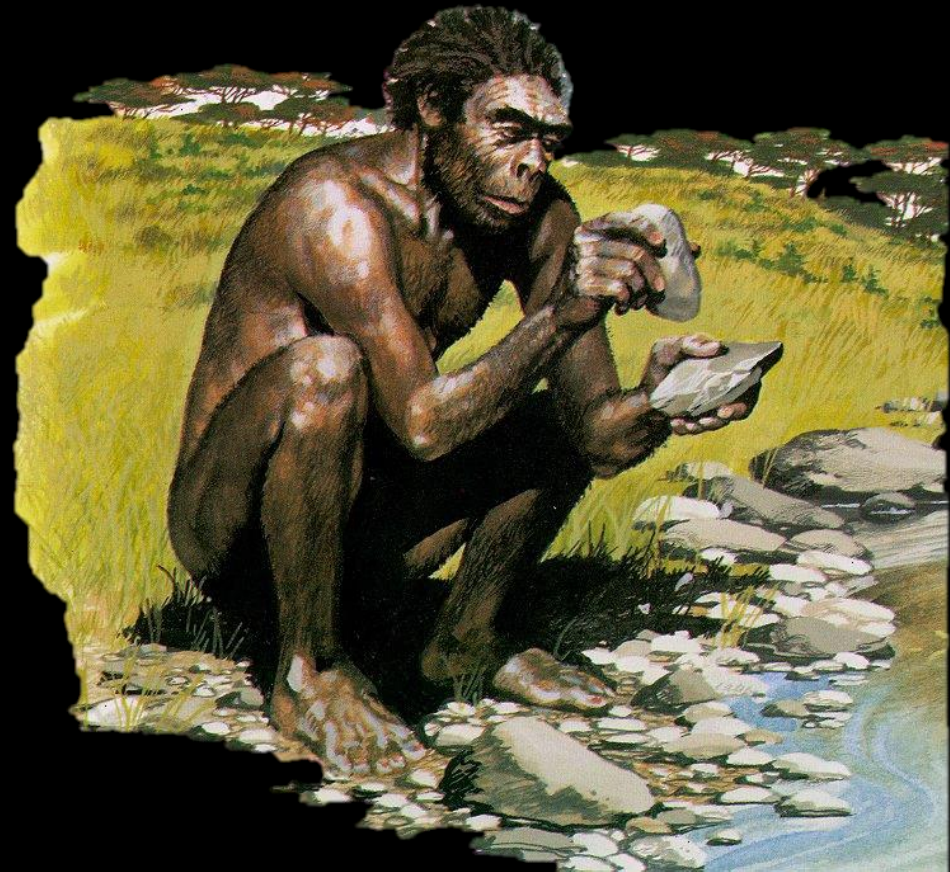




Erasmus Mundus

Il genere *Homo*



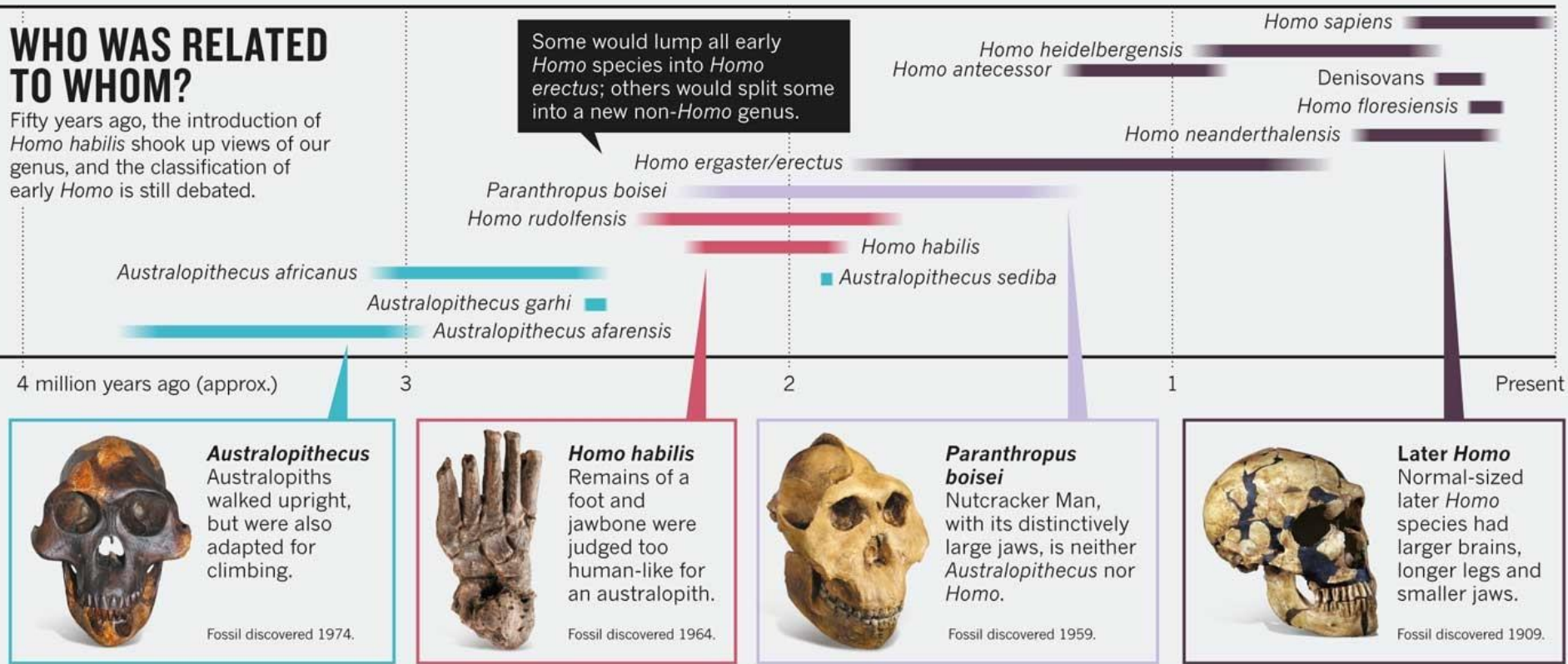
Julie Arnaud

julie.arnaud@unife.it

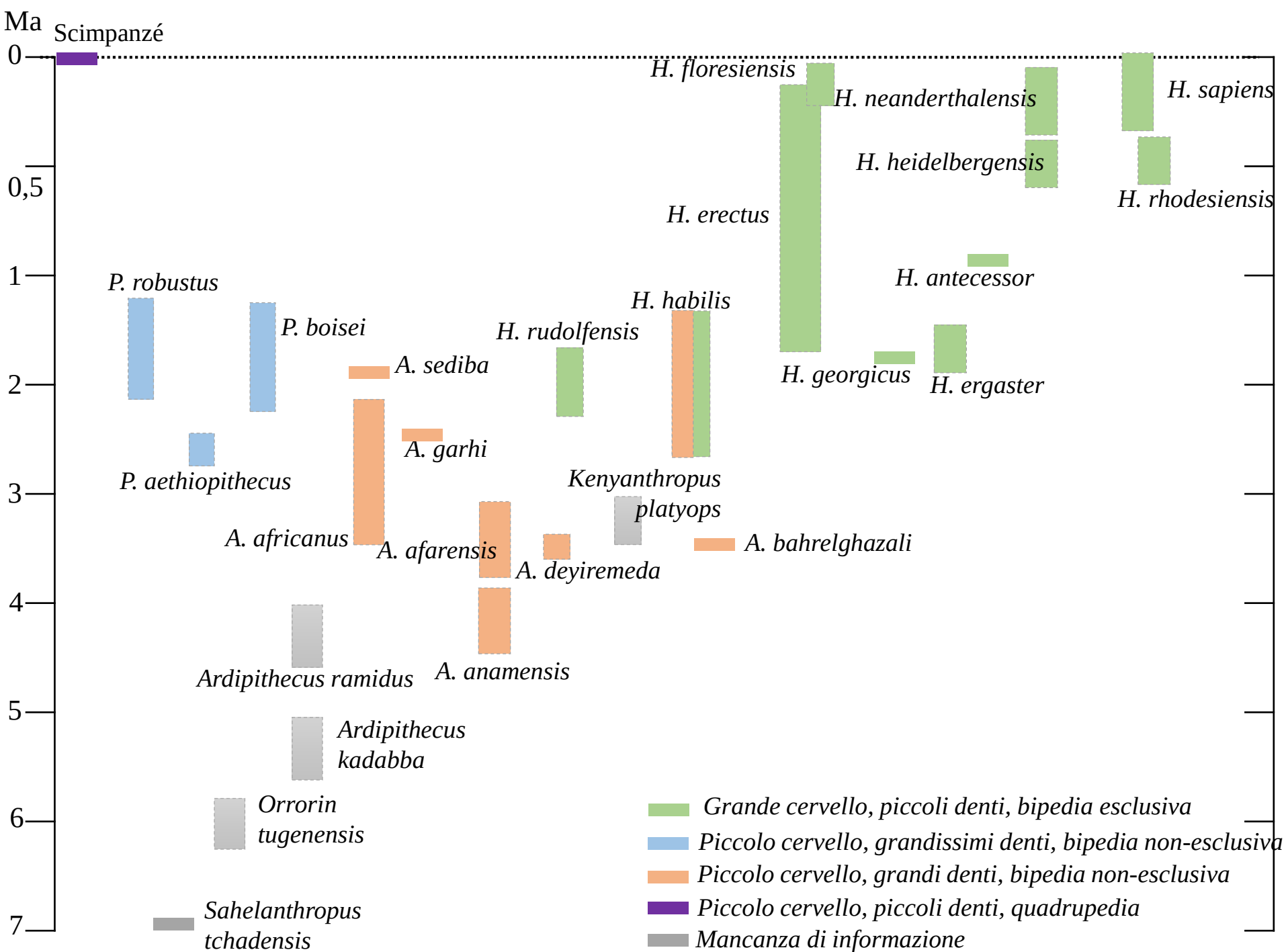
(Wood, 2014)

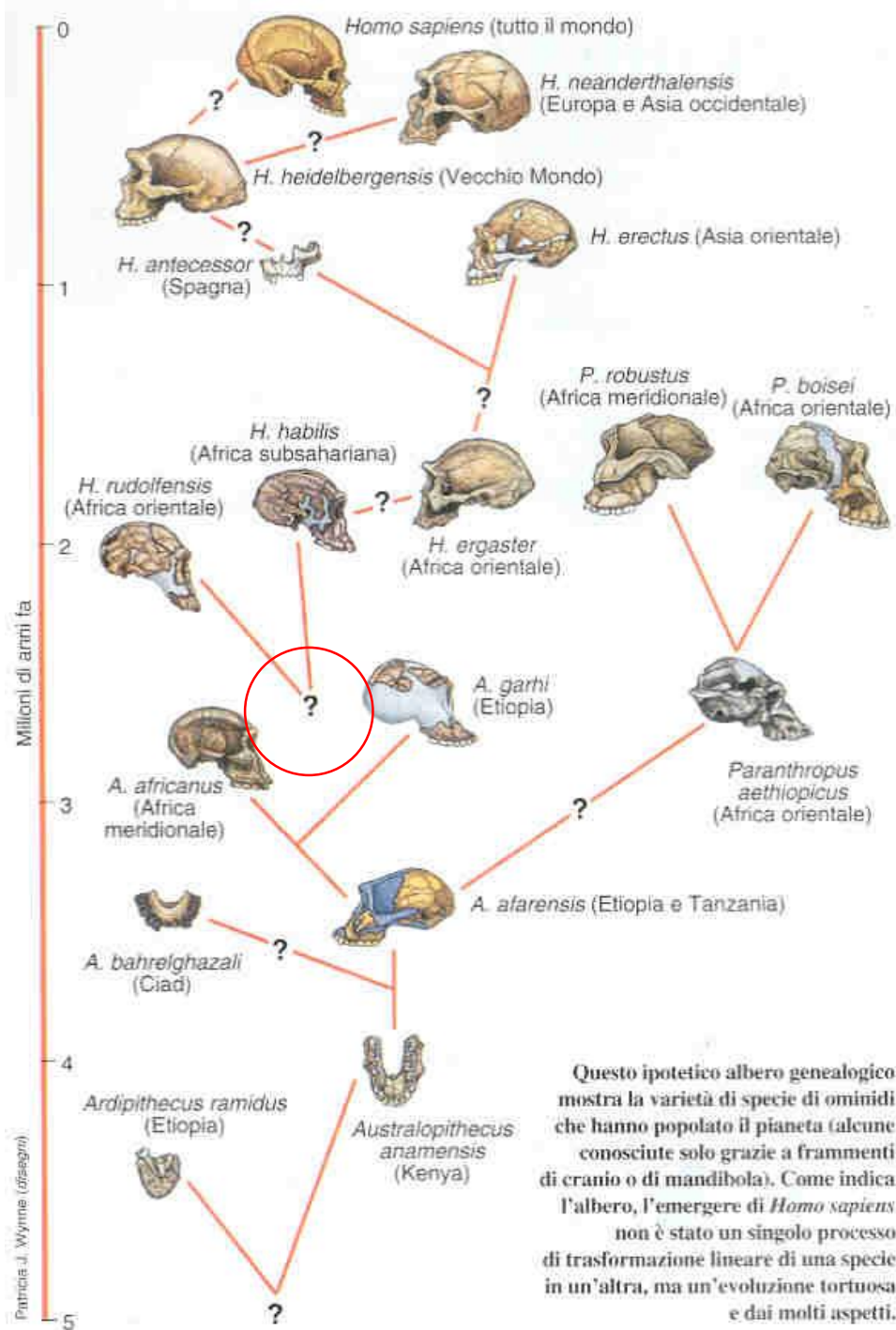
WHO WAS RELATED TO WHOM?

Fifty years ago, the introduction of *Homo habilis* shook up views of our genus, and the classification of early *Homo* is still debated.



Australopithecus: Sabena Jane Blackbird/Alamy; *H. habilis*: Human Origins Program/Smithsonian Institution; *P. boisei*: Natural History Museum/SPL; *H. neanderthalensis*: Javier Trueba/MSF/SPL





Questo ipotetico albero genealogico mostra la varietà di specie di ominidi che hanno popolato il pianeta (alcune conosciute solo grazie a frammenti di cranio o di mandibola). Come indica l'albero, l'emergere di *Homo sapiens* non è stato un singolo processo di trasformazione lineare di una specie in un'altra, ma un'evoluzione tortuosa e dai molti aspetti.

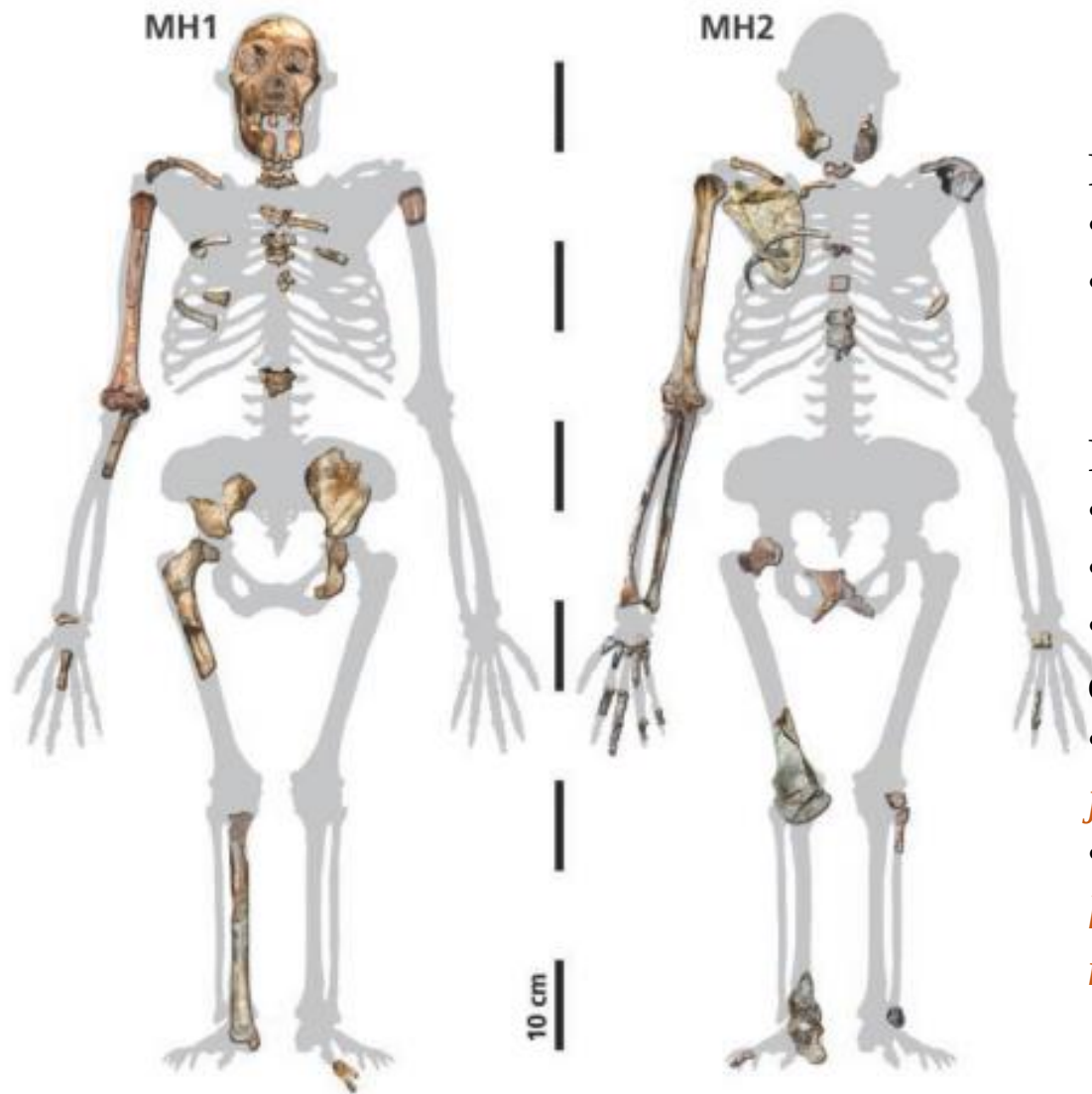


Fig. 2. Associated skeletal elements of MH1 (left) and MH2 (right), in approximate anatomical position, superimposed over an illustration of an idealized *Au. africanus* skeleton (with some adjustment for differences in body proportions). The proximal right tibia of MH1 has been reconstructed from a natural cast of the proximal metaphysis.

Australopiteco o *Homo* ?

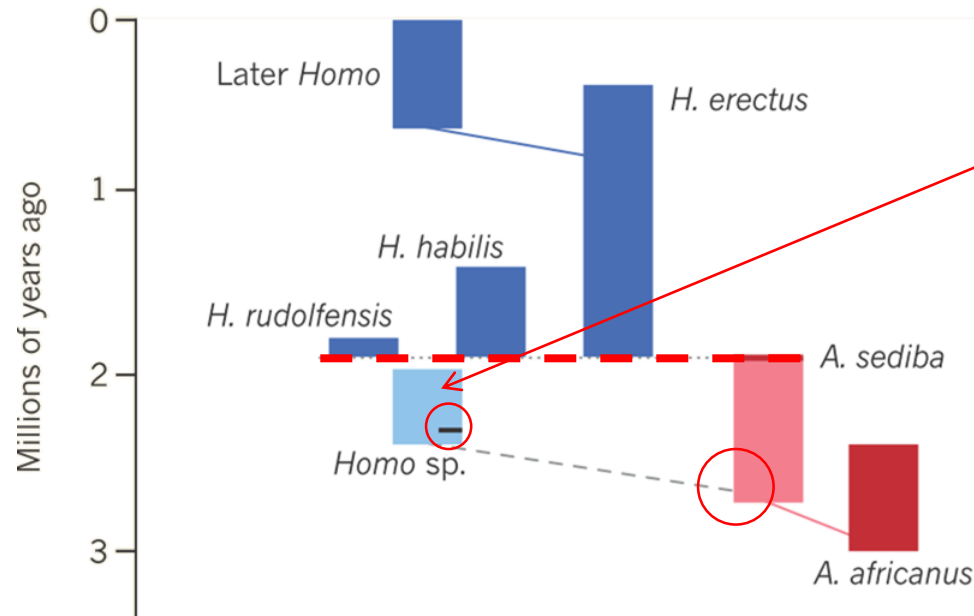
Pro-Australopiteco:

- Piccolo cervello / *small brain*
- Bracci lunghi / *long arms*

Pro-*Homo*:

- Forma del bacino
- Articolazione dell'anca
- Pollice lungo e dita corte = mani con una manipolazione precisa
- *Shape of the pelvis and ankle joint*
- *long thumb and short finger = hands capable of precise manipulation*

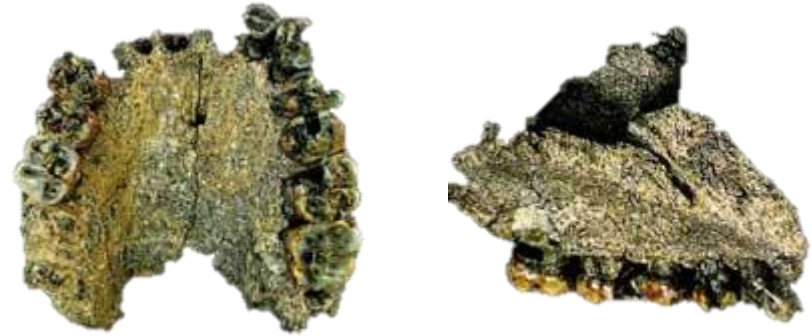
Au. sediba (Malapa, South Africa)



(Nature 478, 6 october 2011)

Fossili frammentari generalmente attribuiti ai primi *Homo*

Fragmentary fossils that are generally thought to come from early Homo



AL 666-1 (2.35 Ma, Hadar)

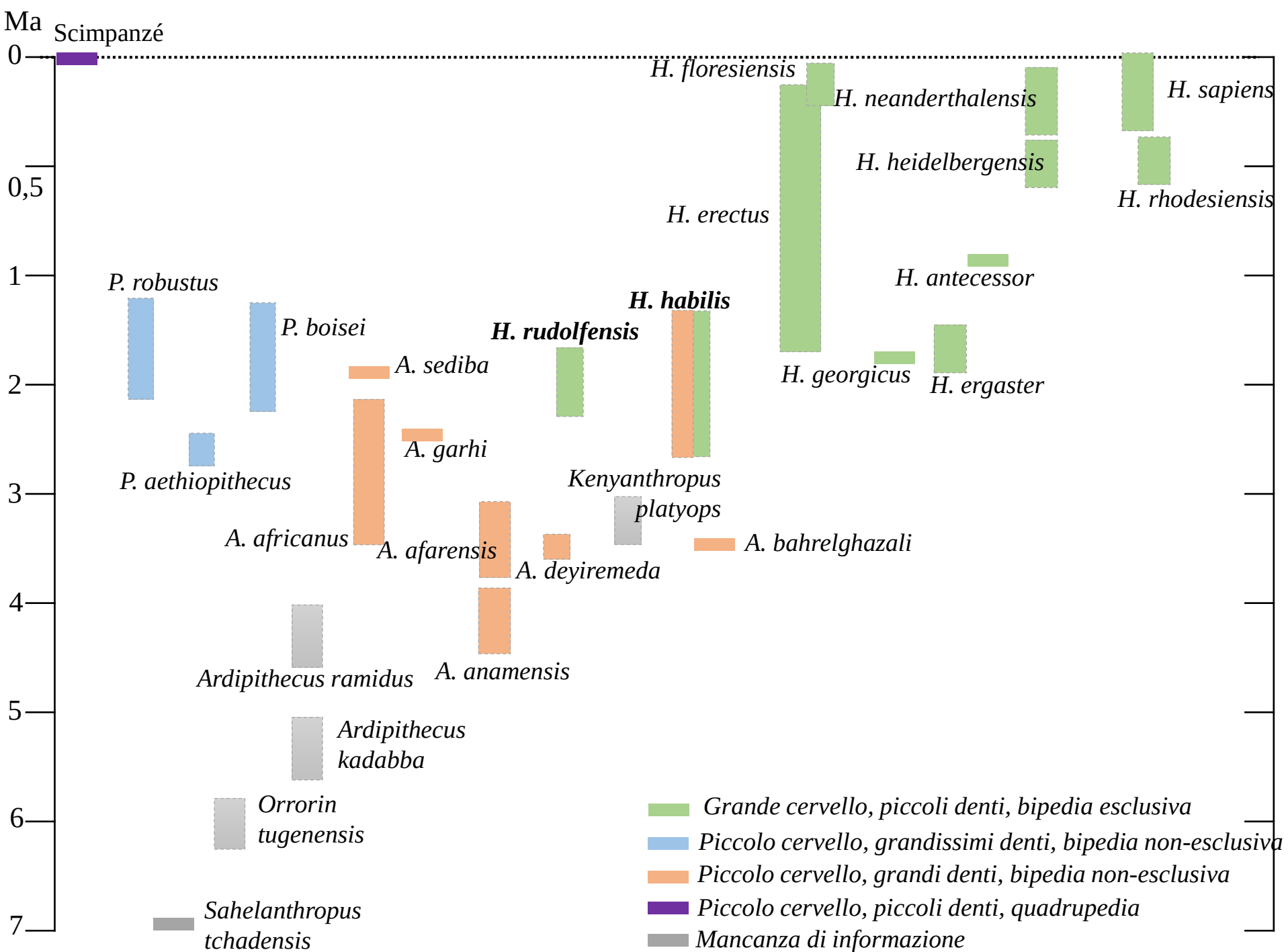
2 scenari in cui *A. sediba* è l'antenato del genere *Homo*

Scenario 1: I fossili di Malapa sono i ultimi rappresentanti della popolazione di *A. sediba* di cui i primi rappresentanti erano ancestrali a *Homo*

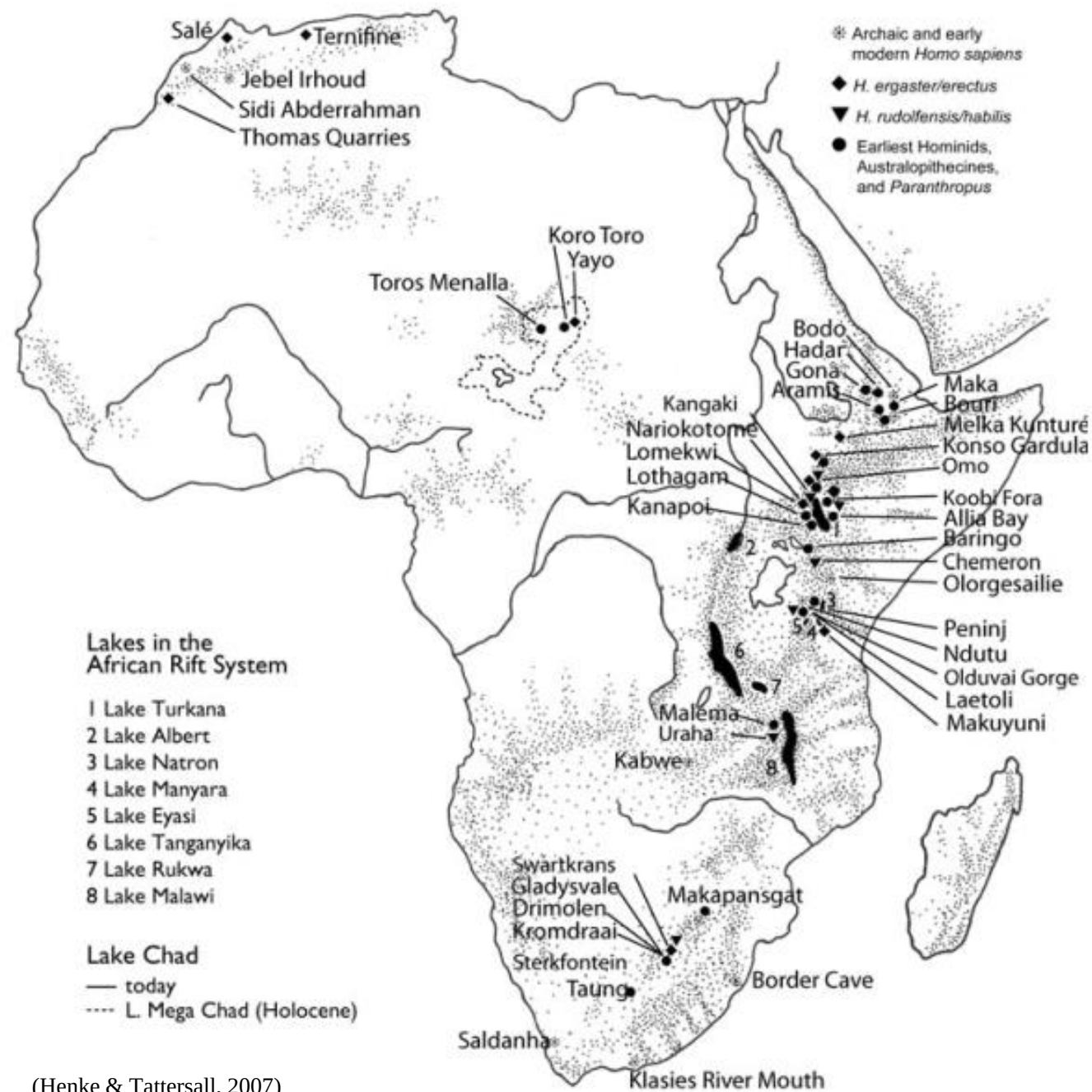
Scenario 1: Fossils at Malapa come from a late-surviving population of A. sediba, whose earlier representatives were ancestral to Homo

Scenario 2: La popolazione di *A. sediba* a Malapa era ancestrale ai primi *Homo*, implicando che i fossili datati prima di 2 Ma non possono essere attribuiti a *Homo*

Scenario 2: the A. sediba population at Malapa was itself ancestral to early Homo which means that fossils pre-dating 2 My ago cannot be attributed to Homo



African early hominid sites. *Homo rudolfensis* and *Homo habilis* sites in bold



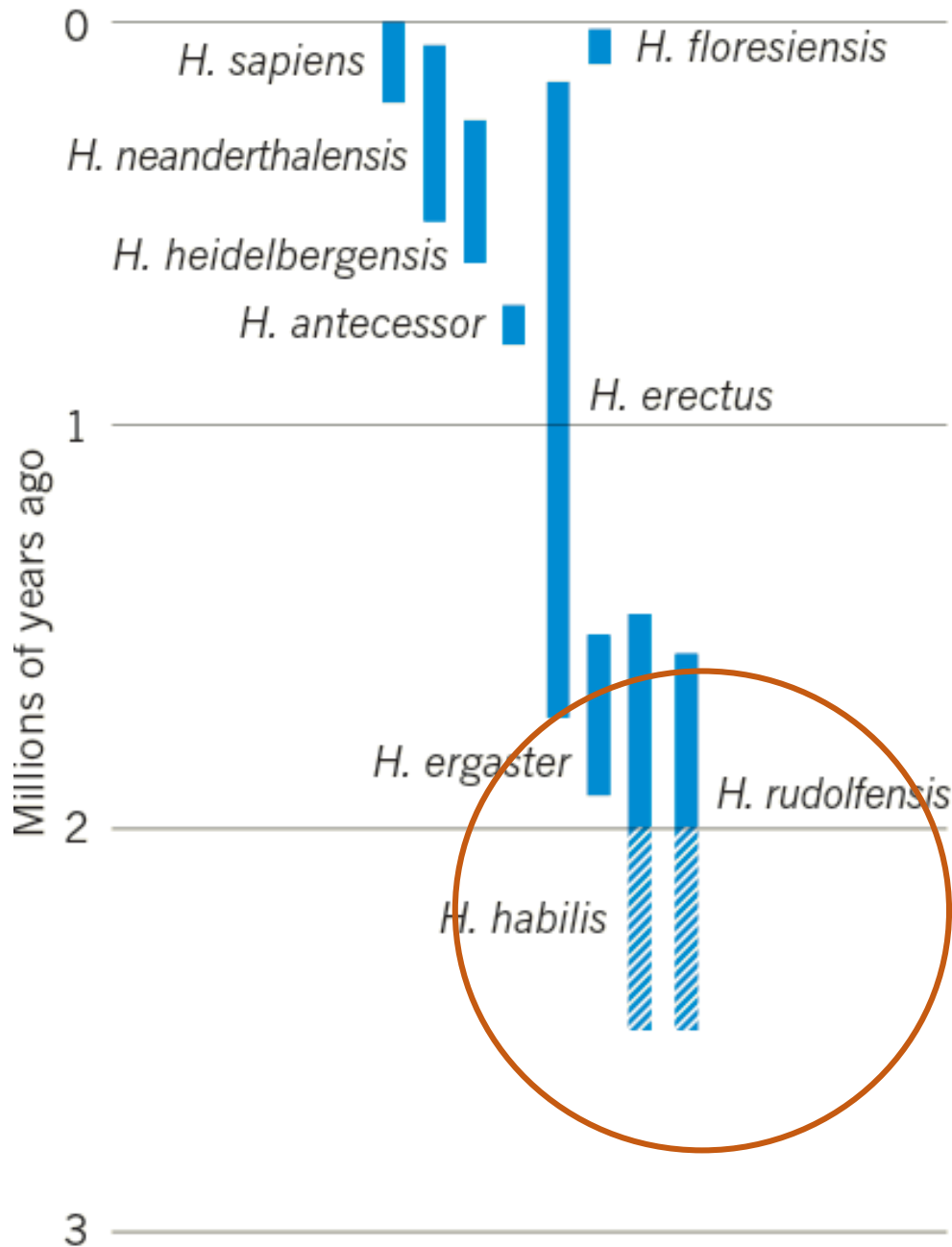
Criteri di assegnazione al genere *Homo* (Keith 1948; Tobias 1991; Wood and Collard 2001)

- Capacità cranica > 600cm³
- Capacità di parlare e di produrre industrie
- Police opponibile

Hominid fossils are generally assigned to the genus Homo if they fulfill four main criteria Keith 1948; Tobias 1991; Wood and Collard 2001):

- *A brain size above 600 cm³*
- *Ability for speech and tool-making*
- *Opposable Pollux*

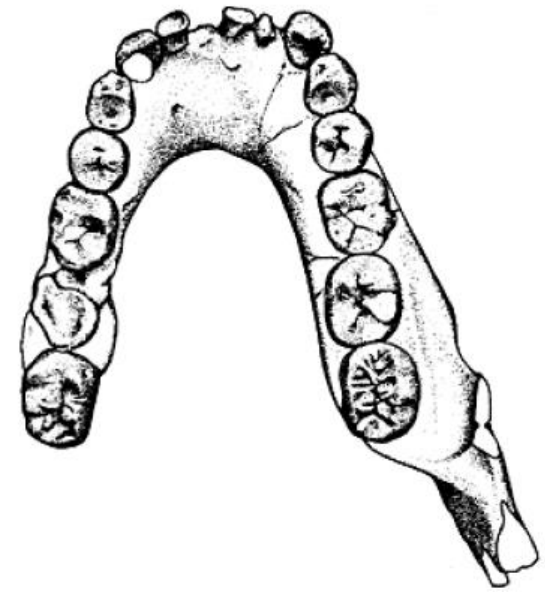
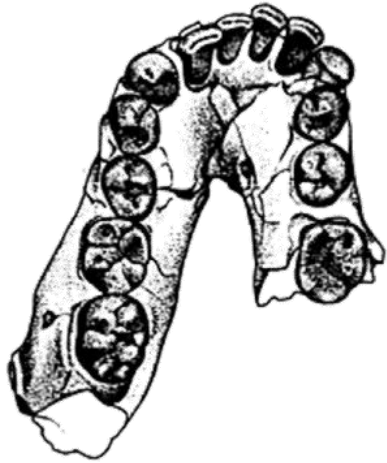
Homo habilis



The genus *Homo*, to which modern humans (*Homo sapiens*) and several extinct species belong, most probably arose between **2 million and 3 million years ago**, but fossil evidence **before 2 million years ago** (hatched lines) is frustratingly **sparse**. New fossil discoveries from Leakey and colleagues strengthen the case for recognizing at least two evolutionary lineages at the early stages of the genus, to which the species *Homo habilis* and *Homo rudolfensis* are assigned. However, whether either of these two lineages was ancestral to *Homo erectus*, let alone to modern humans, remains uncertain.

(Wood, 2012)

Homo habilis



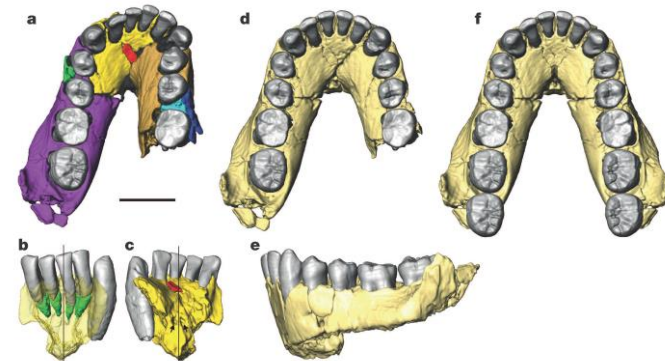
Homo habilis mandible OH 13 from Olduvai Gorge, Tanzania. Scale is 1cm.

OH 7: Olotipo di *H. habilis* trovato a Olduvai in 1964.

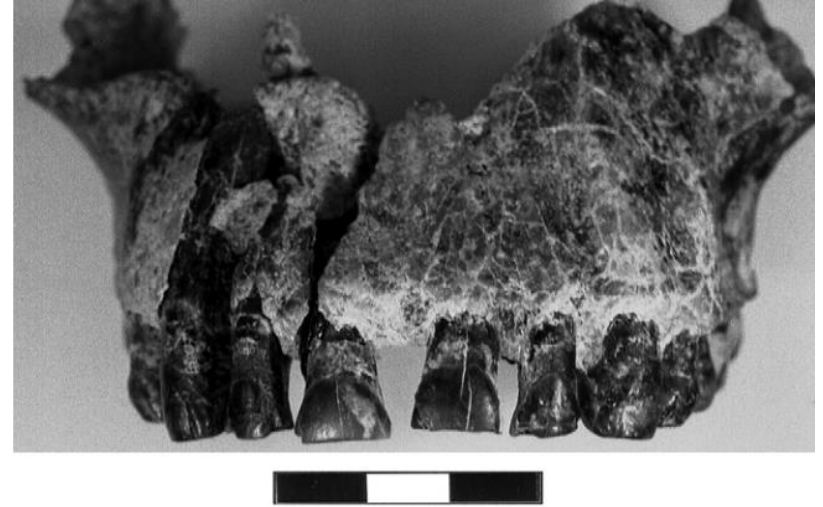
- Spessore elevato
- PM e M < *Australopithecus*
- CC (calcolato a partire di 2 parietali) = 700 ml

OH 7: Holotype of Homo habilis from Olduvai Gorge (1964)

- Thick jaw
- PM and M < *Australopithecus*
- CC (calculated from two parietal bones) = 700 ml



Homo habilis



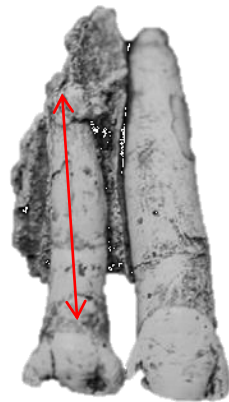
OH 65

C : Radice dritta

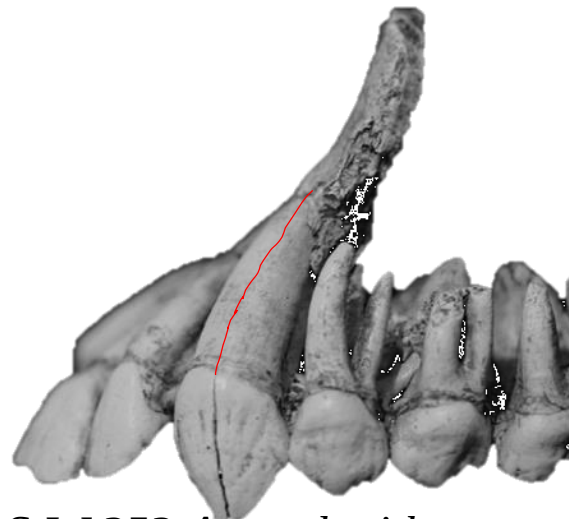
C: straight root

P3: Radice dritta e unica

P3 : Straight single root



OH 65



StW 252 *Australopithecus*

C : Radice curva e più corta

C: Shorter and curved root

P3: Doppia radice curva

P3: two short curved roots

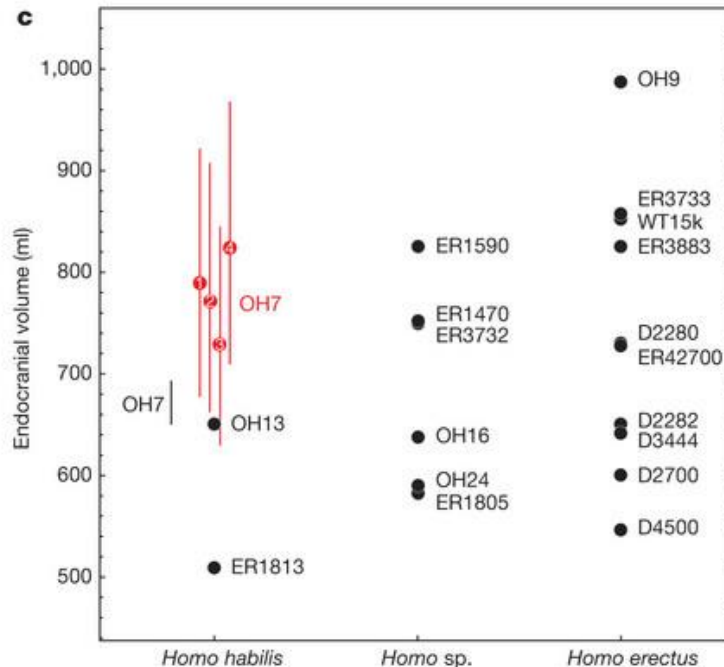
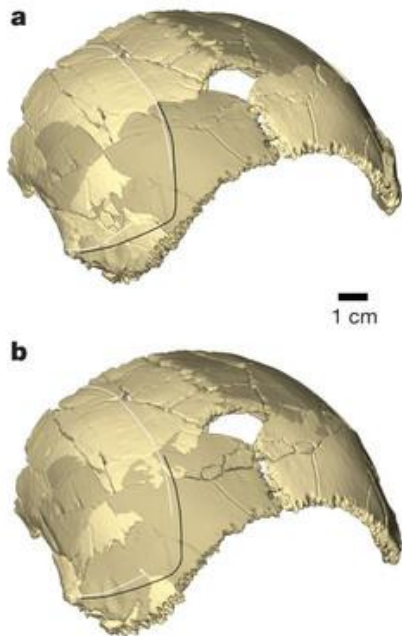
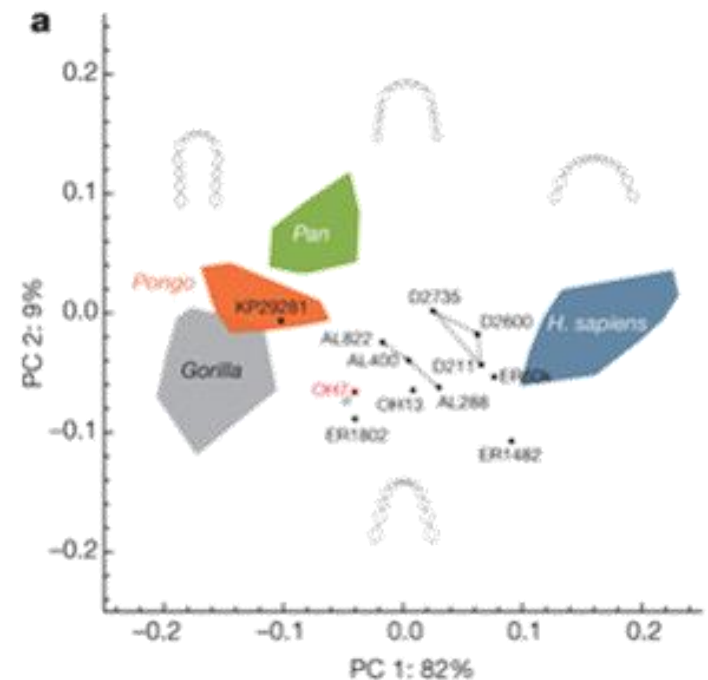
Reconstructed *Homo habilis* type OH 7 suggests deep-rooted species diversity in early *Homo*

Fred Spoor^{1,2*}, Philipp Gunz^{1*}, Simon Neubauer¹, Stefanie Stelzer¹, Nadia Scott¹, Amandus Kwekason³ & M. Christopher Dean²

OH7 = Primitivo con un arcata dentaria lunga e stressa più simile a *A. afarensis* che alle forme derivate paraboliche di *H. sapiens* o *H. erectus*.

La forma di OH7 non concorda con un unica specie di primi *Homo*: la morfologia di OH7 è incompatibile con i fossili attribuiti a *H. rudolfensis* et la mascella *Homo sp.* A.L. 666-1 (più derivati che OH7 ma 500ka più antichi).

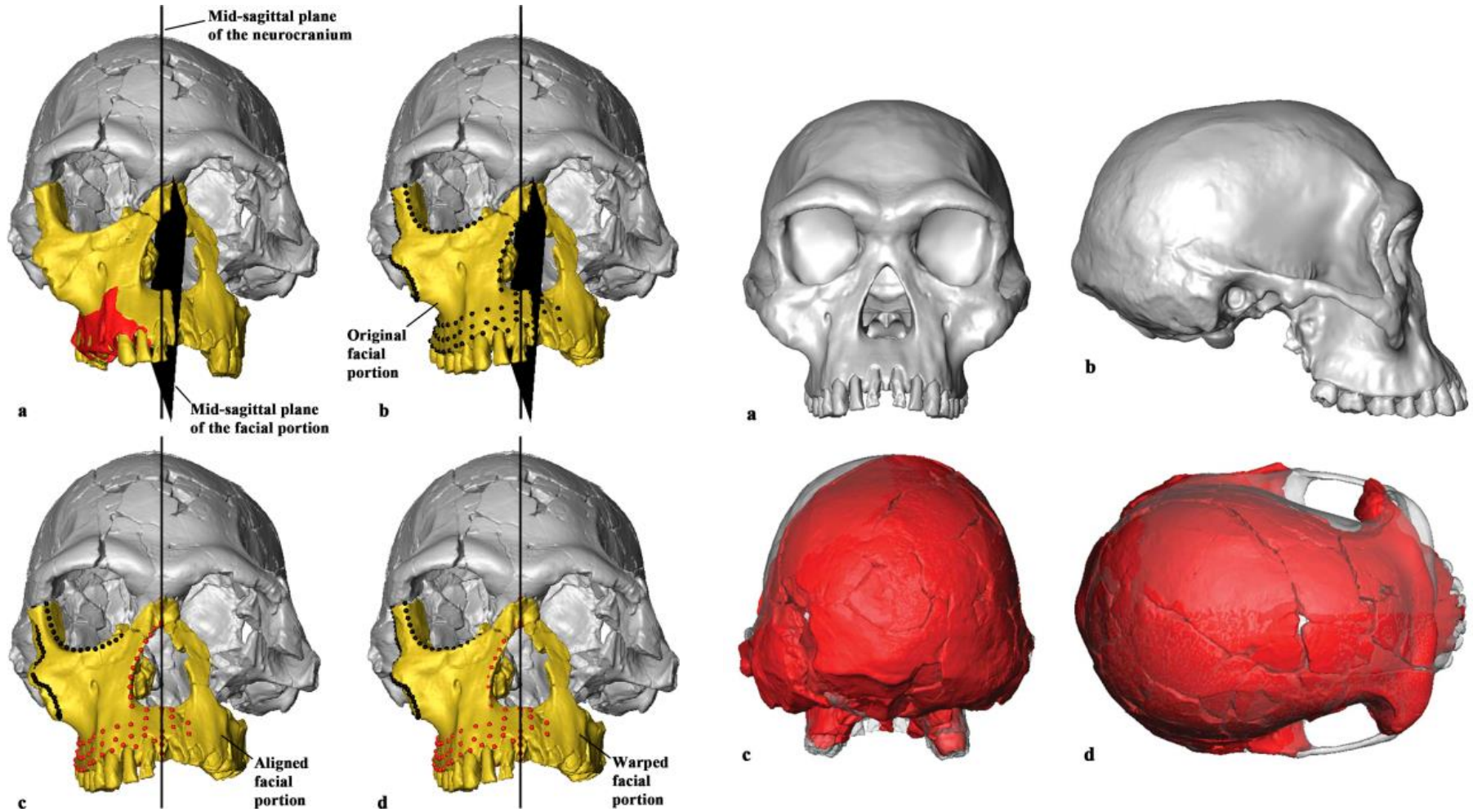
-> la linea evolutiva di *H. habilis* prende origine prima di 2,3 Ma



La ricostruzione dell'osso parietale di OH7 e l'estimazione del volume endocranico (729-824 ml) che è più grande di quello pubblicato in precedenza, permettono di evidenziare una sovrapposizione quasi-completa delle dimensioni del cervello delle prime specie *Homo*.

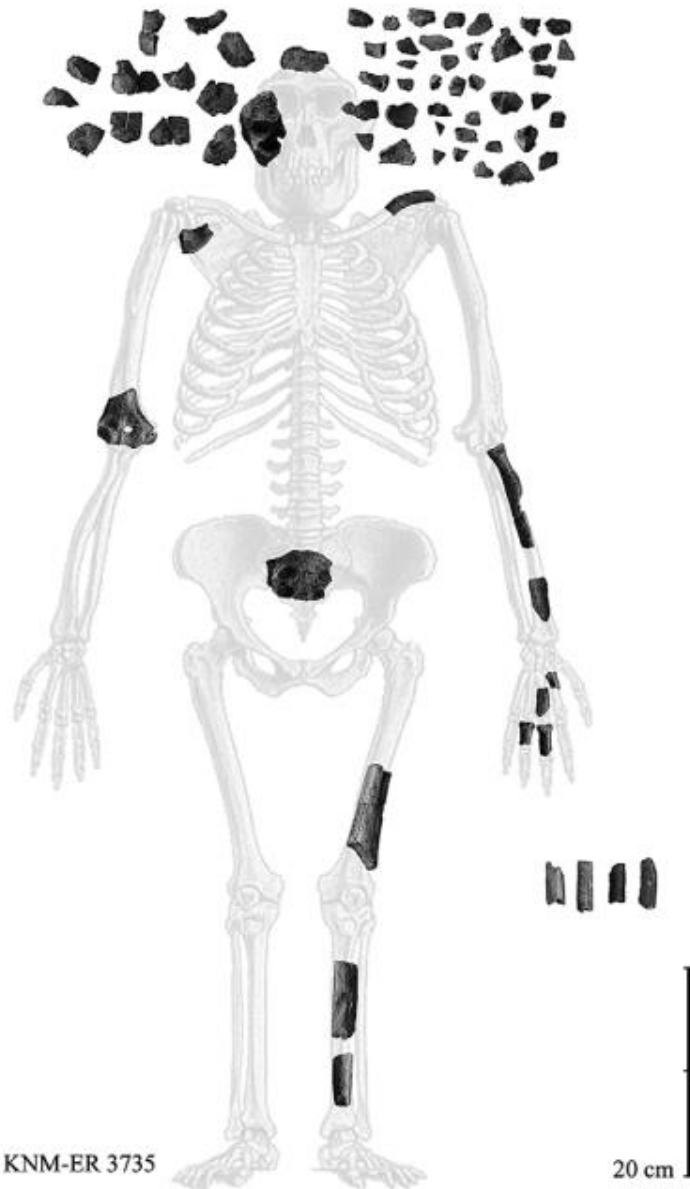
Technical Note: Virtual Reconstruction of KNM-ER 1813 *Homo habilis* Cranium

Stefano Benazzi,^{1*} Giorgio Gruppioni,² David S. Strait,³ and Jean-Jacques Hublin¹



Homo habilis

Mosaica di caratteri:



Moderni:

- Gracilità dell'omero e del radio
Gracile humerus and radius
- Epifisi prossimale delle falange piccole
Small base of the hand phalange
- Pilastro del femore ben sviluppato
Well developed pilaster
- Geometria della sezione del femore
Cross sectional geometry of the femur

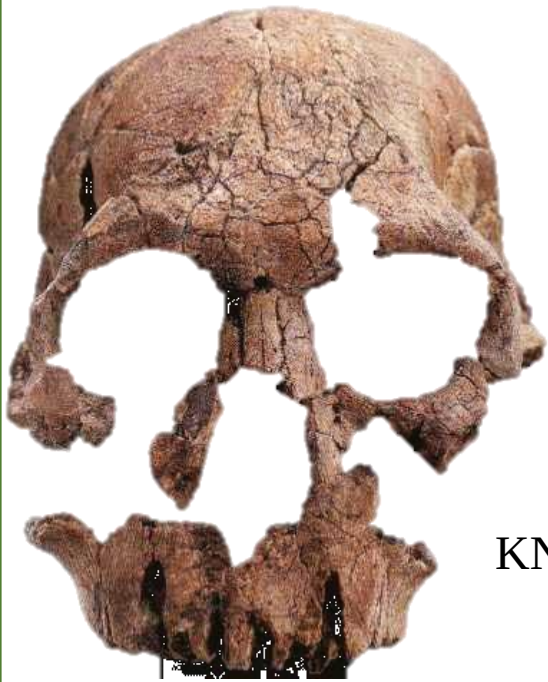
Ancestrali (condivisi con primi ominidi):

- Sacro piccolo
Small sacrum
- Diafisi delle falange robuste
Robust midshaft of the phalanges

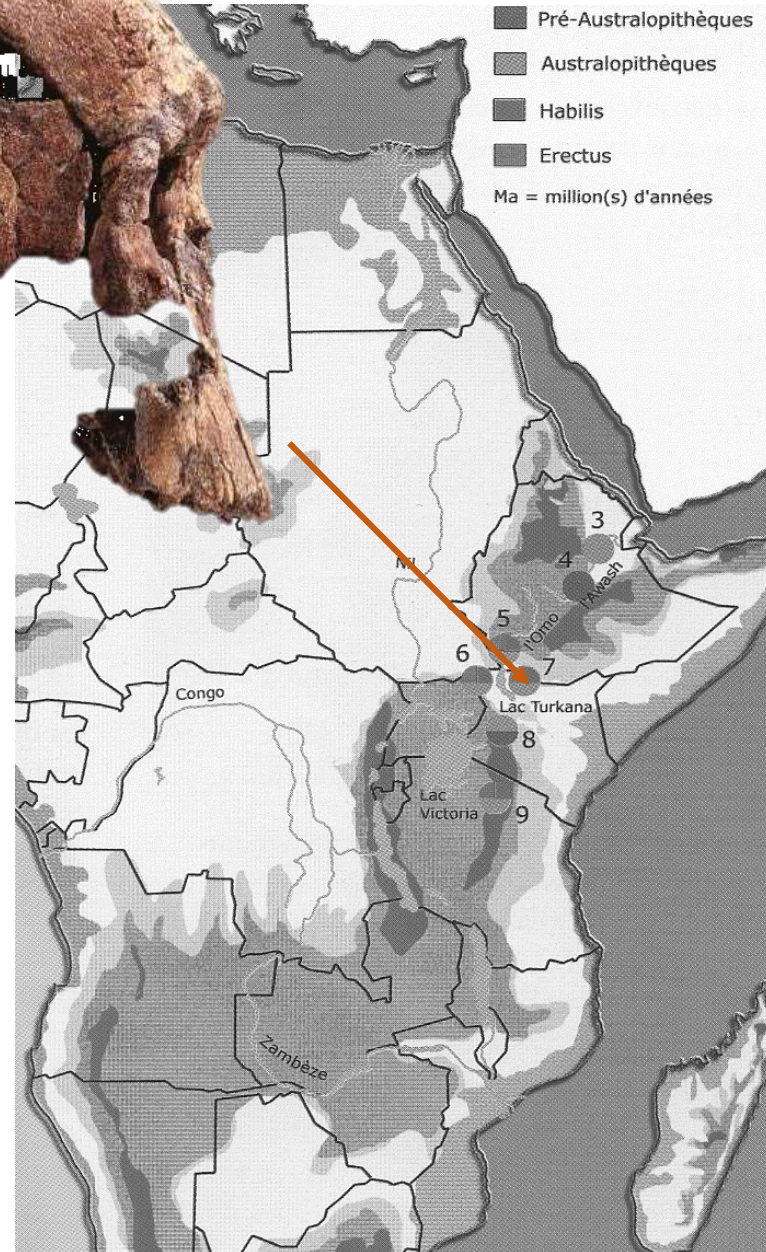
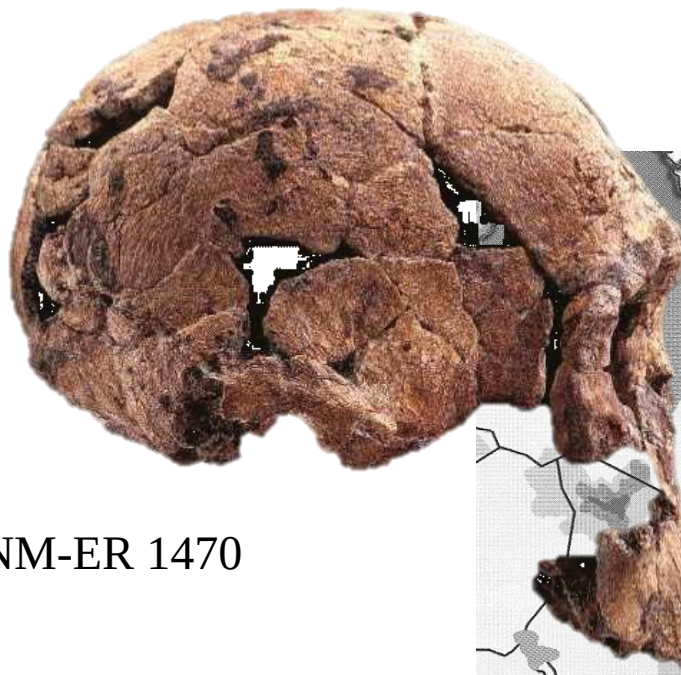
Scimmiesche:

- Scapola robusta
Robust scapula
- Avanbraccio lungo
Long forearm

Homo rudolfensis



KNM-ER 1470





Radice dei zigomatici situati anteriormente
Anteriorly placed maxillary zygomatic roots



Faccia piatta e ortognata nella regione subnasale

Flat and subnasally orthognathic face

New fossils from Koobi Fora in northern Kenya confirm taxonomic diversity in early *Homo*

Meave G. Leakey^{1,2}, Fred Spoor^{3,4}, M. Christopher Dean⁴, Craig S. Feibel⁵, Susan C. Antón⁶, Christopher Kiarie¹ & Louise N. Leakey^{1,2}

KNM-ER 62000: 8 anni (?)
Corona ~ primo *Homo*
Palato più corto che australopitecini



Figure 1 | The KNM-ER 62000 face. a–d, Anterior (a), right lateral (b), inferior (c) and superior views (d) of the KNM-ER 62000 face. Scale

Molari e premolari piccoli
Small molars and premolars
Corpo alto ma stretto mesiolateralmente
Tall but mediolaterally narrow corpora

The new fossils confirm the presence of two contemporary species of early *Homo*, in addition to *Homo erectus*, in the early Pleistocene of eastern Africa



KNM-ER 60000 (1.78-1.87 Ma) e 62003 1.90-1.95 Ma

Significant morphological differences between *H. habilis* and *H. rudolfensis*

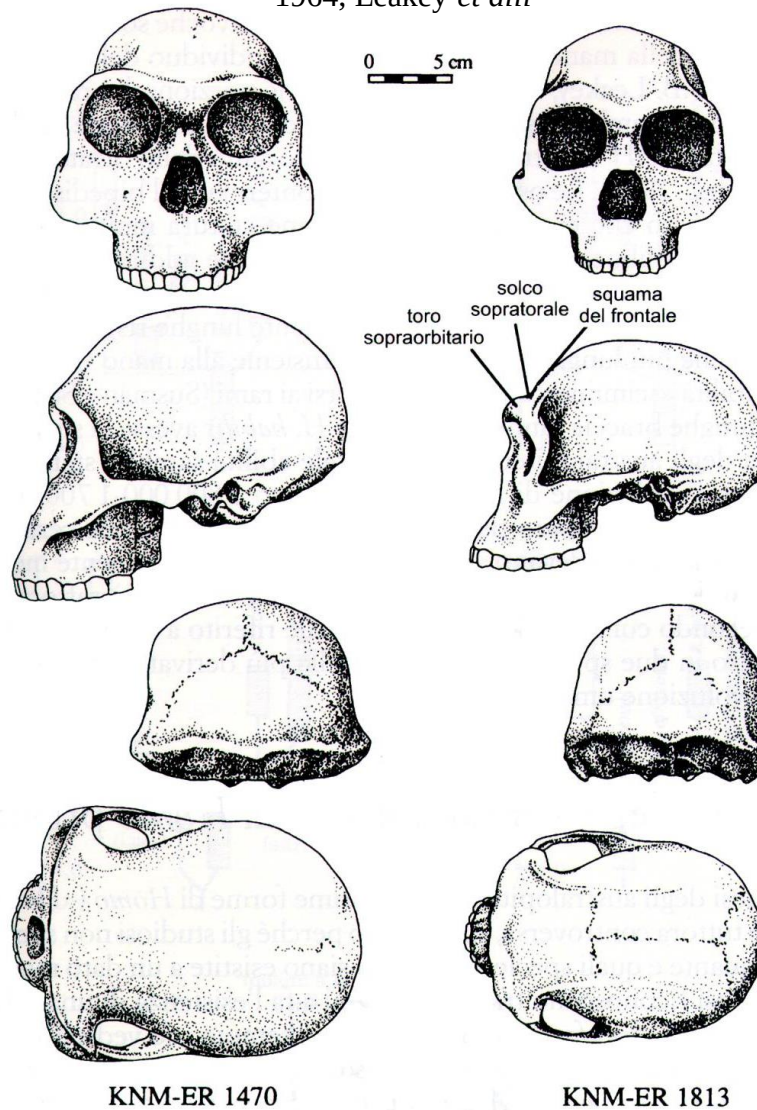
	<i>Homo habilis sensu stricto</i>	<i>Homo rudolfensis</i>
Skull and teeth		
Absolute brain size (cm ³)	An average volume of 610	An average volume of 751
Overall cranial vault morphology	Enlarged occipital contribution to the sagittal arc	Primitive condition
Endocranial morphology	Primitive sulcal pattern	Frontal lobe asymmetry
Suture pattern	Complex	Simple
Frontal	Incipient supraorbital torus	Torus absent
Parietal	Coronal > sagittal chord	Primitive condition
Face-overall	Upper face > midface breadth	Midface > upperface breadth: markedly orthognathic
Nose	Margins sharp and everted; evident nasal sill	Less everted margins; no nasal sill
Malar surface	Vertical or near vertical	Anteriorly inclined
Palate	Foreshortened	Large
Upper teeth	Probably two-rooted premolars	Premolars three-rooted; absolutely and relatively large anterior teeth
Mandibular fossa	Relatively deep	Shallow
Foramen magnum	Orientation variable	Anteriorly inclined
Mandibular corpus	Moderate relief on external surface; rounded base	Marked relief on external surface; everted base
Lower teeth	Buccolingually narrowed; postcanine crowns; reduced talonid on P ₄ ; M ₃ reduction; mostly single-rooted mandibular premolars	Broad postcanine crowns; relatively large P ₄ talonid; no M ₃ reduction; twin, platelike P ₄ roots, and bifid, or even twin, platelike P ₃ roots
Postcranium		
Limb proportions	Apelike	?
Forelimb robusticity	Apelike	?
Hand	Mosaic of apelike and modern humanlike features	?
Hindfoot	Retains climbing adaptations	Later <i>Homo</i> -like
Femur	Australopithecine-like	Later <i>Homo</i> -like

After Wood (1992).

Homo rudolfensis
(2.5-1.6 M.a)

- Morfologia più robusta
Most robust morphology
- maggiore cc (750 cm³)
> CC
- faccia più robusta (larga a metà altezza e ortognata)
Most robust face
- Si trova a Koobi Fora, Chemeron e Uraha
- Denti megadonti e abrasione dei denti orizzontale
Megadont teeth and more horizontal tooth abrasion

1964, Leakey et alii



Homo habilis
(2.0-1.6 M.a)

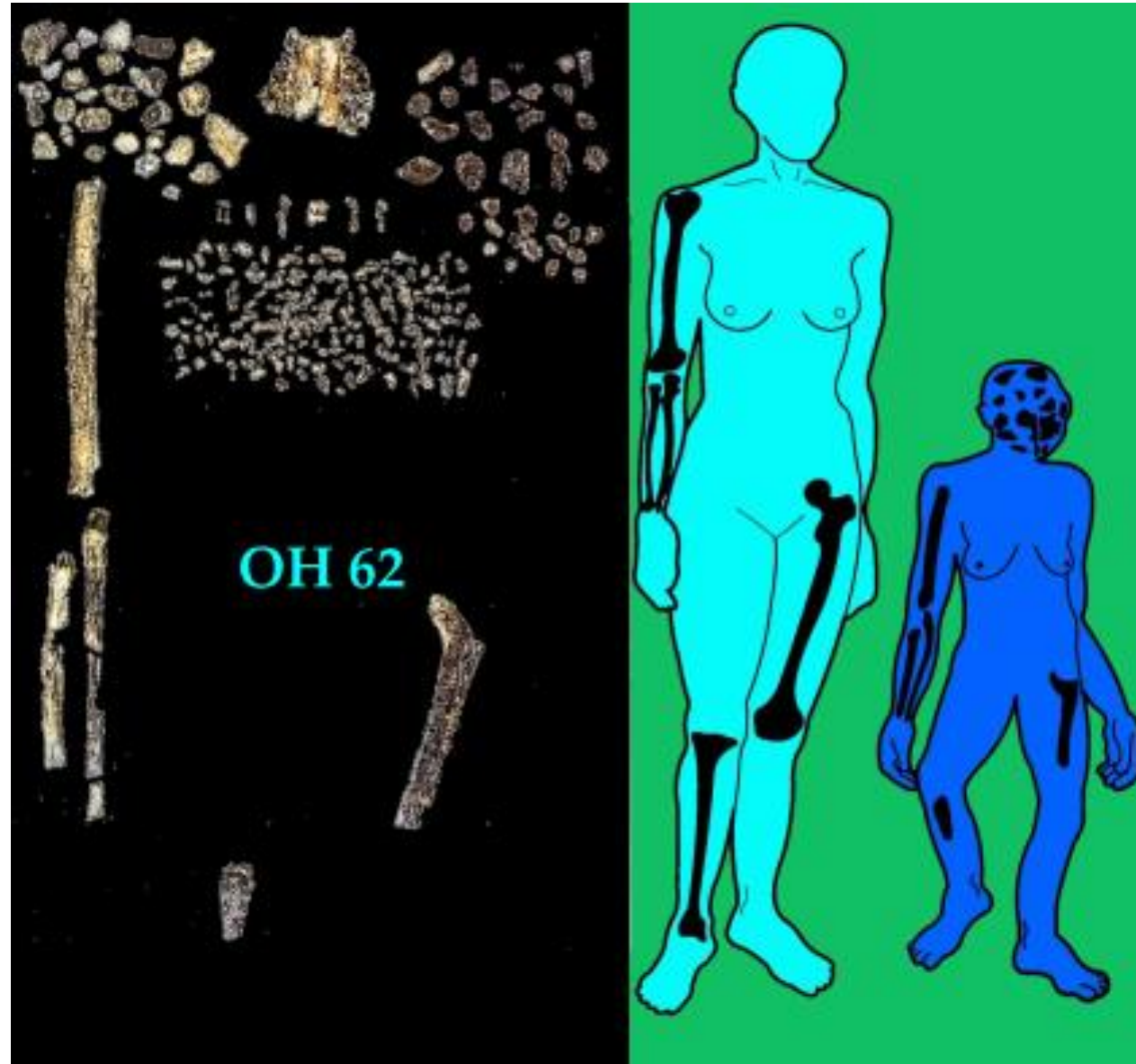
- Specie più gracile
More gracile
- cervello più ridotto (610 cm³)
< CC
- Si trova a Koobi Fora, Omo e Olduvai.
- Molari più gracili
Molars more gracile
- Rilievo dei denti usurati più alto
higher relief in worn teeth

Differenze dell'usura dentaria che indicano delle differenze notevole nella dieta e l'ecologia dei primi *Homo*
Differences in tooth wear indicating significant differences in diet and ecology of early Homo species

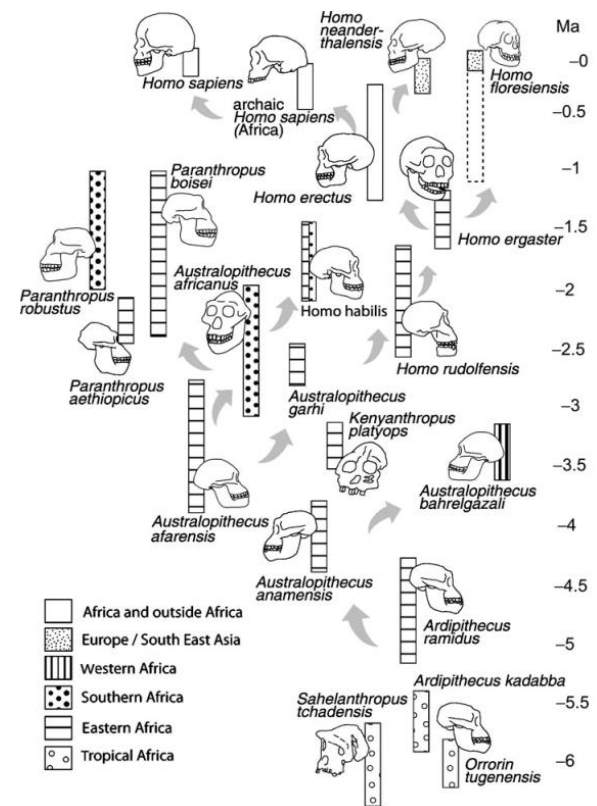
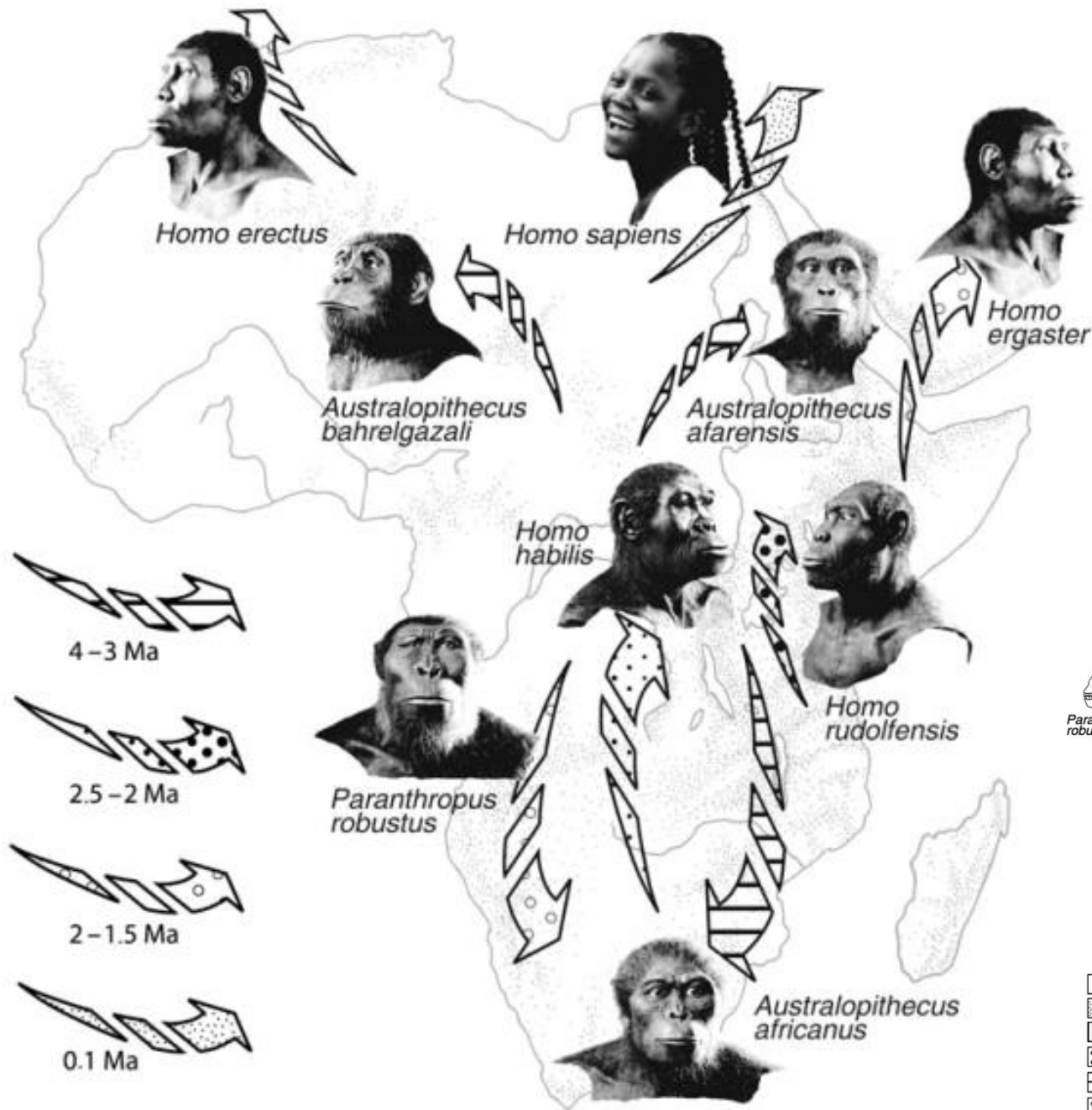
Le caratteristiche morfologiche dimostrano che i individui erano capace di avere una bipedia efficace. Però il talus è meno umano che il resto del piede e ha una morfologia scimmiesca

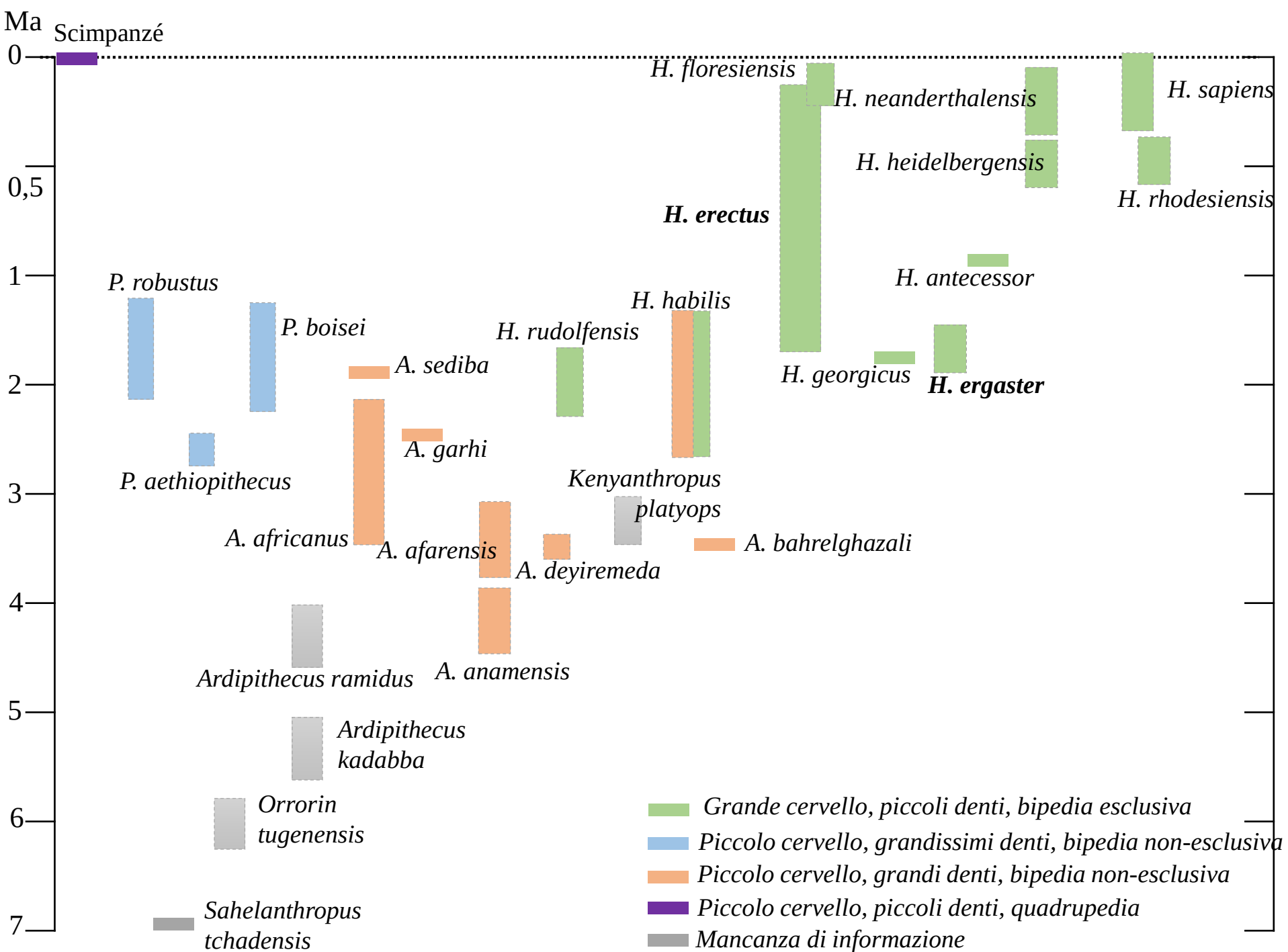
La bipedia dell' *Homo habilis* può essere posizionata tra quella occasionale dei Australopitecine e quella obbligata dei *H. ergaster*.

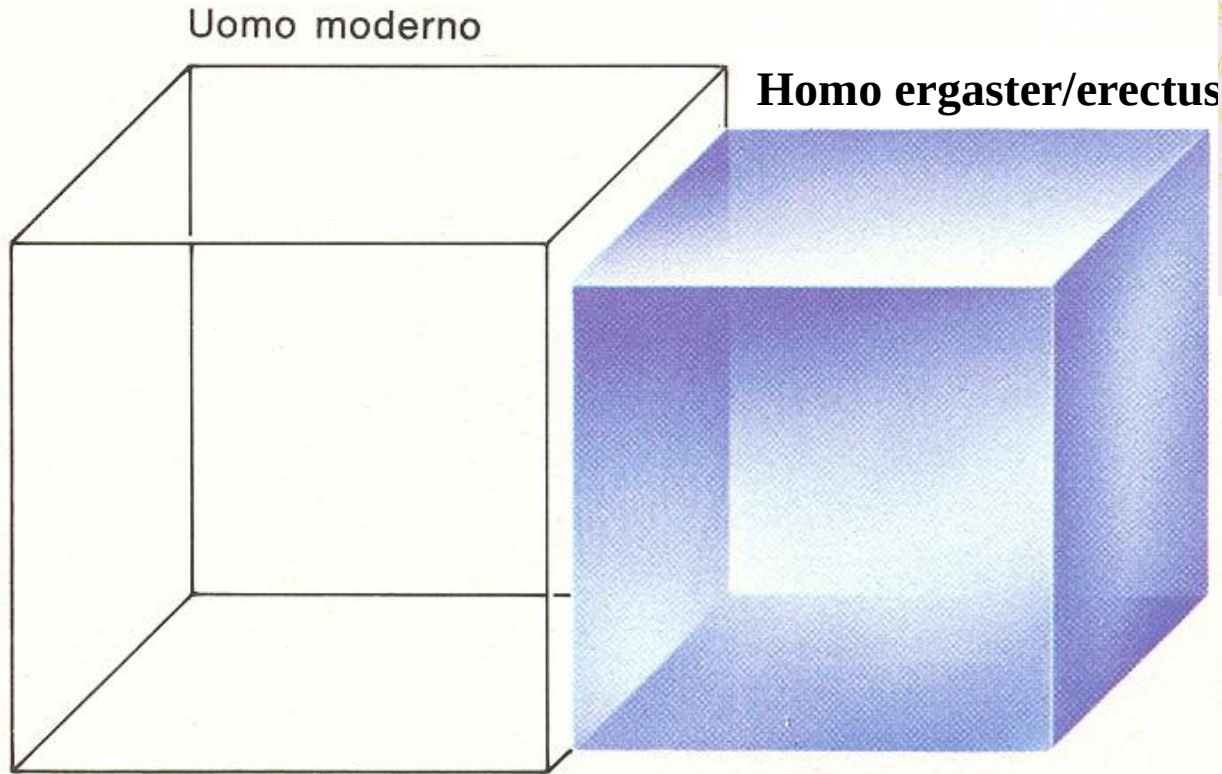
Efficient bipedism but the talus has ape-like morphology. The Homo habilis bipedism can be placed somewhere between the occasional one of the Australopiths and the obligatory one of H. ergaster



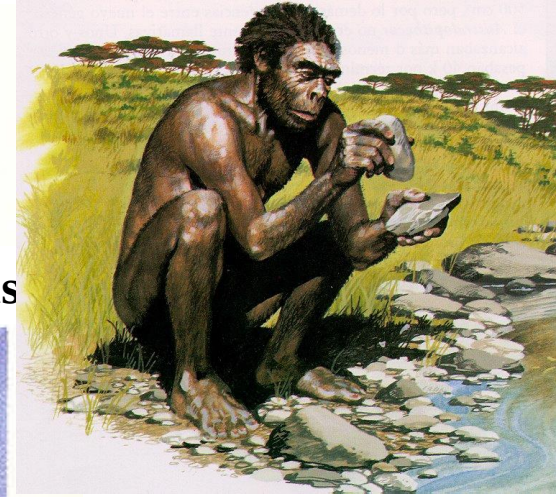
Early hominid biogeography, dispersal and migration in Africa





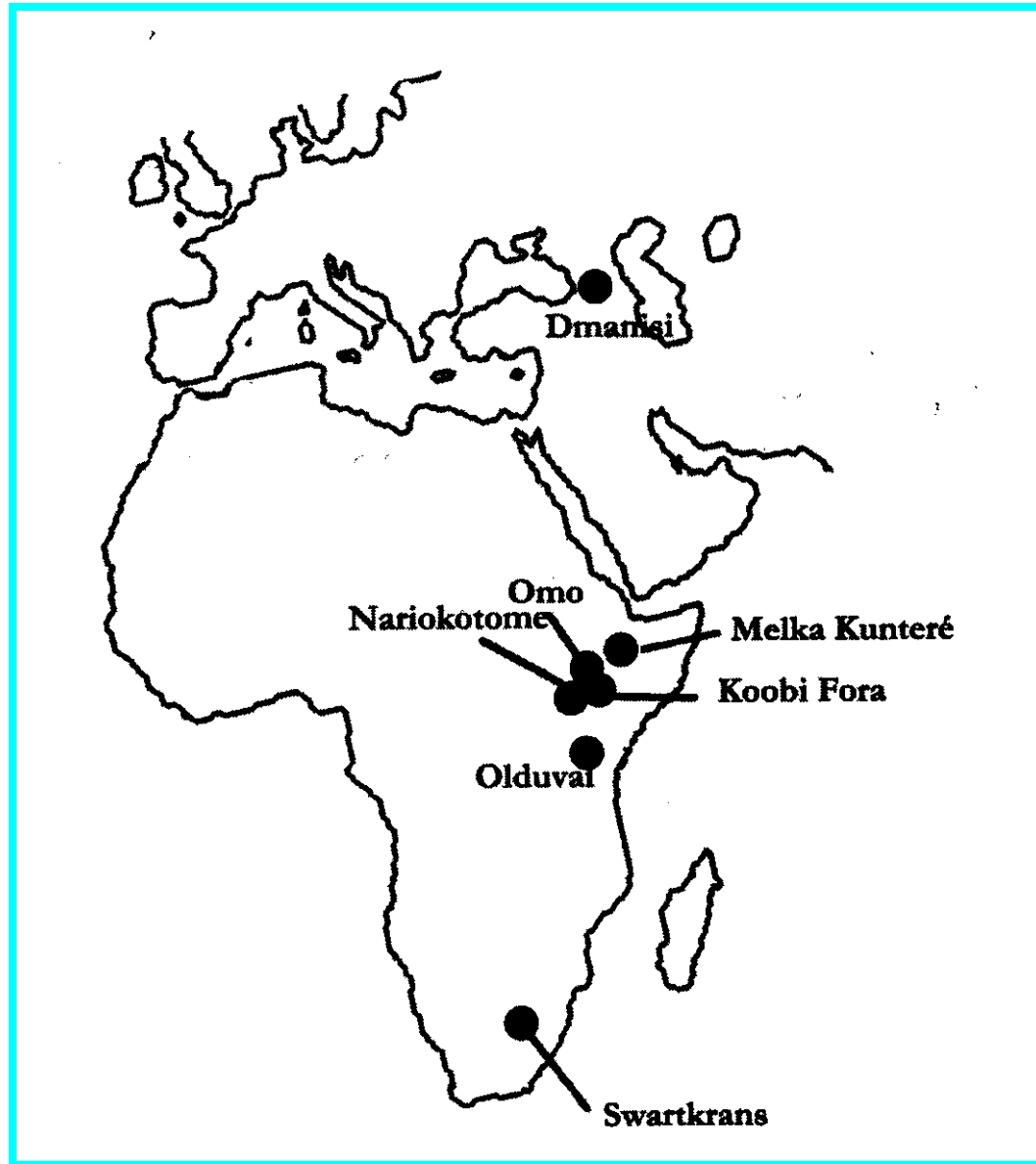


Il graduale aumento nella capacità cranica degli ominidi continuò nell'*Homo erectus*, la cui media era di 950 cm³. Si verificarono anche importanti progressi sociali: la caccia fu organizzata, gli utensili divennero più vari, e nei climi più freddi venne usato il fuoco.



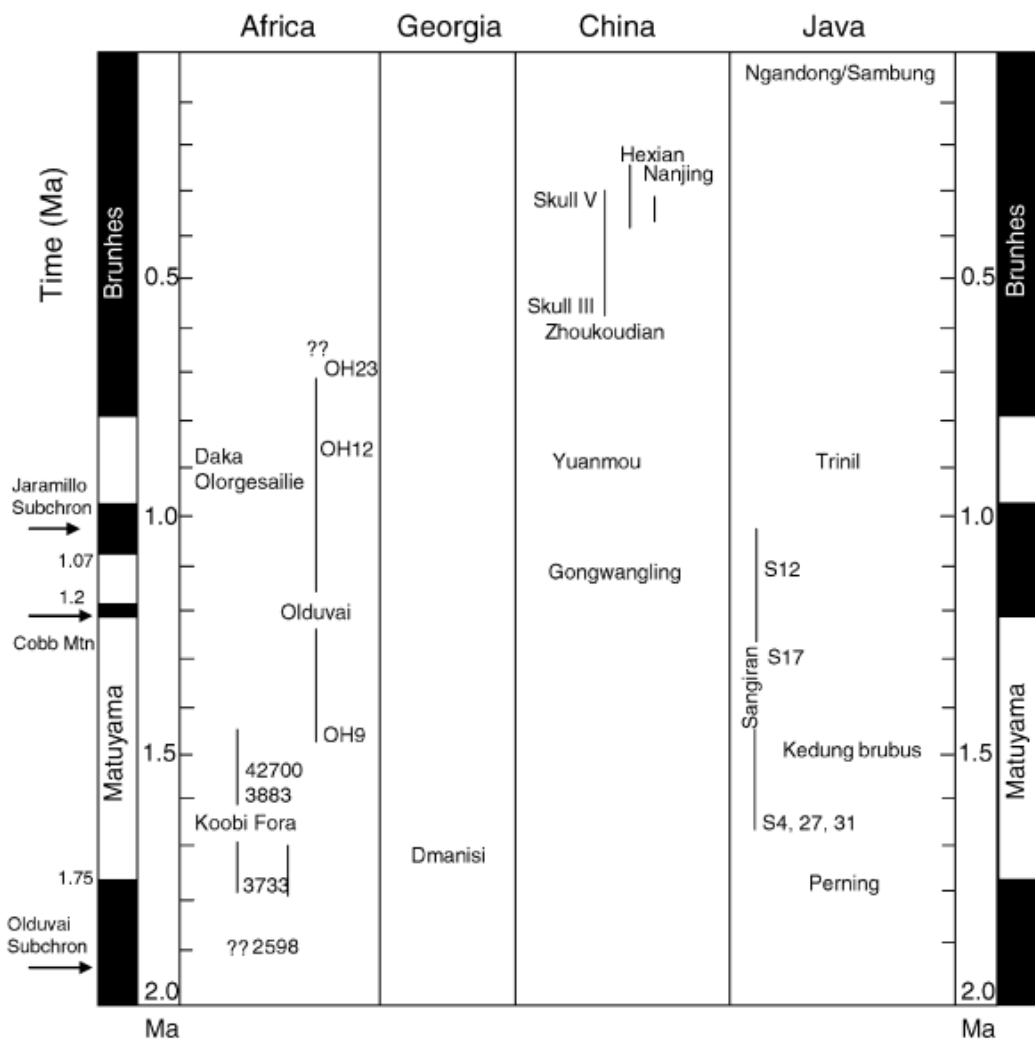
Gradual increase of cranium capacity of the hominids continue in Homo erectus (950 cc). Important social progress: organized hunting, diversification of tools

Homo ergaster



Principali siti con resti di *Homo ergaster*

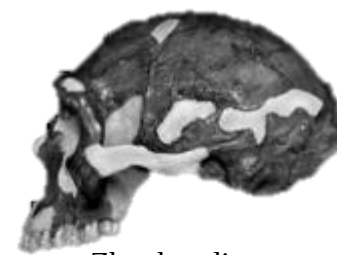
Temporal distribution of *H. erectus* sites



(Henke & Tattersall, 2007)



Sangiran 17



Zhoukoudian



Koobi Fora KNM-ER 3733



Koobi Fora KNM-ER 3883



Koobi Fora KNM-ER 3732



Olduvai OH 9



West Turkana KNM-WT 15000



Koobi Fora KNM-ER 1813

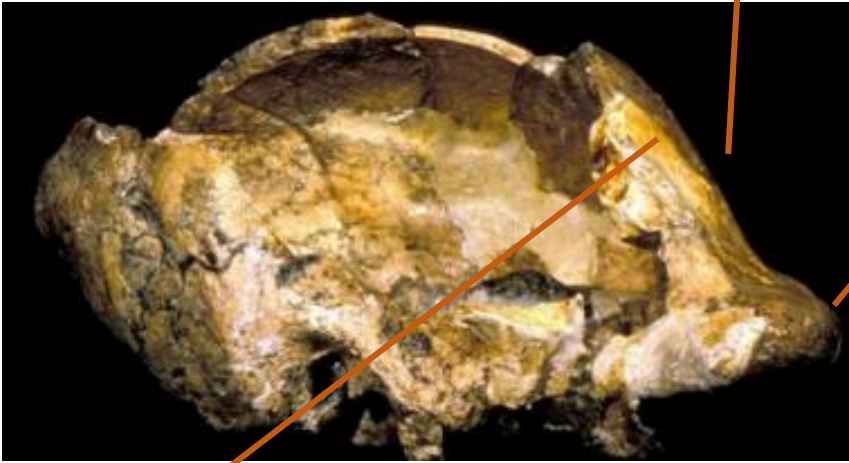


Dmanisi D 2282

(From Schwartz and
Tattersall, 2005)

Frontale sfuggente

Toro sopraorbitario spesso



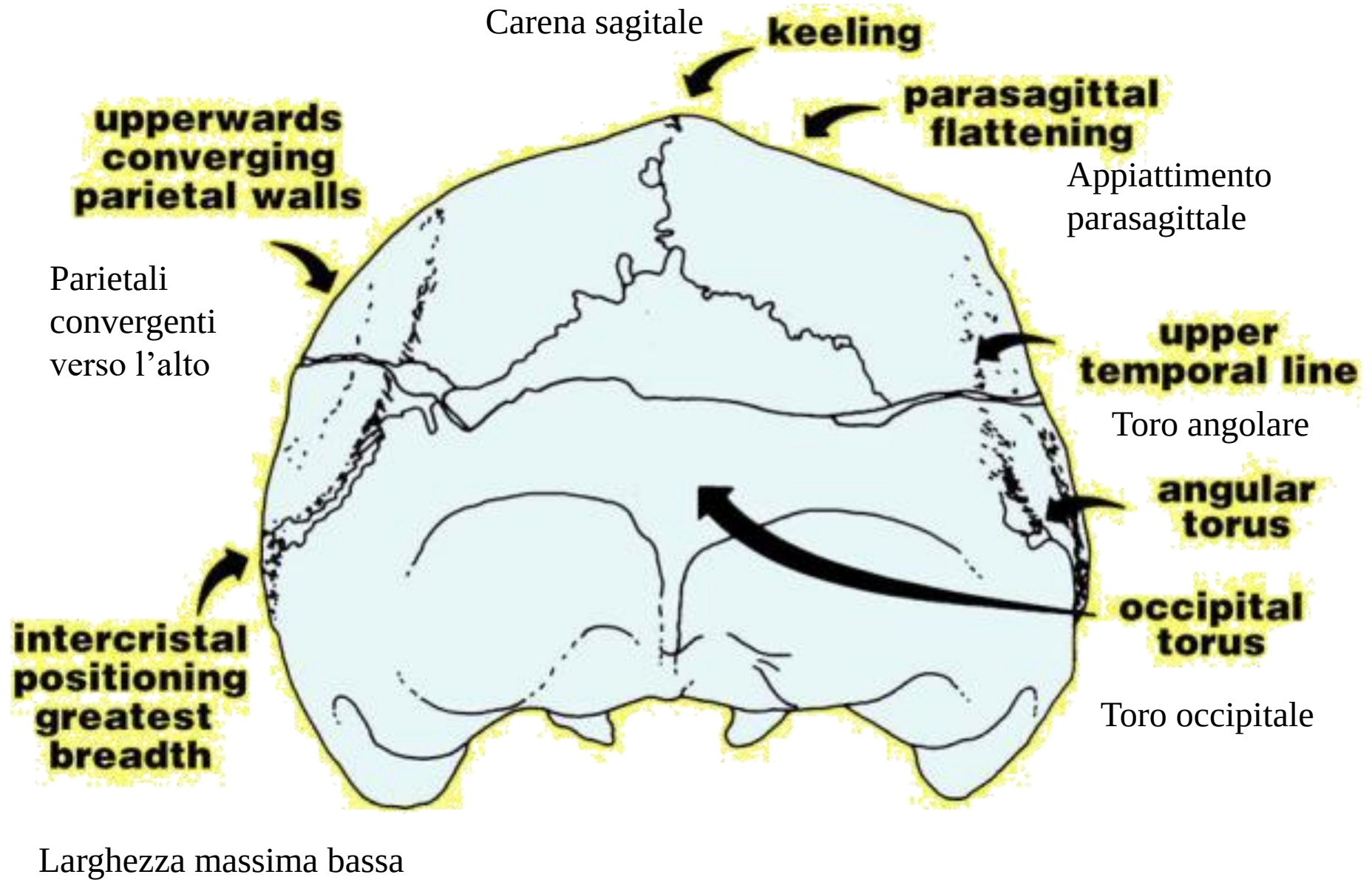
Linee temporali marcate

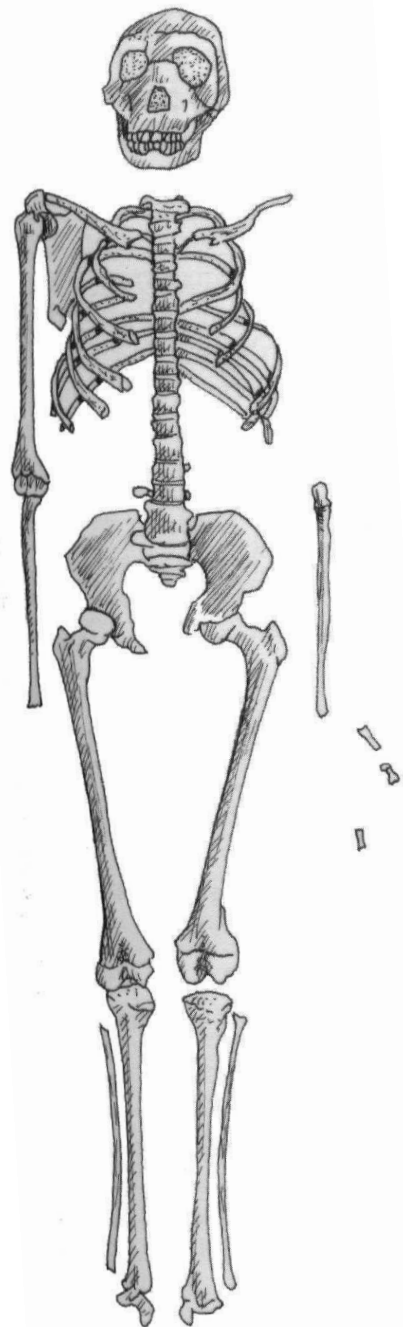
Restringimento retroorbitario



Solco sopratorale

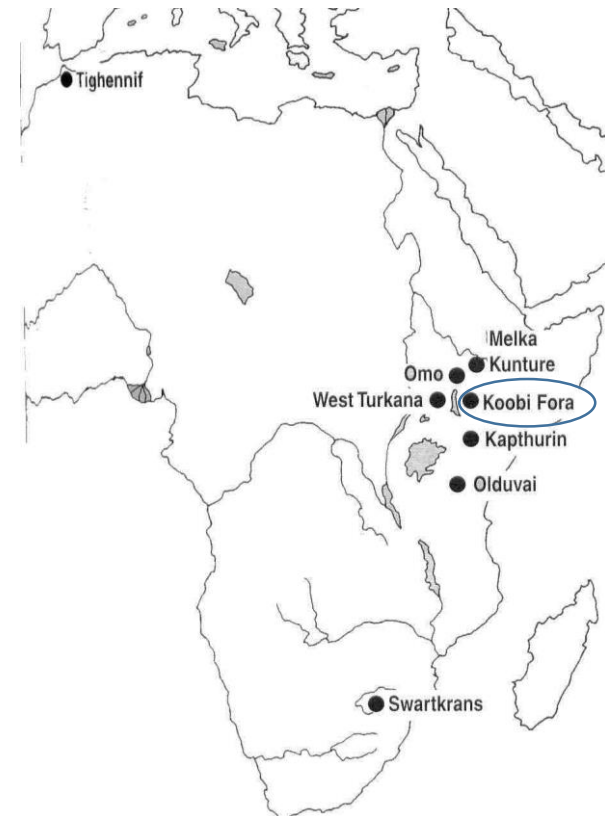
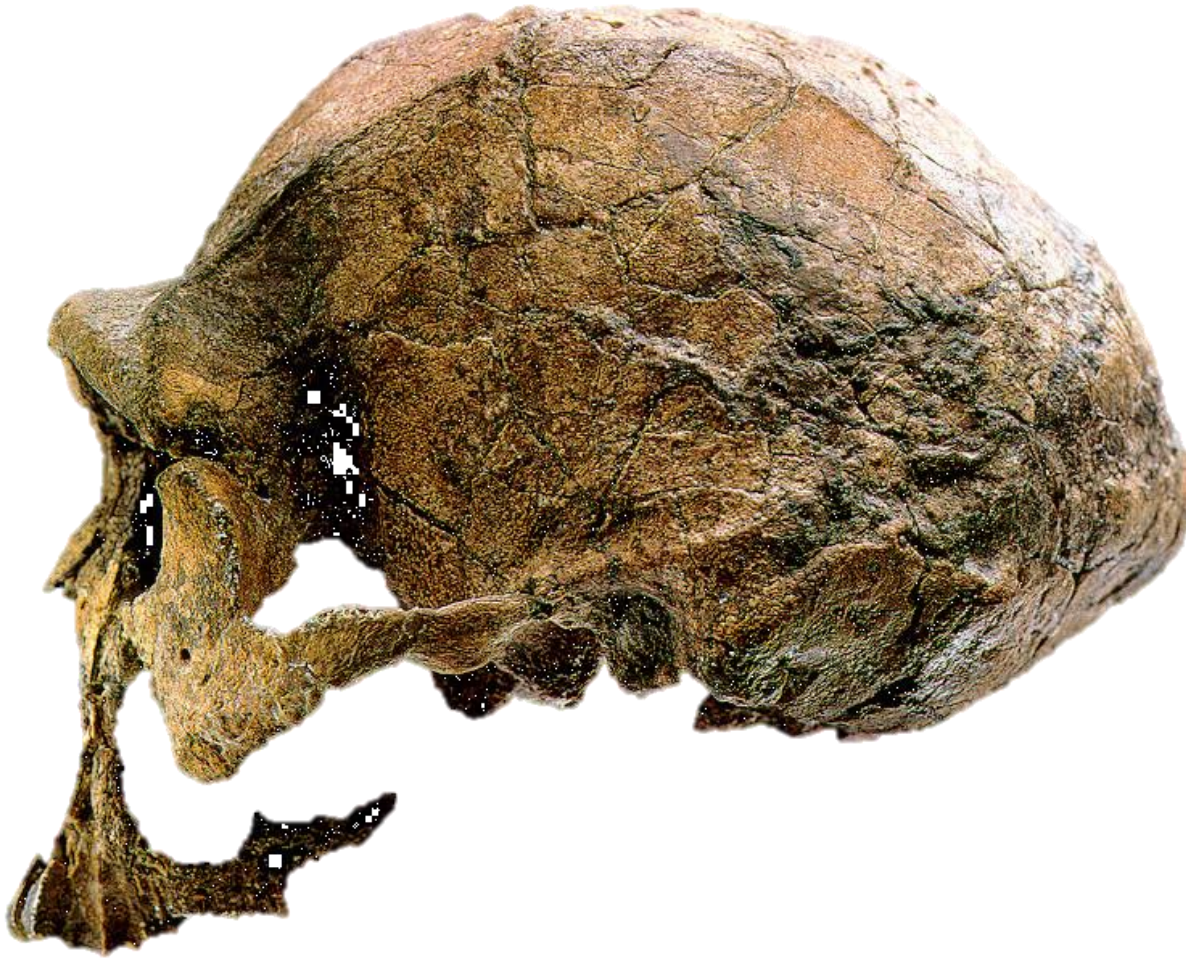
OH9, calvario incompleto da Olduvai
(caratteri condivisi con le forme asiatiche)





Scheletro di *Homo ergaster* (KNM-WT 15000)
scoperto a Nariokotome (Kenya) e datato a circa
1,6 milioni di anni BP

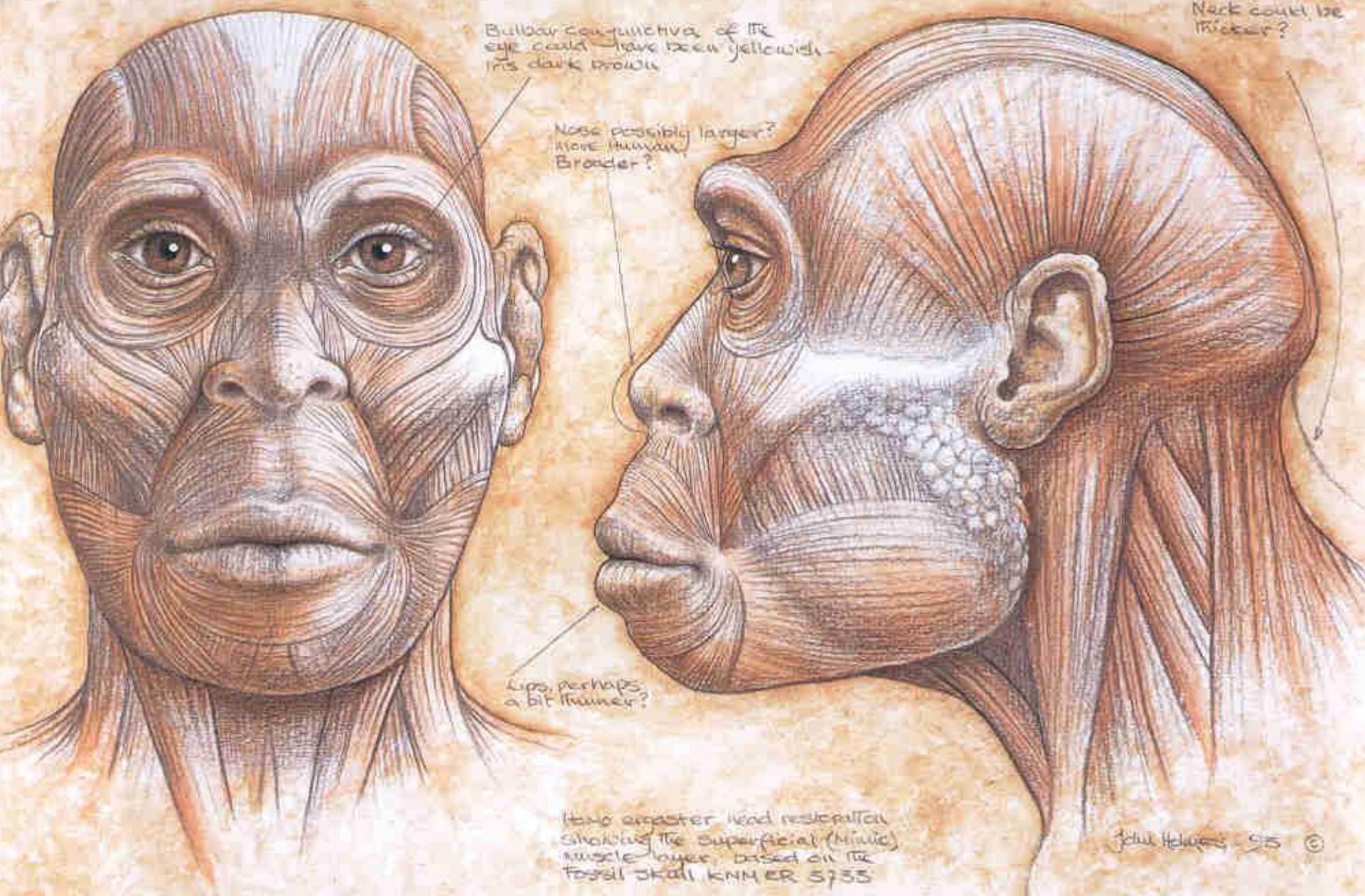
H. ergaster KNM-ER 3733, Koobi Fora 1.75 MA



H. ergaster KNM-ER 3733, Koobi Fora 1.75 MA



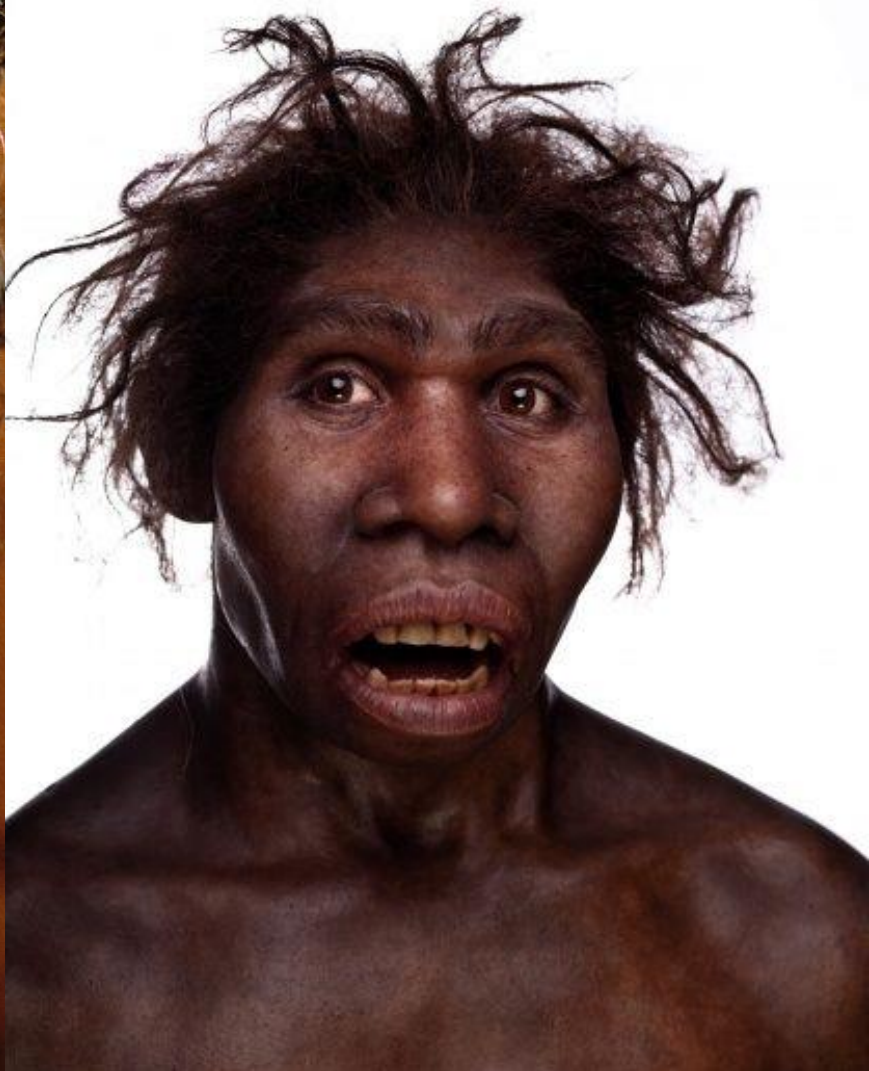
Ricostruzione anatomica di *H. ergaster* sulla base del cranio KNM-ER 3733





KNM-ER 3733

KNM-WT 15000





H. ergaster

KNM-ER 992

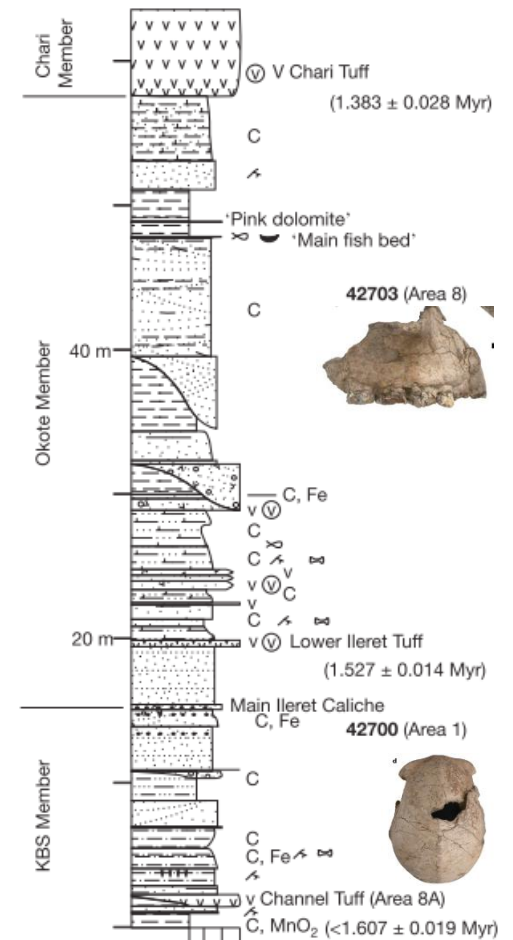
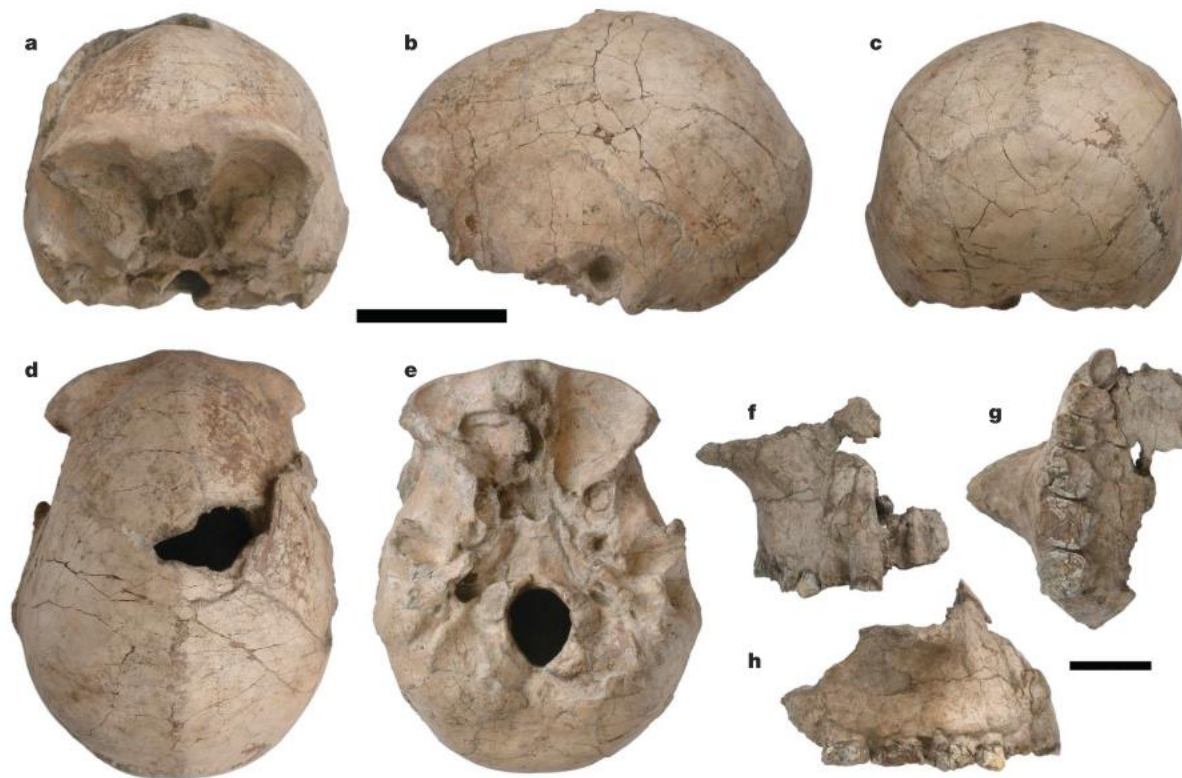
1.5 Myr

Koobi Fora
(Kenya)

LETTERS

Implications of new early *Homo* fossils from Ileret, east of Lake Turkana, Kenya

F. Spoor¹, M. G. Leakey^{2,3}, P. N. Gathogo⁵, F. H. Brown⁵, S. C. Antón⁶, I. McDougall⁷, C. Kiarie⁸, F. K. Manthi⁸ & L. N. Leakey^{2,4}

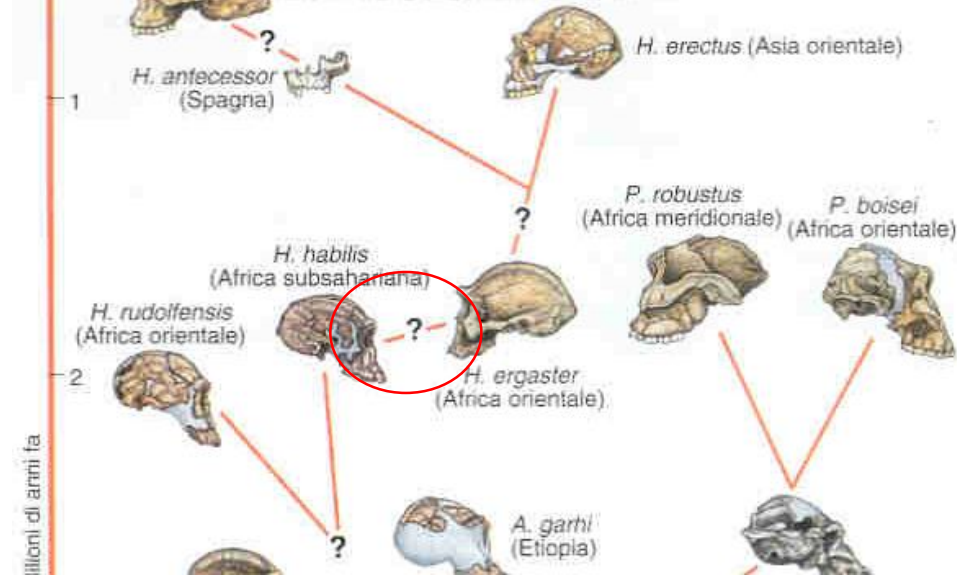


The KNM-ER 42700 calvaria and KNM-ER 42703 partial maxilla

LETTERS

Implications of new early *Homo* fossils from Ileret, east of Lake Turkana, Kenya

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I siti in Africa orientale danno informazione sull'emergenza e l'evoluzione dei primi *Homo*.

Sites in eastern Africa have shed light on the emergence and early evolution of the genus Homo

H. habilis e *H. erectus* sono spesso interpretati come una singola linea evolutiva anagenetica.

H. habilis and H. erectus, have often been interpreted as time-successive segments of a single anagenetic evolutionary lineage.

KNM-ER
42700
Calvaria



KNM-ER
42703
Frammento di
mascellare

Due nuovi resti cranici trovati nella formazione di Koobi Fora (Lago Turkana in Kenya) hanno cambiato le idee sul rapporto tra le specie dei primi *Homo*

Two new cranial fossils from the Koobi Fora Formation, east of Lake Turkana in Kenya, change the knowledge about the relationship between species of early Homo.

Il frammento di mascellare attribuito a *H. habilis* dimostra che questa specie ha sopravvissuto dopo quello che si pensava, implicando il rapporto anagenetico con *H. erectus* improbabile.

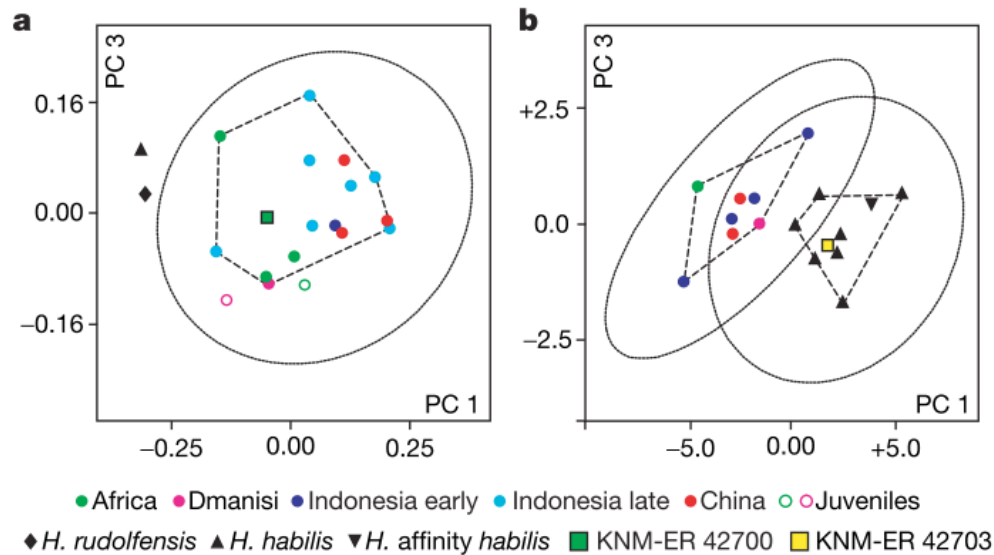
A partial maxilla assigned to H. habilis reliably demonstrates that this species survived until later than previously recognized, making an anagenetic relationship with H. erectus unlikely.

La scoperta di un piccolo calvario di *H. erectus* indica che questo taxa si sovrappone in taglia con *H. habilis*, e potrebbe avere dimostrato un dimorfismo sessuale marcato.

The discovery of a particularly small calvaria of H. erectus indicates that this taxon overlapped in size with H. habilis, and may have shown marked sexual dimorphism.

Il nuovo fossile conferma la distinzione tra *H. habilis* e *H. erectus*, indipendentemente dalla taglia generale cranica, e suggerisce che questi due taxa vivevano nella stessa area (lago) per quasi mezzo milione di anni.

The new fossils confirm the distinctiveness of H. habilis and H. erectus, independently of overall cranial size, and suggest that these two early taxa were living broadly sympatrically in the same lake basin for almost half a million years.



KNM-ER 42700 = *H. erectus* variability

KNM-ER 42703 (denti) = *H. habilis* variability



Early Hominin Foot Morphology Based on 1.5-Million-Year-Old Footprints from Ileret, Kenya

Matthew R. Bennett,^{1*} John W.K. Harris,² Brian G. Richmond,^{3,4} David R. Braun,⁵ Emma Mbua,⁶ Purity Kiura,⁶ Daniel Olago,⁷ Mzalendo Kibunjia,⁶ Christine Omuombo,⁷ Anna K. Behrensmeier,⁸ David Huddart,⁹ Silvia Gonzalez⁹

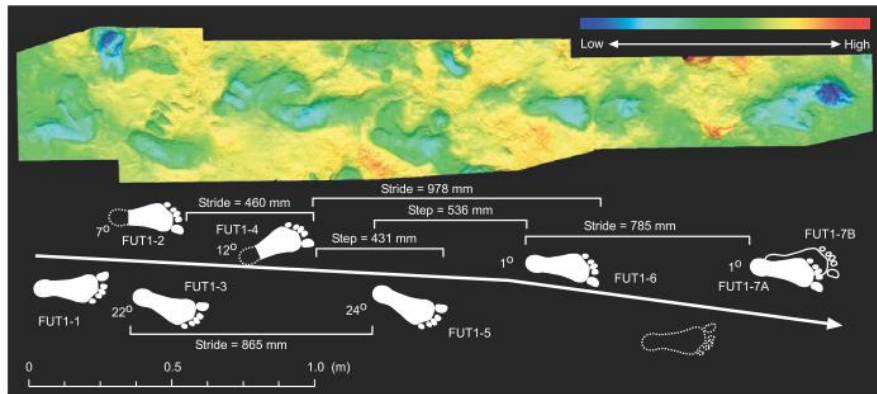
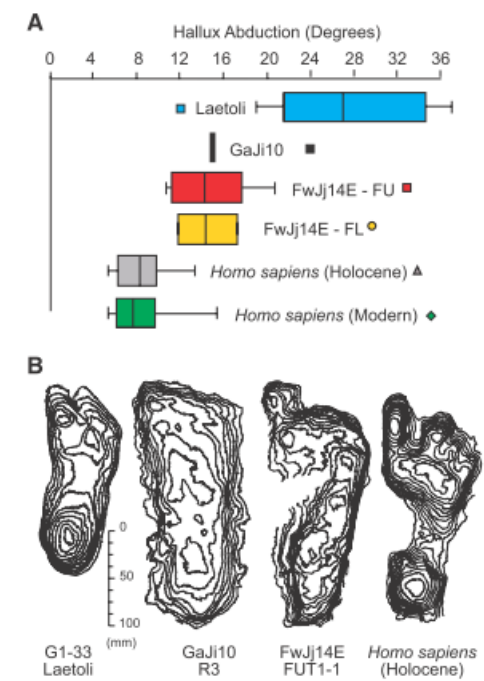


Fig. 2. Tessellated swath of optical laser scans of the main footprint trail on the upper footprint surface at FwJj14E. Color is rendered with 5-mm isopleths.



Impronte datate a 1.51-1.53 Ma

Alluce relativamente abdotto (distante) / *Relatively abducted hallux*

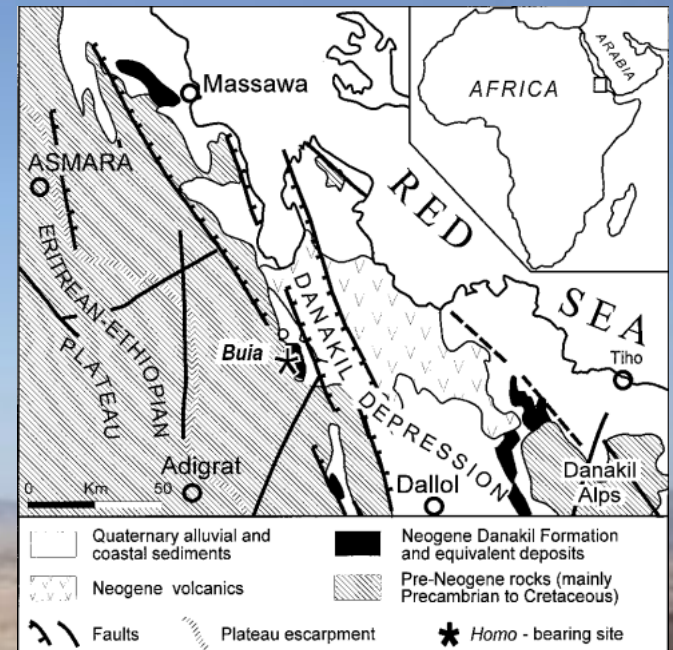
Trasferimento mediale del peso prima del push-off / *Medial weight transfer before push-off*

La taglia delle impronte è in accordo con la statura e la massa corporea stimata dei *ergaster/erectus*

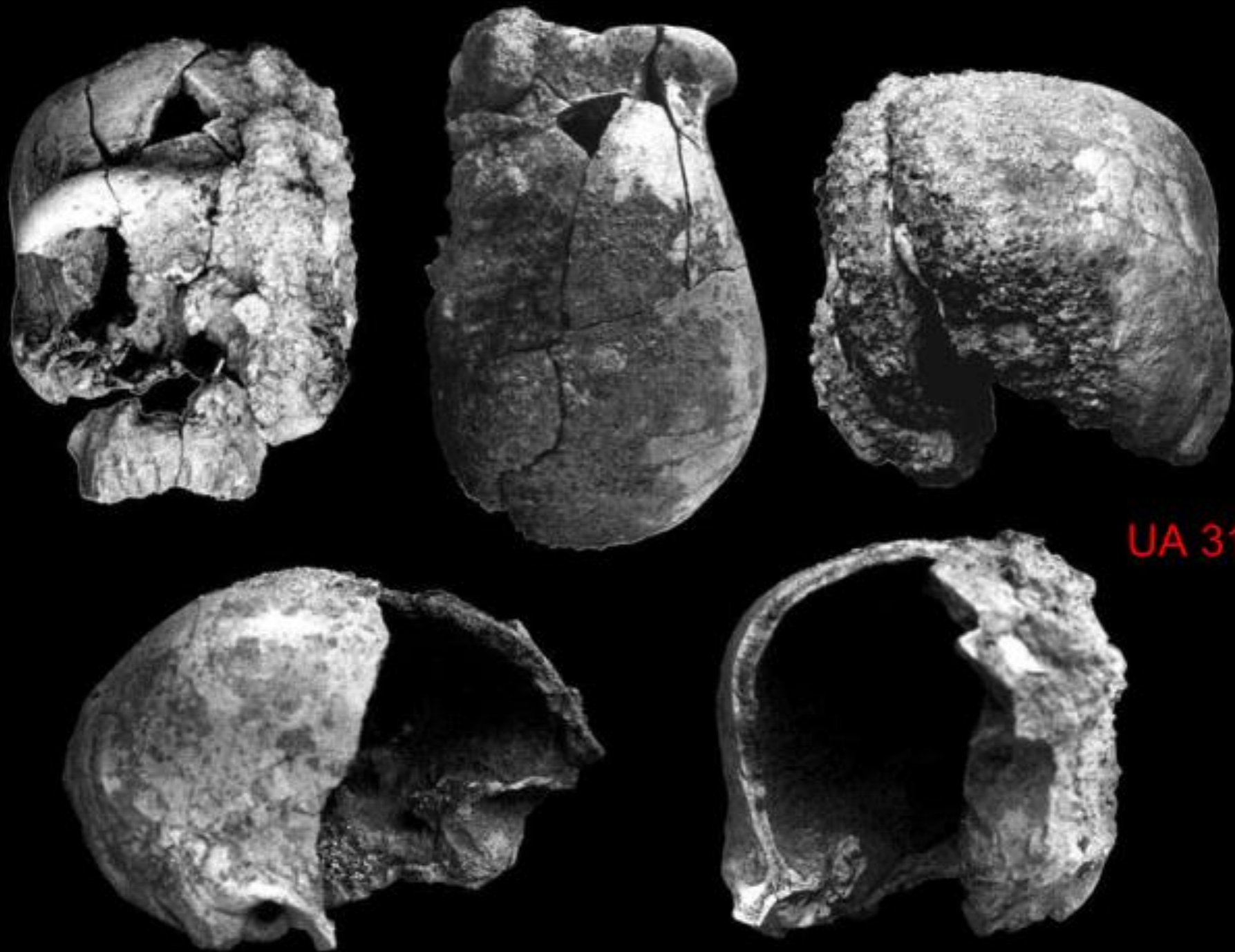
The size of the footprints is consistent with stature and body mass estimates for H. ergaster / erectus

Distinti morfologicamente da Laetoli / *Morphologically distinct from laetoli (3.75 Ma)*

Dimostrano che i ominini hanno sviluppato un piede funzionalmente moderno e una locomozione bipeda / *Show that hominins had evolved an essentially modern human foot function and style of bipedal locomotion*



Uadi Aalad (UA),
Buia, Erythrée



UA 31



**UA 31
(Buia)**

UA 31

WT 15K

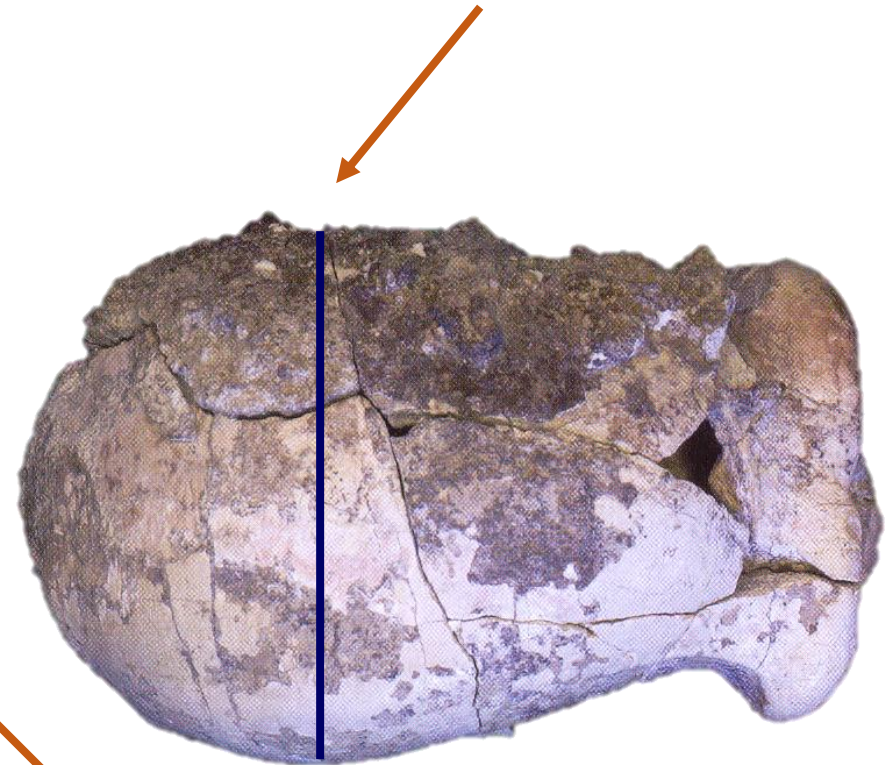
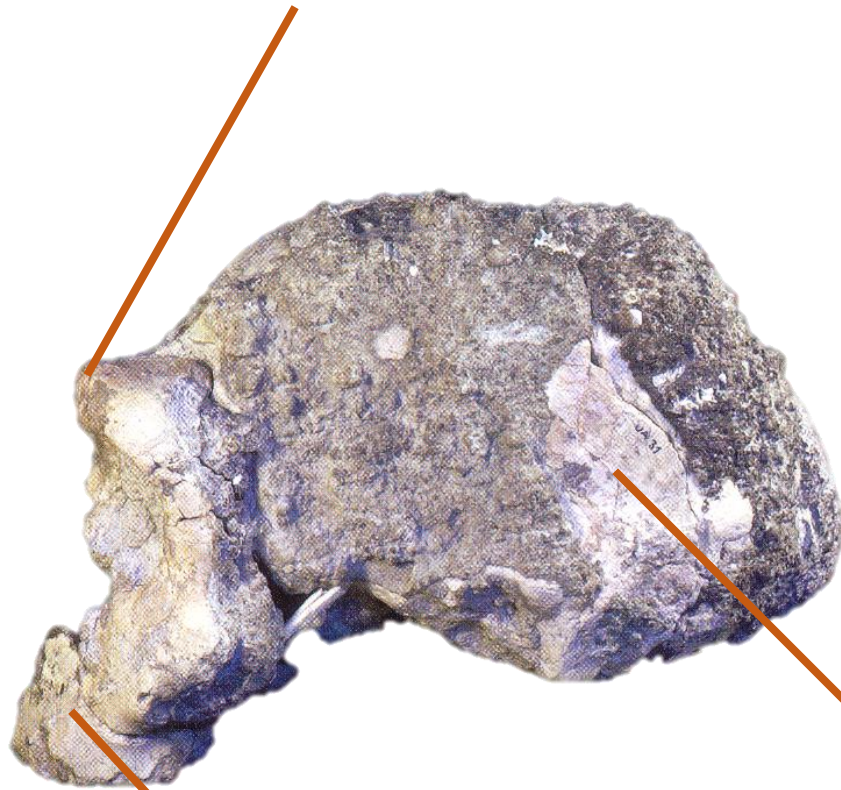
P4 / M¹

P4 / M¹



Toro massiccio

Larghezza biparietale



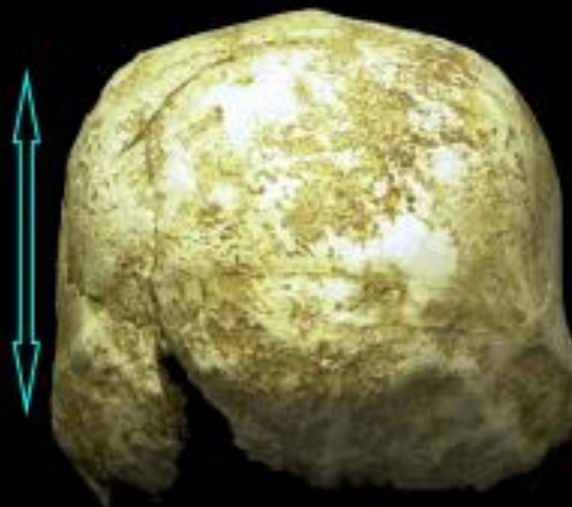
Prognatismo
sottonasale

cc 750-800 cm³

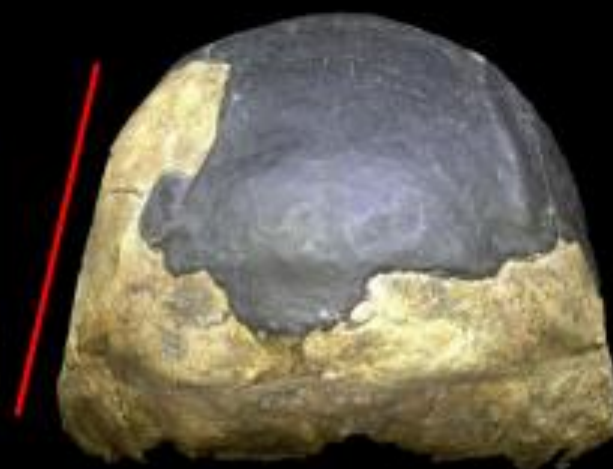
Buia, UA 31, (Eritrea, 1995-97)



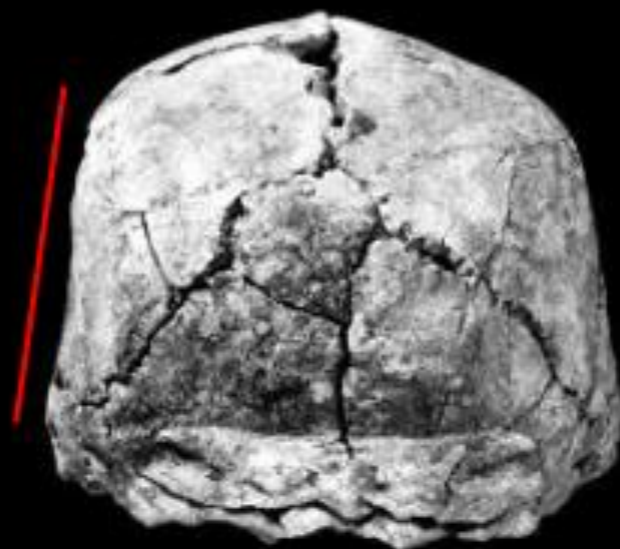
Sangiran 17



UA 31



OH 9



Daka

AFRICA

0 mi 600
0 km 600

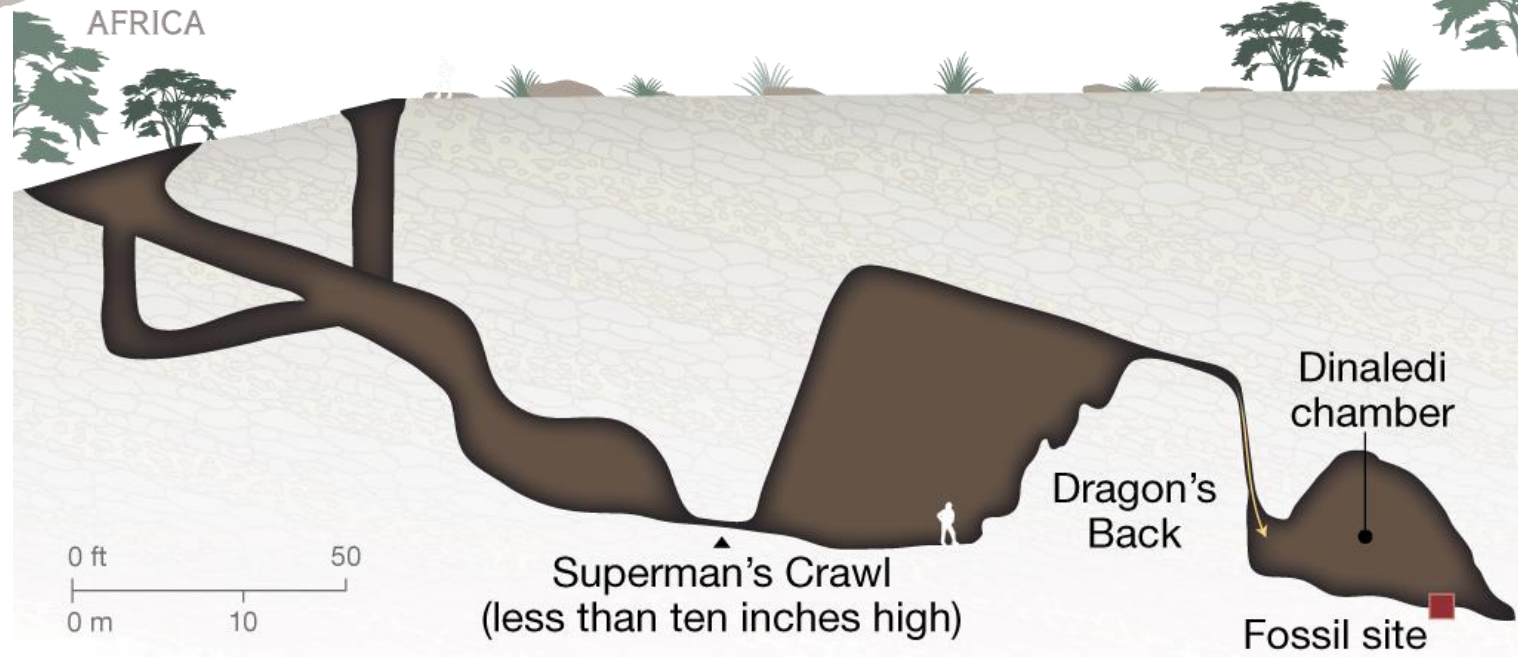
ETHIOPIA
Lake Turkana
KENYA
Olduvai Gorge
TANZANIA

Rising Star cave

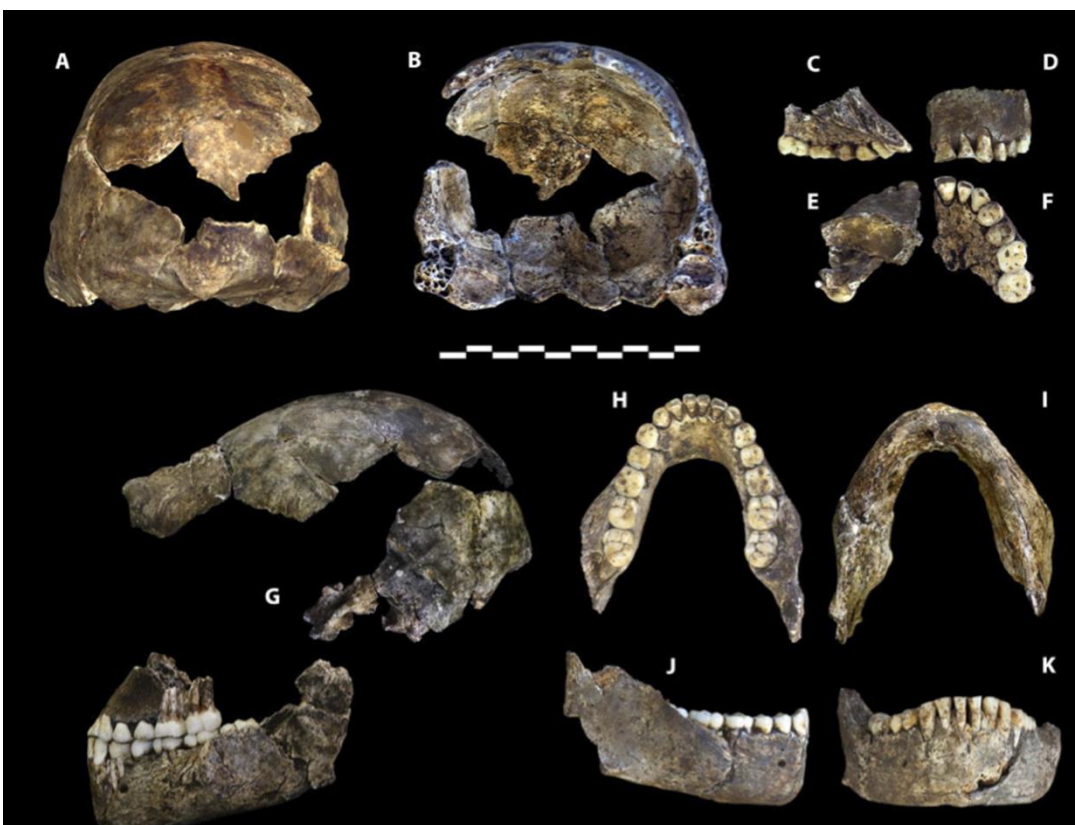
Malapa Johannesburg

SOUTH AFRICA

Homo naledi 335 and 236 kya

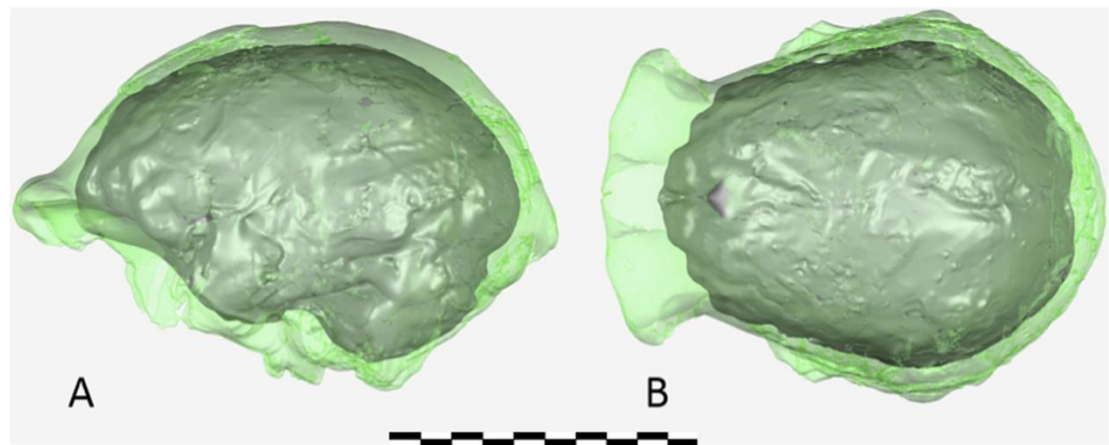




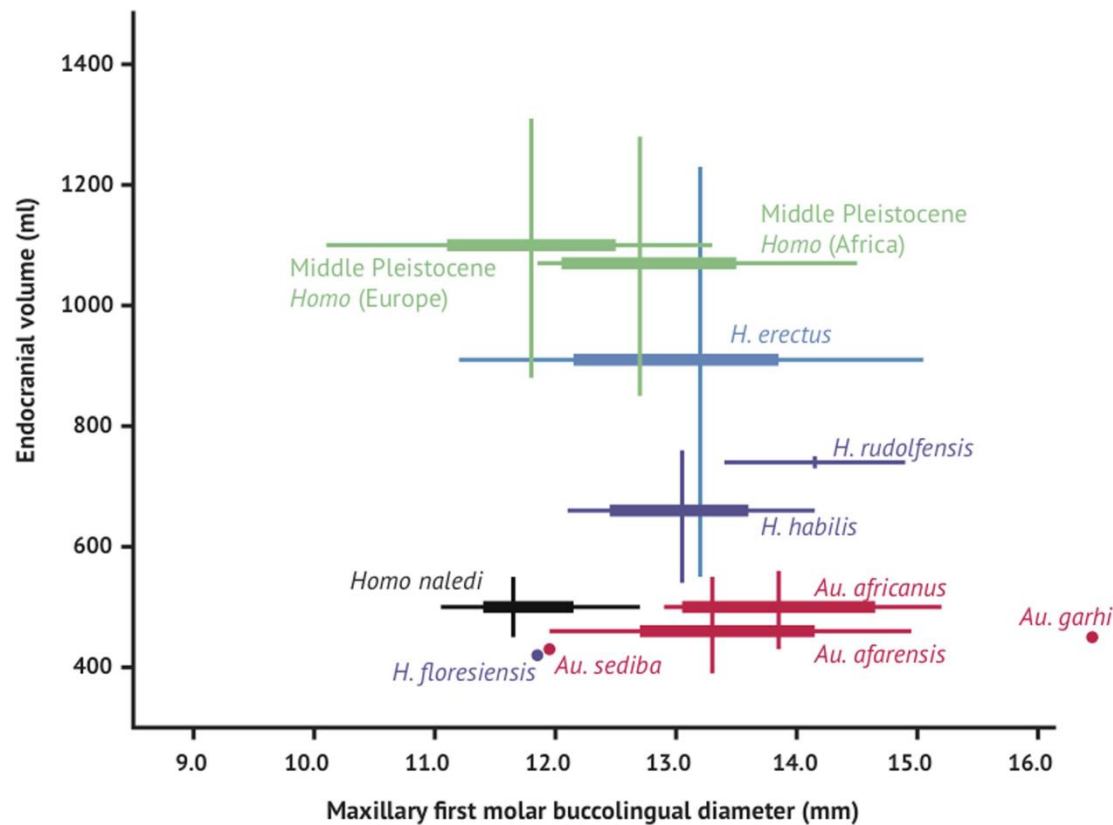


Holotype specimen of *Homo naledi*, Dinaledi Hominin 1 (DH1).

Virtual reconstruction of the endocranium of the larger composite cranium from DH1 and DH2 overlaid with the ectocranial surfaces.



The braincase of this composite male skull of *H. naledi* measures 560 cc less than half that of the modern human.

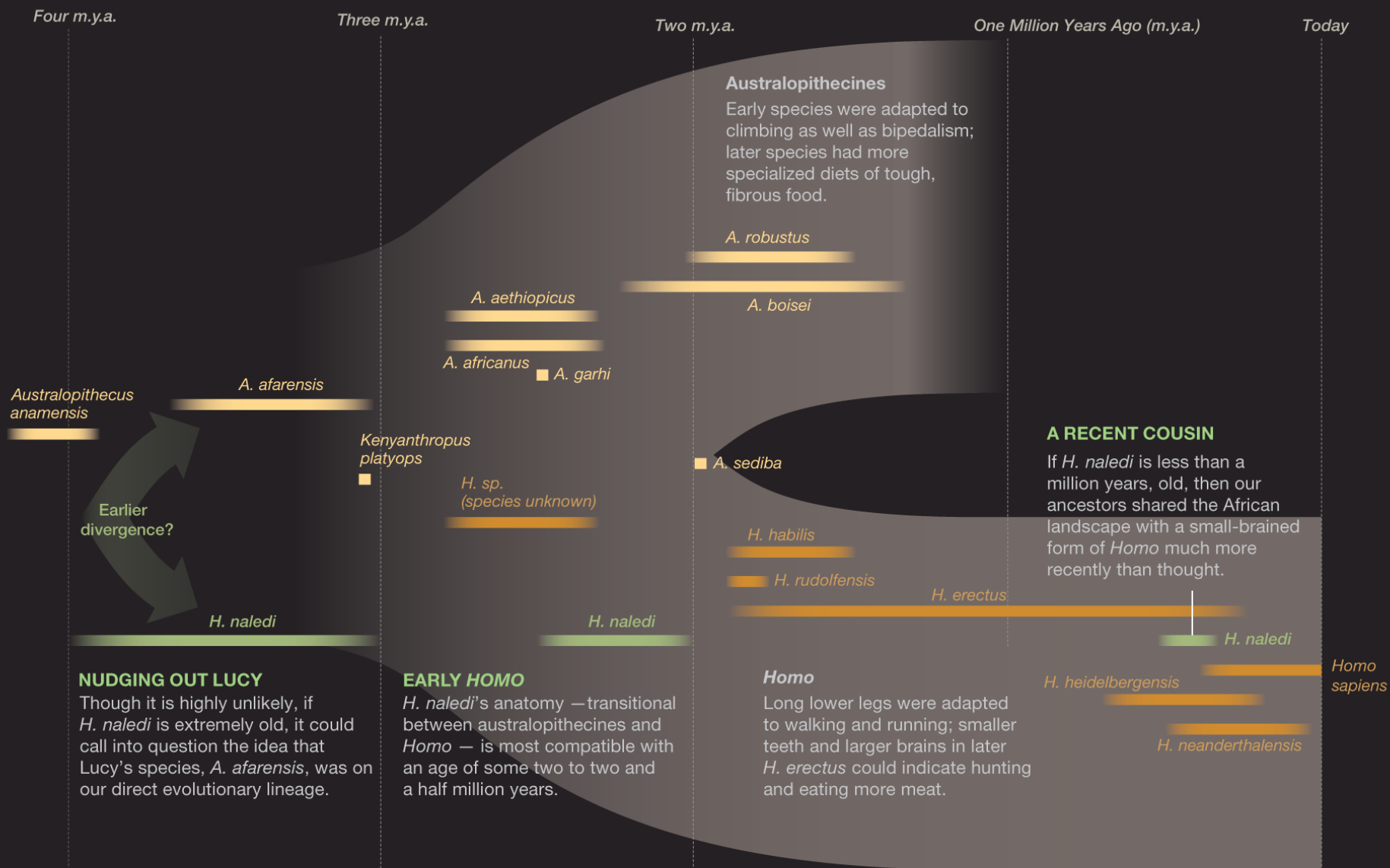


Dimensione del cervello e dei denti nei ominidi.

H. naledi presenta dei molari con dimensioni ridotte (confrontabili con i *Homo* successivi) e un volume endocranico relativamente piccolo (simile agli australipitecine). Il range di variazione del campione di Dinaledi è piuttosto ridotto, in particolare confrontandolo con quello dei *H. erectus* sensu lato.

Brain size and tooth size in hominins.

H. naledi occupies a position with relatively small molar size (comparable to later *Homo*) and relatively small endocranial volume (comparable to australopiths). The range of variation within the Dinaledi sample is also fairly small, in particular in comparison to the extensive range of variation within the *H. erectus* sensu lato.



HOMO FEATURES

Humanesque skull

The general shape of *H. naledi*'s skull is advanced, though the braincase is less than half of a modern human's.

Versatile hands

H. naledi's palms, wrists, and thumbs are humanlike, suggesting tool use.

Long legs

The leg bones are long and slender and have the strong muscle attachments characteristic of a modern bipedal gait.

Humanlike feet

Except for the slightly curved toes, *H. naledi*'s feet are nearly indistinguishable from ours, with arches that suggest an efficient long-distance stride.



AUSTRALOPITHECINE FEATURES

Primitive shoulders

H. naledi's shoulders are positioned in a way that would have helped with climbing and hanging.

Flared pelvis

The hip bones of *H. naledi* flare outward—a primitive trait—and are shorter front to back than those of modern humans.

Curved fingers

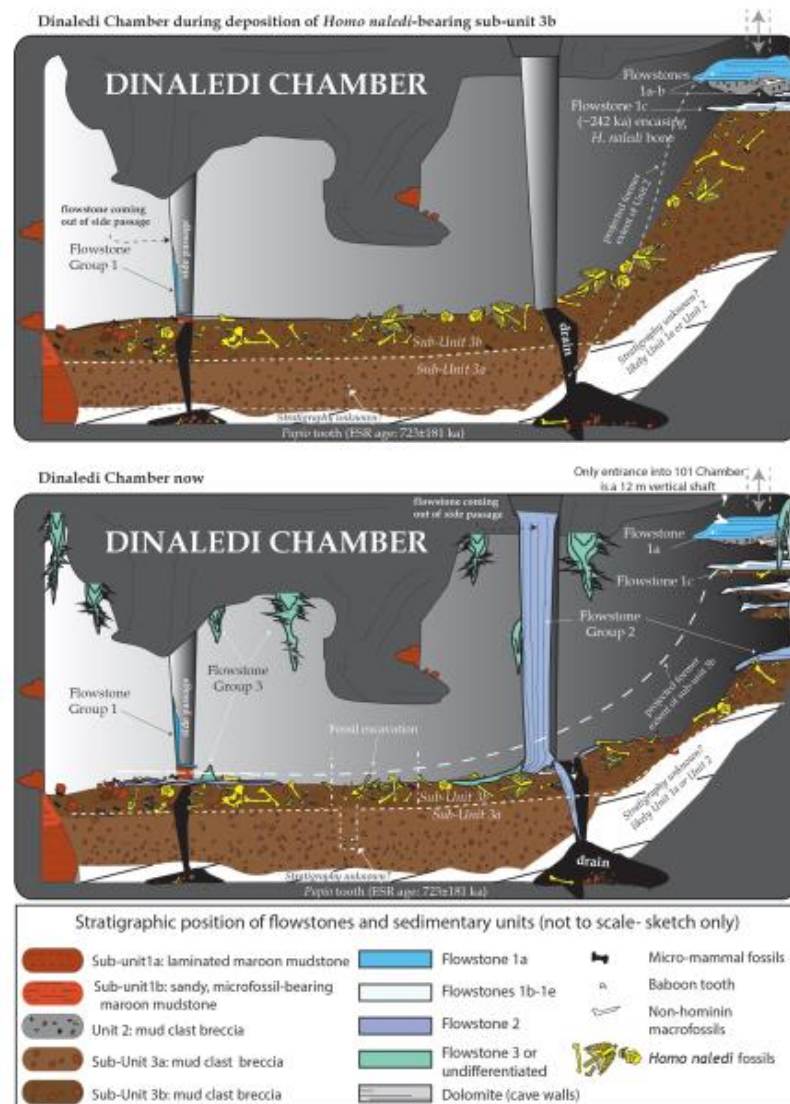
Long, curved fingers, useful for climbing in trees, could be a trait retained from a more apelike ancestor.

The age of *Homo naledi* and associated sediments in the Rising Star Cave, South Africa

Paul HGM Dirks^{1,2*}, Eric M Roberts^{1,2}, Hannah Hilbert-Wolf¹, Jan D Kramers³, John Hawks^{2,4}, Anthony Dosseto⁵, Mathieu Duval^{6,7}, Marina Elliott², Mary Evans⁸, Rainer Grün^{6,9}, John Hellstrom¹⁰, Andy IR Herries¹¹, Renaud Joannes-Boyau¹², Tebogo V Makhubela³, Christa J Placzek¹, Jessie Robbins¹, Carl Spandler¹, Jelle Wiersma¹, Jon Woodhead¹⁰, Lee R Berger²

Abstract New ages for flowstone, sediments and fossil bones from the Dinaledi Chamber are presented. We combined optically stimulated luminescence dating of sediments with U-Th and palaeomagnetic analyses of flowstones to establish that all sediments containing *Homo naledi* fossils can be allocated to a single stratigraphic entity (sub-unit 3b), interpreted to be deposited between 236 ka and 414 ka. This result has been confirmed independently by dating three *H. naledi* teeth with combined U-series and electron spin resonance (US-ESR) dating. Two dating scenarios for the fossils were tested by varying the assumed levels of ²²²Rn loss in the encasing sediments: a maximum age scenario provides an average age for the two least altered fossil teeth of 253 +82/-70 ka, whilst a minimum age scenario yields an average age of 200 +70/-61 ka. We consider the maximum age scenario to more closely reflect conditions in the cave, and therefore, the true age of the fossils. By combining the US-ESR maximum age estimate obtained from the teeth, with the U-Th age for the oldest flowstone overlying *Homo naledi* fossils, we have constrained the depositional age of *Homo naledi* to a period between 236 ka and 335 ka. These age results demonstrate that a morphologically primitive hominin, *Homo naledi*, survived into the later parts of the Pleistocene in Africa, and indicate a much younger age for the *Homo naledi* fossil than have previously been hypothesized based on their morphology.

DOI: 10.7554/eLife.24231.001



"Lucy"

Australopithecus afarensis

3.2 million years ago

Adult Female

3 ft 8 in

60-65 lbs

"Turkana Boy"

Homo erectus

1.6 million years ago

Adolescent Male

5 ft

110-115 lbs

"Rising Star Hominin"

Homo naledi

~300 ky

Adult Male

4 ft 10 in

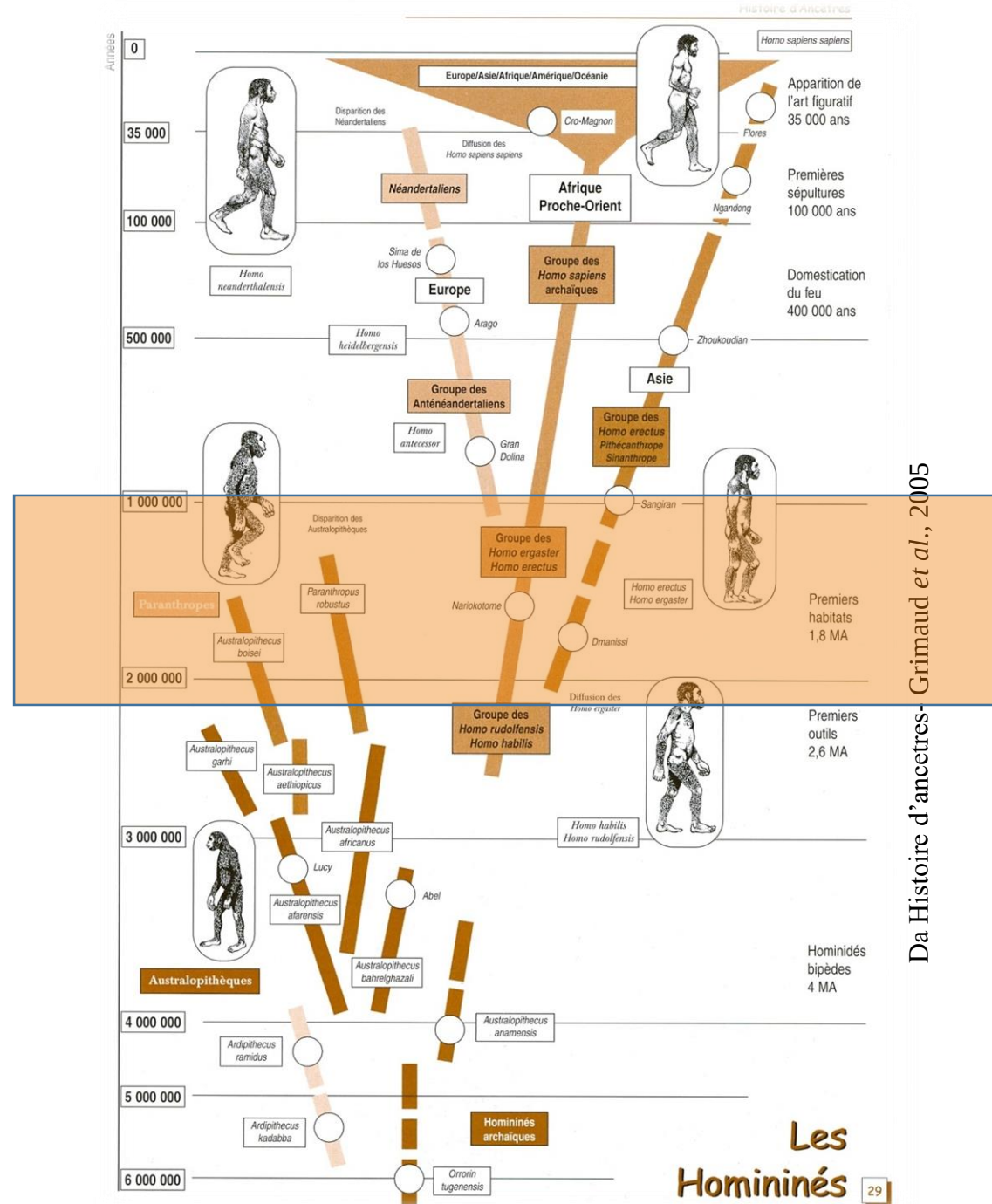
100-110 lbs



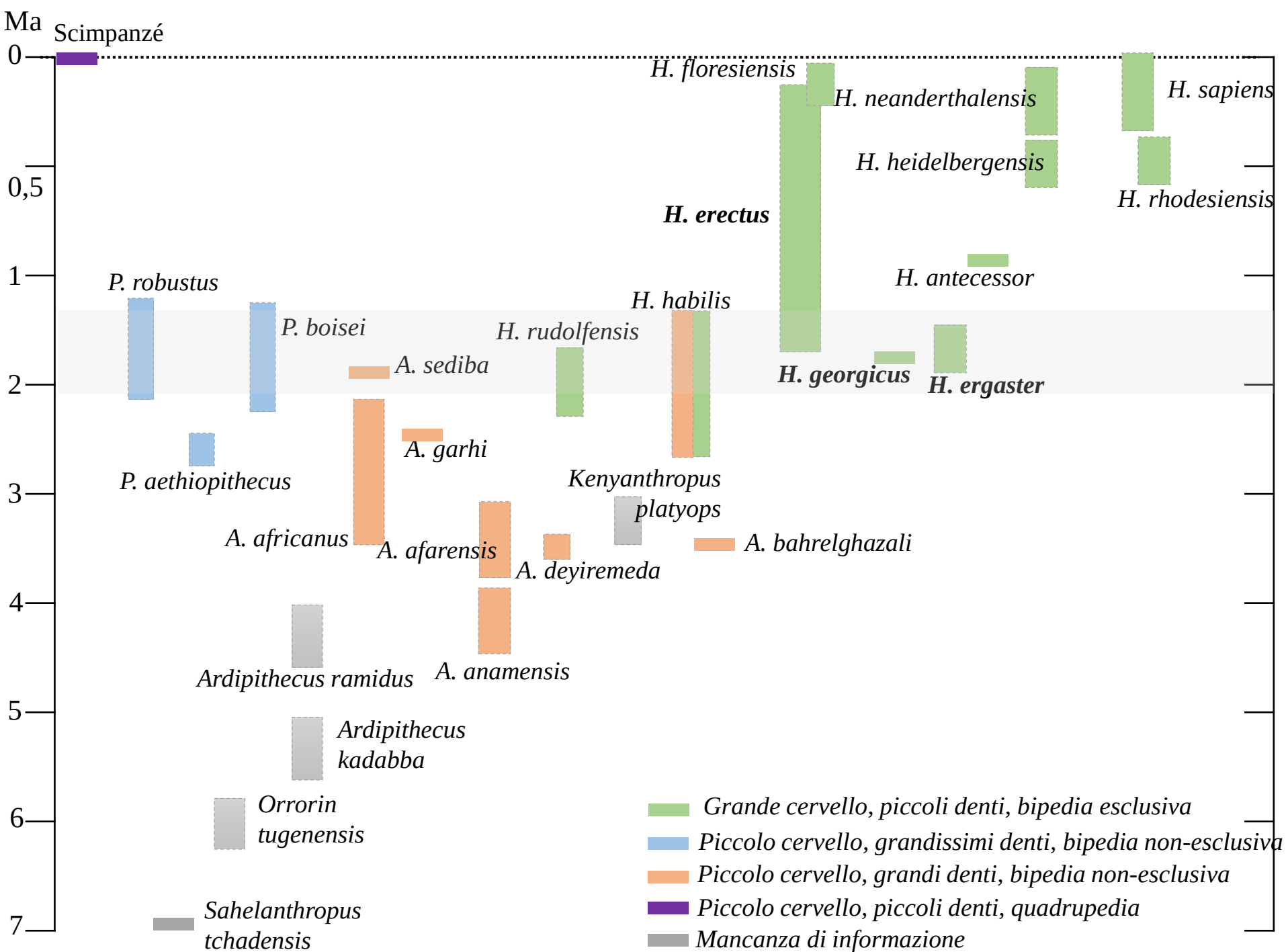
Out of Africa.....



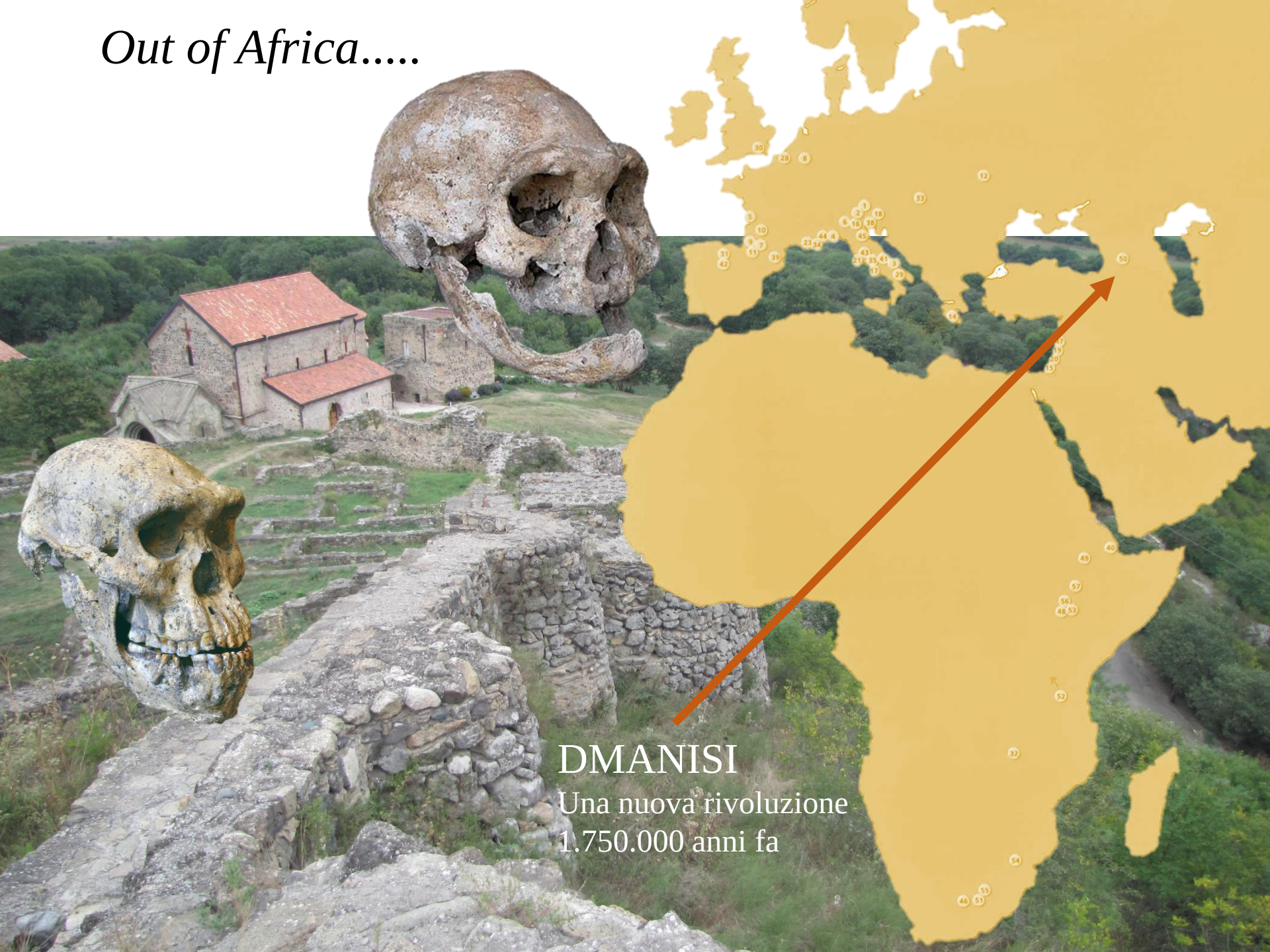
Out of Africa.....



Da Histoire d'ancêtres - Grimaud et al., 2005



Out of Africa.....



DMANISI

Una nuova rivoluzione
1.750.000 anni fa

Out of Africa.....

La stratigrafia del sito inizia con una colata basaltica di 4 m di spessore.

La colata su cui si sono insediati gli ominidi è datata a più di 1,8 milioni di anni BP





Campagna di scavo 2002

1.8-million-year-old hominin skull

These features had not been observed together in an early Homo fossil until now.

Long face
similar to the more recent *Homo erectus*

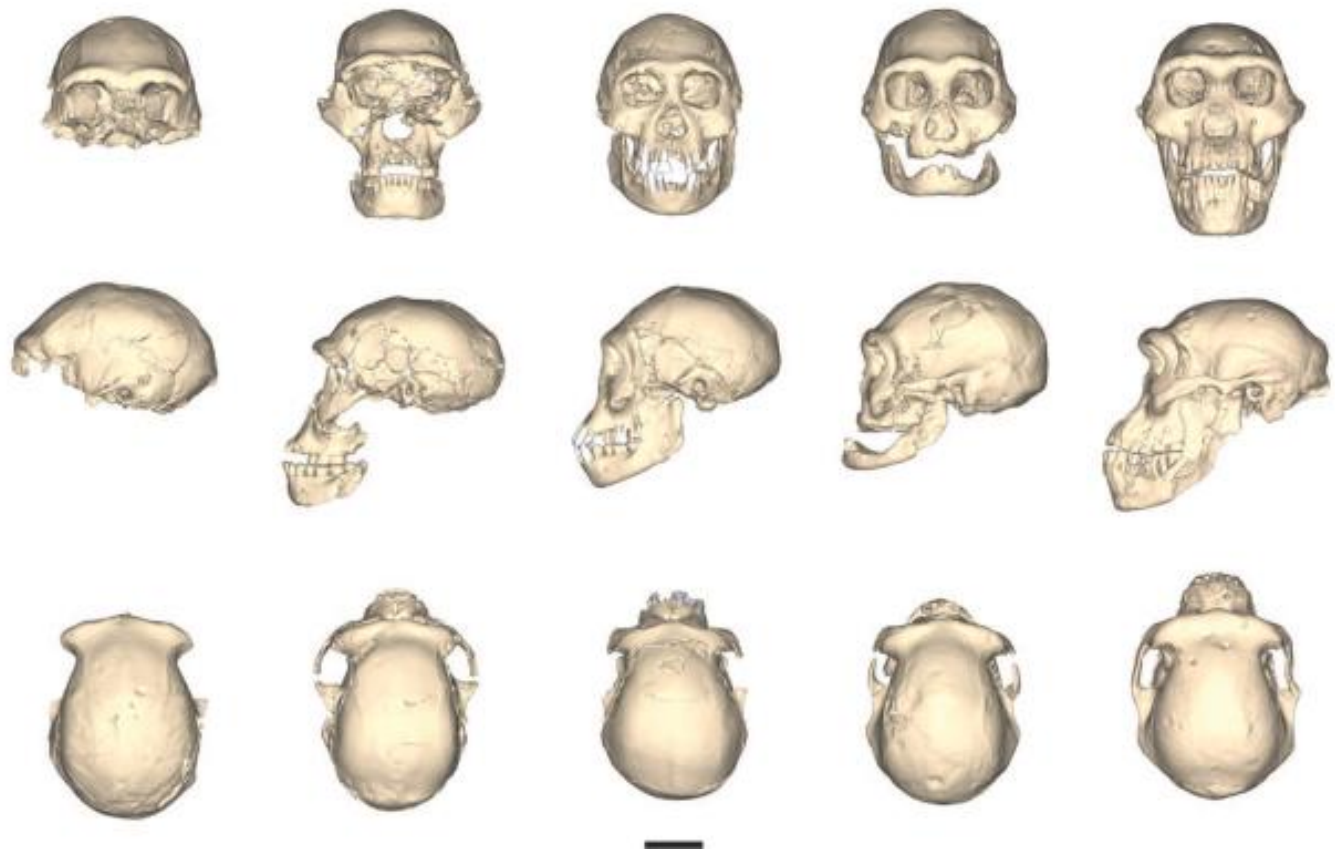
A small brain
similar to the older *Homo habilis*

Large teeth
similar to older *Homo rudolfensis*

The blend of features suggests early humans were one species that had diverse facial and cranial characteristics.

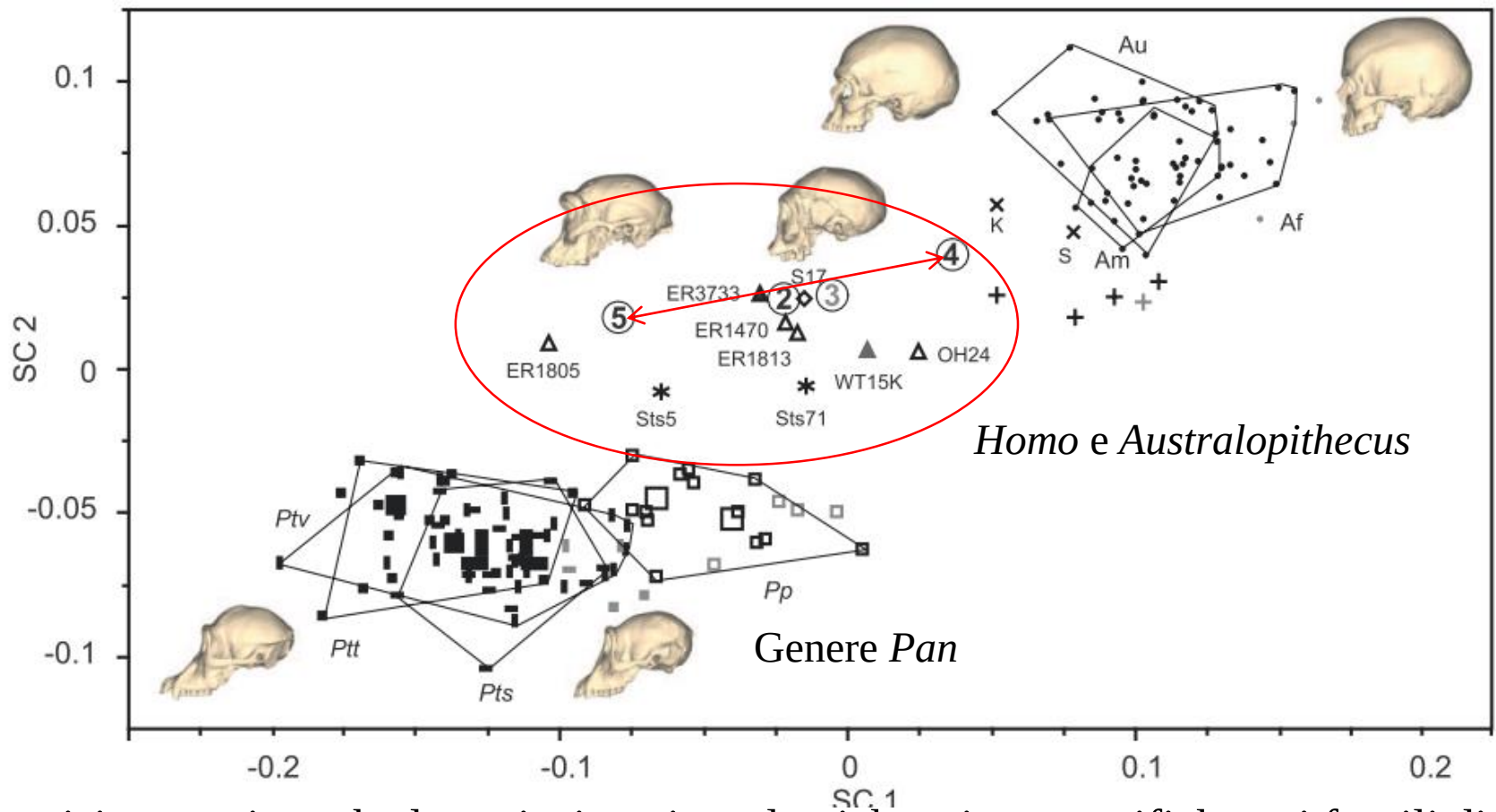
A Complete Skull from Dmanisi, Georgia, and the Evolutionary Biology of Early *Homo*

David Lordkipanidze,^{1*} Marcia S. Ponce de León,² Ann Margvelashvili,^{1,2} Yoel Rak,³ G. Philip Rightmire,⁴ Abesalom Vekua,¹ Christoph P. E. Zollikofer^{2*}



Il campione di Dmanisi, che comprende ad oggi 5 crani, fornisce delle evidenze dirette di una variazione morfologica ampia all'interno e tra i primi *Homo*. Questo suggerisce l'esistenza di una linea evolutiva unica dei primi *Homo*, con una continuità filogeografica attraverso i continenti.

The Dmanisi sample, which now comprises five crania, provides direct evidence for wide morphological variation within and among early Homo paleodemes. This implies the existence of a single evolving lineage of early Homo, with phylogeographic continuity across continents.



Dmanisi suggerisce che le variazioni intrademiche e intraspecifiche nei fossili di ominidi del Plio-Pleistocene tendono ad essere interpretate come specie diverse, soprattutto quando dei singoli fossili provenienti da diverse località sono confrontati tra di loro.

Dmanisi adds to the growing evidence that intrademic and intraspecific variation in Plio-Pleistocene fossil hominids tends to be misinterpreted as species diversity, especially when single fossil specimens from different localities are compared with each other

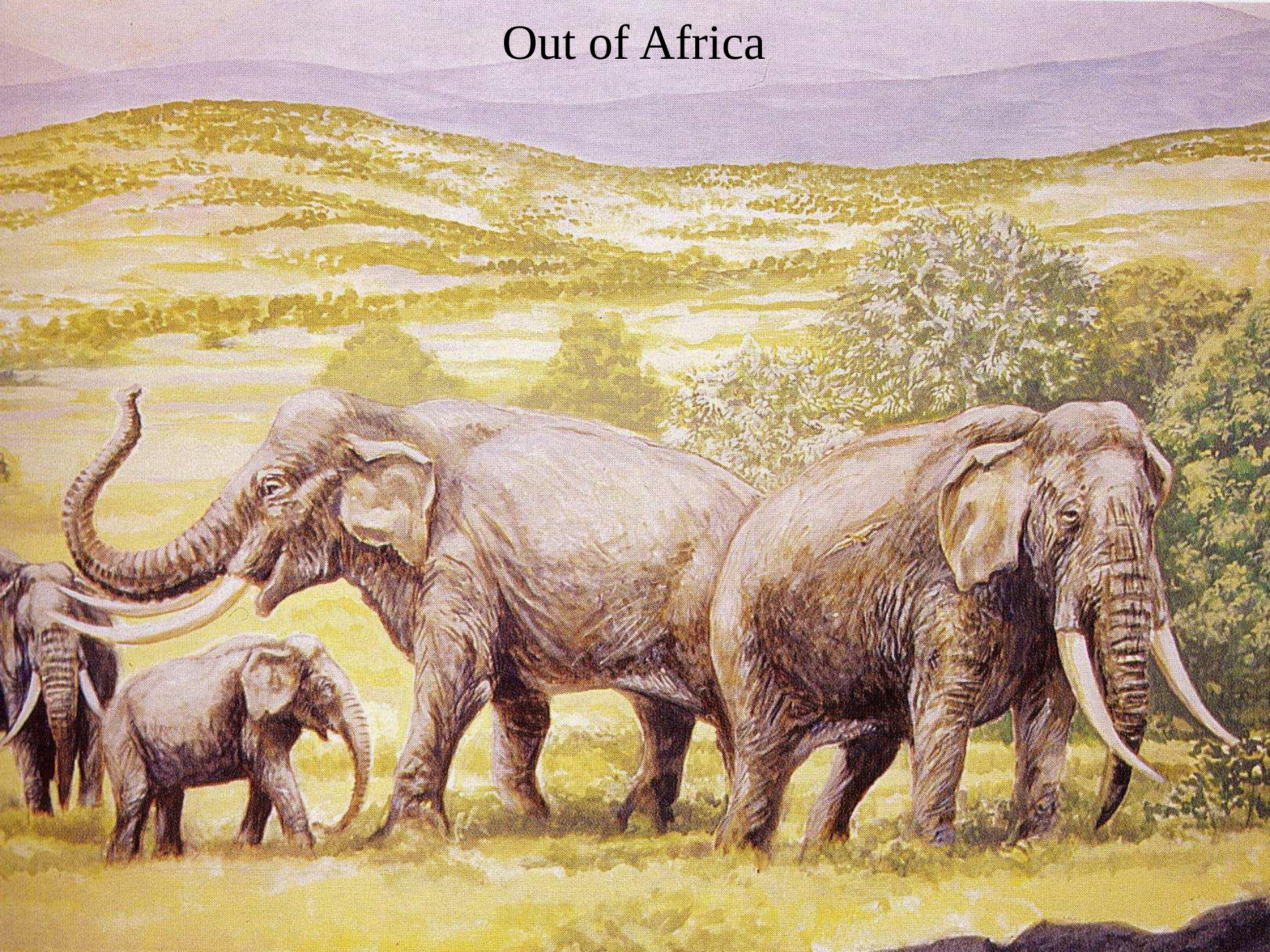
La popolazione di Dmanisi proviene probabilmente da un'espansione del Pleistocene inferiore di *H. erectus* dall'Africa = *H. erectus ergaster*. È designato come *H. e.e. georgicus* per indicare la localizzazione geografica.

The Dmanisi population probably originated from an Early Pleistocene expansion of the H. erectus lineage from Africa, so it is sensibly placed within H. e. ergaster and formally designated as H. e. e. georgicus to denote the geographic location of this deme

Dato i scarsi e frammentati fossili ritrovati in Africa precedenti a Dmanisi, la questione della filogenia e la classificazione dei primi *Homo* africani rimane irrisolta. Bisognerebbe testare l'ipotesi secondo la quale tutti i fossili attribuiti ai taxa *H. habilis* e *H. rudolfensis* appartengono ad un'unica linea evolutiva *Homo*.

Given the scattered and fragmentary fossil record in Africa that predates Dmanisi, questions of earliest African Homo phylogenetics and classification remain unresolved. It remains to be tested whether all of the fossils currently allocated to the taxa H. habilis and H. rudolfensis belong to a single evolving Homo lineage.

Out of Africa

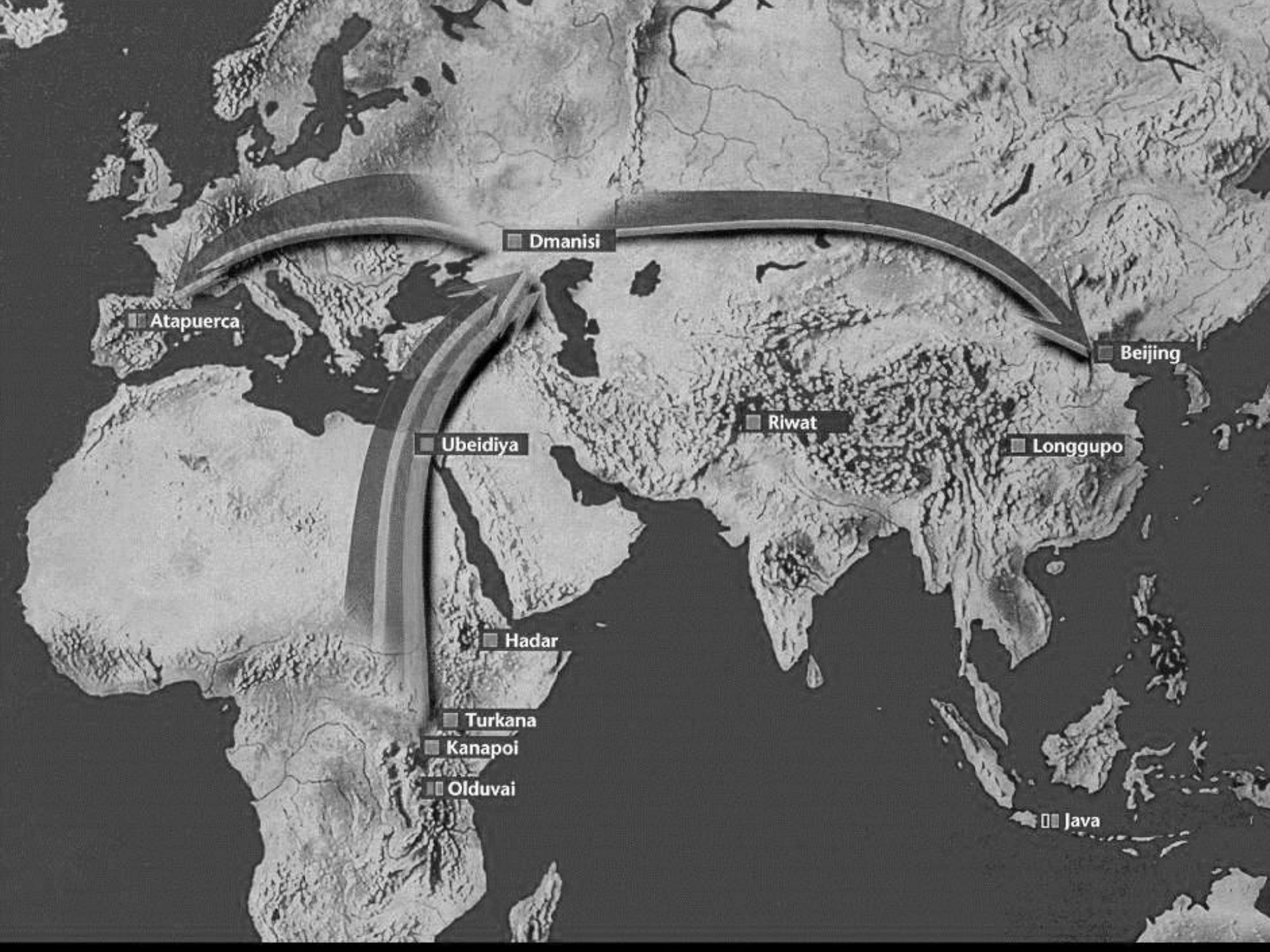


Out of Africa.....



Out of Africa.....





Dmanisi

Atapuerca

Ubeidiya

Hadar

Turkana

Kanapoi

Olduvai

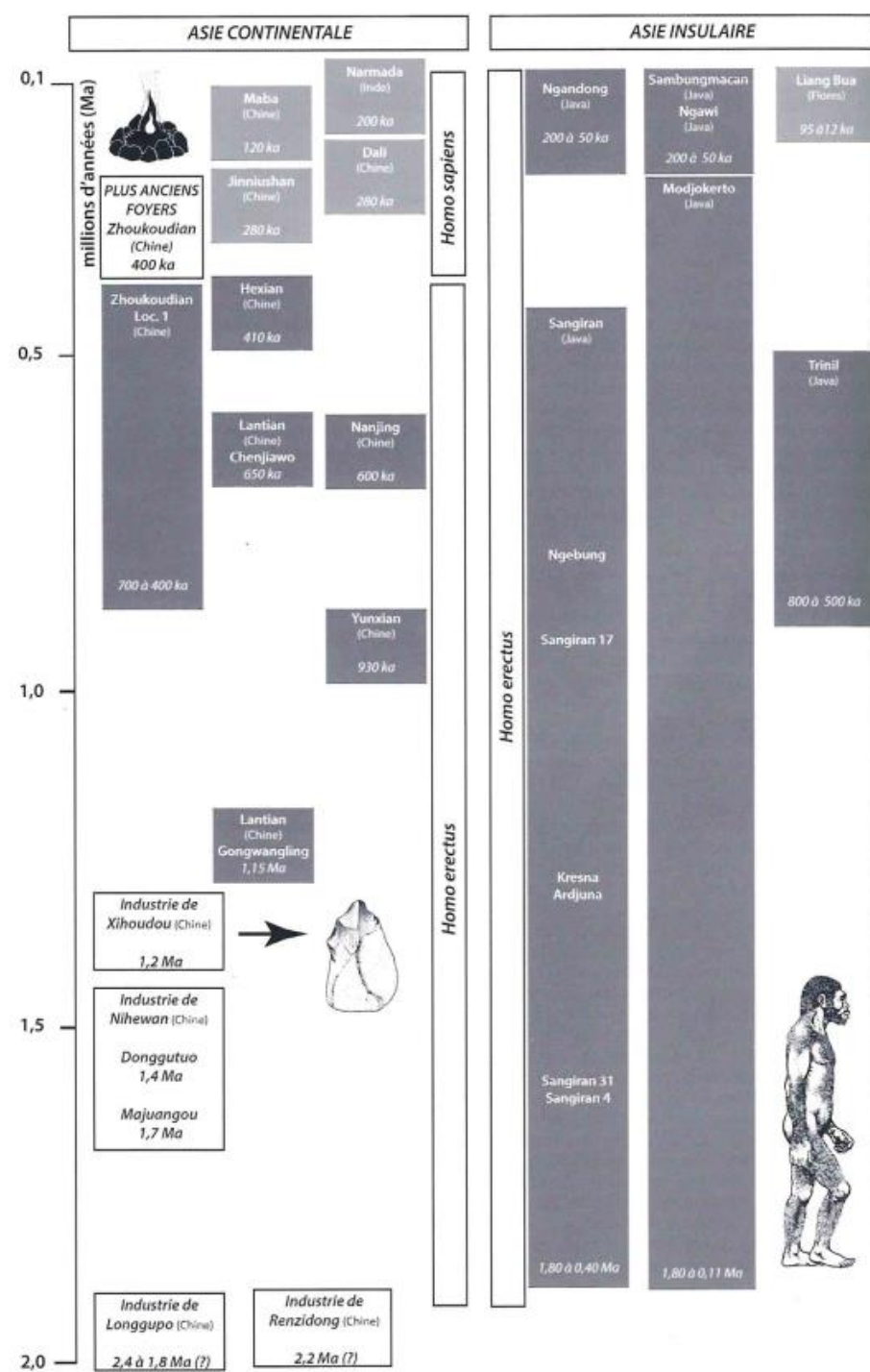
Riwat

Longgupo

Beijing

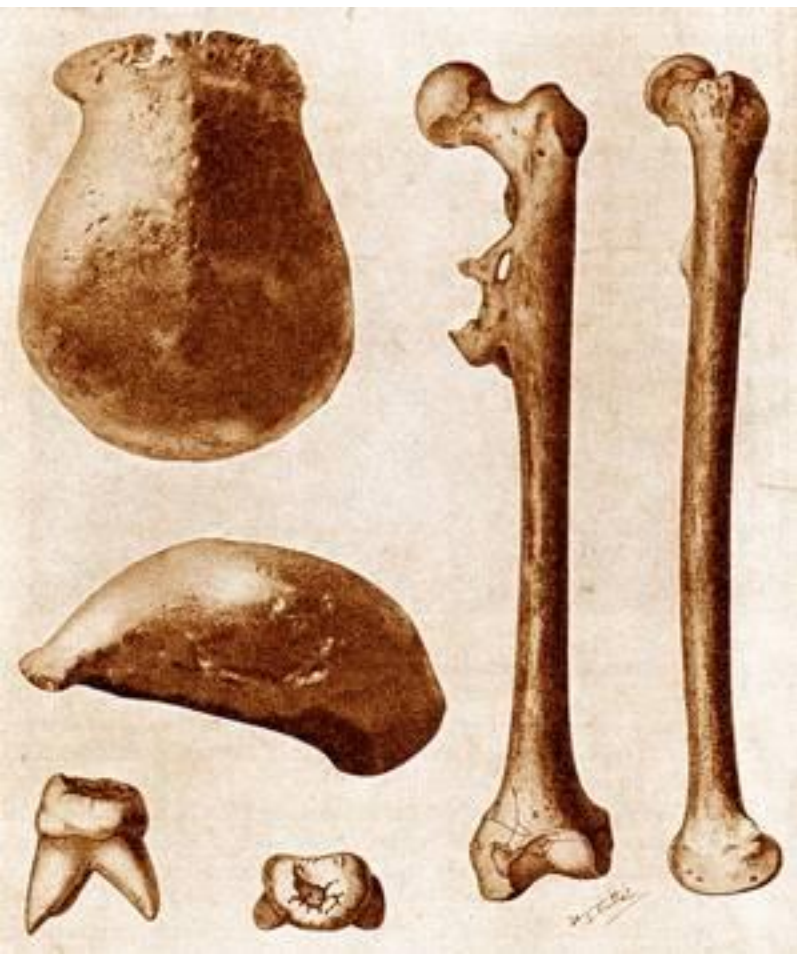
Java

Out of Africa.....verso l'Asia



Out of Africa.....chi?

- ⊙ L'olotipo di *H. erectus* è il cranio di Trinil (Java)
- ⊙ Appartengono alla stessa specie i crani di Zhoukoudian (Cina), Sangiran e Ngandong
- ⊙ ... ritrovamenti africani?



Più antichi fossili africani: *Homo ergaster*
Fossili più recenti: *Homo erectus*

Larghezza cranica massima
Maximum cranial breadth



*Australopithecus
africanus*



Homo erectus



Homo sapiens

Forma sfenoide: larghezza massima in posizione arretrata

Sphenoid shape: Maximum breadth backward

Restringimento dietro il toro sopra-orbitale / *Shrinkage retro orbital*

Parete convergente verso l'avanti: forma sfenoide

Wall convergente forward: sphenoidal shape

Parete convergente quasi-

parallela: forma ovoide

Wall almost parallel: ovoidal shape



*Australopithecus
africanus*



Homo erectus



Homo sapiens

Prognatismo faciale
Facial prognatism



*Australopithecus
africanus*



Homo erectus



Homo sapiens

Prognatismo alveolare
Alveolare prognathism

Proiezione laterale dei zigomatici
Lateral projection of the zygomatics



*Australopithecus
africanus*



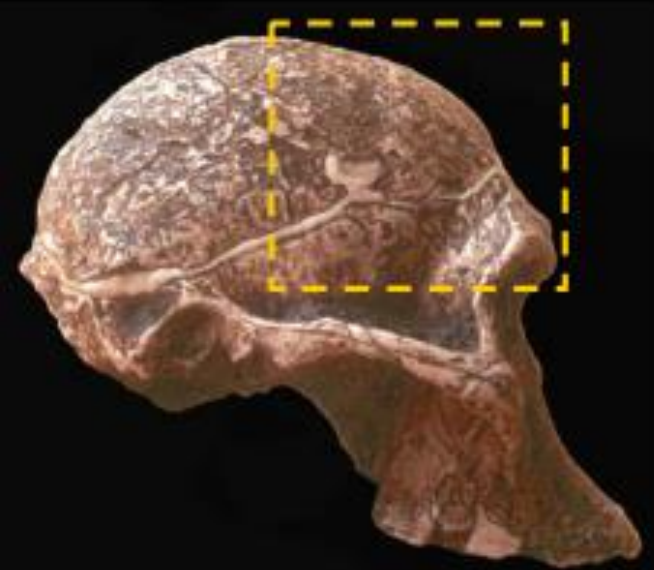
Homo erectus



Homo sapiens

Arcate zigomatiche visibile in vista superiore

Osso frontale sfuggente
Receding frontal bone



*Australopithecus
africanus*



Homo sapiens



Homo erectus

Forma dell'osso occipitale

Occipital shape



*Australopithecus
africanus*



Homo sapiens



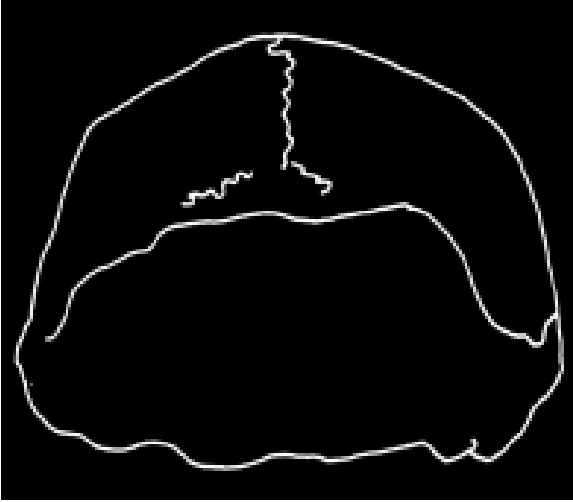
Homo erectus

Piano nucale lungo e squama occipitale piccola (contrario dei *sapiens*) = muscoli più potenti ma cervello più piccolo

Long nuchal plan and small occipital squama (opposite of sapiens) = stronger muscle but smaller brain

Forma del cranio in vista posteriore

Cranial shape in posterior view

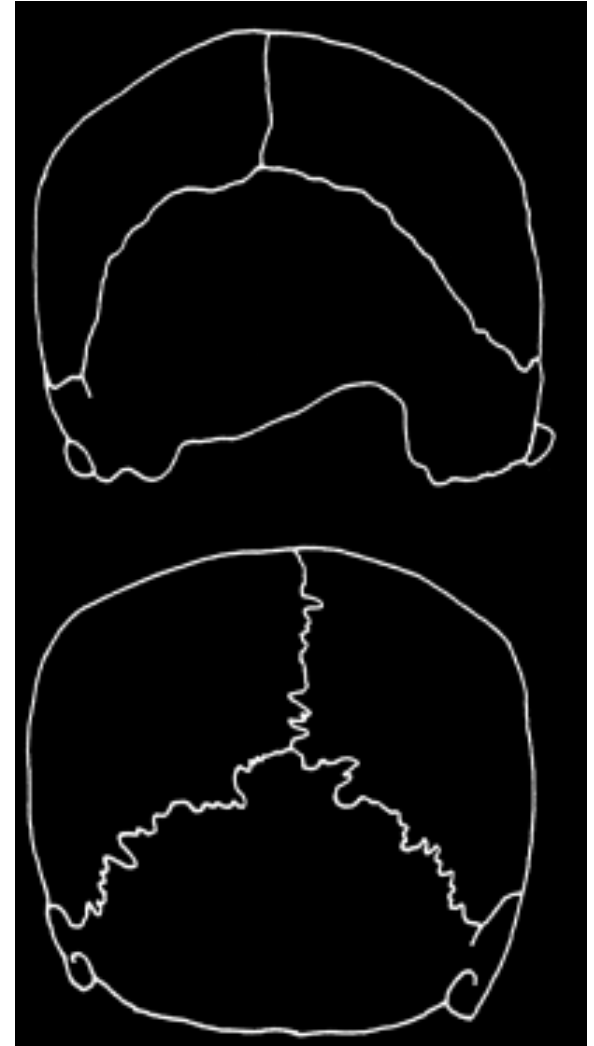


Pentagonale a parete
convergente verso l'alto

*Pentagonal with the wall
convergent upward*

Bozze parietale non sviluppate

Undeveloped parietal bump



A « tetto di casa »
(*Homo sapiens*)

In « House roof »
(*Homo sapiens*)

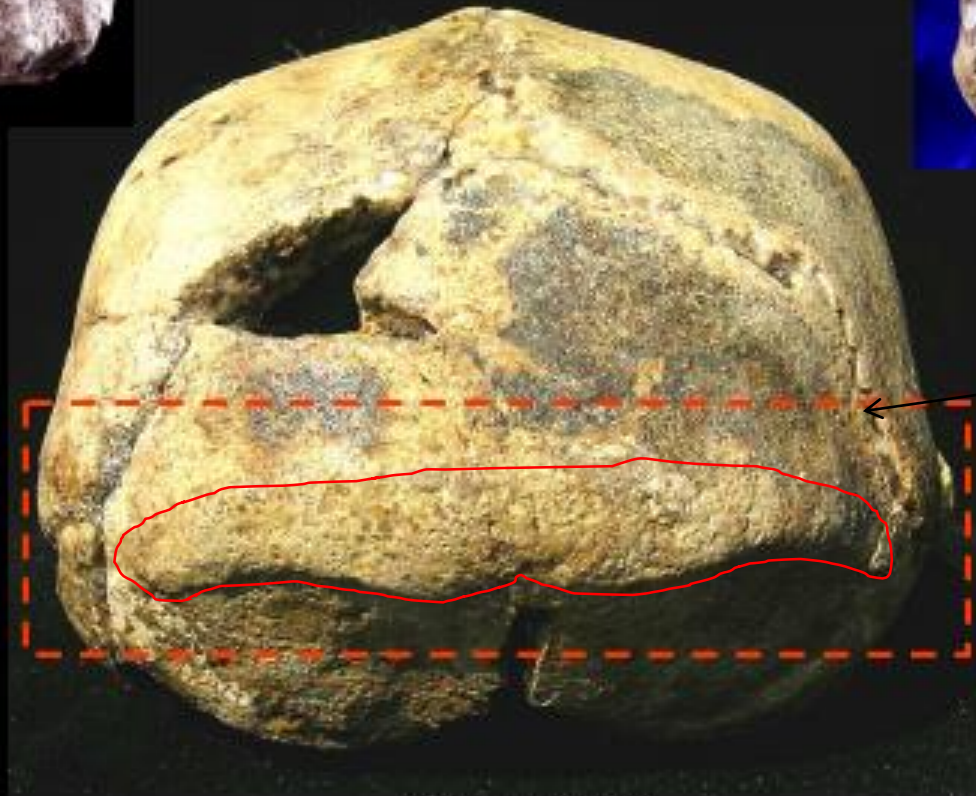
Toro occipital transverso
Occipital transverse torus



*Australopithecus
africanus*



Homo sapiens



Homo erectus

Toro occipitale
trasverso

Complexe supra-orbitaire



Australopithecus africanus



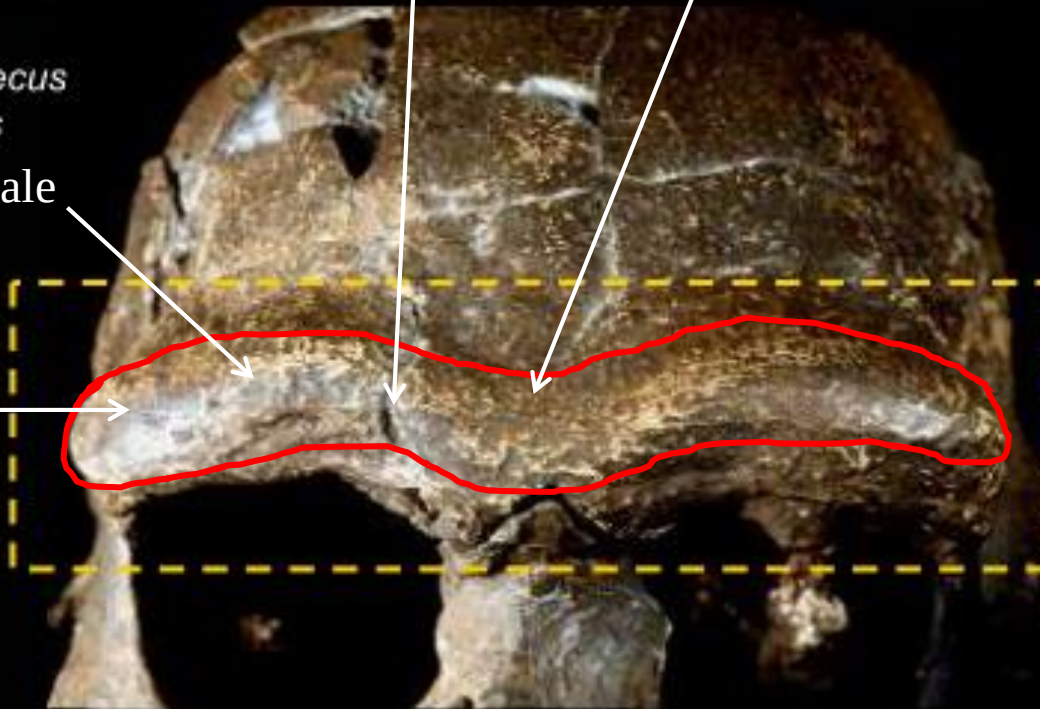
Homo sapiens

Arcata
sopraccigliare

Glabella

Solco sopra-orbitale

Trigone sopra-
orbitale



torus supra-orbitaire: tous
les éléments sont fusionnés

Homo erectus

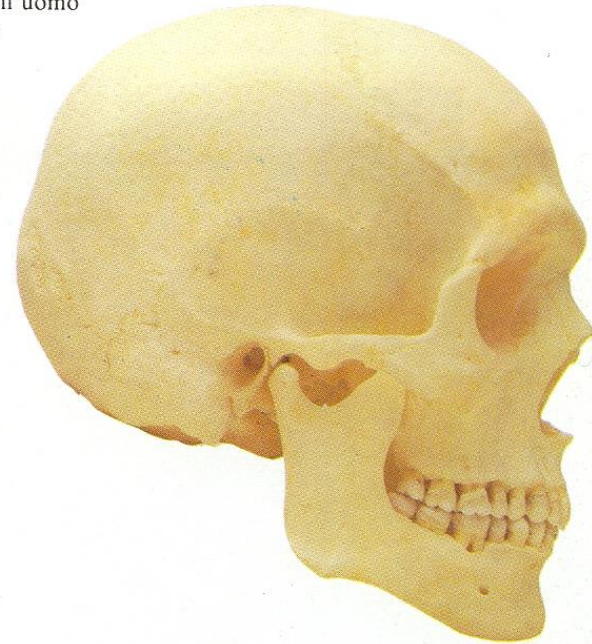
Spazio interorbitale largo = becco encefalico / *large interorbital space = encephalic beak*

cranio dell'*Homo erectus*, «uomo di Pechino»



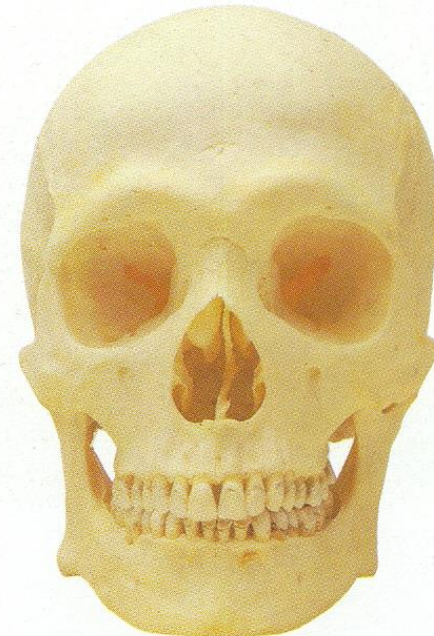
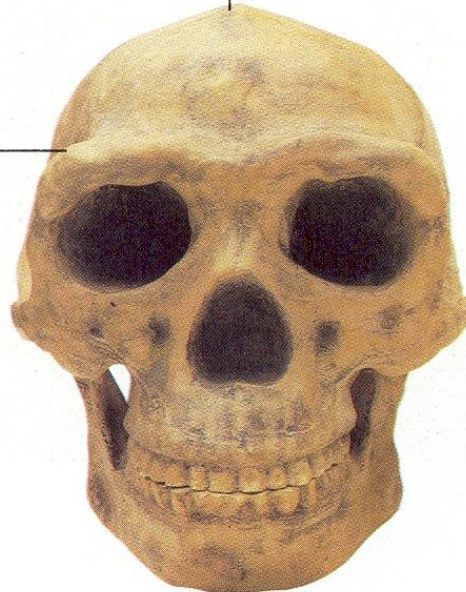
spessa cresta sulla
parte posteriore del
cranio

cranio dell'uomo
moderno



apice del cranio
carenato

arcata sopraorbitale
dritta e spessa



LONGGUPO (2 Ma BP)

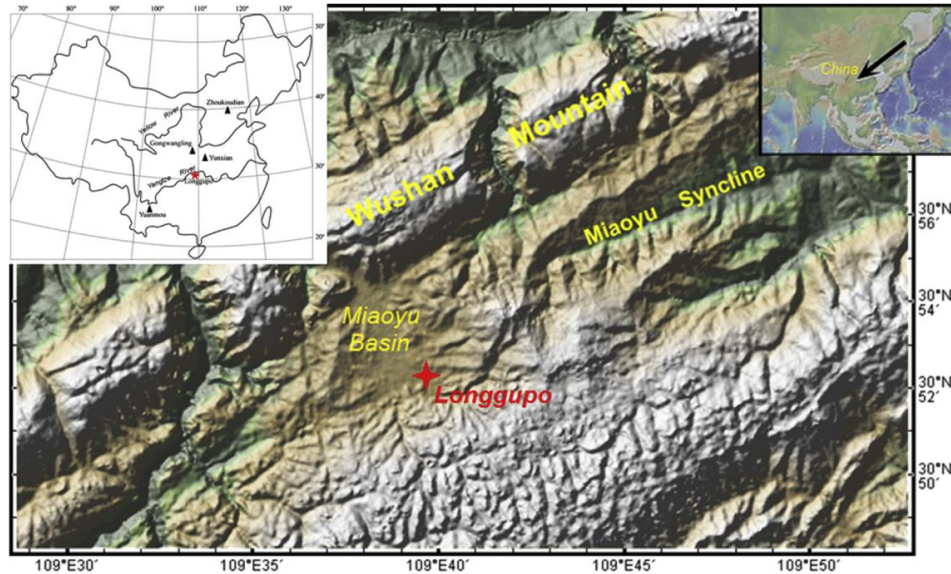
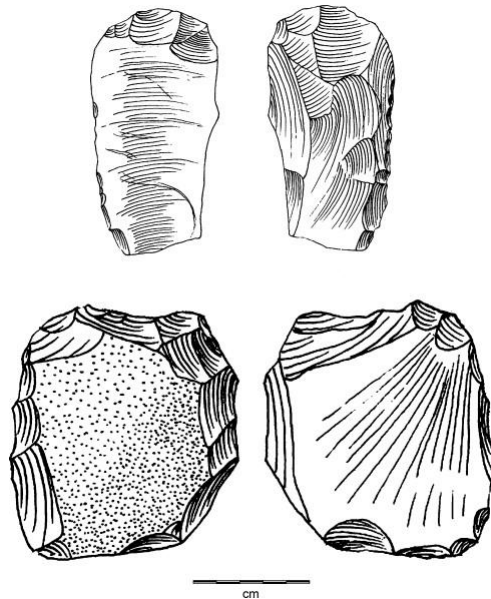


Fig. 1. Location of Longgupo site.



The earliest evidence of hominid settlement in China: Combined electron spin resonance and uranium series (ESR/U-series) dating of mammalian fossil teeth from Longgupo cave

Fei Han ^{a,*}, Jean-Jacques Bahain ^b, Chenglong Deng ^c, Éric Boëda ^{d,e,f}, Yamei Hou ^e, Guangbiao Wei ^f, Wanbo Huang ^{f,g}, Tristan Garcia ^h, Qingfeng Shao ⁱ, Cunding He ^f, Christophe Falguères ^b, Pierre Voinchet ^b, Gongming Yin ^a

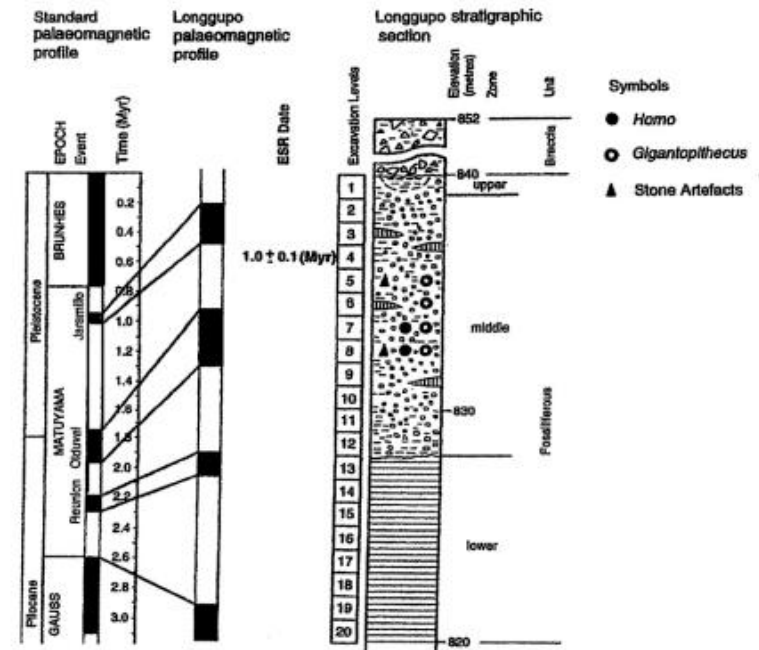


Fig. 6. Stratigraphie de la grotte Longgupo et hypothèses de datation (d'après Huang et al., 1995).
Fig. 6. Stratigraphy of the Longgupo cave and hypotheses for datation (after Huang et al., 1995).

Paléontologie humaine et Préhistoire

Les premiers peuplements d'Asie du Sud : vestiges culturels

Claire Gaillard

UMR 5198 du CNRS, département de préhistoire du Muséum national d'histoire naturelle,
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Disponible sur internet le 28 novembre 2005

Rédigé à l'invitation du Comité éditorial



ISAMPUR 1 Ma BP

Java

Modjokerto 1,8-0,4 Ma

Sangiran 1,8-0,4 Ma

(Sangiran 4, 31, Ardjuna, Kresna, Sangiran17, Ngebung)

Trinil 0,8-0,5 Ma



China

Lantian - Gongwangling 1,15 Ma

Yunxian 0,93 Ma

Zhoukoudian loc. 1 0,7-0,4 Ma

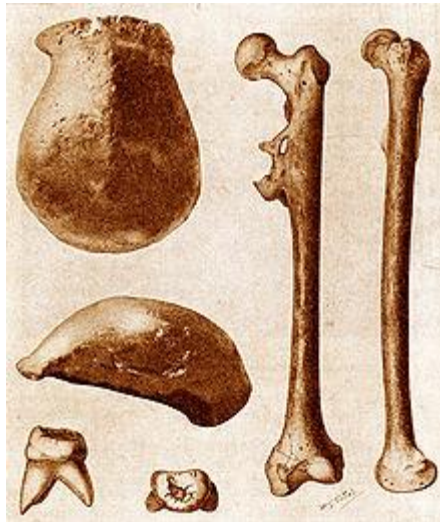
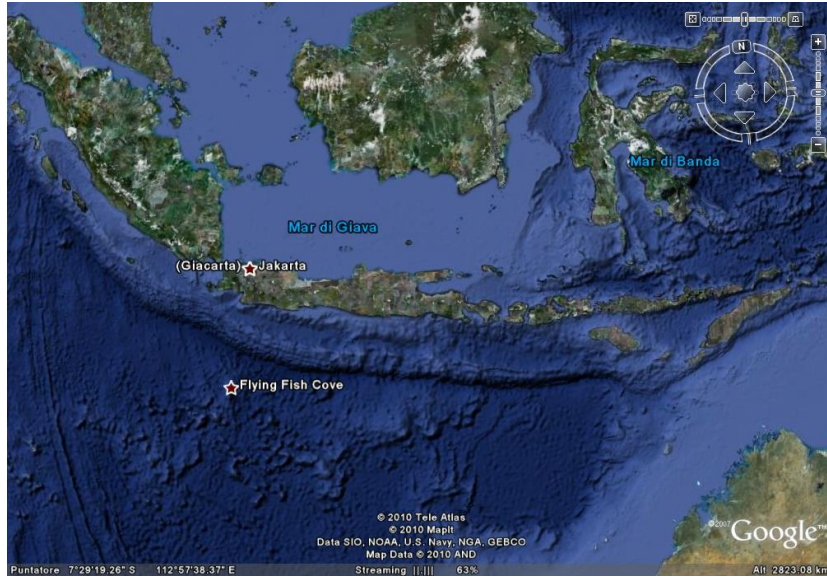
Lantian – Chenjiawo 0,65 Ma

Nanjing 0,6 Ma

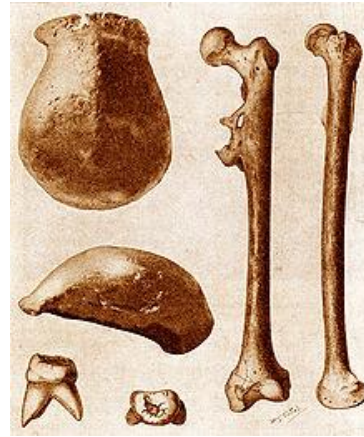
Hexian 0,41 Ma



Homo erectus à Java (*Pithecanthropus*)



Homo erectus à Java (*Pithecanthropus*)

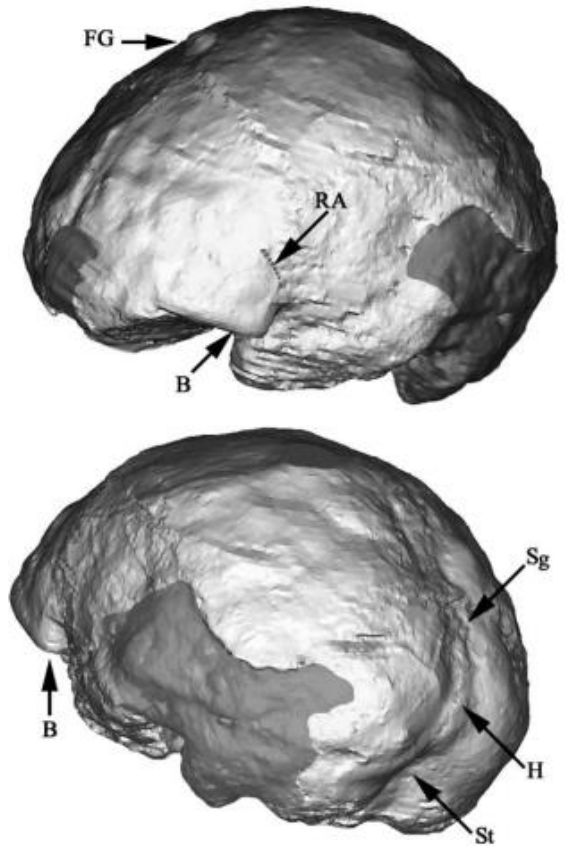
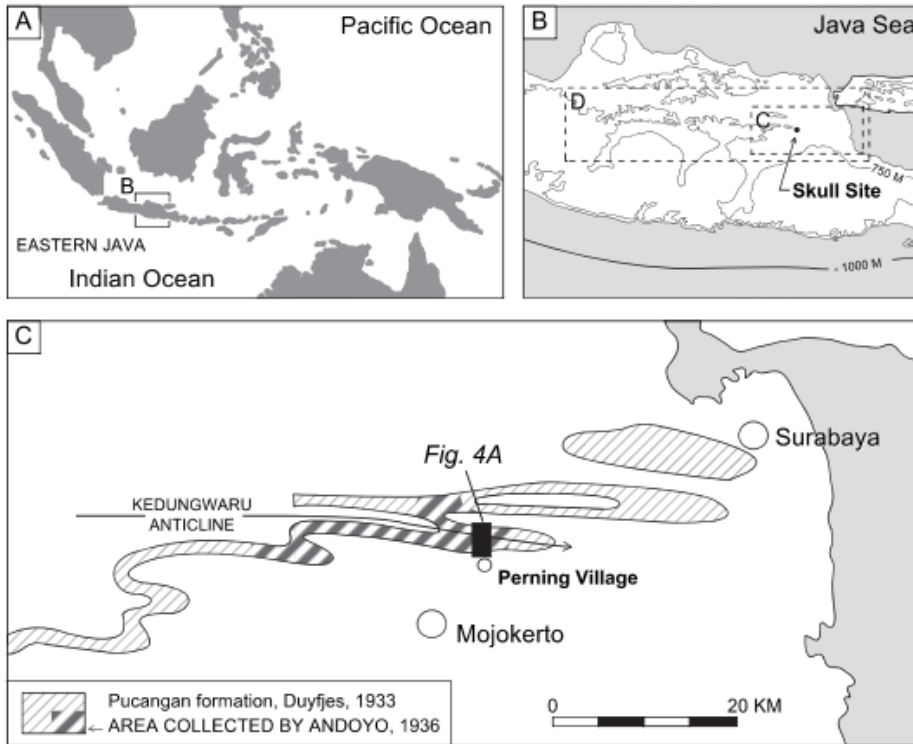


Cliché H. T. Simanjuntak

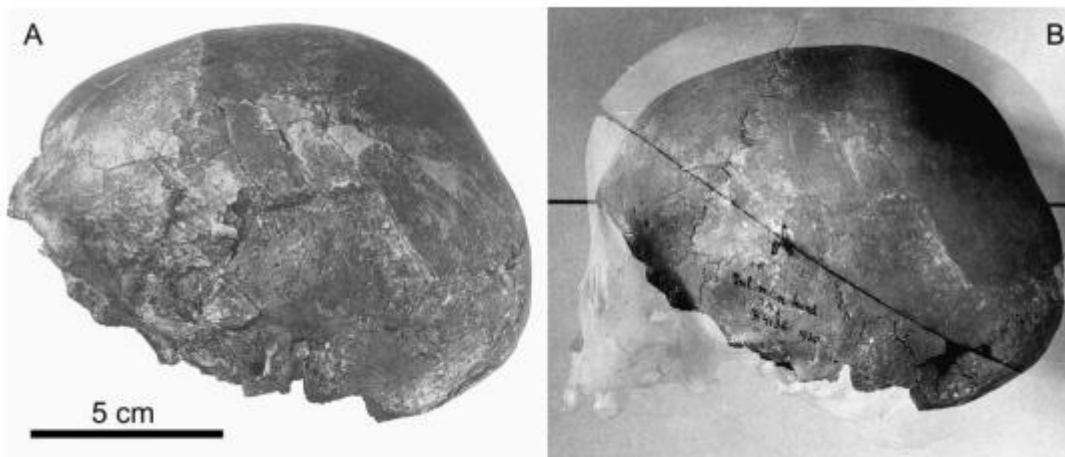
1.6 ± 0.04 mya (Jacob & Curtis 1971)
 1.66 ± 0.04 mya (Swisher *et al* 1994)
 $1.64-1.67$ mya: Kalibeng-Pucangan (Sémah 2000)
 1.66 ± 0.04 mya: Lowest Pucangan: (Widiasmoro 2001).

1.9 ± 0.5 mya (Jacob & Curtis 1971)
 1.81 ± 0.04 mya (Swisher *et al* 1994).

Mojokerto, 1.9 Myr

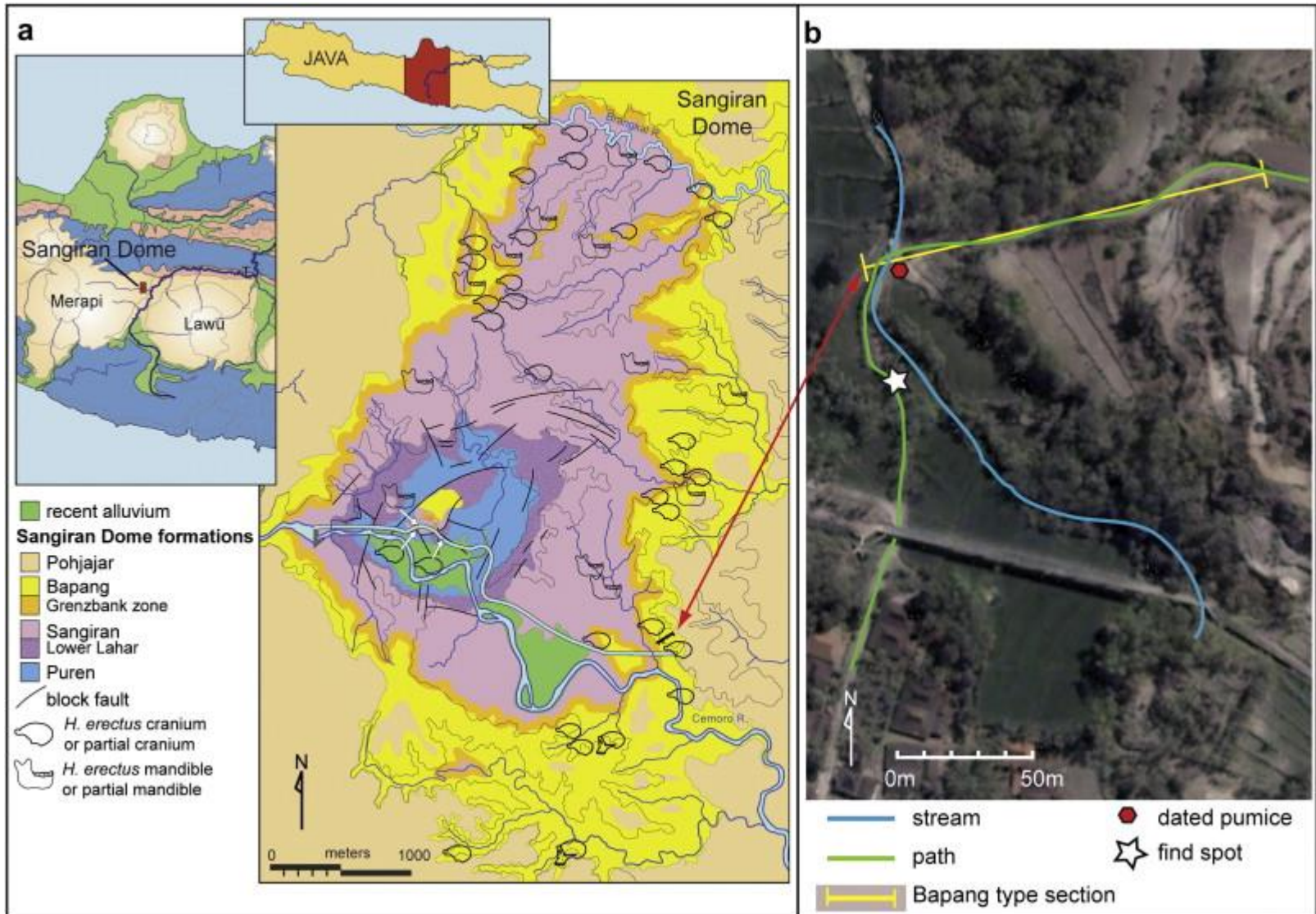


Visualization of Mojokerto endocast (Balzeau, 2005)



Photographs of Mojokerto child skull. A) left lateral view B) compared with 1,5 years old modern-child skull

Sangiran, Java, Indonesia

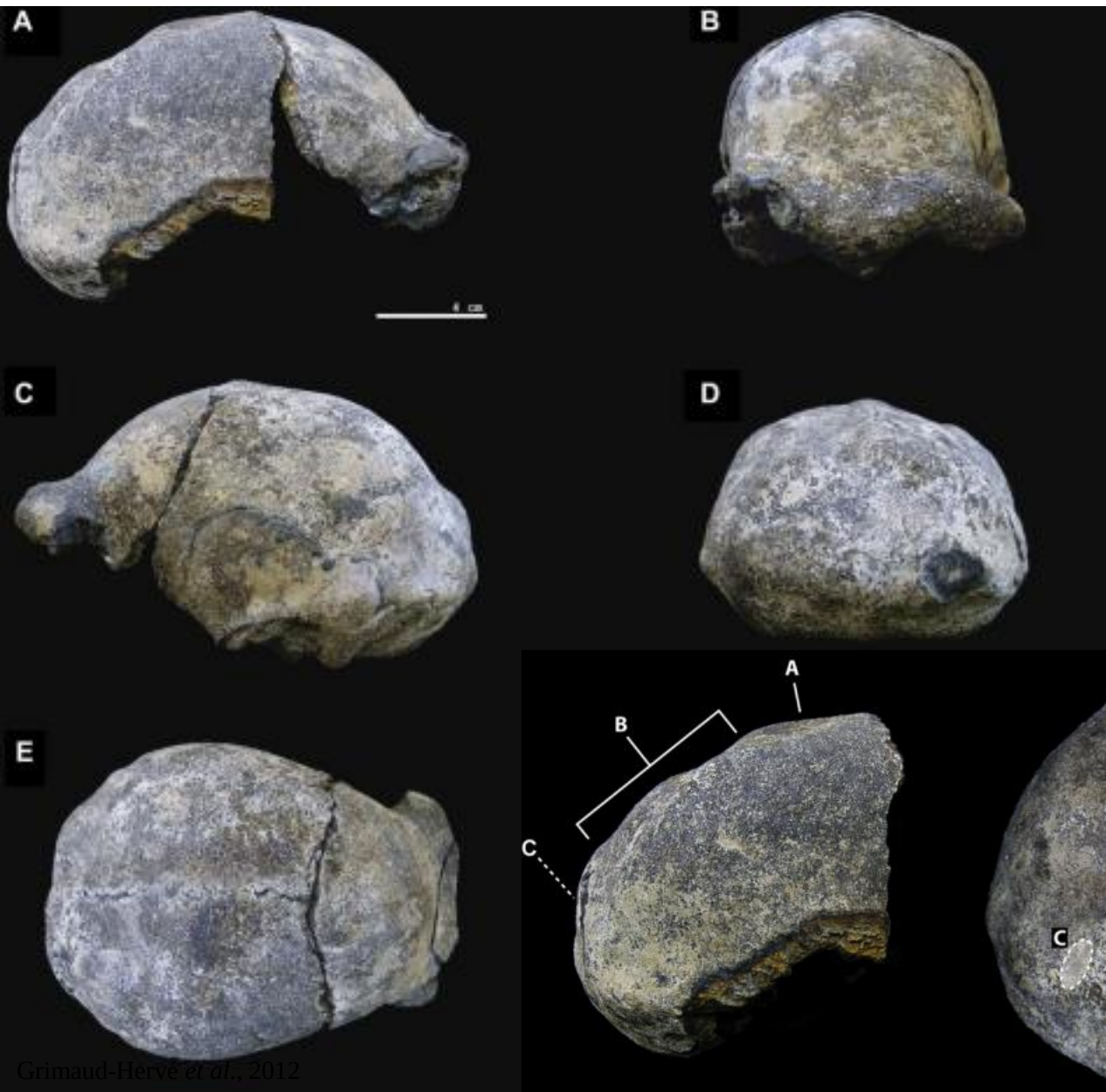




Sangiran 2



Sangiran 38



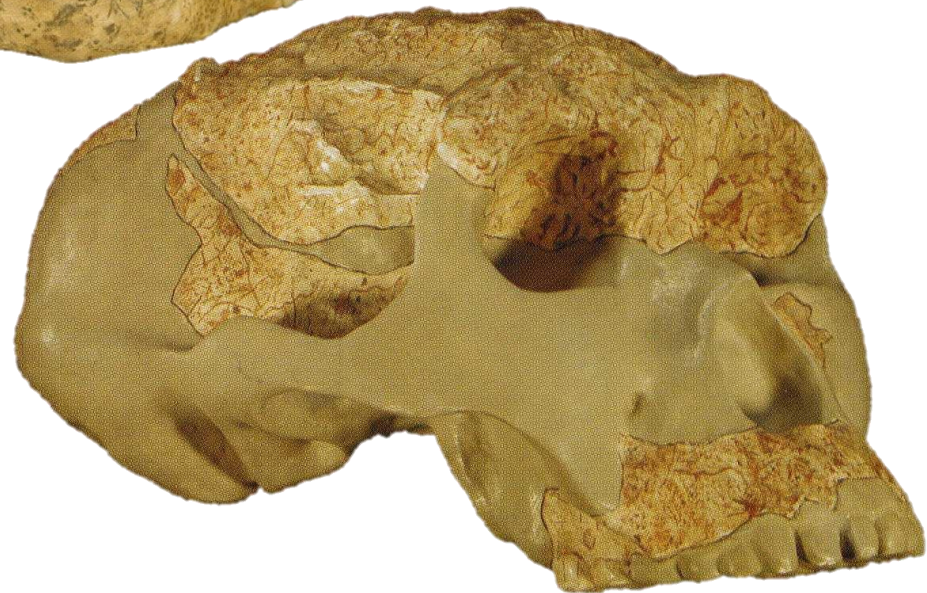
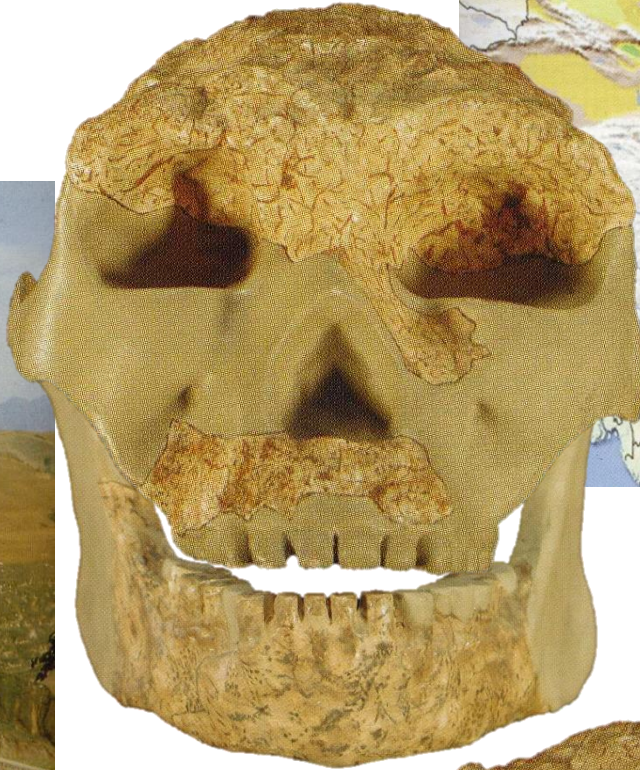
Right lateral (A), anterior (B), left lateral (C), posterior (D), superior (E) views of the Bukuran cranial vault from Sangiran. Oriented in the estimated Frankfurt Horizontal Plane. Scale $\frac{1}{4}$ 4 cm. (AeE) and 5 cm (F).



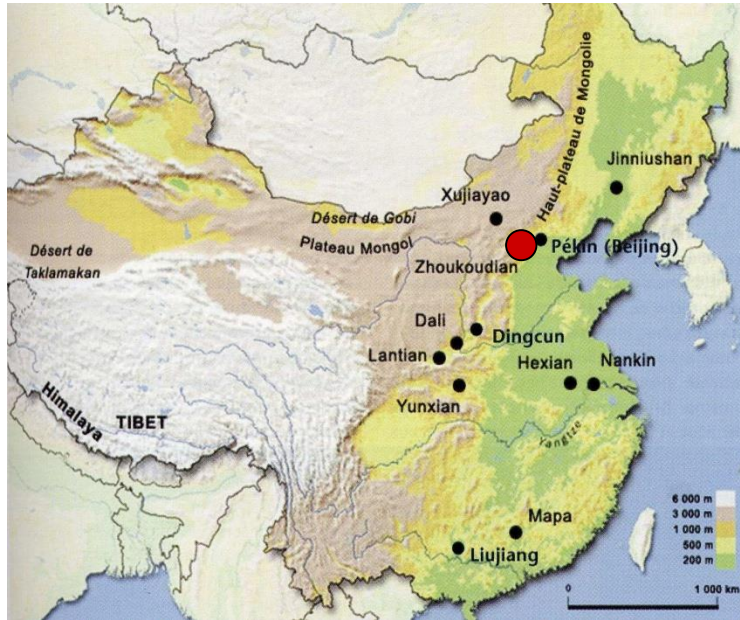
Main pathological depressions of right lateral view. Scale $\frac{1}{4}$ 2 cm

Out of Africa.....verso l'Asia

LANTIAN

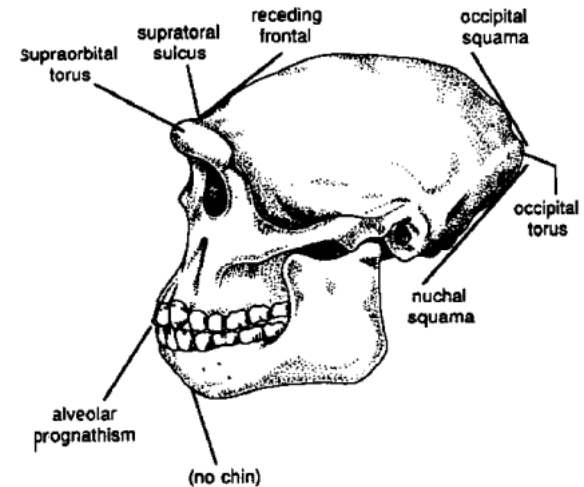


Out of Africa.....verso l'Asia



ZHOUKLOUDIAN

La località 1 è stata datata tra 600.000 e 200.000 anni BP. Si tratta di un insediamento in grotta.



Confronto tra Sangiran 4 (basso) e Zhoukoudian



A geometric morphometric study of a Middle Pleistocene cranium from Hexian, China

Yaming Cui ^{a, b, *}, Xinzhi Wu ^a

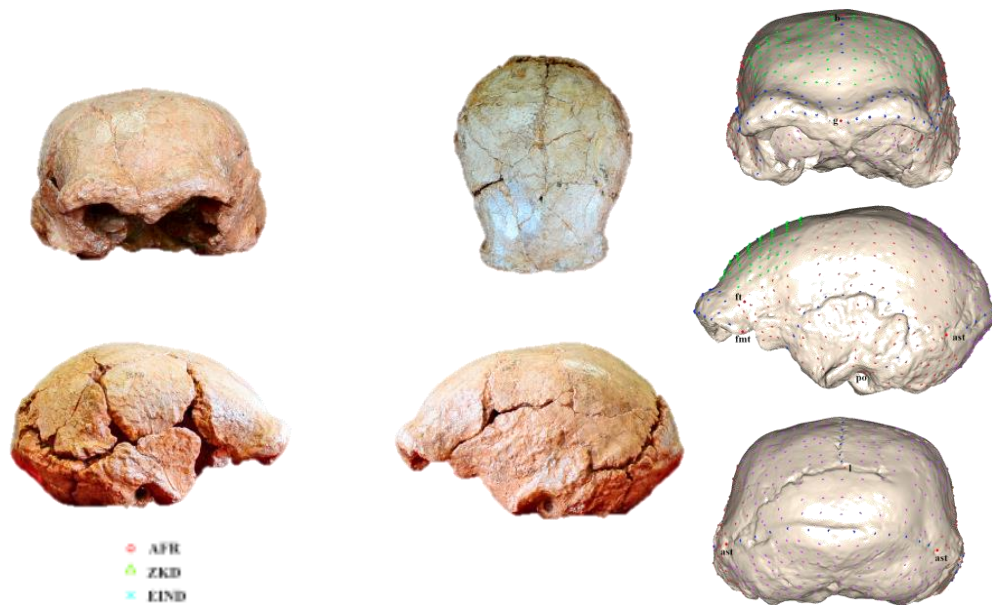
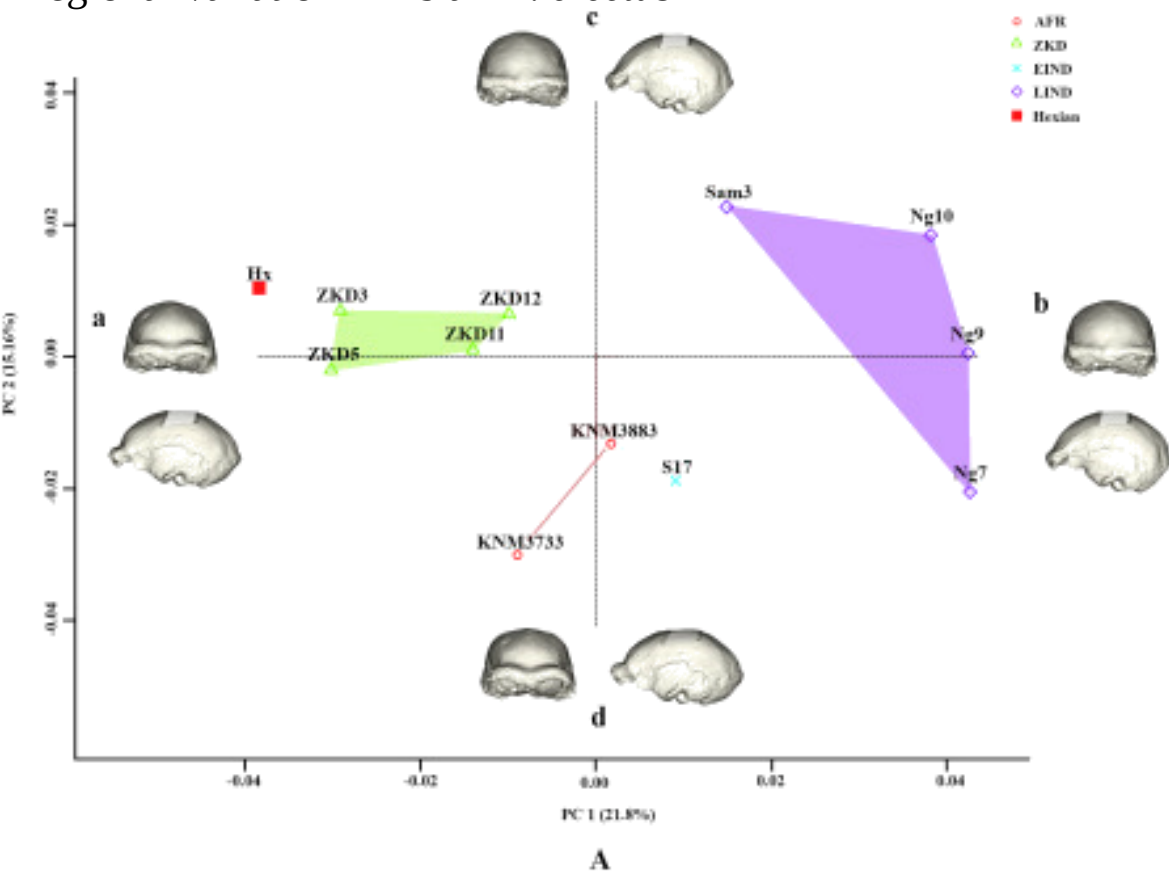
^a Key Laboratory of Vertebrate Evolution and Human Origins, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing 100044, China

^b University of the Chinese Academy of Sciences, Beijing 100049, China



150 and 412 ka

Regional variation in Asian *H. erectus*



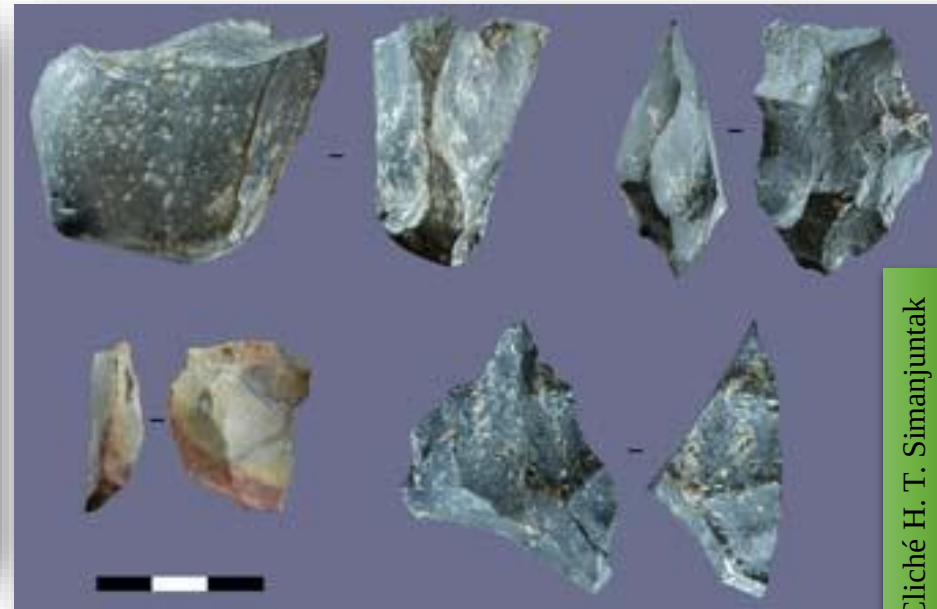
Soa Bassin, Flores



Lithic artifacts discovery at the open sites of Mata Menge, Tangitallo, etc associated with *Stegodon*, komodo dragon, rat and various other taxa from layers dated to c.800,000 BP (Morwood *et al.* 1997-1999).



Dozu Dhalu, Soa
gorga 07



LETTERS

Hominins on Flores, Indonesia, by one million years ago

Adam Brumm¹, Gitte M. Jensen², Gert D. van den Bergh^{1,3}, Michael J. Morwood¹, Iwan Kurniawan⁴, Fachroel Aziz⁴ & Michael Storey²

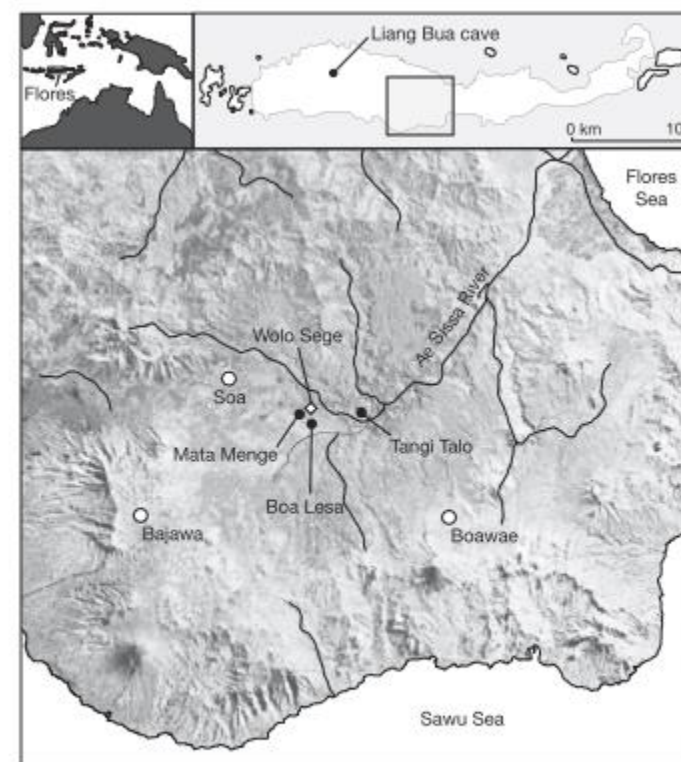
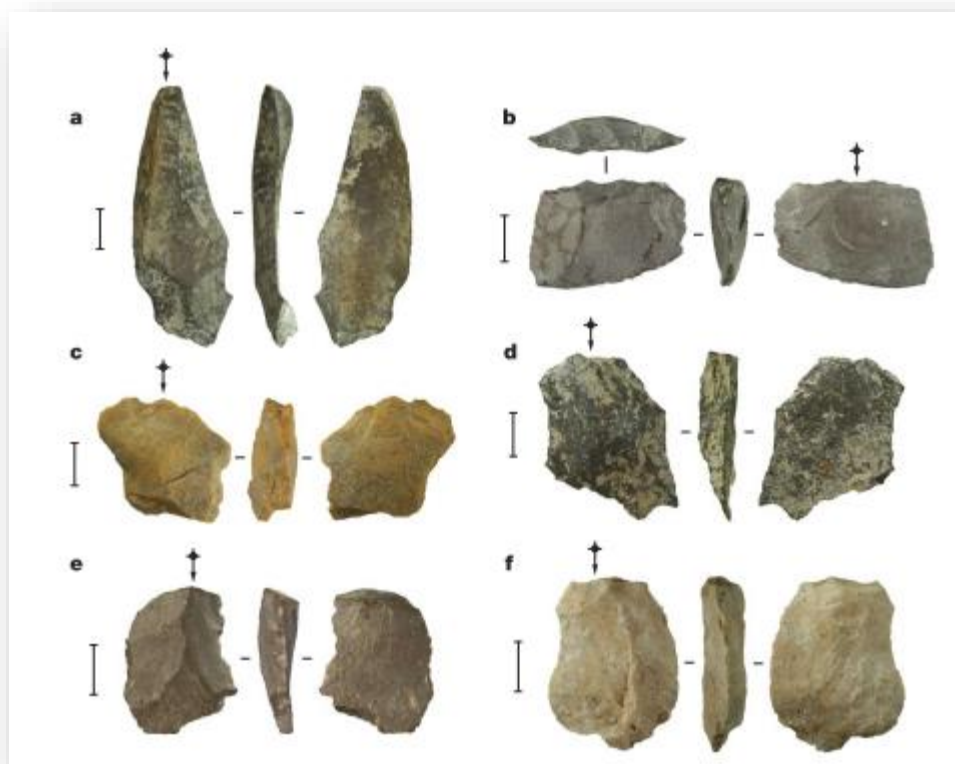
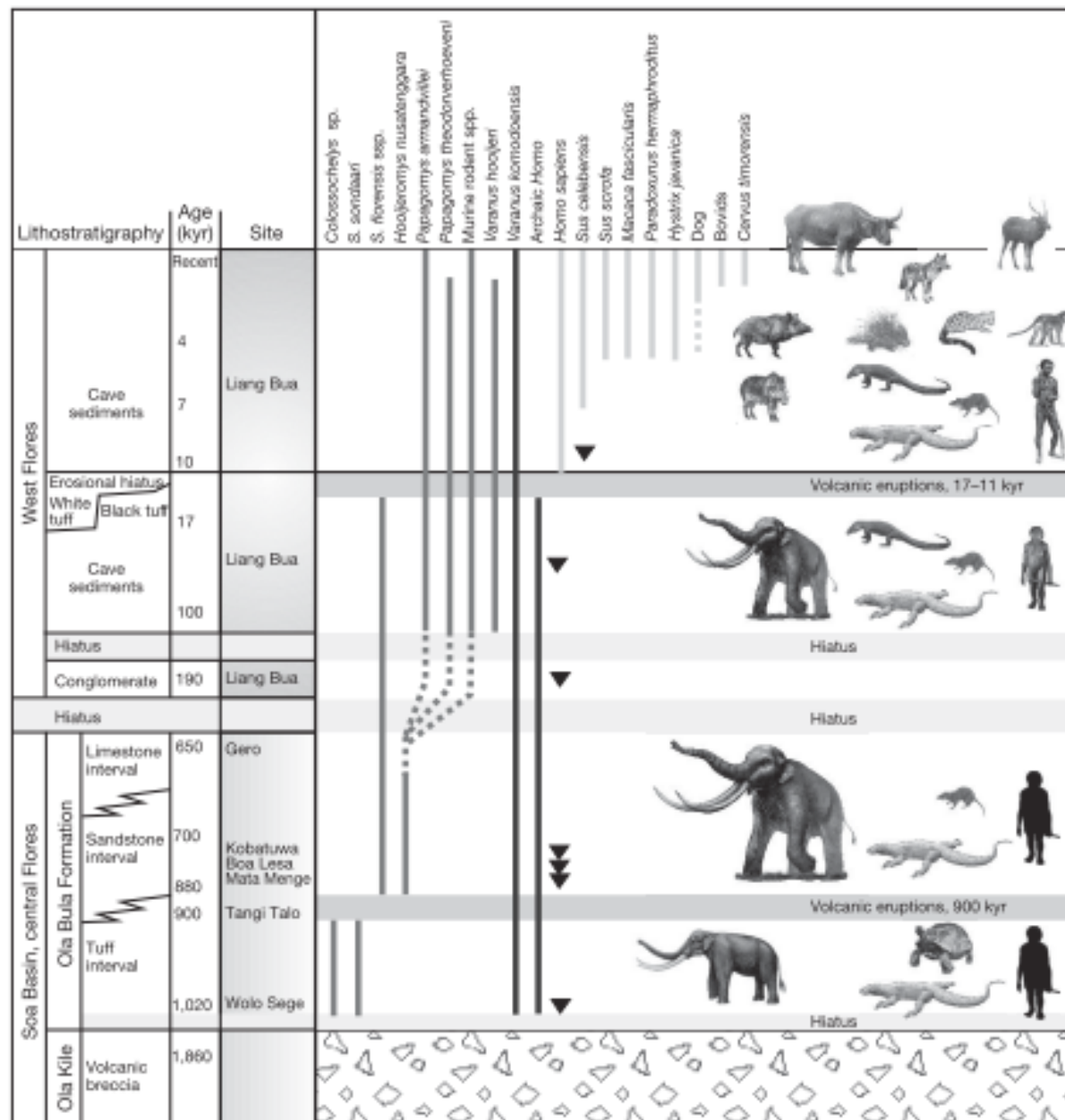


Figure 1 | Map of Flores showing the location of Wolo Sege. Also shown are other key early- or middle-Pleistocene archaeological and palaeontological localities in the Soa Basin mentioned in the text, and the late-Pleistocene Liang Bua cave in western Flores. (Base maps courtesy of D. Hobbs.)



A new small-bodied hominin from the Late Pleistocene of Flores, Indonesia

P. Brown¹, T. Sutikna², M. J. Morwood¹, R. P. Soejono², Jatmiko², E. Wayhu Saptomo² & Rokus Awe Due²

¹Archaeology & Palaeoanthropology, School of Human & Environmental Studies, University of New England, Armidale, New South Wales 2351, Australia

²Indonesian Centre for Archaeology, Jl. Raya Condut Pejaten No. 4, Jakarta 12001, Indonesia

Currently, it is widely accepted that only one hominin genus, *Homo*, was present in Pleistocene Asia, represented by two species, *Homo erectus* and *Homo sapiens*. Both species are characterized by greater brain size, increased body height and smaller teeth relative to Pliocene *Australopithecus* in Africa. Here we report the discovery, from the Late Pleistocene of Flores, Indonesia, of an adult hominin with stature and endocranial volume approximating 1 m and 380 cm³, respectively—equal to the smallest-known australopithecines. The combination of primitive and derived features assigns this hominin to a new species, *Homo floresiensis*. The most likely explanation for its existence on Flores is long-term isolation, with subsequent endemic dwarfing, of an ancestral *H. erectus* population. Importantly, *H. floresiensis* shows that the genus *Homo* is morphologically more varied and flexible in its adaptive responses than previously thought.

Description of *Homo floresiensis*

Order Primates Linnaeus, 1758
Suborder Anthropoidea Mivart, 1864
Superfamily Hominoidea Gray, 1825
Family Hominidae Gray, 1825
Tribe Hominini Gray, 1825
Genus *Homo* Linnaeus, 1758
Homo floresiensis sp. nov.

Horizon. The type specimen LB1 was found at a depth of 5.9 m in Sector VII of the excavation at Liang Bua. It is associated with calibrated accelerator mass spectrometry (AMS) dates of approximately 18 kyr and bracketed by luminescence dates of 35 ± 4 kyr and 14 ± 2 kyr. The referred isolated left P₃ (LB2) was recovered just below a disconformity at 4.7 m in Sector IV, and bracketed by a U-series date of 37.7 ± 0.2 kyr on flowstone, and 20 cm above an electron-spin resonance (ESR)/U-series date of 74^{+14}_{-12} kyr on a *Stegodon* molar.

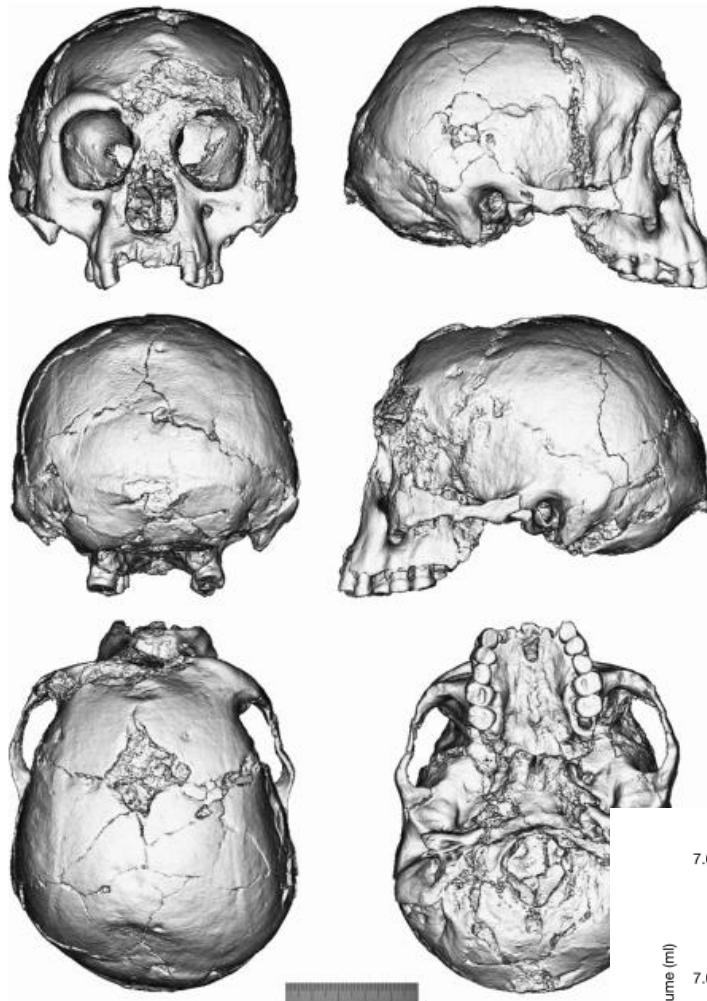


Figure 2. Surface rendered CT images of LB1/1. The orientations and scale same as in

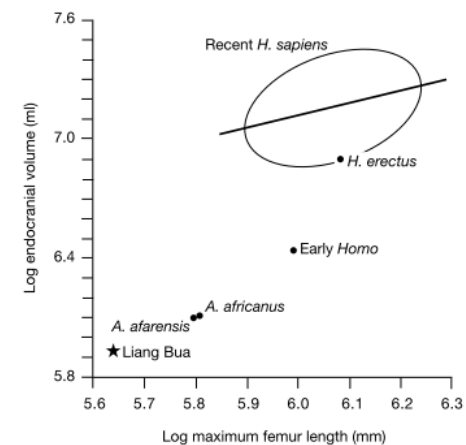


Figure 3 Relationship between endocranial volume and femur length in LB1, *A. afarensis*, *A. africanus*, early *Homo* sp., *H. erectus* and modern *H. sapiens*. Modern human data, with least squares regression line and 95% confidence ellipse, from a global sample of 155 individuals collected by P.B. Details of the hominin samples are in the Supplementary Information.

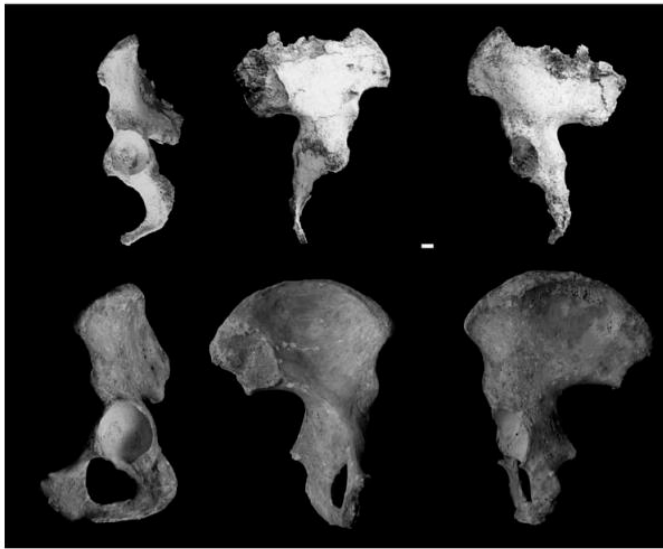


Figure 6 Comparison of the left innominate from LB1 with a modern adult female *H. sapiens*. Lateral (external), and medial and lateral views of maximum iliac breadth. The pubic region of LB1 is not preserved and the iliac crest is incomplete. Scale bar, 1 cm.

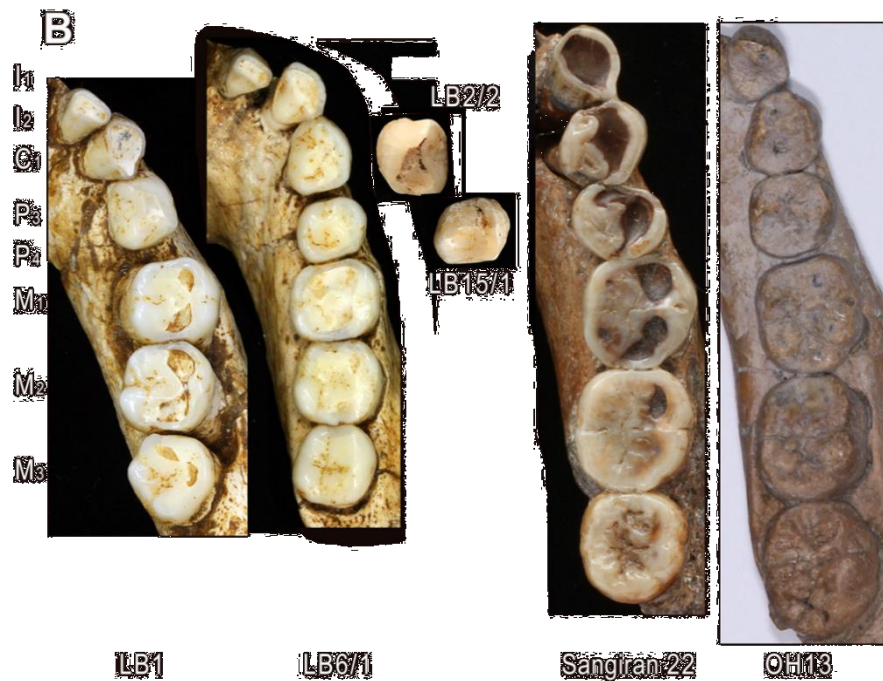
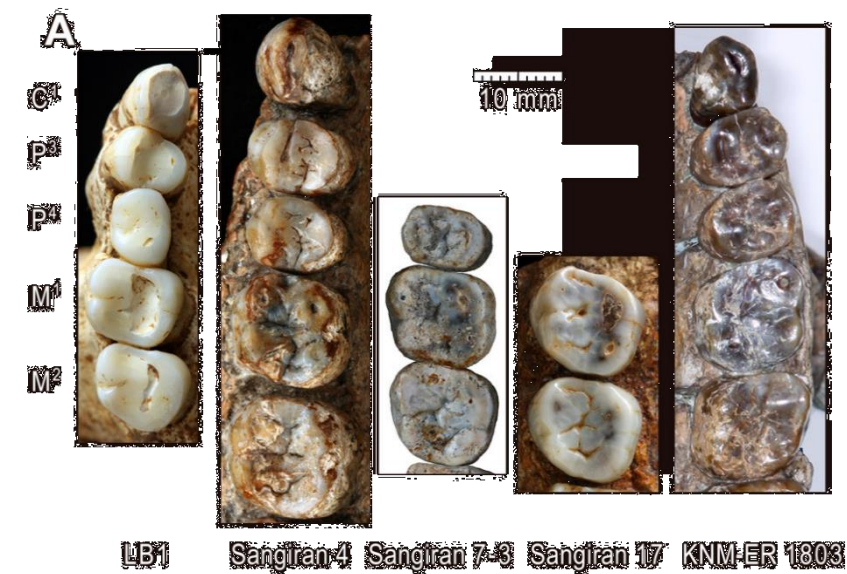
LB1: Mosaica di caratteri primitivi, unici e derivati mai visti in altri ominidi: volume endocranico piccolo e stature = australopitecini

Ma non condivide con questo genere altri caratteri come le dimensione dentale, il prognatismo facciale accentuato che sono piu simili ad altre specie del genere *Homo*



Figure 7 Anterior and posterior views of the LB1 right femur and tibia, with cross-sections of the femur neck and midshaft, and tibia midshaft. The anterior surfaces of the medial and lateral condyles of the femur are not preserved. With the exception of the medial malleolus, the tibia is complete and undistorted. Scale bar, 1 cm.

LB1 has the small endocranial volume and stature evident in early australopithecines, it does not have the great postcanine tooth size, deep prognathic facial skeleton and masticatory adaptations common to members of this genus. Instead, the facial and dental proportions, postcranial anatomy consistent with human-like obligate bipedalism.



H. floresiensis had primitive canine-premolar (comparable to *H. erectus*) and advanced molar morphologies (more progressive even compared to MH), a combination of dental traits unknown in any other hominin species.

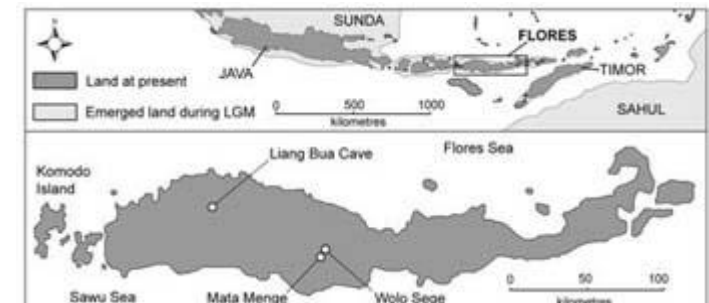
This evidence contradicts the earlier claim of an entirely modern human-like dental morphology of *H. floresiensis*, while at the same time does not support the hypothesis that *H. floresiensis* originated from a much older *H. habilis* or *Australopithecus*-like small-brained hominin species currently unknown in the Asian fossil record.

These results are however consistent with the alternative hypothesis that *H. floresiensis* derived from an earlier Asian *Homo erectus* population and experienced substantial body and brain size dwarfism in an isolated insular setting.

Homo floresiensis-like fossils from the early Middle Pleistocene of Flores

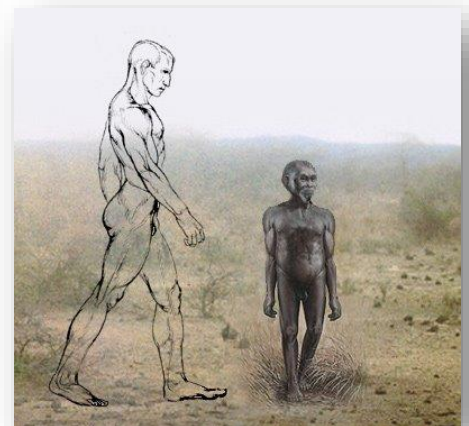
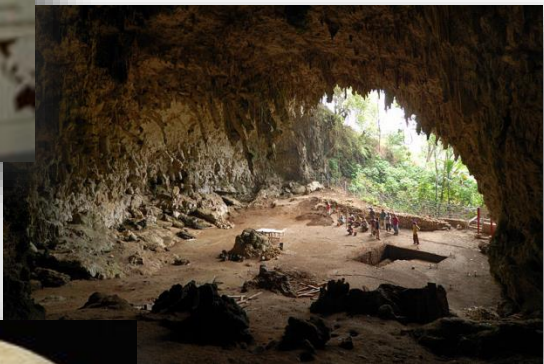
Gerrit D. van den Bergh^{1*}, Yousuke Kaifu^{2*}, Iwan Kurniawan³, Reiko T. Kono², Adam Brumm^{4,5}, Erick Setiyabudi³, Fachroel Aziz³ & Michael J. Morwood^{1,†}

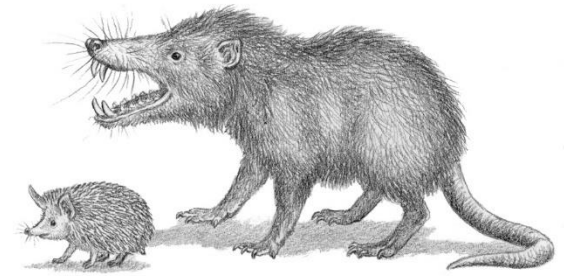
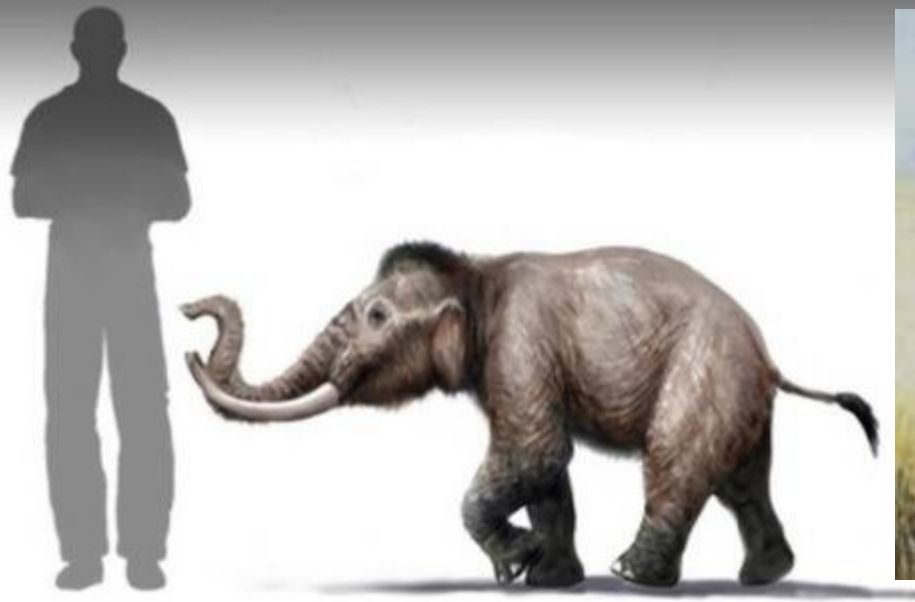
0,7 Ma



The Mata Menge are derived compared with *Australopithecus* and *H. habilis*, and so tend to support the view that *H. floresiensis* is a dwarfed descendent of early Asian *H. erectus*.

Hominins on Flores has acquired extremely small body size and other morphological traits specific to *H. floresiensis* at an unexpectedly early time





Insular endemism:

Limited resources

Absence of large predators

Genetic drift

« the smallest become large and the largest become small »

