The Humans Who Went Extinct
Homo neanderthalensis:
The Other Smart Human

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FEB 26, 2020

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2020: Indian hominins survived Mt. Tuba eruption at 74 Ka

These tools, excavated from a site in central India, may have been continuously produced between 80,000 and 25,000 years ago. CHRIS CLARKSON

Dhaba in central India: Dated to before and *after* the eruption; Used Lavaillois technique; also later blades in higher levels; bolsters data that MH reached Australia by 65 Ka


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7-6
If we don't go back and paint this on a wall, no one's ever gonna believe it.
Blazek

The most famous and best understood of all fossil humans.
But were an evolutionary dead end.

Neandertals Were People, Too.

Based on the 2 Gibraltar skulls:
called Nana and Flint

New York Times, 1/15/17:
Adrie & Alfons Kennis

Depictions of hominin...P.Plailly/E.Daynes/Eurelios


NATIONAL GEOGRAPHIC
The Other Humans
NEANDERTHALS REVEALED

Oct. 2008

2 or 3 Lectures

- 1: History of N discoveries, basic facts about Ns, reconstructions
- 2: Other interesting N research; fight between researchers who believe Ns were our equals and those who do not accept this; question of how Ns went extinct
- 3: If we discuss a lot in first 2

- Majority of N genetics research will be presented in the two Paleogenetics lectures

Neandertals: The iconic other

- The first non-MH hominin discovered.
- Originally seen as different from MHs, the outsider, the other, the contrast.

Importance of Ns

- Focus of paleoanthropology for 150 years
- Most anthropologists were European: lived in Europe, or have European ancestry, or worked in Europe.
- Note: Most of our evolutionary history is in Africa. And indeed, a large part of it might have been in East Asia. The populations in East Asia may have been much larger and persisted for much longer time period than those in Europe.
- While Neanderthals are an important part of the history of our understanding of human evolution, their importance to that understanding is that they're just one part of the story and maybe not as big a part of the story as we think they are.
- Absence of evidence is not evidence of absence: a major issue in N research

Neandertals

- Harvati: “Neanderthals are the best represented and most studied group in the human fossil record.”

- We know more facts about Neanderthals than any other extinct humans. Many thousands of their artefacts and fossils have been found, including several nearly complete skeletons.

- We also know about their genetic make-up, as several Neanderthal genomes have now been reconstructed from ancient DNA obtained from their fossils.

Harvati and Harrison, 2006

Bernard Woods on Neandertals

"[Neanderthals] are not as tall as we are, their limbs aren’t as long, the surfaces of their joints are bigger, their bones are bigger, their bones are generally stronger," Wood says. Then he points out their defining characteristic: thick, spherical skulls, protruding brows, and a very small forehead.

They probably needed about another 600 or 700 calories a day more than a modern human" to feed their hardier bodies — great in times of plenty but catastrophic in a famine.

They were the gas-guzzling pickup truck of the hominins. We were the smart car.

Wood's suggestion, that Neanderthals were simply not energy-efficient enough to survive periods of scarcity, is compelling.

Still, as he points out later, Neanderthals managed to survive for 700 thousand years, far longer than we have so far.

Neandertals: Ancestors, Dead Ends, or Interbreeding?

- No other aspect of human evolution has generated as much public interest for so long a time as the story of the Neanderthals.
- The “Neandertal Question” is probably paleoanthropology’s longest running headache: “What is their relationship to the succeeding modern European populations.”
- Much controversy over
  - relationship to anatomically modern humans (*H. sapiens*): replaced by MHs or was there an evolutionary continuity?
  - their fate

N’s as *Homo sapiens*

- The perception of Neanderthals as a separate species changed starting in the 1930s.
- Mayr, Simpson, and Dobzhansky, among the fathers of the Modern Synthesis in Biology, placed Neanderthals and other Pleistocene fossil humans within our own species, Homo sapiens.
- According to this view, Neanderthals were thought to have evolved into modern people through slow, gradual evolution.
- Given modern genetic findings, the majority of current scientists view Neanderthals as a distinct, Western Eurasian evolutionary lineage, which probably did not contribute significantly to the evolution of modern people.

3 Historical hypothesis about N phylogeny

- 1 – There is evolutionary continuity between Ns and MHs in Europe (multiregional model); human evolution as whole went through worldwide N stage; no evidence for this

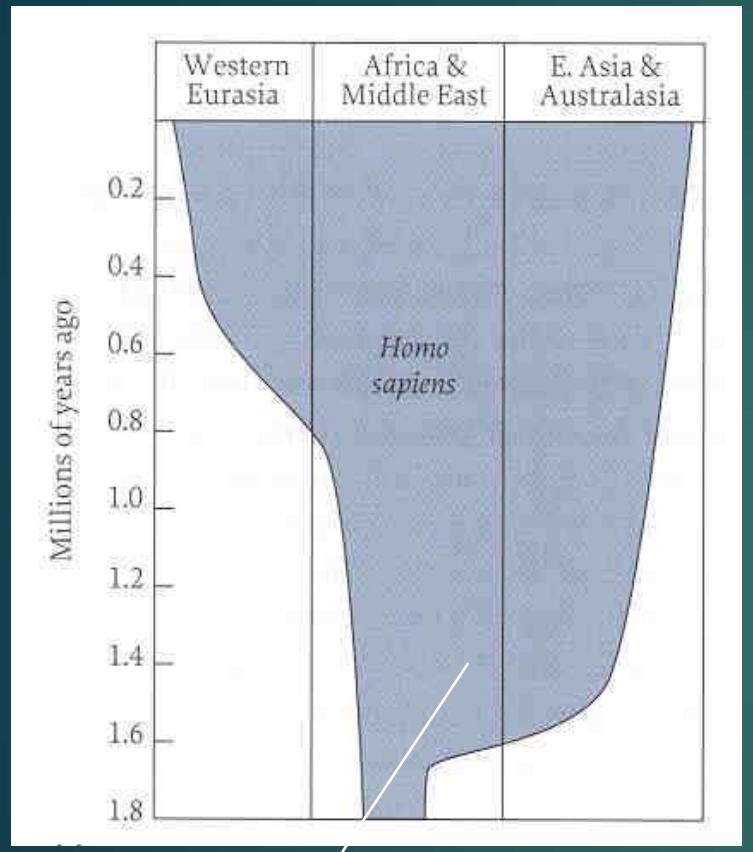
- 2 – Presapiens theory: Ns are an archaic group that went extinct without issue; MHs cannot be descended from Ns; MHs descend from Presapiens type of early human, contemporary but distinct from Ns (like current Out of Africa model)

- 3 – Since N morphology & genetics diverge from MHs, Ns are peripheral to mainstream human evolution; Ns were genetically isolated from AMH by Wurmian glaciers in W Europe

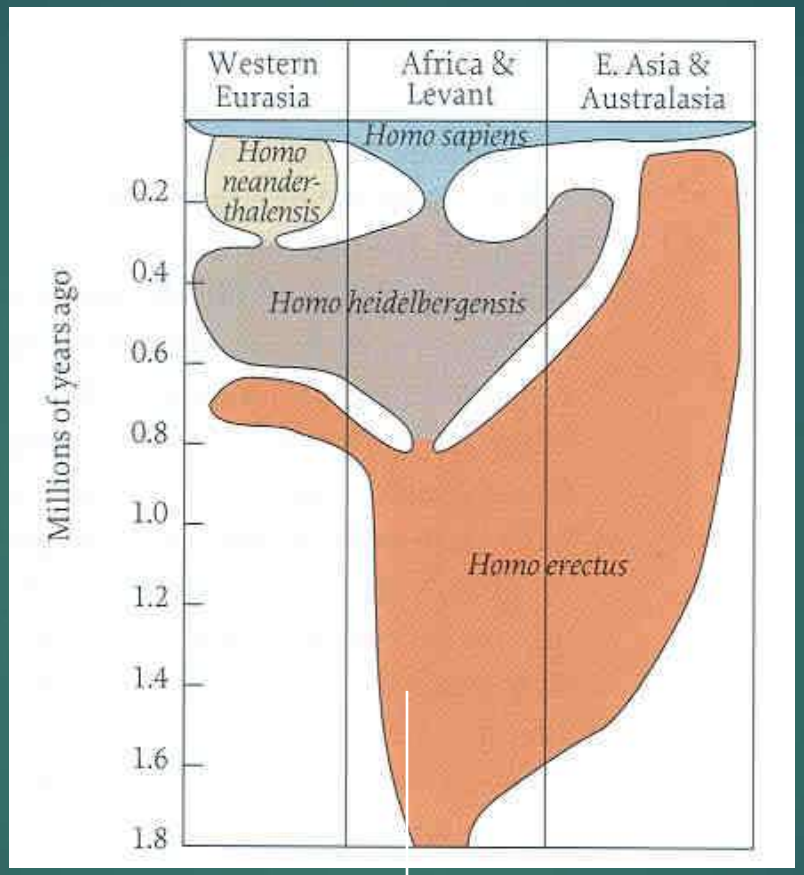
Common ancestor of N and MH

- Paleoanthropologists originally estimated that the human and Neandertal lineages diverged from their common ancestor between 350,000 and 400,000 years ago. This estimate comes from a variety of techniques, most especially the "molecular clock" method which utilizes the known and stable rate of mutation in certain noncoding regions of DNA.
- But what *was* the common ancestor of humans and Neandertals?
  - The most likely candidate is the species we call *Homo heidelbergensis* (for having been first discovered near present-day Heidelberg, Germany).
  - This species existed at the right time: first appearing in Africa at least 700,000 years ago and persisting in Eurasia until as recently as 60,000 years ago.
  - *H. heidelbergensis* also existed in the right places: besides those that remained in Africa (where *H. sapiens* would evolve), a population migrated to Europe and Asia between 400 & 300 Ka, around the time that the Neandertal lineage began to diverge.
  - Of course, the morphology of this species fits with what a common ancestor would have to be as well, possessing all the necessary shared features.

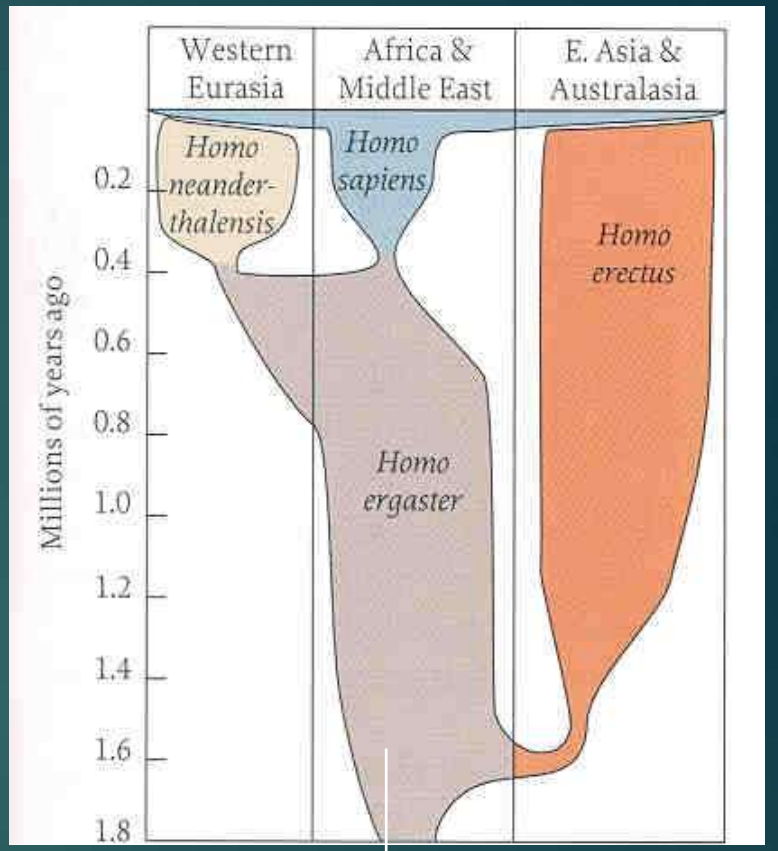
Competing phylogenetic hypotheses



Milford Wolpoff



Phillip Rightmire



Richard Klein

The Neandertals

- Neanderthals are a group of fossil humans that inhabited Western Eurasia from approximately 400 to 30 Ka (Kilo annum).
- Excelled at making Mousterian stone tools and hunting animals with thrusting spears
- Survived the rigors of multiple ice ages
- Died out in Europe between 41 and 30 Ka - this coincides with the start of a very cold period in Europe, and is 2000-5,600 years after *Homo sapiens* reached the continent
- They are a distinct Eurasian human lineage isolated from the rest of the Old World and sharing a common ancestor with modern humans sometime in the early Middle Pleistocene.

Katerina Harvati, *Neanderthals*, Evo Edu Outreach, 2010

C. Stringer

- Many of the new finds challenge how we classify fossils in relation to Homo sapiens today. I continue to call the Neanderthals a different species from us, based on their distinctive skeletons and skulls; others feel that the recent evidence of interbreeding and increasing evidence of sophisticated behavior mean that we should merge them, and the Denisovans, into our species.

Smart or a Neandertal? What species?

Russian boxer
Nicholai Valuev:

History of Inferring Neandertal Inferiority: Mother of all image problems

- No hominin group has been more maligned in the history of paleoanthropology than the Ns. Only hominin now known mainly for use of their name as a pejorative.

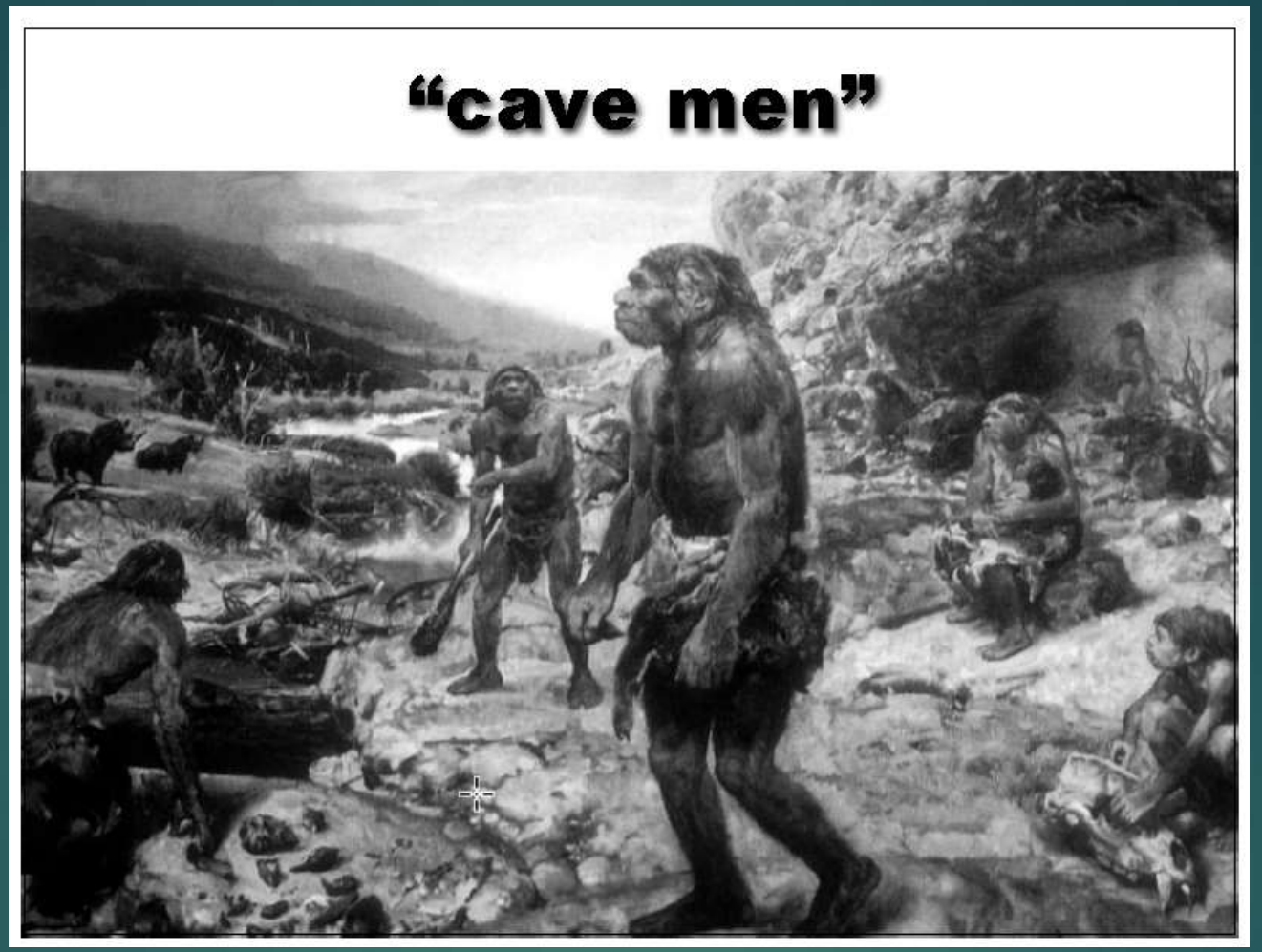
- Ernest Haeckel, in his phylogeny tree, proposed that Ns be named *Homo stupidus*

- Historical perception that *H. sapiens* was superior has blighted the perception and interpretation of Neandertal capabilities
- For 150 years, Ns were thought of as genetically incapable of language, symbolic behavior, foresight, tool creation, art, hunting, & blade & bone tool production; all characteristics granted only to the “superior” MHs of Upper Paleolithic
- There is a growing body of archeological evidence showing that Ns were not significantly different from MHs in their capacity for cultural and symbolic behavior. But a continuing debate.

N as brute

- In an early study of the skull, “The Reputed Fossil Man of the Neanderthal,” geologist William King, who named the species, in 1864 speculated the Neanderthal’s “thoughts and desires… never soared beyond those of the brute.”

- The view persists today from
  - GEICO ads
  - to the Oxford English Dictionary: “(of a man) unpleasant, rude, and not behaving in a socially acceptable way”



We once pictured Ns as a brutish, stocky group of primitive humans who could only grunt to communicate and violently wield their clubs before anyone got too close.

John Hawks: His collection of Neandertal anti-defamation files

- Geico commercials

- “George Lucas regards most of his fans as amoral neanderthals.”

- Barbara King: "Knuckle-dragging Neanderthals!" Every election year, political candidates of all stripes are tarred with this epithet. In a recent column, Washington Post pundit Kathleen Parker asks if it's fair that many U.S. women see the Republican party in precisely those terms. My question: Is that fair to the Neanderthals?

- John V. Farrar’s self-help book: *Dump the Neanderthal; Choose Your Prime Mate (*Can’t therapists leave these poor ancient people alone?)

John Hawks: N anti-defamation files

- "British Archaeologist Says Neanderthals Sang Opera“ Rap is associated with a particular type of music based on words and phrases, something the Neanderthals lacked, [Steven] Mithen said.

- Bill Clinton: “Now it didn’t surprise my wife and daughter to learn that I was part Neanderthal.“

- This, from ScienceAlert: We caught modern genital warts because our ancestors were banging Neanderthals

- The *New York Times* joins the Neandertal anti-defamation league with an editorial by David Frayer: “Whore You Calling a Neanderthal?”
- Sarah Palin characterized an opponent: “a knuckle-dragging Neandertal”

Negative view: Even Richard Klein

- “It is not difficult to understand why the Neanderthals failed to survive,” noted Richard Klein in the third edition of his seminal textbook, *The Human Career*, in 2009.

- “The archaeological record shows that in virtually every detectable aspect—artifacts, site modification, ability to adapt to extreme environments, subsistence, and so forth—the Neanderthals lagged their modern successors, and their more primitive behavior limited their ability to compete for game and other shared resources.”

Si les hommes de Néandertal avaient construit des centrales nucléaires, on serait encore en train de s'occuper de leurs déchets...

neanderthal adjective
Primitive, unenlightened, or reactionary; culturally or intellectually backward.

Mes compétences techniques personnelles sont largement inférieures à celle d'un homme de Néandertal.

According to the left, Trump had appointed a cabinet of Neanderthals.

Police de Laval: des propos « dignes d'hommes du Néandertal ».

Neanderthals: They're Just Like Us.

Trump is a Neanderthal.

Neanderthals for Trump: How our primitive brains are ruining America politics.

Rustre, bas du front, peut-être... Mais brave, héroïque même, le gars Néandertal ! Ce Bayard de l'âge de pierre, ce Lino Ventura des âges farouches.

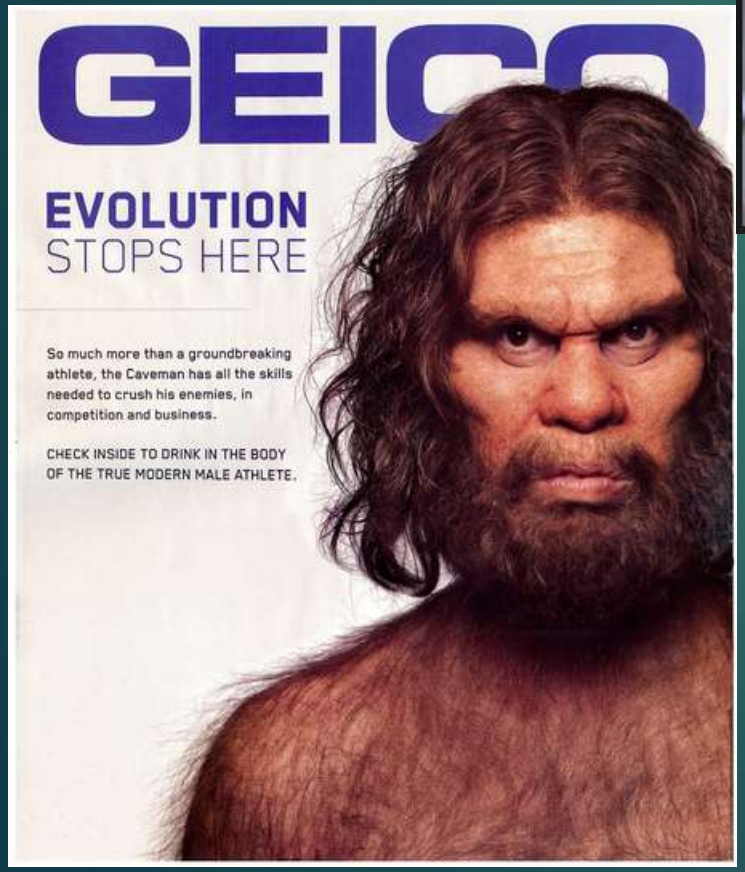
2017, c'est quand même l'année Trump. Cela restera à jamais gravé dans les annales de l'évolution humaine : le Néandertal est parvenu aux commandes de la nation la plus puissante au monde !

Neanderthals Were People, Too.

Avec le Front Néanderthal, on retourne au Jurassique.

Pour mener l'être humain vers la civilisation, il a fallu quelques millions d'années, alors que le retour au Néandertal prend moins d'une semaine.

Neandertal: our only fossil curse word: a name synonymous for primitiveness



(1909)

News flash: negative evidence convicts Neanderthals of gross mental incompetence

John D. Speth

> There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact.
>
> (Mark Twain)

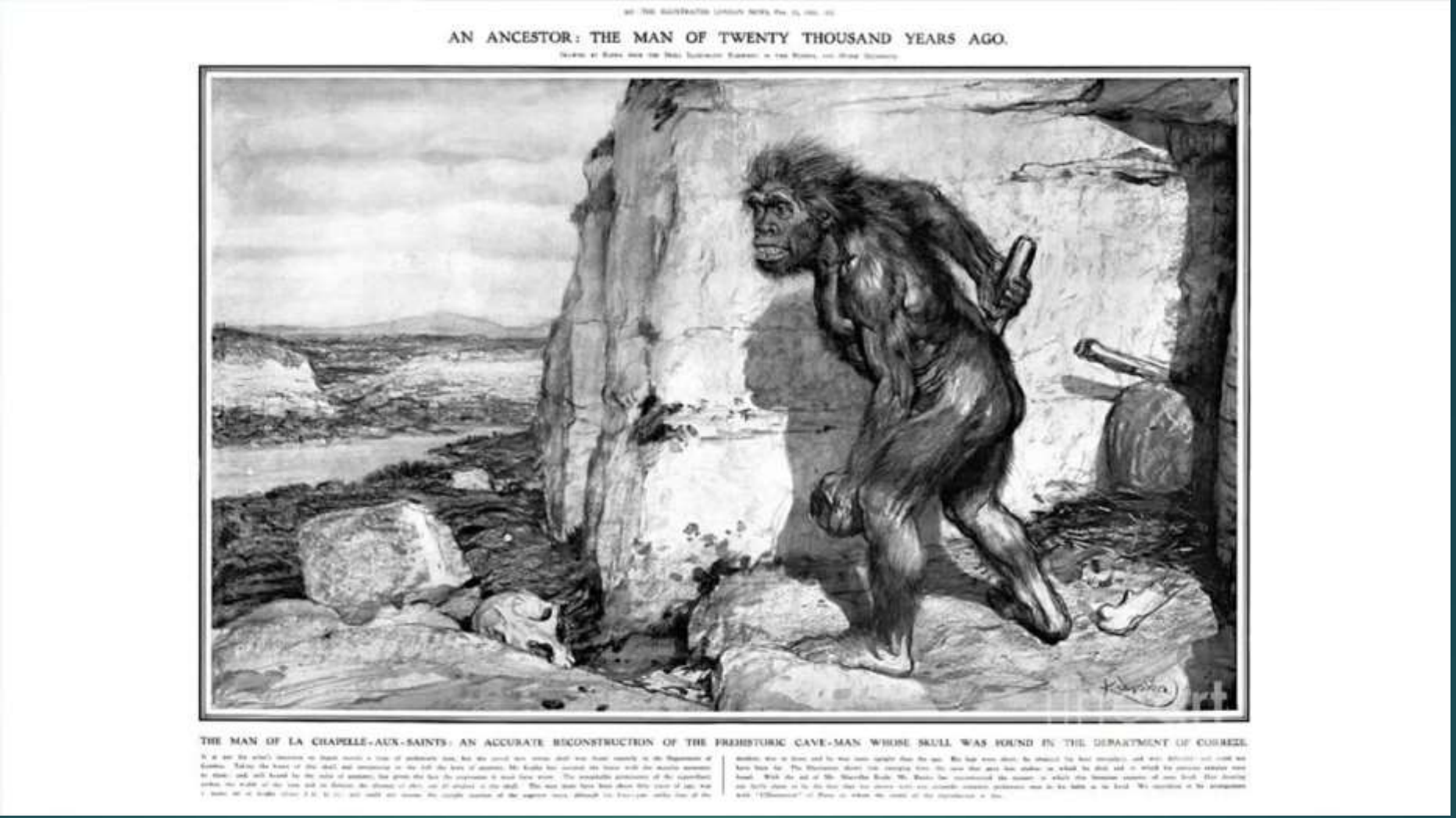
As this is an issue of *World Archaeology* whose overall aim is to promote lively discussion, I hope with this rather smallish contribution to do likewise. In the process, I will stick my neck out far enough that some of my readers will no doubt be delighted to perform the obvious surgery. And, although my tone may seem rather heavy-handed at times, this is done not with the conviction that my ideas are right and those I question are wrong, but with the hope that this will stimulate dialogue that is both productive, and at the same

By most recent accounts, Neanderthals would have had considerable difficulty chewing gum and walking at the same time. In fact, to most contemporary paleoanthropologists, they simply didn't cut the mustard as humans. ‘Their lights were on but nobody was home.’

J. Speth, World Archeology,2010

Marcellin Boule: N as brute

- In 1911, Marcellin Boule, a French paleontologist, published the first scientific description of the Neanderthal species.
- The skeleton in Boule's volume, dubbed the "Old Man of La Chapelle," was a wretched creature: "a hunched-over, brutish, dim-witted, primitive man clearly destined to fail in the game of "survival of the fittest."
- Since Boule's analysis, our view of Neanderthals has shifted, from a caricature of a caveman to a remarkably sophisticated species. We've learned about how they built tools. That they made jewelry. That they, at times, buried their dead. We learned they were possibly stronger than us, and maybe just as smart.



Scientifically endorsed reconstruction of Neandertal, London Times, 1909, based on French anthropologist, Marcellin Boule: scientific origin of club wielding, knuckle dragging caveman stereotype

Rethinking Neandertals

- Neanderthals, traditionally designated Homo sapiens neanderthalensis, were not only "human" but also, it turns out, more "modern" than scientists previously allowed
- Researchers believe that Neandertals were:
  - intelligent
  - capable of developing highly functional tools to help them adapt to a wide variety of ecological zones
  - buried their dead,
  - cared for the sick,
  - had language
  - had art
  - mated with us
- But the question has always remained: Why did they go extinct?

New view of N

- In his critically-acclaimed *Neanderthal Parallax* trilogy, published in 2002 and 2003, science fiction author Robert Sawyer envisions an alternative evolutionary timeline. What if, in the glacial Pleistocene, *Homo sapiens* hadn't beat out every other member of *Homo*? What if, instead, Neanderthals had spent the last 30,000 years achieving a culture as sophisticated as our own? What if Neanderthals did "human" better?
- Humans and Neanderthals had a very similar locomotor pattern; the distributions of ages and disabilities at the Shanidar site suggested a system of Neanderthal social support.
- By the 1990s and early 2000s, research had firmly established that Neanderthals created complex tools, buried their dead, had an organized use of space, probably cared for the infirm, and perhaps even conversed vocally. Over the last decade, a host of sites, like El Sidrón, Riparo Bombrini, and Mezmaiskaya Cave (in Spain, Italy, and Russia, respectively), have offered more evidence—like specialized living areas in rock shelters and complex tool technologies—to indicate that Neanderthals were capable of sophisticated behavior.

Fossil evidence

- *Type specimen*: Neanderthal 1 – adult calotte and partial skeleton, Feldhofer Cave, Elberfield, Germany, 1856.

- *Source(s) of the evidence*: Fossil evidence for *H. neanderthalensis* has been found throughout Europe, with the exception of Scandinavia, as well as in the Near East, the Levant and Western Asia.

- *Nature of the evidence*: Many are burials and so all anatomical regions are represented in the fossil record.

Wood

- For some researchers the taxon is restricted to fossils from Europe and the Near East that used to be referred to as ‘Classic’ Neanderthals.
- Others interpret the taxon more inclusively and include within the hypodigm fossil evidence that is generally older and less derived [for example, Steinheim, Swanscombe and Atapuerca (Sima de los Huesos)].
- *Recent developments*: Researchers have recovered short fragments of mitochondrial DNA from the humerus of the Neanderthal type specimen (Krings et al. 1997, 1999). The fossil sequence falls well outside the range of variation of a diverse sample of modern humans.

N mtDNA

- Researchers suggest that Neanderthals would have been unlikely to have made any contribution to the modern human gene pool and they estimate this amount of difference points to 550–690 kyr of separation.
- Subsequently, mtDNA has been recovered at other Neanderthal sites, including from rib fragments of a child's skeleton at Mezmaiskaya (Ovchinnikov et al. 2000) from several individuals from Vindija (Krings et al. 2000).
- As of November 2007, sequences are known from 13 Neanderthal specimens from sites in Western Europe and the Caucasus.
- The latest Neanderthal fossils to yield mtDNA are the left femur of the Teshik-Tash Neanderthal from Uzbekistan, and from the femur of the subadult individual from Okladnikov, a site in the Altai Mountains in Western Asia (Krause et al. 2007).
- The differences among the fossil mtDNA fragments known up until 2002 are similar to the differences between any three randomly selected African modern humans, but the differences between the mtDNA recovered from Neanderthals and the mtDNA of modern humans is substantial and significant (Knight, 2003).

The evidence: N fossils

- The Neanderthals are the longest known and best understood of all fossil humans.
- Today, several thousand Neanderthal bones are known from more than 70 individual sites. Klein: Total N sample includes 350 individuals

- Most Neanderthal specimens are isolated skeletal elements, especially teeth and jaws, but nearly every part of the skeleton is represented in multiple copies.

- There are also more than 21 partial skeletons from individuals of both sexes and different ages.
- More than 300 archaeological sites have yielded artifacts and broken-up animal bones that illuminate Neanderthal behavior and ecology.

Neandertals

- People who occupied western half of Eurasia (central Asia and Europe)
- Survived wildly fluctuating climate (warm to glacial conditions)
- Masters of local food environment
- Their skeletons are morphologically different from MHs
- Genetically very close to MHs, but slightly different: 99.7% identical
- Geographic morphological variability and a huge territorial range
- Always a small population (~50 to 100k), only a 10^{th} of population of Africa
- Capable of speech (had MH-like hyoid bone and FOXP2 gene)

Homo neanderthalensis

- *Homo neanderthalensis* (alternatively, *H. sapiens neanderthalensis*) was a late hominin form:
  - N diverged from common ancestor ~ 550 to 765 Ka
  - Commonly given span: 430 to 30 Ka
  - gradual development and establishment of typical N form in Europe
  - disappeared from Europe and Asia by ~41k–30 Ka, though evidence from Gibraltar suggests that some may have survived there until ~28 Ka.
- Interacted with modern humans both:
  - ~100 K in Levant
  - 40 K in Europe (for 5600-2600 yrs).

Neandertals

- The extreme cold of the European Ice Ages is considered at least partly responsible for the evolution of some of the distinctive Neanderthal anatomy, although other factors (small population size, effects of chance in small populations) were probably also important.
- The causes for the Neanderthal extinction are not well understood.
- Worsening climate and competition with modern humans are frequently cited.
- Neanderthals were our sister species, much more closely related to us than the chimpanzees, our closest living relatives today.
- But there has been a continuing historical debate surrounding the relationship of Neanderthals with modern humans.

Species: *Homo neanderthalensis:* Basic Facts

- **Lived:** from about 430,000 to 30,000 years ago
- **Appearance:** Large nose, strong double-arched brow ridge, relatively short and stocky bodies
- **Brain size:** at least 1,200 cc to 1,750cc (11% larger than MH); Average cranial capacity: 1520 cc
- **Diet:** Meat, plants and fungi, marine recourses when available
- **Tool use**: Mousterian, Lavallois technique; Châtelperronian (Saint-Cesaire)
- **Species named:** 1864
- **Name meaning:** 'human from the Neander Valley'

Homo neanderthalensis

- **Habitat and Distribution**: Europe and western Asia (but not Africa), adapting to extremely cold climatic conditions.

- **Climate**: The climate was much colder than it is today, and several glaciations (Ice Ages) occurred during this time. Neanderthals mostly lived in cold climates, and their body proportions are similar to those of modern cold-adapted peoples: short and solid with short limbs.

- **Size**: Their bones are thick and heavy and show signs of powerful muscle attachments. Neanderthals would have been extraordinarily strong by modern standards.

Accretion model of N development

- In Paleoanthropology, the **accretion model** is a theory for the appearance of Neanderthals; distinctive N craniofacial complex evolved as a set of disconnected features rather than functional complex
- It suggests that those traits characteristically Neanderthal appeared gradually (accreted) over hundreds of thousands of years, rather than abruptly. First proposed by Piveteau (1970), it was developed by Vandermeersch (1978) and Jean-Jacques Hublin (1982)
- The model proposes four descriptive stages for the appearance of Neanderthal characteristics.
- According to those that defined the stages, these likely just reflect the discontinuity of the fossil record. For example, no specimen dates to OIS 8 (300–243 ka), so this gap serves to separate stages 2 and 3.

The fossil sequence in Europe, dated to Oxygen Isotope Stage periods

Pre-stage OIS 12: 478 Ka	Early Pre-Neanderthals: Mauer, Arago, Bilzingsleben, Vértesszöllös, ?Petralona, ?Montmaurin
Stage 11-9: 424 to 337 Ka	Pre-Neanderthals: Atapuerca (Sima de los Huesos), Swanscombe, Steinheim, Reilingen
Stage 7-5: 243 to 130 Ka	Early Neanderthals: Ehringsdorf, Fontéchevade, Biache, Lazaret, Saccopastore, Krapina, Tabun
Stage 4-3: 71 to 57 Ka	Classic Neandertal: La Ferrassie, La Chapelle, Monte Circeo, La Quina, Le Moustier, Shanidar, Amud

Accretion model

- Stage 1: Early pre-Neanderthals –Date 476 to 424 Ka ---wide occipital torus---- includes Arago, Petralona, Mauer 1
- Stage 2: Pre-Neandertals – Date 424 to 300 Ka ---double arched supraorbital orbits, midfacial prognathism, protruding occipital torus, incipient occipital bun, incipient to well-defined suprainiac fossa ---includes Atapuerca 5 and Steinheim 1
- Stage 3: Early Neanderthals ---Date 243-71 Ka ---Full occipital bun, pronounced occipital convexity, elongated skull--- includes Saccopastore 1, Krapina 3, Shanidar 2 & 4
- Stage 4: Classic Neanderthals--- Date 71 to 40 Ka ---Orbits of the eyes rounded; nose cavity larger; exaggerated occipital plane convexity; exaggerated suprainiac fossa---includes La Chapelle, Gibraltar 1, La Ferrassie

The four stages of Neandertal evolution

Neandertal stages: (Stage no.) Name	Isotope stages (climate stages)	Derived European anatomical features	Example specimens
1 "early-pre-Neandertals" i.e., early "archaic" *H. sapiens* in Europe	Pre-stage 12 (Cromerian Complex), stage 12 (Elster="Mindel") 478 Ka	Convex and receding horizontal infraorbital profile, wide occipital torus	Arago, Mauer, Petralona
2 "pre-Neandertats" i.e., late European "archaic" *H. sapiens*	Stage 11-9 (Hoxnian, *sensu lato,* Holstein *sensu lato,* "Mindel/Riss") 424 to 337 Ka	Bilaterally protruding occipital torus, suprainiac fossa (incipient to well defined), strong juxtamastoid eminence, styloid process not aligned with the stylomastoid foramen and the digastric groove, incipient "en bombe", increased occipital plane convexity, lateral post-toral sulcus deepens inferiorly, glabella moves anteroinferiorly disrupting previously horizontal supercilliary ridges, reduced maxillary buttress, anteriorly advanced and sagittally oriented face	Bilzingsleben, Vértesszôllôs, Atapuerca SH site, Swanscombe, Steinheim, Reilingen

*

The four stages of Neandertal evolution

Neandertal stages: (Stage no.) Name	Isotope stages (climate stages)	Derived European anatomical features	Example specimens
3 “early Neandertals,” i.e., show some “classic” Neandertal features	Stage 7-5 (part of the later Saale = “Riss”, Eem = “Riss/Würm”) 243 to 130 Ka	Full suprainiac fossa, full “en bombe,” high occipital plane convexity, reduced mastoid, large juxtamastoid process, elongate temporal bone, anterior mastoid tubercle, external auditory meatus fully depressed, increased dolichocephaly Mean Early – 1289 cc Mean Late - 1482.5cc	Ehringsdorf, Biache 1, La Chaise Suard, Lazaret, La Chaise Bourgeois-Delaunay, Saccopastore, (most of) Krapina, (part of) Shanidar
4 “classic Neandertals”	Stage 4--:? (Early Weichsel = “Würm”) 71 to 57 Ka	Exaggerated occipital plane convexity, and suprainiac fossa, large piriform aperture, rounded circumorbital morphology, post-toral sulcus deepen	Neandertal, Spy, (rest of) Monte Circeo, Gibraltar Forbes Quarry, La Chapelle-aux-saints, La Quina, La Ferrassie, La Moustier, Shanidar, Amud.

Life History variables

- MHs: slower life hx, reach sexual maturity at much later age, longer life expectancy; earlier hominins had faster more apelike life hx

- Dental development tracks overall maturation; brain reaches 90% of growth at time of M1 eruption; Skeleton reaches maturity at M3 eruption, as does age of sexual maturity

- Crown formation evidence for both:
  - N maturing faster than MH in dental maturation, as well as
  - similar dental development.

Life History variables

- Ns and MHs similar in small birth canals and large adult brains, implying similar amount of postnatal brain growth.
- Neandertal newborns had large brains similar to those of modern humans.
- Likely that both Ns and MHs had prolonged childhoods
- Ns died before their mid 40s based on skeletal age estimates
- Wear seriation of dentitions suggest that Ns died much more often in young adulthood

Developmental variables

- Many N features developed early in life, possibly prebirth:
- Ancestral features: skeletal robusticity, low braincases, large chinless jaw
- Derived: globular form of skull in rearview, suprainiac fossa, elongation of foramen magnum

Tool Technologies

- Most Neandertals are found with Middle Paleolithic Mousterian tool industries.

- A few later Neandertals are associated with an upper Paleolithic industry, known as the Châttelperronian

- They possessed thrusting spears and may have had projectile technology.

Homo neanderthalensis: Tools

- Tools: A large number of tools and weapons have been found.
- Their toolkit is more advanced than that of *H. erectus* or *H. heidelbergensis*, and is known as **Mousterian** technology (after Le Moustier, France)
- This technology represented a refinement of the basic prepared core technique. Levallois method.
- Recovered stone tools are typically fashioned from nearby sources of flint or quartz, indicating to some researchers that a Neanderthal group did not necessarily range far.

- Debate over whether there was little change in technology from 200 to 50 Ka
  - Bordes: lithic typologies vs Binford: functions of tools; N as scavengers
  - Neither accepted innovation in tool making

Middle Paleolithic (Middle Stone Age) Industries

- Characterized by prepared core technologies in which multiple steps are required to create a tool of specific characteristics (e.g. Levailois technique, disk cores etc.).
- Included both soft and hard hammer techniques and bone tools.
- Include more tool types than Early Stone Age industries in Africa
- Small groups meant less technology klg exchanged

N tool purposes

- The typical Neanderthal tool kit contained a variety of implements, including large spear points and knives that would have been hafted, or set in wooden handles.
- Other tools were suitable for cutting meat, cracking open bones (to get at fat-rich marrow) or scraping hides (useful for clothing, blankets or shelter).
- Yet other stone tools were used for woodworking; among the very few wooden artifacts associated with Neanderthal sites are objects that resemble spears and pegs.

Neandertals

- Had sex with humans circa 50K ago in Middle East;
  - N genes in MH genome, but also MH genes in N genome

- Genome is 99.7% identical to modern humans; the two species shared a common ancestor about 700 to 500 K years ago.

N size and strength

- Greater muscularity
- Enhanced musculoskeletal leverage
- Greater strength
- 30 to 50 % stronger than MHs
- But big muscular bodies are energetically expensive

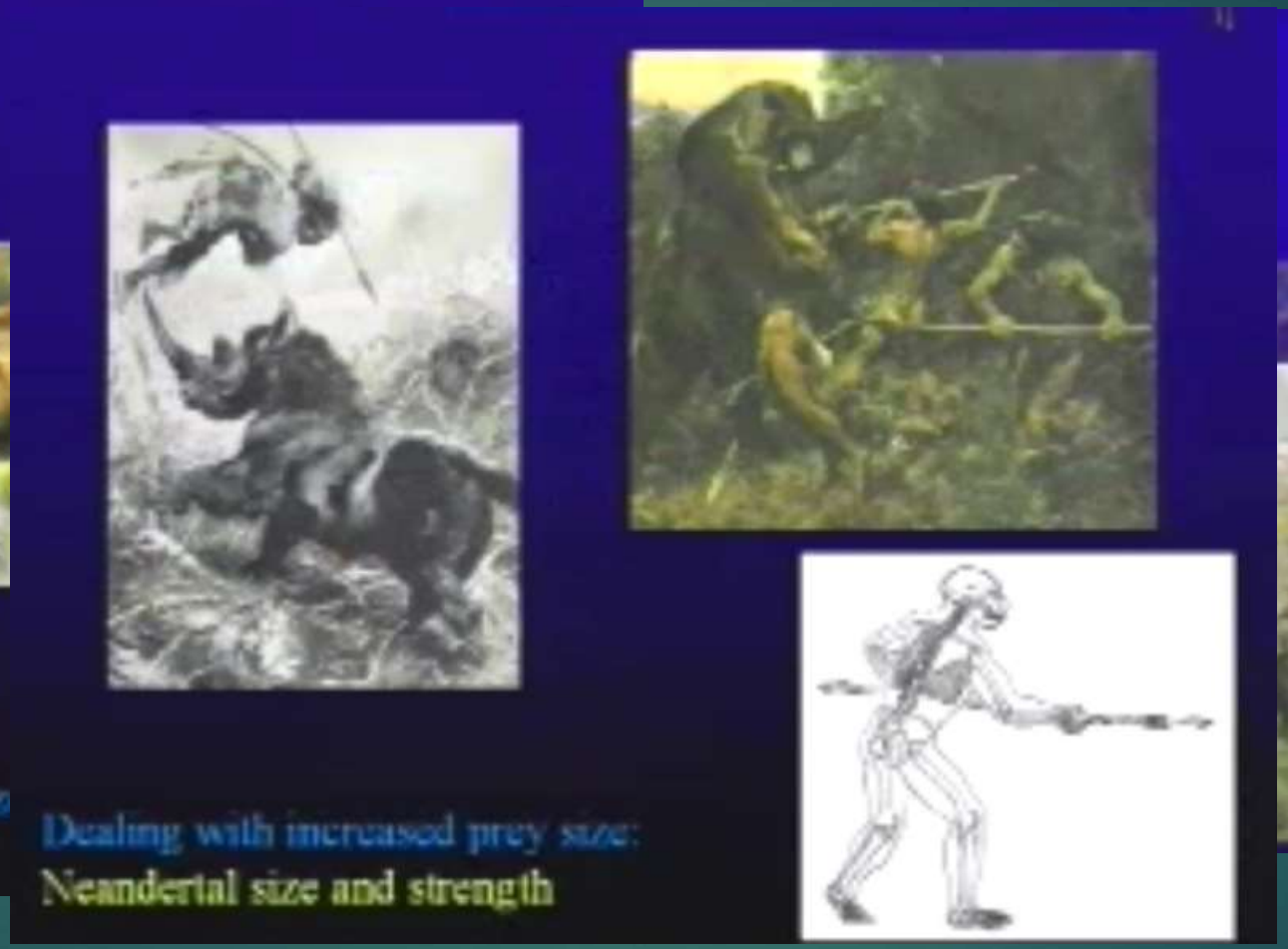
With seasonally decreased prey density: Need more mobility

MH

Neandertal

N: increased thigh bone robusticity (compared with MH weightlifter);
but with greater mass & shorter limbs, have increased energetic cost of transport;
spent 215 kilocalories per day more than MHs in foraging

N size and strength: prey on large bodied animals



In Europe: horse, caribou, reindeer, bison and aurochs, and rhinos; They were close range hunters

Diet

- Archaeological bone assemblages suggest Neandertals were hunters rather than scavengers.
- Stable isotopic studies suggest Neandertals ate a great deal of animal resources (meat and marrow);
- Seasonality: More meat as response to reduced plant productivity in colder Europe
- Marine resources at Gibraltar: monk seals, dolphins, shellfish, (mussels, limpets, cockles), tortoises, rock pigeons, rabbit, ibex, red deer;
- Evidence for continuous use of coastal resources between ~150 and 40 ka

N used 61 different plants

- Neanderthals across the entire range probably consumed as many plant species as did modern humans

- 2016 Study: sources included plant remains (e.g., starch, pollen, phytoliths, and seeds) in soil and dental calculus, dental and tool wear, coprolites, and genetics, for Neanderthal's nutritional, medicinal, and ritual use of plants
- 61 different taxa from 26 different plant families; found at 17 different archaeological sites.

- Fairly efficient seasonal gatherers: Berries, greens, roots – plants with limited time frame (few weeks)

Gerhard P. Shipley and Kelly Kindscher, 2016

N Diet

- Teeth plaque reveal N ate 80% meat, 20% plants; but 2014 fossilized feces study indicates more plant usage; study:
- Used toothpicks
- A few sites suggest that Neandertals practiced cannibalism, at least occasionally.

Very High Daily Energy Requirements in Ns

- Neanderthals had higher daily energy requirements than MHs
- Sorenson and Leonard study: Estimated their total energy expenditure by calculating their basal metabolic rates:
- Neanderthals ranged from 3000 to 5500 kcal/day
- Modern human populations ranged from 2720 +/- 607 kcal/day
- How much Caribou: 2000 kcal per kilo; N would need to eat 4.5 lbs per day; 10 Ns require 2 caribou per week
- Also teeth evidence of that periods of severe starvation were not uncommon

Sorensen MV, Leonard WR, 2001

Life spans, and Sexual differentiation

- Neandertals experienced a “relatively short lifecycle.” Lived hard lives.
- Within that lifecycle individuals would experience a great deal of “trauma” related to severe physical activity.
- All adult N fossils have healed fxs; famous Trinkaus article “injuries like rodeo riders”
- This applied to both males and females.
- Lack of sexual division of labor, based on the robustness of both male and female Neandertals, while anatomically modern human females appeared to “[gracilize] relatively quickly…”

Pettitt 2000

N Statistics

- Half of all N fossils are children under age 11;
  - half of N children died before reaching adolescence
  - defects in dental enamel point to starvation as 1 of major causes
- 2 examples in Israel of probable infanticide (i.e. Kebara KMT 1, an infant of 7 to 9 months apparently tossed onto a rubbish heap
- 4 of 5 N never reached age 45
- Territorial: average 27 square miles for hunting
- 5600 miles from West to East

Population Numbers

- Strong evidence that climate change forced population fluctuations.

- Rarity of Mousterian sites in deposits reflecting peak cold in northern France & Poland reflects population shrinkage under adverse conditions

- There were 1 Mousterian cave for every 5 UP caves in France & Spain;
- Mousterian caves are much richer in bones of bears and hyenas who denned there when people were absent; cave bear disappears 5-10 years after UP people appear in Europe
- Mousterians were less numerous than UP

Neanderthals were “thin on the ground”

- Population size:
  - Lived in groups of 15-30
  - Estimates of only 1 person per 40 sq. miles
  - Total population in Eurasia = 5,000 to 70,000 (JP Bocquet-Appel - 2013); Hawks: less than 100 K
  - Genetic studies show that (late) Neandertal populations had small effective population sizes.
  - Subjected to bottlenecks due to fluctuating climatic changes, which produced little genetic diversity
  - Eventual significant familial interbreeding

N statistics

- Old idea that Neandertals groups limited themselves to a single river valley and only occasionally ventured farther afield is refuted by abundant evidence for transport of raw materials across major rivers

- Dogandžić and McPherron's extensive review show in detail that the Mellars and French analysis, which claimed MHs were 10x more numerous than Ns was severely flawed; MHs did not have larger populations at this time

N living sites

- Mousterian living sites: France, Spain, mostly southern and western margins of easternmost Europe; only parts of Europe where mean January temperature exceeded -15 °C (5 °F).
- Mousterian debris occur in both open-air and rock shelter or cave mouth sites
- Open air sites occur near active or once active springs, lakes, streams; now need mining operations to find these
- At majority of open-air sites, no specialized function apparent, only human presence; structure remnants are absent
- Mousterian caves were living sites, most in southwest France; artifacts are sparse

Structural traces

- Fossil fireplaces/hearths occur in almost every Mousterian cave
- Stacked hearths at Gorham's Cave and Kebara Cave; reflect recurrent fire building over millennia
- Confirm that fire could be made at will and that caves served as camps
- Hearth evidence: Lenses of ash and charcoal, 50 cm to 1 m across; some surrounded by rocks; but no UP air inflow mechanisms
- Direct evidence of housing is all but absent, except for hearths; UP evidence includes excavated depressions, arrangement of large bones and stones, postholes

Settlements

- Mousterian people were nomadic, with different seasonal sites

- Stone sources: heavily local; 70-98% in France & eastern Europe of stone in sites came from less than 5 miles away; Only 2-20% from 5-20 Km away; less than 5% from 30 km; vs UP, 25% were 30 Km away

- But in central Europe (Poland, Czech, Hungary), stone from 100-200 Km (larger territories due to climate?, or just closes good material)

Mousterian ecology

- Lived in mid-and low-latitude environments via hunting and gathering
- Most frequent fossil bones that exhibit stone tool marks are medium sized and large ungulates (red deer, fallow deer, reindeer, bison, wild oxen, wild sheep & goats, gazelles, & horses); UP add many mammoth bones
- Use of stone tipped thrusting spears

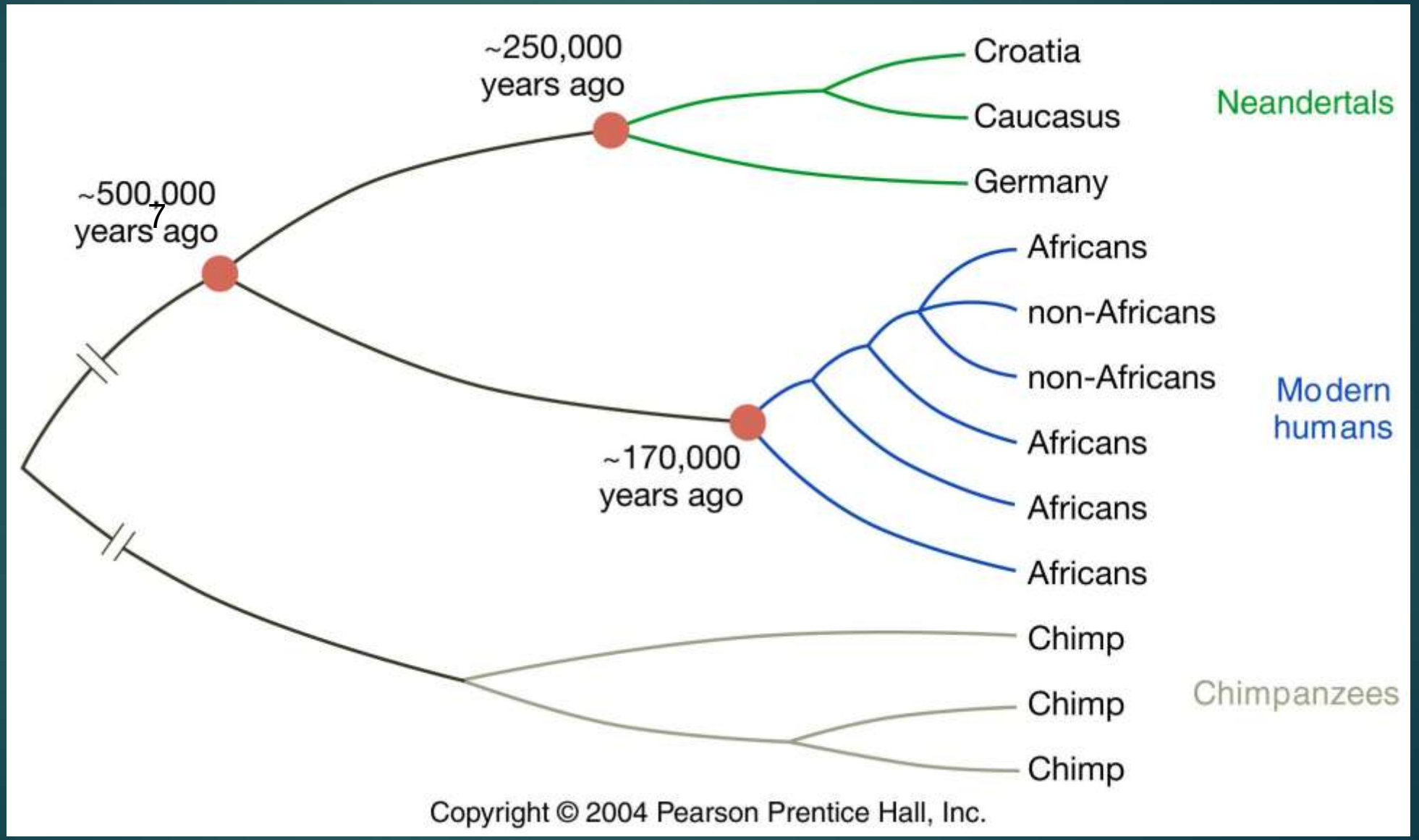
N burials

- Intentionally buried some of their dead; big ? = why; ritual or practical purposes? (hygiene, prey avoidance)
- Usually shallow graves
- 35 known N grave sites, including Feldhofer, Spy, Le Moustier, Le Quina, Saint-Cesaire, Kiik-Koba, Mezmaiskaya, Tabun, Amud, Dederiyeh, Shanidar, Teshik-Tash, La Ferrassie
- In 16 of 20 N graves, bodies are tightly flexed (near fetal position): burial ritual or simply smallest grave?
- No instances where N skeletons are accompanied by grave goods
- No evidence that Ns practices ritual in their burials

Neandertals

- Had a language (the nature of which is debated and likely unknowable)
- Disappeared from Europe about 5,000 years after *Homo sapiens* reached the continent; this coincides with the start of a very cold period in Europe
- Genetic N variants in MH for some immune functions, Diabetes, Lupus, Crohn's diseases; 1.6-2.1 % N DNA in MHs

Neanderthals are genetically distinct from *Homo sapiens*



Social life

- Smaller, more local groups; lived in river valleys
- Less organized camps, more temporary
- Less organized hearths
- Abundance of ochre, other oxides
- Châtelperronian controversy
- Cared for disabled

Homo neanderthalensis

- Cold adapted: could not have survived without mastering fire & worn clothes; survived numerous episodes of extreme climate change
- Large broad noses (cold adapted (warmer air) vs cooling method for high metabolism)
- Neanderthals could make fire.
- Used large bayonet style spears
- Abundant evidence for hafting on Levallois & Mousterian points & scrapers; some of lithic material came from up to 30 km away; but Ns did not typically engage in long-distance trade.

- Lacked some of tools in *Homo sapiens*' repertoire, in particular, needles, fishhooks, and fish nets; but devised leather working lissoirs

Behavioral evidence in archeological record

- Amount of teeth wear (dental attrition): Used teeth & jaws like vice, as 3rd hand; teeth very worn down
- Evidence of grinding in back, clamping in front; some N incisor teeth are tilted toward outside as if holding leather to make it smooth

- N had right oblique angled scratches on incisors indicating they were righthanded

- Right arm muscles stronger,
  - but unlike us, right arms were very much stronger than left;
  - for clothes-making through hide scraping;
  - but no bone needles

Neandertals facts: evidence of symbolism?

- They made jewelry and specialized tools.
- They made ocher and other pigments, as ornamentation for their faces & bodies.
- They manufactured glue from birch bark, which required heating the bark to at least 644 degrees Fahrenheit — a feat scientists find difficult to duplicate without a ceramic container.

- In Gibraltar and elsewhere, there's evidence that Neanderthals extracted the feathers of corvid birds — only dark feathers — possibly for aesthetic or ceremonial purposes.

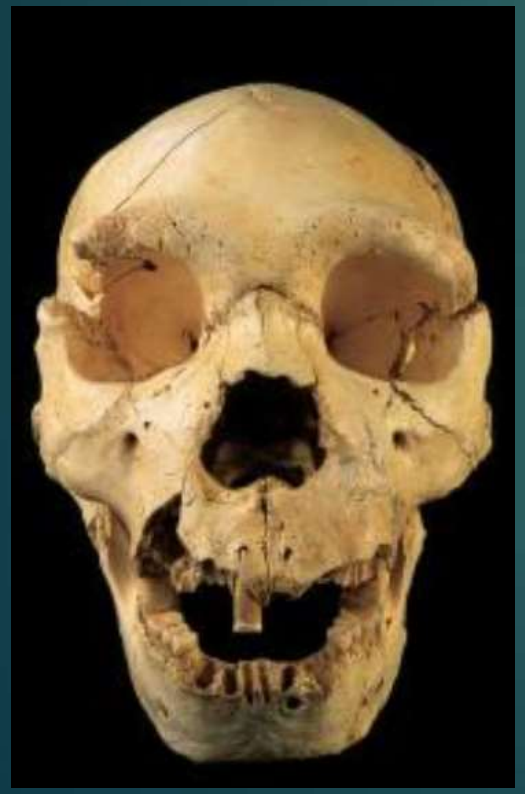
N statistics

- Male dominated; women exchanged with other groups - males stay in group, females join new groups

- Used both fire hardened wood spears and stone tipped spears; tar and sinew to bind stone tips to wooden spears

Sima de los Huesos: 430 Ka, 1125-1400 cc; ave 1232 cc

- 17 skulls from Sima de los Huesos
- Atapuerca, Spain; pre-Neandertal



The complexity of fossil interpretation at Sima de los Huesos 2

- In 2015, new nuclear DNA results show that the SH hominins carry mtDNAs more closely related to those of Denisovans in Asia than Neanderthals,

- 2015 Nuclear DNA: Sima de los Huesos hominins were related to Neanderthals rather than to Denisovans.

- This is the oldest dated DNA currently achieved in a hominin, at 430 Ka

- The SH hominins are phylogenetically related to Neanderthals, thus making them the earliest unquestionable representatives of the Neanderthal lineage.

- It also indicates that the population divergence between Neanderthals and Denisovans predates 430 Ka (estimated at 550 to 750 Ka)

Accretion model

- Theory known as the "accretion model" rests on two hypotheses:
  - Timing of the origin of the Neandertal lineage: Under this model, the Neandertals originated in the Middle Pleistocene, branching off as early as 400 Ka, or even earlier.
  - Pattern of morphological change: full suite of derived Neandertal physical features did not emerge as a single package, but that different features appeared separately and at different times.
- In particular, Neandertal facial morphology evolved first, followed later by changes in the brain.

Accretion model of full N development

- This process of Neanderthal evolution has been described as the "Accretion Model"
- The physical appearance of Neanderthals in the fossil record is gradual.
- Neanderthal-like features appear for the first time in *H. heidelbergensis* fossils dating to as early as 600 Ka.

- The frequency of Neanderthal features increases through time, with specimens dating from approximately 200 to 100 Ka showing clear Neanderthal anatomy.

- The full suite of Neanderthal features appears with the "classic" Neanderthals in the Late Pleistocene, dated from approximately 70 to 30 Ka.

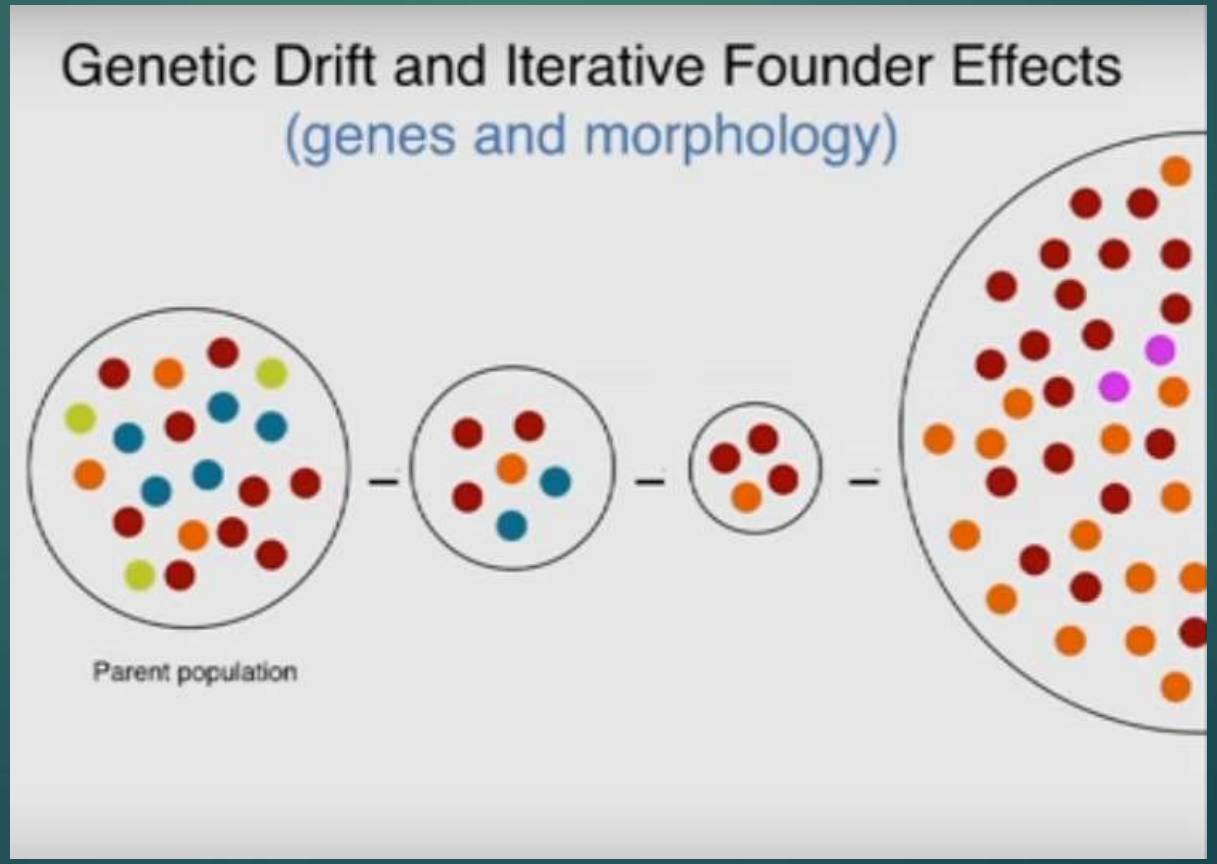
(e.g., Dean et al. 1998; Hublin 2009); Bischoff et al. 2013)

Hublin: Accretion of derived N features over time:

J. Hublin: A list of derived (apomorphic) Neandertal features

- Displaying a shift in frequency of these features
- Evolving at different rates in different anatomical areas
- Process driven by isolation and demographic fluctuation
- Genetic Drift played a major role
- In MIS 7, at 200K, reach full N morphology

Mechanism driving N accretion is not adaptation or natural selection but genetic drift & repeated founder effects; a process driven by isolation & demography; by chance from bottleneck decreases and repopulation



Rightmire: Accretion hypothesis of N development

- Gradual accumulation of the derived Neandertal traits
- In this framework, *H. heidelbergensis and H. neanderthalensis* are considered to be chronospecies of an exclusively European lineage
- "Accretion" hypothesis: distinctive Neanderthal characters appear first in the facial skeleton.
- Such traces can be identified in the Mauer and Arago remains.
- Ancestors of Neanderthals became increasingly isolated through time as a consequence of colder climate conditions.
- Isolation in this relatively harsh environment led to the full expression of the morphology that distinguishes Neanderthal skulls and postcranial bones from those of other populations.

Dates of some N Discovery & Location

- 1829, Engis, Belgium
- 1848, Forbes' Quarry, Gibraltar
- 1856, Neander, Germany: Neander 1
- 1880, Sipka, Moravia
- 1886, Spy, Belgium – pair of skeletons
- 1899-1906, Krapina, Croatia
- 1908-1925, Ehringsdorf, Germany
- 1908, Le Moustier, France
- 1908, La Chapelle-aux-Saints
- 1909, La Ferrassie – skeleton
- 1911, La Quina
- 1911, St. Brelade, Channel Islands
- 1924, first non-Western Europe, at Kiik-Koba, Crimea

1929, Tabun cave on Mt. Carmel, Israel
1929, Saccopastore, Italy
1938, Teshik-Tash in central Asia
1939, Guattari/Circeo, Italy
1953, Shanidar, Iraq
1961, Amud, Israel
1964, Kebara, Israel
1976, Sima de los Huesos, Spain
1978, Bontnewydd, Wales
1979, St. Cesaire, France
1981, Vindija, Croatia
1983, Zaffaraya, Spain
1993, Dederiyeh, Syria
1999, Lakonis, Greece

Of ~41 classic N sites; 30 proto-N sites

Dates of earliest historical discoveries 1

- 1829 – *H. neanderthalensis*, cranium, Engis, Belgium
- 1848 – *H. neanderthalensis*, cranium, Gibraltar
- 1856 – *H. neanderthalensis*, skeleton, Feldhofer, Germany
- 1865 – H. *neanderthalensis*, mandible, Trou de la Naulette, Belgium
- 1868 – H. *sapiens*, skeleton, Cro-Magnon, France
- 1880 – *H. neanderthalensis*, mandible, Sipka, Czech Republic
- 1886 – *H. neanderthalensis*, skeletons, Spy, Belgium
- 1891 – *Pitcanthropus erectus (H. erectus)*, cranium, Java, Indonesia
- 1899 – *H. neanderthalensis*, 25 skeletons, Krapina, Croatia

Dates of earliest historical discoveries 2

- 1907 – *H. heidelbergensis*, mandible, Mauer, Germany
- 1908 – *H. neanderthalensis*, skeleton, Le Moustier, France
- 1908 - *H. neanderthalensis*, skeleton, La Chapelle-aux-Saints, France
- 1909 - *H. neanderthalensis*, skeleton, La Ferrassie, France
- 1910 - *H. neanderthalensis*, skeleton, Le Quina, France
- 1924 – *H. neanderthalensis*, Kiik-Koba, Crimea
- 1925 – *H. neanderthalensis*, craniums, Ehringsdorf, Germany
- 1925 – *H. neanderthalensis*, child cranium, Gibraltar

Dates of earliest historical discoveries 3

- 1925 – *H. neanderthalensis*, skull, Galilee, Israel
- 1925 – *H. neanderthalensis*, skull, Skhul, Israel
- 1929 – *H. neanderthalensis*, skull, Saccopastore, Italy
- 1932 - *H. neanderthalensis*, skull, Tabun, Israel
- 1938 – *H. neanderthalensis*, child skull, Teshik-Tash, Russia
- 1939 – *H. neanderthalensis*, skull, Grotto Guattari, Italy
- 1957 – *H. neanderthalensis*, skulls, Shanidar, Iraq
- 1979: - *H. neanderthalensis*, St. Césaire, France
- 1983: - *H. neanderthalensis*, Kebara Cave, Israel
- 1992*: - H. neanderthalensis* (child), Amud, Israel
- 1992: - *H. neanderthalensis*, La Sima de los Huesos, Spain

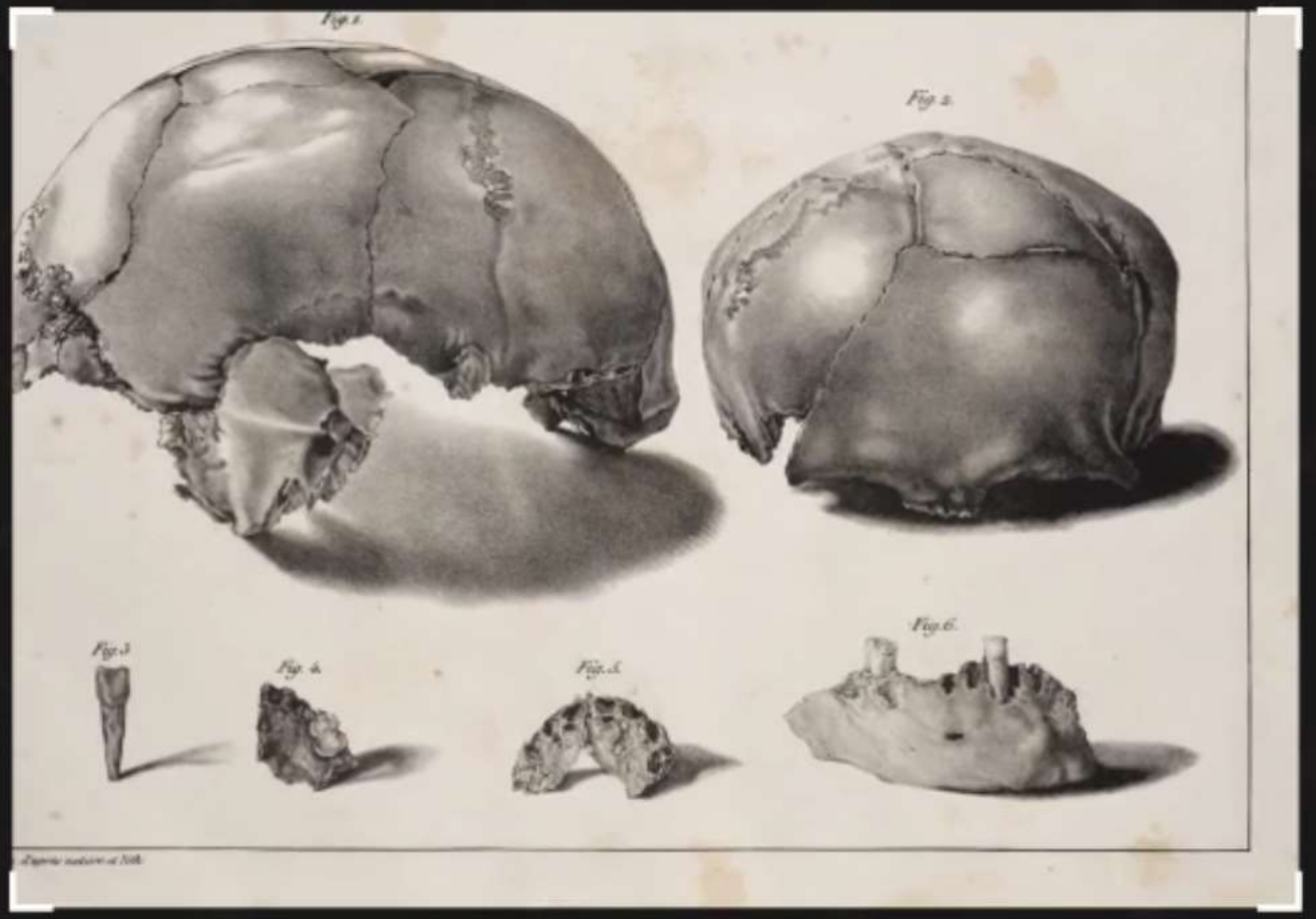
Philippe-Charles Schmerling (1791-1836): First Neandertal discovery, Engis, Belgium

- Belgian physician, prehistorian, pioneer in paleontology, paleoanthropology, paleopathology and geologist.
- Some consider him the founder of paleontology
- 1829: he found part of a cranium at Awir Cave II near Engis in Belgium and belonged to an infant; published in 1833.
- It was not recognized as a Neandertal until 1936, when Charles Fraipont authored a monograph on this child fossil.

Licking fossil bones: make the claim stick

- The state-of-the-art technique for determining the age of a fossil in the 19th century: licking the bones.
- Belief that an ancient, fossilized bone would stick to the tongue, whereas a recent bone would not.
- In the early 19th century, this tongue test was so firmly accepted that scientists feared being laughed off the stage if they could not deliver an entire lecture with a bone hanging from their tongue.
- An unfortunate scientist named Philippe-Charles Schmerling suffered this exact humiliation when he claimed he had found an ancient human but failed to make the claim stick

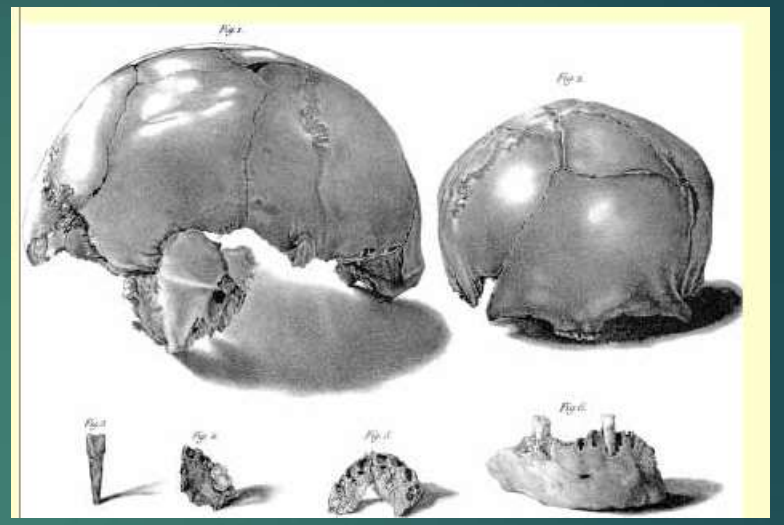
PHILIPPE-CHARLES SCHMERLING (1790-1836)



SCHMERLING'S DISCOVERY

BELGIUM, 1829

1829: Engis 1 (Belgium) juvenile Neanderthal cranium



1st Neandertal found; 2nd discovered fossil hominin

Engis, Belgium

- A similar collection of bones, found in Belgium in 1830, had been (incorrectly) identified by paleontologist August Mayer as the remains of a Cossack soldier from the war of 1812 who had spent his life on horseback, despite a case of rickets.
- The dense ridges of bone over that skeleton's brow were, Mayer insisted, the result of the soldier's constant agonized brow-furrowing.

Forbes Quarry, Gibraltar, 1848

Captain Edmund Flint, 1848

Forbes Quarry, Gibraltar, 1848

Only N fossil Darwin ever touched, circa 1864, brought by geologist friend Charles Lyell; It was brought to Down House so he could examine it

Captain Edmund Flint:
Second H. Neandertal discovery

- ***1848: Gibraltar 1*** is the specimen name of a Neanderthal skull found at Forbes' Quarry in Gibraltar, by Captain Edmund Flint, a British officer with the Royal Navy.

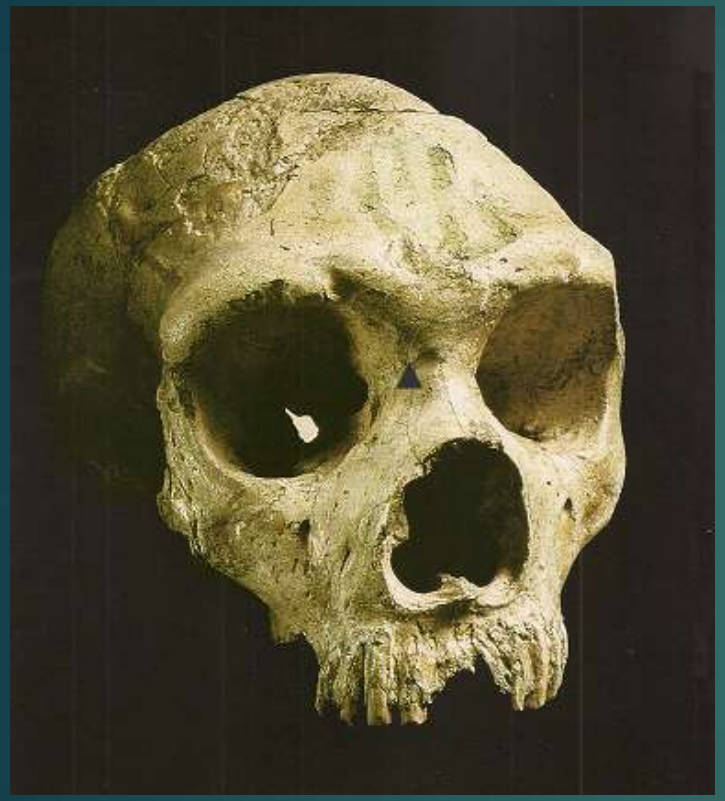
- First known adult Neanderthal skull, and only the second Neanderthal fossil ever to be found (but not identified as Neanderthal until 1907).

- 1865: British paleontologist Hugh Falconer (1808-1865) & George Busk (1807-1886) named Gibraltar Neandertal 1 as *Homo calpicus* (Busk, *1865);* Busk later thought it was similar to Neander skull, but classified it as a distinct species

G. Busk

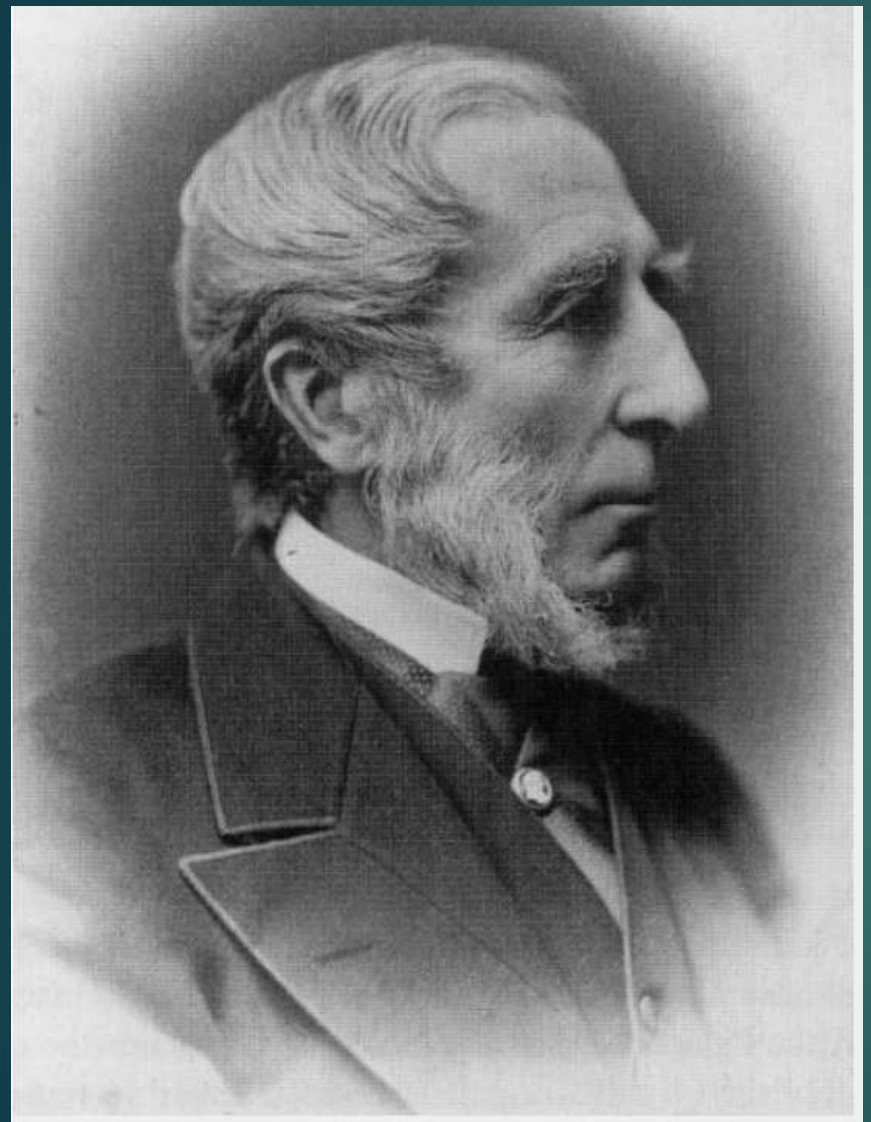
H. Falconer

1848: Gibraltar I, 2nd Neandertal discovery, 1st complete N adult skull; a female

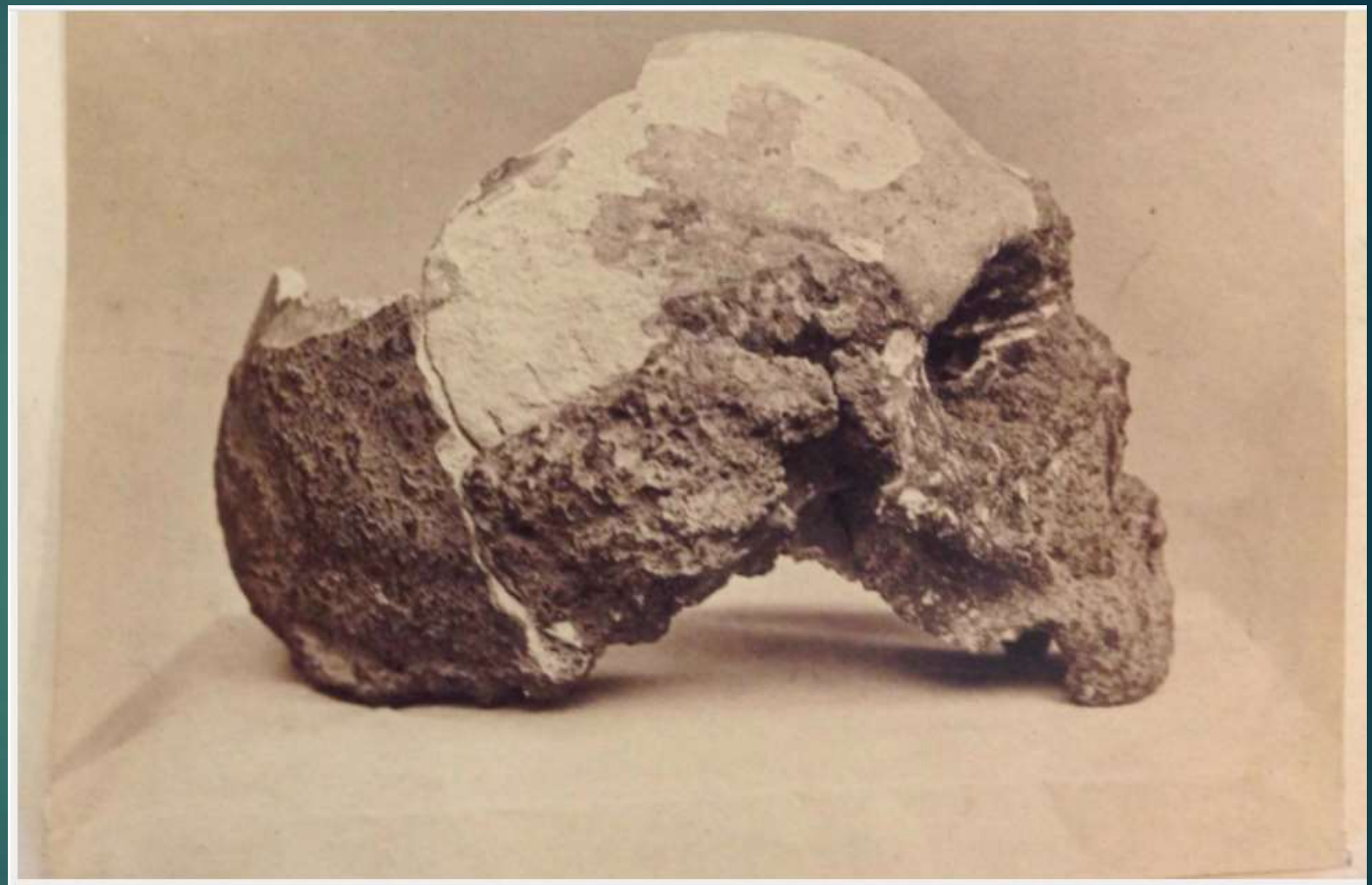


Homo neanderthalensis
(Gibraltar 1)
Discoverer: Captain Edmund Flint
Locality: Forbes' Quarry, Gibraltar
Age: unknown; Date: 1848

George Busk's photo of Gibraltar 1

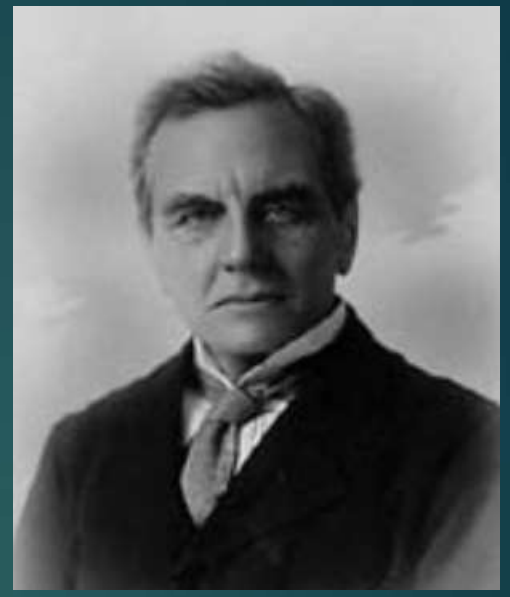


George Busk



Gibraltar Neanderthal from Busk's papers, Royal College of Surgeons London

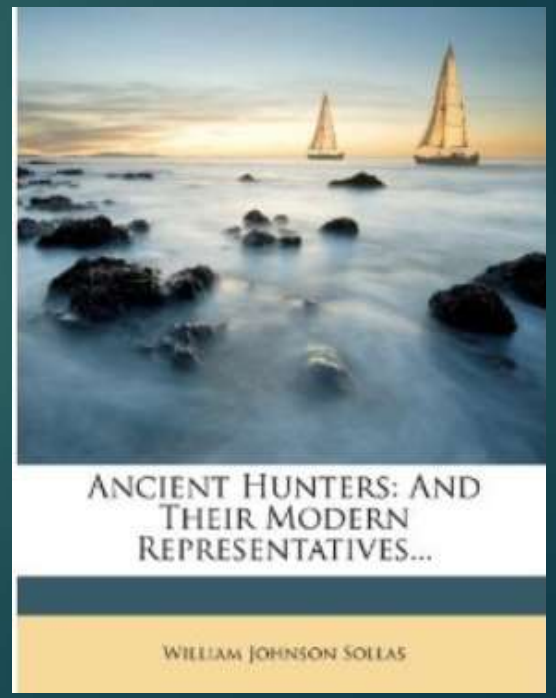
William Johnson Sollas (1849–1936): Identifies Gibraltar I as Neandertal in 1907



- British geologist and anthropologist. Professor of Geology at the University of Oxford

- 1907: William Sollas analyzed Gibralter skull; and recognized it as Neanderthal.

- A shift towards a branching model of human evolution, rather than a straight line.



Neanderthal Debut: In 1856, Neandertal 1; type specimen

Homo neanderthalensis
(Neandertal 1, type)
Discoverer: Local workers
Locality: Feldhofer grotto, Neander Valley, Germany
Age: 40K
Date: 1856

Skull discovered by quarryman, who dropped it down a cliff while shoveling the bones out of cave entrance.

Johann Karl Fuhlrott (1803-1877):
Discovery of "1st" Neandertal from Feldhofer

- Schoolteacher from Elberfeld, Germany
- 1856: Given the original Neandertal 1 bones "as cave bear bones".
- Recognized them as belonging to ancient human, "artificially flattened head"
- First recognized early human fossil:
- A 40,000-year-old type specimen "Neandertal 1", including a skullcap and various bones, discovered at the Kleine Feldhofer Grotte in the Neander Valley near Düsseldorf, Germany.

J. C. Fuhlrott, *Verh. naturhist. Ver. preuss. Rheinl.* 14, Corr. Bl., 50. (1857)

Neanderthal 1 = 40 Ka: later discoveries of related facial fossils

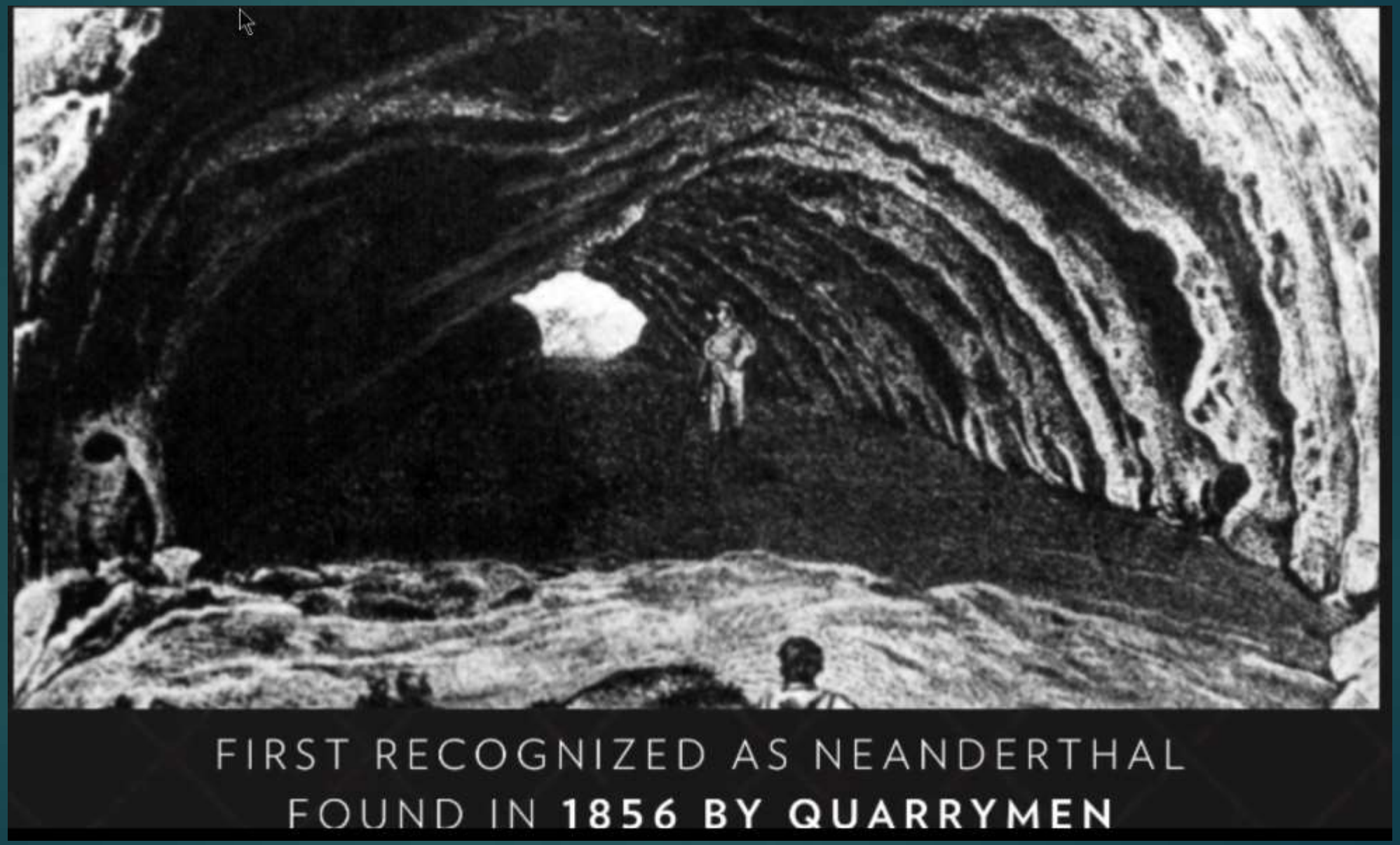
- Type specimen (Neanderthal 1): 1856, Kleine Feldhofer Grotte, Neander Valley, Germany; skullcap & 15 postcranial bones (later 62 fragments); 2 adults & 1 subadult; no indications of age

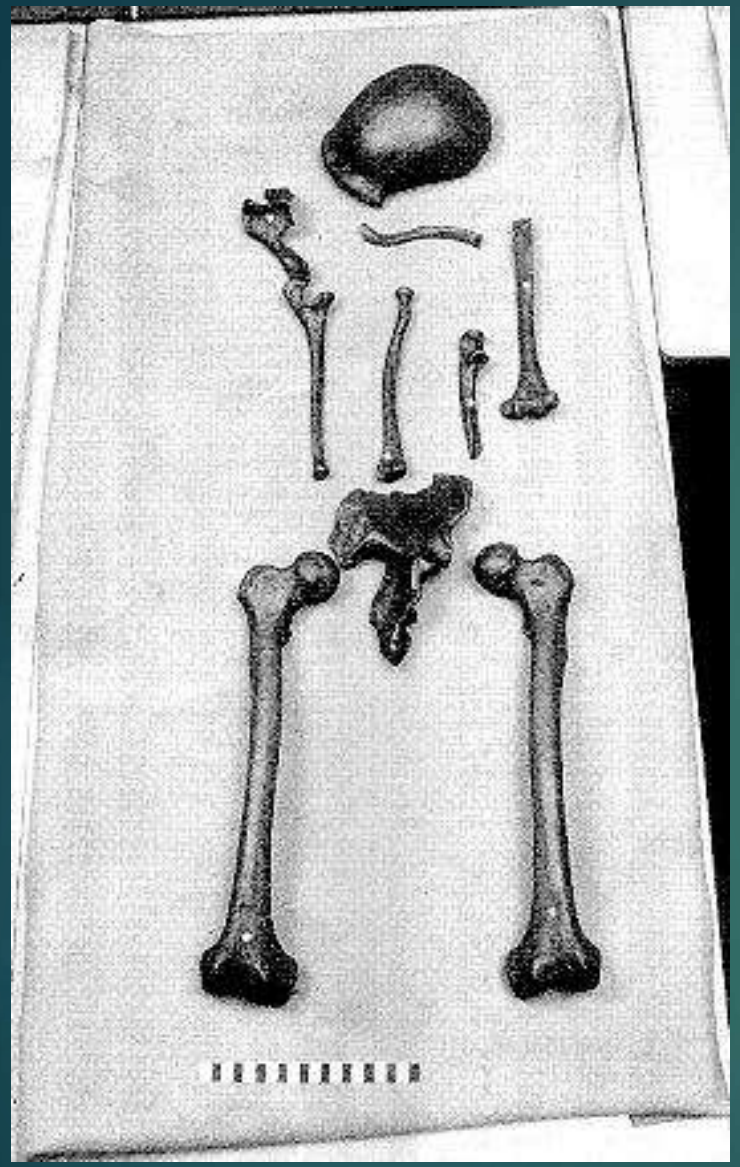
- Ralf Schmitz & Jurgen Thissen (1997) figured out location of original cave

- 1997 excavations found fauna, artifacts, bone fragments, & NN 13 (lateral femoral condyle of Neanderthal 1)

- In 2000, 2 cranial fragments of original calotte; sediment dated to ca 40 Ka for type specimen

Neander Valley Quarry Cave





The Neander Valley, east of Dusseldorf in Germany, was the location for the discovery of Neandertal 1, the original Neandertal type specimen, in 1856, during the removal of deposits from the Kleine Feldhofer Grotte.

1856

Today

Memorial today

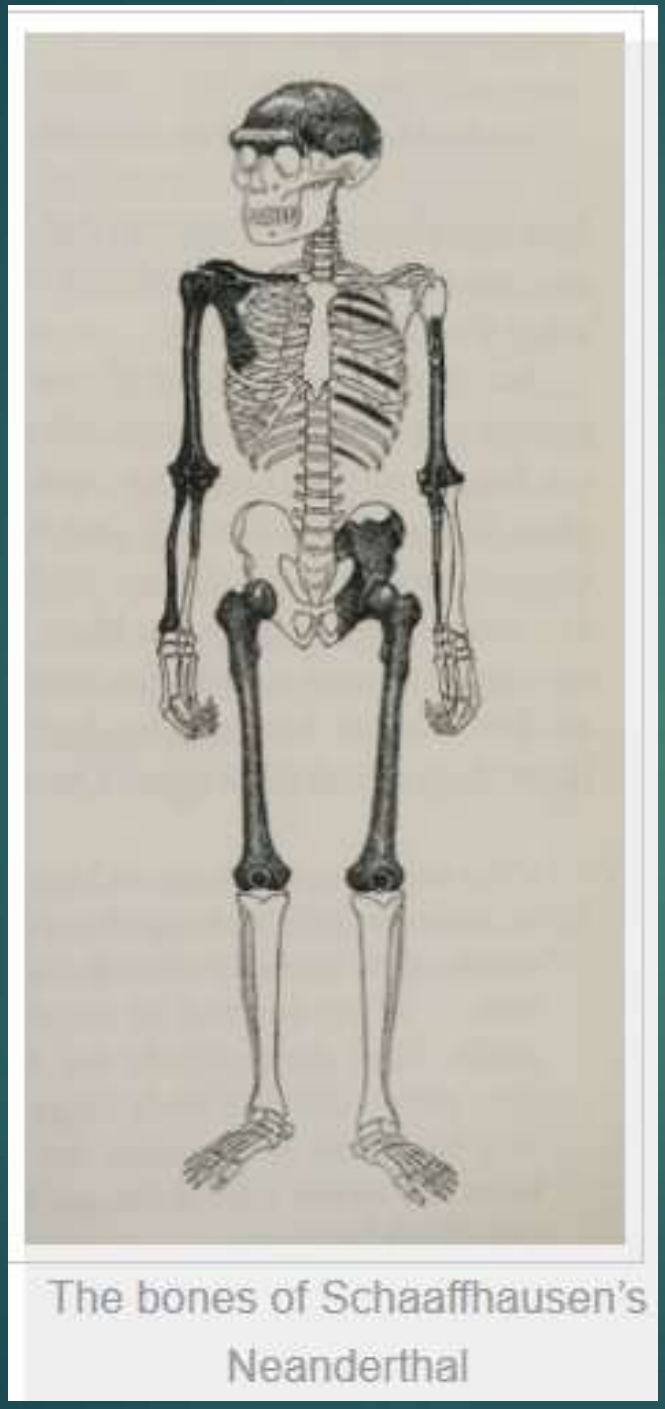
Entire mitoch DNA of original N inscribed on concrete cross;
To fit what we now know of nuclear N DNA would require a 10 Km cross

NEANDER VALLEY,
GERMANY

NEANDERTHALENSIS

Neandertal 1 skeleton

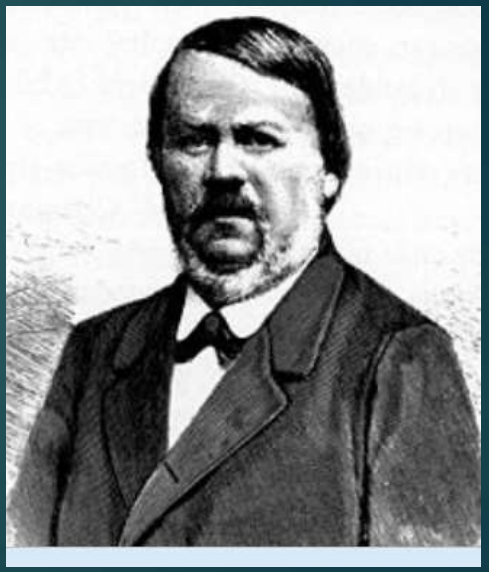
Feldhofer N



The bones of Schaaffhausen's Neanderthal

Hermann Schaaffhausen (1816-1893): First published description of Neandertal I

- Professor of anatomy at the University of Bonn
- 1857: With Johann Fuhlrott, Schaffhausen described the original Feldhofer Neanderthal using quantitative craniometry; concluded skull was outside MH variation & brain was large (>1000cc); but was unable to date
- In 1860, Charles Lyell, the geologist, reached same conclusions; & made plaster cast of skull; Thomas Huxley & George Busk reached same conclusion of its ancient age, but noted ape-like features of the specimen (browridge)



H. Schaaffhausen, *Verh. naturhist. Ver. preuss. Rheinl.* 14, Corr. Bl., 50–52. (1857)
Schaaffhausen, H. On the crania of the most ancient races of man. Müllers Archiv 1858:453.

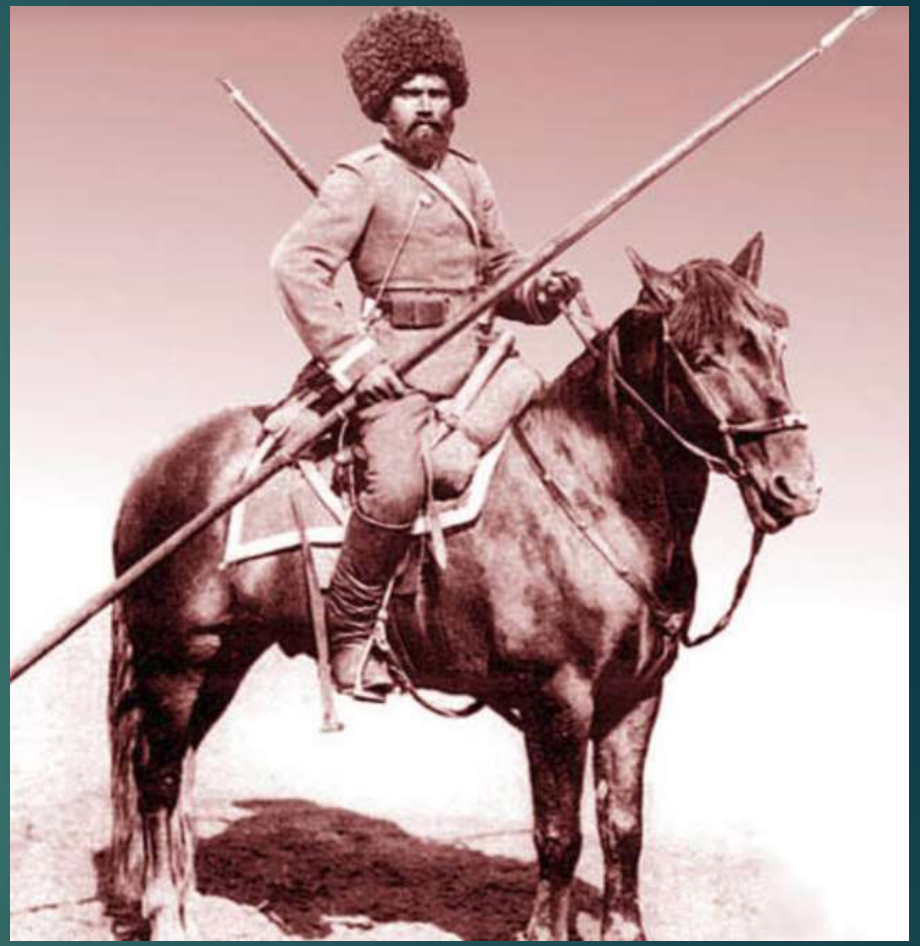
August Mayer

- The anatomist August Mayer speculated that the specimen had been a rickets-afflicted Cossack cavalryman whose regiment had pursued Napoleon in 1814. The man's bowed bones, he said, were caused by too much time in the saddle.

- In 1866—seven years after the publication of Darwin's bombshell book—German biologist Ernst Haeckel proposed calling the species *Homo stupidus*.

Early improper interpretation of original Neanderthals as MHs malformed “due to pathology”

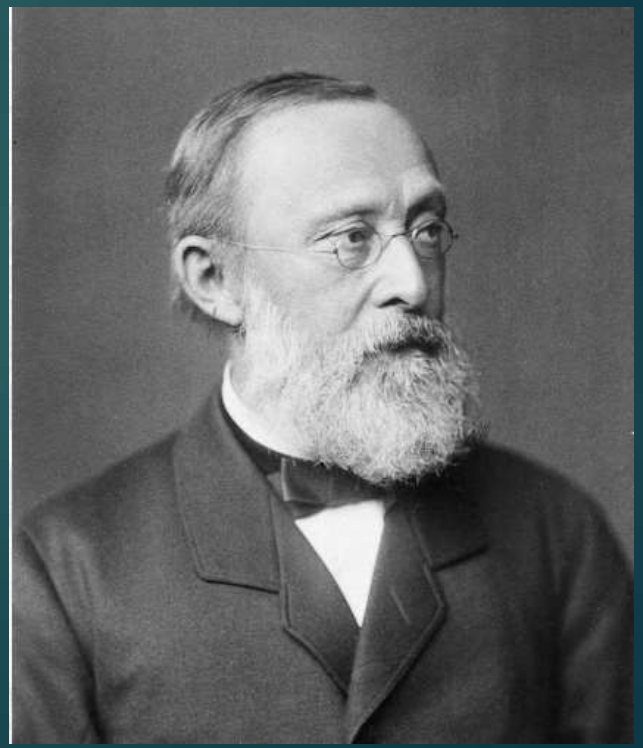
- Neanderthal 1: A. Mayer: Cossack with rickets?
  - Thomas Huxley rebuttal: how had a dying Cossack climbed a 60 foot vertical cliff and bury himself, naked, under 5 feet of mud?
- La Chapelle-aux-Saints: osteoarthritis



- N as modern human with congenital hypothyroidism (cretinism)
- Response similar to discovery of *Homo floresiensis* in 2003

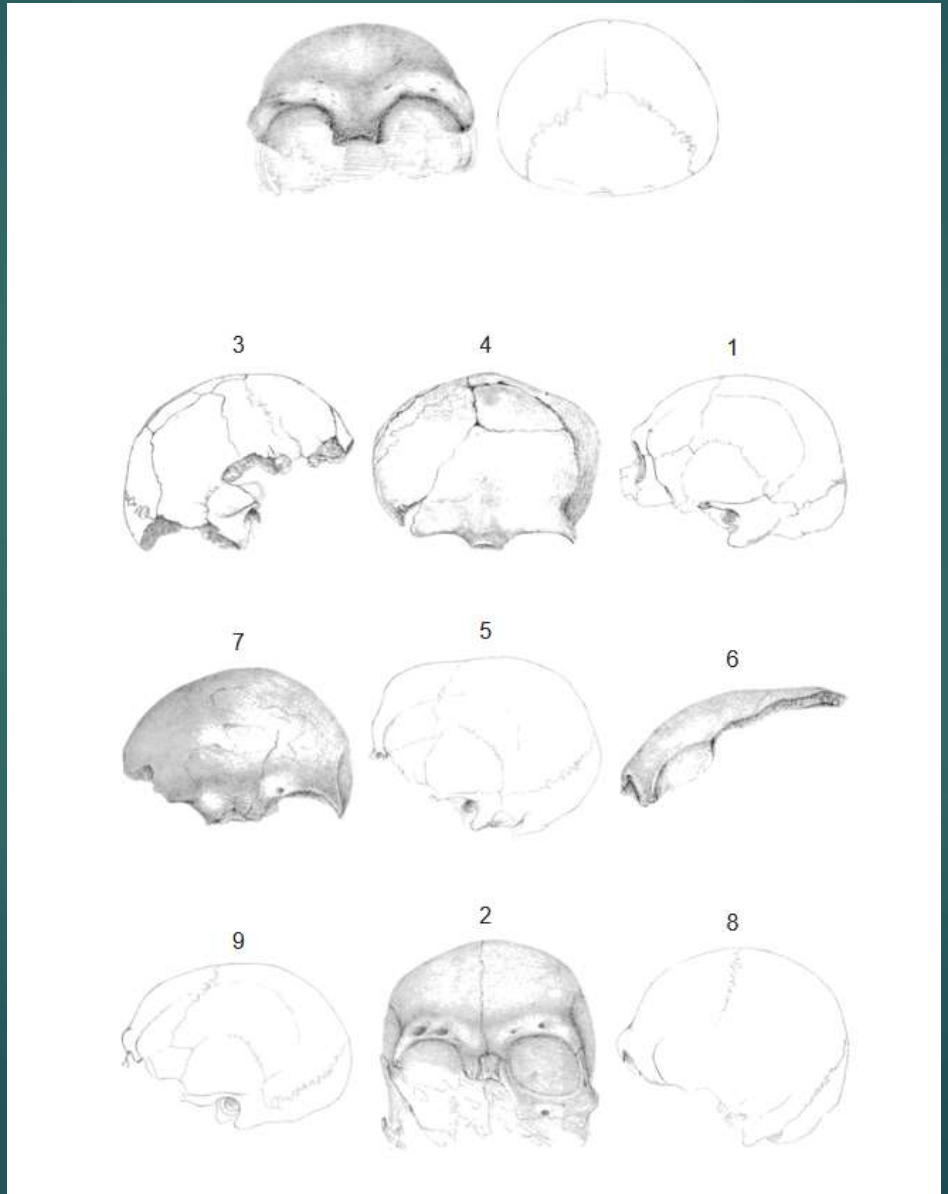
Rudolf Virchow (1821-1909): Neandertal 1 is an Idiot or a Cassock!

- German physician: Father of modern pathology
- Foremost German physical anthropologist in last half of 19th century
- Deeply opposed idea of human evolution
- Blamed the flattened skull on powerful blows from a heavy object.
- Insisted Neanderthal was modern man with disease induced deformities of a pathological (microcephalic) idiot or Russian soldier; skeleton of a lost, bowlegged Cossack with rickets.
- The peculiar bony ridge over the man's eyes was a result of the poor Cossack's perpetually furrowing his brow in pain — because of rickets.
- Rejected Aryan race theories



1858: Schaaffhausen, H. On the crania of the most ancient races of man. Müllers Archiv 1858:453

First published drawings
Of Neanderthal 1



Thomas Huxley: *Evidence as to Man's Place in Nature*, 1863

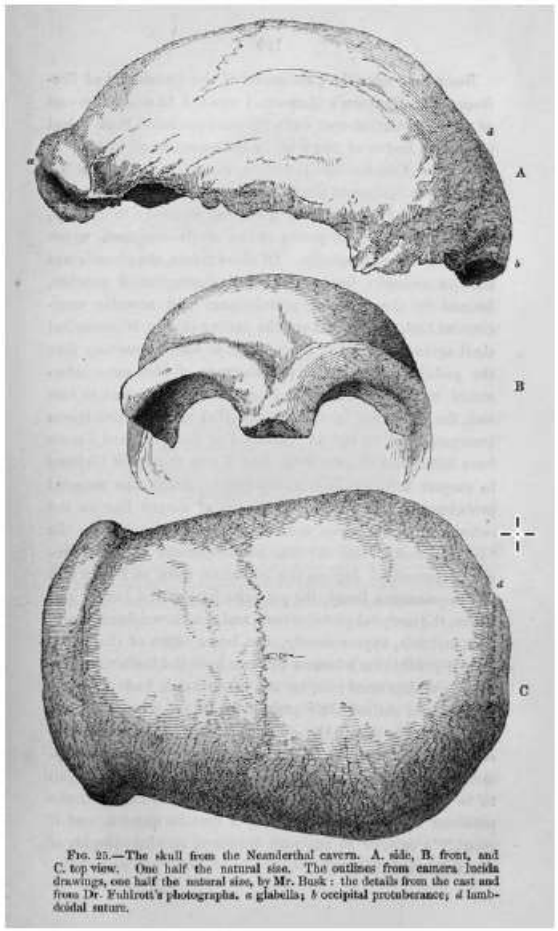


FIG. 25.—The skull from the Neanderthal cavern. A. side, B. front, and C. top view. One half the natural size. The outlines from camera lucida drawings, one half the natural size, by Mr. Busk: the details from the cast and from Dr. Fuhlrott's photographs. *a* glabella; *b* occipital protuberance; *d* lambdoidal suture.

Figure 4. The Neanderthal skull, from Thomas Henry Huxley, *Evidence as to Man's Place in Nature*, London: Williams and Norgate, 1863, p. 138.

Huxley's Neandertal, 1864

Humans related to primates and to apes

Cites Engis and Feldhofer skulls; human, but not different

Brain size as criterion for humanity

Neanderthal 1
1863 photo by Huxley

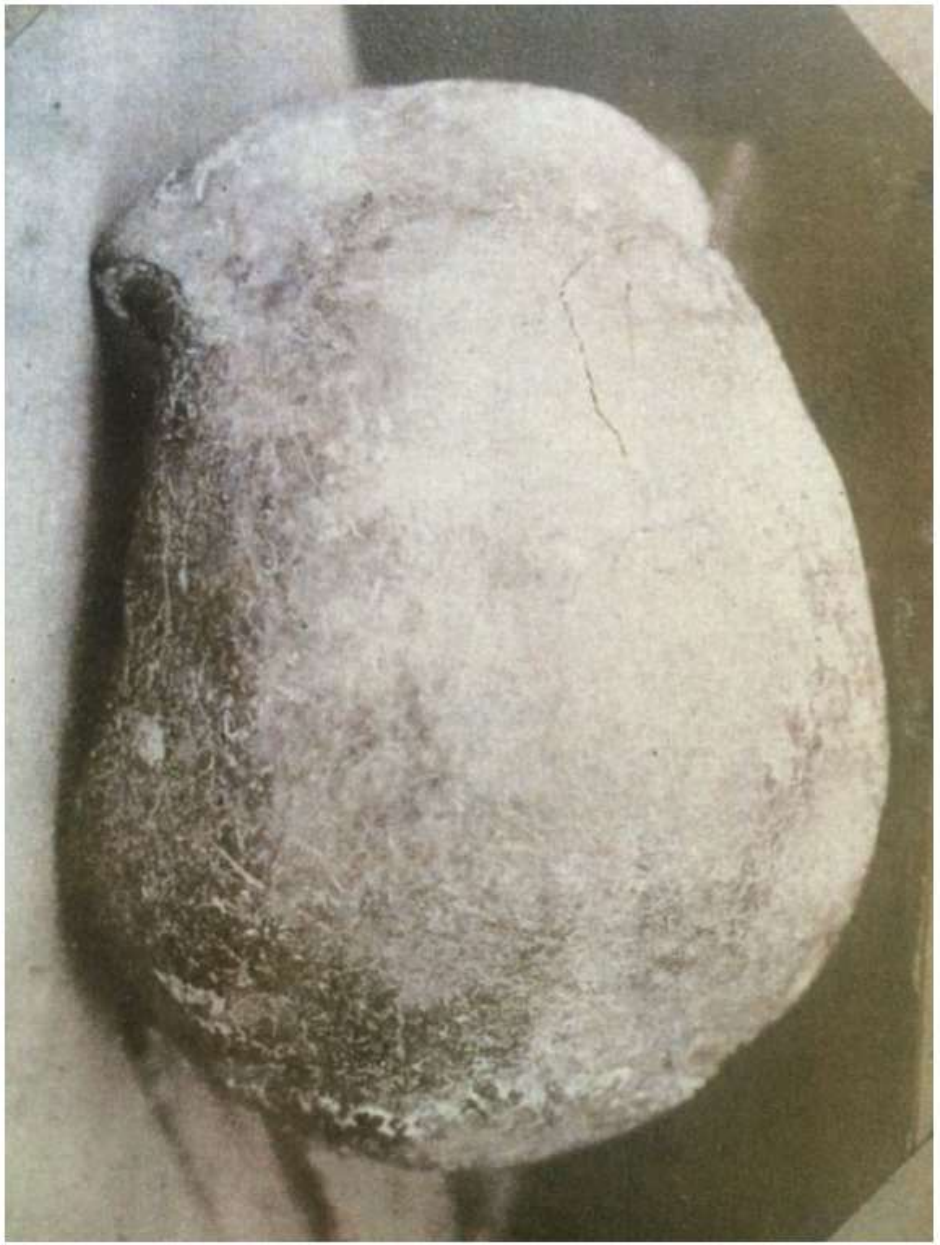


Figure 1. A photograph of the Neanderthal cranium, viewed from above. Huxley Papers, Imperial College London, 1863, Volume 105, Box no 105, Series 19.

William King (1809-1866):
1864: Names first extinct human species; first fossil hominin

- Professor of geology at Queen's College, Ireland
- 1864: *Homo neanderthalensis* becomes the first fossil hominin species to be named.
- Idea that Neandertal is a completely separate species from Homo sapiens sapiens.
- Racist interpretation: skull like savage Africans - "The thoughts and desires which once dwelt within it never soared beyond those of a brute."

W. King, *Quarterly Review of Science* **1**, 88 (1864).

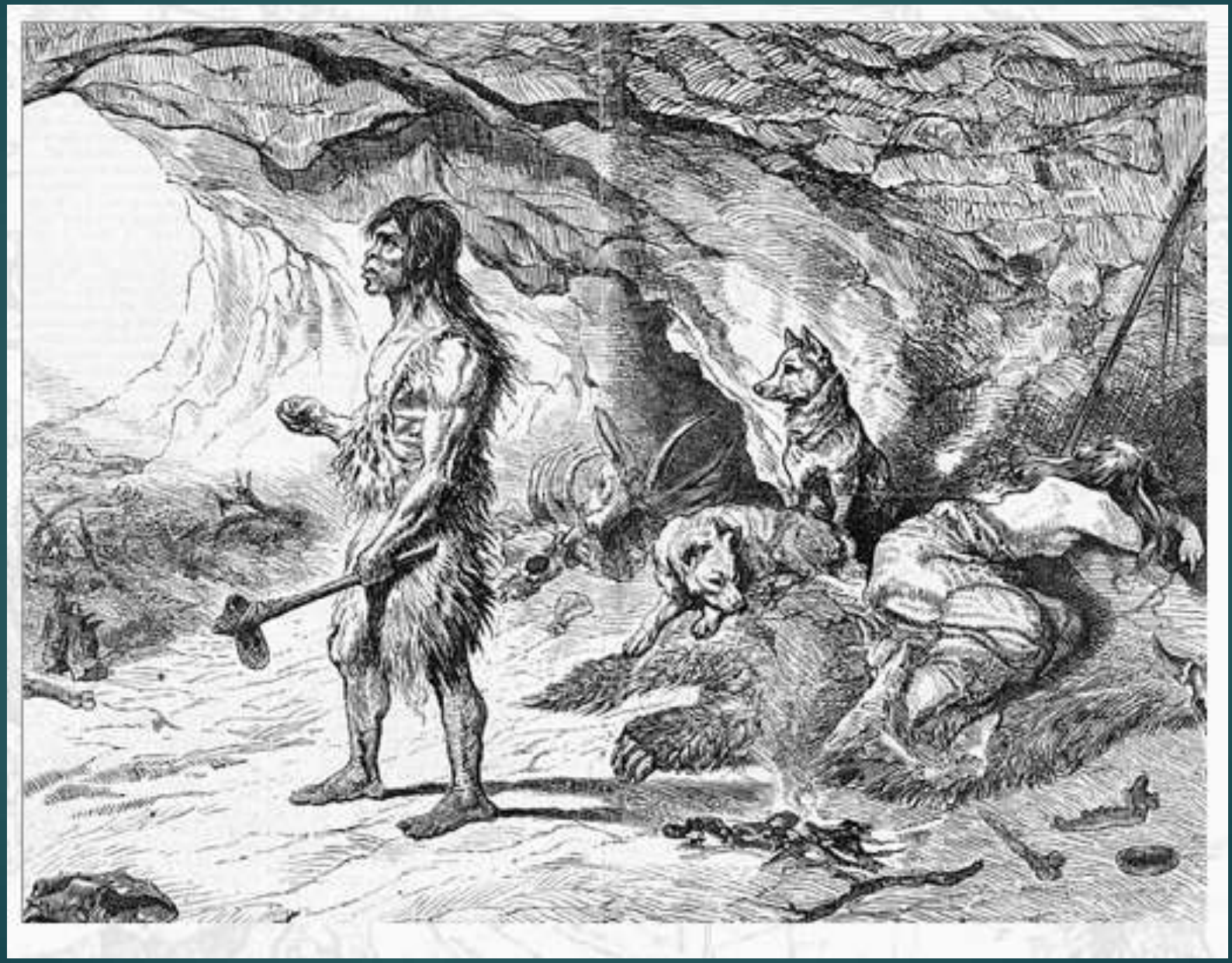
William King

- One British geologist, William King, suspected something more radical. Instead of being the remains of an atypical human, they might have belonged to a typical member of an alternate humanity. In 1864, he published a paper introducing it as such — an extinct human species, the first ever discovered. King named this species after the valley where it was found, which itself had been named for the ecstatic poet who once wandered it. He called it Homo neanderthalensis: Neanderthal Man.
- Who was Neanderthal Man? King felt obligated to describe him. But with no established techniques for interpreting archaeological material like the skull, he fell back on racism and phrenology. He focused on the peculiarities of the Neanderthal's skull, including the "enormously projecting brow." No living humans had skeletal features remotely like these, but King was under the impression that the skulls of contemporary African and Australian aboriginals resembled the Neanderthals' more than "ordinary" white-people skulls. So extrapolating from his low opinion of what he called these "savage" races, he explained that the Neanderthal's skull alone was proof of its moral "darkness" and stupidity. "The thoughts and desires which once dwelt within it never soared beyond those of a brute," he wrote. Other scientists piled on. So did the popular press. We knew almost nothing about Neanderthals, but already we assumed they were ogres and losers.

NeanderTal vs NeanderTHal

- John Hawks: “William King was the first to make a taxonomic name for the group we call Neandertals.
- He named it *Homo neanderthalensis* — that’s *“neanderthalensis”* with a “TH”.
- By the almighty rules of taxonomic nomenclature, that’s the name our poor heroes are stuck: *Homo neanderthalensis*
- So using “Neandertal” with a “T” is an act of taxonomic subversion.”
- Hawks: “Neanderthal” with a “TH” has an ordinary English meaning that is well understood by everybody — it means *“stupid,” “clumsy” and “brutish” all in one! Since* that’s not ordinarily what I mean when I’m describing Neandertals, I take advantage of the unfamiliarity of the alternate spelling to get people to think about them in a different way.

Neandertal hits the press: Harper's Weekly, 1873



Neandertal's antiquity

- N’s antiquity was only firmly established
  - with the eventual discovery of additional similar skeletons that, unlike the Neanderthal 1 skeleton,
  - were found together with stone tools and with the bones of extinct animals.

- Once their status as fossil predecessors of modern humans was accepted, their relationship with modern humans, and particularly modern Europeans, began to be intensely debated.

Gustav Schwalbe, MD (1844-1916)

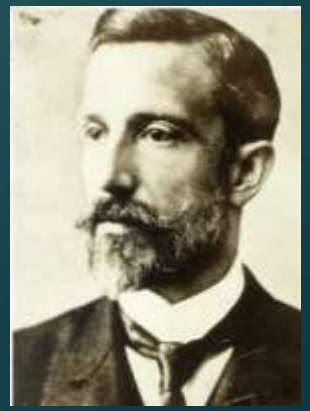
- German anatomist and anthropologist
- First long monographs on both Java Man and Neandertals
- Morphological series from Pithecanthropus to N to MHs, a line of descent
- He considered the Neanderthal to be a direct ancestor of modern humans.
- He was important in getting Ns accepted as a distinct form of early man

•*Studien über Pithecantropus Erectus* (Study of Pithecantropus Erectus), Leipzig, 1899
•*Der Neander Schädel* (The Neanderthal skull) ib. 1901
•*Vorgeschichte der Menschen* (Prehistory of humans) ib. 1903.

Marcel de Puydt, Max Lohest, & Julien Fraipont: Spy Neandertal & Mousterian Tools

- Belgian lawyer & amateur archeologist; and a geologist

- 1886: Discoverers of 2 nearly complete Neandertal skeletons (male & female) at Spy d'Orneau, Belgium, found with Mousterian tools (knapped flints) (dated to older than 40 Ka); and mammoth bones; first real evidence of great antiquity of Ns
- Found in undisturbed archeological context that for first time established their antiquity; all prior findings had been incidental findings in cave mouth contexts



- 1888: Julien Fraipont, anatomist at Univ. of Liege, co-wrote monograph on it in the *American Anthropologist*

Spy, Belgium

Spy 2

Spy 1 & 2

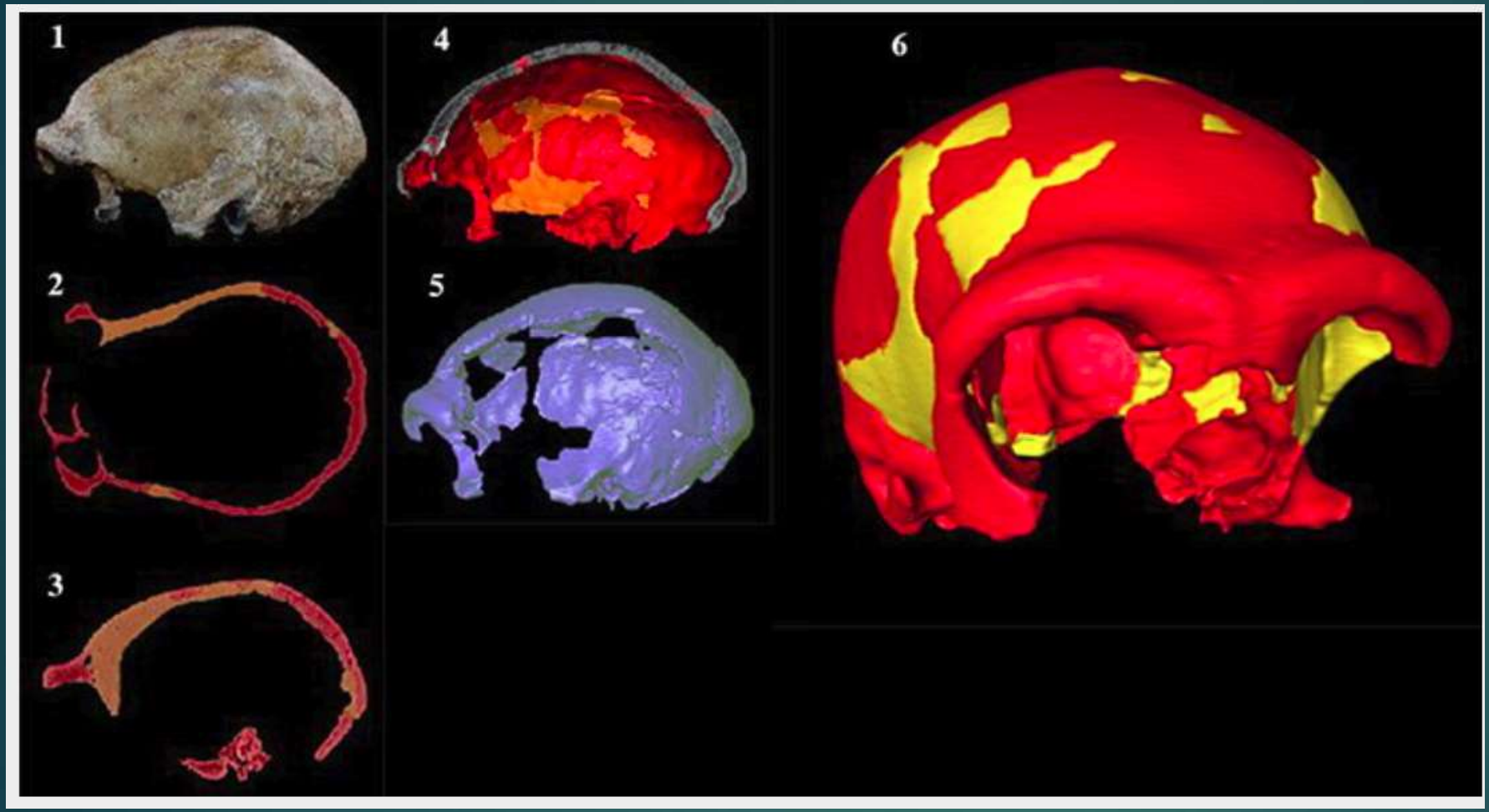
Skullcap of Spy 1, thought to be of a female. Spy 2, femur.

Spy, Belgium, discovered in 1886.

Between 41,500 BP and 38,000 BP.

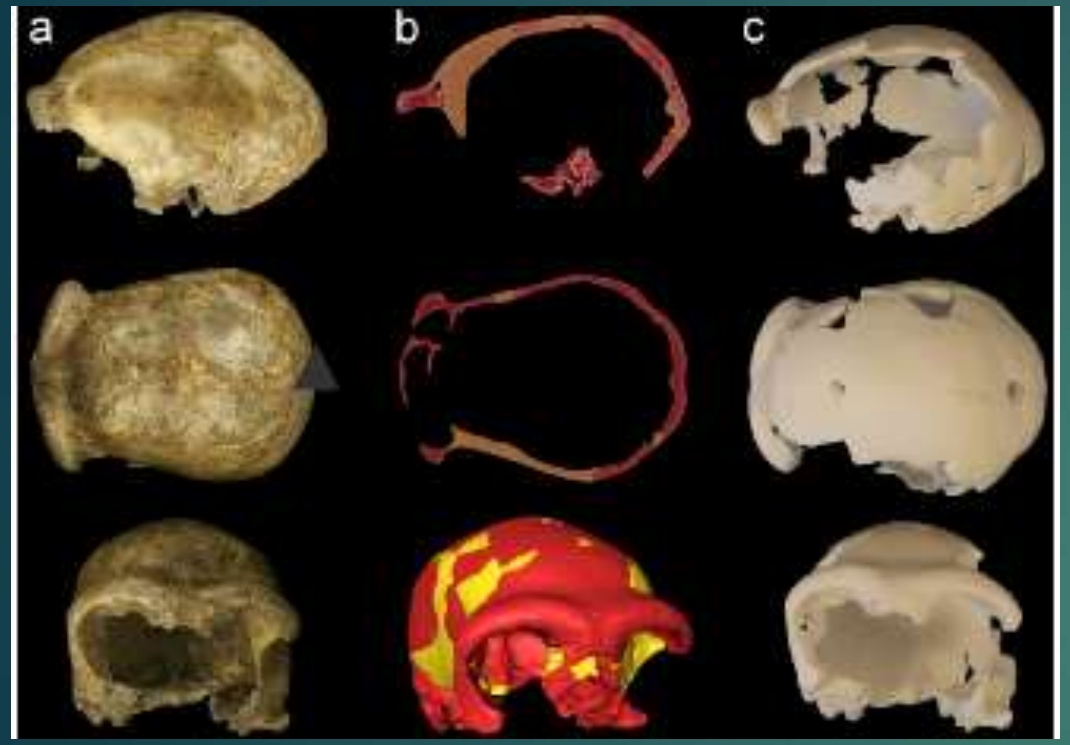
Spy 2

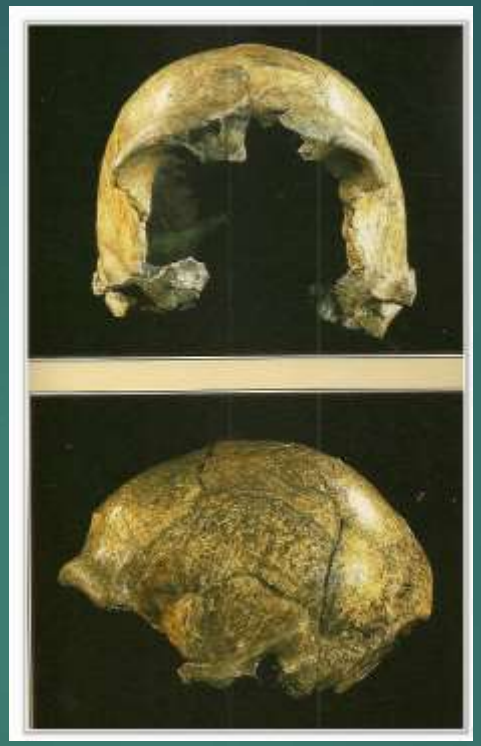
Reconstruction of the Spy I skull.



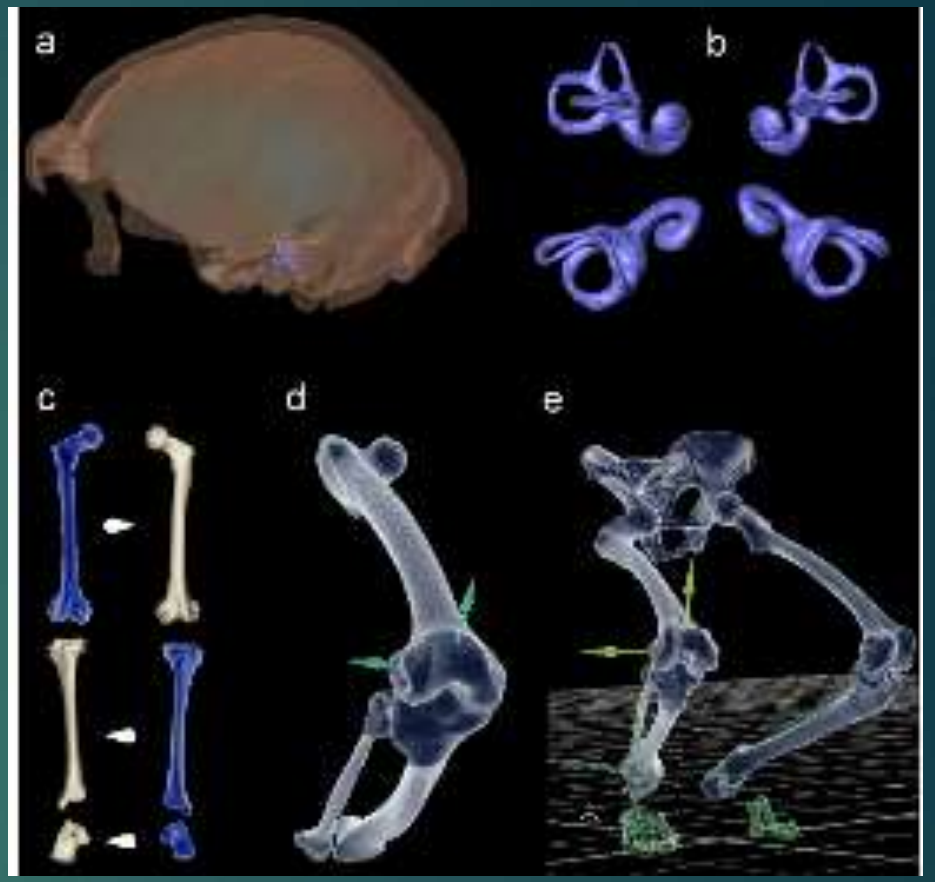
1: Left lateral view of the original.
2 and 3: CT slices and segmentation of bone (in red) and plaster (in orange) with Amira ® 3.1.
4: Internal view of the 3D reconstruction of the right part of the fossil.
5: left lateral view of the 3D reconstruction of the bone material without plaster.
6: Reconstructed skull with segmented bone and plaster.

1886: Neandertal, Spy Belgium, > 40 Ka





[Spy 1]



[Spy 2, a complete skeleton found in a contracted position.]

Believed Ns crouched in walking because of burial position

Spy 2 reconstruction

Spy Cave

Spy Cave is one of the most iconic Neanderthal sites with two adult skeletons.

- Discovered in 1866, various hypotheses were proposed: burial, cannibalism, accident.
- We clarify the possible cause of death based on taphonomic and forensic criteria.
- The most feasible: interpersonal violence followed by accidental falling blocks.
- This case may appear as the first perfect crime naturally hidden.

1899-1921: bonanza of N discoveries

- 1899-1905: Krapina cave, near Zagreb, Croatia – partial N fossils
- 1908 - German site of Ehringsdorf
- 1908-1911: French cave sites of La Chapelle-aux-Saints (1908), Le Moustier (1908 & 1914), La Ferrassie (1909, 1910, 1912), and Le Quina (1911)– complete N skeletons
- N archetype: "old man" of La Chapelle skeleton as described by Marcellin Boule

Central Europe’s Largest Neanderthal site: Krapina, Croatia

- In the year 1899, the fossil remnants of the Homo sapiens neanderthalensis species were found at the excavation site located at the Hušnjak hill in Krapina.

- During a six-year research (1899 -1905) at the site, excavation was led by Dragutin Gorjanović-Kramberger

- Cave's sandstone deposits, which were 8 meters high.

- Largest and most abundant collection of Neanderthal people collected at a single locality.

Krapina Cave

- The bones belong to the fossil remains of several dozen (up to 80) individuals, both male and female, from 2 to 40 years of age.
- A total of 876 single fossil Neanderthal fossils were found, but no complete skeleton; Dated to 130 Ka
- Numerous fossil animal remains of cave bear, wolf, elk, giant deer, woolly rhinoceros, wild buffalo, and many other animals were found.
- Over a thousand pieces of stone tools from the Paleolithic age, or Early Stone Age

Dragutin Gorjanović-Kramberger (1856-1936):

Largest N fossil find of all + cannibalism in Neandertals

- Croatian paleontologist
- 1899: discovered the Neandertal fossils at Krapina, Croatia
- In 1906 published “On the diluvial man of Krapina”

- Gorjanović-Kramberger's research helped prove the theory of evolution of the human species, concluding that Neandertals were not modern humans

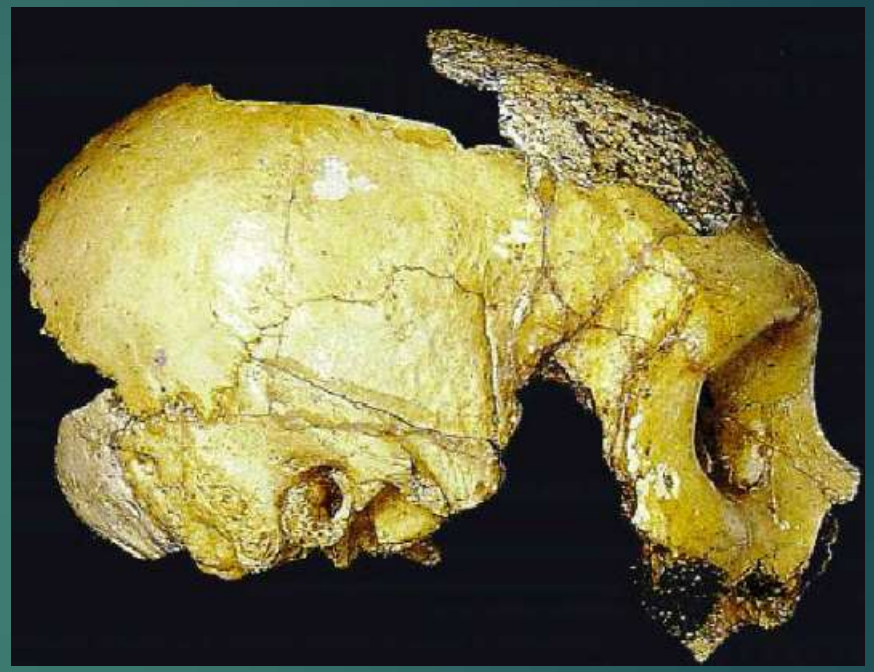
- Evidence of cannibalism (although later disputed)

Dragutin Gorjanović-Kramberger 2

- The material from Krapina is the
  - largest population sample of Neanderthals ever found, second only to Atapuerca.
- There are more than 800 fossils, 82 individuals, ages of 16-24 years, dated to 130 Ka; representing a period of over 50 K years
- Bones are gracile, highly fragmented;
  - signs of arthritis & healed fractures
  - cut marks due to cannibalism (based on the fragmentation and traces of burning)
  - use of eagle talons as necklaces

Eagle talons, 130 Ka

1899: 800 fossils of 82 Neandertals, Krapina, Croatia



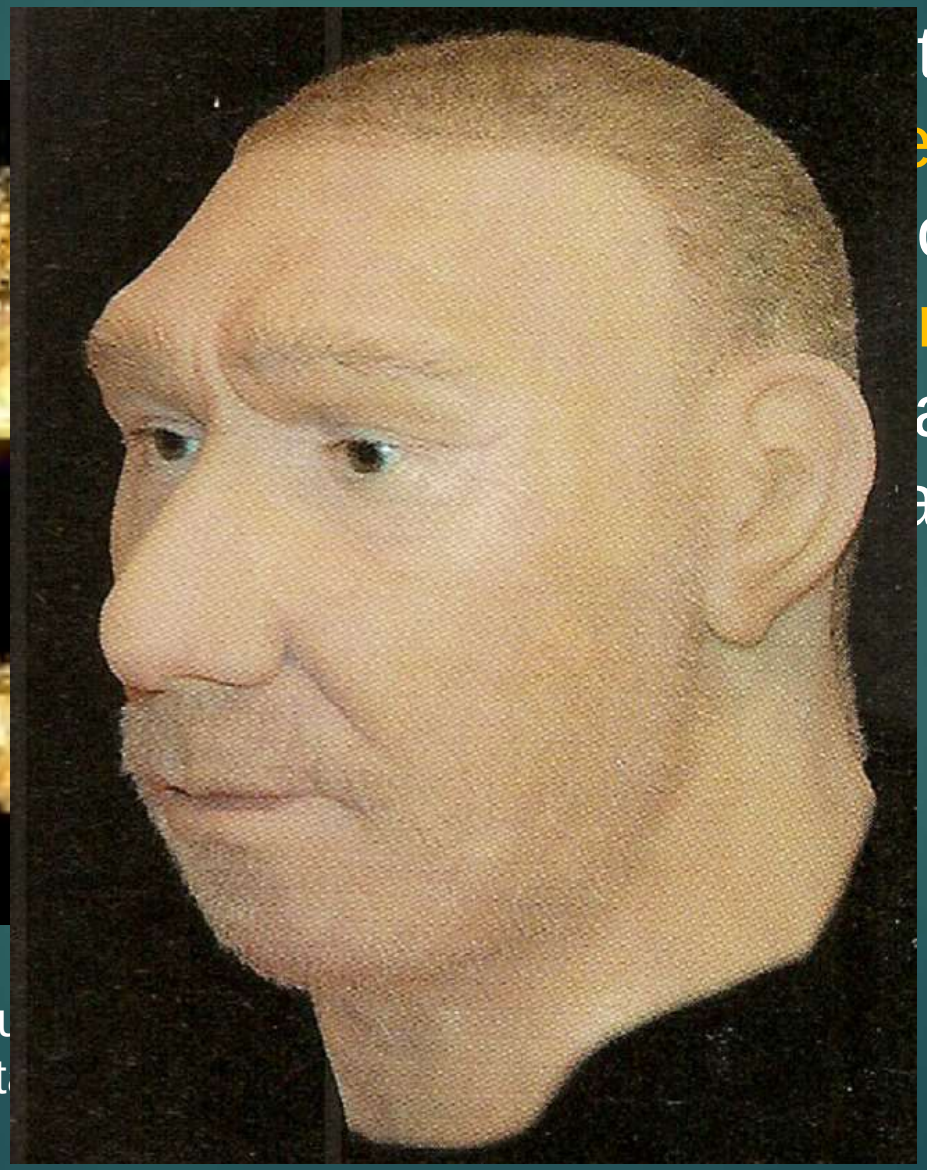
Homo neanderthalensis
(Karpina C)
Discoverer: Karl Gorjanovic-Kramberger
Locality: Krapina cave, Croatia
Date:1899
Age: 130K

Krapina Neandertals

- Artificial grooves on 14
  th indicate toothpick
  e
  o the most extreme
  rodonty (vertically
  arged pulp chamber)
  any human fossil

Laterally deep supraorbit
(ophryonic groove)

Circu



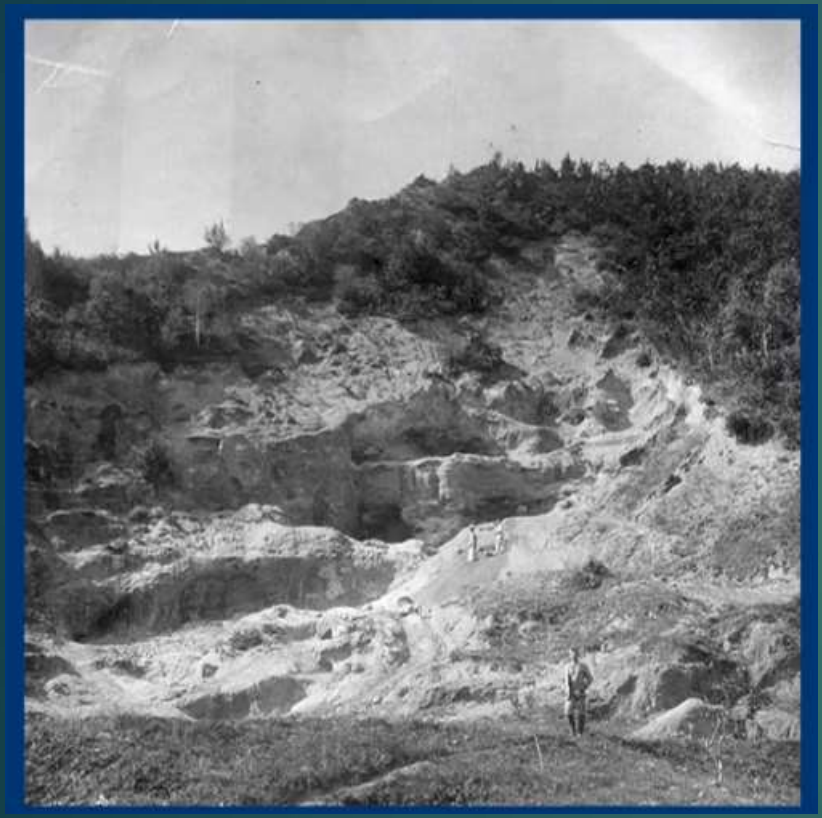
Krapina

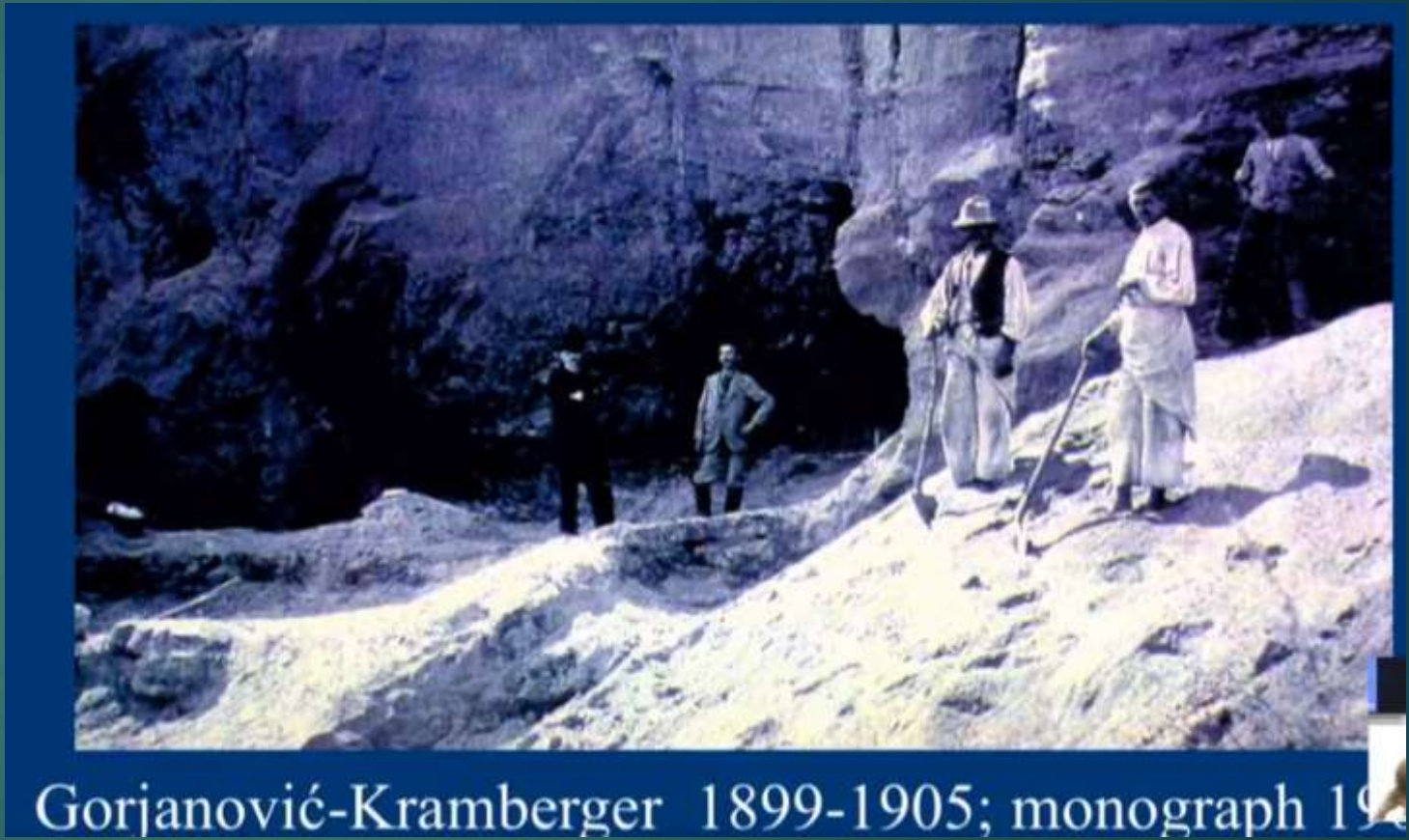
Krapina, Croatia

Krapina and the case for complex behavior in early Neandertals

David W. Frayer (University of Kansas), Janet Monge (University of Pennsylvania), Davorka Radovčić & Jakov Radovčić (Croatian Natural History Museum)

Krapina rock shelter, 1901, limestone

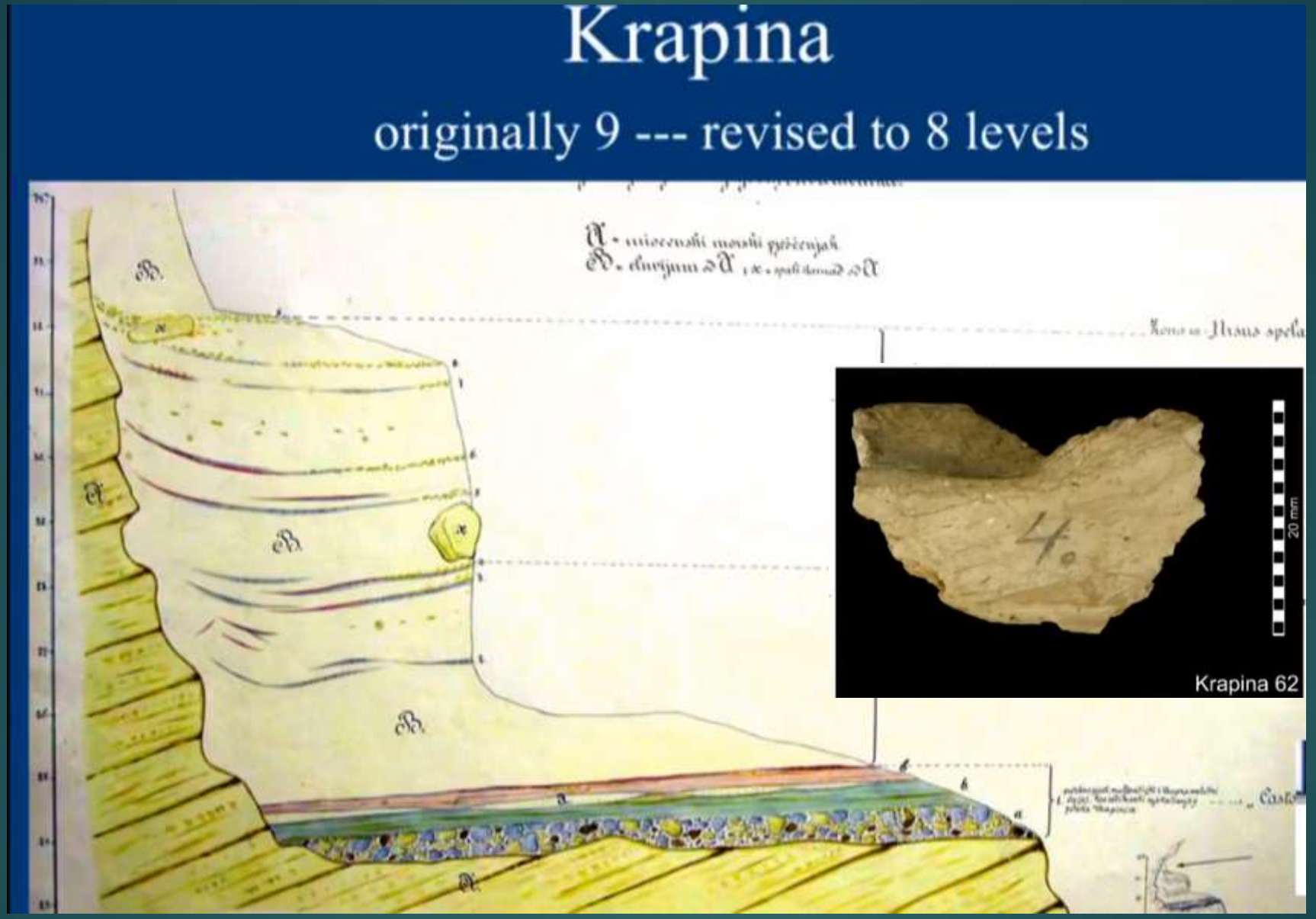




1906

Krapina

originally 9 --- revised to 8 levels



Wrote level number on all specimens, tools; level 4 and 5 = most of Ns; but found on all levels

Krapina

- Short sequence with rapid accumulation of sediments, 10 K
- No longer exists; totally eroded away
- Dated to 130 Ka, MIS5e; E-R dating; warm temp. fauna support this
- Well before any MHs in area; so behaviors are purely N
- Lots of Ns: Gorjanović-Kramberger = >10; Wolpoff, in 1976, >-82

Crania and mandibles: not as well known, no complete craniums

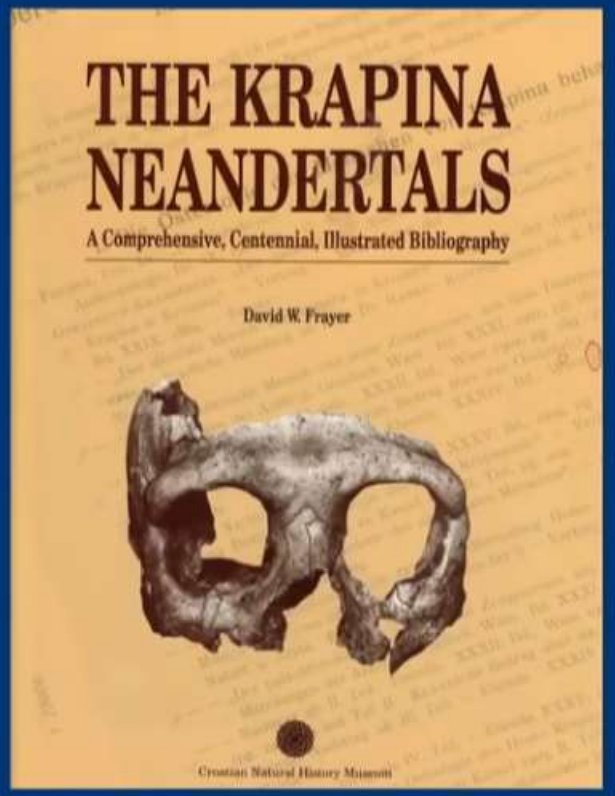
Over 200 Isolated teeth

Post cranial remains

Krapina Tools: Mousterian

- Krapina tools
- Sitnek and Smith 1991
- 1191 artifacts (tuffs & chert)
- 273 tools & retouched flakes
- 918 unmodified cores & flakes
- None from the cave

Typical Mousterian



2007

3058 references

1899-2005

Davorka Radovčić
2013

Otto Hauser (1874-1932): Discoveries by despised dealer: Le Moustier

- Swiss-German antiquities dealer
- Detested by the French for his discoveries
- 1908: Le Moustier rockshelter, southwest France: discovers a complete Neanderthal skeleton within a “burial” site (all but the skull later lost in World War II); type site for Mousterian culture.
- 1909: discovery of a Cro-Magnon skeleton at Combe, Capelle; associated Châtelperronian industry

Le Moustier

A Juvenile Neandertal excavated in 1909.

http://www.mnh.si.edu/anthro/humanorigins/ha/lemoust.htm

1908: Le Moustier, Neanderthal cranium, 45K

Abbes Jean and Amedee Bouyssonie: French Priests get into the act

- French brothers and priests
- 1908: Excavated, with Bouffia Bonneval, the Neandertal skeleton, the 'Old Man', at La Chapelle-aux-Saints
- Turned it over to Marcellin Boule for analysis

Three abbots for a Neanderthal & M. Boule

Louis Bardon (1874-1944), Jean Bouyssonie (1877-1965) , Amédée Bouyssonie (1867-1958)

Jean Guibert (1857–1914) et Henri Breuil (1877–1961)

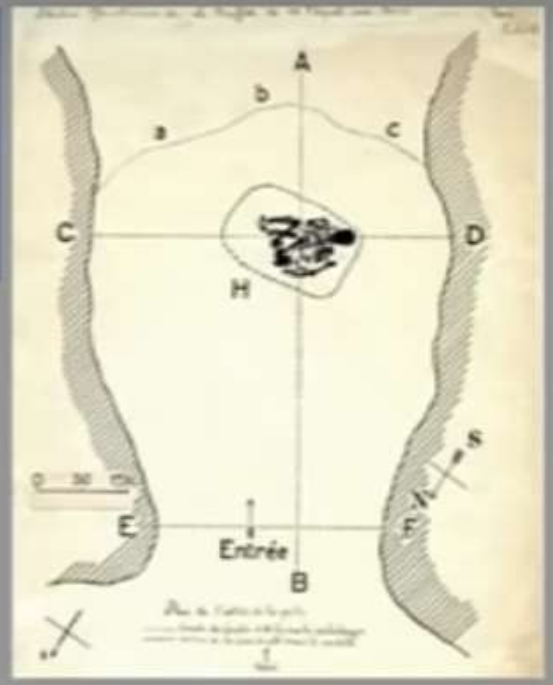
© *Chercheurs de lumière dans les grottes obscures*, Association des anciens de l'ensemble scolaire Edmond Michelet, 2008

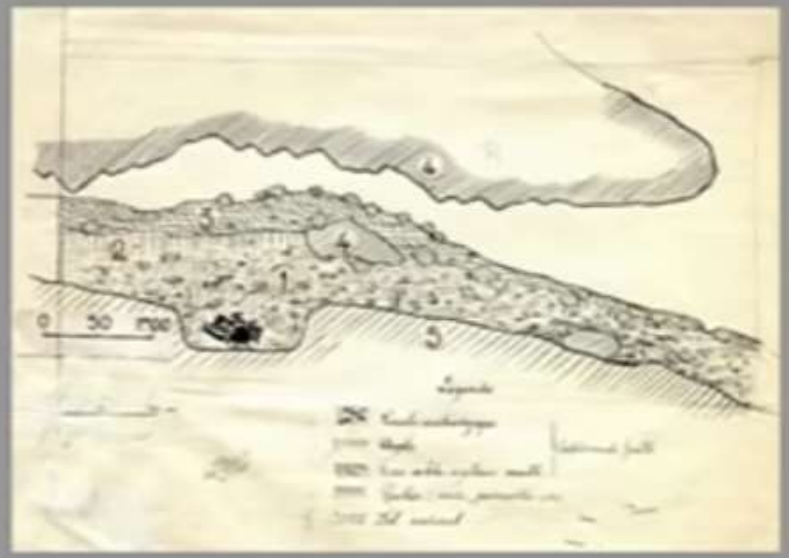
La Chapelle-aux-Saints, France.

Pick damage

« On trouve l'os frontal à quatre heures et à cinq heures et demie on devait rentrer à l'école. On piocha ferme et un tas d'os restèrent dans les terres. Boule arrivé plus tard avec son personnel passa trois jours à les cribler. Il découvrit les articulations et cent débris qu'on mit un mois à rapprocher. »

Lettre d'Émile Cartailhac à Joseph Déchelette, 2 octobre 1909





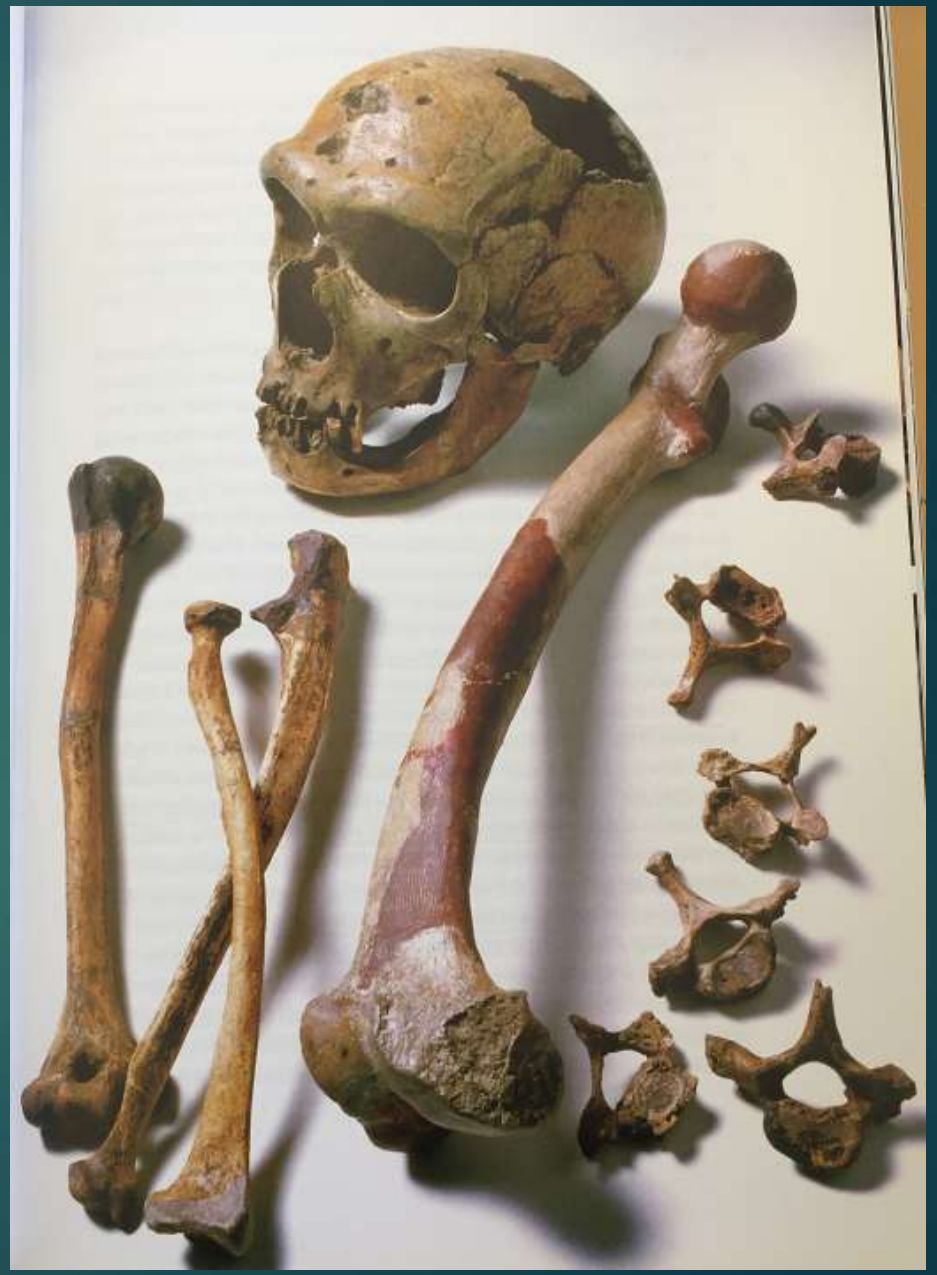
La Chapelle-aux-Saints (Corrèze), le 3 août 1908

In 1908, Joseph Bonneval, a servant, discovered the skull by sinking a pick into it.
La Chapelle aux Saints: died at about age 45-50; lost all his teeth except 1; extreme osteoarthritis
If they made it to adulthood, 2/3rds of Ns died before age 45

- This is a reconstruction of a Neanderthal burial at La Chapelle-aux-Saints, France. The original discovery at the site in 1908 remains one of the most famous and highly debated Neanderthal finds of all time.

1908: Neandertal,
La Chapelle-Aux-Saints, “Old Man”

Homo neanderthalensis
(La Chapelle-Aux-Saints)
Discoverer: Fathers Bouyssonie & Josef Bonneval
Locality: Bouffia Bonneval, La Chapelle-Aux-Saints, France
Age: 350K
Date: 1908



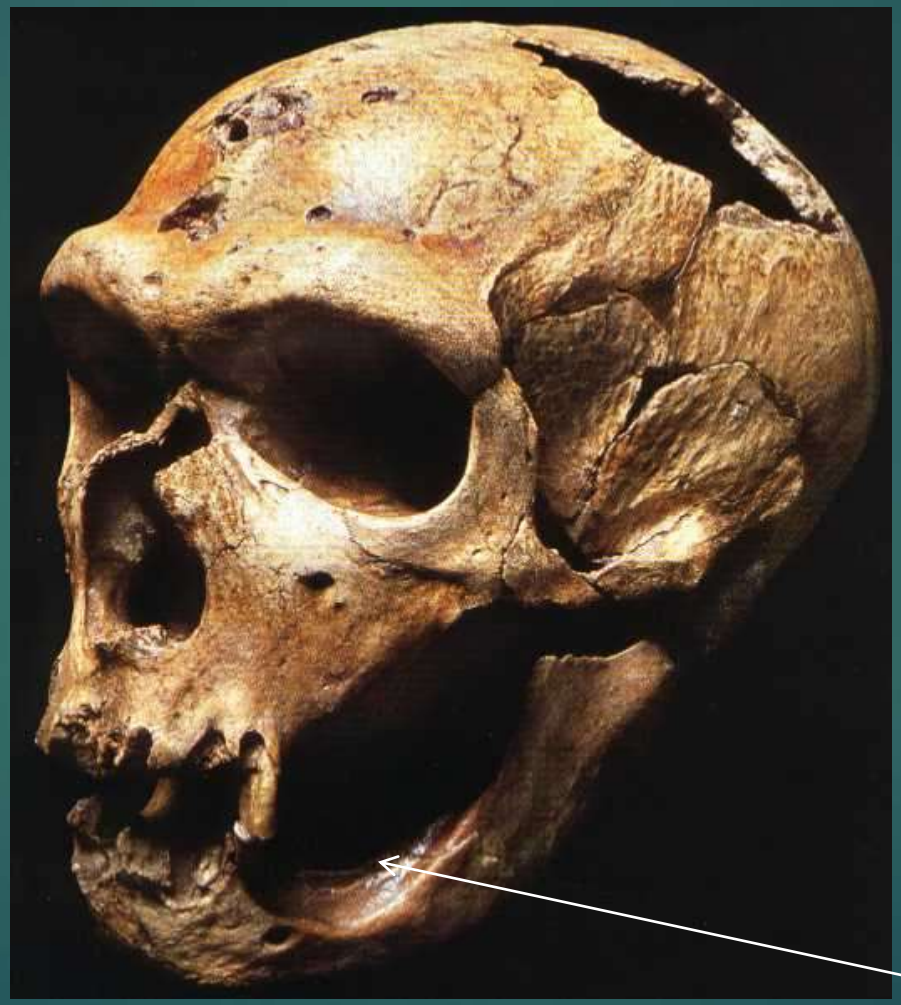
Aged, pathological skeleton formed basis of pervasive negative view of Neandertal

“Old Man” of La-Chapelle

Extreme osteo-arthritis

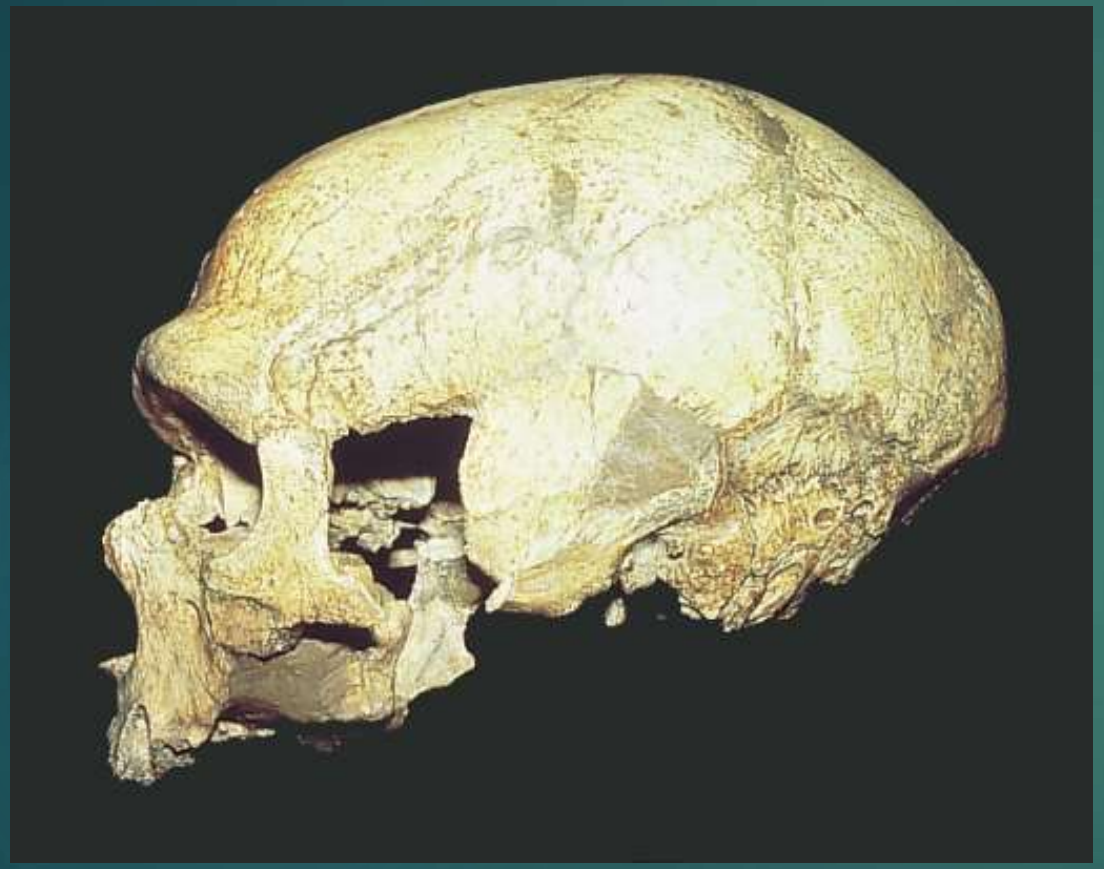
Extreme osteo-arthritis

“Old Man” of La-Chapelle



Molars missing and reabsorbed

La Chapelle-aux-Saints Skull



- Note:
  - occipital bun,
  - projecting face,
  - low vault.

Old Man of La Chapelle: Elder Care

- The Old Man of La Chapelle, who dates to about 50,000 years ago, suffered from severe arthritis in his neck, had a deformed left hip, a crushed toe, a broken rib, and damaged patella.

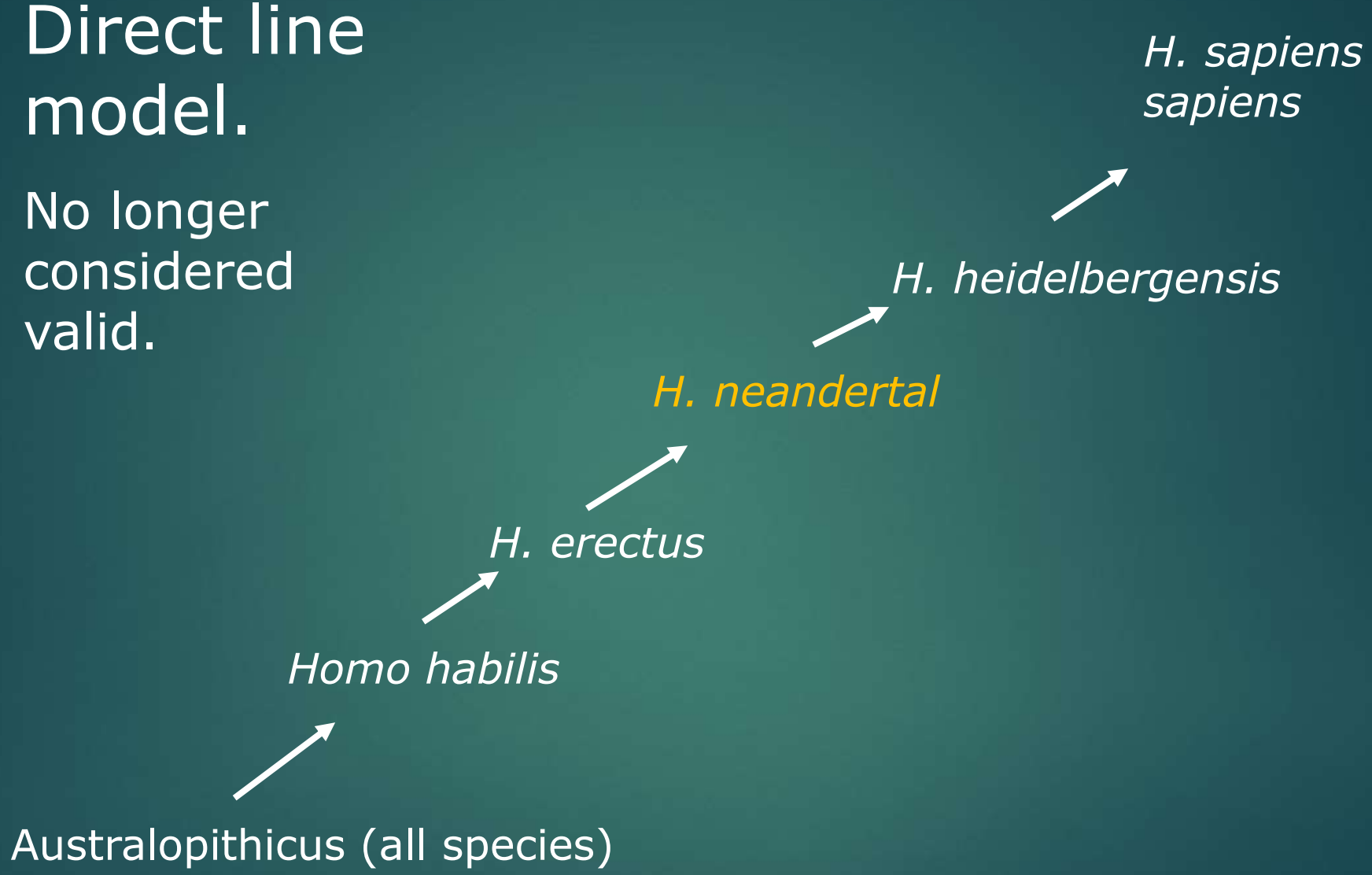
- The fact that despite all of these ailments, this individual was able to survive indicates that he was cared for by other members of his clan.

N as own species, not ancestral to MHs

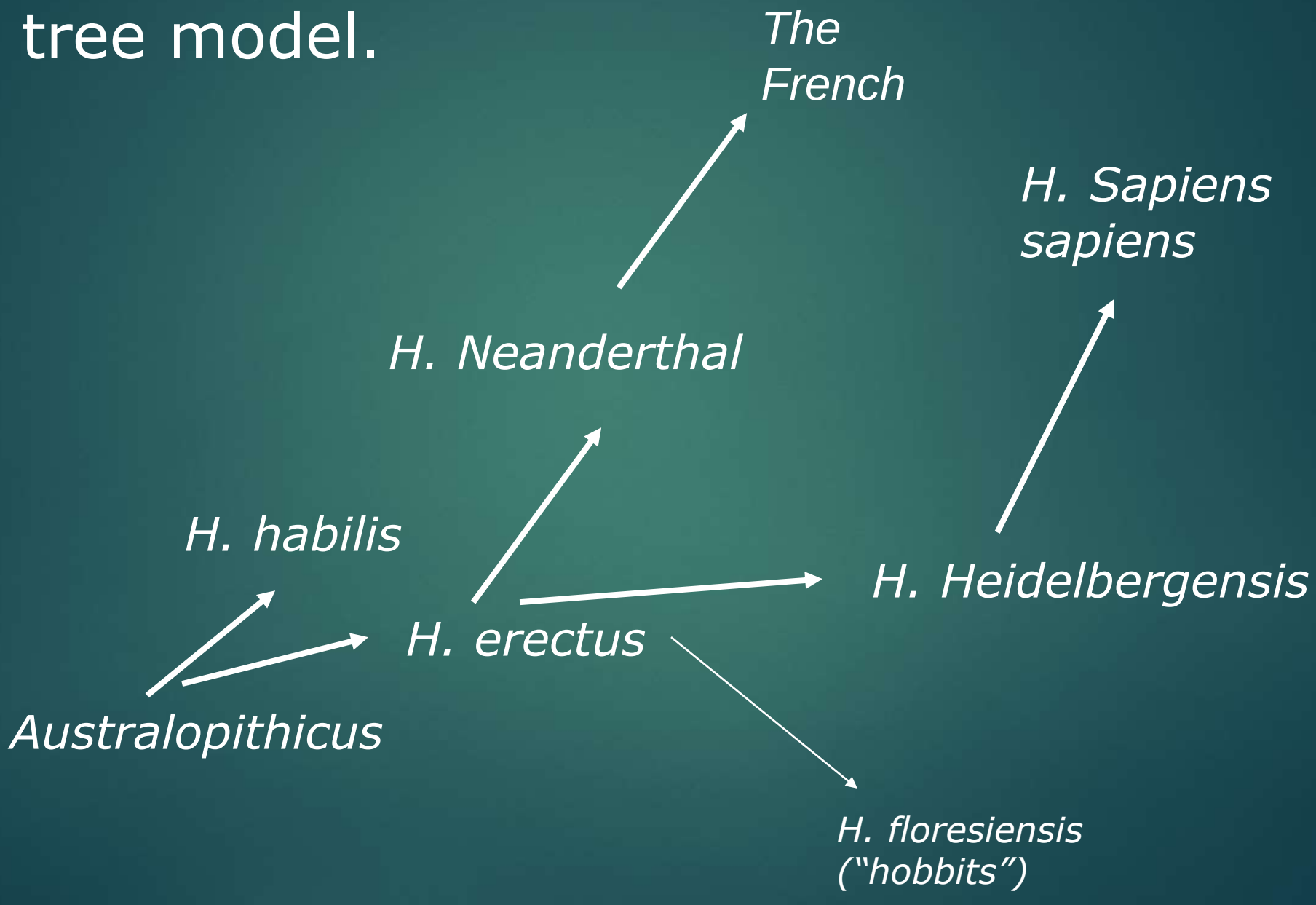
- The predominant view in the 1910s and 1920s was represented by scientists like Marcellin Boule and Sir Arthur Keith, who were among the most influential scholars of their day.
- They placed Neanderthals in their own species, Homo neanderthalensis, and rejected any ancestral role in the evolution of MHs, pointing out their "primitiveness" and presumed inferiority (e.g., Boule 1911–1913).
- In 1930, the prominent British anthropologist Sir Arthur Keith, writing in The New York Times, channeled Boule's work to justify colonialism. For Keith, the replacement of an ancient, inferior species like Neanderthals by newer, heartier Homo sapiens proved that Britain's actions in Australia — "The white man ... replacing the most ancient type of brown man known to us" — was part of a natural order that had been operating for millenniums.

Direct line model.

No longer considered valid.



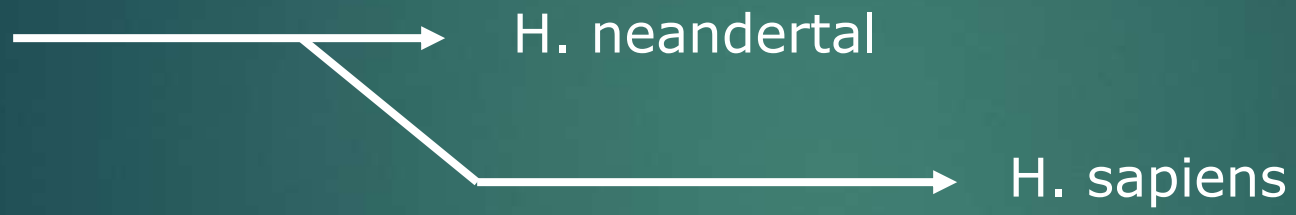
Branching tree model.



A

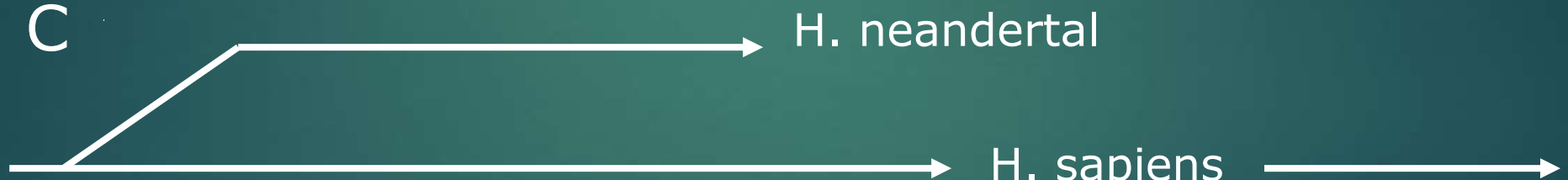
Direct ancestor

B



Cousin, no overlap

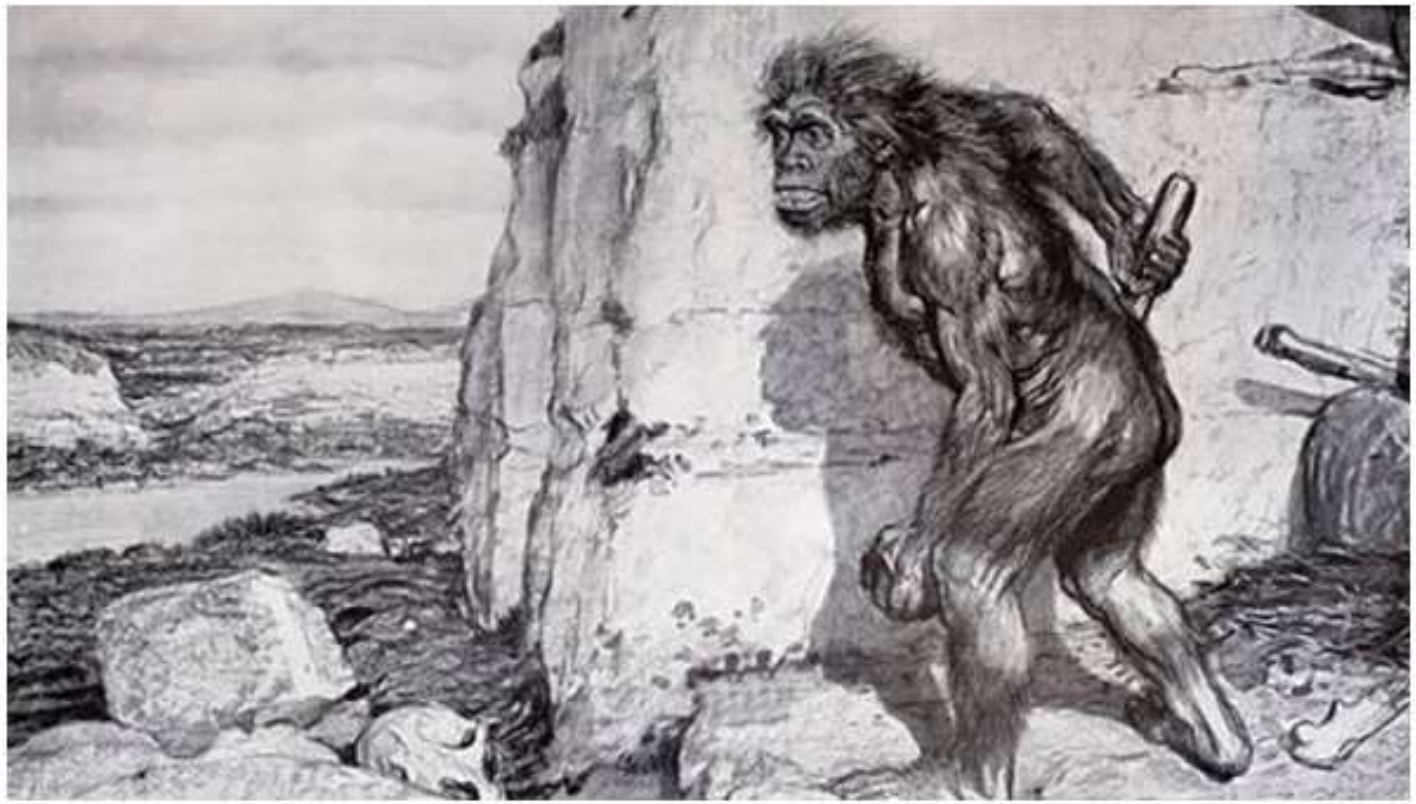
C



Not close enough to be same species

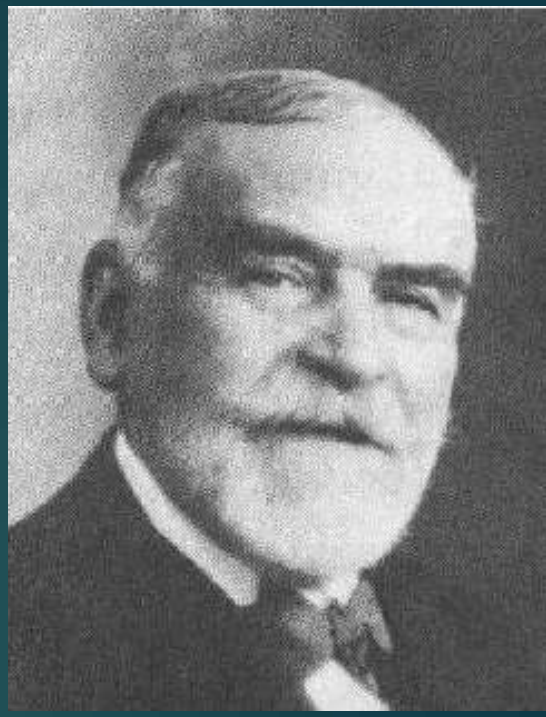
Original N conceptions: only species that is used as a paleontological insult – “You are a Neandertal”

Old Man of La Chapelle-aux-Saint;
an arthritic Neandertal;
Boule's erroneous 1911 reconstruction



19th Century Neanderthal Portrayal,
1909 by Frantisek Kupka

Pierre Marcellin Boule (1861-1942): Neandertal as a slouchy, barbaric troglodyte



- Predominant French paleontologist of early 20th century
- One of founders of Paris's Institut de Paleontologie Humaine
- 1911: 336 pp Monograph of first complete Neandertal skeleton, from La Chapelle-aux-Saints (Correze, France)

- 1911: Marcellin Boule's N article in *Annales de Paléontologie* establishes paleoanthropology as a discipline. (https://archive.org/details/b22463355/page/232/mode/2up)
- It wasn't until 1957 that the Old Man's dysmorphia was recognized as the byproduct of several deforming injuries and severe osteoarthritis, a degenerative joint disease.

Boule

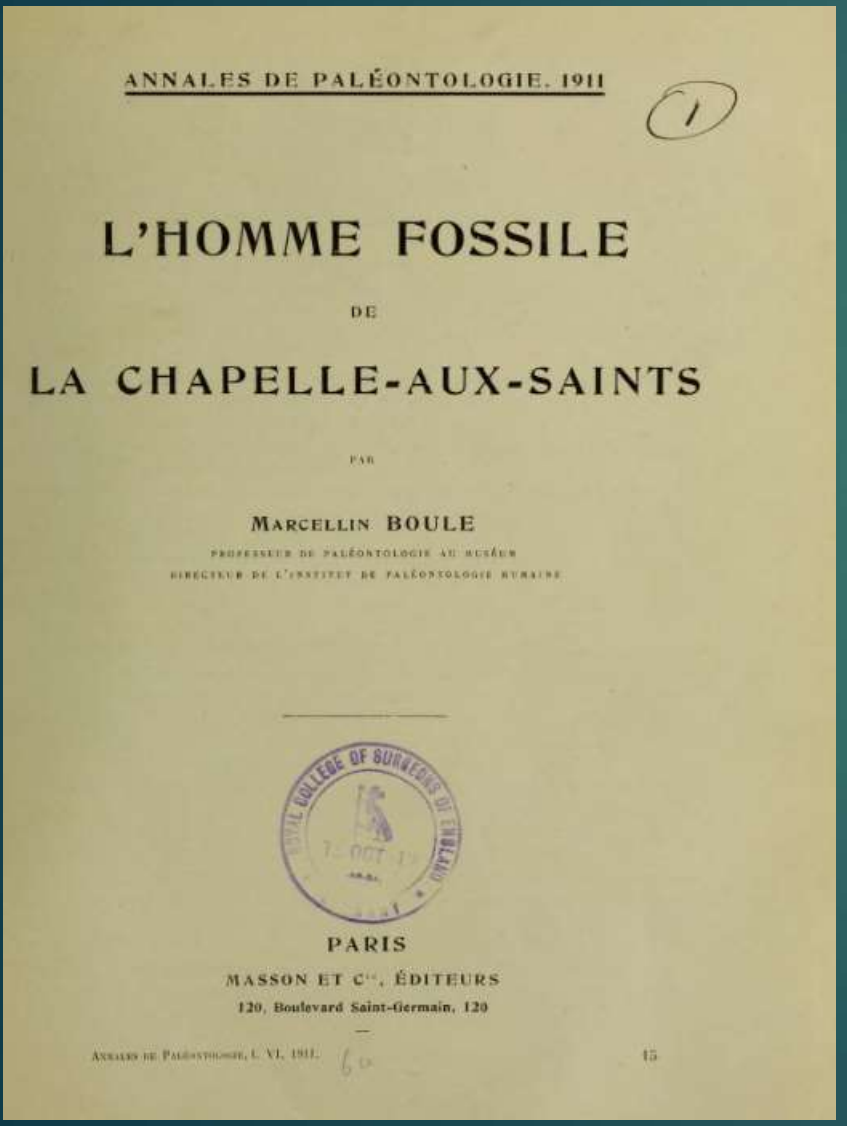
- 1911-1913: Marcellin Boule's article in *Annales de Paléontologie* establishes paleoanthropology as a discipline.
- Boule, Marcellin. *L'homme fossile de La Chapelle-aux-Saints*. Paris: Masson, 1911.
- ———. *Les hommes fossiles: éléments de paléontologie humaine*. Masson, 1921.

- 1921: Rejected Piltdown fossil as chimp jaw & human skull

- It wasn't until 1957 that the Old Man's dysmorphia was recognized as the byproduct of several deforming injuries and severe osteoarthritis, a degenerative joint disease.

Marcellin Boule's *L'Homme de La Chapelle* (1911):

Used stereoscope images to create 3D images.



ANNALES DE PALÉONTOLOGIE. 1911

L'HOMME FOSSILE

DE

LA CHAPELLE-AUX-SAINTS

PAR

MARCELLIN BOULE

PROFESSEUR DE PALÉONTOLOGIE AU MUSÉUM

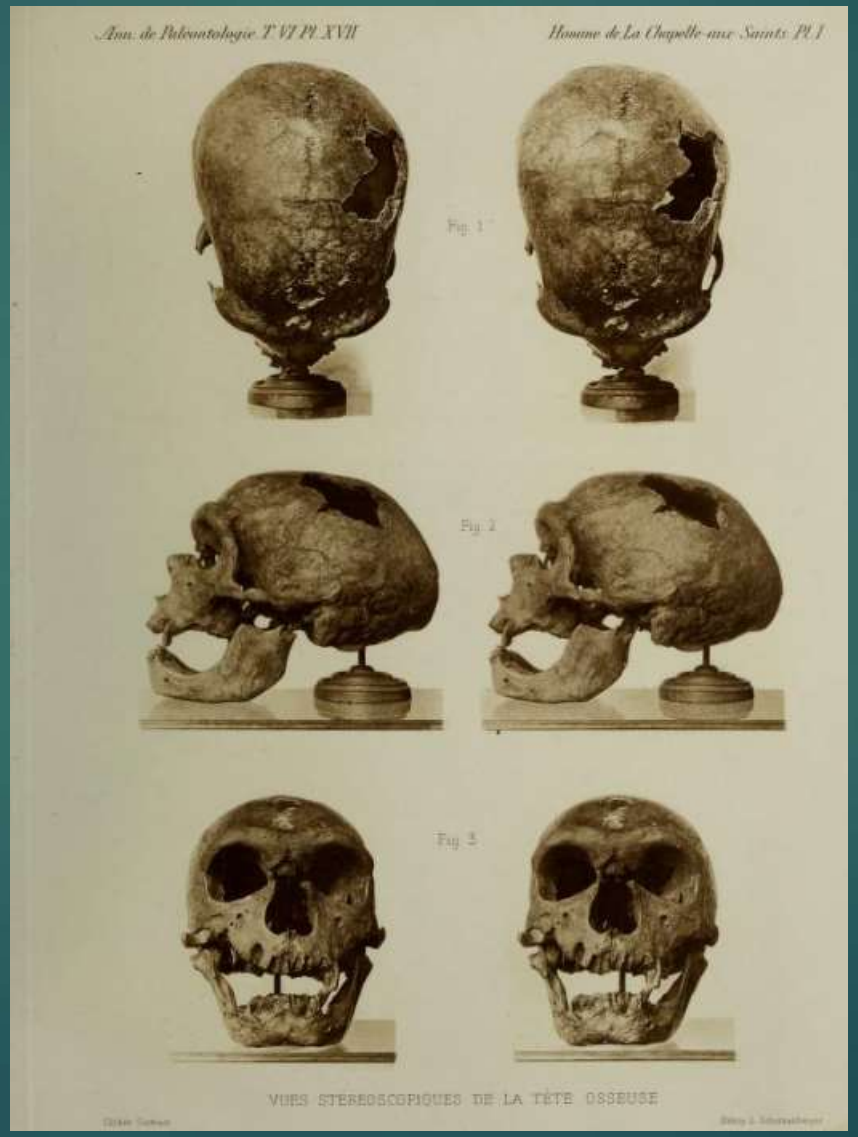
DIRECTEUR DE L'INSTITUT DE PALÉONTOLOGIE HUMAINE

ROYAL COLLEGE OF SURGEONS OF ENGLAND

PARIS

MASSON ET C^ie^, ÉDITEURS

120, Boulevard Saint-Germain, 120



Ann. de Paléontologie T VI Pl XVII

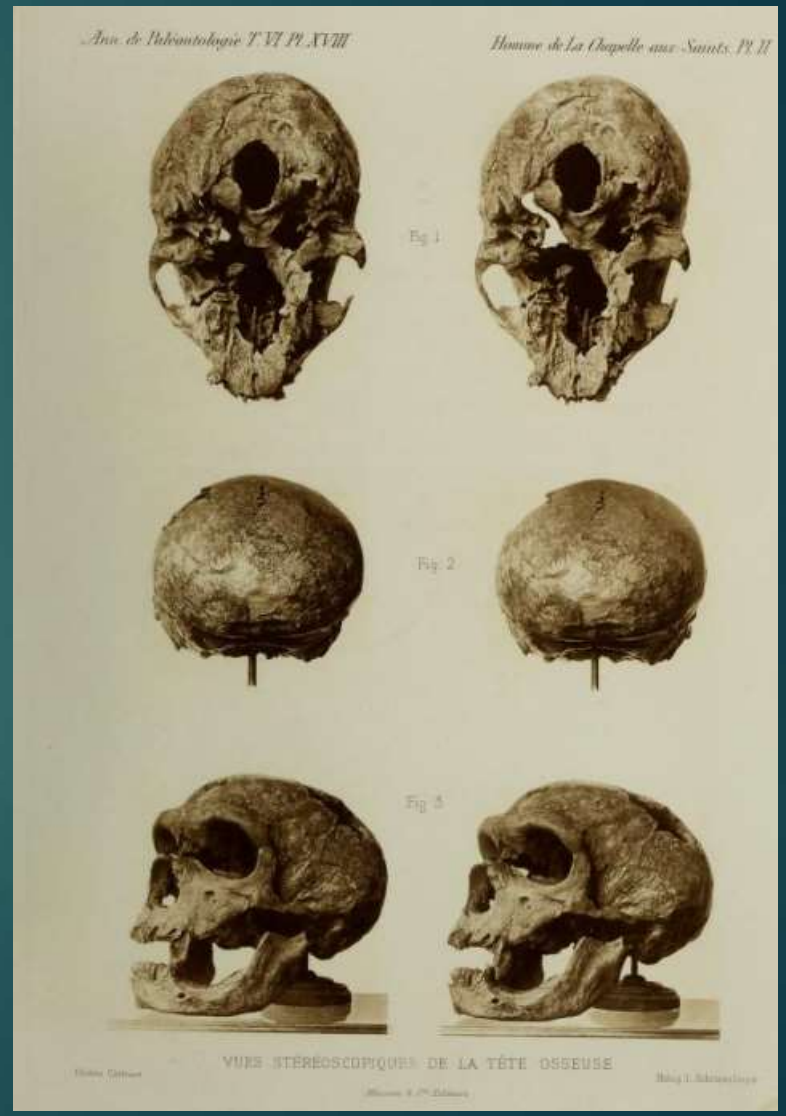
Homme de La Chapelle aux Saints Pl I

Fig. 1

Fig. 2

Fig. 3

VUES STÉRÉOSCOPIQUES DE LA TÊTE OSSEUSE



Ann. de Paléontologie T VI Pl XVIII

Homme de La Chapelle aux Saints Pl II

Fig. 1

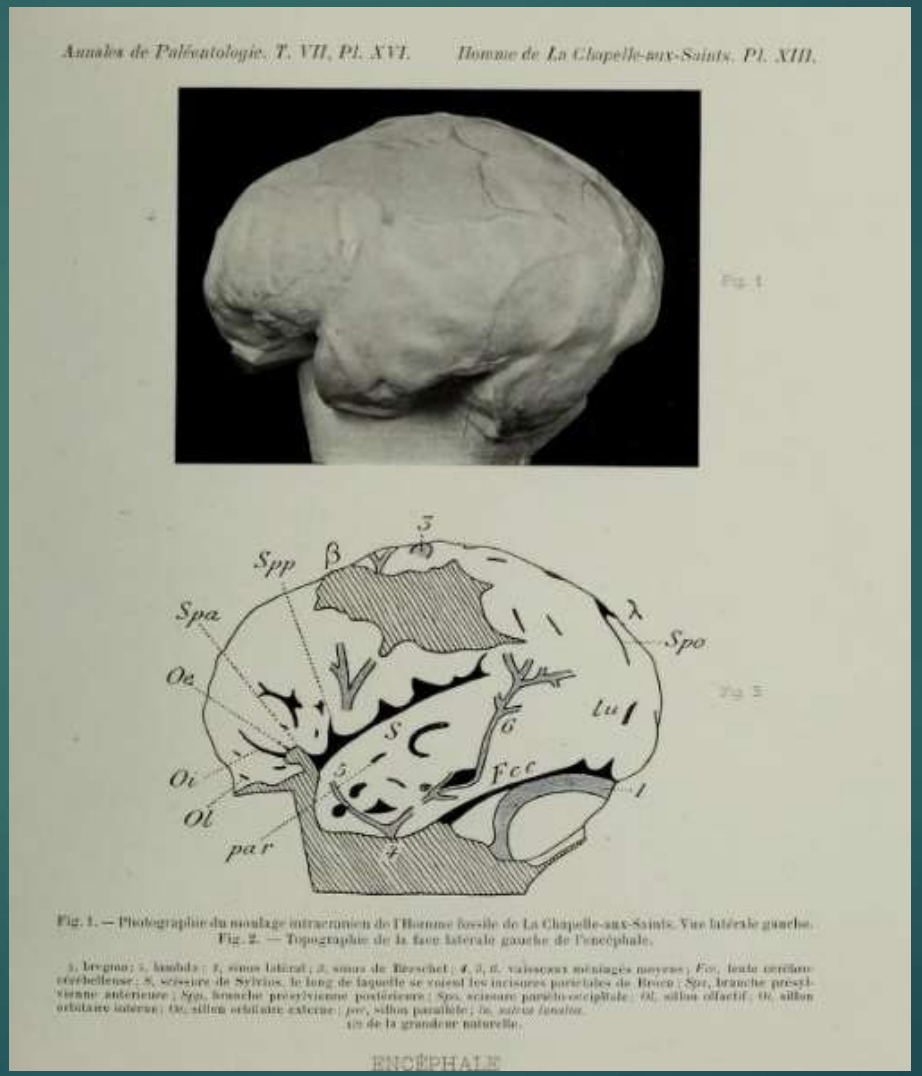
Fig. 2

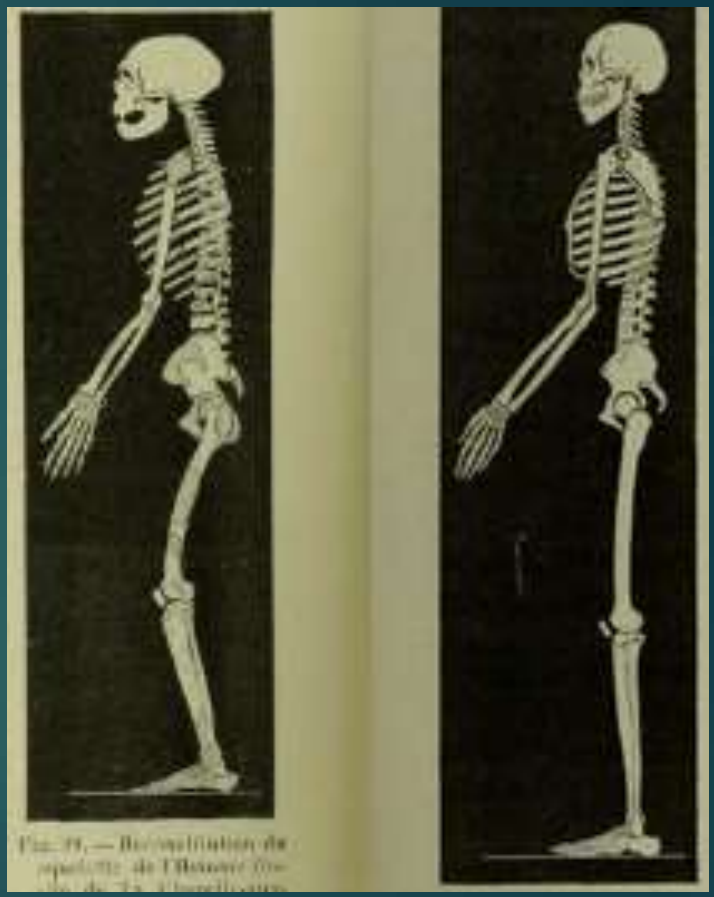
Fig. 3

VUES STÉRÉOSCOPIQUES DE LA TÊTE OSSEUSE

Marcellin Boule's *L'Homme de La Chapelle* (1911):

Marcellin Boule's *L'Homme de La Chapelle* (1911):



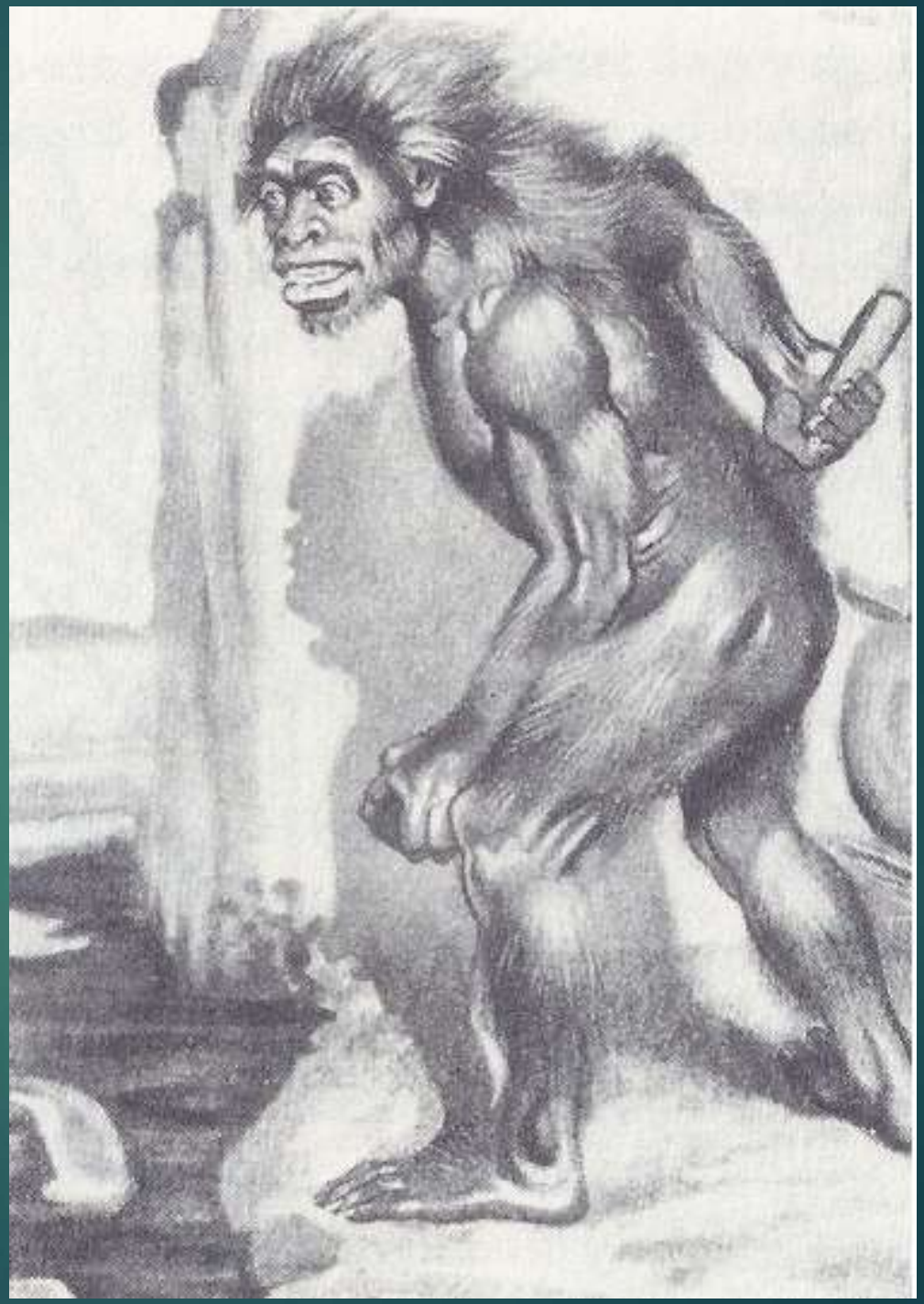


Boule: Origin of N as brute theory

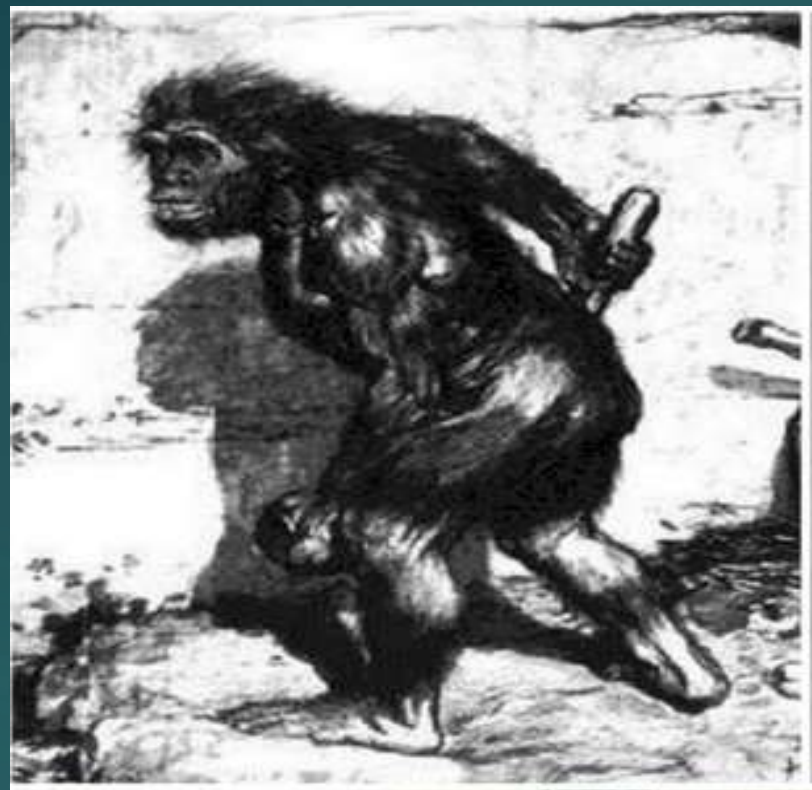
- His view of “Old Man” (& of Neanderthals) led to erroneous view that he was a stooped, arthritic, apish, brutish, & shuffling; more ape-like than human with "rudimentary intellectual abilities".
- He deduced that its head must have been slouched forward, its spine hunched, knees bent, its toe was divergent like an ape’s, and it had an inferior brain.
- Then, having reassembled the Neanderthal this way, Boule insulted it. This “brutish” and “clumsy” posture, he wrote, clearly indicated a lack of morals and a lifestyle dominated by “functions of a purely vegetative or bestial kind.”
- Boule believed in “Presapiens” theory: modern humans already existed at the time of the Ns; not ancestral;

1909: Neandertal as Brute

Frantisek Kupka, 1909 bestial reconstruction, per Boule



Negative depictions of Ns



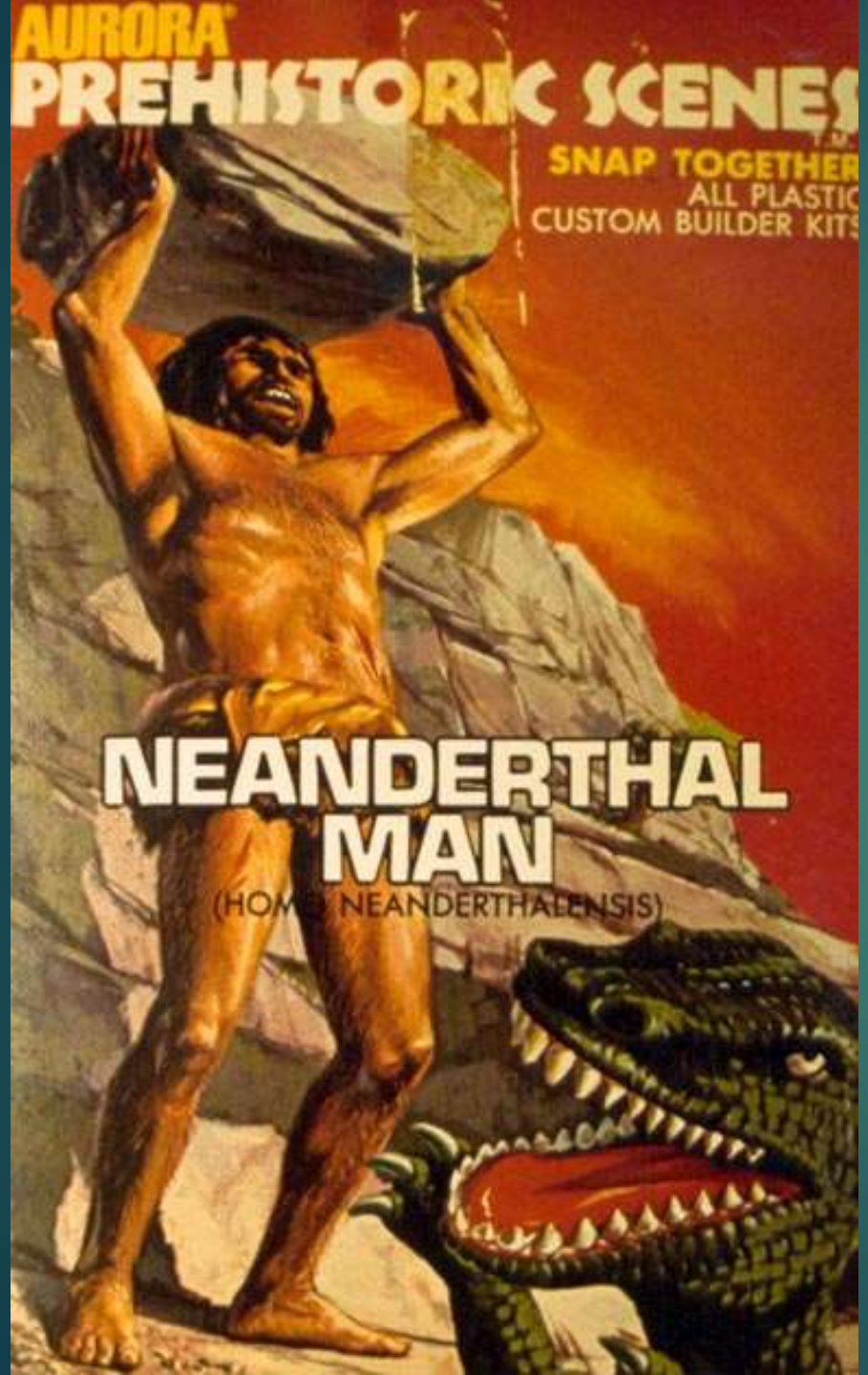
Neanderthals: Earlier Views = Not history's Intellectuals

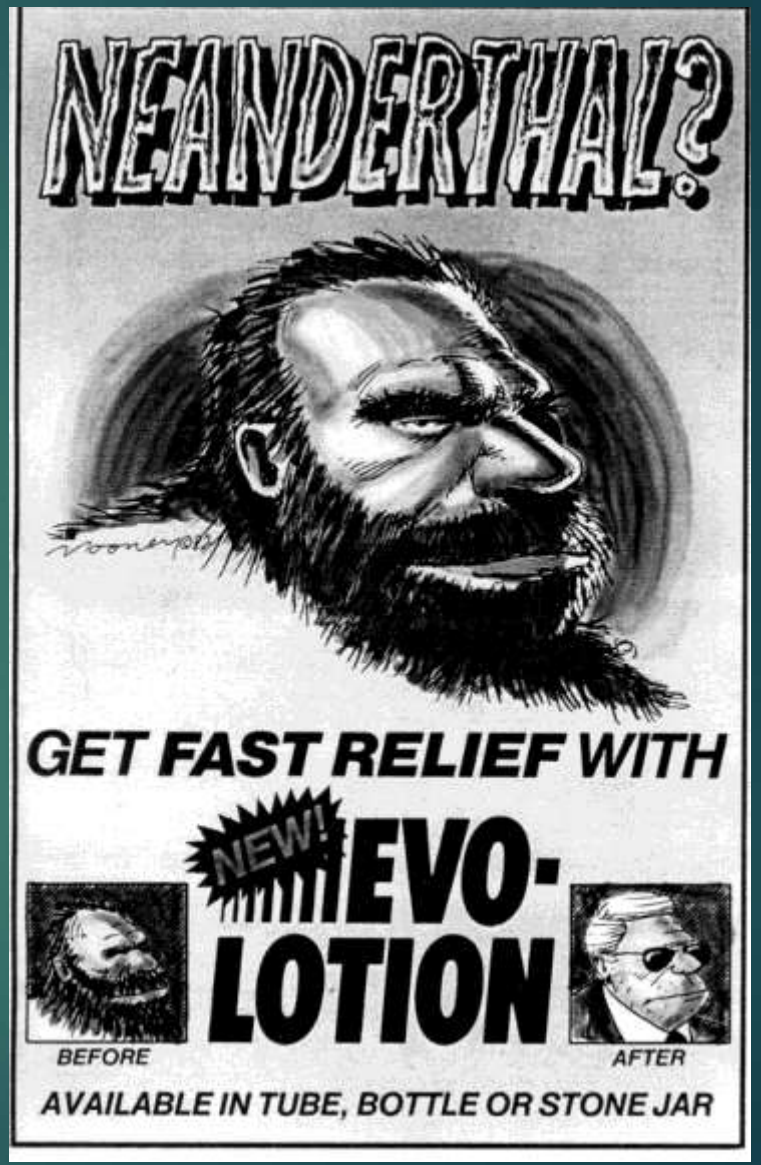
Until very recently, Neanderthals were most often depicted as brutish, dimwitted, "half man . . . half beast."

Field Museum, 1915:
Based on La Chapelle

Neandertal as frat boy run amok.

Brutish behavior considered Neandertal.


AURORA
PREHISTORIC SCENES
SNAP TOGETHER
ALL PLASTIC
CUSTOM BUILDER KITS
NEANDERTHAL MAN
(HOMO NEANDERTHALENSIS)


NEANDERTHAL?
GET FAST RELIEF WITH
NEW!
EVO-LOTION
BEFORE
AFTER
AVAILABLE IN TUBE, BOTTLE OR STONE JAR

At the Max Planck Institute, a French paleontologist’s early 20th-century representation depicts a Neanderthal as apelike and backward. (Alexa Vachon)

We know Ns are dumb: because they are gone

News flash: negative evidence convicts Neanderthals of gross mental incompetence

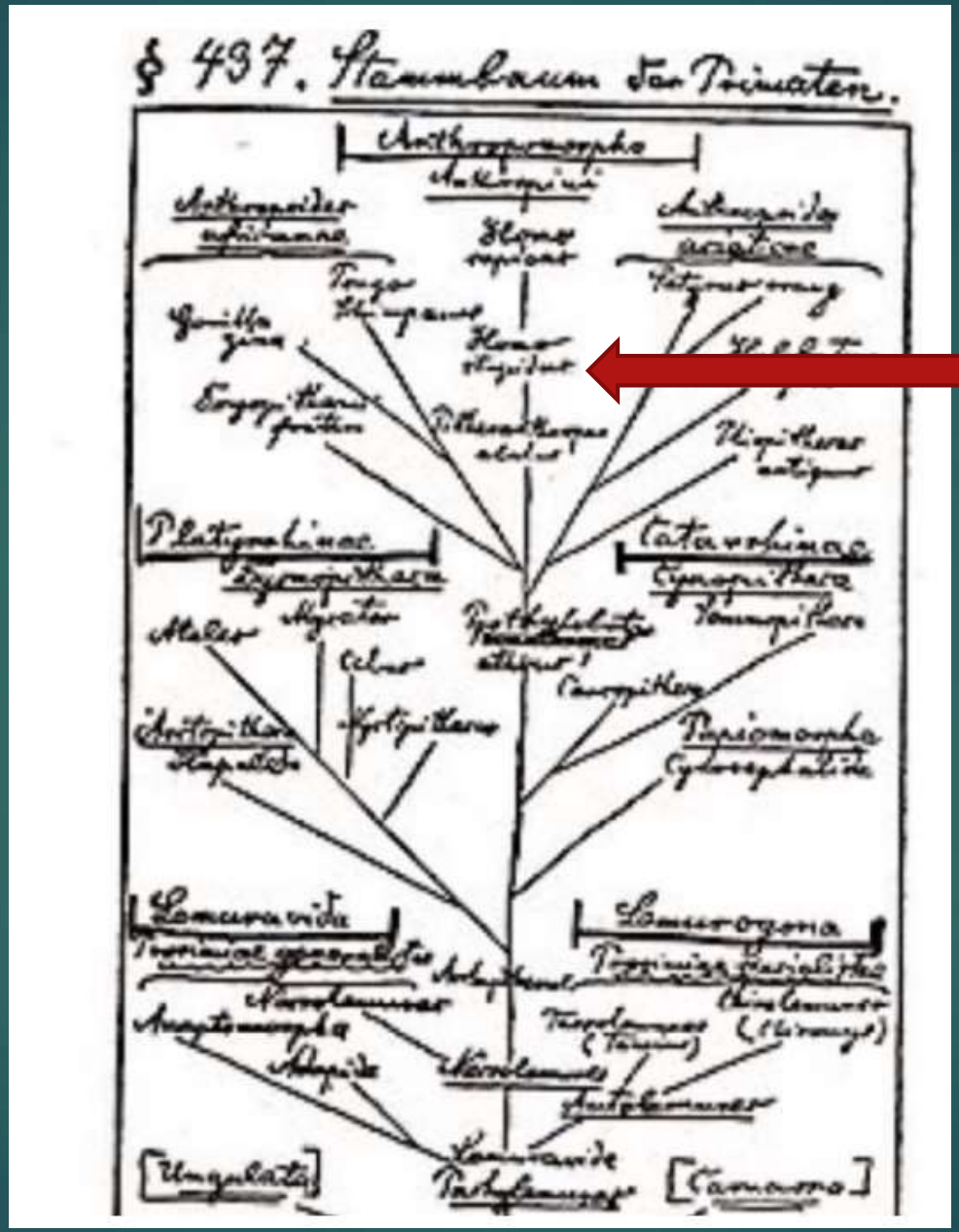
John D. Speth

> There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact.
>
> (Mark Twain)

As this is an issue of *World Archaeology* whose overall aim is to promote lively discussion, I hope with this rather smallish contribution to do likewise. In the process, I will stick my neck out far enough that some of my readers will no doubt be delighted to perform the obvious surgery. And, although my tone may seem rather heavy-handed at times, this is done not with the conviction that my ideas are right and those I question are wrong, but

In a 1000 years, after-effects of climate change, what will the bright rats say about us?

Ernest Haeckel's Phylogenetic Tree



Homo Stupidus

"Mute"

Historical explanations of Ns

- N Felder fossil: Opponents of evolution insisted that they belonged to an ordinary person. One theory held that it was a Cossack who had wandered into the region in the tumult following the Napoleonic Wars.
- The reason the bones looked odd—Neandertal femurs are distinctly bowed—was that the Cossack had spent too long on his horse.
- Another attributed the remains to a man with rickets: the man had been in so much pain from his disease that he'd kept his forehead perpetually tensed—hence the protruding brow ridge. (What a man with rickets and in constant pain was doing climbing into a cave was never really explained.)
- In "The Descent of Man," which appeared in 1871, Darwin mentioned Neandertals only in passing. "It must be admitted that some skulls of very high antiquity, such as the famous one of Neandertal, are well developed and capacious," he noted.

History of N interpretation

- In 1911, Boule began publishing his analysis of the first nearly complete Neanderthal skeleton ever discovered, which he named Old Man of La Chapelle, after the limestone cave where it was found. Laboring to reconstruct the Old Man's anatomy, he deduced that its head must have been slouched forward, its spine hunched and its toes spread like an ape's. Then, having reassembled the Neanderthal this way, Boule insulted it. This "brutish" and "clumsy" posture, he wrote, clearly indicated a lack of morals and a lifestyle dominated by "functions of a purely vegetative or bestial kind."
- A colleague of Boule's went further, claiming that Neanderthals usually walked on all fours and never laughed: "Man-ape had no smile." Boule was part of a movement trying to reconcile natural selection with religion; by portraying Neanderthals as closer to animals than to us, he could protect the ideal of a separate, immaculate human lineage. When he consulted with an artist to make a rendering of the Neanderthal, it came out looking like a furry, mean gorilla.

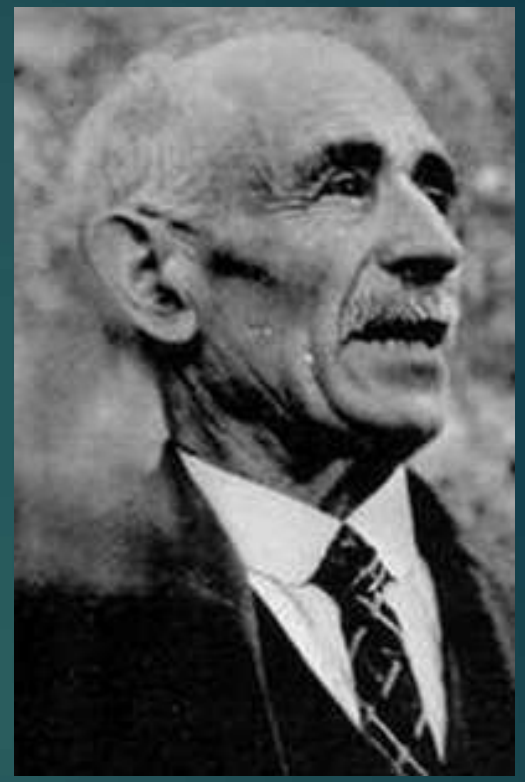
History of N interpretation

- In 1908, a nearly complete Neandertal skeleton was discovered in a cave near La Chapelle-aux-Saints, in southern France. The skeleton was sent to a paleontologist named Marcellin Boule, at Paris's National Museum of Natural History. In a series of monographs, Boule invented what might be called the cartoon version of the Neandertals—bent-kneed, hunched over, and brutish. Neandertal bones, Boule wrote, displayed a "distinctly simian arrangement," while the shape of their skulls indicated "the predominance of functions of a purely vegetative or bestial kind."
- Boule's conclusions were studied and then echoed by many of his contemporaries; the British anthropologist Sir Grafton Elliot Smith, for instance, described Neandertals as walking with "a half-stooping slouch" upon "legs of a peculiarly ungraceful form." (Smith also claimed that Neandertals' "unattractiveness" was "further emphasized by a shaggy covering of hair over most of the body," although there was—and still is—no clear evidence that they were hairy.)

History of N interpretation

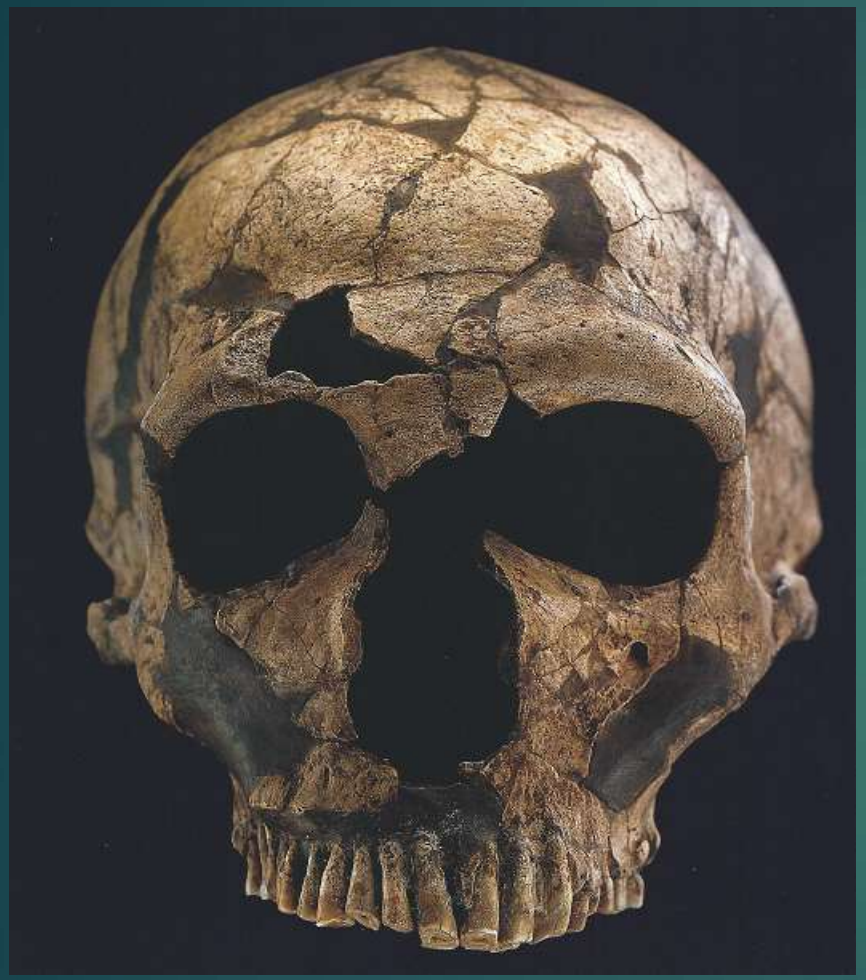
- In the 1950s, a pair of anatomists, Williams Straus and Alexander Cave, decided to reexamine the skeleton from La Chapelle. What Boule had taken for the Neandertal's natural posture, Straus and Cave determined, was probably a function of arthritis. Neandertals did not walk with a slouch, or with bent knees. Indeed, given a shave and a new suit, the pair wrote, a Neandertal probably would attract no more attention on a New York City subway "than some of its other denizens."

Denis Peyrony (1869-1954): Discovery of most complete Neandertal skull at La Ferrassie



- School teacher and prehistorian
- 1909: With L. Capitan, discovered the largest and most complete Neandertal skull ever discovered, along with several other Neandertal fossils, in the rock shelter of La Ferrassie in southwestern France.
- Adult male and female Neanderthal skeletons, followed in later years by isolated bones of five children; first “family” burial; 8 in all
- Described by Jean-Louise Heim

1909, Classic Neandertal, La Ferrassie, 50K



Homo neanderthalensis
(La Ferrassie 1)
Discoverer: Denis Peyrony & Louis Capitan
Locality: La Ferrassie, France
Age: 50K
Date: 1909

Osteo-arthritic condition indicates that the person would need care for his lack of mobility

Neandertals and Sapiens

La Ferrassie N

Cro-Magnon MH

At the same time in Europe

Cro-Magnon

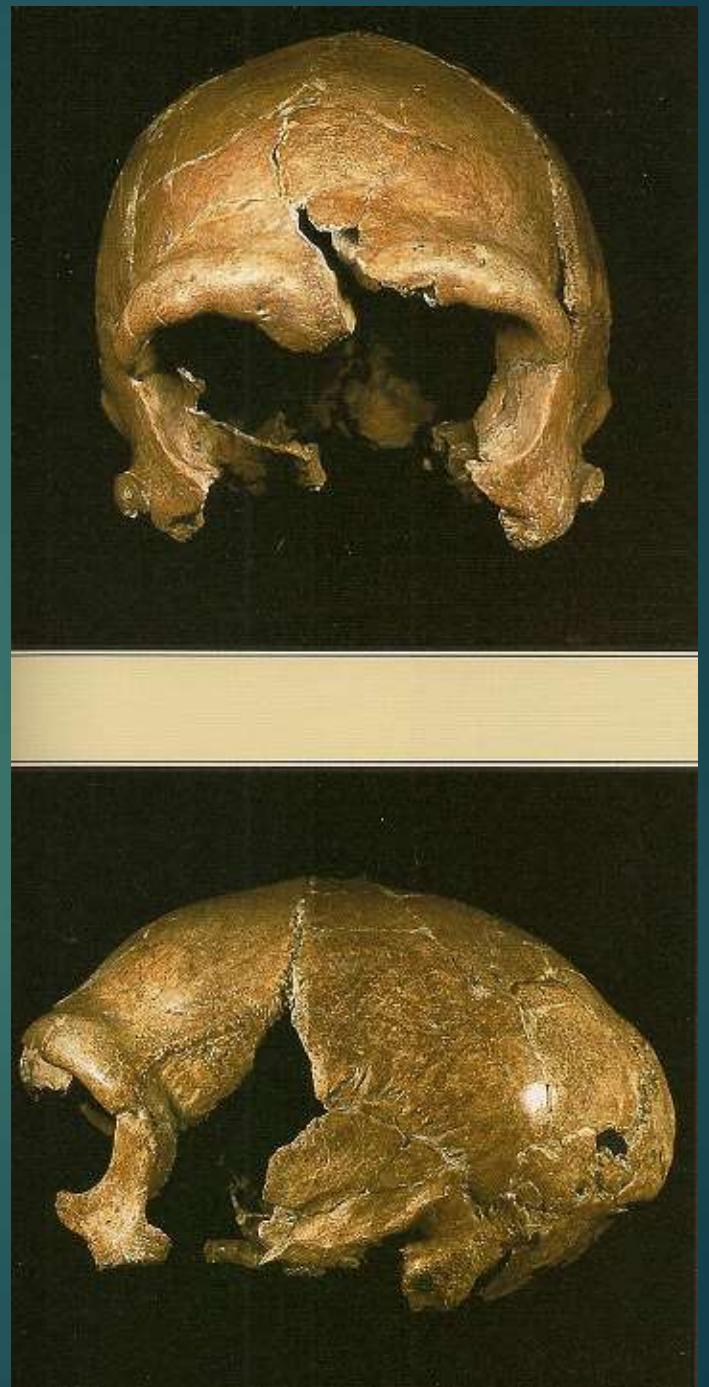
La Ferrassie N

Henri Martin: La Quina

Neandertal at different times at same site

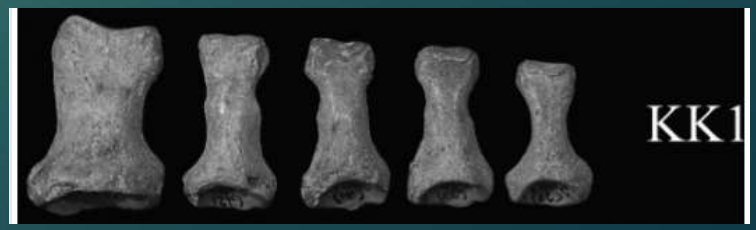
- French archaeologist
- 1910: Discovered two Neandertal skeletons with Mousterian scrappers and other tools at La Quina Shelter, France
- 1905-1935: Excavated systematically by Dr. Henri Martin; first confirmed occurrence of Neandertal remains in multiple levels of an occupation site
- *Astragale humain du Moustérien moyen de La Quina. Ses affinités*, Henri Martin, 1910

1910: Neandertal, La Quina



Gleb Anatol’evich Bonch-Osmolovskii (1890-1943): Neandertals in Russia

- Soviet anthropologist and archaeologist.
- 1924: in the Kiik-Koba cave (Crimea), Bonch-Osmolovskii discovered the first Neanderthal fossil in the USSR.
- Two skeletons, a child and an adult



Mt. Carmel in Levant

Dorothy Garrod (1892-1968): Levant Ns First Neandertal outside Europe, Tabun I

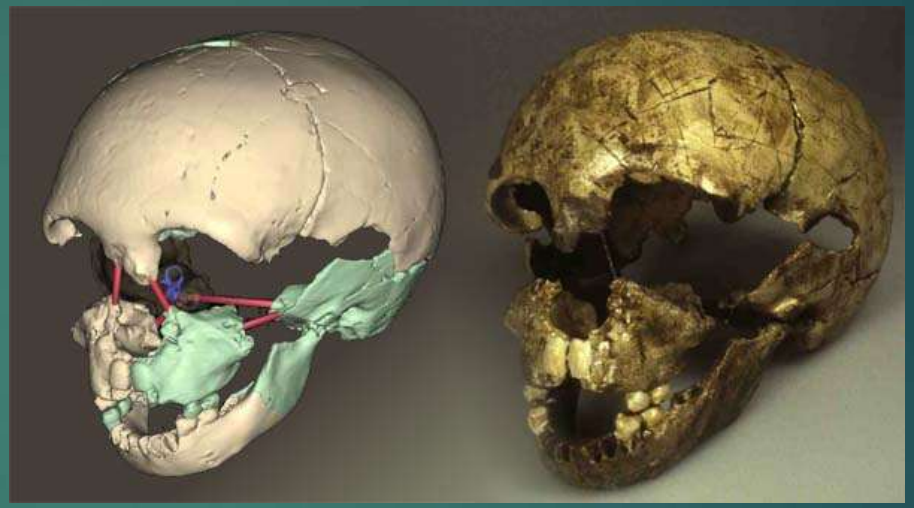
- British archaeologist; Fellow at Newham College; first woman professor at Cambridge
- 1925: excavated a Neandertal child's skull at Devil's Tower Cave, Gibraltar.
- 1928-1934: Leader of British School of Archaeology's excavations at Mt. Carmel caves, Palestine, in the caves of Tabun, El Wad, Es Skhul, Shuqba and Kebara;
- Tabun was first Neanderthal burial found in Middle East.
- 1932: Tabun I: Skeleton of female Neandertal excavated at Tabun Cave, Palestine, the first confirmed discovery of Neandertals outside Europe.

Dorothy Garrod, 1925: Neandertal child, Devil's Tower, Gibraltar

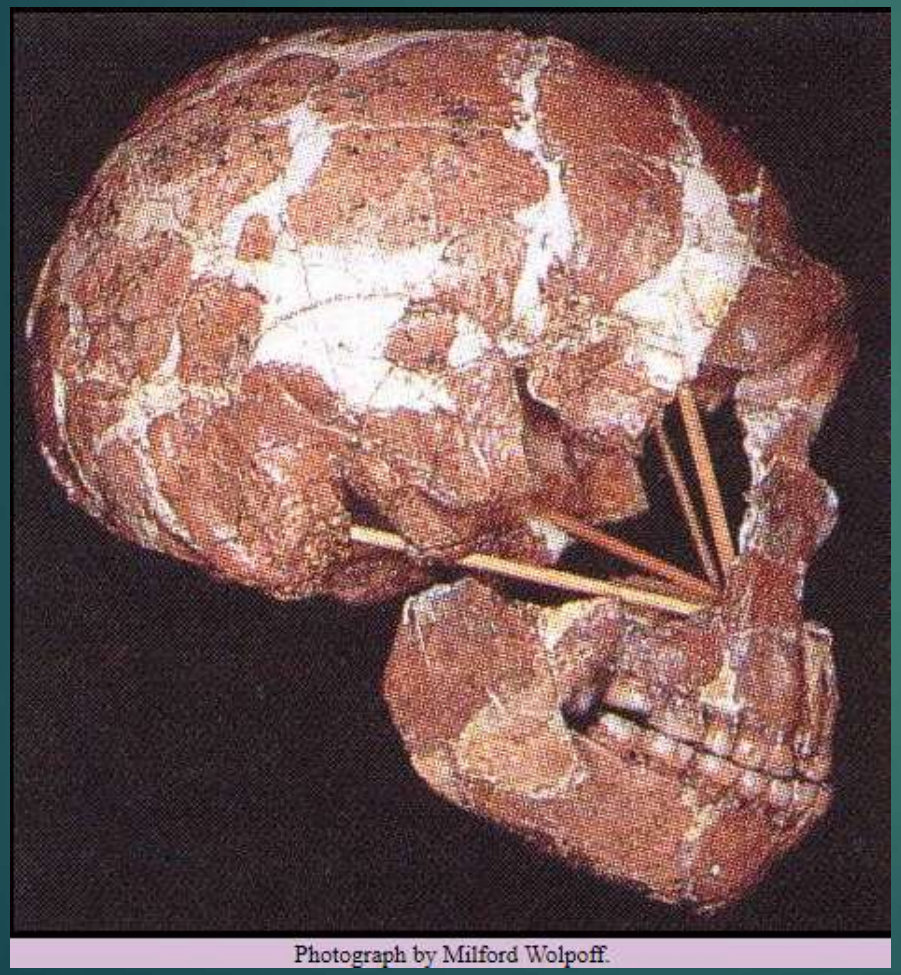
Gibraltar 2

The Gibraltar 2 Neanderthal child specimen is represented by 5 cranial fragments recovered by Dorothy Garrod at the Devil's Tower site in Gibraltar (Garrod *et al.*, 1928).

Gibraltar Child:
A Neandertal Child



1932: Neandertal, Tabun I, Mount Carmel, Palestine



Photograph by Milford Wolpoff.

Tabun 1: 130 Ka

Francis Turville-Petre (1901 - 1941): Neandertal in Palestine: Galilee Man

- Openly gay English anthropologist

- 1925: discovered in the Zuttiyeh Cave near Sea of Galilee, the partial frontal cranial remains of a Neanderthal individual, named the 'Galilee Skull' or 'Galilee Man';
- First ancient fossilized hominin found in Western Asia.

Francis Turville-Petre in Zuttiyeh Cave, Wadi al Amud.

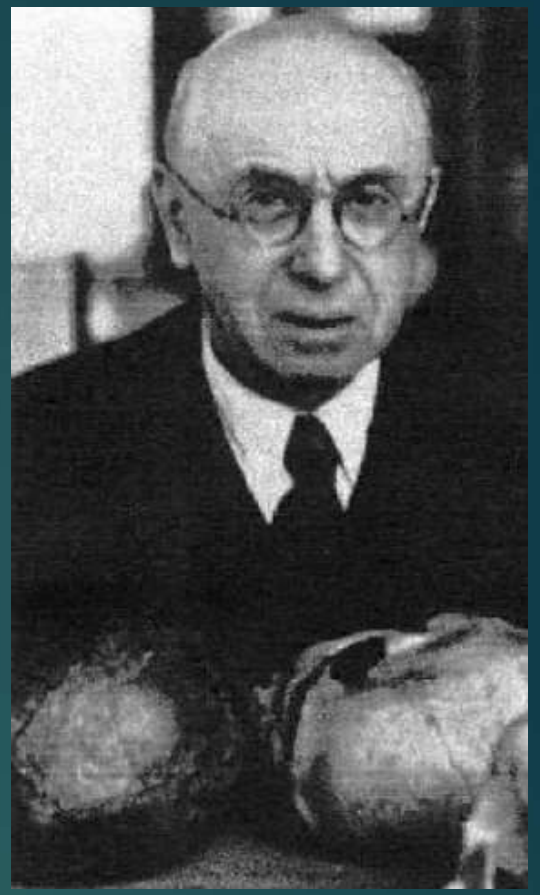
1925: Neandertal, Galilee Man

Dated at > 250 Ka; some consider *H. heidelbergensis*

Zuttiyeh, Arago, Skhul, Shanidar

Zuttiyeh, Arago 21, Skhul V, Shanidar 5 (side view mirrored). Credit: 1=Pierre-Francois Puech; 2,3,4=Roberto Sáez

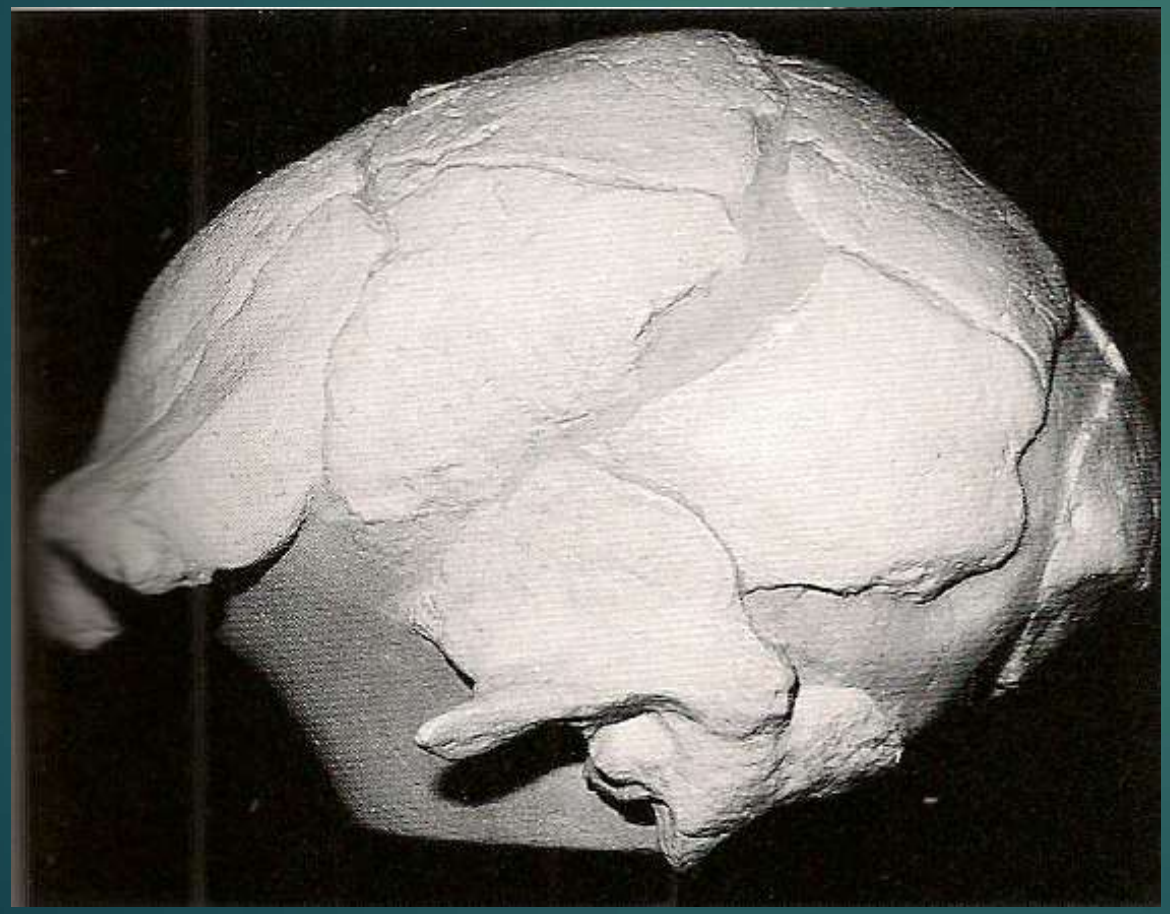
Franz Weidenreich (1873–1948): Oldest Neandertal with tools, 150 Ka



- German anatomist and anthropologist

- 1925: at Ehringsdorf, Germany, discovered the remains of both an adult and adolescent Neandertal in the Fischer and Kämpfe quarries: was the oldest occurrence of Neandertals associated with Mousterian culture (150–120K)

1925: Ehringsdorf Neandertal skull, 150K, discovered by Weidenreich: discovered the remains of both an adult and adolescent Neanderthal in the Fischer and Kämpfe quarries: was the oldest occurrence of Neandertals associated with Mousterian culture (150–120K)

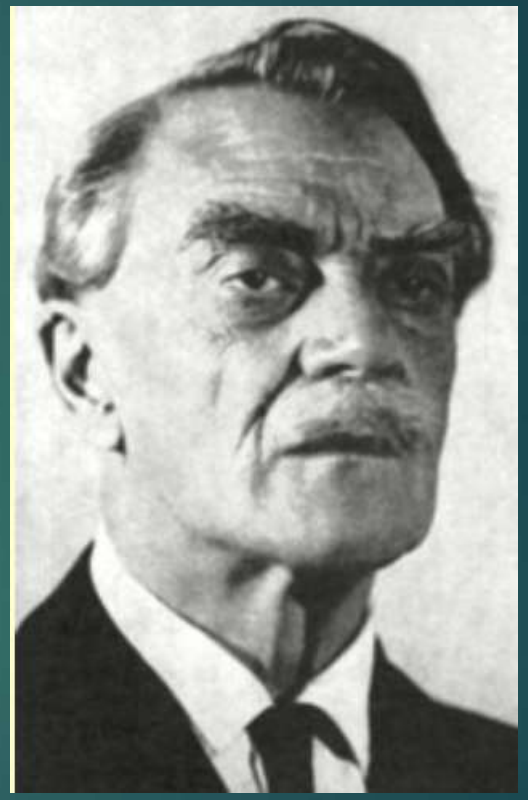


Features:
Occipital bun
High rounded forehead (frontal boss)
Browridge
But no mastoid process behind the ears

An early N species

Sergio Sergi (1878-1972): Italian Neandertals

- Father of modern human paleoanthrology in Italy
- 1929: Studied the Saccopastore neanderthal, found by Mario Grazioli: partial Neandertal craniums at Saccopastore quarry at Rome, Italy; 80-120K
- Collaborated with Alberto Blanc on the Monte Circeo Neanderthal cranium

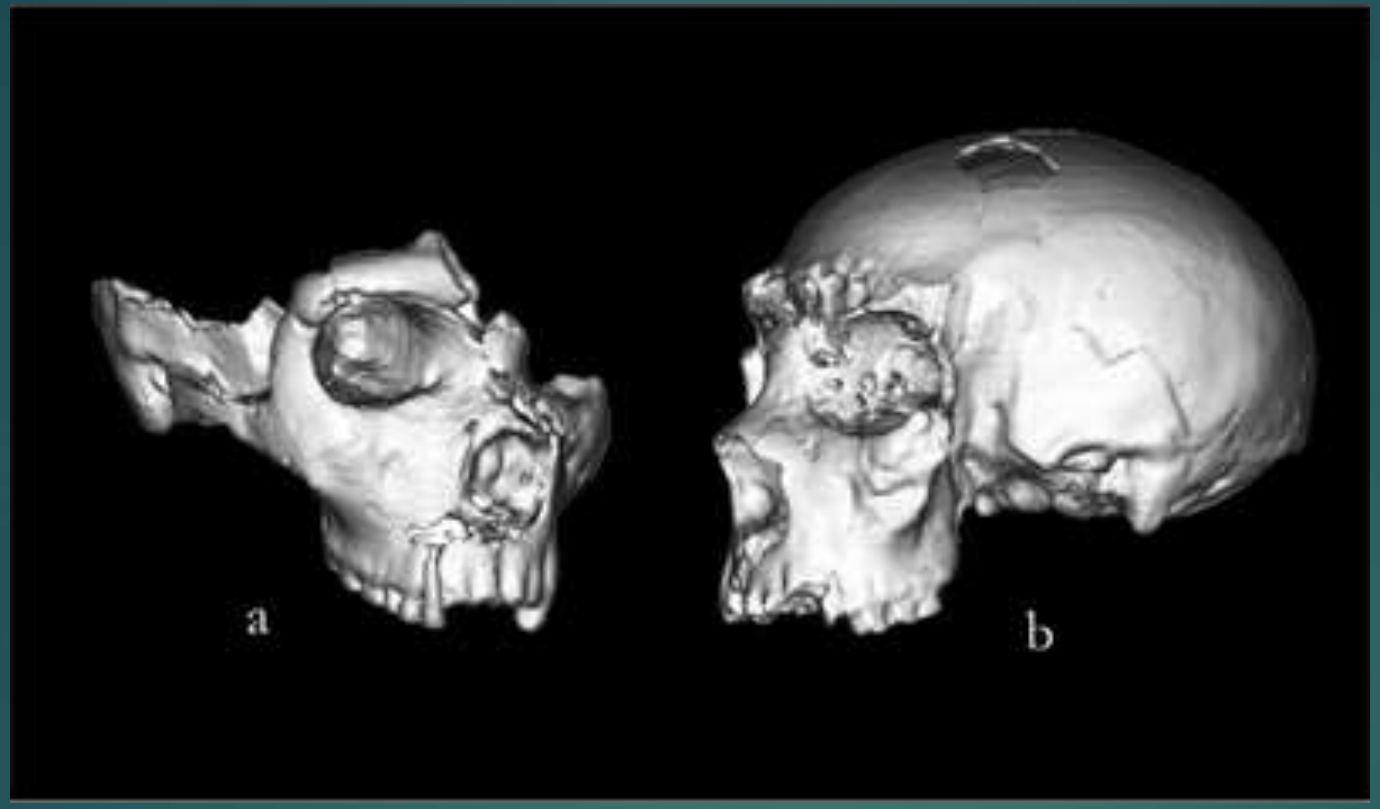


1929: *Homo Neandertalensis,* Saccopastore, Italy

Similar to N of Krapina, Croatia;
Early N – less thick boned

Homo neanderthalensis
(Saccopastore 1)
Discoverer: Mario Grazioli
Locality: Saccopastore quarry, Rome, Italy
Date:1929
Age: 120K

Saccopastore, Italy



En bombe
Protruding midface
Prominent nose
Sloping molars
No canine fossa

Sacc.2

ECV 1300cc

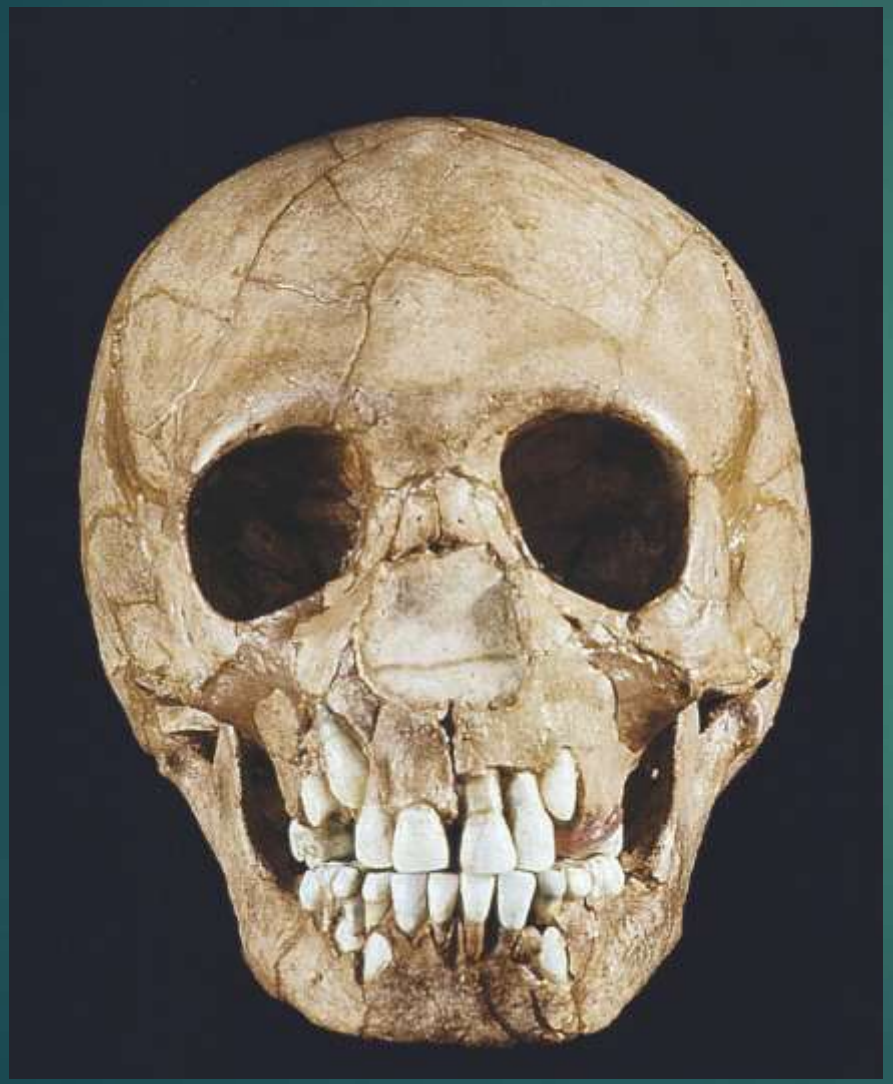
Sacc.1

ECV 1200cc

Alexei Pavlovich Okladnikov (1908-1981): Farthest East: Teshik-Task Neandertal child

- Soviet archaeologist and ethnographer
- 1938: Discoverer of Teshik-Tash Neandertal child
- At the time, the farthest known easterly occurrence of Neanderthal male child at Bajsuntau, Uzbekistan

1938: Teshik-Tash Neandertal child, Bajsuntau, Uzbekistan

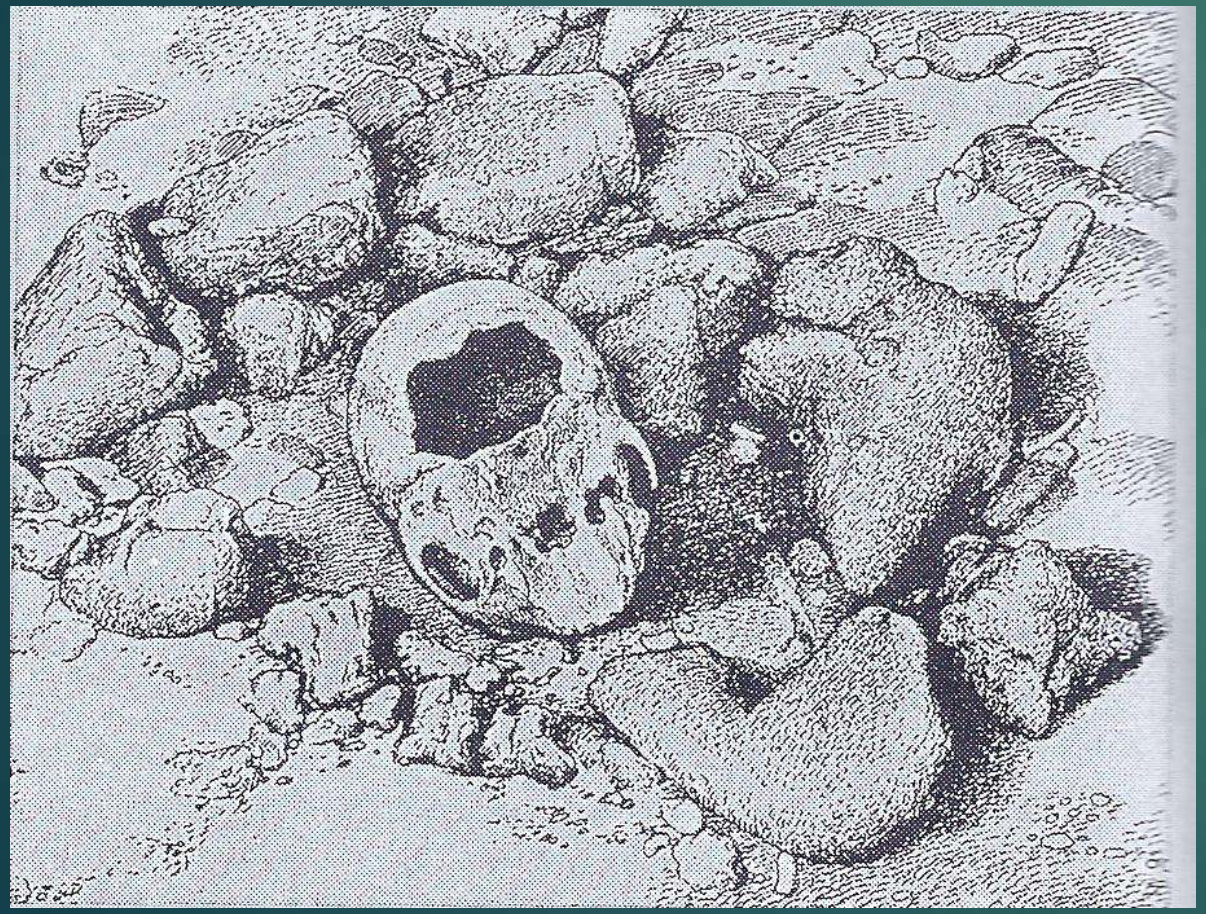


Homo neanderthalensis
(Teshik-Tash)
Discoverer: Alexei Okladnikov
Locality: Teshik-Tash, Uzbekistan
Date:1938
Age: 70K

Alberto Carlo Blanc (1906-1960): Italian Neandertal; Religious?

- Italian paleoanthropologist
- 1935: He and H. Brenne discover a second set of remains with both archaic and semi-modern features at Saccopastore.
- 1939: Discovers the Neandertal cranium from Grotta Guattari at Monte Circeo
- Found within a stone circle (Mousterian ritual?); this helped foster a theory of Neanderthal ritual behavior, including ceremonial cannibalism.
- Believed Neandertals had religious beliefs

1939: Neandertal cranium from Grotta Guattari at Monte Circeo

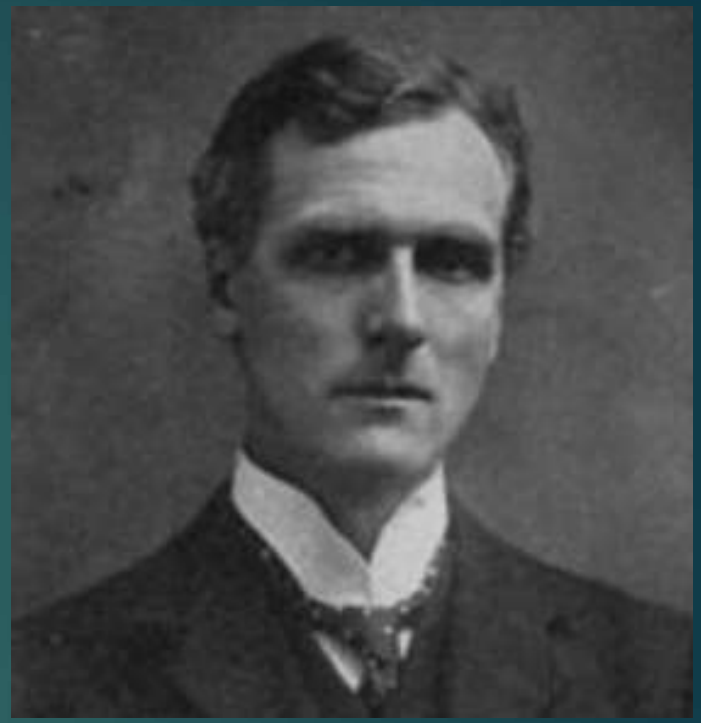


1993: Homo neanderthalensis, Altamura, Italy

Altamura Man, 130-170 Ka: fell down a hole

Represents the most complete skeleton of a single nonmodern human ever found; DNA, 2016: 130 Ka; Oldest Classical Neandertal DNA

Sir Arthur Keith (1866-1955): Pre-sapiens theory



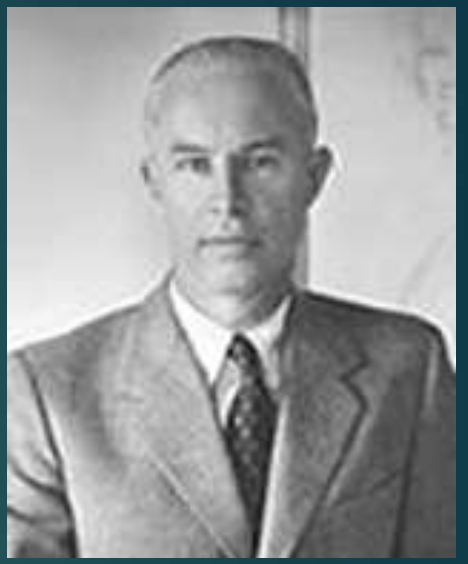
- Scottish anatomist & physical anthropologist
- One of foremost authorities on fossil humans in early 20th century Britain
- Pre-sapiens theory: *H. Neandertalensis* & *H. erectus* played little or no role in the evolution of modern humans.
- Involved in Galley Hills skeleton; identified Gibraltar 1 as Neandertal

Theodore D. McCown (1908-1969):
Excavation at Skhul, transitional skulls

- American anthropologist; Univ. of Calif. Berkeley
- Supervised the digging at Skhul; large Neandertal population sample
- Wrote up the Mount Carmel skeletons with Arthur Keith

William W. Howells (1908-2005):

Statistical skull methodology & “Neandertal”

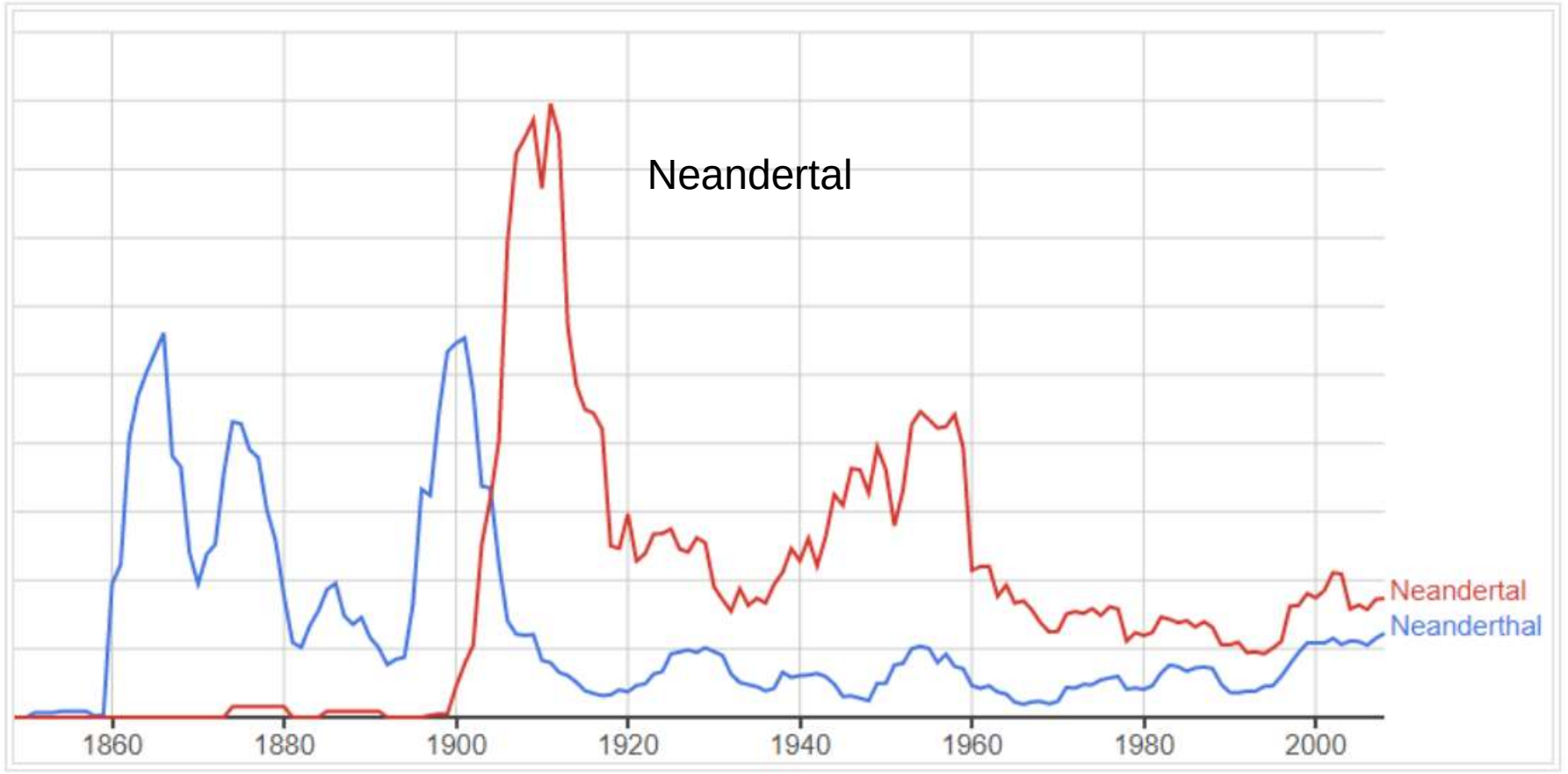


- Professor of anthropology, Harvard University
- Student of E. A. Hooton
- Worked at AMNH

- 1952: He and Henri Vallois suggest use of the **spelling “Neandertal”** as removing the “h” conforms with changes in German spelling.

German use of “Neandertal” post 1900.

And yes! Look what happened in the early 1900’s in the books written in German...



Earnest A. Hooton (1887-1954):

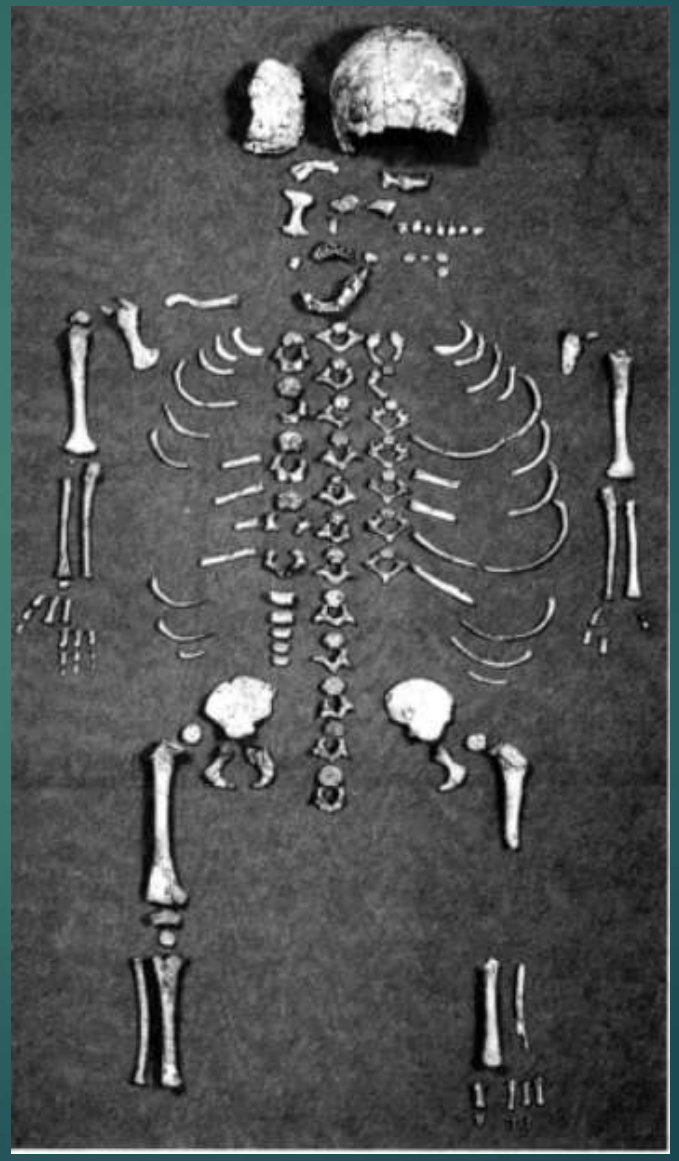
Neandertal differences & racial classification

- First American professor of physical anthropologist
- Professor, Harvard University
- Influential teacher of a generation of physical anthropologists
- 1946: described differences between “classic Neanderthals” (more robust) from Western Europe and those with more modern appearance from central Europe (lighter boned at Krapina) or the Near East.

N's as *Homo sapiens?*

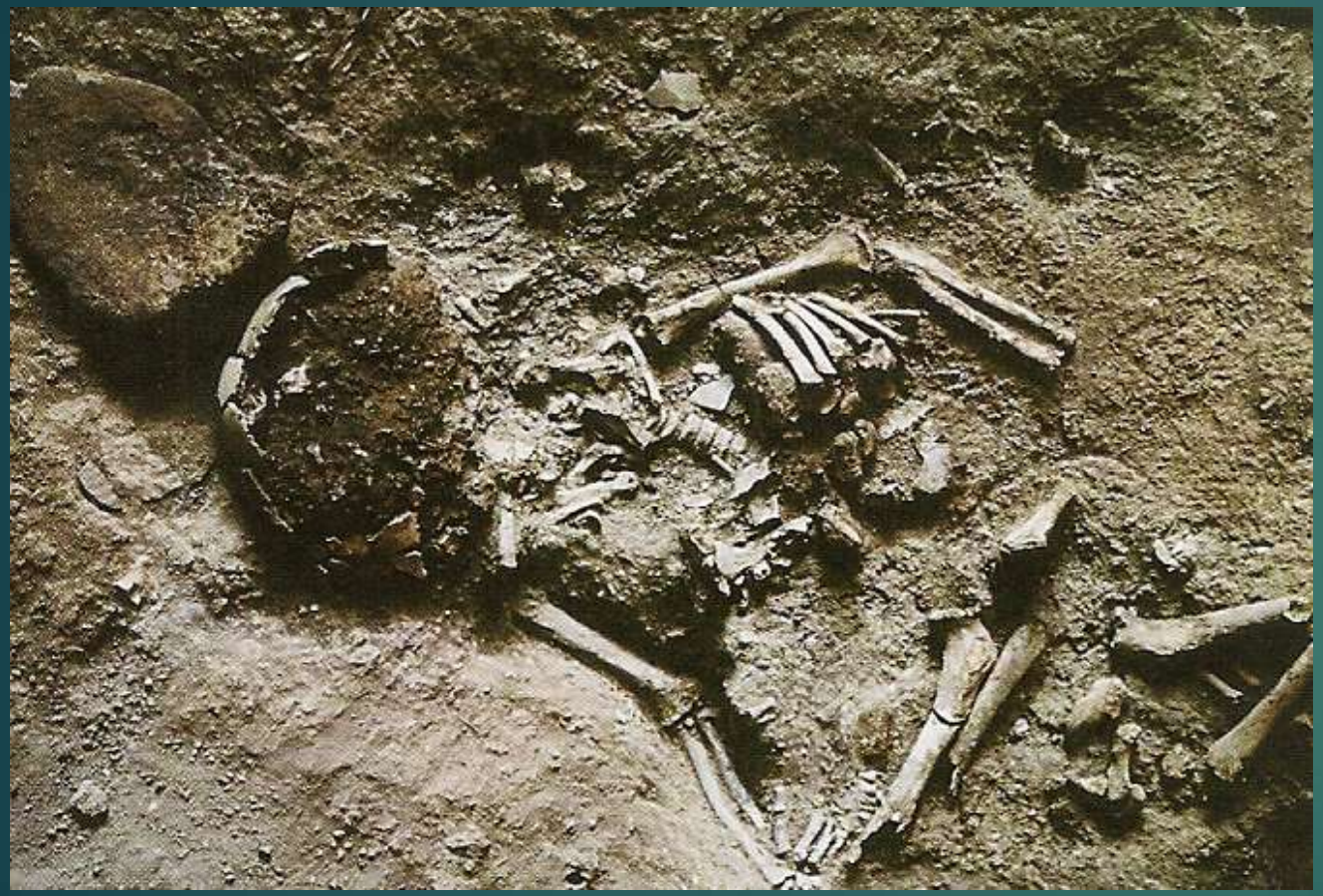
- The perception of Neanderthals as a separate species changed starting in the 1930s.
- Mayr, Simpson, and Dobzhansky, among the fathers of the Modern Synthesis in Biology, placed Neanderthals and other Pleistocene fossil humans within our own species, Homo sapiens.
- According to this view, Neanderthals were thought to have evolved into modern people through slow, gradual evolution.
- Given modern genetic findings, the majority of current scientists view Neanderthals as a distinct, Western Eurasian evolutionary lineage, which probably did not contribute significantly to the evolution of modern people.

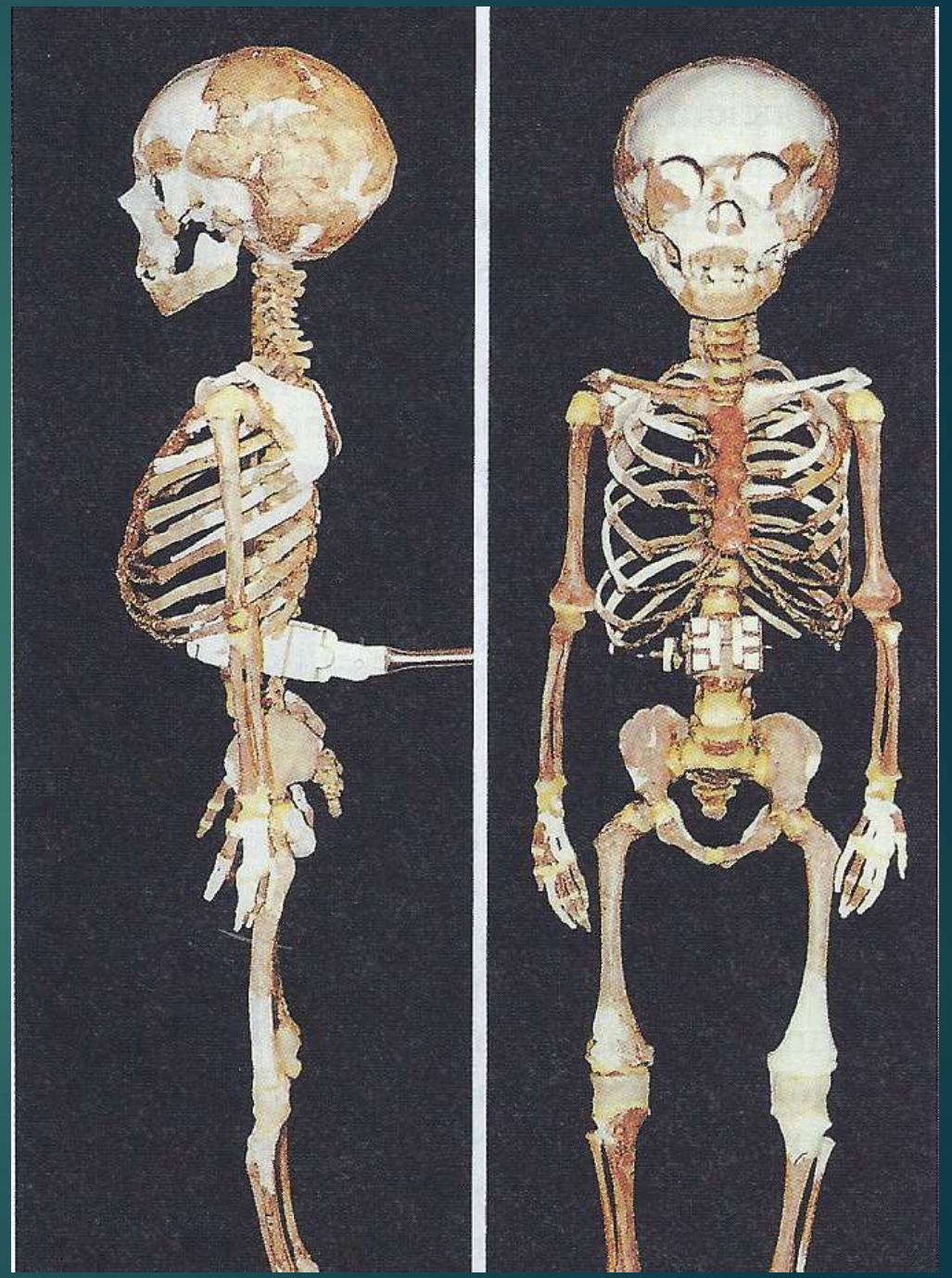
1993, Dederiyeh, Syria Infant, 60K



- Infant
- 60K

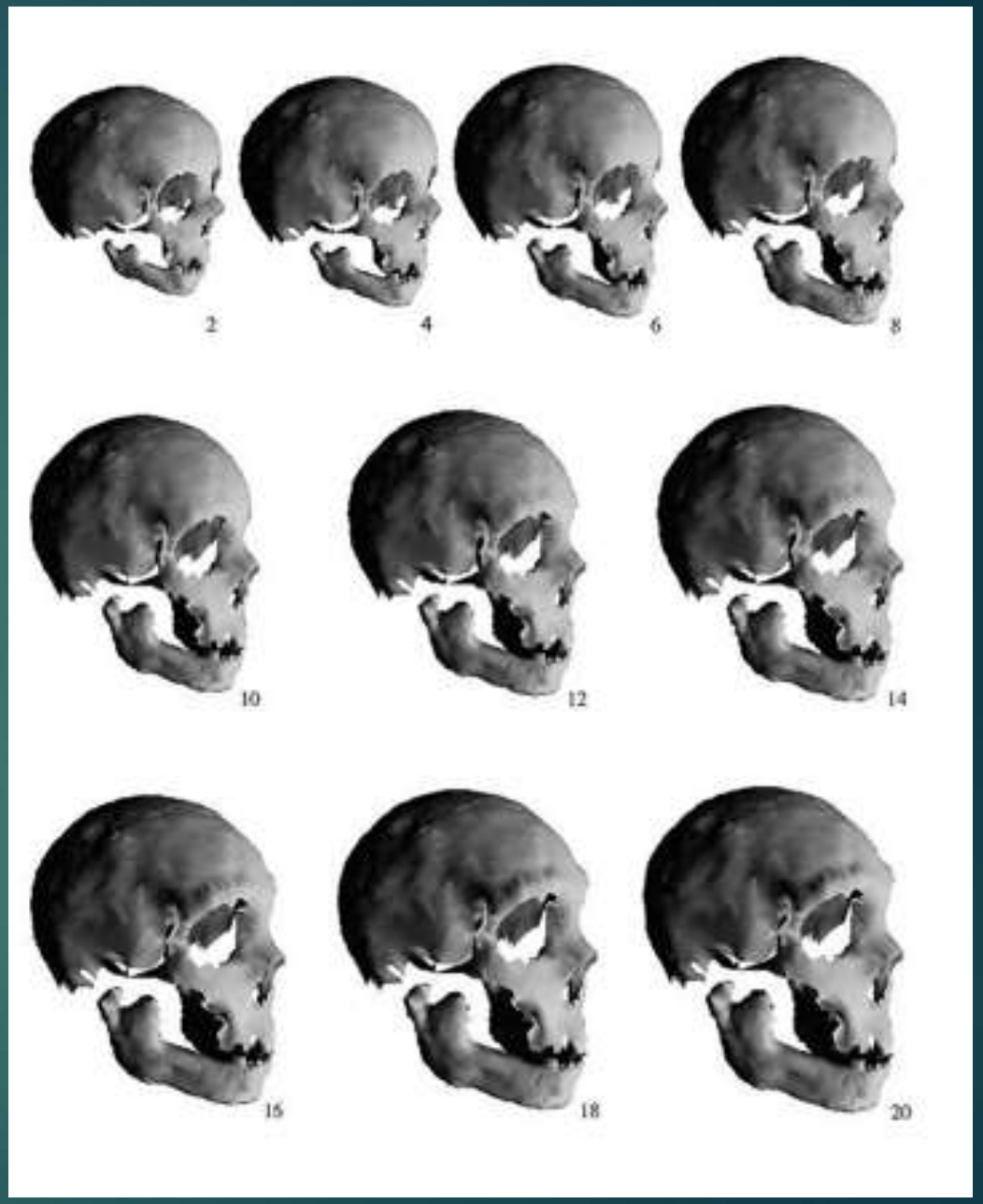
Dederiyeh infant





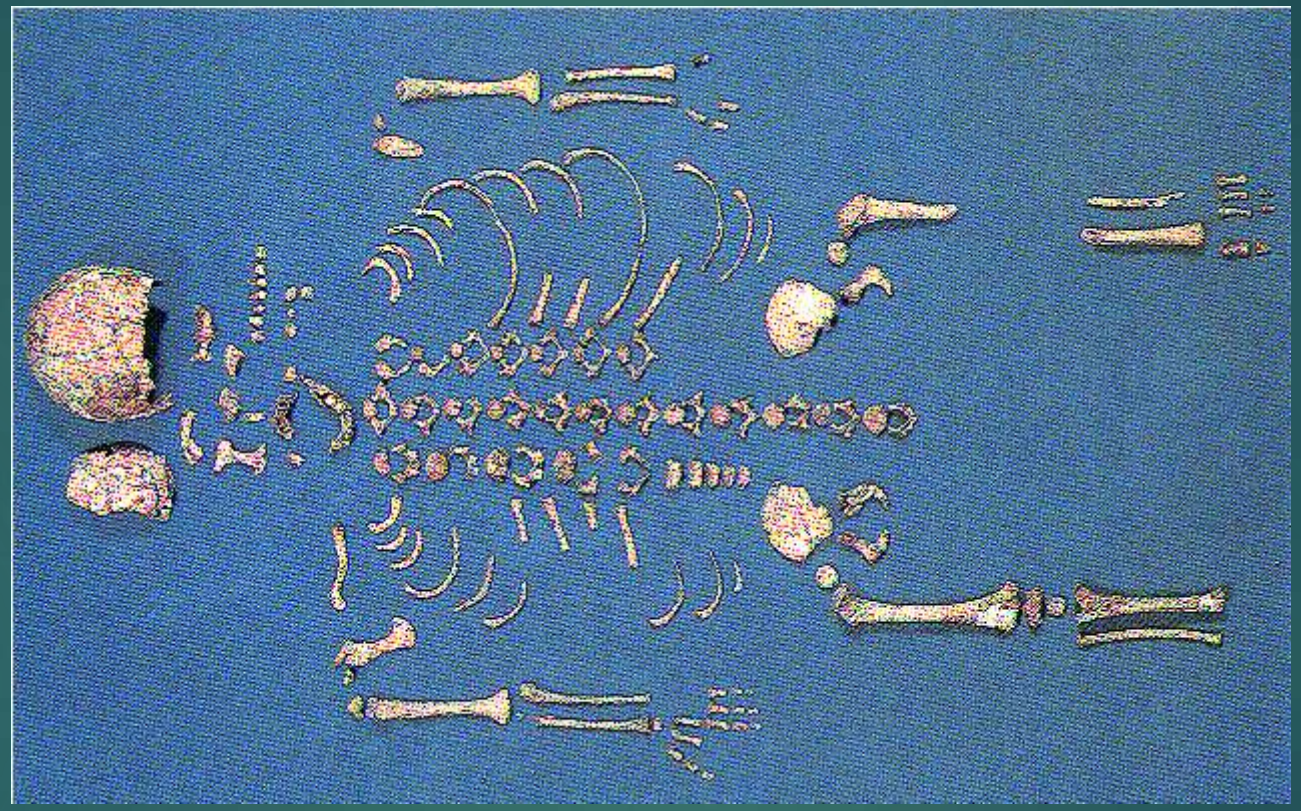
1993, Dederiyeh, Syria Infant, 60K

- Infant
- 60K

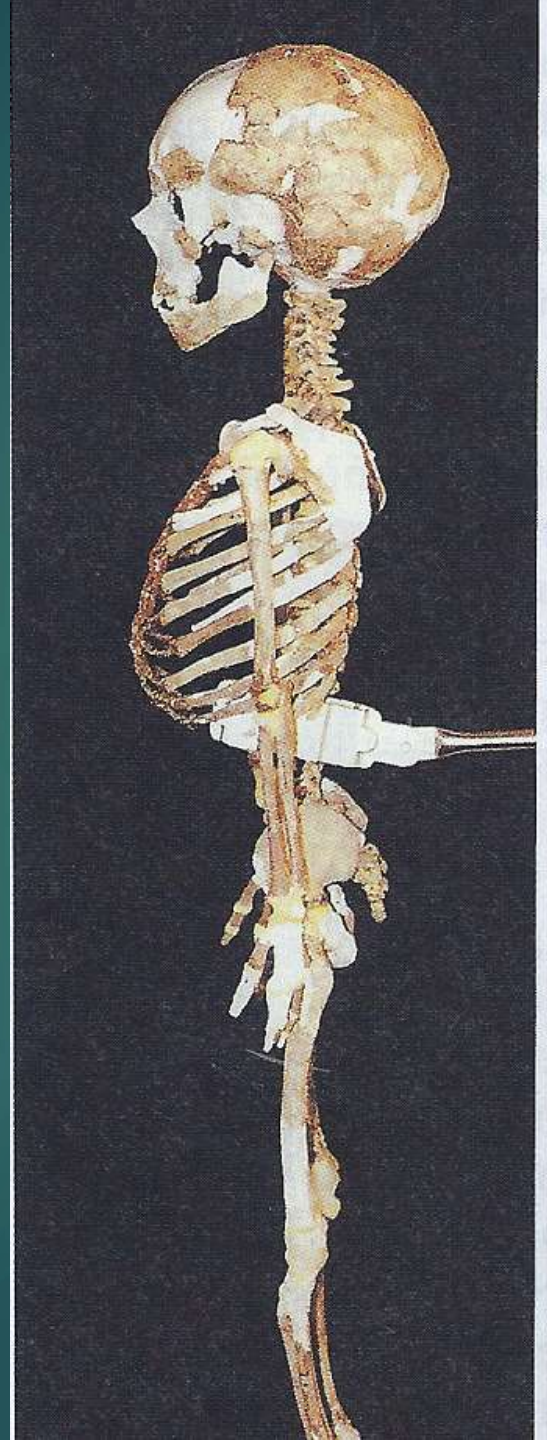
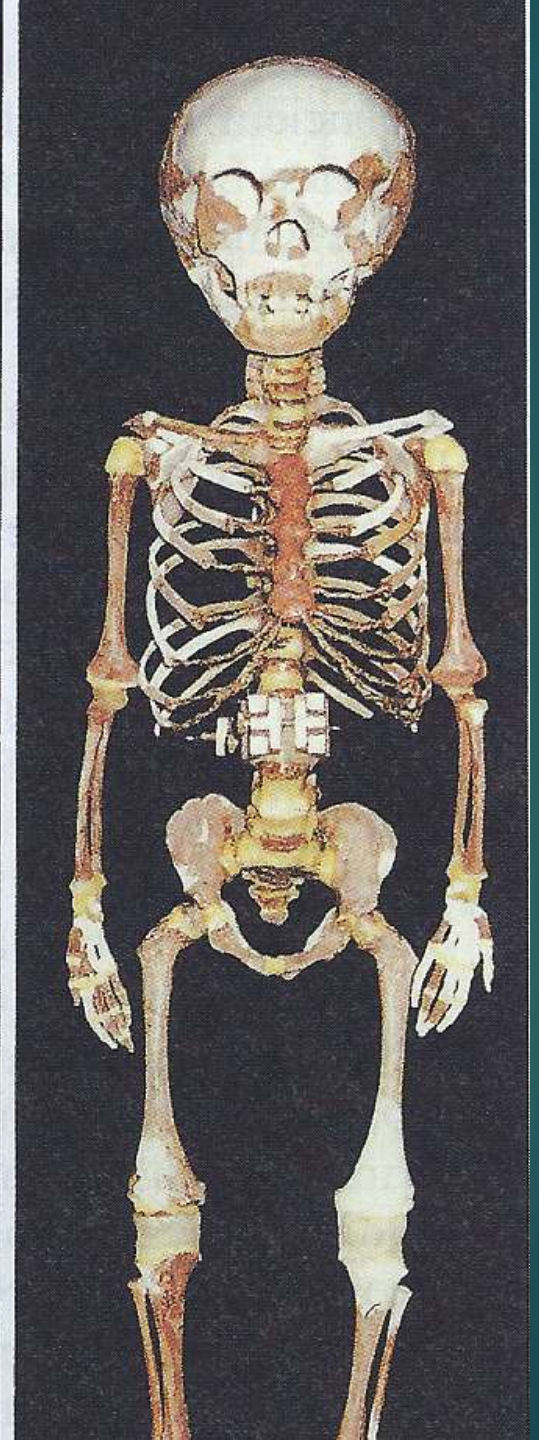


Computer model of maturation of Dederiyeh infant (to adult based on Amud 1)

Dederiyeh, Syria Partial Skeleton



~By **Takashi Oguchi**, from **Dederiyeh, Syria**, and contains the remains of a 2-year old child

Francois Leveque (1935-): St. Césaire Neanderthal & Châtelperronian tools?

- French archeologist
- 1979: Co-author, with Bernard Vandermeersch of the **discovery of St. Césaire 1 Neanderthal** skeleton of a young adult individual is unique in its association **with Châtelperronian artifacts** from a level dated to ca. 36 K; but artifact association has been questioned.
- One of the last Neandertals at 36 Ka
- Evidence of **co-existence of moderns and Neanderthal;** helped to demonstrate that MH & Ns represented separately evolving lines rather than sequential stages in our own evolution
- Lévêque and Vandermeersch, *Bulletin de la Société Préhistorique Francaise* **77**, 35 (1980).

Bernard Vandermeersch:

Qafzeh moderns, Saint-Cesaire & Kebara Neanderthal

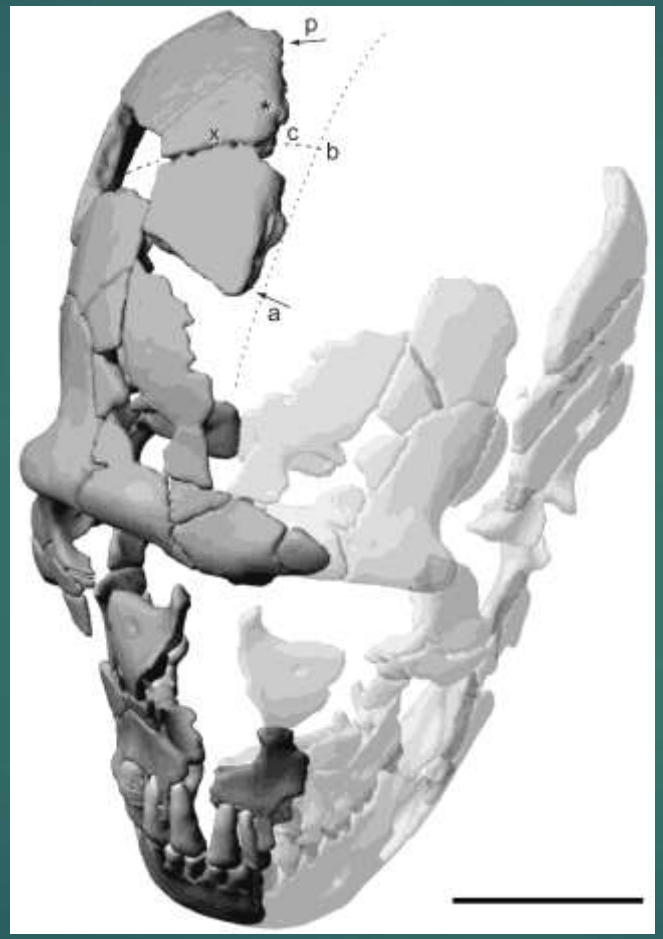
- French Paleoanthropologist
- Professor of Anthropology at the University of Bordeaux.
- 1965-1980: Re-excavated Jebel Qafzeh
- Described 24 anatomically modern human skeletons found there, 90K
- 1979: Co-authored with Francois Leveque, of paper announcing the “last Neandertal” found at Saint-Cesaire associated with Châtelperronian tools,
- 1983: Part of the team that discovered the Neandertal burial at Kebara Cave
- Lévêque and Vandermeersch, *Bulletin de la Société Préhistorique Francaise* **77**, 35 (1980). 36K

1979: *Homo Neanderthalensis*, Saint-Cesaire, one of last; associated with Châtelperronian tools

Homo neanderthalensis
(Saint-Cesaire)
Discoverer: Francois Leveque
Locality: Fierrot's Rock, Charente-Maritime, France
Date: 1979
Age: 36K

Young adult with cranial fracture likely due to a weapon

1979: *Homo Neanderthalensis*, Saint-Cesaire, one of last, 39K



Computerized reconstruction

Discoverer: Francois Leveque; Locality: Fierrot's Rock, Charente-Maritime, France

Lynne Schepartz: Kebara hyoid bone – Neandertals Speak

- Paleoanthropologist
- University of Cincinnati and University of the Witwatersrand
- 1983: Discovered the remains of an adult male at Kebara, Israel. These remains are the most complete Neandertal skeleton known, including earliest complete hyoid bone.
- Believes Neandertals could speak. She accuses researchers like Lieberman and Laitman, who stick to their belief in modern humans' unique language abilities, of "linguicentrism"

Kebara Cave, Mt. Carmel, Israel

Kebara Cave, at Mount Carmel, Israel

1983: *Homo neanderthalensis*, at Kebara, Israel
Most complete Neandertal specimen; & hyoid bone

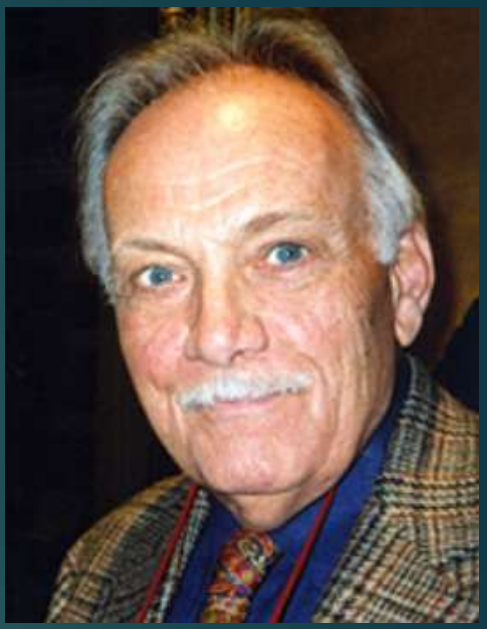
Homo neanderthalensis
(Kebara 2)
Discoverer: Lynne Schepartz
Locality: Kebara Cave, Israel
Date:1983
Age: 60K

Pelvis

Hyoid bone

Kebara N skeleton

Francis Clark Howell (1925-2007):
Father of Modern Paleoanthropology

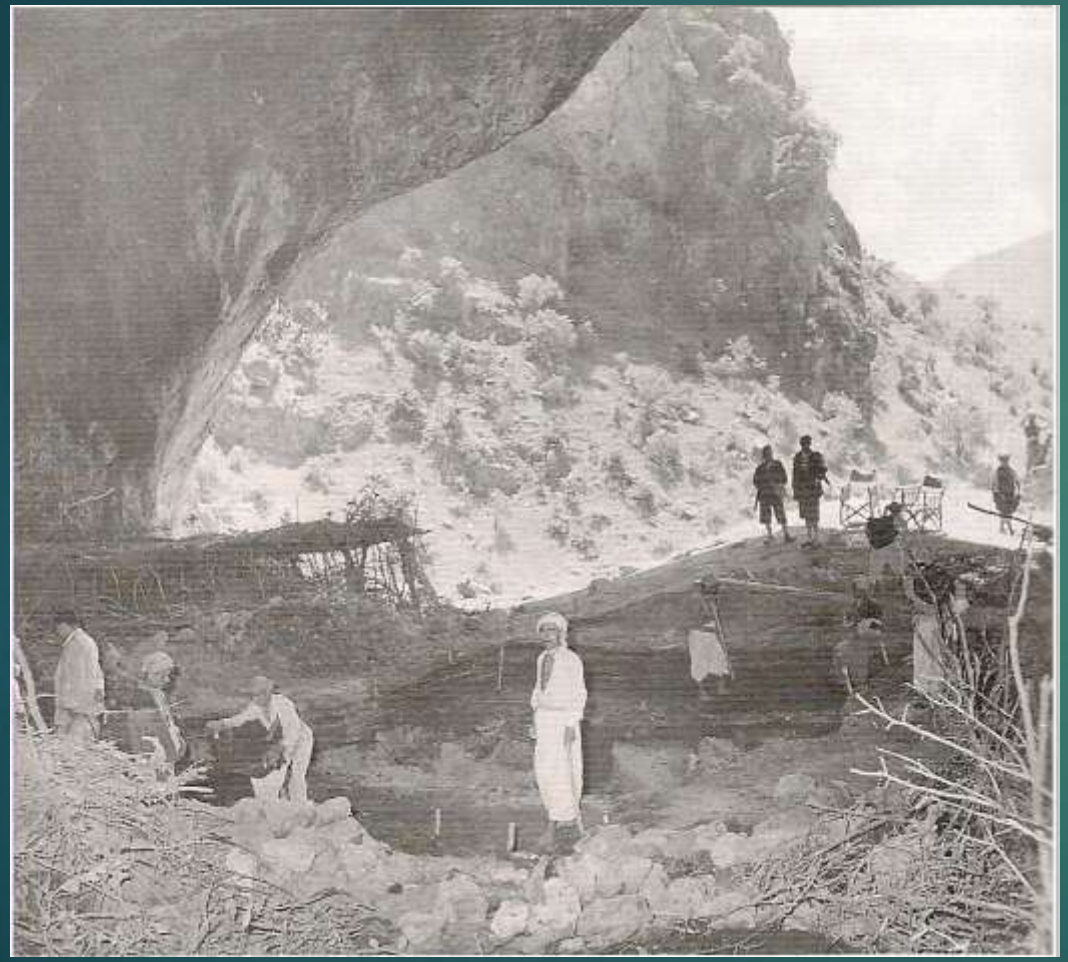


- American anthropologist
- Used new understanding of evolutionary processes to explain **Neandertal morphology in terms of genetic isolation and adaptation to glacial climate**
- Pioneered new dating methods based on **potassium-argon radioisotope techniques and multi-disciplinary approach to site development.**

Shanidar, Iraq, Cave

Looking out from the Shanidar Cave

Shanidar Cave, Iraq & Shanidar 4 with flower pollen



Ralph Solecki (1917-): Neandertals the Flower People

- American archeologist, Columbia Univ.
- 1957-1961: **Excavated at Shanidar, Iraq**
- Author: *"Shanidar, the First Flower People"*
- **First adult Neandertal skeletons in Iraq**, 80K.
- The excavated area produced nine skeletons (labeled Shanidar I – IX).
- Developed theory that Neandertals had religious beliefs: funeral ceremonies, burying their dead with flowers (although the flower pollen is now thought to be a modern contaminant by Persian Jirds, a gerbil; or bees), and that they took care of injured individuals
- Jean Auel used his ideas for background when she was writing her Clan of the Cave Bear series.

Ralph Solecki (1917-):
Neandertals the Flower People

The dastardly Persian Jird

The real flower creature

10 Shanidar Ns

- The ten Neanderthals at the site were found within a Mousterian layer which also contained hundreds of stone tools including points, side-scrapers, and flakes and bones from animals including wild goats and spur-thighed tortoises
- The first nine (Shanidar 1-9) were unearthed between 1957 and 1961 by Ralph Solecki and a team from Columbia University.
- The skeleton of Shanidar 3 is held at the Smithsonian Institution. The others (Shanidar 1, 2, and 4-8) were kept in Iraq and may have been lost during the 2003 invasion, although casts remain at the Smithsonian.
- In 2006, while sorting a collection of faunal bones from the site at the Smithsonian, Melinda Zeder discovered leg and foot bones from a tenth Neanderthal, now known as Shanidar 10

Shanidar, Iran

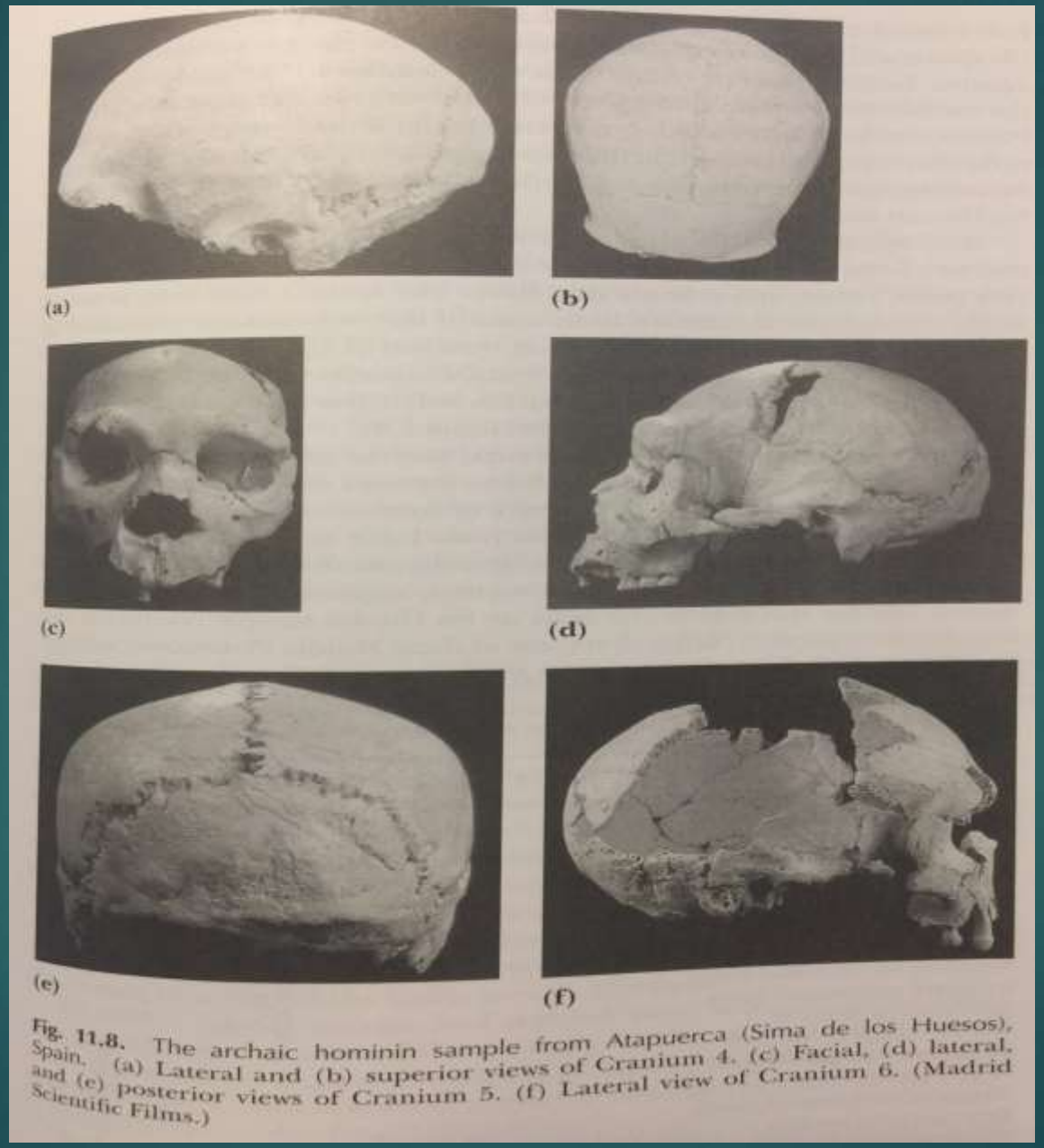


Fig. 11.8. The archaic hominin sample from Atapuerca (Sima de los Huesos), Spain. (a) Lateral and (b) superior views of Cranium 4. (c) Facial, (d) lateral, and (e) posterior views of Cranium 5. (f) Lateral view of Cranium 6. (Madrid Scientific Films.)

Cranium 4

Cranium 5

Cranium 6

Cranium 6

G. Conroy & H. Pontzer, 2012

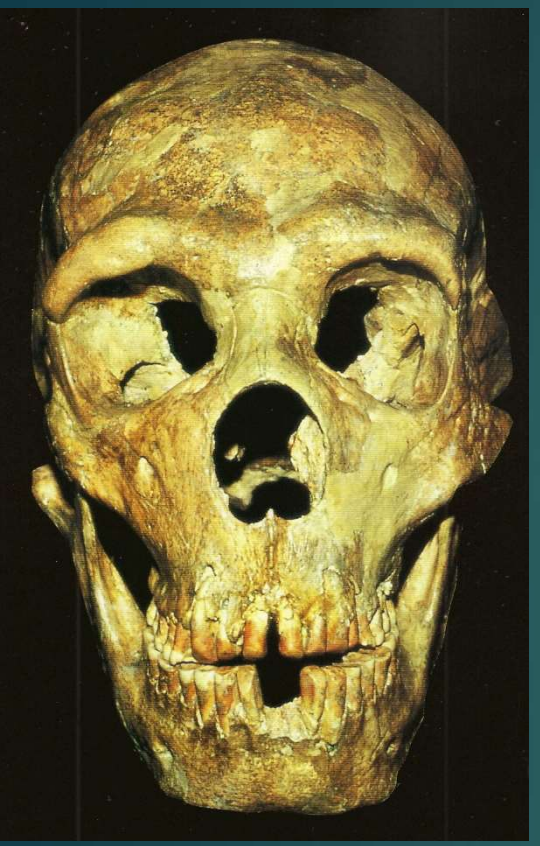
R. Dale Stewart (1901-1997): Shanidar Neandertals

- Physical anthropologist at Smithsonian
- Analyzed most of the Shanidar Neandertal remains (turned them over to Erik Trinkaus)
- Moderns had lived in same caves

61. Ralph S. Solecki (left) and T. Dale Stewart (middle) in 1960 during the excavations at Shanidar Cave that produced many Neandertal skeletons

Shanidar 1

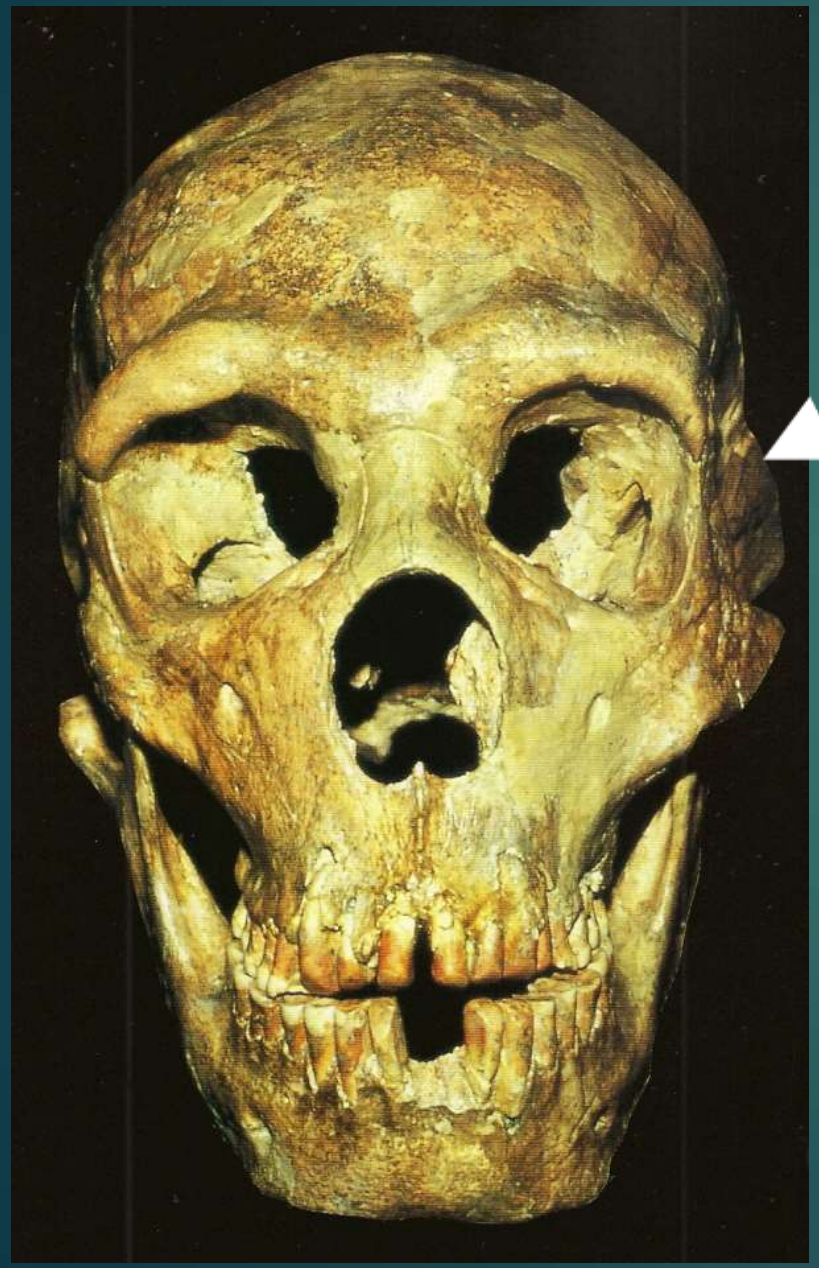
1957-1961: *Homo neanderthalensis*, Shanidar I



Shanidar cave in the Zagros Mountains. (Jan Sefti /CC BY SA 2.0)

“Shanidar, the First Flower People“

Shanidar 1: adult male, 40-50 years, old & injured



- <u>Eye socket crushed-Blinded in that eye</u>
- Had suffered substantial injuries to arms, legs, & head, which had partially healed, suggesting he had been cared for by others

Left arm amputated above the elbow

Shanidar 1 = He was inspiration for Creb, the disabled shaman in Jean M. Auel's novel *The Clan of the Cave Bear* (1980)

Shanidar: Flowers for the Dead?

- in the 1950s, Smithsonian anthropologist Ralph Solecki, a team from Columbia University and Kurdish workers unearthed the fossilized bones of eight adult and two infant Neanderthal skeletons—spanning burials from 65,000 to 35,000 years ago—at a site known as the Shanidar cave, in the Kurdistan area of northern Iraq.
- One of the skeletons, excavated in 1957, is known simply as Shanidar 3. The male Neanderthal lived 35,000 to 45,000 years ago, was 40 to 50 years old and stood about 5-foot-6. Shanidar 3 now resides at the Smithsonian National Museum of Natural History; Shanidar 3, Potts adds, “is the Hope Diamond of the Human Origins collection. “There is quite a severe and deep cut to a rib on [Shanidar 3’s] left side,” says Potts. “This cut would have been deep enough to collapse his lung, so Shanidar 3 is the oldest known individual who could have been murdered.”

- Solecki’s pioneering studies of the Shanidar skeletons and their burials suggested complex socialization skills. From pollen found in one of the Shanidar graves, Solecki hypothesized that flowers had been buried with the Neanderthal dead—until then, such burials had been associated only with Cro-Magnons, the earliest known *H. sapiens* in Europe
- Skeletons showed evidence of injuries tended and healed—indications that the sick and wounded had been cared for. Solecki’s attitude toward them was encapsulated in the title of his 1971 book, *Shanidar: The First Flower People.*
- Drawing on Solecki’s research, writer Jean Auel mixed fiction and archaeology in her novel, *The Clan of the Cave Bear*, a 1980 bestseller that humanized, if not glamorized, Neanderthals.

Shanidar 3 rib with weapon injury: 1st murder evidence?

Rick Potts adds, Shanidar 3 “is the Hope Diamond of the Human Origins collection”

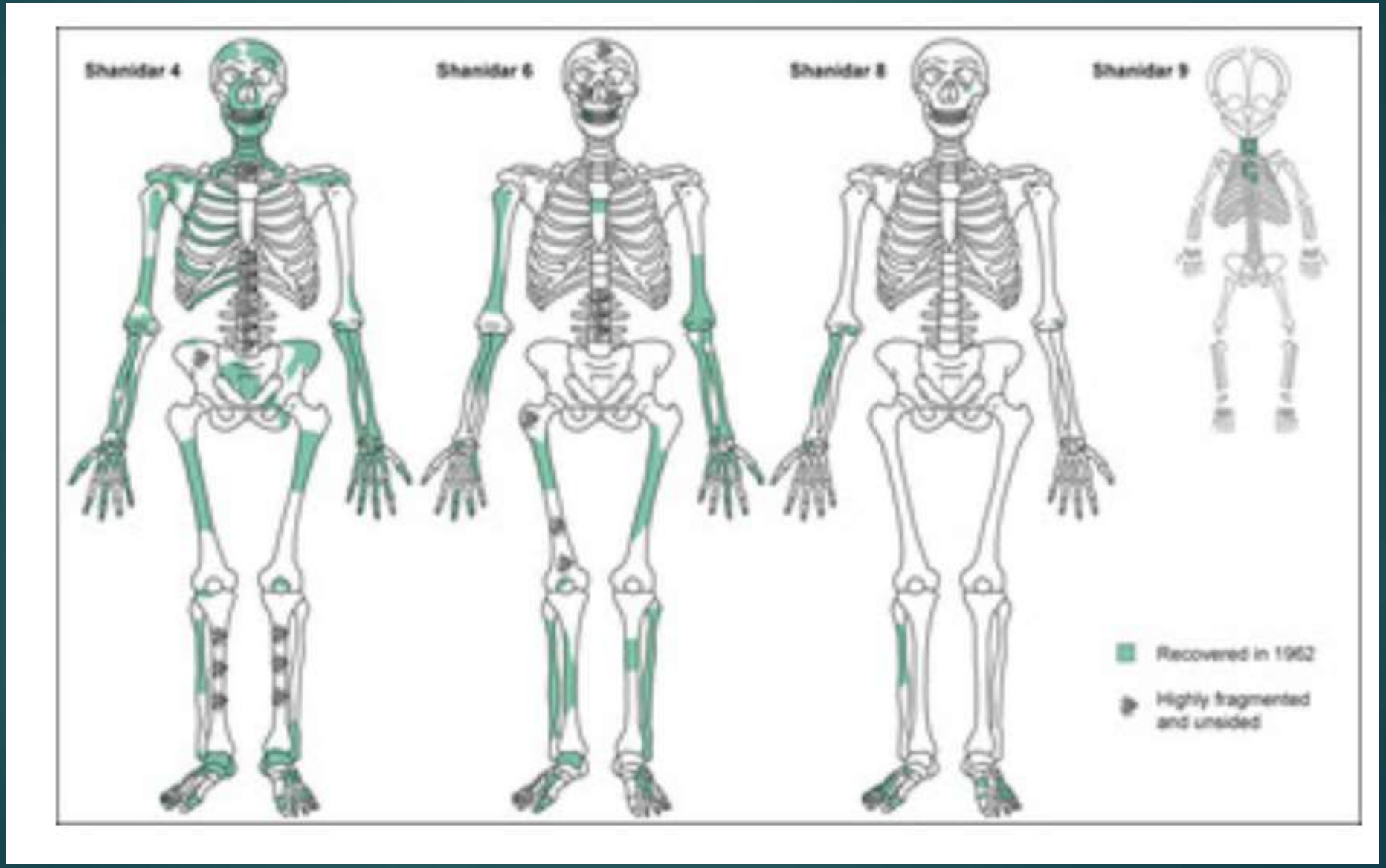
Shanidar 3

- Shanidar 3; at Smithsonian; only N skeleton in USA; died of wound to lower chest that damaged a rib (and possibly the lung)

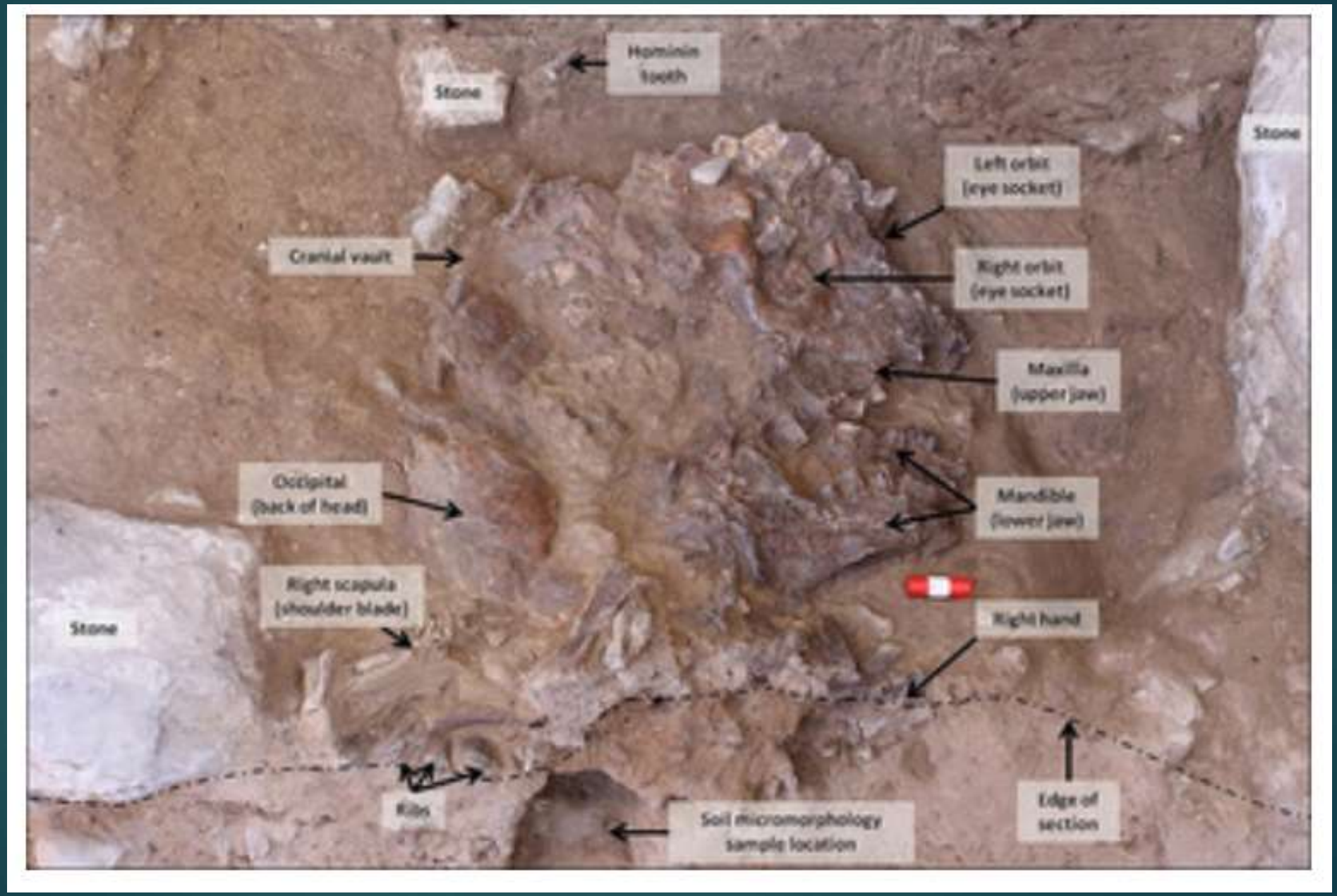
- N spears were thick (1in), not built for throwing;
- S. Churchill: used spear on pigs; broke 3 ribs; lots of fxs of hands and feet

- Attack by MHs?: Long range projectiles, come in at 45% angle & damage like S 3

Preserved skeletal elements of Shanidar 4, 6, 8 and 9, compiled based on Trinkaus (1983)

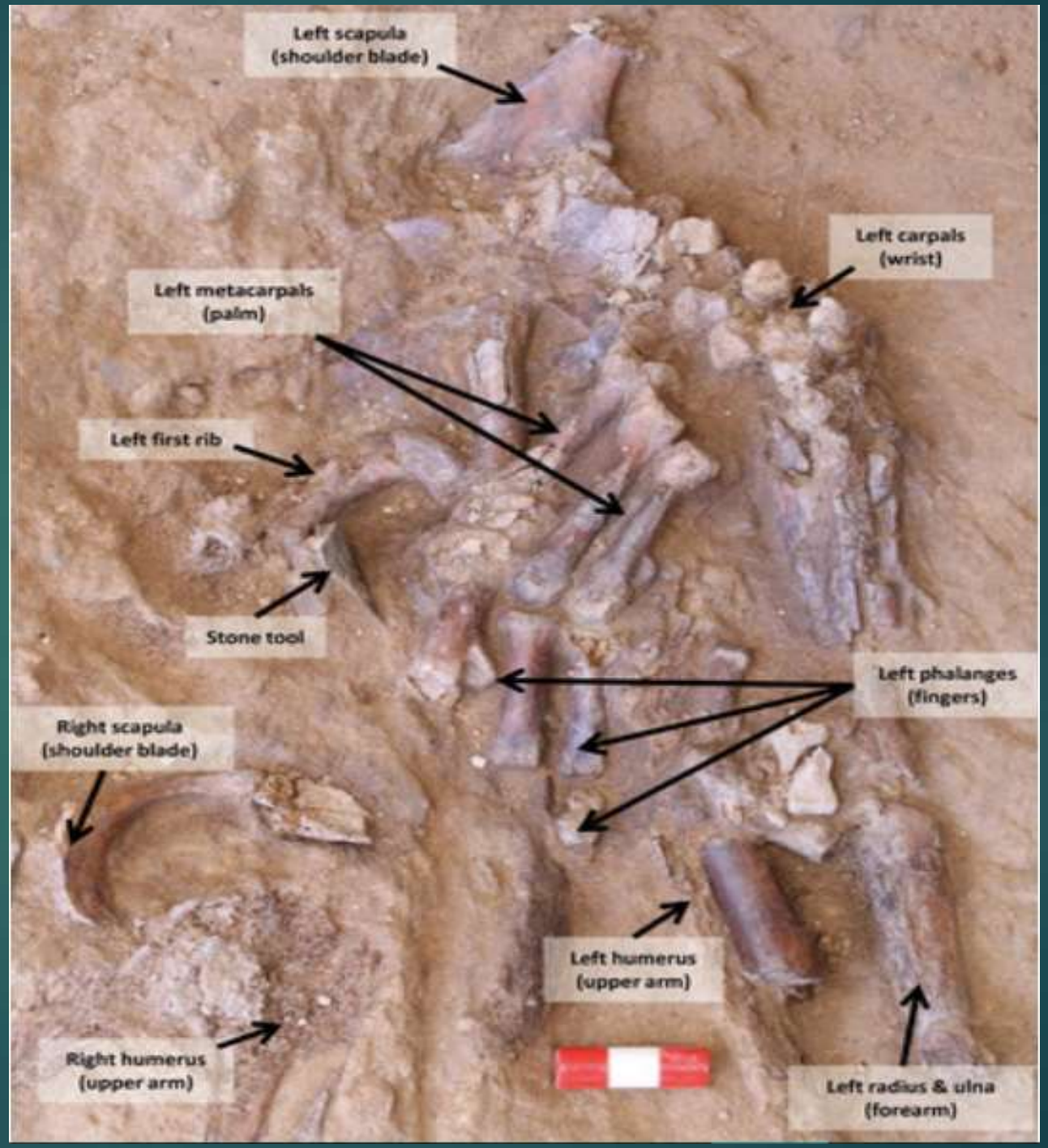


2020: Shanidar Z skull in situ



Shanidar Z:

Upper body and left arm remains that lay beneath the skull: articulated, upper body, waist, upwards of an older adult Neanderthal; also mineralized pollen



Shanidar Z

The bones of the Neanderthal's left arm and ribs in situ. (Graeme Barker)

2020: Shanidar Z burial

Because of the skeletons' close proximity of Z to Flower burial, and because four of the skeletons - including this one, and the Flower Burial - seem to have been posed rather than laying in fallen positions, the archaeologists believe they were deliberately buried.

Shanidar, 2018

- Solecki uncovered the remains of 10 Neanderthals when he worked at the site 60 years ago,
- 2014 expedition: 2 skeletons and 1 crushed skull
- Shanidar Cave, today one of the Kurdistan Region's most popular and picturesque tourist attractions, is a priceless vault of Paleolithic treasures.
- It appears that people were starting to use this cave – probably Neanderthal people, but we're not sure – about 120,000 years ago, maybe a bit more. And they came back again, and again, and again, and again through time.

  "We're beginning to get the sense that they were here in the warmest times during the last Ice Age and in the warm period before that Ice Age. We think that they came here to hunt ibex – but they also ate other things like tortoises, in fact many different kinds of animals."
- One radiocarbon date costs £300 and one uranium date costs over £1,000.

Cecilio Barroso:
Overlap of *H. neanderthalensis & sapiens*

- 1983: Discovered, with Paqui Medina, a Neanderthal mandible in Zafarraya cave (Cueva del Boquete), 25-30Ka (challenged)
- Near the mandible, Mousterian tools originally dated to 27K, but now 46 Ka.
- The find was one of the first pieces of definite evidence showing that the presence of Neanderthals and modern humans overlapped in Europe for a significant period

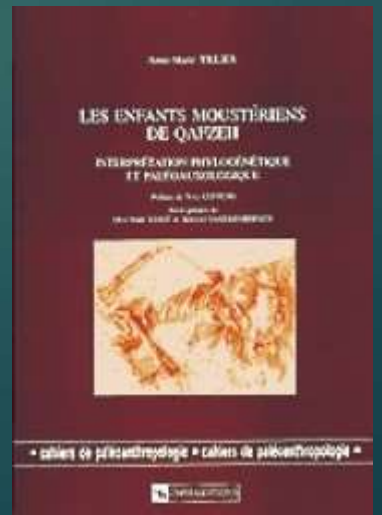
Cannibalism in Zafarraya

- Anthropic actions on Neanderthal bones
- Calcinated Neanderthal bones

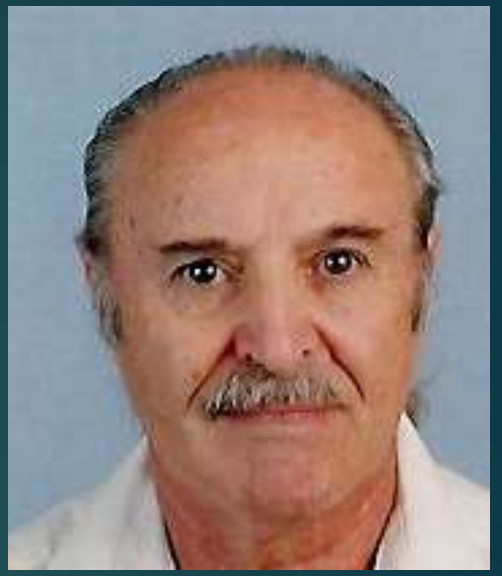
Ann-Marie Tillier:
Juvenile Neandertals

- French paleoanthropologist
- Trained by Bernard Vandermeersch
- Studied and compared the juvenile material of Neandertals and moderns to understand development

- **1999. *Les Enfants Moustériens de Qafzeh. Interprétation Phylogénétique et Paléoauxologique*.**



Baruch Arensburg (1934-): Kebara, Moshe the Neandertal



- Chilean Israeli anatomist and physical anthropologist
- Tel Aviv University
- Co-director (with Ofer Bar-Yosef) of Kebara excavation
- 1982: of the most complete Neandertal skeleton found to date. Nicknamed "Moshe" and dating to *circa* 60,000 BP
- 1987: Co-author of monograph on Kebara Neandertal (includes hyoid bone & nearly complete pelvis)
- Leading authority on the Jewish population of ancient Israel.

Kebara burial

Kebara 2 Partial Skeleton

~Found in 1982 at
Kebara Cave, Israel
~Dated to **60,000 years**

Kebara 2 Skeleton (“Moshe”)

- The archaeological evidence seems to indicate that Moshe was indeed buried.
- He had been placed on his back in a shallow pit with his right arm placed across his chest and his left arm across his abdomen.
- Study of the skeleton suggests that Moshe was between the ages of 25 and 35 when he died.
- His death was apparently a result of natural causes as there is no evidence of violence or disease in his bones.
- Moshe was about 1.7 meters tall - a height that is taller than the average European Neandertal.

N reconstruction of Kebara 2 skeleton

Kebara hyoid bone: Neandertal speech/language?

- Whether or not Neandertals possessed the ability to speak is a question that incites more furious debates than those on Neandertal burials.
- This hyoid bone is identical to ours, thus suggesting that the Neandertals shared our capacity for language.

Neandertal sound

http://www.sciencedaily.com/releases/2008/04/080421154426.htm

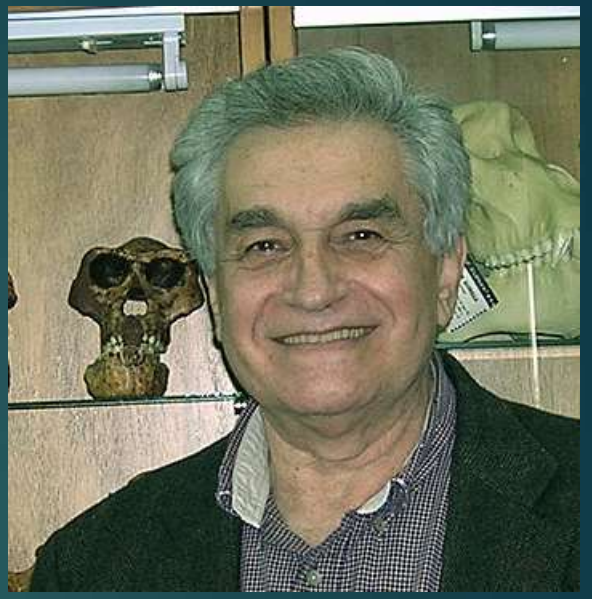
Reconstruction of N vocal track: different “e”

Ofer Bar-Yosef (1937-):

Moderns preceded Neandertals in Levant

- Israeli archaeologist
- Professor of Prehistoric Archaeology at Harvard University as well as Curator of Palaeolithic Archaeology at the Peabody Museum of Archaeology and Ethnology.
- Co-directed Kebara excavation.
- Defended idea that anatomically modern humans preceded Neandertals in Levant (evidence proved him right)

Yoel Rak (1946-): Kebara and Amud Neandertals



- Israeli physical anthropologist; Tel Aviv University
- 1987: Co-author of description of Neandertal skeleton from Kebara: Rak and Arensburg, *Am. J. Phys. Anthropol.* **73**, 227 (1987).
- Includes a hyoid bone and a nearly complete pelvis
- 1992: *Australopithecus Afarensis* (A. L. 444 -2)
- 1992: *Homo neanderthalensis* (Amud 7 child) – oval foramen magnum

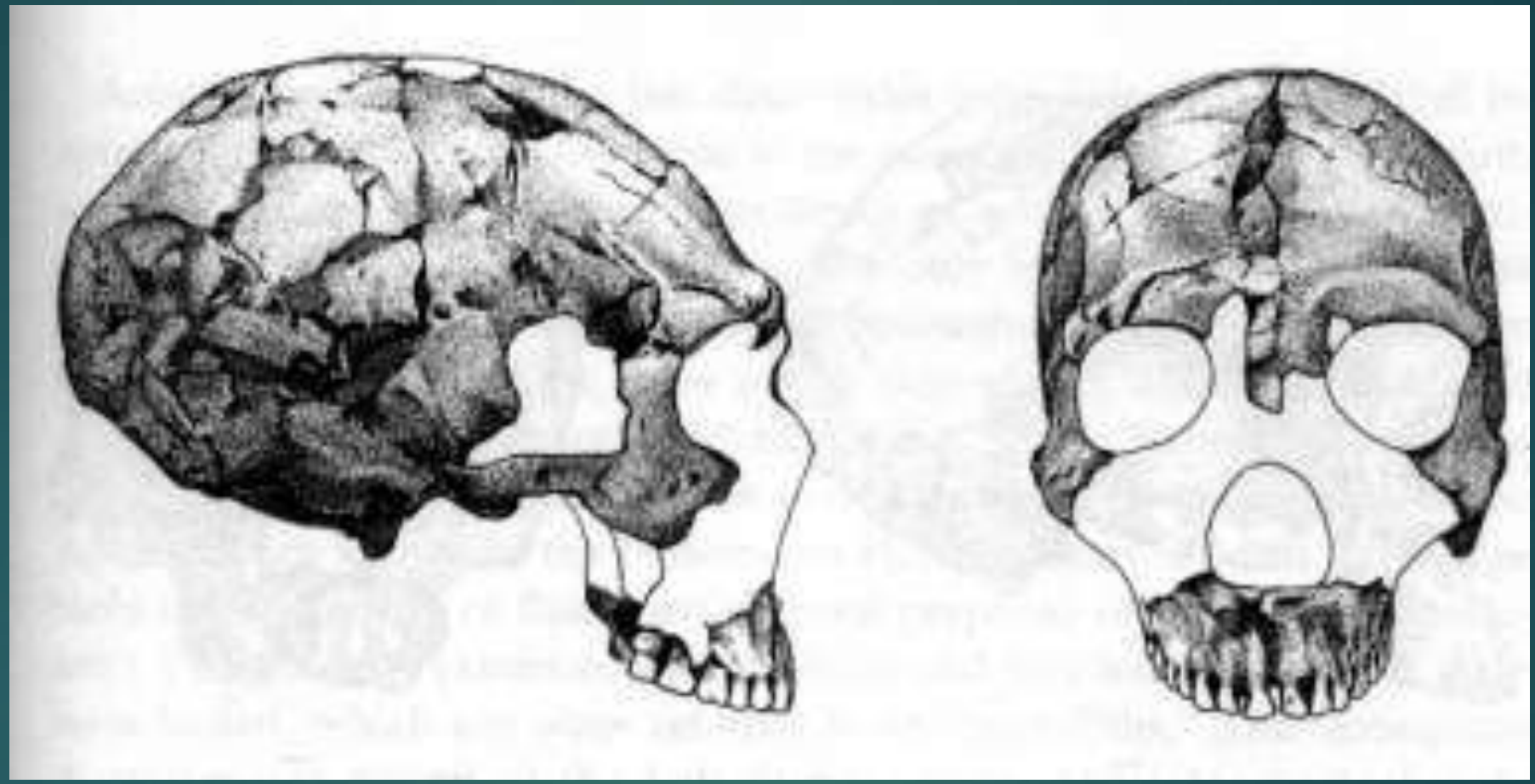
Neandertals of Amud, Israel

- Amud Cave, Israel
- 16 Neandertals
- Dated: 50 to 60 Ka

- Amud 1: 40 Ka
- Brain = 1736 cc
- Largest hominin cranial capacity

Amud 1 Skull - largest Neanderthal brain volume at 1736 cc+

Amud, Israel



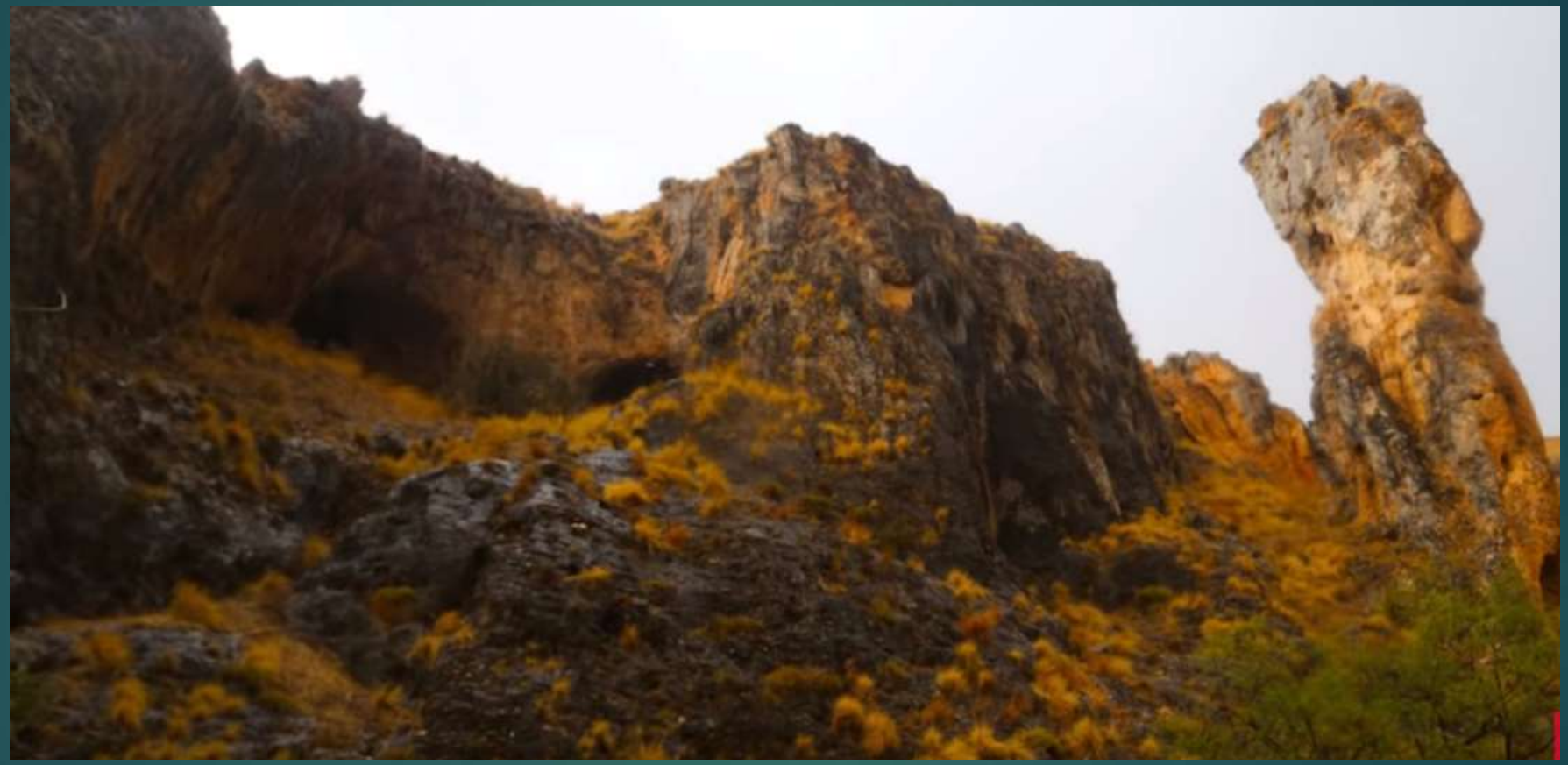
Amud Cranium
~Found at Amud, Israel in 1961 by a Japanese excavation team

Amud 7: Infant

Homo neanderthalensis (Amud 7)
Discoverer: Tina Hietala & Yoel Rak
Locality: Amud Cave, Israel
Age: 50-60K
~Found at **Amud, Israel** in 1961 by a Japanese excavation team

Mt. Carmel, Israel

Amud (“column”) Cave



Amud vs Skhul

Amud: longer, brow ridge
But no occipital bun, not small mastoid process (like N); has tall 6’ skeleton

Skhul: MH, rounder

Excavation of the Tabun Cave, Mt. Carmel, Israel

Asian arrival: Caves of Israel– MHs arrived first; Ns later

- By 130 Ka, mild Eemian interglacial started; greening of Sahara desert; interglacial ended 120 Ka; but greening continued until 60 Ka
- Circa 130 to 60 Ka, both N and MHs began burial of dead
- In northern Israel caves (Amud, Zuttiyeh, Skhul, Tabun, Kebara, Qafzeh): fossils of more than 45 individuals; both species buried their dead
- Yards apart: Skhul/Qafzeh cave = *H. sapiens (*10 burials*)*; Tabun = *H. neanderthalensis*
- Amud: 16 Neandertals

Papagianni & Morse, 2015

Israel caves

- Originally researchers thought N site of Tabun older than MH site of Skhul; but macrofaunal evidence of “rodent clock” (Bar-Yosef) contradicted this
- In 1980s, U-series dating showed that MHs from Qafzeh & Skhul were older (Skhul at 100-135 ka; Qafzeh at 120-90 ka) than Ns of Amud & Kebara (at 60-50 k); 1st MHs reached Israel (& W Asia) first, N later
- Tabun N C1 skeleton: age of the Tabun C1 mandible is 34±5 ka. The age of the femur is 19±2 ka. The femur may have experienced continuous (linear) U uptake which would give an age of 33±4 ka, in agreement with the mandible's EU age. Same age as late Iberian Ns.
- This MH immigration out of Africa c 100k failed (due to new glaciation)
- Five sites in North Africa (Morocco & Algeria) with punctured mollusk shells used as jewelery; similar to those at Blombos Cave in S. Africa

The Levant: Ns later than MHs

- East Mediterranean Levant. AMH were present in that region between 80 and 130 ka, and created the Skhul and Qafzeh record with its burials, pigments and personal ornaments, associated with a Middle Paleolithic lithic technology.
- Between 80 and 47 ka however, only Neandertals are known from the fossil record of the Levant.
- If the absence of fossil AMH in the record represents a true absence from the region, this could indicate that the Skhul/Qafzeh hominins and their immediate descendants indeed may have "lacked the behavioral capacities that enabled subsequent modern humans to compete successfully against the Neanderthals"

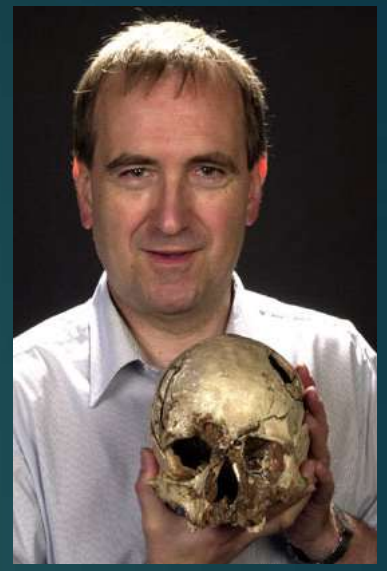
Jean-Jacques Hublin (1953-): When Neandertals met *H. sapiens*

- French Paleoanthropologist
- Director, the Max Planck Society (Germany) and moved to Leipzig to found the Department of Human Evolution
- 1978: Demolished pre-Sapiens hypothesis: used cladistic methods to demonstrate that Neandertals were much earlier than modern humans. He demonstrated that none of the European fossil material predating 40,000 years ago could be related to modern human ancestry
- Proposed the 'accretion model' for the emergence of the Neandertals (successive occurrence of new features and by an increase in their frequency within the pre-Neandertal populations); and "acculturation" model of final Neanderthal populations by anatomically modern humans
- Jebel Irhoud (Morocco), modern fossils
- A longtime Replacement theorist; Does not believe Ns had symbolic, artistic ability

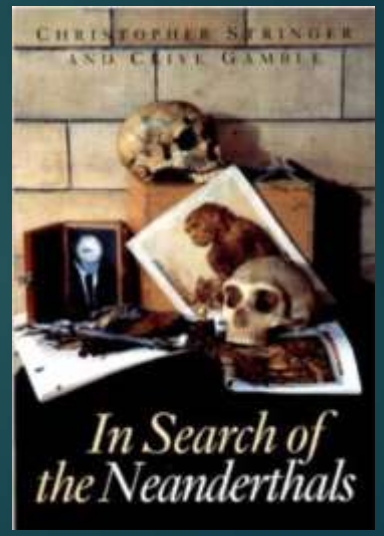
Neanderthals and Us

Who is this guy?

Christopher B. Stringer (1947-):
Out of Africa & Replacement Hypothesis

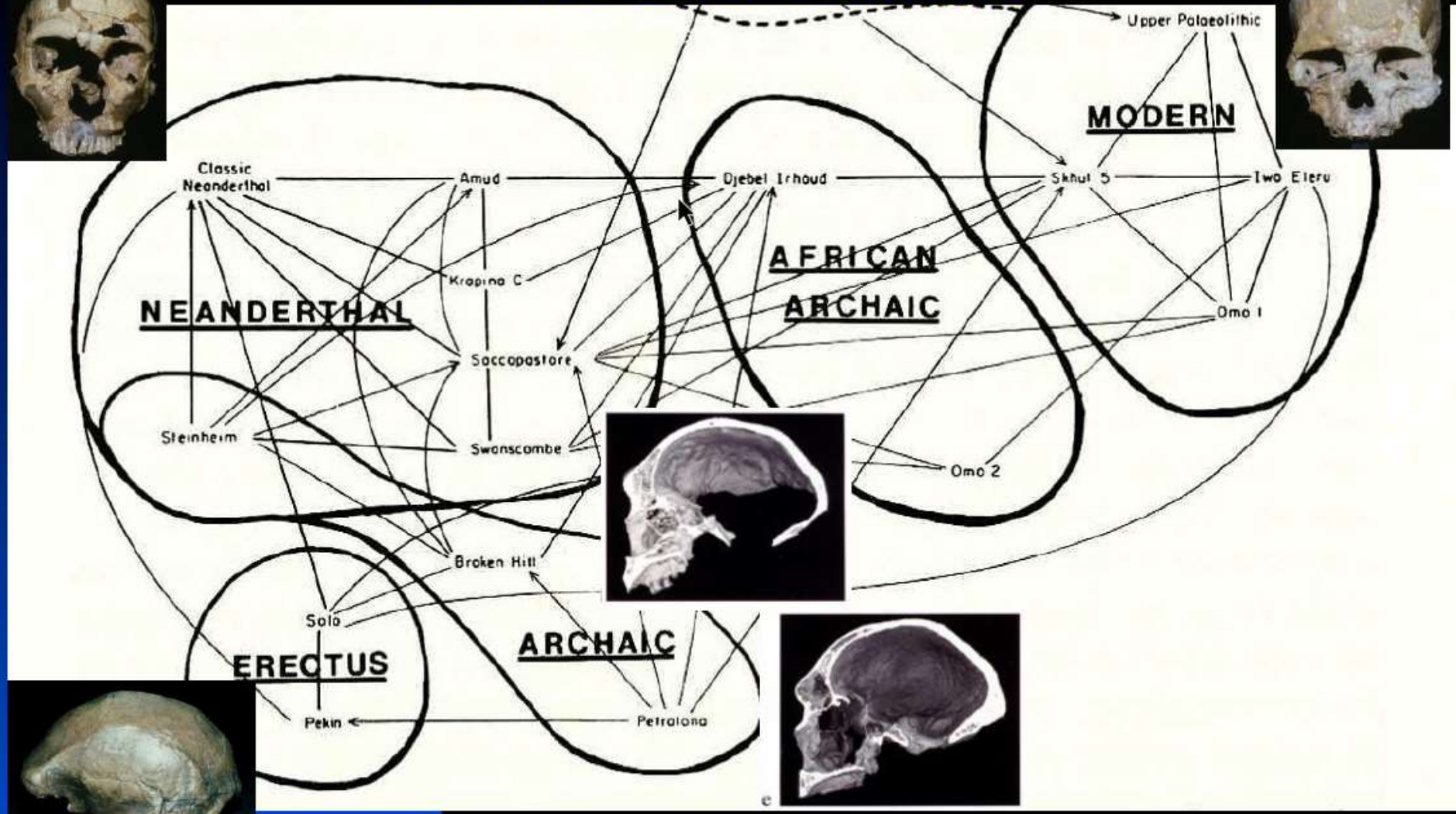


- Britain's foremost paleontologist
- Department of Paleontology at the Natural History Museum
- 1971: concluded Neanderthals were too different to be human ancestors,
- Based on his quantitative study of the cranial form of Neanderthals in comparison to modern humans: Cranial metrics suggest Neanderthals are not good ancestors for modern humans.



- 1993: Stringer & Clive Gamble publish *In Search of the Neanderthals*: Leading exponent of Neandertal replacement hypothesis (moderns replaced, rather than evolved from, Neandertals)
- Leading exponent of Out of Africa theory

Stringer 1974: cranial metrics suggest Neanderthals are not good ancestors for modern humans



Erik Trinkaus (1948-):
Shanidar Neandertals & Hybridization Theory

- Professor of anthropology, Univ. of New Mexico & Washington Univ.
- A leading authority on Neandertals

- 1975: his study of Neanderthal feet confirms they walked like modern humans.

- 1983: Author of *Shanidar Neandertals* and *The Neandertals (*with then wife Pat Shipman)

- 1999: The most vocal proponent of the hybridization hypothesis on anatomical grounds. He claims various fossils as hybrid individuals, including the "child of Lagar Velho", in Portugal dated to 24K

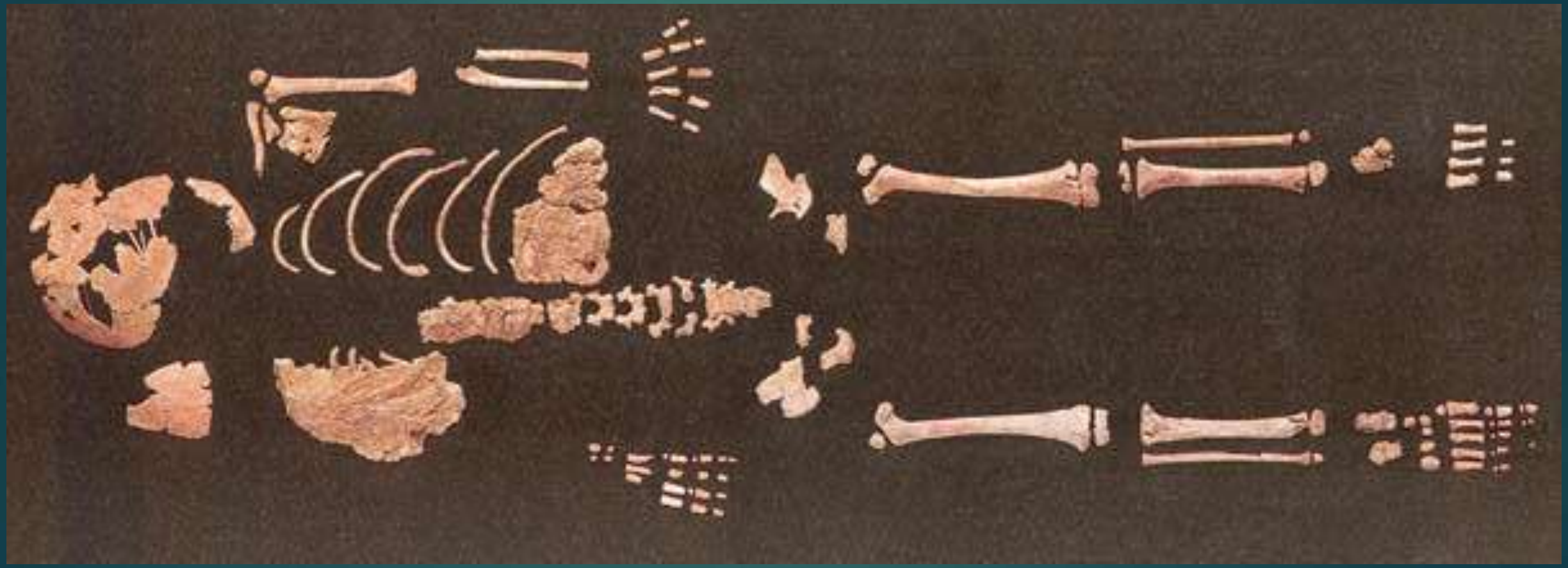
- 2003*:* Pestera cu Oase, Romania: MH with N ggggrandfather

João Zilhão (1957-): Hybridization Theory – Lagar Velho & Oase

- Portugese paleoanthropologist
- Department of Archaeology and Anthropology, University of Bristol
- 1999: with Erik Trinkaus, discovered Lagar Velho, Portugal, child with mixed Neandertal-early modern human ancestry
- 2004: excavations at the Peştera cu Oase (Romania), site of Europe's earliest modern humans.
- Oase: strong argument in favor of an admixture model between regional Neanderthals and early modern humans.

- Joao Zilhao, 2010: 50K Neandertal sites with perforated & pigment-stained marine shells

Trinkaus and team reported previously a possible hybrid on the Iberian peninsula in 1999 (Lagar-Velho 1 child)



Lagar Velho

Skeletal remains of child with Neandertal traits, Portugal, 30,000 years old.

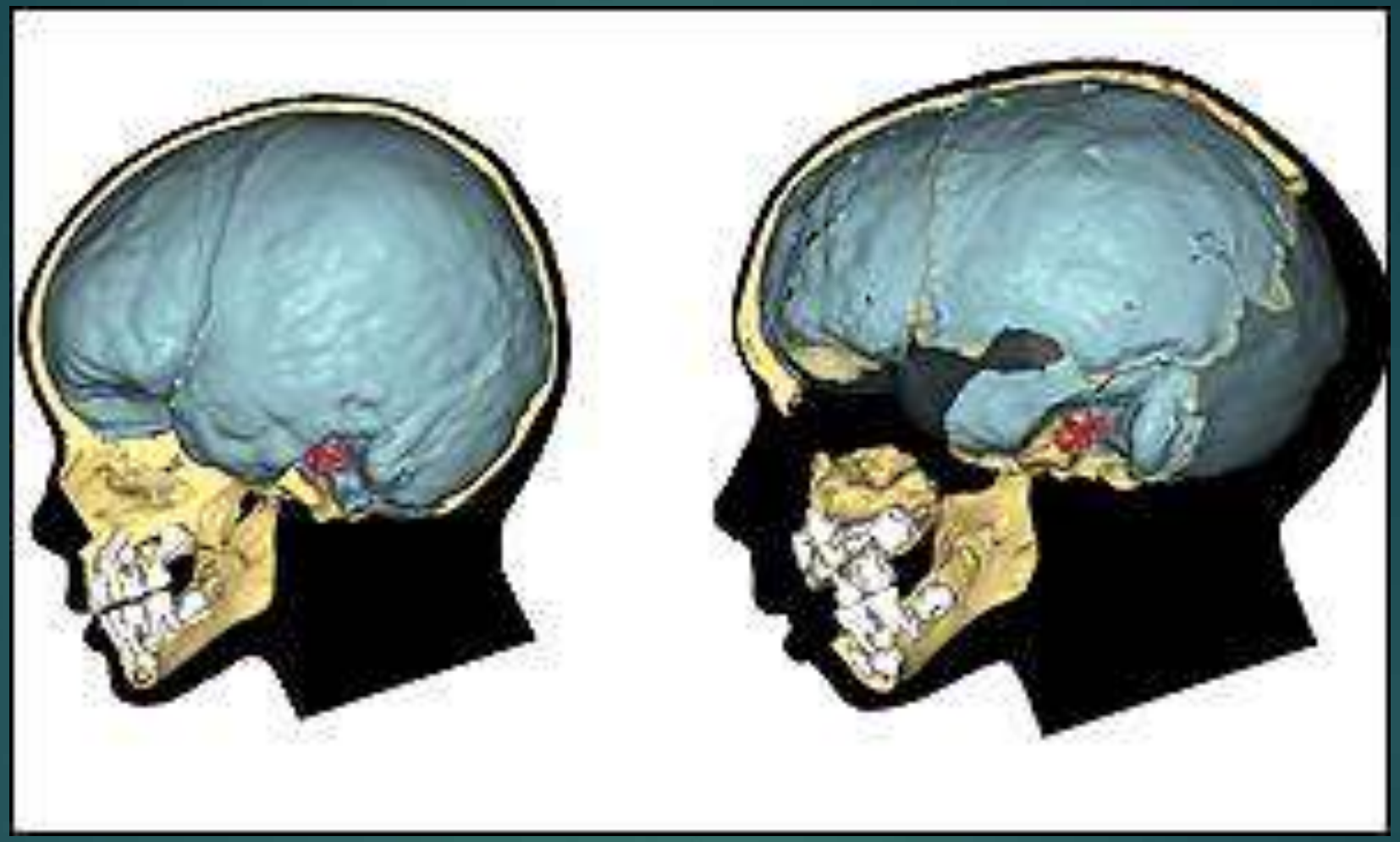
Chin present, but body N like

Before DNA Hybrid Debate: Lagar Velho, Portugal, child: 27 K

- 1998: 4 yo child at Gravettian rock shelter, Lagar Velho; buried with pierced shell, red ocher; clearly modern
- Zilhao & Erik Trinkaus: Fossil had N traits
- Stringer & Tattersall: just modern child
- Zilhao & Trinkaus: N did not become extinct; absorbed into MH population via hybridization and more widespread population mixing
- Stringer & Tattersall: MHs took over Europe from Ns who became extinct; "leaky replacement" (limited interbreeding at 50-60K in Western Asia)
- No attempt at DNA extraction

FIGURE 12.41 Lagar Velho
This skeleton of a child was discovered at a rockshelter site in Portugal's Lapedo Valley.

Duarte et al. 1999



Modern child

Neandertal (?) child

BUT -

4-year-old child's skeleton from Lagar Velho, Portugal, 25 ka

Generally **H. sapiens**-like…

Symphysis slopes

But has a pointed chin

Occipitomastoid crest

Neandertal

Hybrid ?

The Oase 2 (Upper) and Muierii 1 (Lower) crania in norma lateralis left. In an article appearing in the Proceedings of the National Academy of Sciences, Erik Trinkaus, Ph.D., professor of anthropology at Washington University in St. Louis, has brought together data showing that early modern humans did exhibit evidence of Neandertal traits. (Credit: Romanian Academy/Muzeul Olteni/Erik

Modern Human (Cro-Magnon)

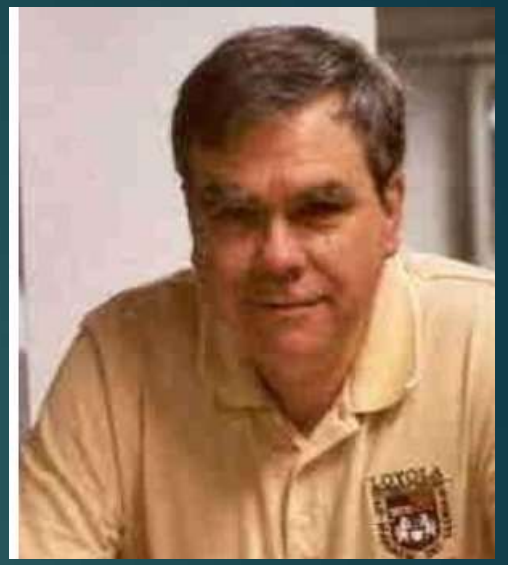
Erik Trinkaus (Washington University) thinks he has detected definite skeletal evidence of hybridization
Published in PNAS, 2007

Francesco d’Errico, 1957 – Italian paleontologist

- Director of Research at the University of Bordeaux in France
- origins of modern behavior in Hominins and specifically the emergence of cultural innovations in the African Middle Stone Age and the transition between Neanderthal and Cro-Magnon cultures
- jewelry, engravings, pigments and tools made from bones were used in Northern and Southern Africa at least 80000 years ago, which is earlier than the previously accepted scenarios for the development of modern behavior.
- Extinction of Neanderthals and their relations with the modern humans
- Defender of N cognitive abilities

Fred H. Smith:

Multiregionalism – Neandertals as subspecies



- Modern American physical anthropologist, Loyola University
- Student of Milford Wolpoff
- Analysis of Neandertal remains from Vindija and Krapina
- 1976: his study of Krapina Neanderthals leads him to conclude that they were a subspecies of H. sapiens

- 2000: Digs in area of the original Neandertal 1 find and discovers additional remains mating with the original fossils.

- Assimilation model: Hypothesis that Neandertals evolved into modern humans, assimilation of archaic humans, and are a subspecies of H. sapiens

- Current theory: N = extinction by hybridization

2000: Fred Smith discovers *Homo neanderthalensis 1* fragment

1859: Original

2000: associated Zygomaticomaxillary fragment

Speciation event: Divergence of sapiens and neandertal

- Evidence now that glaciation in the Balkans was much more severe during the Middle Pleistocene than at the Last Glacial Maximum. Aso, pollen data from Tenaghi Philippon indicate that MIS 12 (~450 Ka) was particularly severe.
- If, at that time, cold, arid conditions extended eastward across the high relief of the Taurus-Zagros mountain systems, coupled with enlarged Caspian and Black Seas, European populations could have been effectively isolated from their African and Asian counterparts.
- Moreover, increased aridity in North Africa and the Levant could have added to this paleogeographic separation.
- Whether increased selection or drift then operated to differentiate these separated populations progressively is still uncertain, but Neanderthal-derived features are evident in Europe from MIS 11 onward

N Locations

Ecosystem of African Modern Humans

Environment of Neandertals: Woodlands

Neandertals: Locations

- Neanderthals lived in a variety of environments:
  - colder regions of Northern Germany and Siberia's Altai Mountains
  - warmer regions of Mediterranean Gibraltar and the Levant.

- Later N subjected to sustained periods of very cold weather; a tundra landscape

Earliest Locations

- Neanderthal localities are known today from England & Spain to Uzbekistan, from Germany to Levant.

- From 430 to 130 Ka, N only in Europe; after 130 Ka, advance into Asia (as did H. sapiens)

- Earliest evidence of hominins that show incipient signs of N skull features come from:
  - Swanscombe, England
  - Arago, France
  - Sima de los Huesos, Atapuerca, Spain

Homo neanderthalensis: Locales

- Several sites near Qafzeh Cave, Israel, suggest that Neanderthals arrived in the region after modern *H. sapiens*.

- This indicates that the population of modern humans in this area was not descended from Neanderthals, and that there was some period of coexistence or an alternating series of migrations into this region.

- Pontnewydd, Wales: among 1st Neandertals in Europe, but last in Britain for 100K; no hominin occupation of Britain from 200 K to 60 K due to formation of English Channel, which lead to N extinction here; N return after glaciation

Locations: Survival in a glacial ecosystem

N locales

Green = N sites

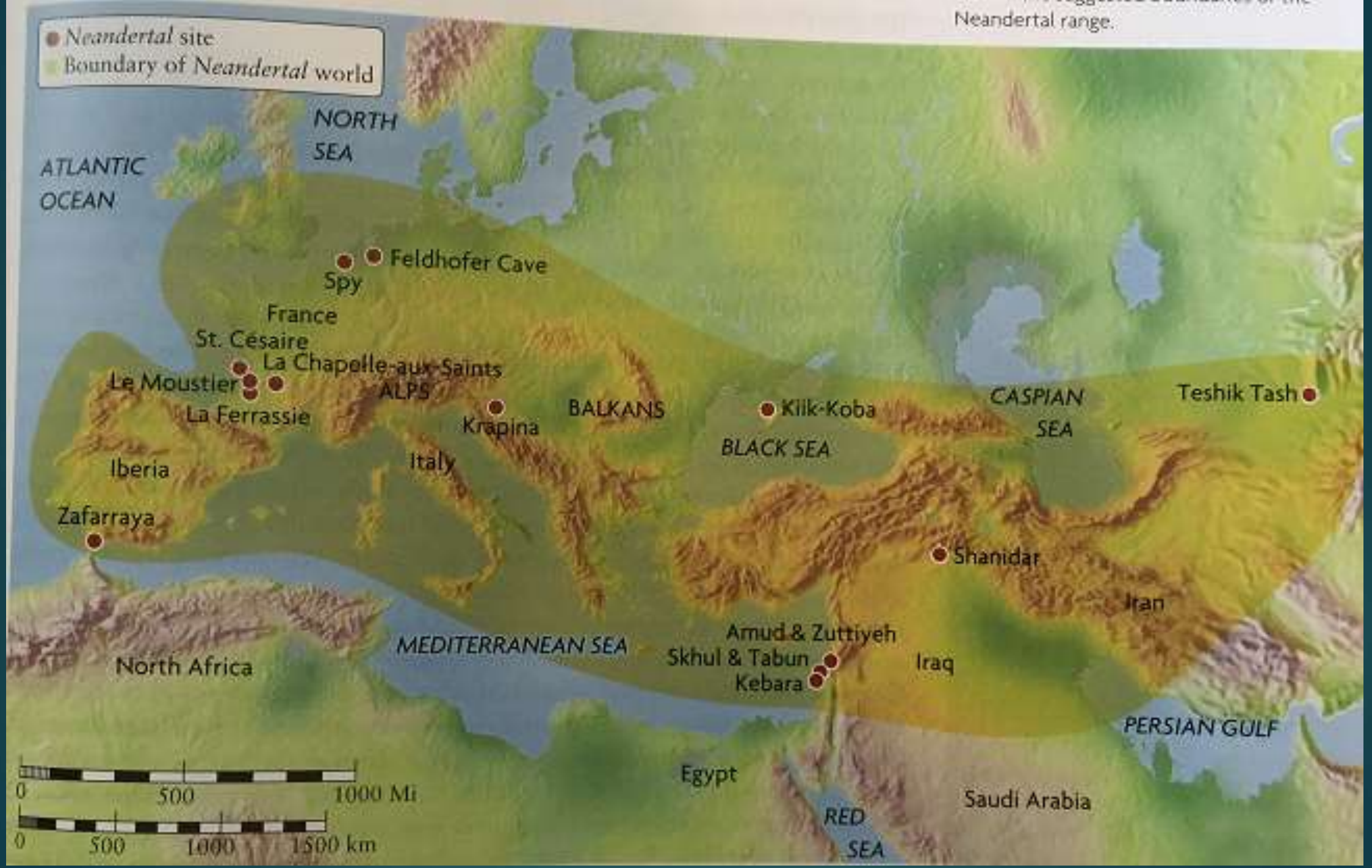
N Locations

Classic Ns in Western Europe, esp. France;
But range was significantly larger: as far east in Central Asia as Uzbekistan, but also continuing in the Middle and Near East, North Africa, and a broad expanse of regions.

But Neanderthals actually varied in their distribution across time.

Glaciers reduce range esp. NW Eurasia

From 400 to 130 Ka, Neandertals only in Europe;
after 130 Ka, advance into Asia (as did *H. sapiens*)

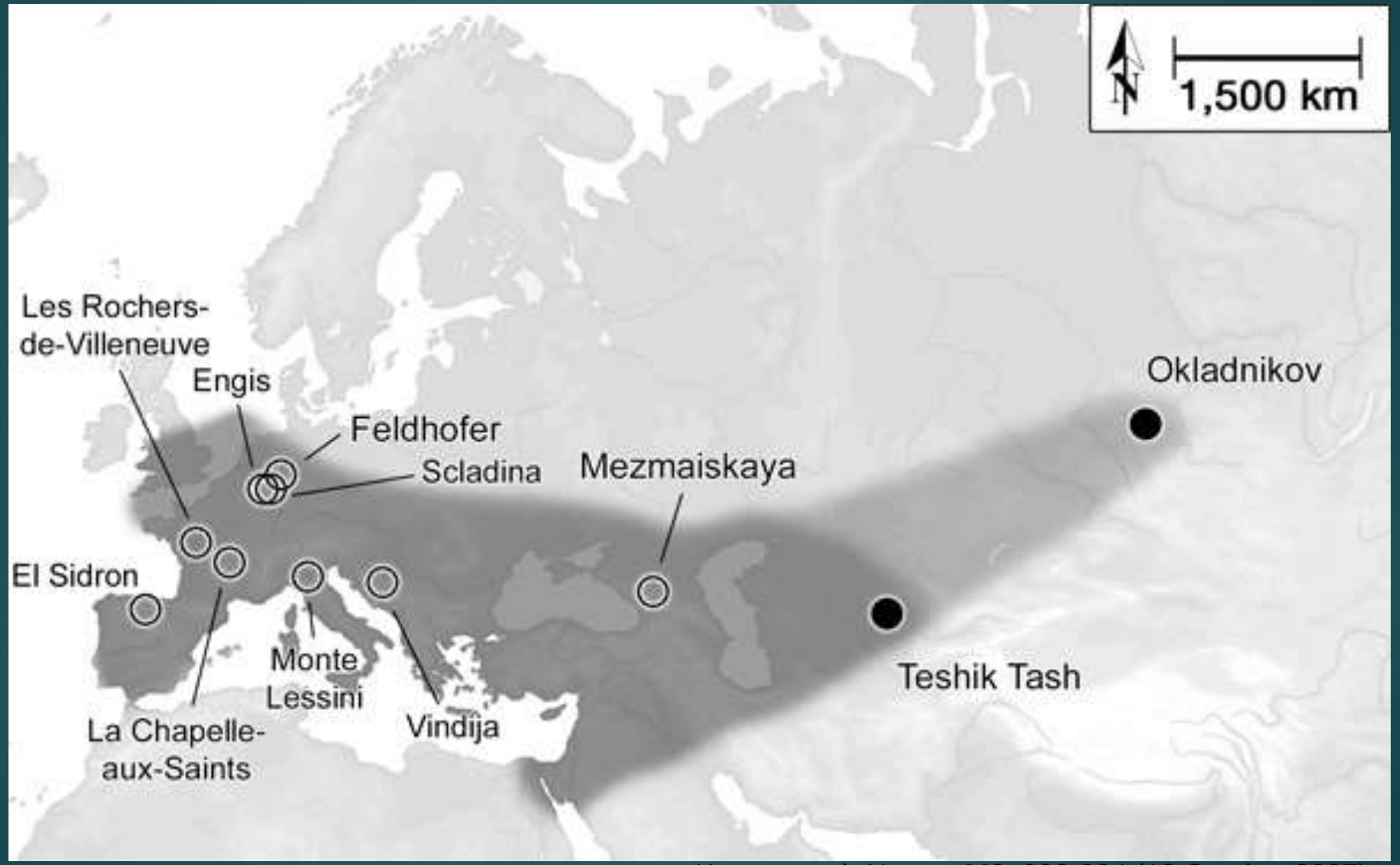


+ Altai Mts, 2000 miles east

Mousterian Tool Sites in *H. Neandertalensis* and *H. sapiens*

The distribution of Mousterian sites across Europe and Asia

Ancient DNA samples from *H. Neandertalensis*

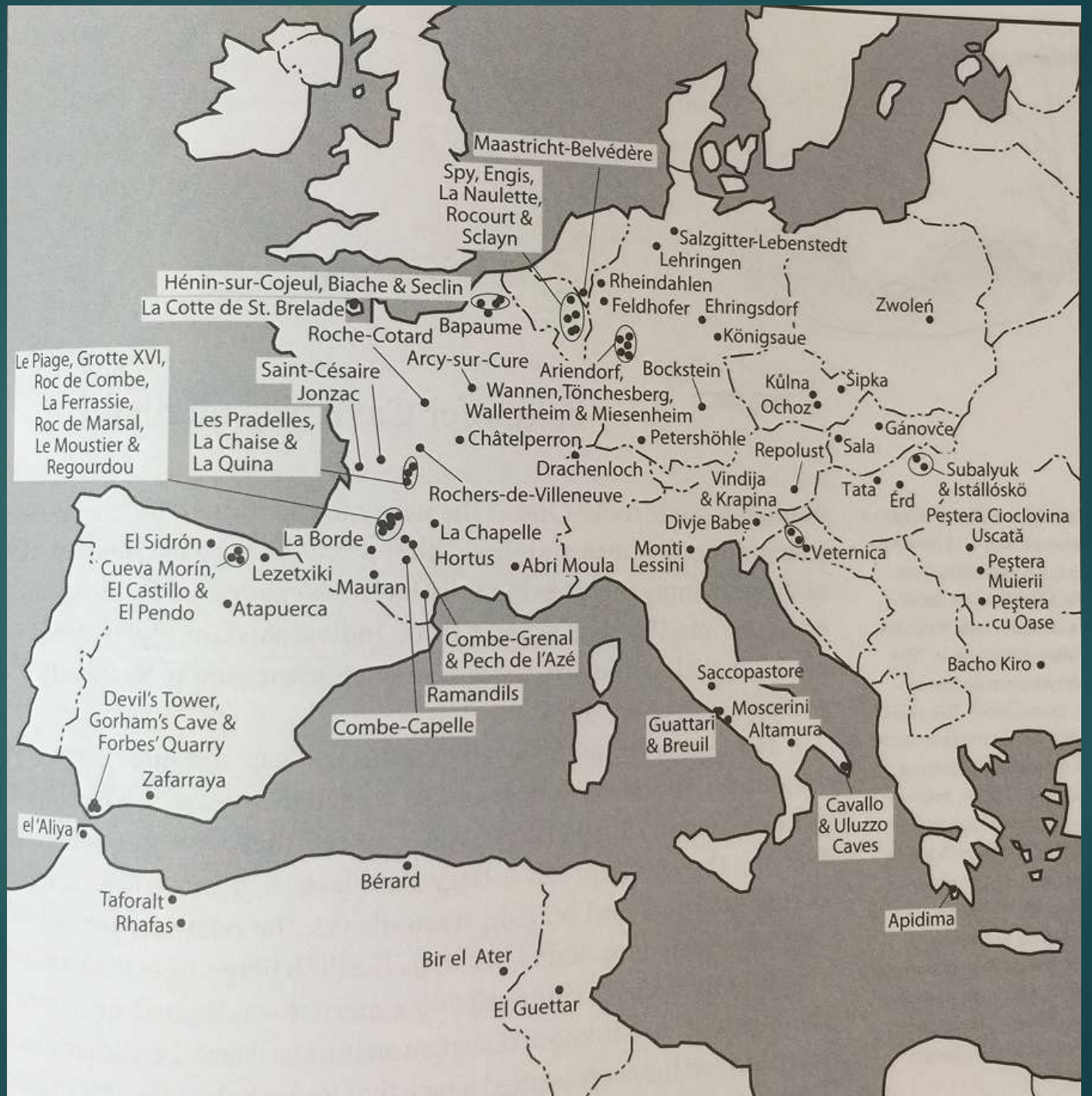


Krause et al. *Nature* **449**, 902-904 (18 October 2007)

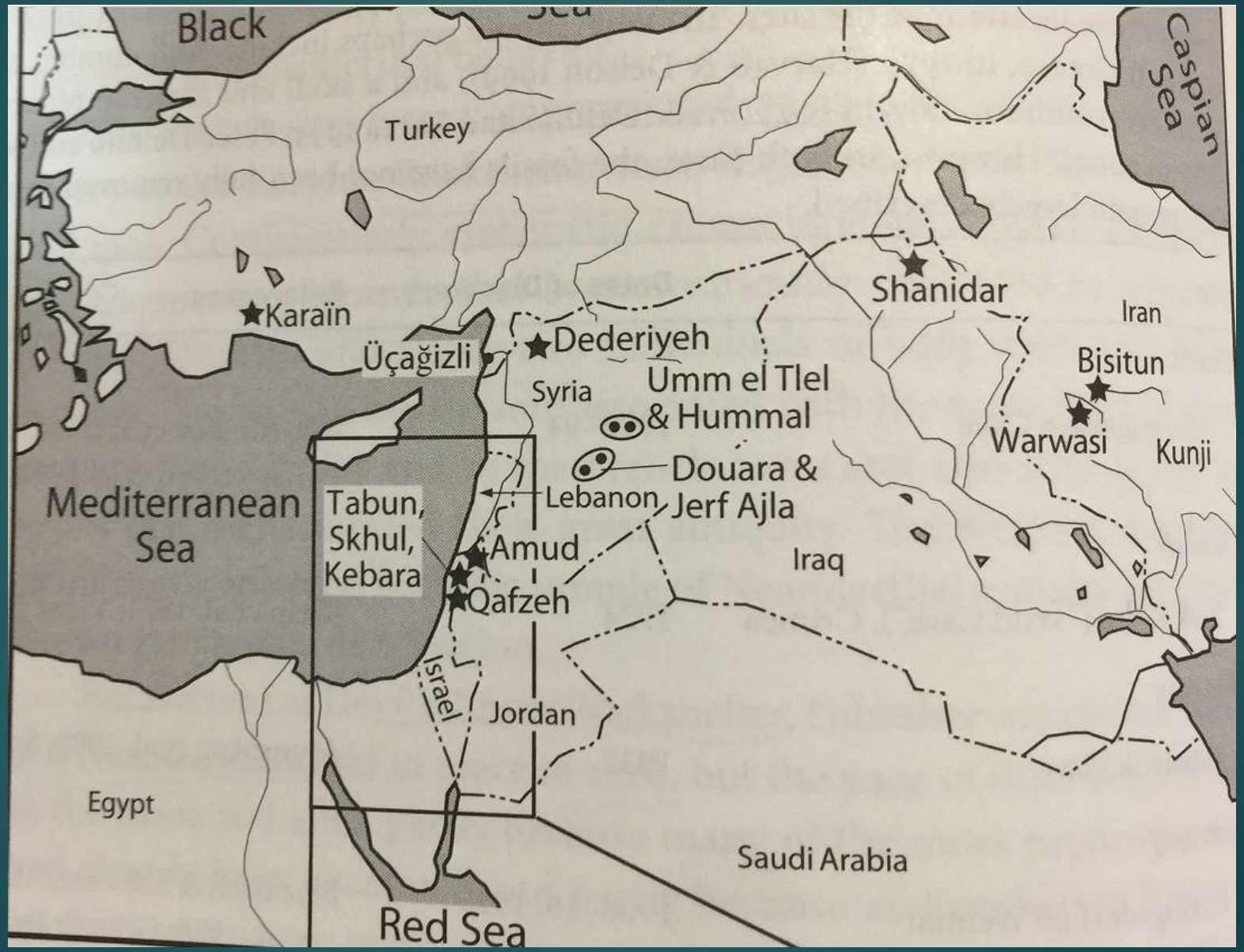
All full N genomes

Most of N diversity is in Western Asia; N's were a central Asian population, that occasionally entered Europe

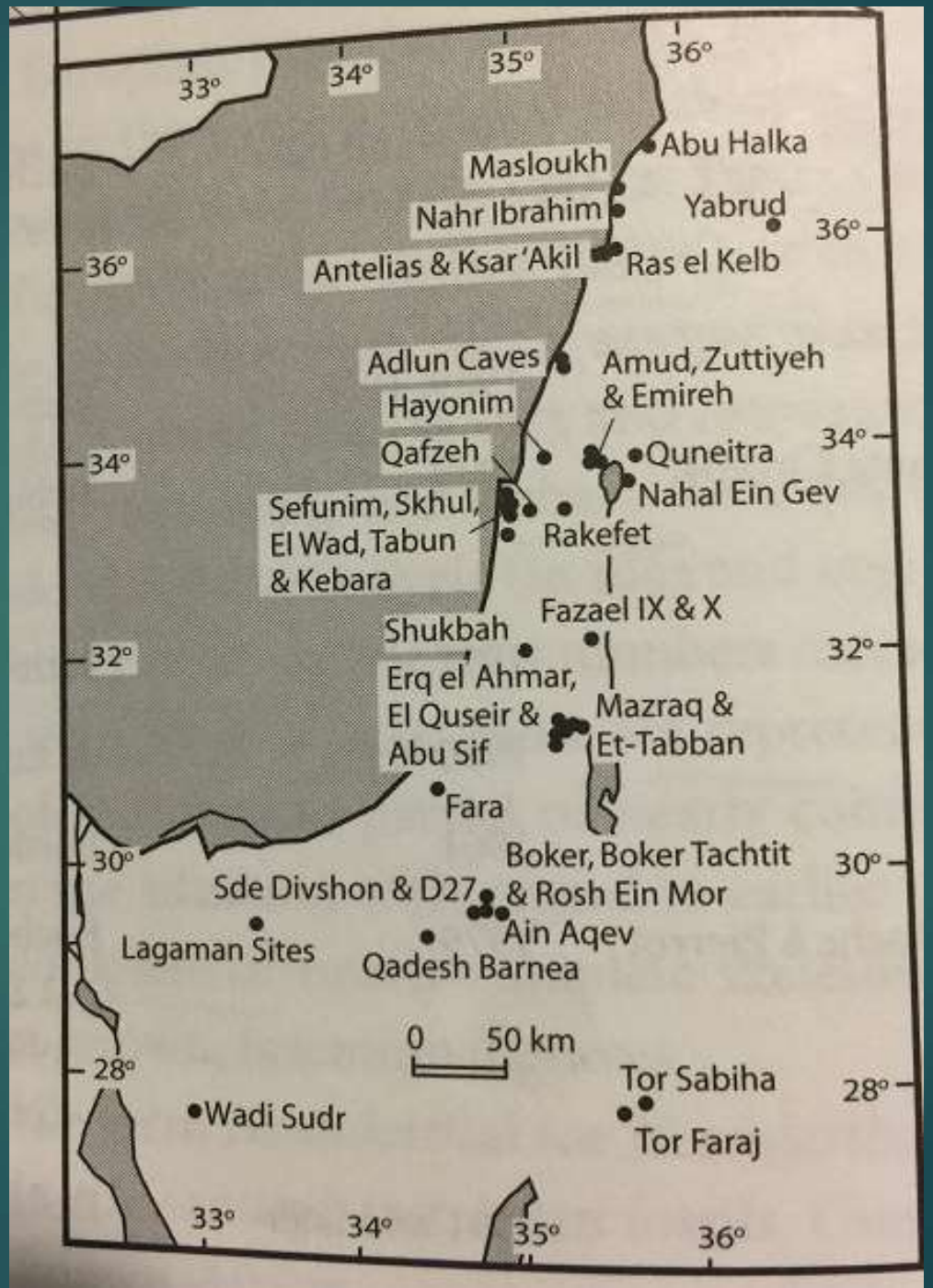
N locations Europe



N locales, Near East



N locales, Near East



Russia		
Mezmaiskaya Cave	1993–94	Baryshnikov et al. 1996; Golovanova et al. 1998; Golovanova et al. 1999; Skinner et al. 2005
Ukraine		
Kiik Koba ("Wild Cave"), Crimea	1924	Klein et al. 1971; Vlček 1975
Hungary		
Subalyuk Cave	1932	Arensburg et al. 1995; Smith 1984; Thoma 1971
Germany		
Ehringsdorf (= Weimar-Ehringsdorf)	1908–16, 1925	Blackwell & Schwarcz 1986; Cook et al. 1982; Grün et al. 1988; Grün & Stringer 1991; Smith 1984
Belgium		
Scladina Cave (Scalyn)	1993 and later	Bocherens et al. 1999; Ellwood et al. 2004; Otte et al. 1993; Smith et al. 2007b; Toussaint et al. 1998
Italy		
Saccopastore	1929, 1935	Blanc 1958; Condemi 1988; Stringer 1990–91
Guattari Cave (Monte Circeo)	1939	Stringer 1990–91; Stringer et al. 1984
France		
Le Regourdou Cave	1957	Petit-Maire et al. 1971
L'Hortus Cave	1960–64	de Lumley 1972
Roc de Marsal	1961	Bordes & Lafille 1962; Madre-Dupouy 1992
Saint-Césaire (La Roche à Pierrot Rockshelter)	1979	Bocherens et al. 2005; Leroi-Gourhan 1984; Lévêque et al. 1993; Mercier et al. 1991; Trinkaus et al. 1999a; Trinkaus et al. 1998a; Vandermeersch 1984; Zollikofer et al. 2002
Moula-Guercy	1991 and later	Defleur et al. 1993; Defleur et al. 1999
Spain		
Zafarraya Cave	1983, 1992	Geraads 1997b; Hublin 1994; Hublin et al. 1995
El Sidrón Cave	1994, 2000, and	Fortea et al. 2003; Lalueza-Fox et al. 2005

		Golovanova et al. 1999; Skinner et al. 2005
Ukraine		
Kiik Koba ("Wild Cave"), Crimea	1924	Klein et al. 1971; Vlček 1975
Hungary		
Subalyuk Cave	1932	Arensburg et al. 1995; Smith 1984; Thoma 1971
Germany		
Ehringsdorf (= Weimar-Ehringsdorf)	1908–16, 1925	Blackwell & Schwarcz 1986; Cook et al. 1982; Grün et al. 1988; Grün & Stringer 1991; Smith 1984
Belgium		
Scladina Cave (Scalyn)	1993 and later	Bocherens et al. 1999; Ellwood et al. 2004; Otte et al. 1993; Smith et al. 2007b; Toussaint et al. 1998
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Moula-Guercy	1991 and later	Defleur et al. 1993; Defleur et al. 1999
Spain		
Zafarraya Cave	1983, 1992	Geraads 1997b; Hublin 1994; Hublin et al. 1995
El Sidrón Cave	1994, 2000, and	Fortea et al. 2003; Lalueza-Fox et al. 2005

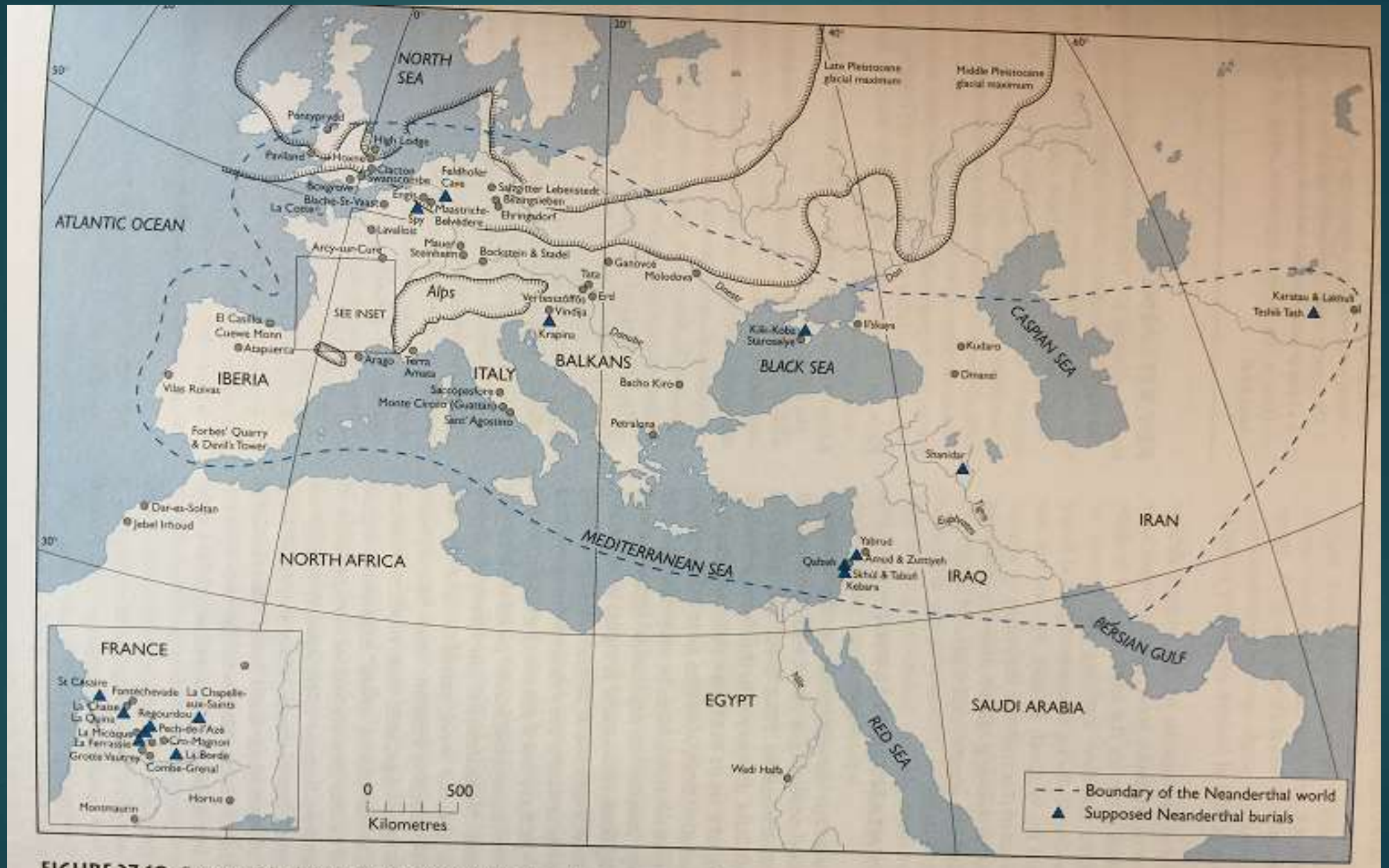
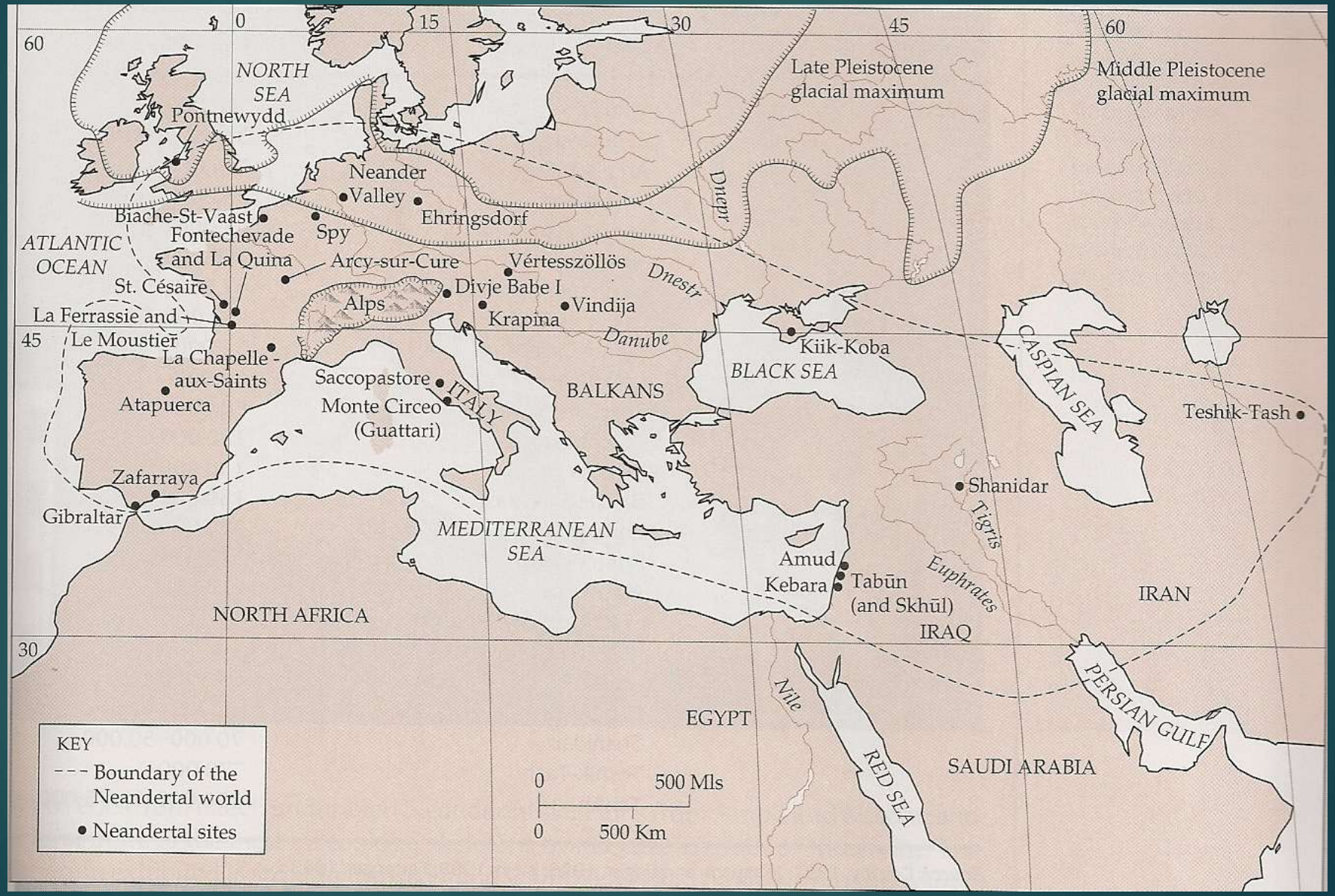


FIGURE 27.10 Geographical distribution: Neanderthal populations were confined to Europe, the Middle East, and western Asia


0
15
30
45
60
60
45
30
NORTH SEA
ATLANTIC OCEAN
Late Pleistocene glacial maximum
Middle Pleistocene glacial maximum
Pontnewydd
Neander Valley
Ehringsdorf
Biache-St-Vaast
Spy
Fontechevade and La Quina
Arcy-sur-Cure
Vértesszöllös
St. Césaire
Divje Babe I
Alps
Vindija
Krapina
La Ferrassie and
Le Moustier
La Chapelle-aux-Saints
Atapuerca
Saccopastore
Monte Circeo (Guattari)
ITALY
BALKANS
Kiik-Koba
BLACK SEA
Dnepr
Dnestr
Danube
CASPIAN SEA
Teshik-Tash
Shanidar
Tigris
Euphrates
IRAN
IRAQ
Zafarraya
Gibraltar
MEDITERRANEAN SEA
Amud
Kebara
Tabūn (and Skhūl)
NORTH AFRICA
EGYPT
Nile
RED SEA
PERSIAN GULF
SAUDI ARABIA
KEY
Boundary of the Neandertal world
Neandertal sites
0
500 Mls
0
500 Km

2017 New Zoo MS technique: Recent dating of 256 N sites

- N disappeared circa 39-40 Ka, with later survival in different parts of Europe;
- Newer Radiocarbon (Carbon 14) dating relies on removal of contamination via micro filtration; now C14 limit lies around 58,000 to 62,000 years
- Many original carbon datings were unreliable, based on collagen in bones; often gave much younger dating; i.e. Vindija Cave in Croatia; original dates of 28-32 Ka, overlap with MHs
- New technique, ZooMS (zooarchaeology by mass spectrometry) involves radiocarbon dating hydroxyproline—an amino acid taken from collagen samples found in bone remains; new Vindija dating 40 Ka, well before arrival of MHs
- Example: 50 Ka bone, contaminated with 1% modern human carbon, date would be 7000 years too young, i.e. date of 43 Ka

Thibaut Deviese, et al., 2017

Partial Record of Neandertal Sites

Geographic Area: Europe

Site	Age
Gibraltar	~28,000 (disputed)
Zafarraya	33,000 (older 27,000)
Arcy-sur-Cure	~34,000
St. Césaire	36,000-32,000
Vindija	~28,000 (now 40,000 dating via ZooMS)
Le Moustier	41,000
Neander Valley	~45,000
La Chapelle-aux-Saints	47,000
La Ferrassie	~50,000

Source: Conroy, 1997; Johanson and Edgar. 1996; Kle,ip. 1999; Tattersall,

Partial Record of N Sites

Geographic Area: Europe

Site	Age
Monte Circeo	52,000
La Quina	64,000
Spy	68,000
Saccopastore	120,000
Krapina	130,000
Biache-St.-Vaast	180,000-130,000
Ehringsdorf	225,000
Pontnewydd	~225,000
Atapuerca (Sima de los Huesos)	~430,000

Partial Record of N Sites

Geographic Area: Near East

Site	Age
Amud	~50,000
Kebara	65,000-47.000
Shanidar	70,000-50,000
Teshik-Tash	~70,000
Tabün 1	50,000 (?)—75,000

Neandertals: Locations

- Neanderthals lived in a variety of environments, from the colder regions of Northern Germany and Siberia's Altai Mountains to the warmer regions of Mediterranean Gibraltar and the Levant.

- Later N subjected to sustained periods of very cold weather; a tundra landscape

34 Neandertal Sites in Spain

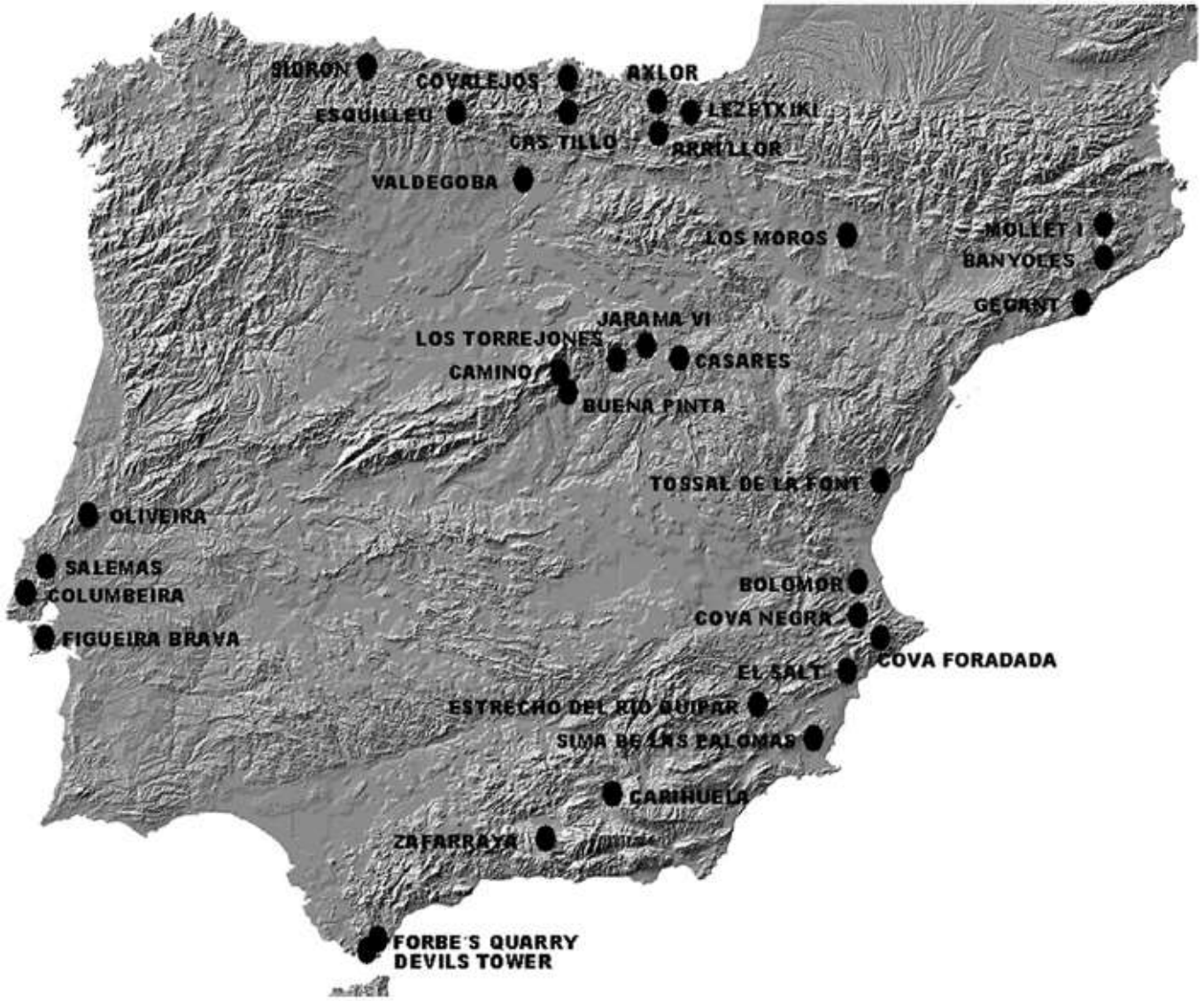


Figure 5. Distribution of the Neanderthal remains in Iberia.

Pontnewydd Cave in Wales - Uranium-Series

- Found bones, teeth, flint, stone axes, scrapers
- Dated to 225 Ka - Uncovered Neandertal hunter-gatherer & his children

Neandertal range = 5700 miles; but "thin on the ground"

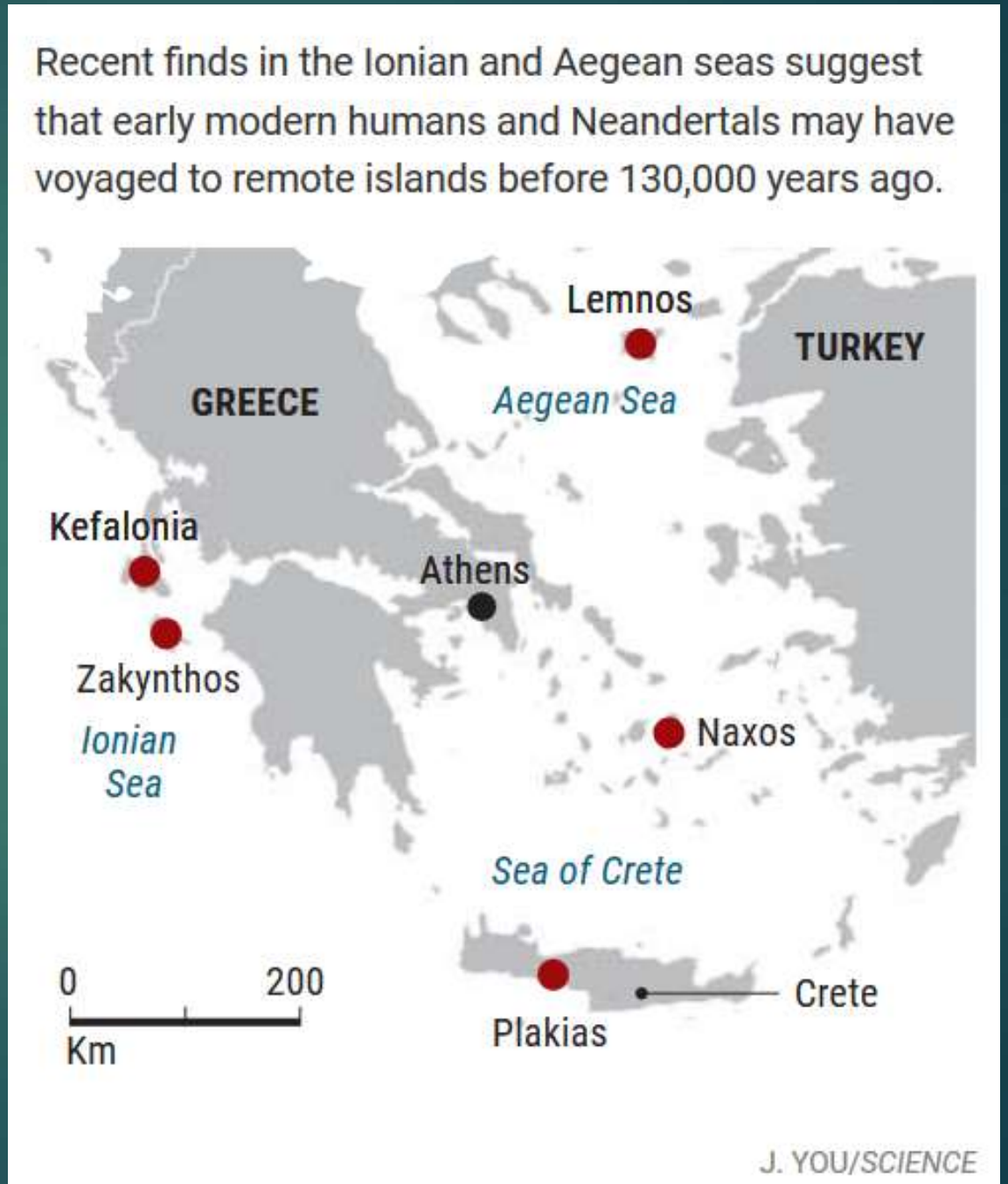
- N range:
  - Gibraltar to Kebara, Israel = 2500 miles
  - Shanidar, Iraq (70-40 Ka) = 600 miles
  - Teshik-Tash, Uzbekistan (70 k) = 600 miles
  - Okladnikov Cave (30 k) & Denisova Cave, Siberia = 2000 miles
  - Total of 5700 miles W to E; Neandertals ranged over an area of ~10 million km^2 ; Africa = 11.7 million km^2

- Ns reached about same distance on east-west axis as Homo sapiens achieved on north-south axis in Africa

N Range 2

- Western Europe was one-fifth the size of their estimated total range but contained three-quarters of all of the sites which have yielded Neandertal remains
- No unambiguous Neandertal sites are known from areas above 53° north, in western Europe (Sweden/Norway); no skeletal finds are known from Africa
- A process of repeated phases of colonization, regional extinction, and recolonization, affecting their limited genetic variation
- Genetic studies show that (late) Neandertal populations had small effective population sizes and were inbred. They were “thin on the ground”. Not enough to fill a football stadium per John Hawks.

Neandertal Island hopping



N on Mediterranean islands

- Their distinctive “Mousterian” stone tools are found on the Greek mainland and, intriguingly, have also been found on the Greek islands of Lefkada, Kefalonia, Zakynthos, and Crete (130 K-35 K).

- That could be explained in two ways:
  - either the islands weren’t islands at the time; disproved; Crete has been an island for 5M years
  - Ns crossed the water somehow.

George Ferentinos, et al., 2012

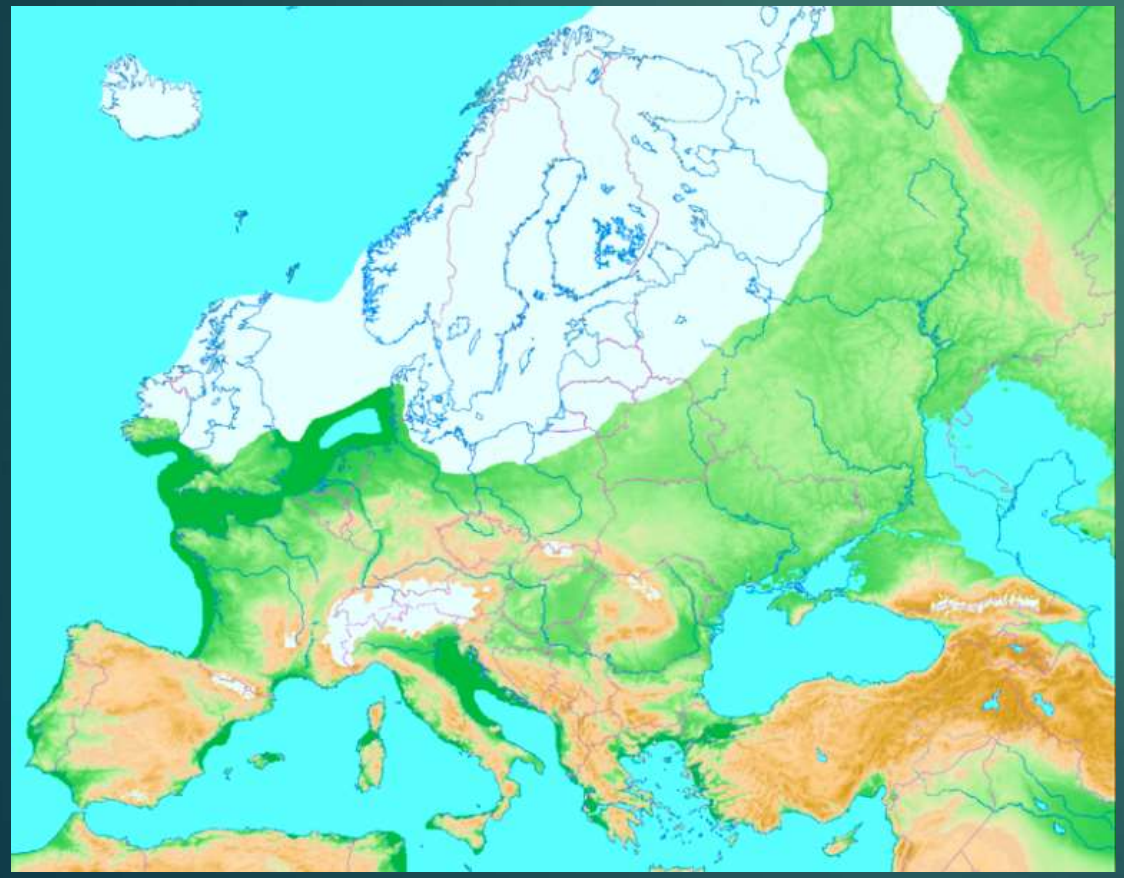
More Ns on Mediterranean

- Then in 2008 and 2009, Thomas Strasser of Providence College in Rhode Island co-led a Greek-U.S. team with archaeologist Curtis Runnels of Boston University and discovered hundreds of stone tools near the southern coastal village of Plakias. The picks, cleavers, scrapers, and bifaces were so plentiful that a one-off accidental stranding seems unlikely
- The artifacts resemble Acheulean tools developed more than a million years ago by *H. erectus* and used until about 130,000 years ago by Neandertals as well.
- Strasser argued that the tools may represent a sea-borne migration of Neandertals from the Near East to Europe.
- The team used a variety of techniques to date the soil around the tools to at least 130,000 years old,

Mousterian tools on islands: a quarry site littered with Mousterian stone tools.

- Possible Neandertal artifacts have turned up on a number of islands, including at Stelida on the island of Naxos. Naxos sits 250 kilometers north of Crete in the Aegean Sea; even during glacial times, when sea levels were lower, it was likely accessible only by watercraft.
- Uncovered hundreds of tools embedded in the soil of a chert quarry. The hand axes and blades resemble the Mousterian toolkit. Naxos evidence may be persuasive because it is well stratified, which means researchers should be able to date it more securely.
- Other Paleolithic tools that appear to be Mousterian have been recovered on the western Ionian islands of Kefalonia and Zakynthos. The plethora of sites adds weight to the idea of purposeful settlement.

LGM: The ice sheets profoundly affected Earth's climate by causing drought, desertification, and a large drop in sea levels. The ice sheets reached their maximum coverage about 27 Ka. Northern Europe was largely covered by ice, the southern boundary of the ice sheets passing through Germany and Poland. Permafrost covered Europe south of the ice sheet down to Southern Hungary. Ice covered the whole of Iceland and almost all of the British Isles



Extent of Alpine glaciation during the Würm ice age.

Ice Ages

Marine isotope stage	Time ago (ka) [14]	Regional names			
		Alpine region	Great Britain	N. Europe	E. Europe
MIS 14	563-533	Günz[15]	Cromer[18]	Cromer[15]	
MIS 13	533-478	Günz[15]	Cromer[18]	Cromer[15]	
MIS 12	478-424	Günz[15] Mindel[22] ?	Anglia[18]	Elster[20] Cromer[15] ?	
MIS 11	424-374	Günz[15] ?	Hoxne[16]	Holstein[16] Cromer/Rhume[15] ?	
MIS 10	374-337	Mindel[15] ?	Wolston[16]	Elster[15][20] ?	
MIS 9	337-300	Mindel-Riss[15] ?	Wolston[16] Purfleet[24]	Holstein[15] ?	
MIS 8	300-243	Riss[15]	Wolston[16]	Saale/Fuhne[15]	
MIS 7	243-191	Riss[15]	Wolston[16] Aveley[24]	Saale/Dömnitz[15] Belvedere[25]	
MIS 6	191-130	Riss[15]	Wolston[16]	Saale/Drenthe,Warthe[15]	
MIS 5e	123 (peak)	Riss-Würm[15]	Ipswich[16]	Eem	
MIS 5d	109 (peak)	Würm[15]	Devens/Early D.[26]	Weichsel/Herning[27]	
MIS 5c	96 (peak)	Würm[15]	Devens/Early D.[26]	Weichsel/Brørup[27]	
MIS 5b	87 (peak)	Würm[15]	Devens/Early D.[26]	Weichsel/Rederstall[27]	
MIS 5a	82 (peak)	Würm[15]	Devens/Early D.[26]	Weichsel/Odderade[27]	
MIS 4	71-57	Würm[15]	Devens/Middle D.[26]	Weichsel/Middle W.[27]	
MIS 3	57-29	Würm[15]	Devens/Middle D.[26]	Weichsel/Middle W.[27]	
MIS 2	29-14	Würm/LGM	Devens/Dimlington	Weichsel/LGM	
MIS 1	14-present	(Holocene)	Flandria	Flandria (Holocene)	

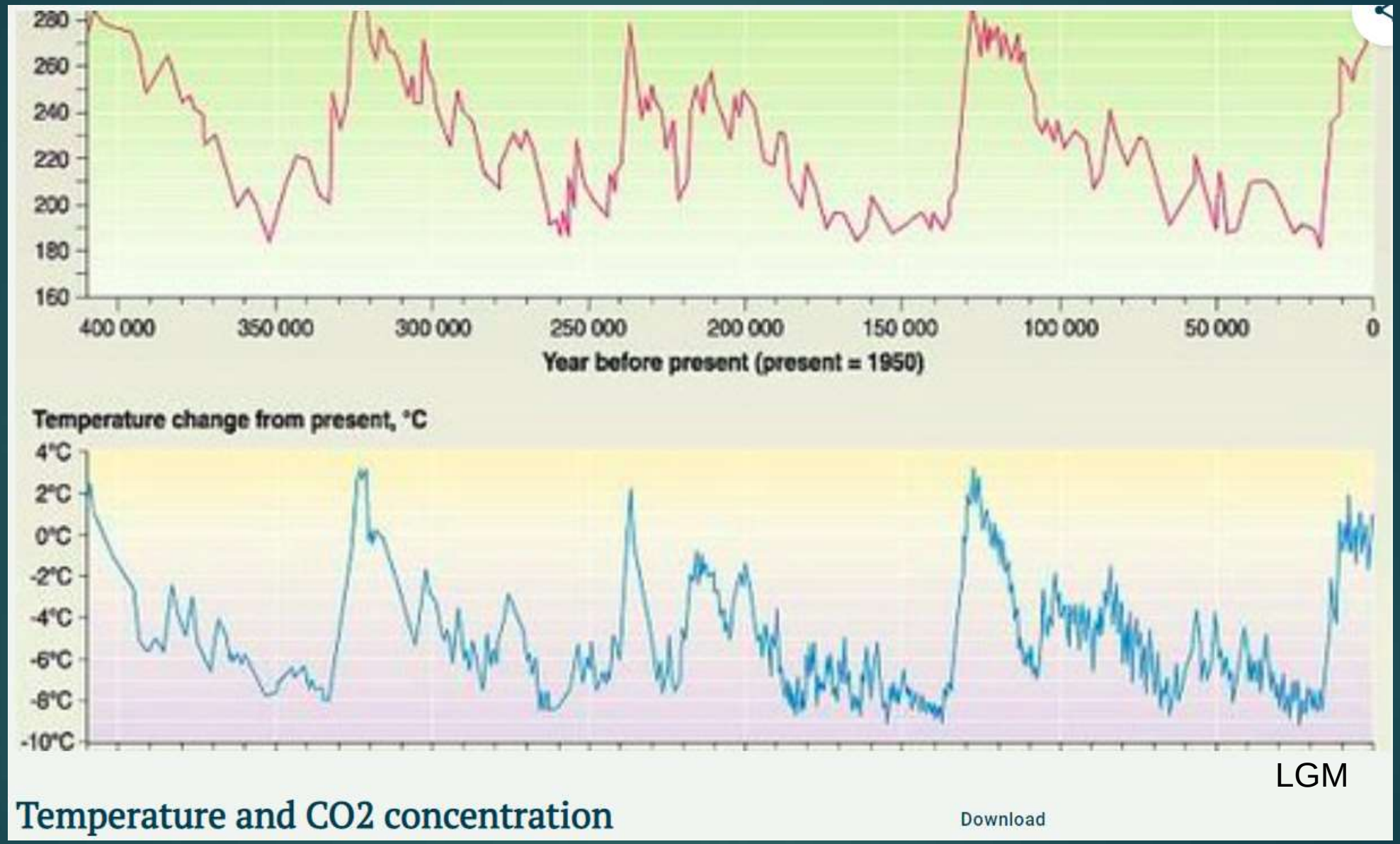
Glacial – Sima de los Huesos
Warm

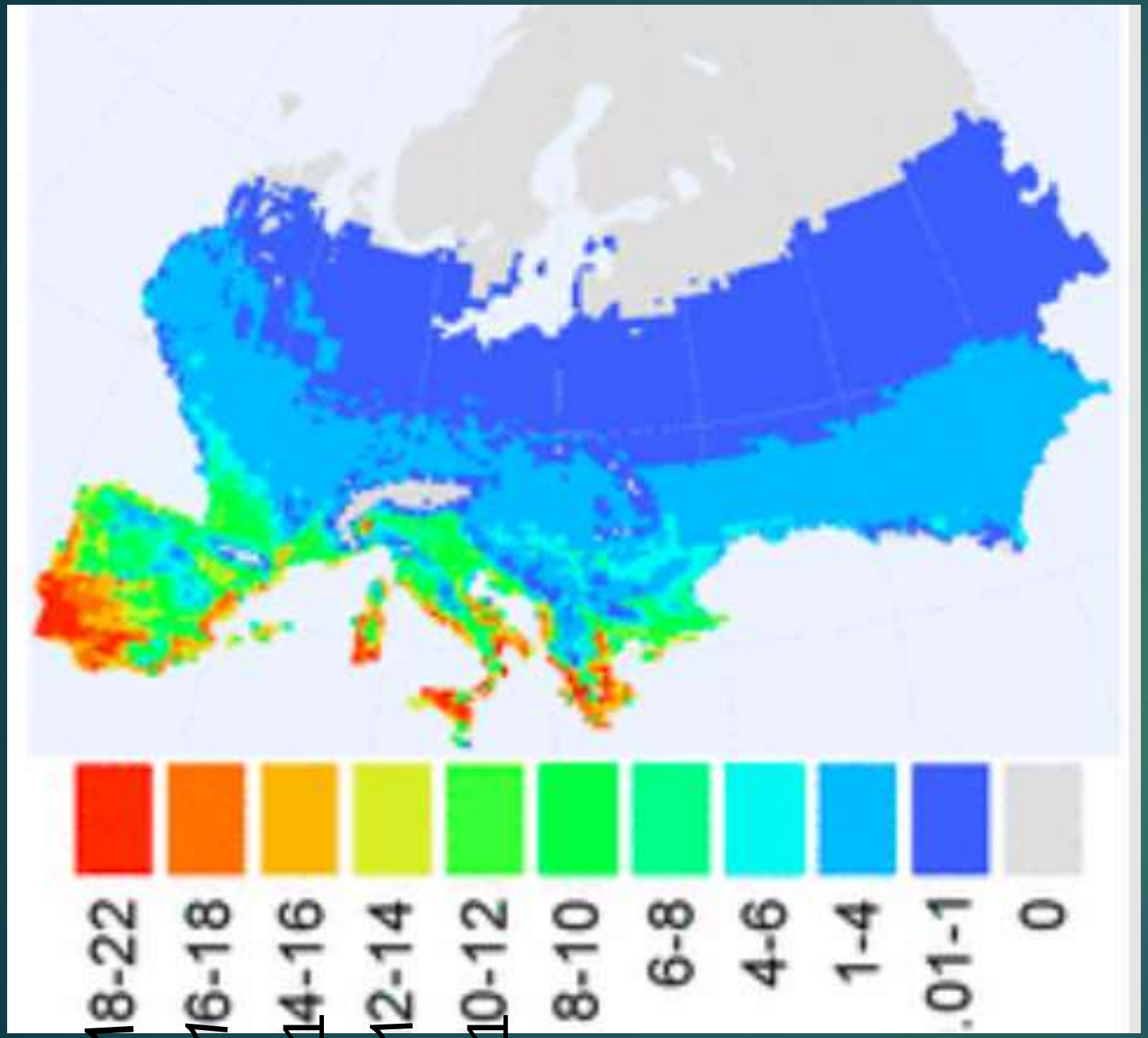
- Glacial
- Warm

Table explanation
Extensive interglacial (similar to Holocene)
Moderate interglacial
Intermediate climate
Moderate glaciation
Extensive glaciation (similar to LGM)

Neandertal extinction

Last Glacial Maximum: 48 °F global temp.


280
260
240
220
200
180
160
400 000
350 000
300 000
250 000
200 000
150 000
100 000
50 000
0
Year before present (present = 1950)
Temperature change from present, °C
4°C
2°C
0°C
-2°C
-4°C
-6°C
-8°C
-10°C
LGM
Temperature and CO2 concentration
Download



Mean population density (people/100 km^2) between 30 and 13 Ka: Hominins like warmer weather

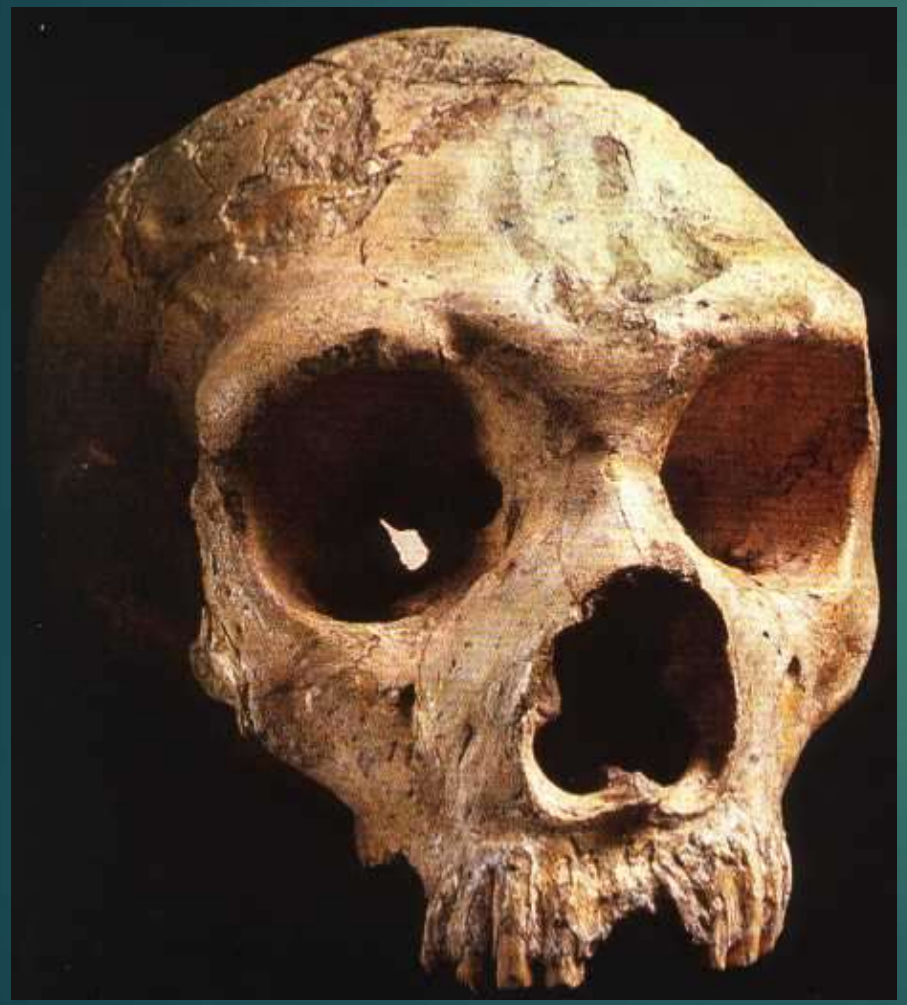
Last 4 Neandertal Strongholds

- Last populations of Neanderthals were concentrated in four strongholds
- (1-4 in order of importance). The south of Iberia stands out as the largest stronghold and it is within this area that the last Neanderthals survived.

The last N refuges

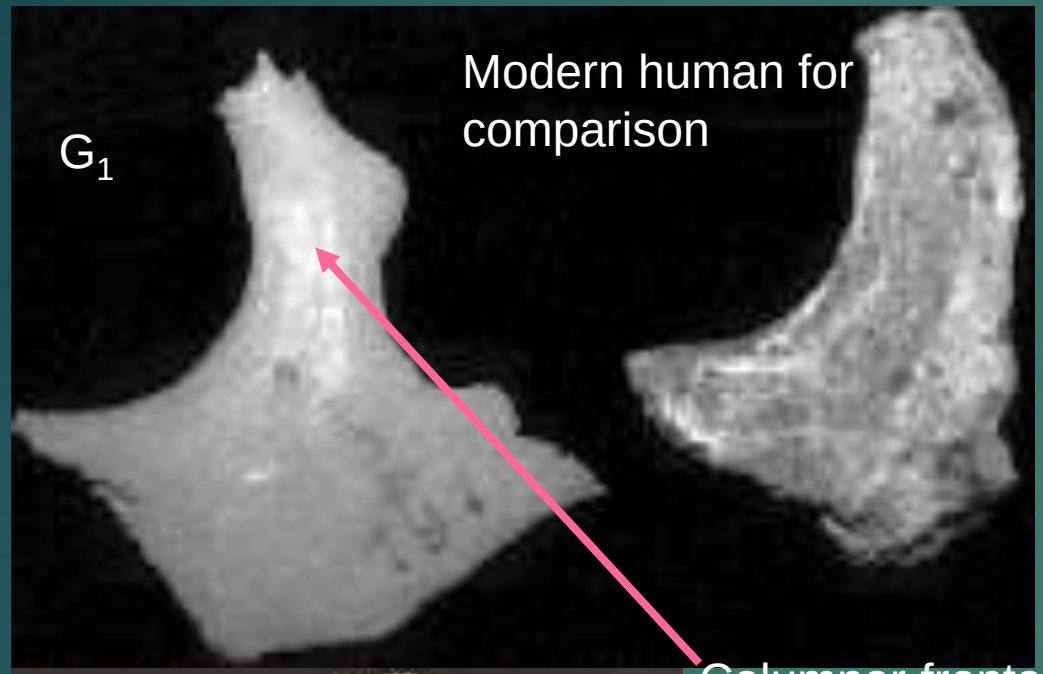
Neandertals survived latest in southern Spain

Forbes Quarry, Gibraltar

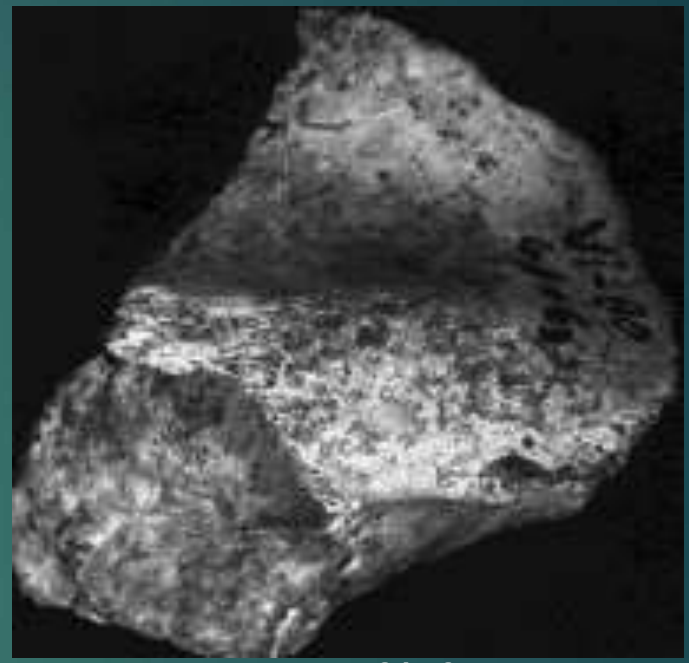


Zaffaraya, Andalusia
33.4 ka

- And in Croatia (40 Ka)

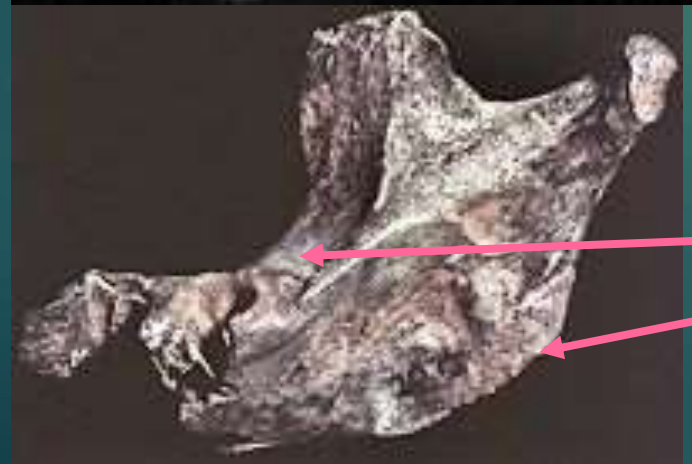


Vindija Layer G_1 28-29 ka



Part of left s-o torus

Columnar frontal process of malar



Retromolar space
Truncated jaw angle

Vindija are small in size but seem to show no other atypical features

Late Mousterian Persistence near the Arctic Circle: 31-34 Ka

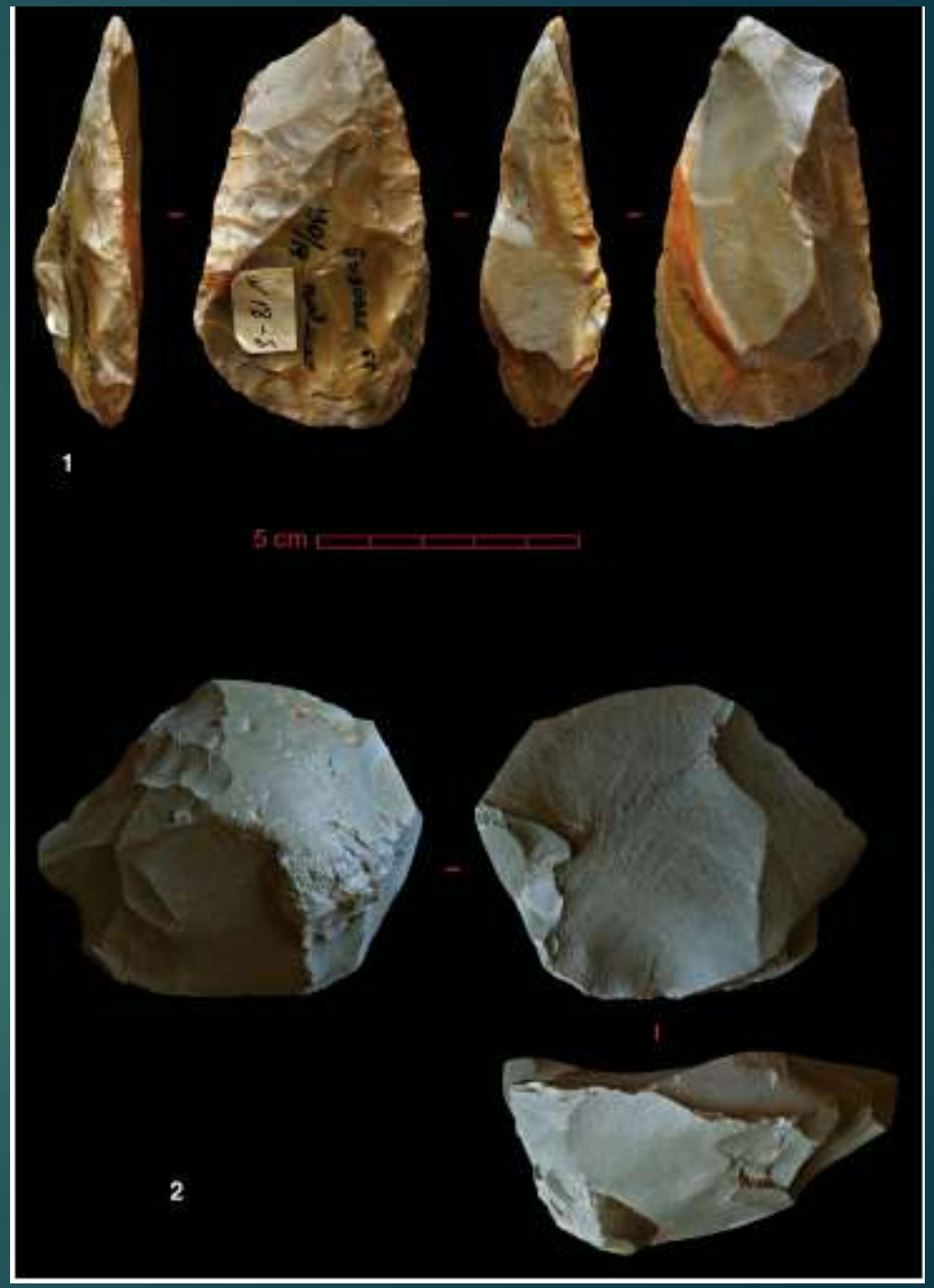
- Paleolithic sites in Russian high latitudes have been considered as Upper Paleolithic and thus representing an Arctic expansion of modern humans.
- Here we show that at Byzovaya, in the western foothills of the Polar Urals, the technological structure of the lithic assemblage makes it directly comparable with Mousterian Middle Paleolithic industries that so far have been exclusively attributed to the Neandertal populations in Europe. Radiocarbon and optical-stimulated luminescence dates on bones and sand grains indicate that the site was occupied during a short period around 31,000 to 34,000 calendar years ago, at the time when only Upper Paleolithic cultures occupied lower latitudes of Eurasia.
- Byzovaya may thus represent a late northern refuge for Neandertals, about 1000 km north of earlier known Mousterian sites.

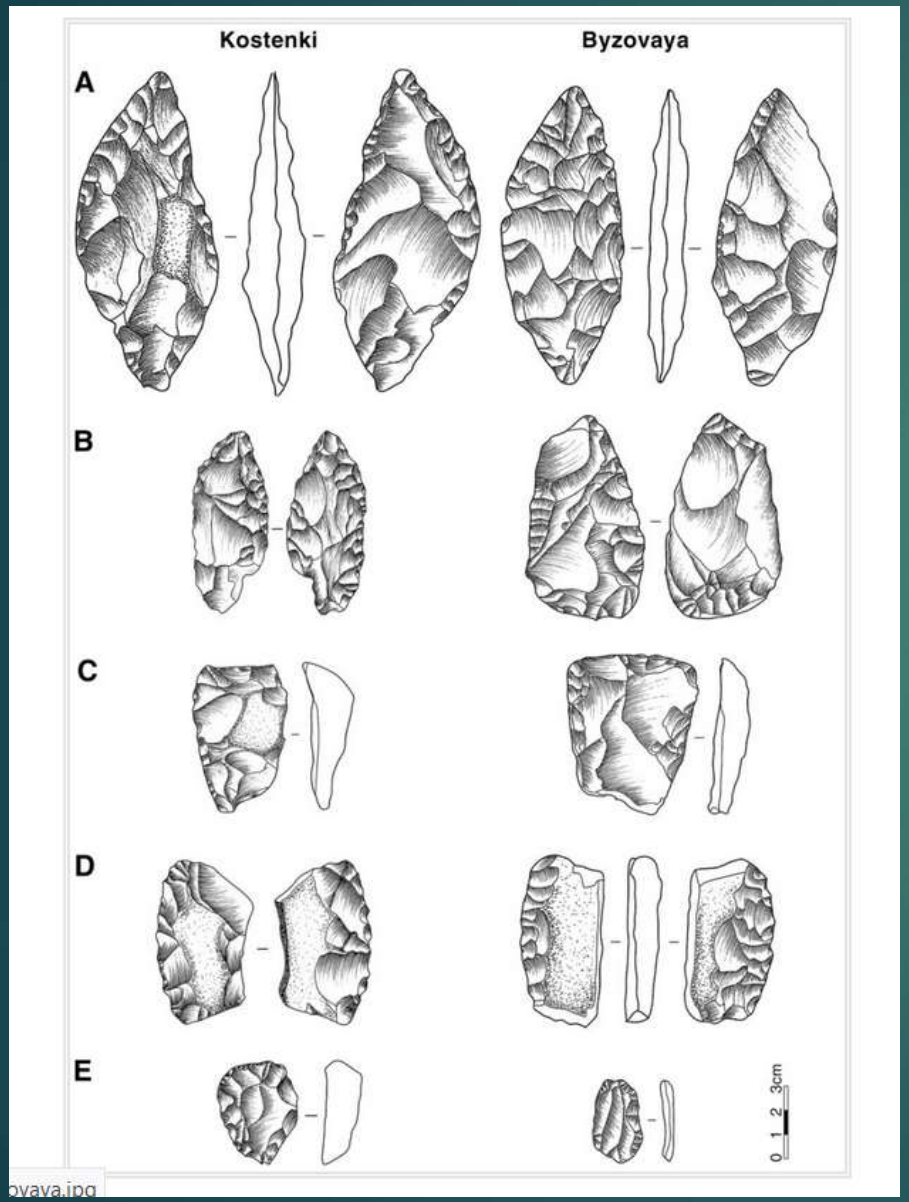
Ludovic Slimak, et al., 2011


Barents Sea
Max. ice sheet extent (MIS2)
Kara Sea
Gorham's cave
Zafarraya
Vindija
Mamontovaya Kurya
Byzovaya
Moscow
Sungir
Garchi
Zaozer'e
Kostenki
Mezmaiskaya
Okladnikov
Yana
Lena
Arctic Circle
Yenissei
Ob
Pechora
Usa
Ural Mountains
Don
Area with previous finds of Neanderthal remains
Late Neanderthal sites
Other Palaeolithic sites

313 lithic artefacts at Byzovaya

- Industry consists of flakes, 11 cores, and as many as 80 defined typological tools. End products are well represented for a collection of this size (80 out of 313). The cores were used exclusively for flake production. Four pieces are typical Levallois cores, a flaking method that is considered to be a distinctive feature in MP assemblages.
- No UP tools
- Typological tools are mainly members of the Mousterian group, dominated by distinctive side-scrapers made out of flakes; belong exclusively to MP traditions from Central and Eastern Europe
- 97% of the identified faunal remains are from mammoth
- Most researchers agree that classical Mousterian industries in Europe were exclusively produced by Neandertals
- Challenges the hypothesis that there was a complete replacement of the MP societies in all of Europe as early as around 37,000 cal yr B.P..





Comparison between Streletskayan assemblages from Kostenki 1 level V (A), Kostenki 12 level III (B to E), and Byzovaya. All Mousterian tools described by Slimak et al. occur in Streletskayan assemblages. (A) Leaf point. (B) Bifacial knife (with scalar retouch). (C) Mousterian scrapers. (D) Quina-type side-scrapers. (E) End-scrapers. Source: Zwyns, N. et al, 2012 (see reference #2)

Lithic artefacts at Byzovaya

- In association with the lithic assemblage, 4,000 bones from large herbivores were found, 97% of which are 21 mammoth individuals *(Mammuthus primigenius)*. But there are no human remains. The site is 550 m2 and had different excavations since 1965.
- It is dated to 31-34 ka. The tool collection was proposed to be Mousterian, because of the use of Levallois and discoid techniques, and the retouches in the form of scrapers and notches.
- Paleogenetics indicates the presence of modern humans in the region 31 ka, contemporary to the Byzovaya collection.
- In contrast, the next oldest Neandertal remains in Eurasia are at least 7,000 years previous to Byzovaya. Therefore, the approach of Byzovaya as a Neandertal site would mean expanding the range of this species more than 1,000 km north, with no other evidence in intermediate areas, and assuming that c. 38,000 years ago some Neandertal groups would arrive there, would live contemporary with close presence of modern humans for more than 5,000 years, and left no known human remains in the fossil record.

Last surviving Neanderthals: 4 caves in Gibraltar

- Clive Finlayson about Gorham's cave at Gibraltar: "It was in some way Neanderthal city," he says. "This was the place with the highest concentration of Neanderthals anywhere in Europe."
- Their occupation in Gibraltar was first established in 1848, with the discovery of the first fully adult Neanderthal skull.
- The youngest Neanderthal populations lived at Gibraltar as recently as 24,000 to 28,000 years before the present.
- Paul Mellars, a professor of prehistory and human evolution at Cambridge University, said he believes the range of radiocarbon dating evidence in the paper suggests ages more like 31,000 or 32,000 years for the charcoal. Contamination by younger material might have skewed some radiocarbon results toward more recent dates, he observed.

Earlier Neanderthal remains found in Gibraltar include a female skull (Nana) discovered in Forbes's Quarry in 1848 and a child’s skull (Flint) discovered in Devil’s Tower rock shelter in 1926.

Gibraltar, Southern End

- Multiple caves, a Neandertal city, N Shangri-La
- Sea level was significantly lower than current cave entrance; a plain 80 meters below current opening; coast 4-5 Km out; sea floor now was land then; with a freshwater lagoon (there are still outlets in current sea floor)
- Lived there for 100K, until 28 Ka (dated campfire); one of the most recent survival N areas
- 100s of stone tools
- Diet: shellfish, fish; Mousterian Paella (minus the rice); Marine resources: in 1 meter area of cave: 2 dolphins, 1 tuna, mussels
- Then at 28 K, with Last Glacial Maximum, a series of droughts, periods of dryness and N disappear here

Gibraltar

- Climatic conditions were variable; sometimes changing in 10 years
- an environmental crisis would have lead to a population crash; circa 30 Ka worst drought in 250 K

Gibraltar: Last Refugia

Sea erosion Caves in Gibraltar

Gibraltar: Gorham’s and Vanguard caves

Neandertals inhabited this cave on and off for 100 K

Credit Jaap Scheeren for The New York Times

Gibraltar Caves

Now a UNESCO world heritage site!

Gorham's Cave complex, Gibraltar

Gibraltar

Gibraltar

Cave area in pre (bottom) and post (top) N times.

125 K ago, sea level was 120 meters lower; there was a large coastal plane, with shoreline was 4.5 km away

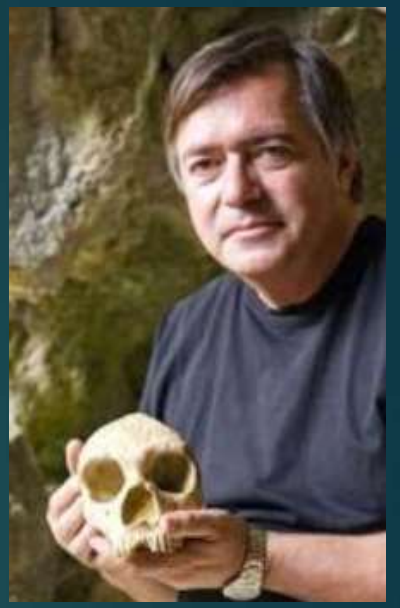
40 Ka: grasslands covered miles outside caves

Caves in Rock of Gibraltar

Gibraltar

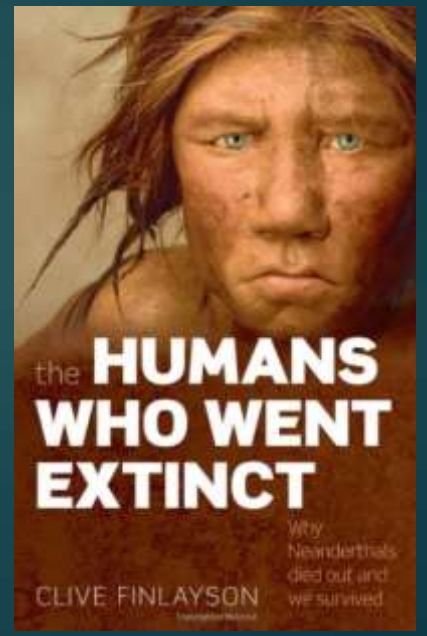
Gibraltar

Clive & Geraldine Finlayson: Defenders of Neanderthal Abilities



- English ornithologist & paleontologist
- Director, Heritage Division, Gibraltar Museum
- Co-director (with C.B.Stringer, J. Rodriguez Vidal and F.Giles Pacheco) of the Gibraltar Caves Research Project 1991-present

- Gorham's Cave, Gibraltar contains the most recent Mousterian assemblages known to date (Finlayson et al. 2006). Finlayson has described it as "the longest and most detailed record of [Neanderthals'] way of life that is currently available."
- Neanderthals inhabited Gorham's Cave on and off for 100,000 years, as well as a second cave next to it, called Vanguard Cave.
- In 28 years, no N fossils; 20 other caves & coastline underwater now



2017: 1st N tooth at Vanguard Cave

- The upper right canine milk tooth was found in Vanguard Cave and researchers believe it belonged to a four or five-year old Neanderthal.
- Although the Gorham's complex has produced archaeological and paleontological evidence of Neanderthal occupation spanning more than 100,000 years, it has never before yielded Neanderthal remains.

Dated to 51 Ka

Finlayson: Mousterian site of Gibraltar

- Gibraltar: southern refuge of Ns, there for at least 100 K years
- Ns = successful hunters, exploitation of marine resources
- Fossils of 151 species of birds (25% of all European species) found in caves; monk seals, bottle nosed dolphins, limpets, mussels, clams, moles, bats, rodents
- Materials discovered: pollen (types of vegetation incl. olive, pine trees), charcoal (nearby material), pinecones and nuts, amphibians (cave temperature), fish scales, hearths, stone tools (phytoliths identif. wood)
- Vanguard cave totally filled by dunes; evidence of N presence; Gorham's cave dunes never reached the top (Lowest N level IV, sapiens levels, Phoenician level (ceramics))

Neanderthals & Corvids

Clive Finlayson models griffon plumage. The ulna was removed from the carcass with a flint tool and the feathers left intact. Most of the birds Neandertals used were smaller and thus perhaps better suited to headdresses. Image: Kate Wong

- 2012 *PLOS ONE study:* review of 1699 fossil sites in Eurasia and north Africa spanning the Pleistocene epoch.
- Neandertals across western Eurasia were strongly associated with corvids and raptors (black vultures and their relatives)—more so than were the anatomically modern humans who succeeded them.

Bonelli's eagle is one of the raptor species Neandertals hunted, presumably for its dark feathers. Image: Clive Finlayson

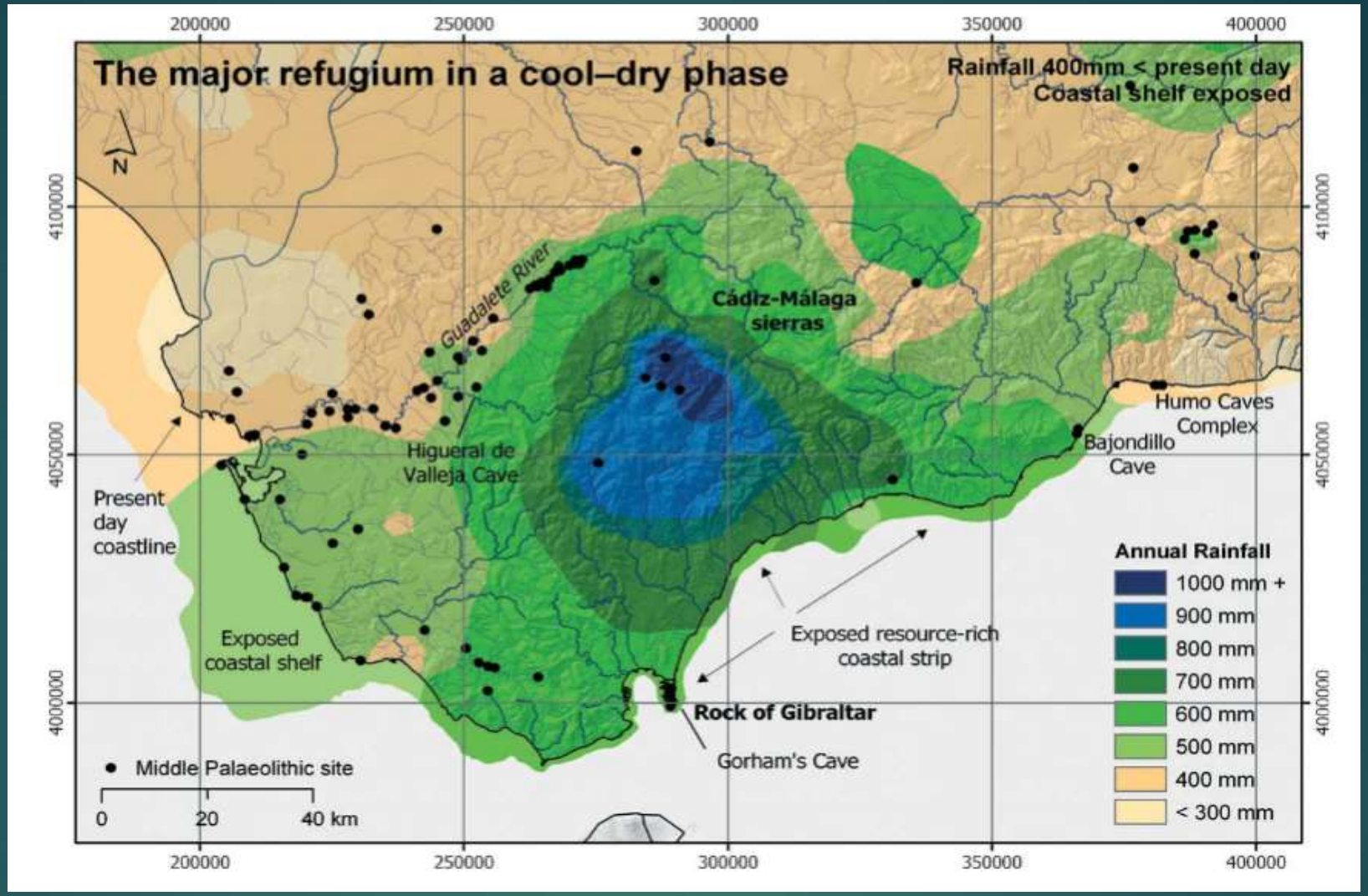
Nana, Gibraltar 1

Nana

Flint, Gibraltar 2

Flint

Importance of Rain:
Southern Iberia as a glacial refugium for Neanderthal populations during the late Pleistocene.



- In terms of the Neanderthals, two core refugia have been identified as crucial to their late survival: a resource-rich major refugium containing Gorham's Cave; and an upland refugium within the Betic Mountains.
- A characteristic of both refugia was their receipt of adequate levels of rainfall, even during the most arid climatic scenarios modelled. This strongly suggests that high precipitation was the key underlying factor in the late survival of Neanderthal populations in southern Iberia.

- Start

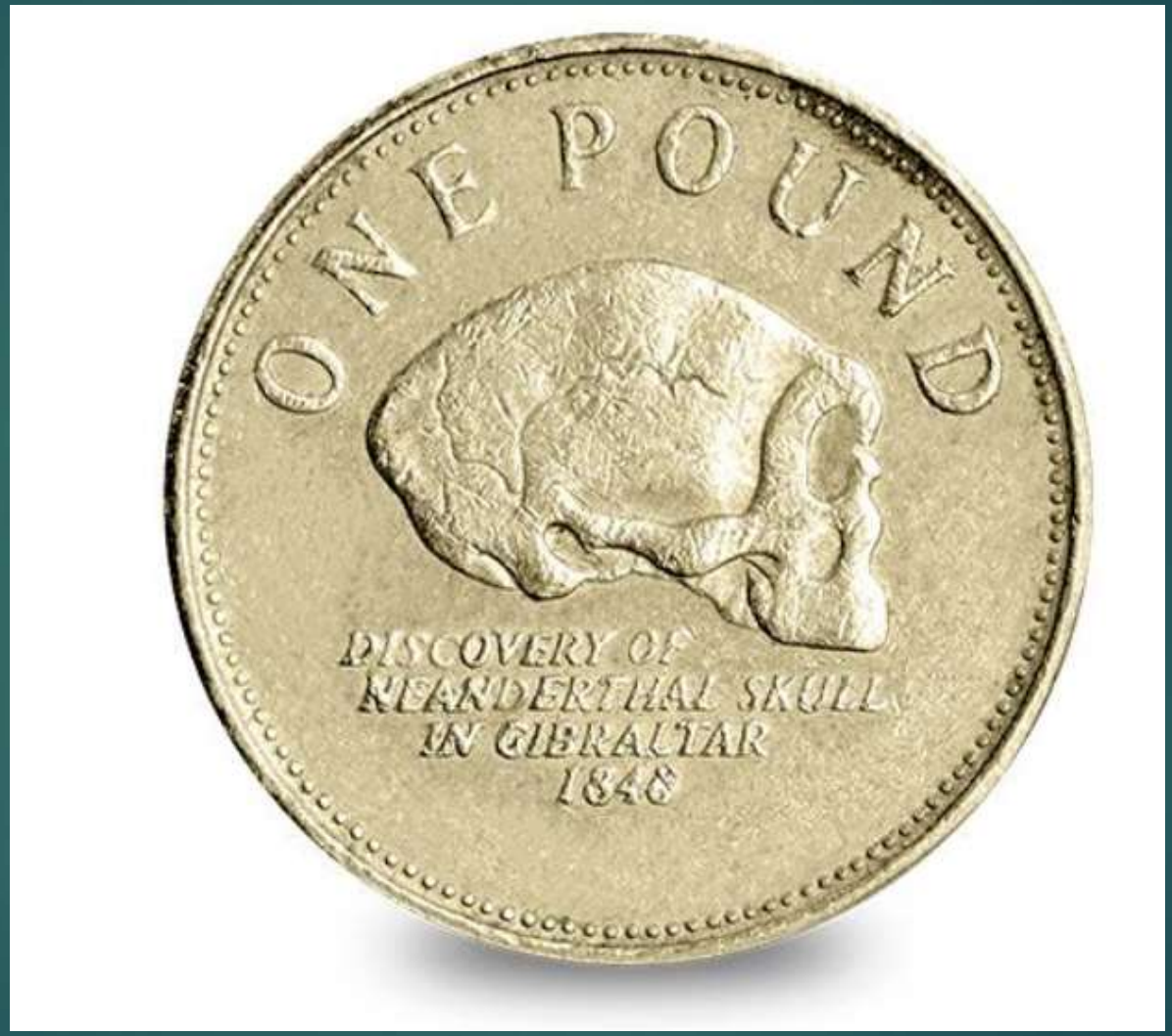
Gibraltar Ns: Diet

- Ancient pollen data and animal remains recovered from Gibraltar indicate Neanderthals had access to a variety of habitats—woodlands, savannah, salt marshes and scrub land—that provided a wealth of food options.
- In addition to hunting deer, rabbits and birds, these Neanderthals enjoyed eating monk seals, fish, mussels and even dolphins on a seasonal basis.

Gibraltar Ns: Diet

- Remains from the cave suggest that they exploited seafood and marine mammals.
- This is unsurprising given new evidence published in January 2020 that suggests they could swim.
- There is even evidence that they hunted or scavenged dolphins. How they did so remains unclear, but we do know they hunted – or scavenged – large game like woolly mammoths, woolly rhinos, deer and ibex.
- The remains of more than 151 different species of bird have also been uncovered in Gorham's cave, many with tooth and cut marks, which suggests Neanderthals ate them.
- There is even evidence they caught birds of prey, including golden eagles and vultures

Gibraltar **£1** coin



“Discovery of Neanderthal skull in Gibraltar 1848”

Cueva Antón, 37 Ka; recently challenged

- The late persistence in Southern Iberia of a Neandertal-associated Middle Paleolithic is supported by the archeological stratigraphy and the radiocarbon and luminescence dating of three newly excavated localities in the Mula basin of Murcia (Spain). At Cueva Antón, Mousterian layer I-k can be no more than 37,100 years-old. At La Boja, the basal Aurignacian can be no less than 36,500 years-old.

Conclusion: Need fossils

- Fossils are needed to resolve the issue of the late survival of Neanderthals in Southern Spain. Lithic evidence is not sufficient to support their presence or disappearance.