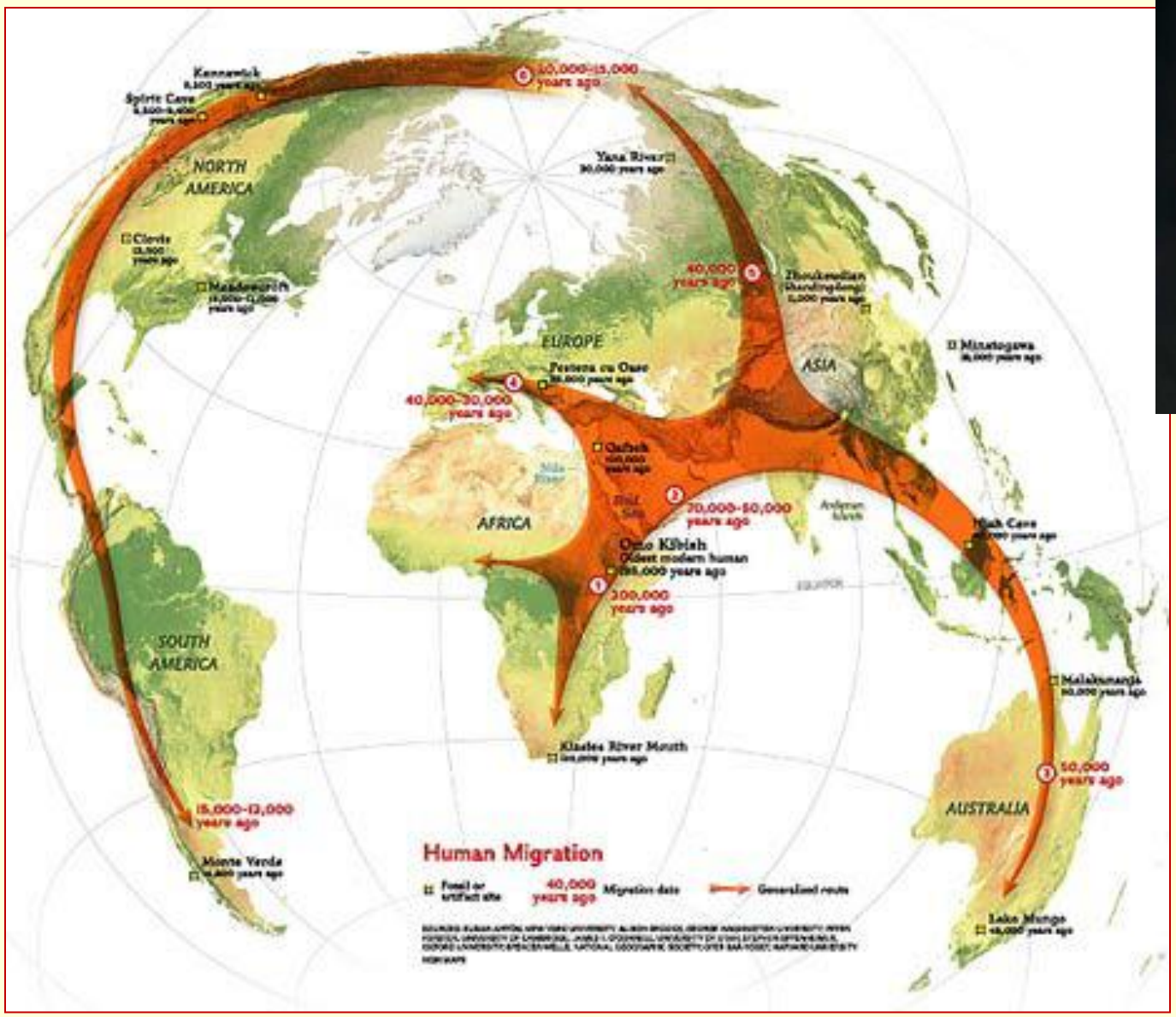
Sezione di Scienze Preistoriche e Antropologiche

Homo sapiens

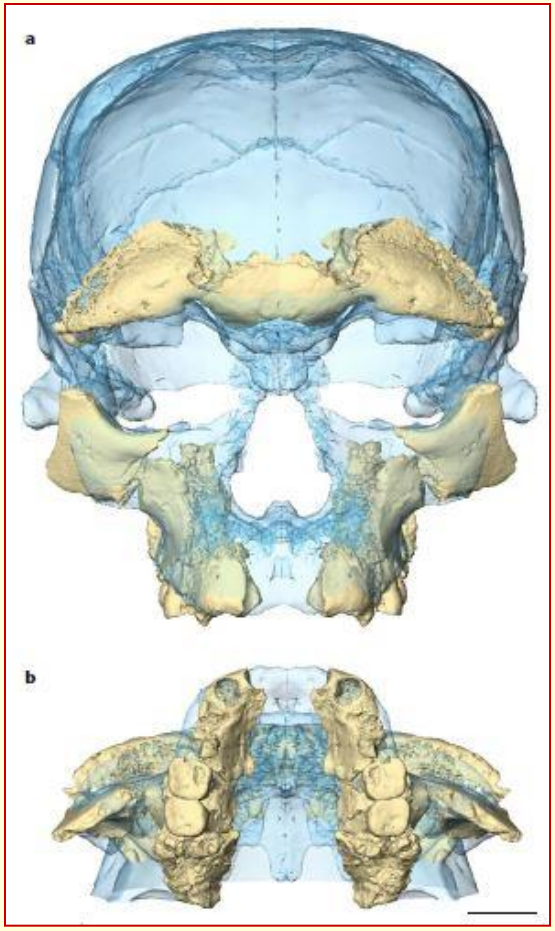


LETTER

doi:10.1038/nature22336

New fossils from Jebel Irhoud, Morocco and the pan-African origin of *Homo sapiens*

Jean-Jacques Hublin[1,2], Abdelouahed Ben-Ncer[3], Shara E. Bailey[4], Sarah E. Freidline[1], Simon Neubauer[1], Matthew M. Skinner[5], Inga Bergmann[1], Adeline Le Cabec[1], Stefano Benazzi[6], Katerina Harvati[7] & Philipp Gunz[1]

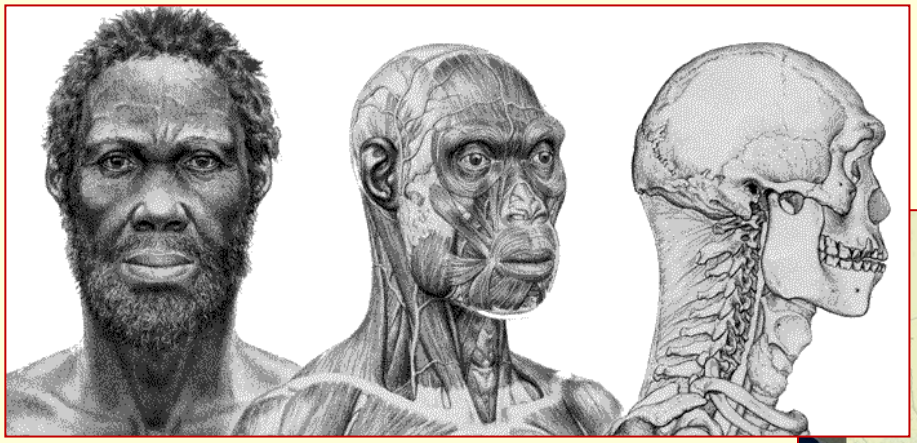


The earliest H.s.

"We identified a **mosaic of features** including facial, mandibular and dental morphology that aligns the Jebel Irhoud material with early or recent anatomically modern humans and more primitive neurocranial and endocranial morphology.

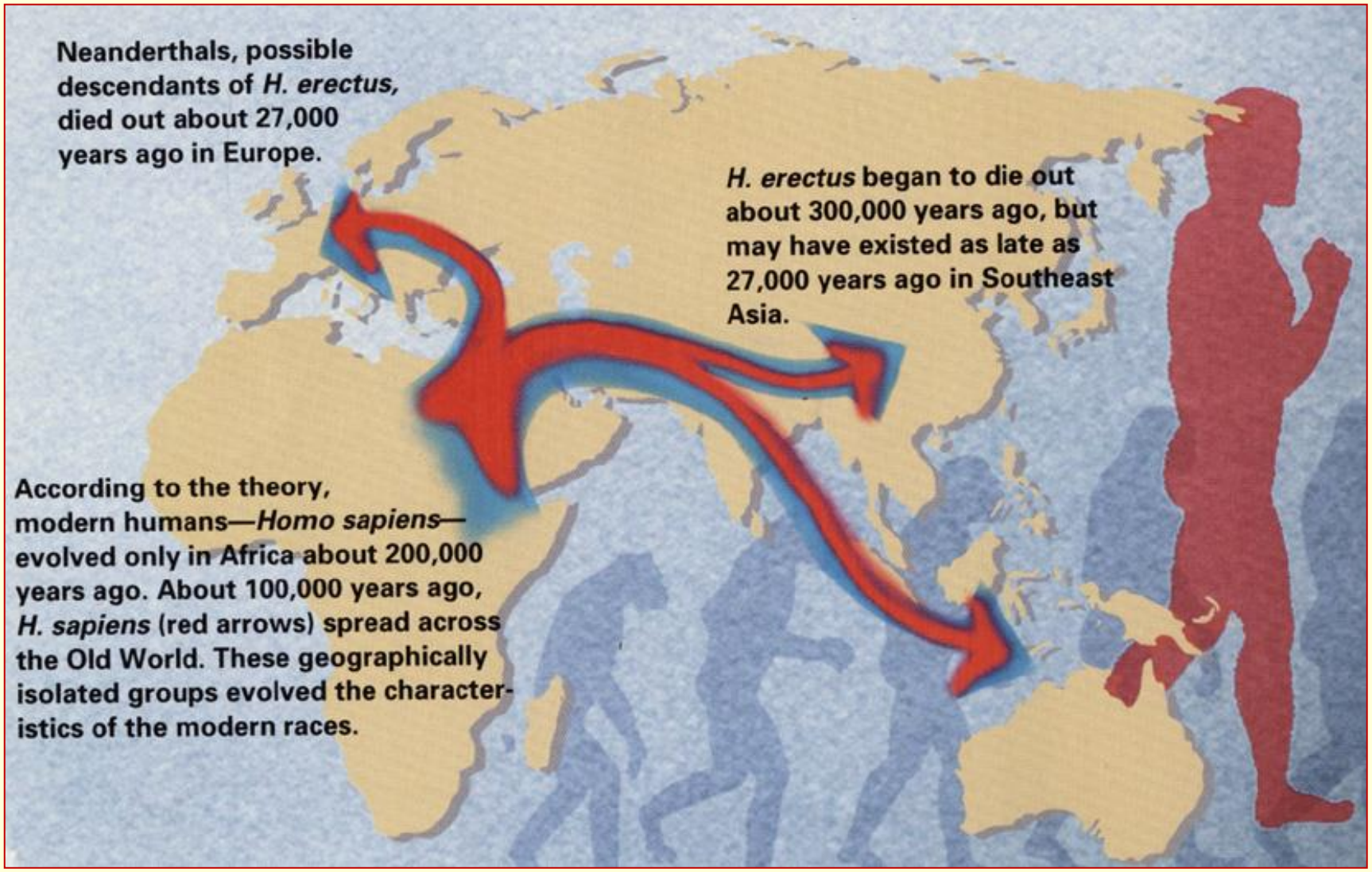
In combination with an age of **315±34 thousand years**, this evidence makes Jebel Irhoud the oldest and richest African Middle Stone Age hominin site that documents early stages of the *H. sapiens* clade in which key features of modern morphology were established.

Furthermore, it shows that the evolutionary processes behind the emergence of *H. sapiens* involved the whole African continent."

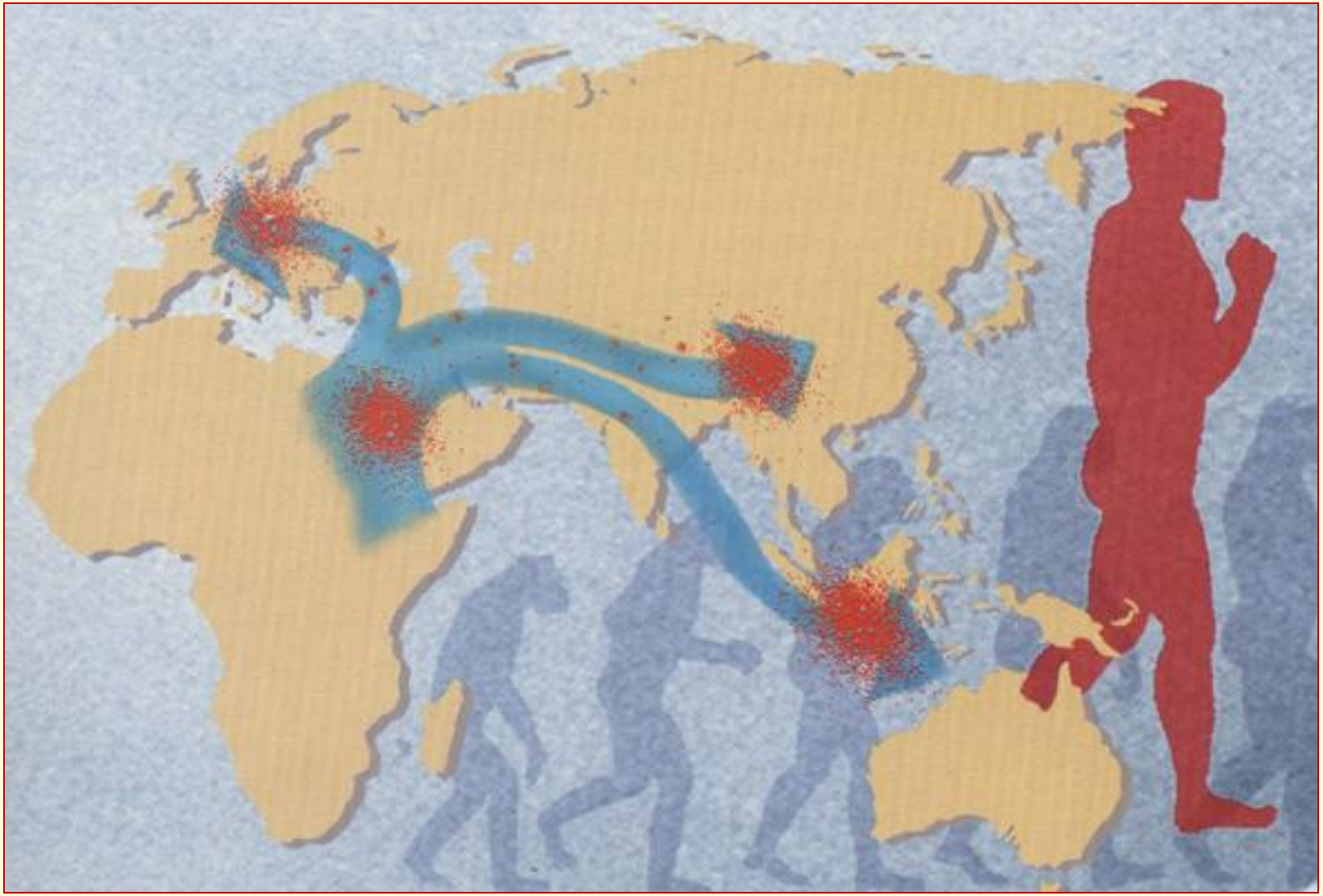


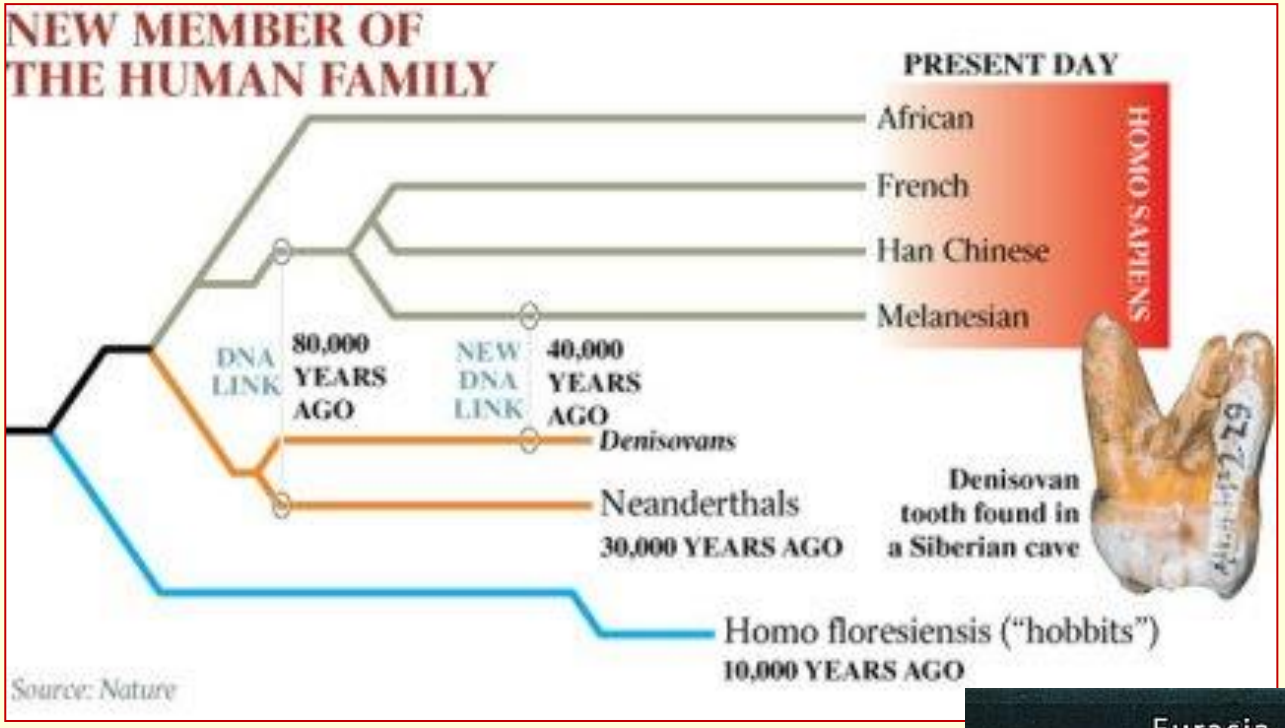
Homo sapiens hidaltu, 160K

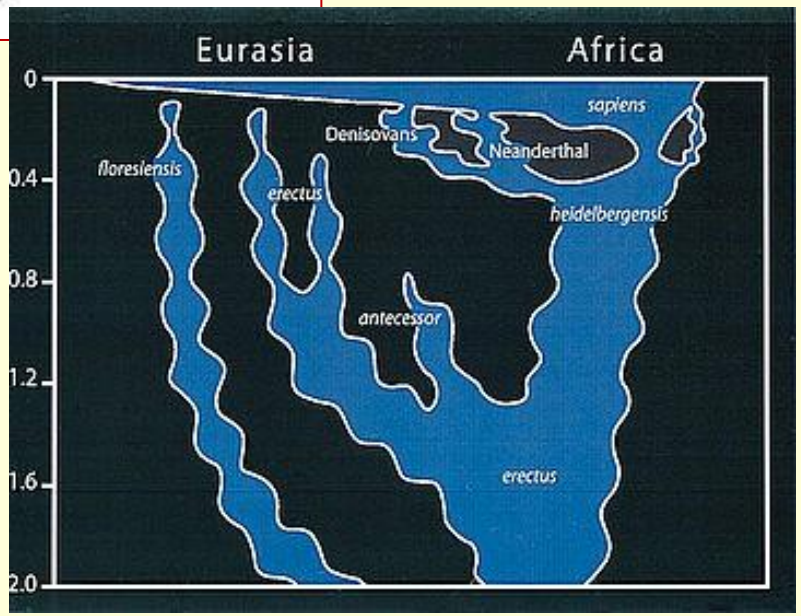
Substitution model about the appearance of Modern Humans



Multiregional model about the appearance of Modern Humans

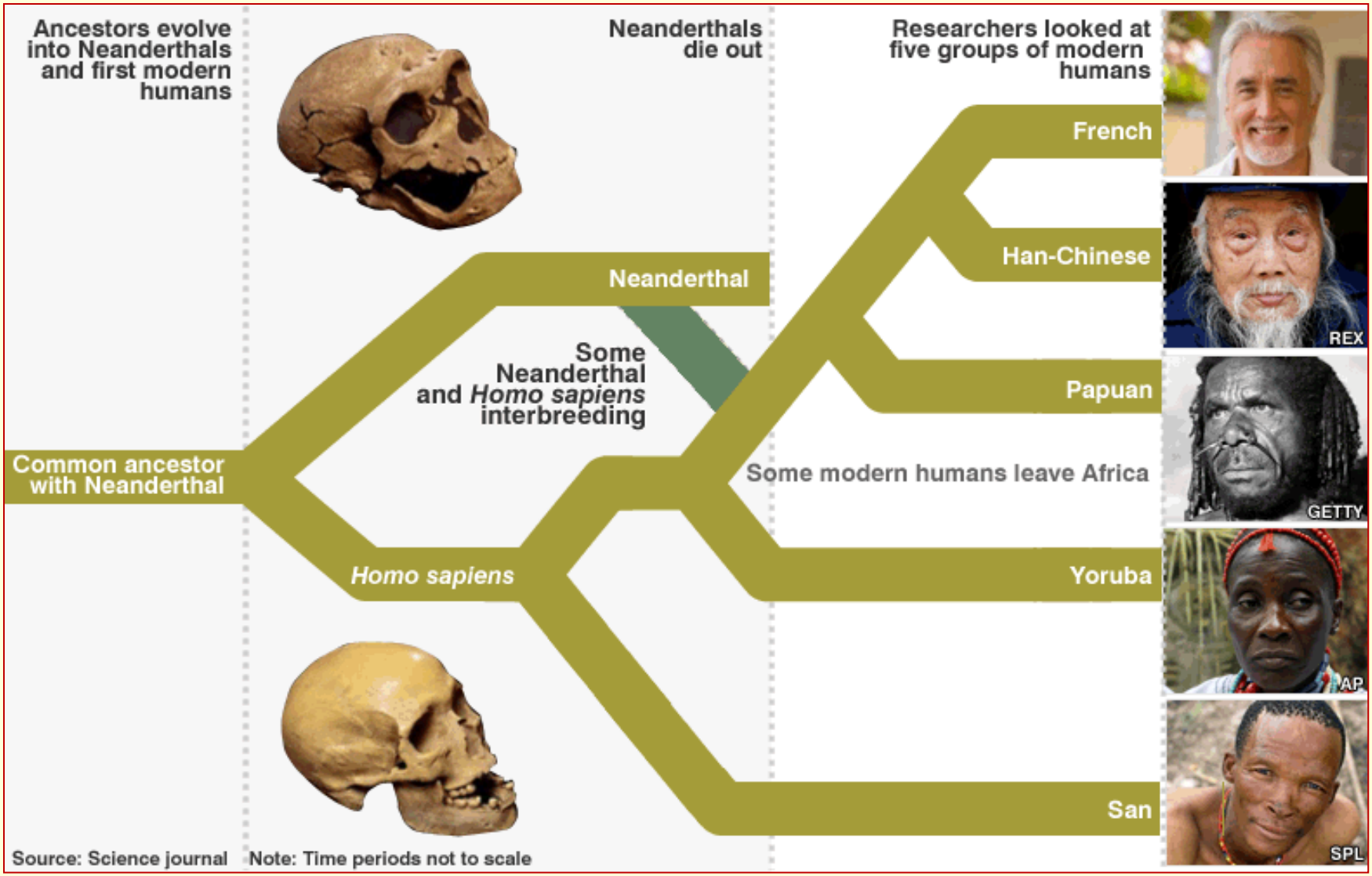






Multiple ibridizations?

Hypothesys Out of Africa + partial interbreeding

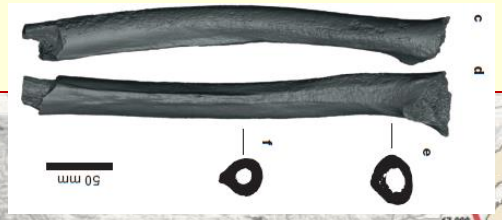

Ancestors evolve into Neanderthals and first modern humans
Neanderthals die out
Researchers looked at five groups of modern humans
French
Han-Chinese
Papuan
Yoruba
San
Neanderthal
Some Neanderthal and Homo sapiens interbreeding
Common ancestor with Neanderthal
Homo sapiens
Some modern humans leave Africa
REX
GETTY
AP
SPL
Source: Science journal
Note: Time periods not to scale

Swante Paeebo

"Close Encounters of the Prehistoric Kind"

Science, May 7, 2010

"The long-awaited sequence of the Neanderthal genome suggests that modern humans and Neanderthals interbred tens of thousands of years ago, perhaps in the Middle East"



Ust-ishim femore

LETTER

doi:10.1038/nature13422

Pleistocene cave art from Sulawesi, Indonesia

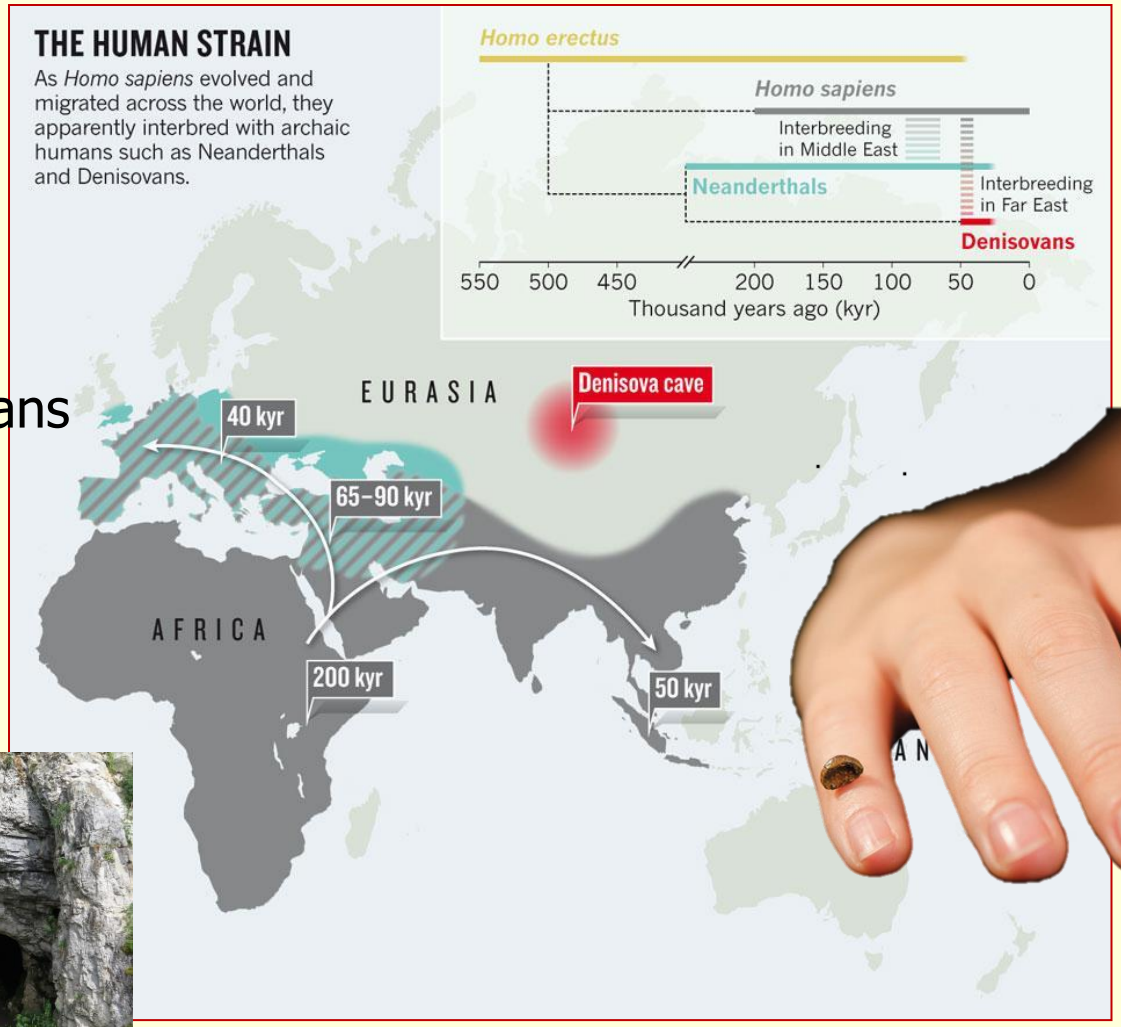
M. Aubert[1,2]*, A. Brumm[1]†*, M. Ramli[3], T. Sutikna[1,4], E. W. Saptomo[4], B. Hakim[5], M. J. Morwood‡, G. D. van den Bergh[1], L. Kinsley[6] & A. Dosseto[7,8]

The human story 100-30,000 yr ago

Neanderthals

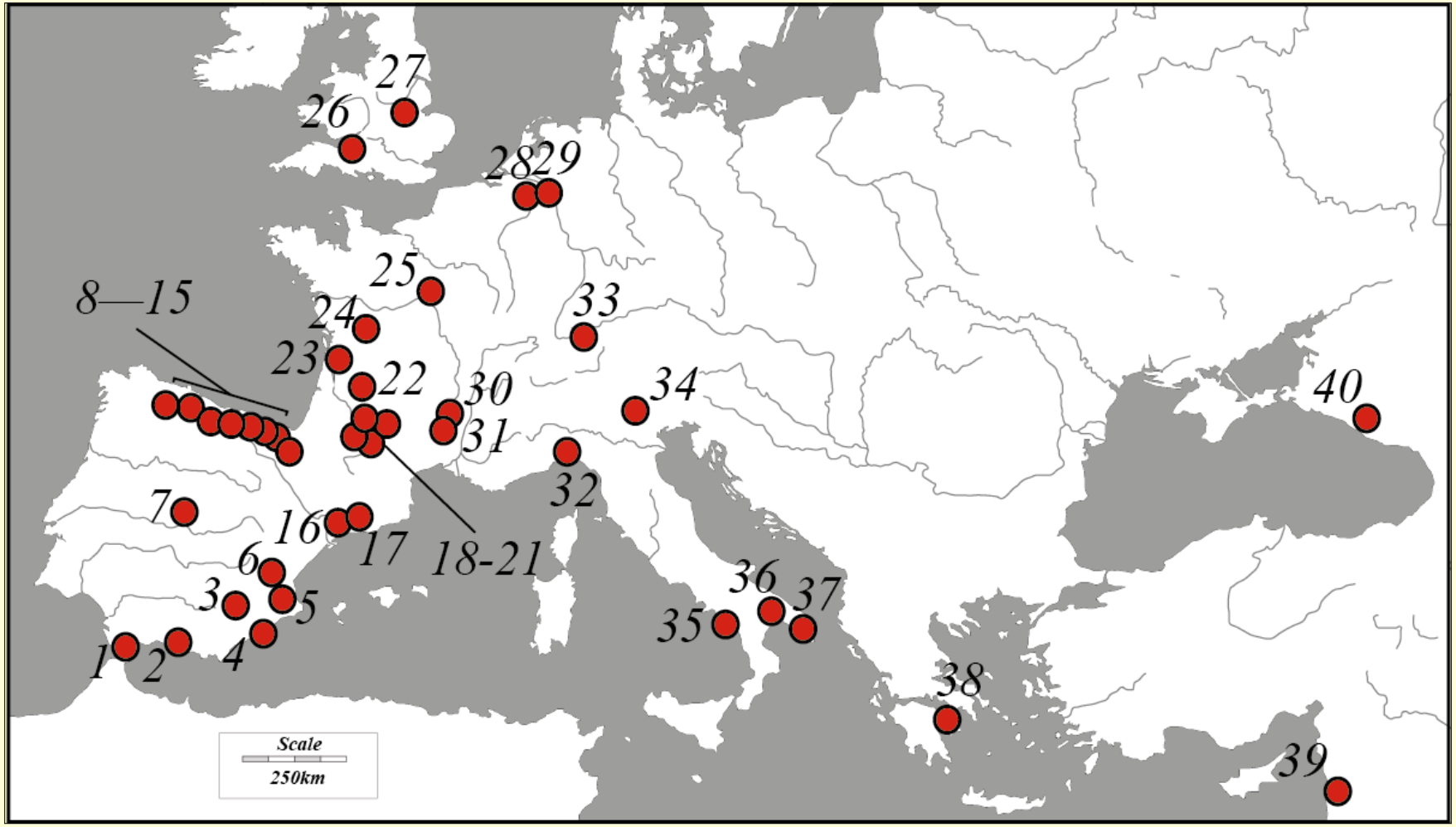
Modern humans

Denisovans



When did Neanderthals disappear?

~200 new AMS dates related to Neanderthal occupation

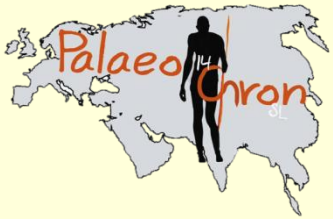


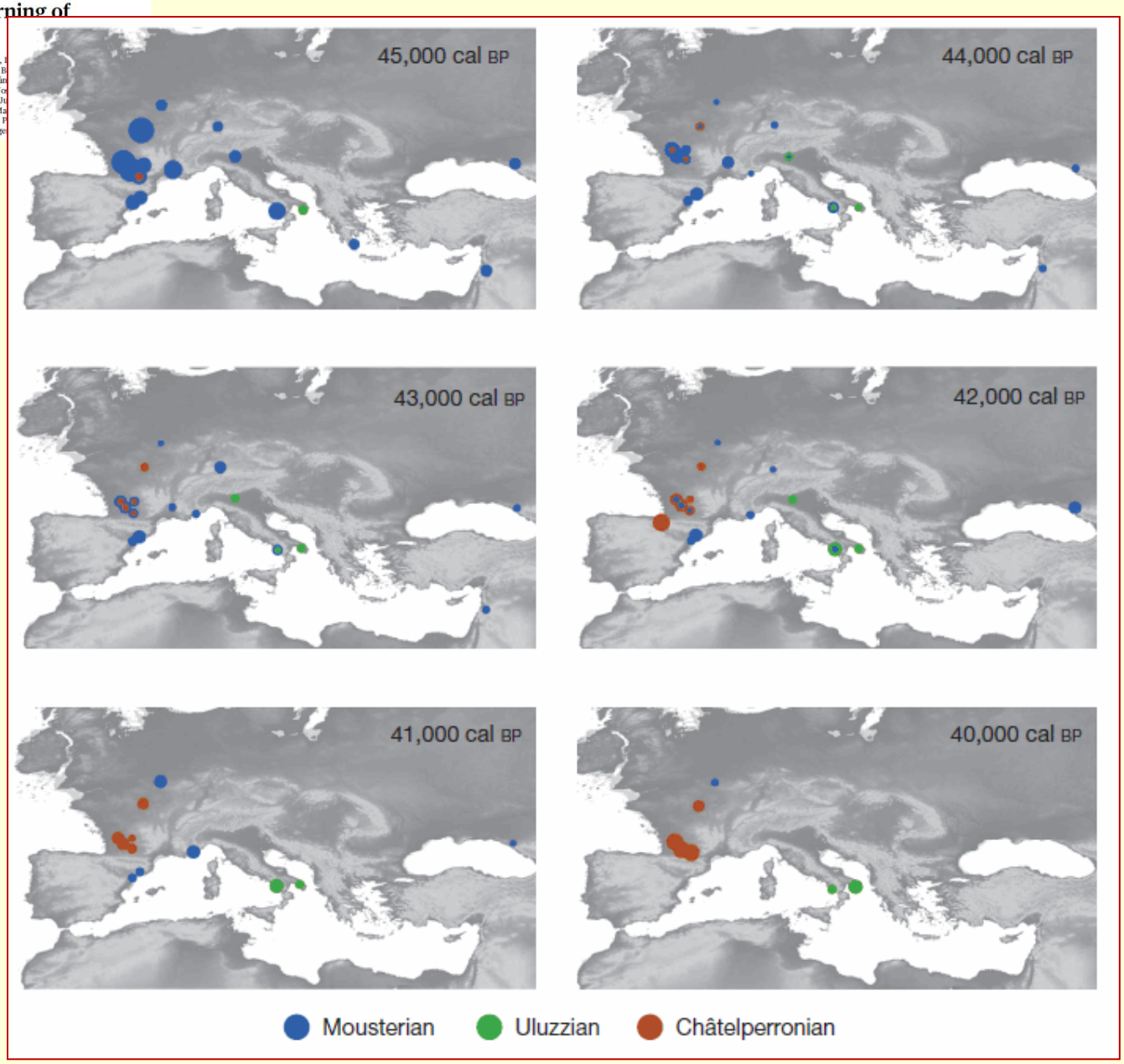
LETTER

doi:10.1038/nature13621

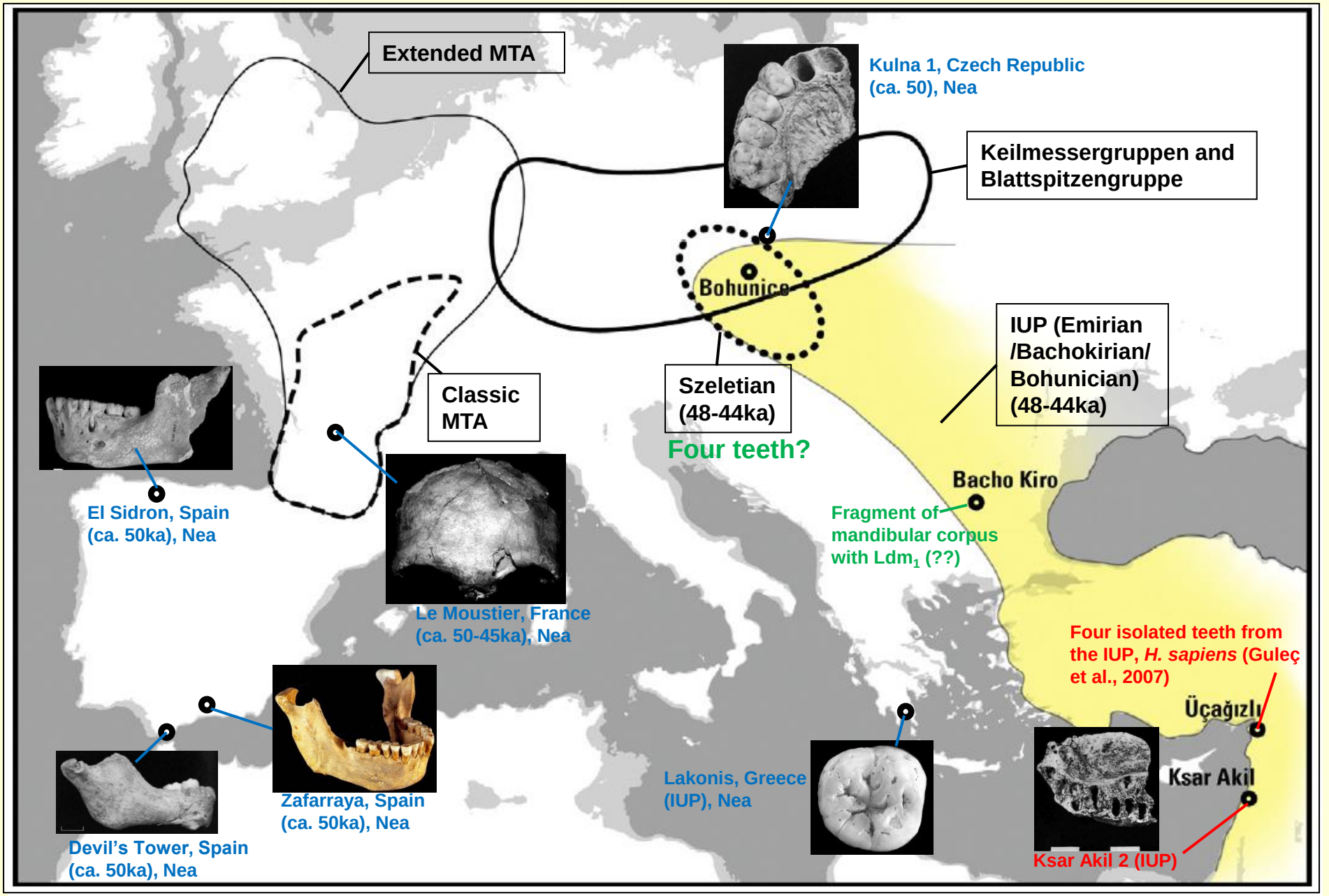
The timing and spatiotemporal patterning of Neanderthal disappearance

Tom Higham[1], Katerina Douka[1], Rachel Wood[1,2], Christopher Bronk Ramsey[1], Fiona Brock[1], [I]
Alvaro Arrizabalaga[5], Javier Baena[6], Cecilio Barroso-Ruiz[7], Christopher Bergman[8], Coralie B
Miguel Caparrós[11], Nicholas J. Conard[12,13], Christelle Draily[14], Alain Froment[15], Bertila Galvá
Alejandro García-Moreno[17,35], Stefano Grimaldi[18], Paul Haesaerts[19], Brigitte Holt[20], María-Jo
Arthur Jelinek[21], Jesús F. Jordá Pardo[22], José-Manuel Maíllo-Fernández[22], Anat Marom[1,23], Ju
Laure Metz[25], Eugène Morin[26], Adriana Moroni[20], Fabio Negrino[27], Eleni Panagopoulou[28], Ma
Marco de la Rasilla[29], Julien Riel-Salvatore[22], Annamaria Ronchitelli[10], David Santamaría[31], P
Ludovic Slimak[25], Joaquim Soler[24], Narcis Soler[24], Aritza Villaluenga[17], Ron Pinhasi[3,4] & Roge



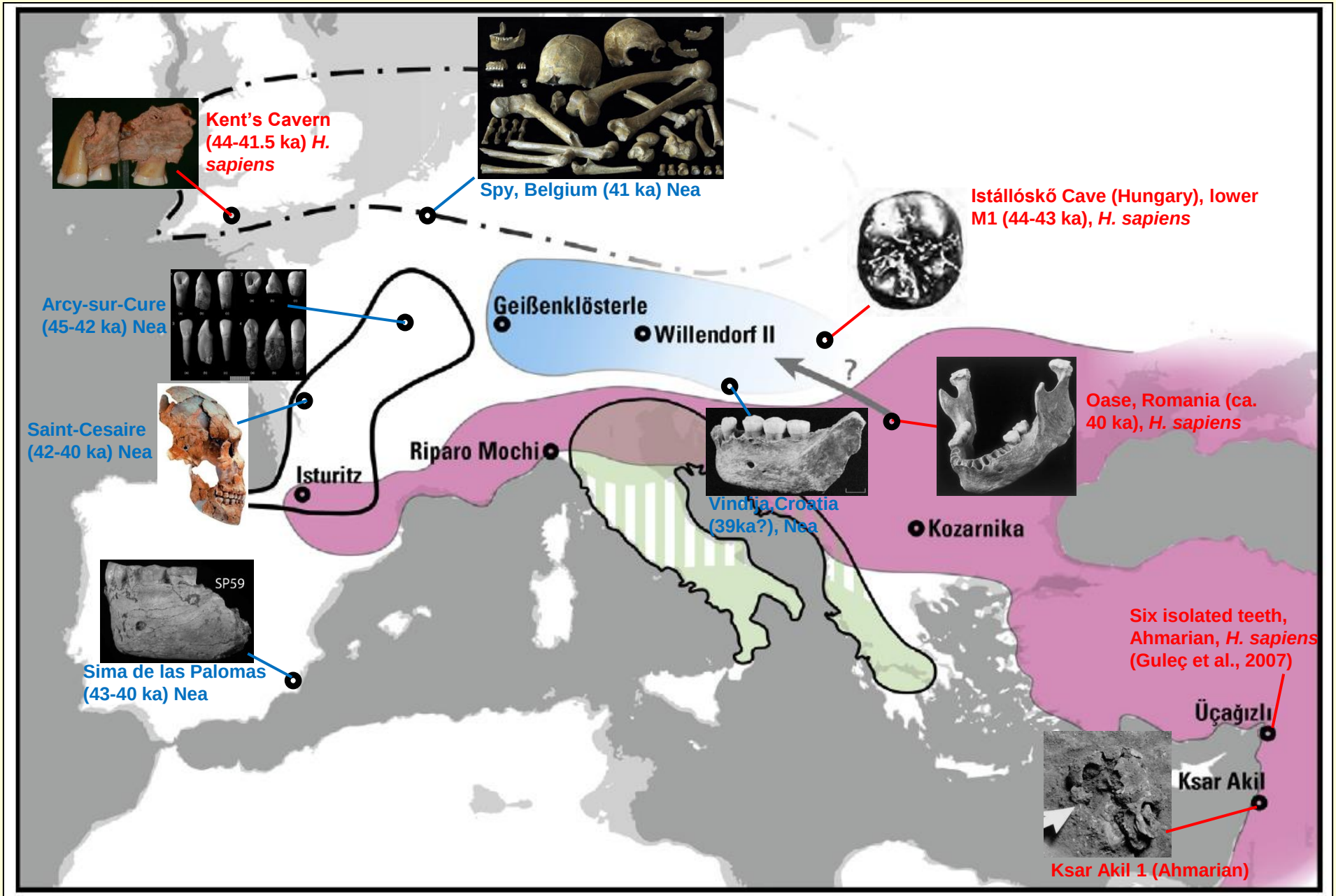


Da 50 e 45 ka cal BP



Modified from Hublin, 2014

Da 45 a 40 ka cal BP



Modified from Hublin, 2014

Convivenze – Sostituzioni – Ibridazioni

Ancient DNA pinpoints Paleolithic liaison in Europe

Romanian fossil was the great-great-great-grandson of a Neandertal—but an evolutionary dead end

….that the Oase man had far more Neandertal DNA—composing 4.8% to 11.3% of his genome—than either the ancient modern humans from Russia or living Europeans and Asians…

NAS

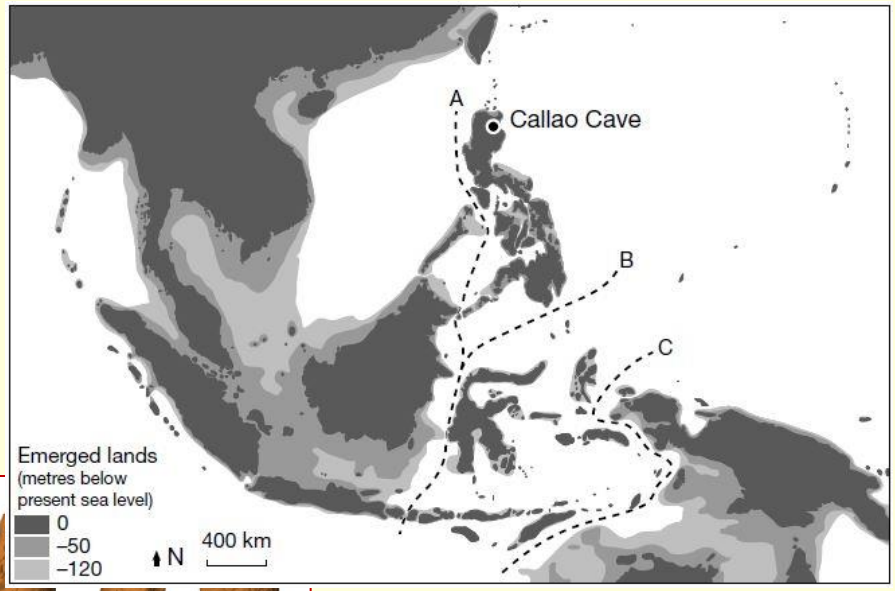
An early modern human from the Peştera cu Oase, Romania

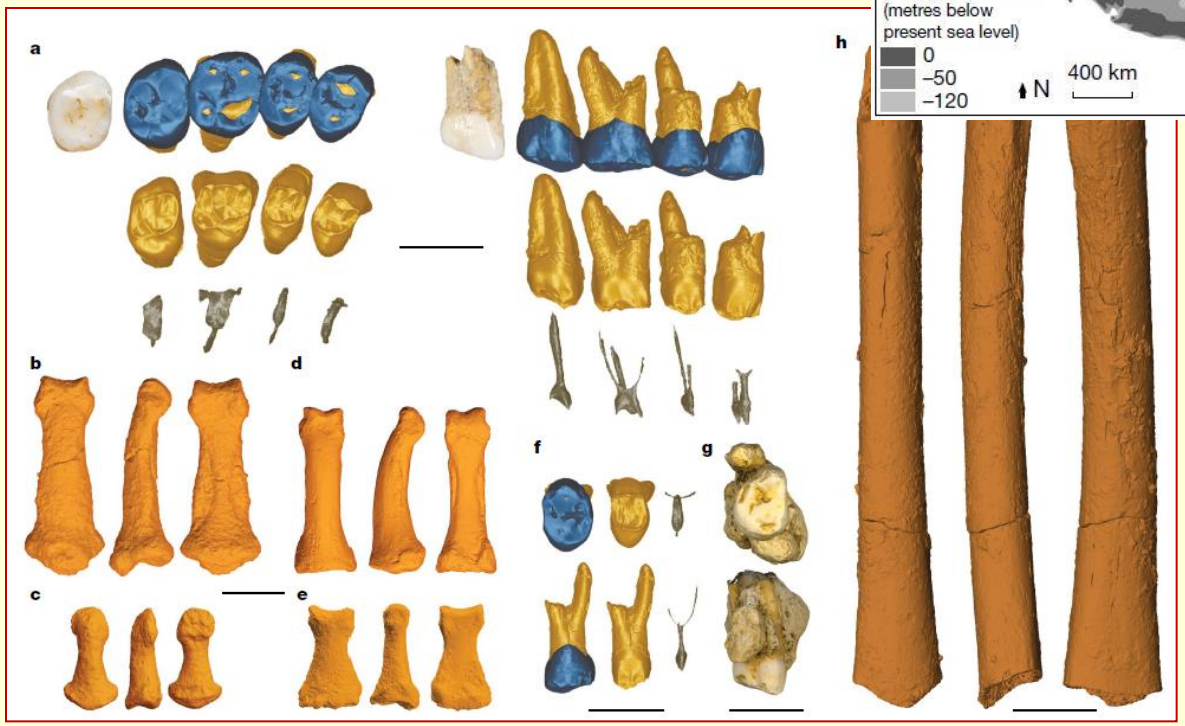
Erik Trinkaus*†, Oana Moldovan‡, Ştefan Milota§, Adrian Bilgăr¶, Laurenţiu Sarcina§, Sheela Athreya‖, Shara E. Bailey**, Ricardo Rodrigo††, Gherase Mircea§, Thomas Higham‡‡, Christopher Bronk Ramsey‡‡, and Johannes van der Plicht§§

Popolamento dell'Australia

A new species of *Homo* from the Late Pleistocene of the Philippines

Florent Détroit[1]*, Armand Salvador Mijares[2,3]*, Julien Corny[1], Guillaume Daver[4], Clément Zanolli[5,6], Eusebio Dizon[3], Emil Robles[2], Rainer Grün[7,8] & Philip J. Piper[3,9]





Homo floresiensis (Flores)

Liang Bua

100,000-60,000 ka

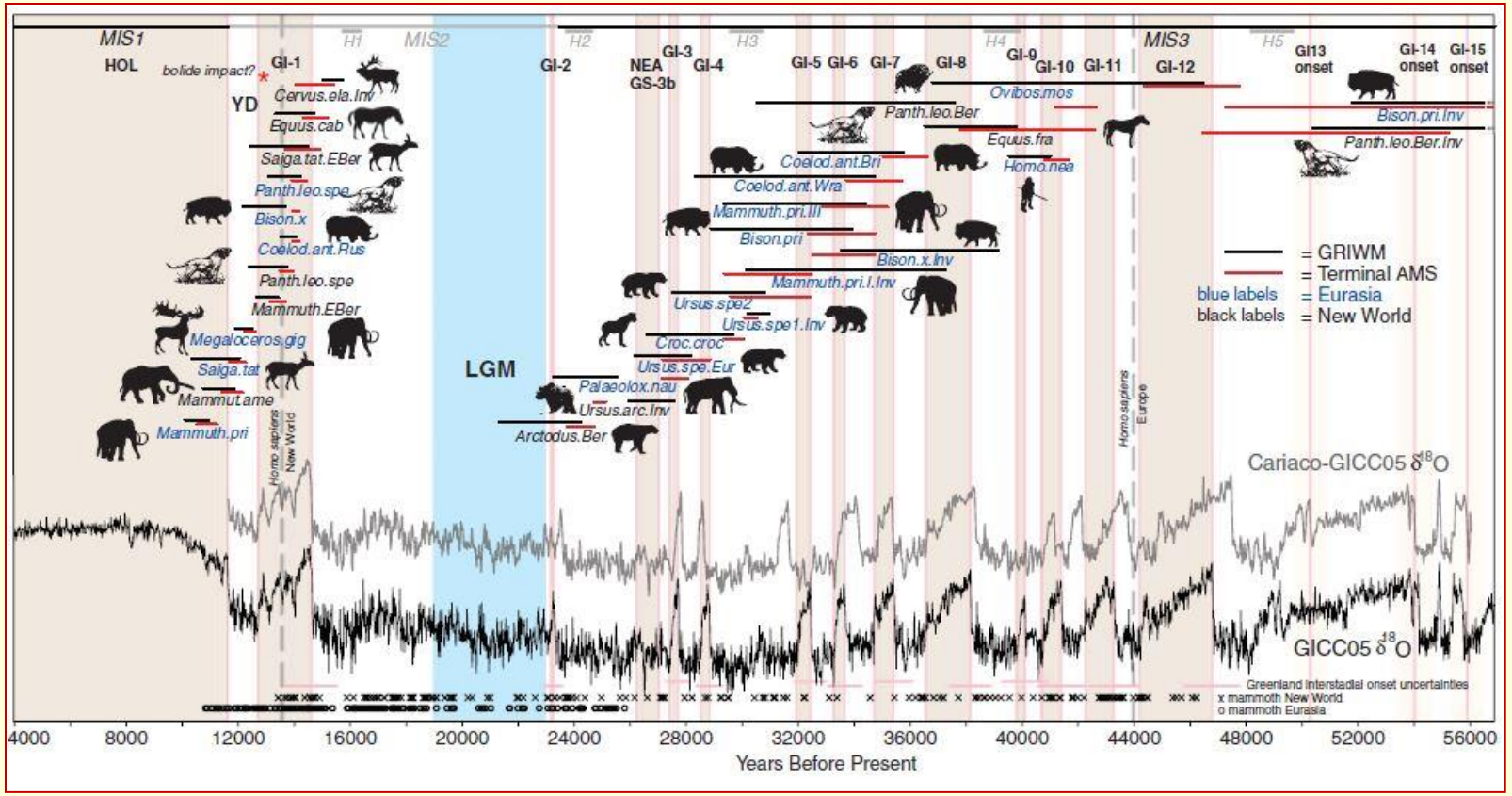
RESEARCH ARTICLES

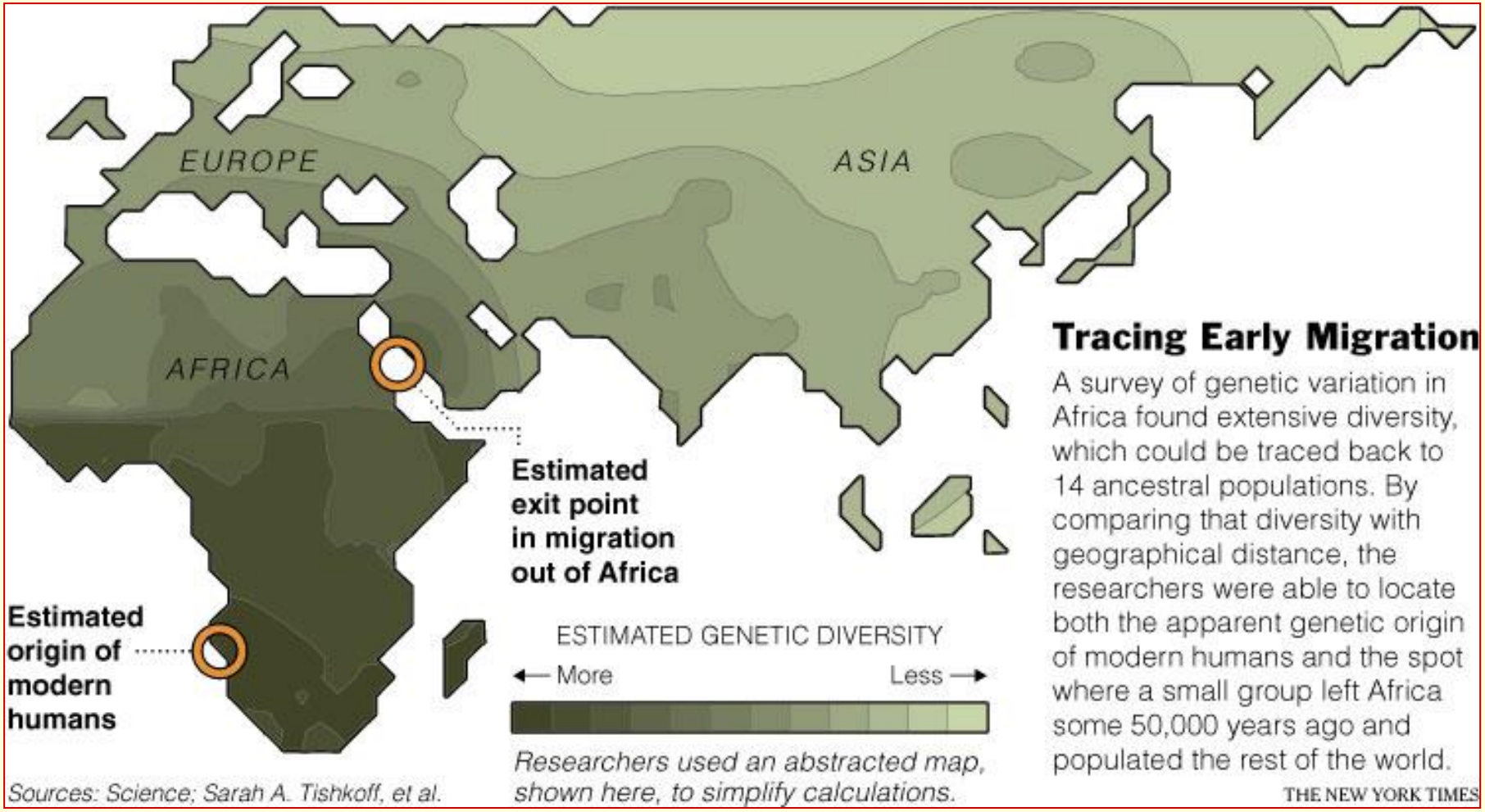
PALEOECOLOGY

Abrupt warming events drove Late Pleistocene Holarctic megafaunal turnover

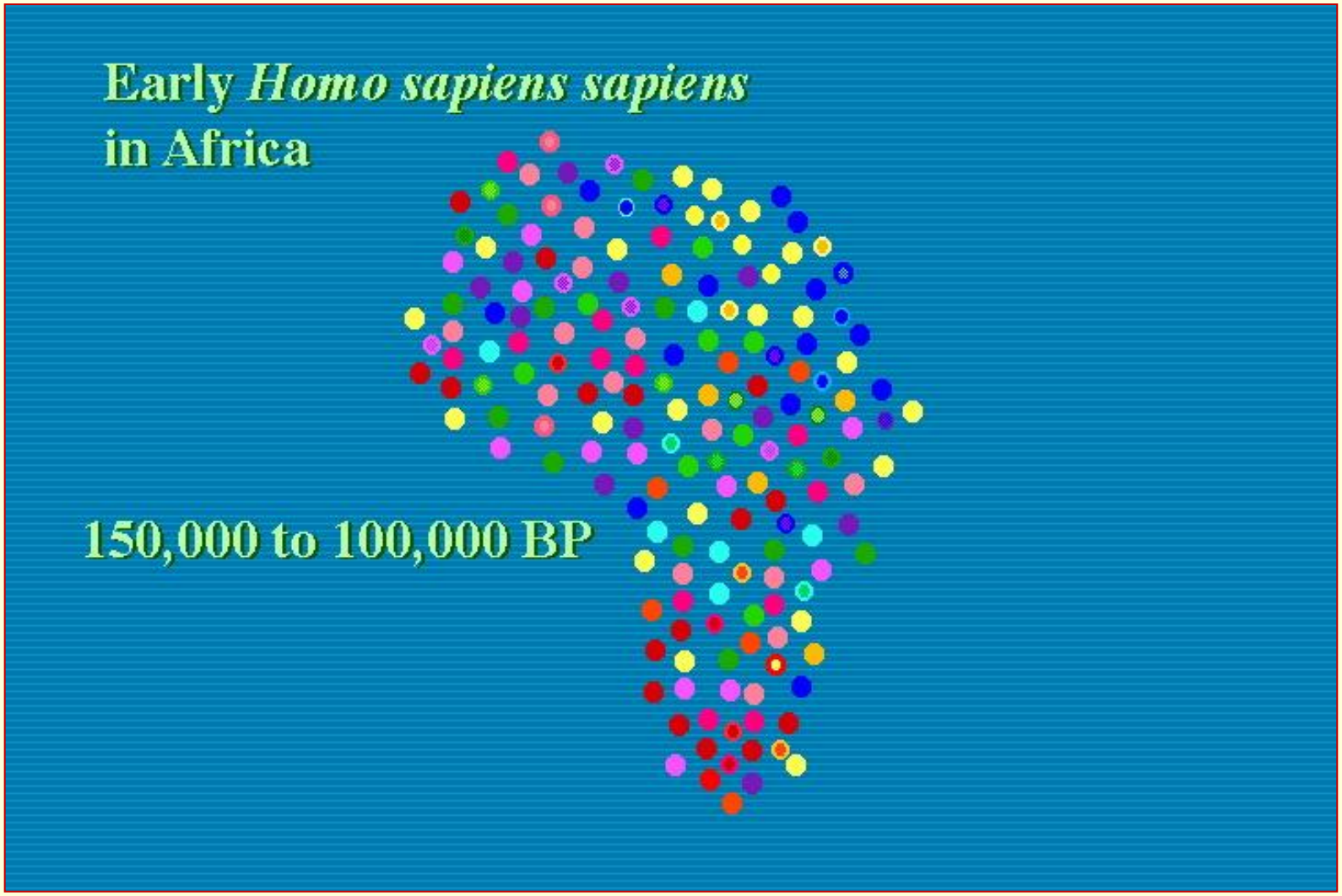
Alan Cooper,[1]* Chris Turney,[2]* Konrad A. Hughen,[3] Barry W. Brook,[4,5] H. Gregory McDonald,[6] Corey J. A. Bradshaw[4]

Eventi di estinzione-trasformazione della megafauna e records paleoclimatici del Pleistocene superiore




EUROPE
ASIA
AFRICA
Estimated exit point in migration out of Africa
Estimated origin of modern humans
ESTIMATED GENETIC DIVERSITY
More
Less
Researchers used an abstracted map, shown here, to simplify calculations.
Sources: Science; Sarah A. Tishkoff, et al.
Tracing Early Migration
A survey of genetic variation in Africa found extensive diversity, which could be traced back to 14 ancestral populations. By comparing that diversity with geographical distance, the researchers were able to locate both the apparent genetic origin of modern humans and the spot where a small group left Africa some 50,000 years ago and populated the rest of the world.
THE NEW YORK TIMES

Variabilità genetica popolazione africana

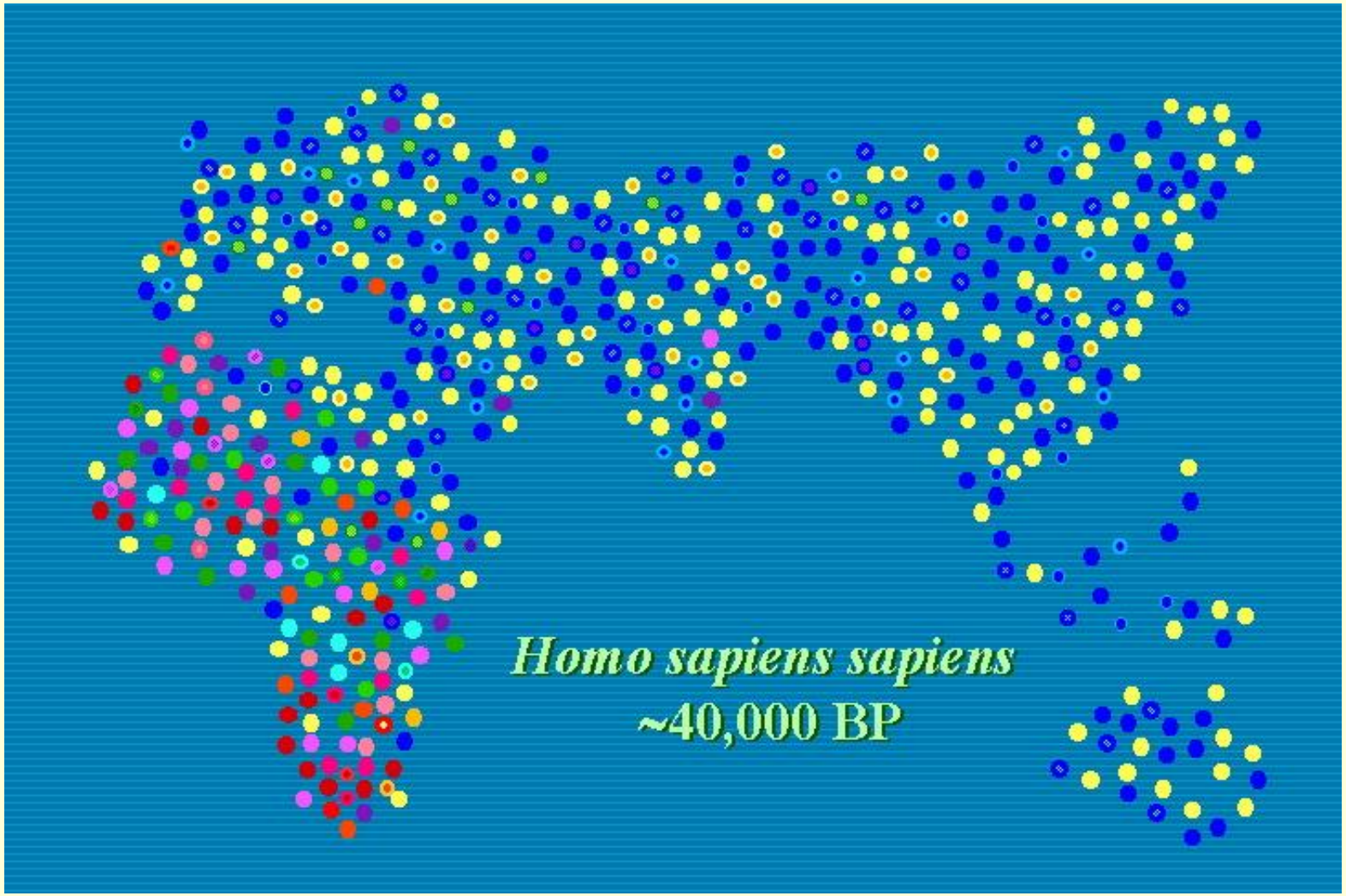


(courtesy, Kenneth Kidd, Yale University)

Deriva genetica delle prime AMH popolazioni out of Africa

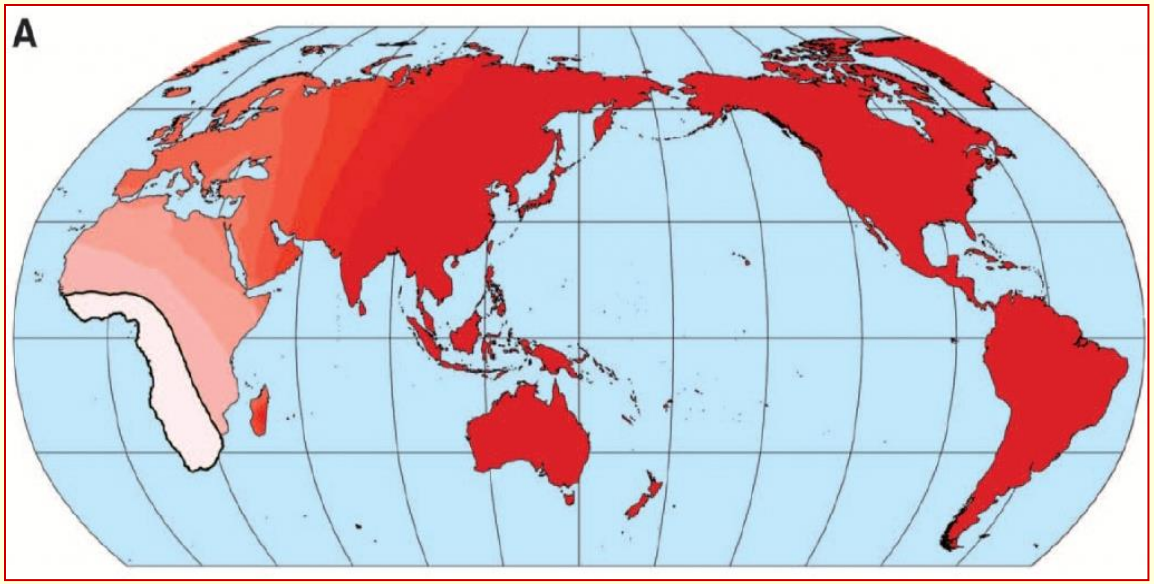
(courtesy, Kenneth Kidd, Yale University)

Riduzione della variabilità genetica della popolazione euroasiatica



(courtesy, Kenneth Kidd, Yale University)

Una relazione tra linguaggio ed espansione?



Atkinson, Science 2011

"Truly modern language, akin to languages spoken today, may thus have been the key cultural innovation that allowed the emergence of these and other hallmarks of behavioral modernity and ultimately led to our colonization of the globe"

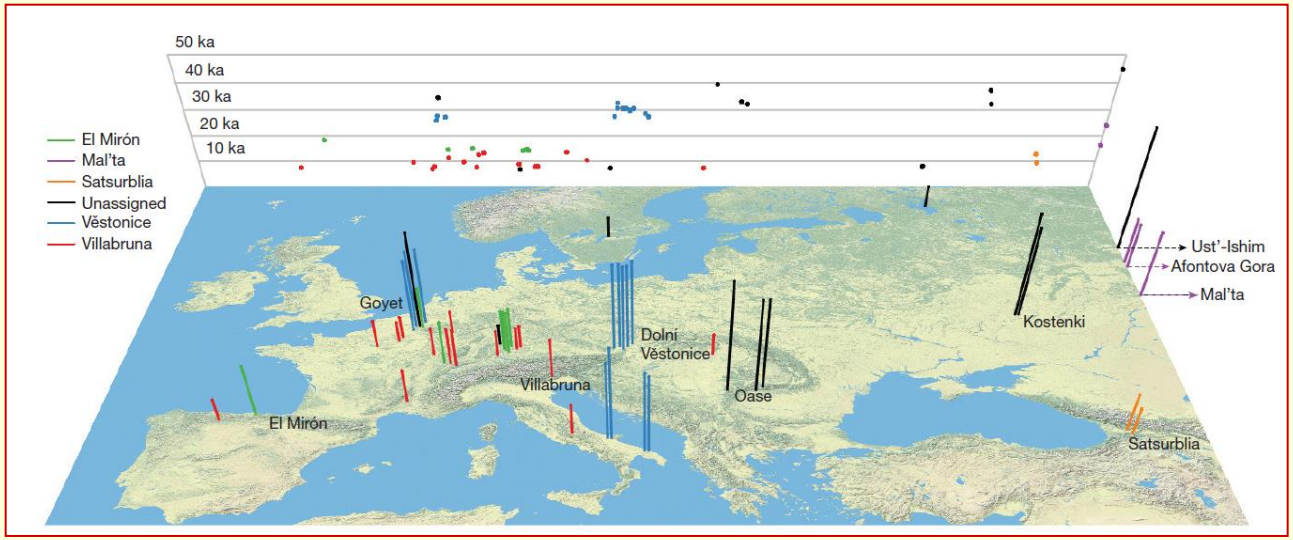
"Language was central to human expansion across the globe. It was our secret weapon, and as soon we got language we became a really dangerous species"

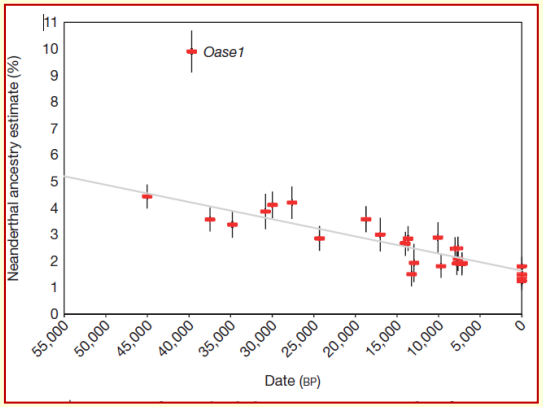
(Mark Pagel, NYT, April 14, 2011)

Not only one sapiens..

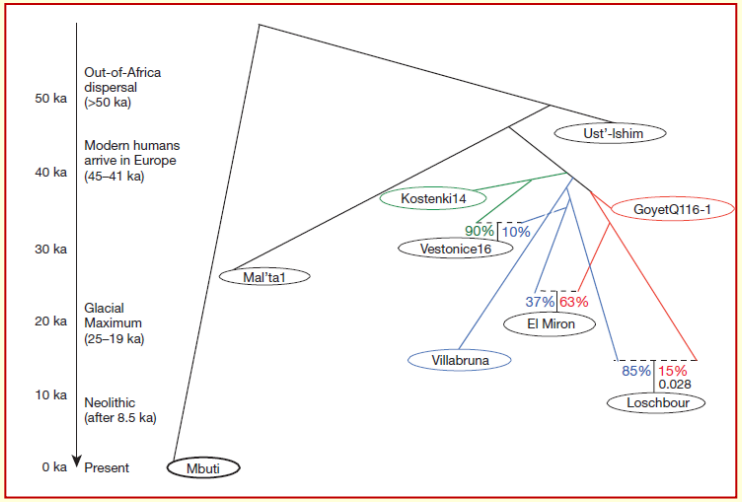
The genetic history of Ice Age Europe

Qiaomei Fu[1,2,3], Cosimo Posth[4,5]*, Mateja Hajdinjak[3]*, Martin Petr[3], Swapan Mallick[2,6,7], Daniel Fernandes[8,9],

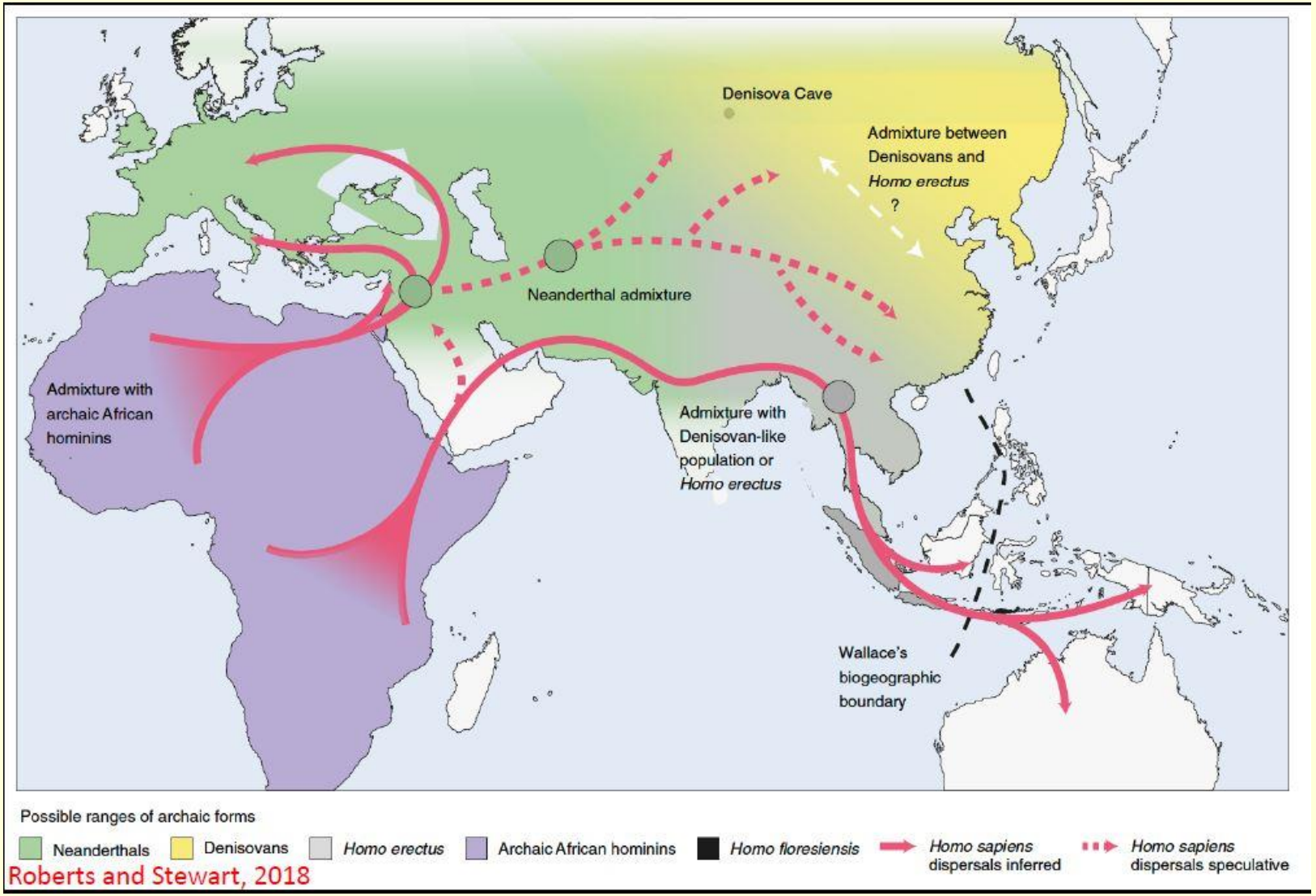




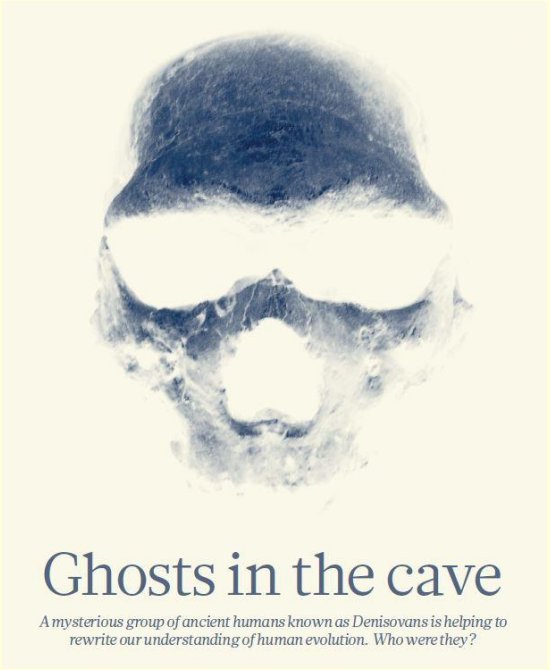
Decreasing Neandertal DNA in Palaeolithic euroasiatic humanity



Sapiens e gli altri

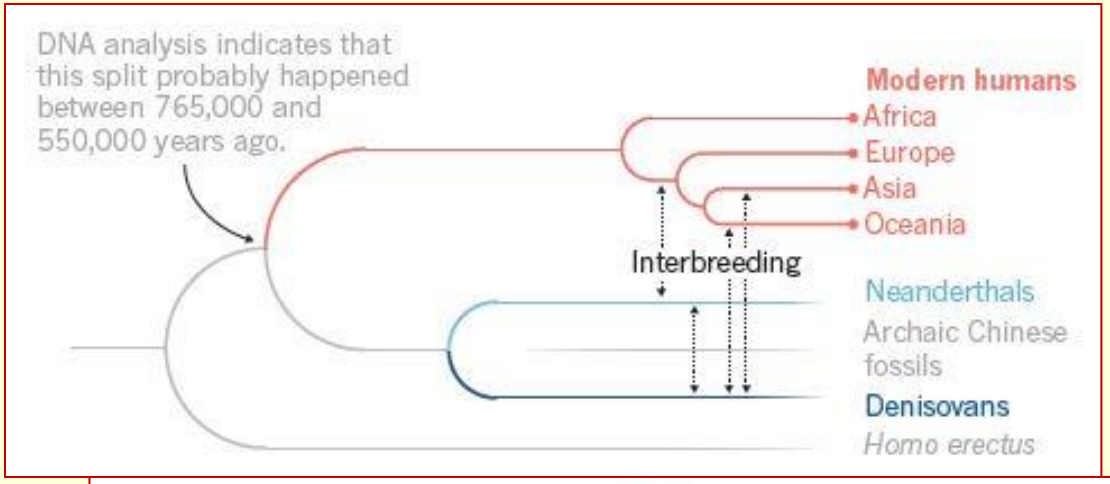


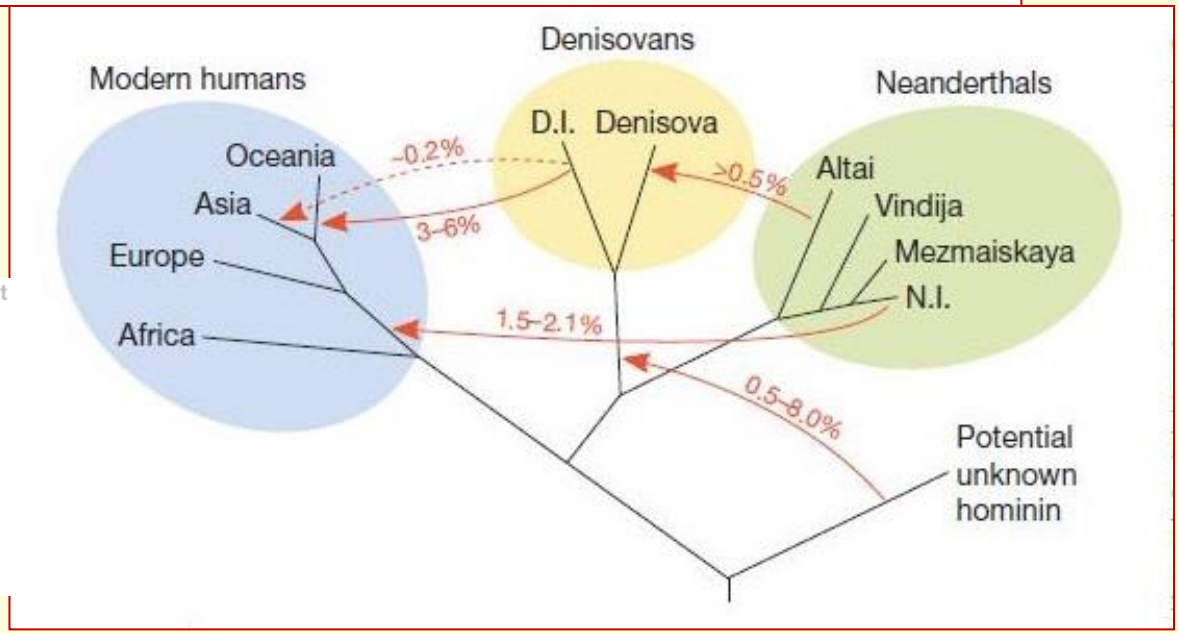
Interbreedings continui



Ghosts in the cave

A mysterious group of ancient humans known as Denisovans is helping to rewrite our understanding of human evolution. Who were they?





Report

Current Biology

The Combined Landscape of Denisovan and Neanderthal Ancestry in Present-Day Humans

Highlights

- Denisovan admixture into modern humans occurred after Neanderthal admixture
- There is more Denisovan ancestry in South Asians than expected from current models
- Denisovan ancestry has been subject to positive and negative selection after admixture
- Male infertility most likely occurred after modern human interbreeding with Denisovans

Authors

Sriram Sankararaman, Swapan Mallick, Nick Patterson, David Reich

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sriram@cs.ucla.edu (S.S.), reich@genetics.med.harvard.edu (D.R.)

In Brief

Sankararaman et al. present a map of