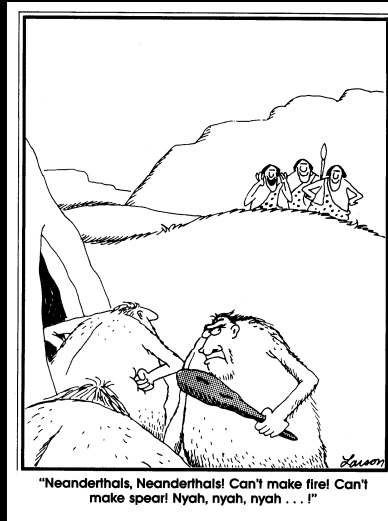
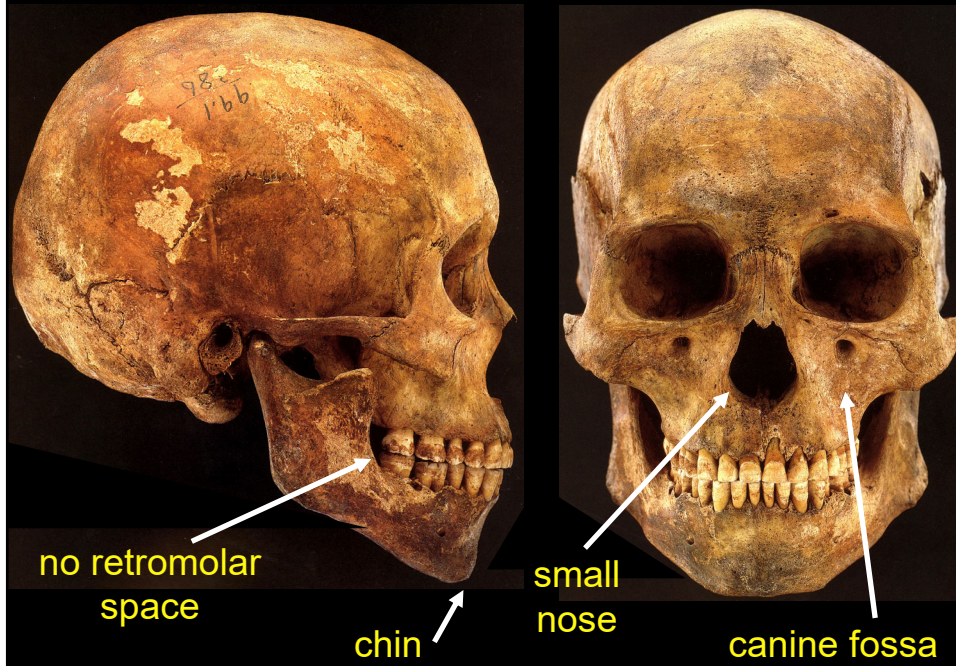


Origins of anatomically modern humans

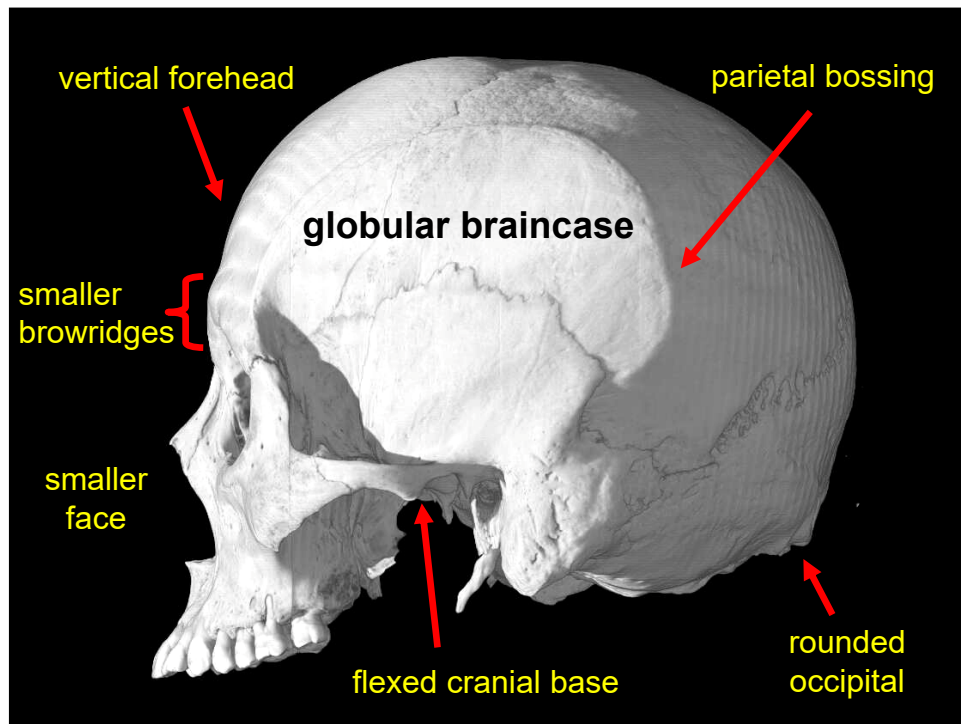


1

anatomically modern humans - *Homo sapiens sapiens*

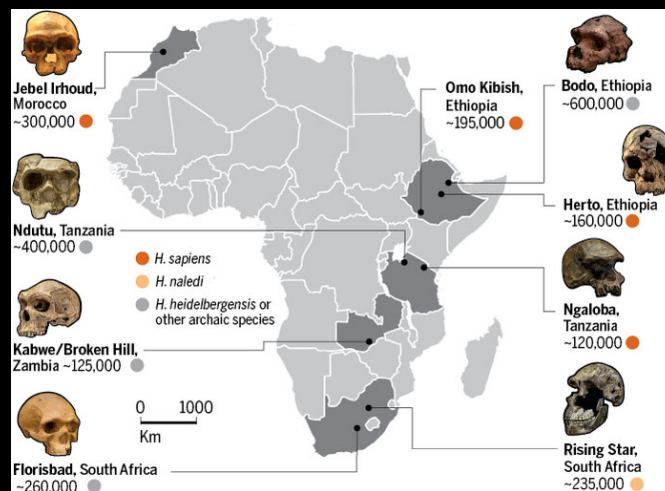


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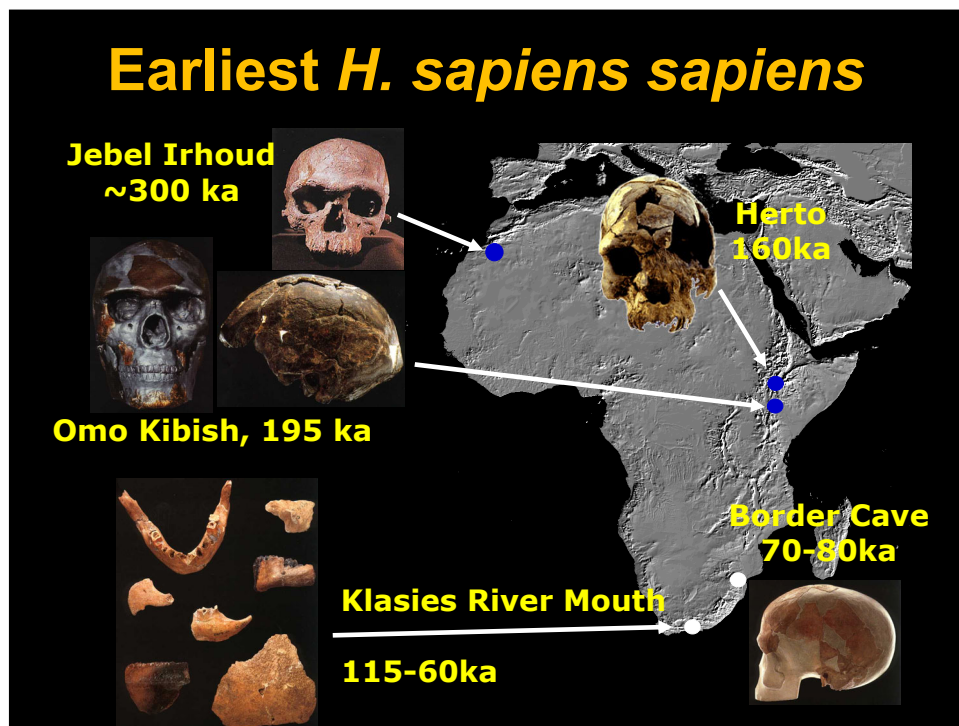


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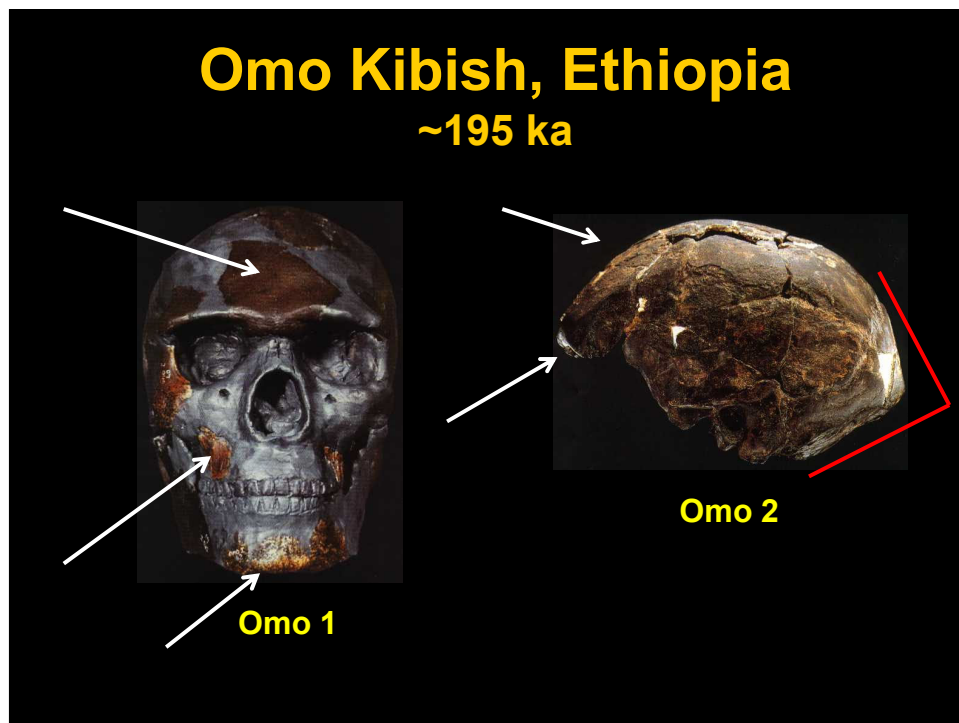
Fossil hominins 300-100 Ka in Africa



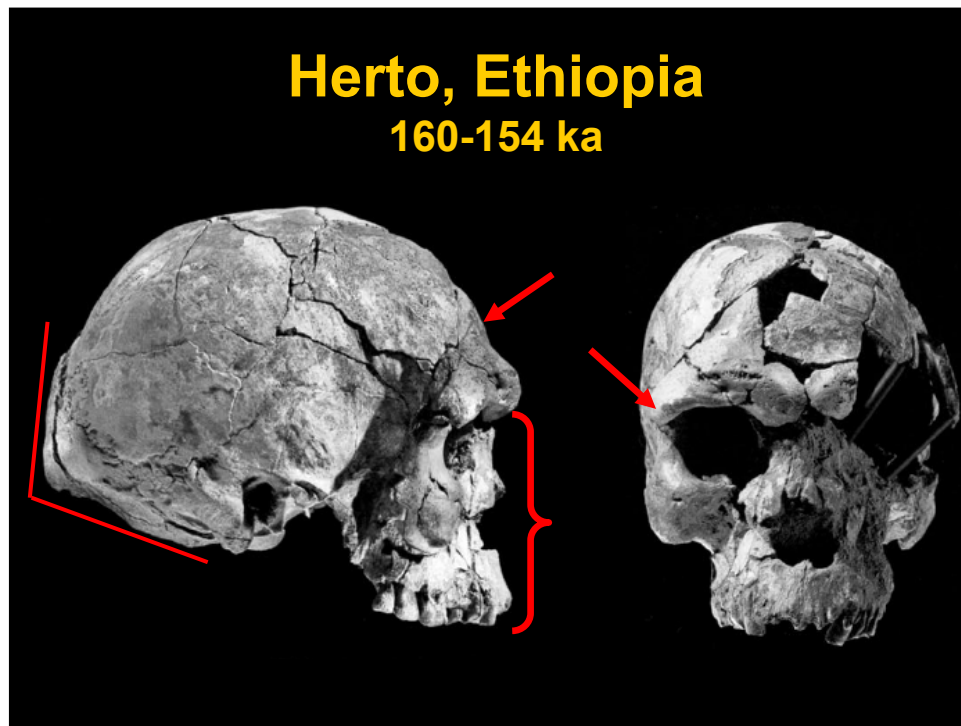
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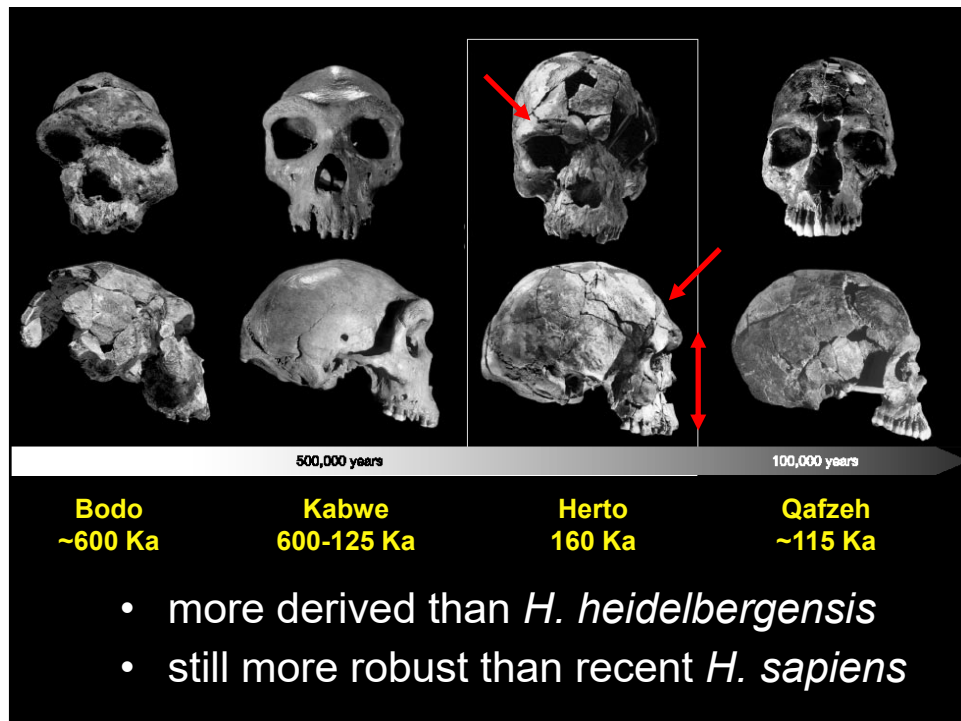
5



6



7



8

Levant



AMHs & Neanderthals inhabited for thousands of years:

- **Misliya** (196 ka) – earliest AMH outside of Africa!
- **Tabun** (127 ka) – Neanderthals
- **Qafzeh & Skhul** (130-90 ka) - AMHs
- **Kebara & Amud** (60-55 ka) - Neanderthals

9



Skhul 130-100 ka

- 10 individuals (M, F & C)
- Deliberate burials



Qafzeh 120-90 ka

- 14 AMH individuals
- Elaborate burials

10

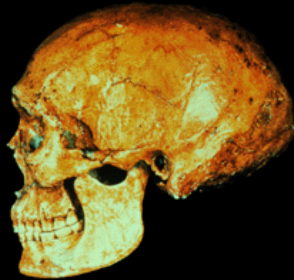


- Fuyan Cave, Daoxian, Hunan Province, southern China (2015)
- 47 anatomically modern human teeth, abundant fauna
- At least 80ka, possibly as early as 120ka!



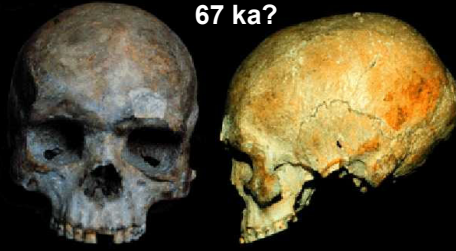
East Asia

- Yamashita-cho, Okinawa
– 32 ka



Upper Cave, Zhoukoudian
29-24 ka

Liujiang
67 ka?



Tianyuan Cave, Zhoukoudian
42-39 ka

13

Niah Cave, Borneo



- Dated to 45-39 ka
- Earliest firmly dated AMH skeleton in Southeast Asia



14



Australia: Lake Mungo

- Controversial dating (62-28 ka)
- Most likely around 40 ka
- **Gracile**: later fossils (Kow Swamp) and recent indigenous Australians more robust
- Covered with **red ochre**
- **Repatriated** in 2017

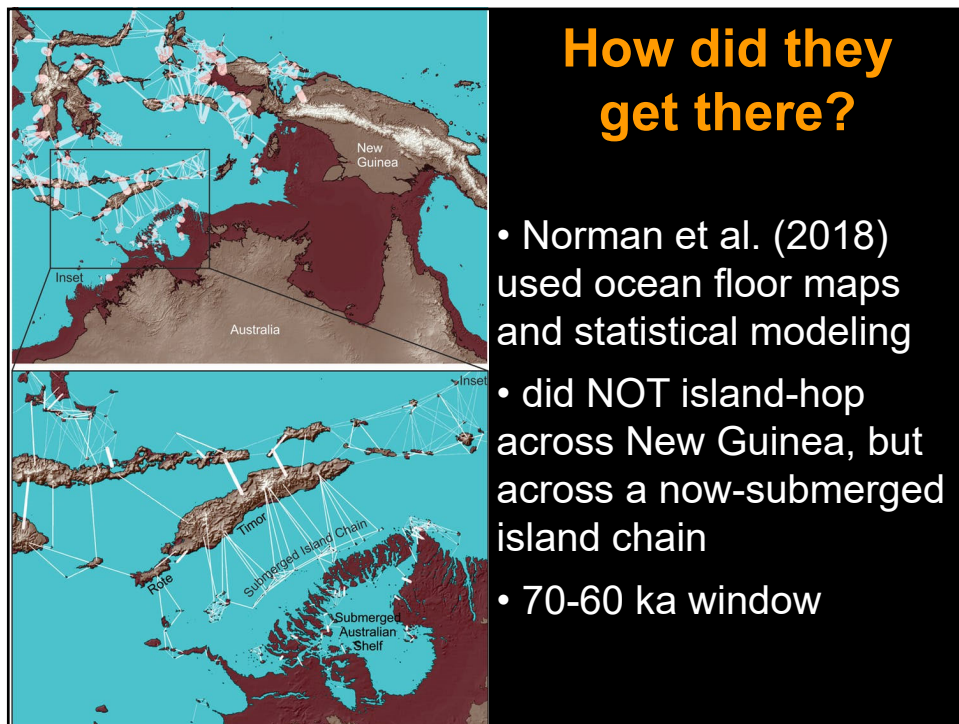
15



How did they get there?

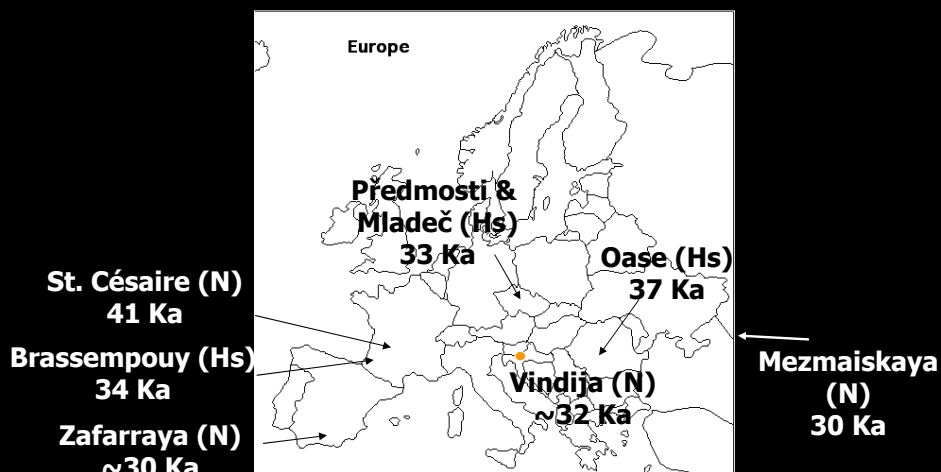
- Glacials = Sunda Shelf exposed, but **no land bridge to Sahul** (New Guinea + Australia) because of deep sea strait separating them
- Land bridges from mainland South East Asia to Borneo (Niah Cave), Sumatra, Java

16

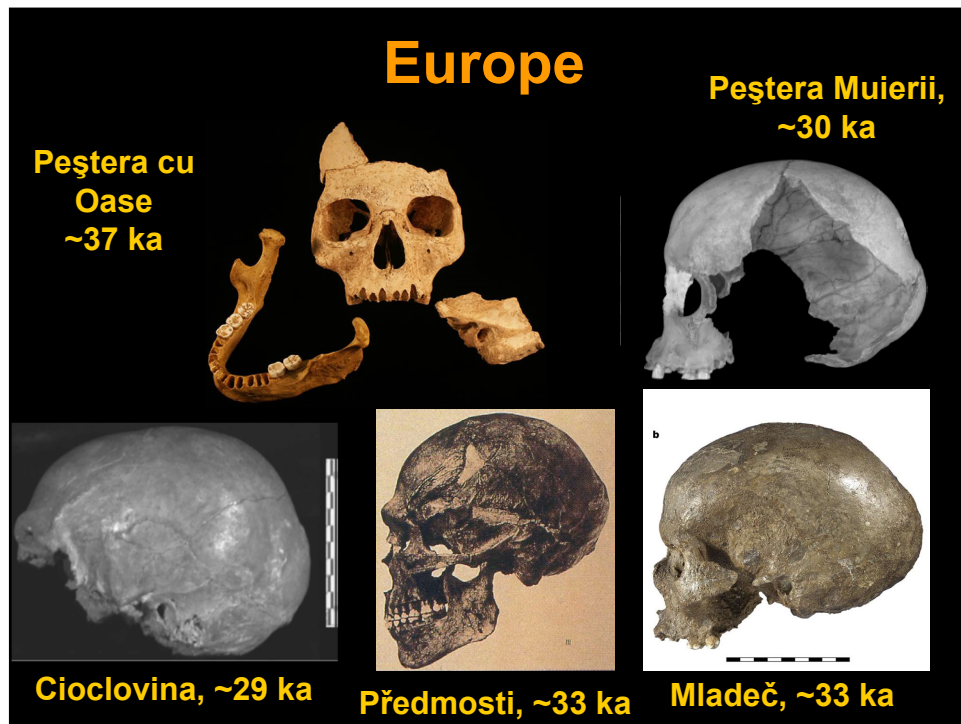


17

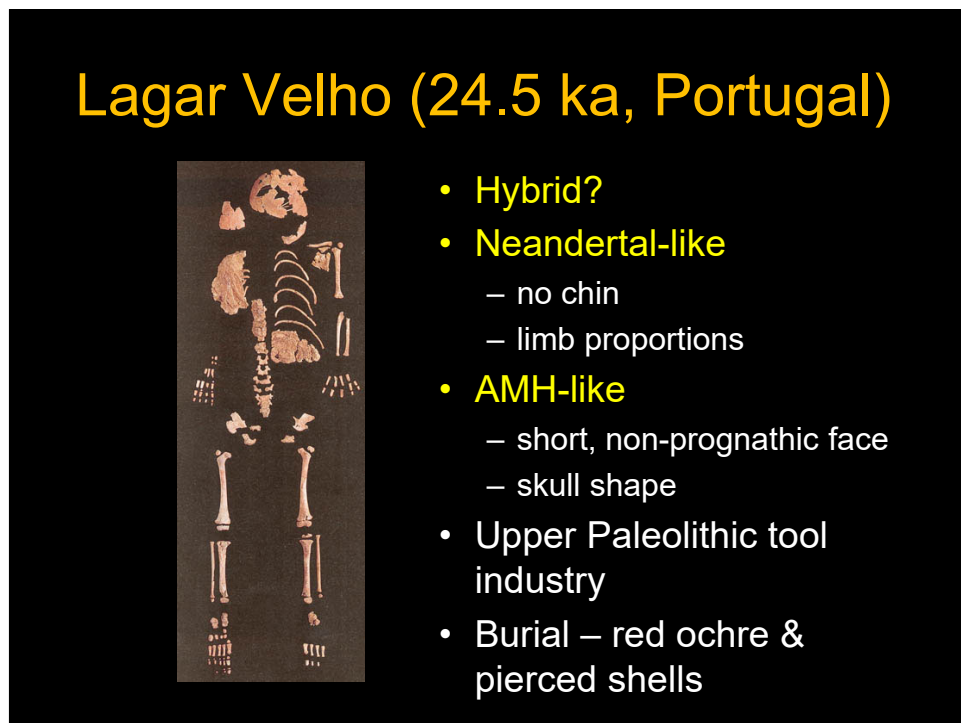
Neandertals and modern humans coexisted for >5,000 years in Europe



18



19

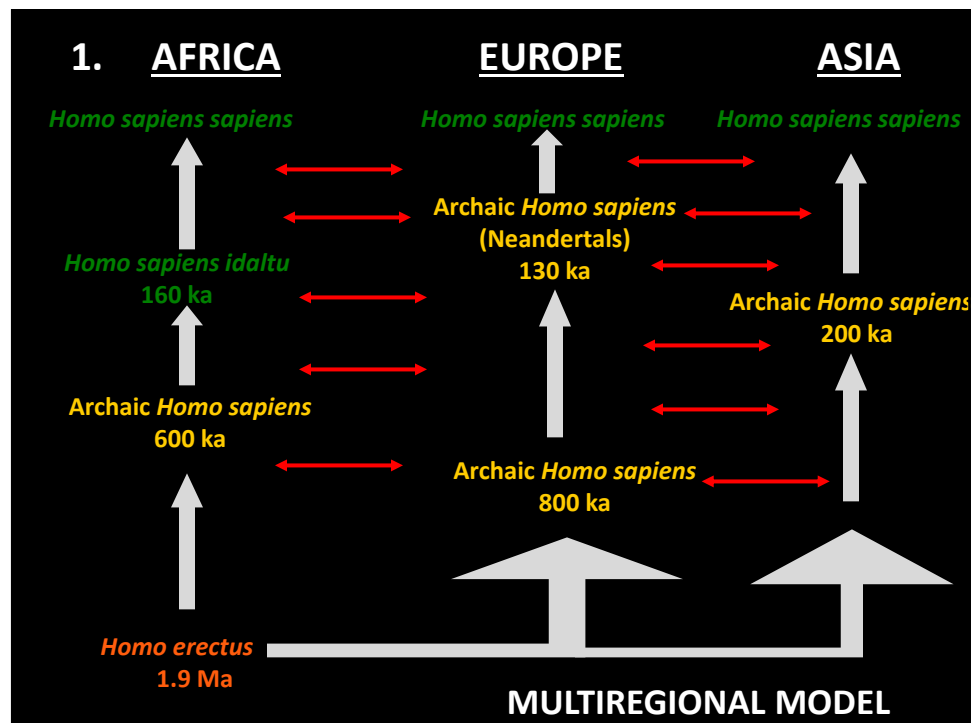


20

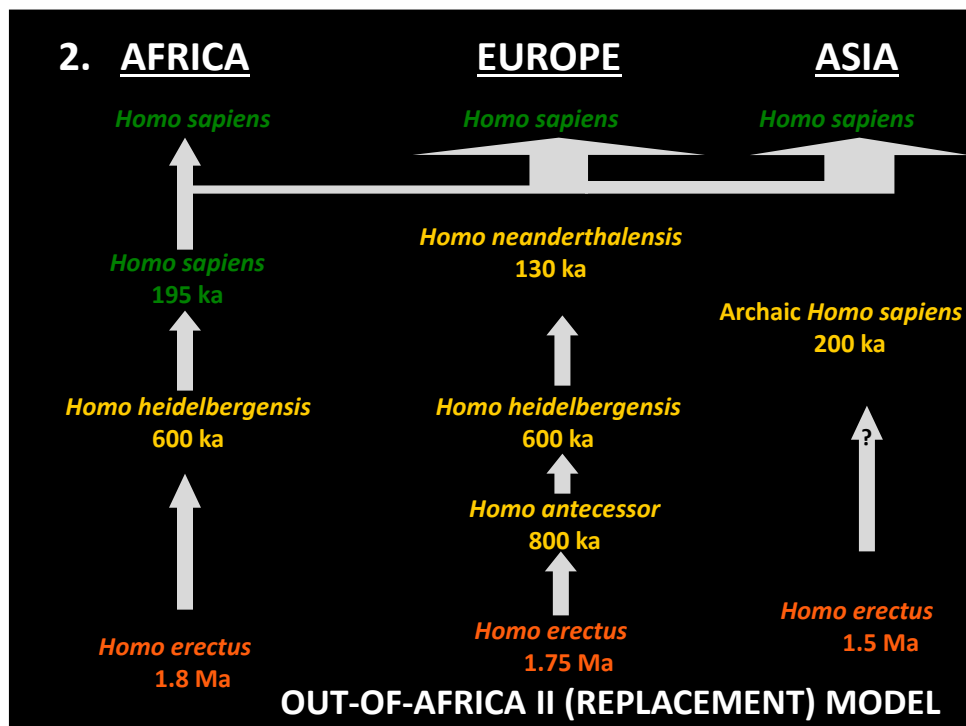
Models for modern human origins

1. Multiregionalism or Multiregional Continuity Model
2. Out-of-Africa (II) or Replacement Model
3. Assimilation/hybridization or “Mostly-out-of-Africa” Model

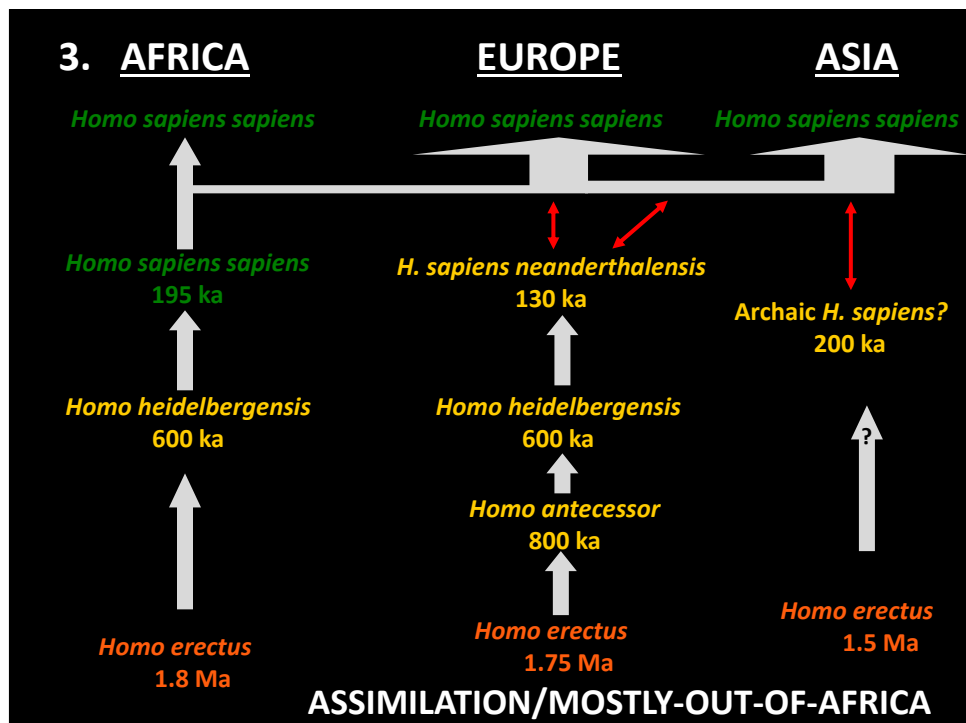
21



22



23



24

Modern and ancient DNA studies: Cann et al. (1987)



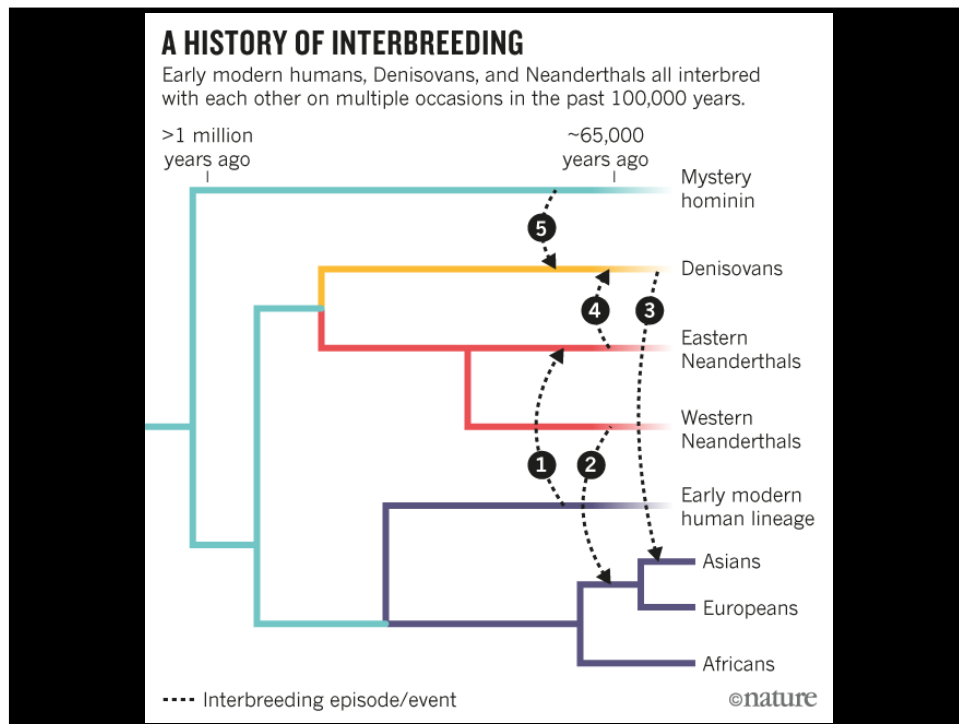
- mtDNA of 147 modern human populations
- Found:
 - Not much genetic variation
 - 140-290 Ka since common ancestor in sub-Saharan Africa
 - Evidence for genetic bottleneck

25

Did AMH interbreed with Neanderthals?

Yes, in different periods and
places, as well as with
Denisovans and another
mystery hominin!

26



27

Who were the Denisovans?

- Denisova Cave, Altai Mountains, Siberia
- Fragmentary remains of three hominins discovered in 2010: **hand phalanx**, molar tooth, foot phalanx (more material recovered since)



28

Denisova Cave, Russia

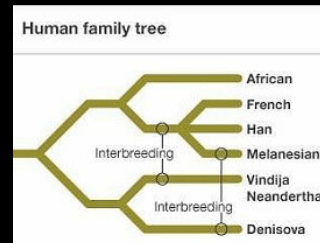


- Neanderthal + previously unknown, **ancient mtDNA lineage**
- Denisovan nuclear DNA found in modern humans

29

Who were the Denisovans?

- Hand phalanx:
 - previously **unknown mtDNA lineage!**
 - Girl, lived ~50ka, whole genome sequenced
 - LCA with Neanderthals 640 kya, with modern African populations 804 kya
- Two additional Denisovan individuals at least 110ka, possibly 170ka
- Cave also inhabited by Neanderthals and AMH



30

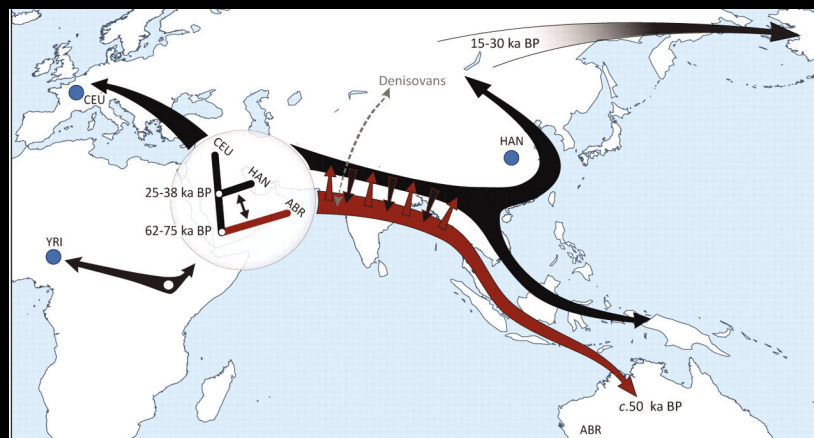
Who were the Denisovans?

- New finds from the Tibetan Plateau, 160 ka
- Genetic adaptations to high altitude (hypoxia) – introgressed into living modern human populations in that region



31

2 waves of migration into Asia



32

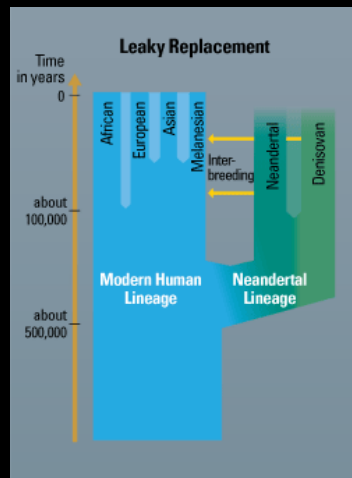
aDNA from Sima de los Huesos

- Closer to Denisovans than Neandertals
 - mtDNA lineage from a founder population that went extinct in Neandertals?
 - *H. antecessor* interbred with ancestors of both Denisovans and Sima hominins?
 - Ancestral western Eurasian population?

33

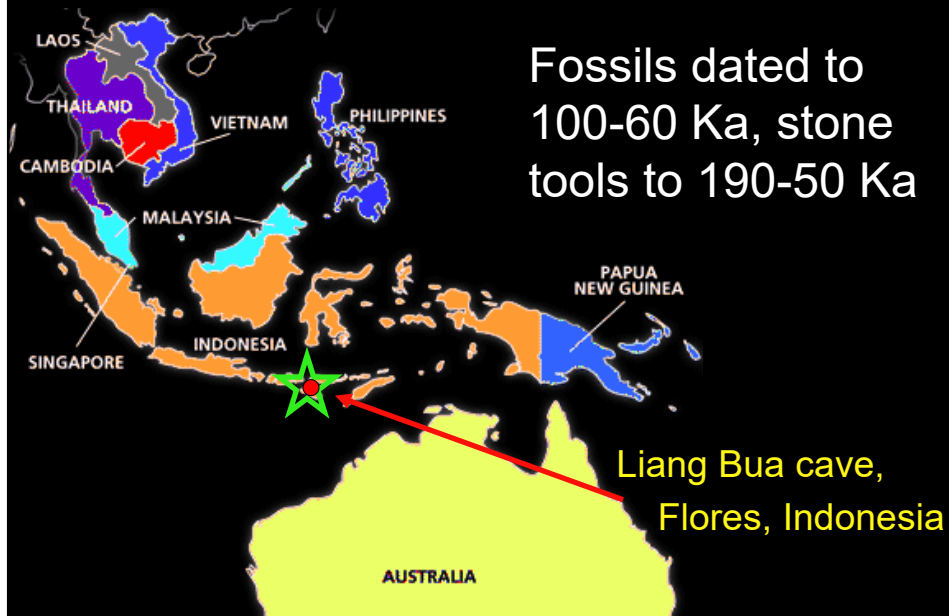
Summary of DNA evidence: “Mostly out of Africa”

- Based on **entire human, Neanderthal and Denisovan genomes**
- Neanderthals and AMH split about 600ka
- Some evidence of a third, archaic lineage
- **Pan-African origins of AMH** (aka African multiregionalism)

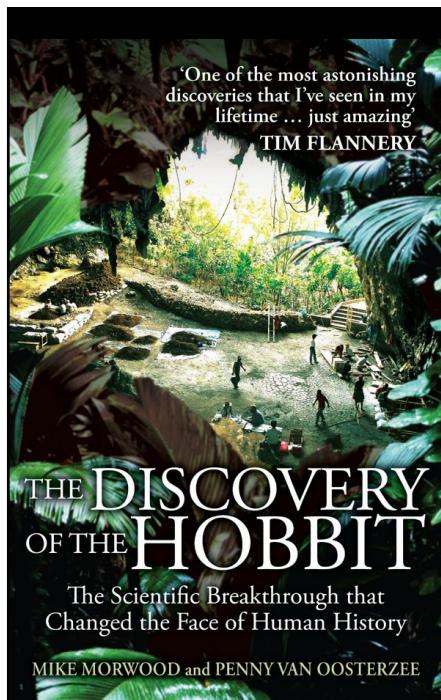


34

Homo floresiensis ("The Hobbit")



35



Homo floresiensis

- Type specimen LB1 (18 kya)
- Cranium, mandible & partial skeleton of a female
- 11 individuals total

Liang Bua cave

36

H. floresiensis cranium



- Brain size 380-420 cc
- Vault long, broad & low
- Thick boned
- No sagittal keel or robust supraorbital torus, less prognathic than *H. erectus*
- Cranial base is flexed

37

H. floresiensis mandible & teeth



- Teeth highly worn
- Teeth similar to *H. erectus*
- No chin

38

H. floresiensis postcrania



- 3.25 ft (1m) tall
- mosaic of traits
- **primitive**: very curved clavicle, straight humerus, ape-like wrist, flaring ilia, small joints, short lower limb, long curved toes, short big toe, lack of a fully modern arch
- like australopiths or early *Homo*

39

H. floresiensis

Note:
LB1 was
female



Reconstructions

40

Microcephaly?

Is *H. floresiensis* a microcephalic modern human?

- brain size like *Australopithecus*, but endocast resembles *H. erectus*
- microcephaly does not account for other differences



41

New fossils from the Philippines

- Callao cave, Luzon, the Philippines
- Evidence of hominin activity as early as 771ka, but bones dated to >50 ka (DNA recovery failed)
- Described as AMH in 2010, renamed *H. luzonensis* in 2019
- Teeth, hand & foot bones, fragment of a juvenile femur
- Mosaic of australopith-like and modern-like traits
- Short stature



42

Insular (island) dwarfism

- On small islands **small animals get large** (in absence of predators), **large animals get smaller** (restricted resources)
- Found with dwarfed elephants and giant rats
- Sometimes in dwarfism brains shrink more than expected – very energetically costly
- Could be **dwarfed small *H. erectus*** (e.g. Dmanisi) or *H. habilis* (skull shape matches the expectations)
 - stone tools at 2.5 Ma, Zarqa Valley, Jordan
 - stone tools (?) at 2.1 Ma, Chinese Loess Plateau
 - Pre-erectus dispersal?