The genus *Homo*

Julie Arnaud

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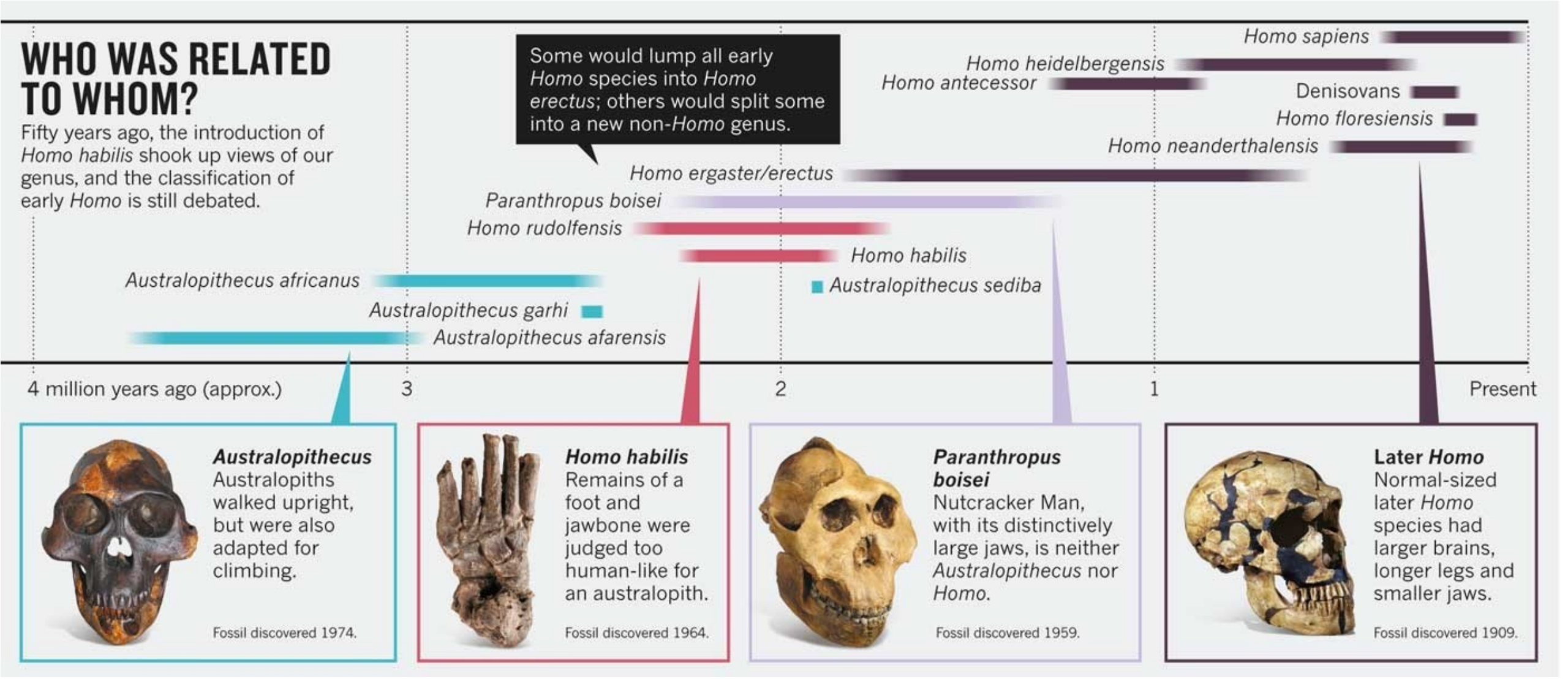
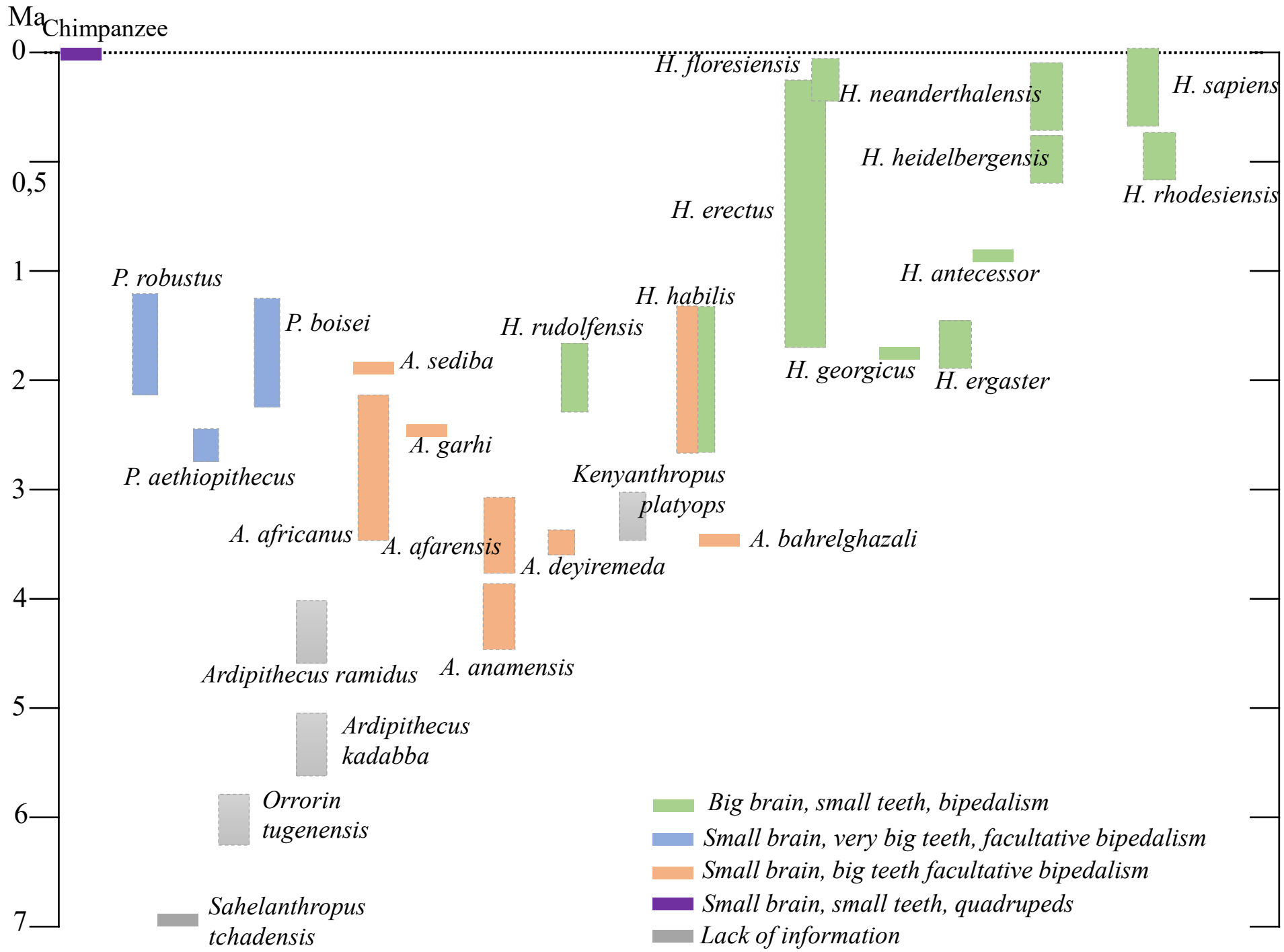
(Wood, 2014)



Australopithecus: Sabena Jane Blackbird/Alamy; H. habilis: Human Origins Program/Smithsonian Institution; P. boisei: Natural History Museum/SPL; H. neanderthalensis: Javier Trueba/MSF/SPL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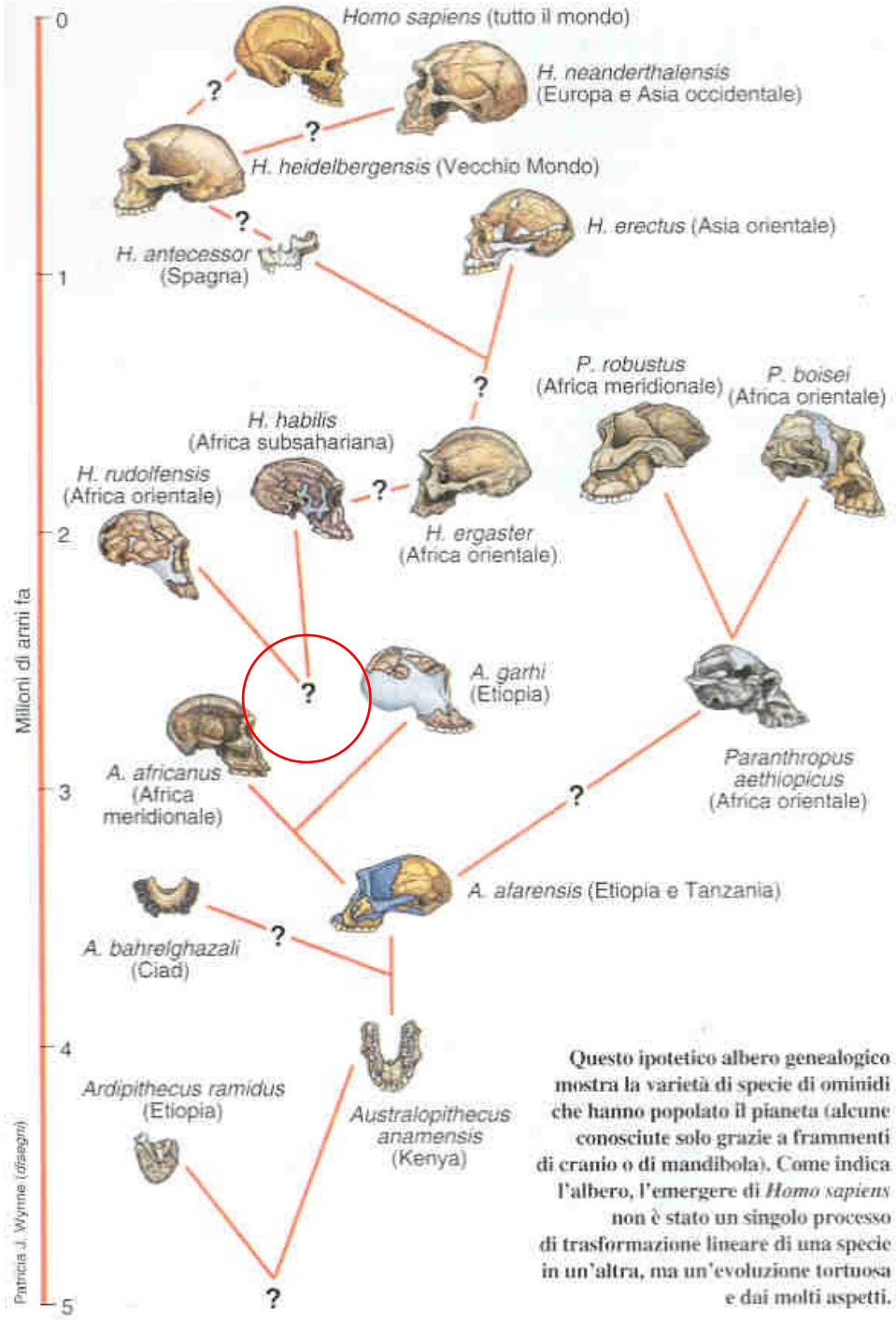
H. floresiensis
H. neanderthalensis
H. sapiens
H. heidelbergensis
H. rhodesiensis
H. erectus
H. antecessor
P. robustus
H. habilis
P. boisei
H. rudolfensis
A. sediba
H. georgicus
H. ergaster
A. garhi
P. aethiopithecus
Kenyanthropus platyops
A. africanus
A. afarensis
A. bahrelghazali
A. deyiremeda
A. anamensis
Ardipithecus ramidus
Ardipithecus kadabba
Orrorin tugenensis
Sahelanthropus tchadensis
Big brain, small teeth, bipedalism
Small brain, very big teeth, facultative bipedalism
Small brain, big teeth facultative bipedalism
Small brain, small teeth, quadrupeds
Lack of information



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.

Australopithecus sediba

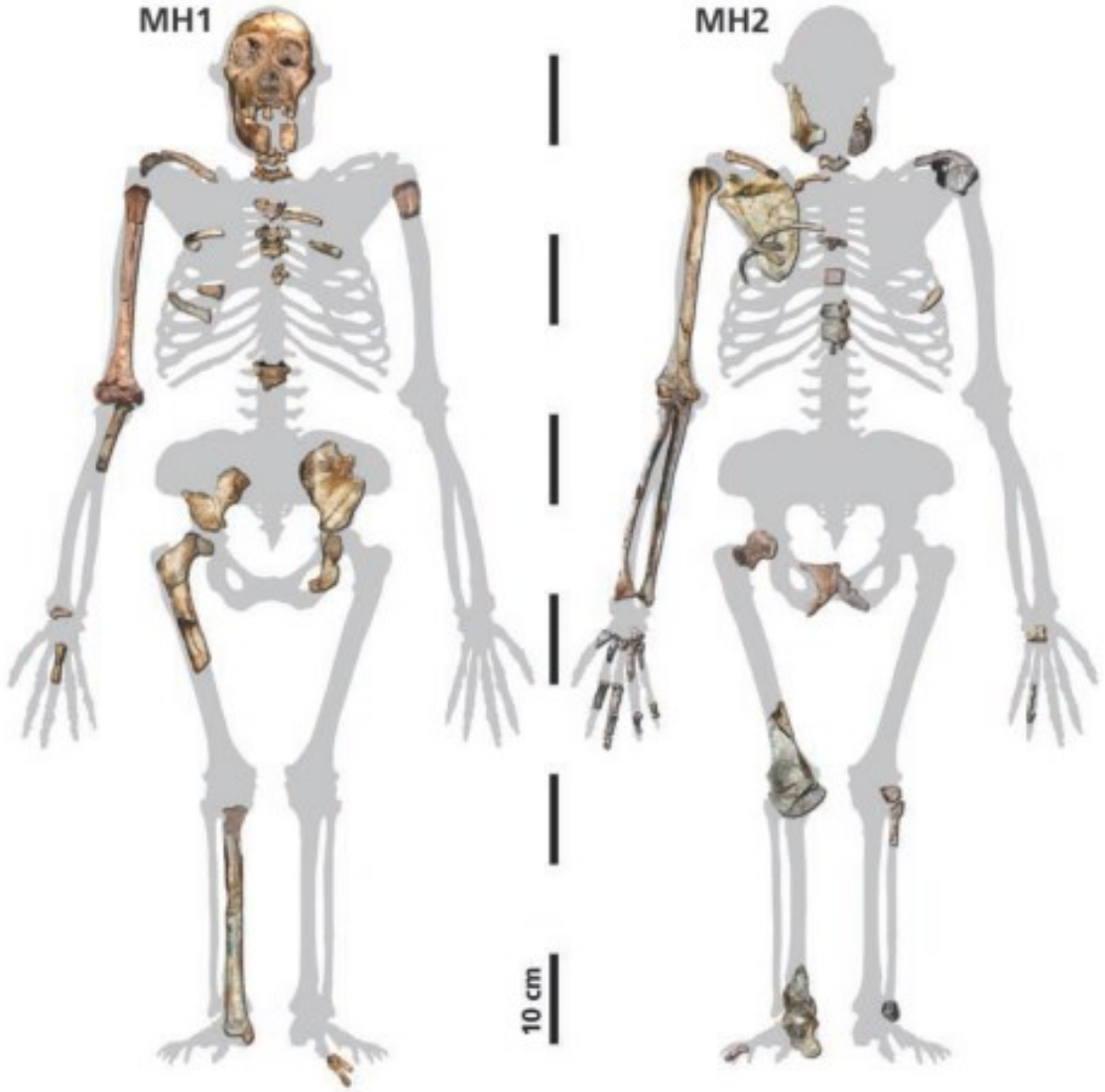


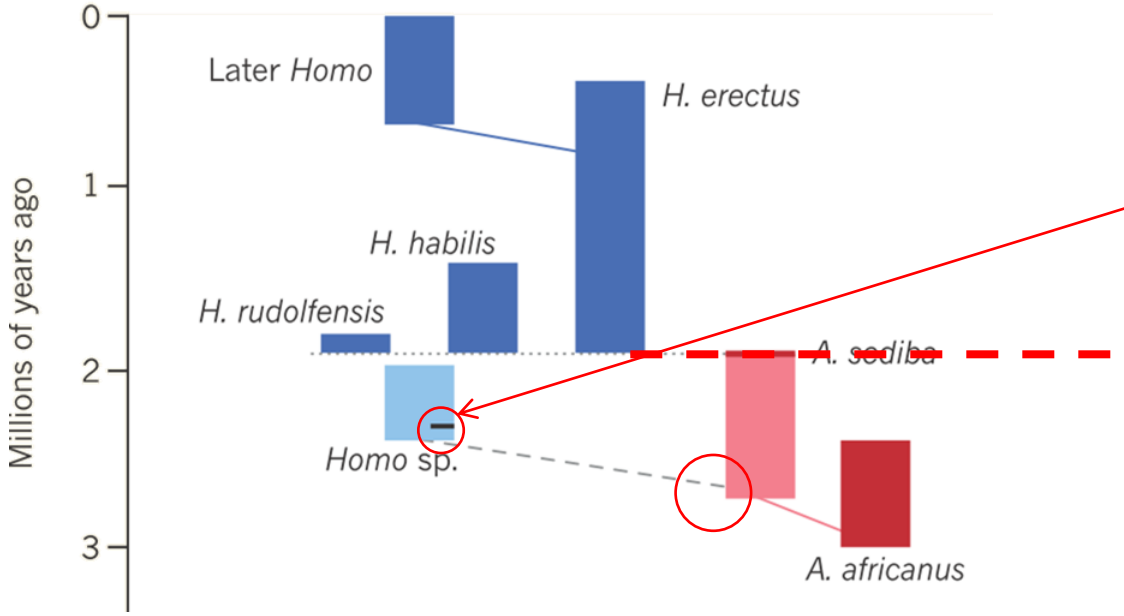
Fig. 2. Associated skeletal elements of MH1 (**left**) and MH2 (**right**), in approximate anatomical position, superimposed over an illustration of an idealized *Au. africanus* skeleton (with some adjustment for differences in body proportions). The proximal right tibia of MH1 has been reconstructed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

Au. sediba (Malapa, South Africa)

Australopiteco o *Homo* ?

Pro-Autralopiteco:
- Piccolo cervello / *small brain*
- Bracci lungi / *long arms*

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



(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)

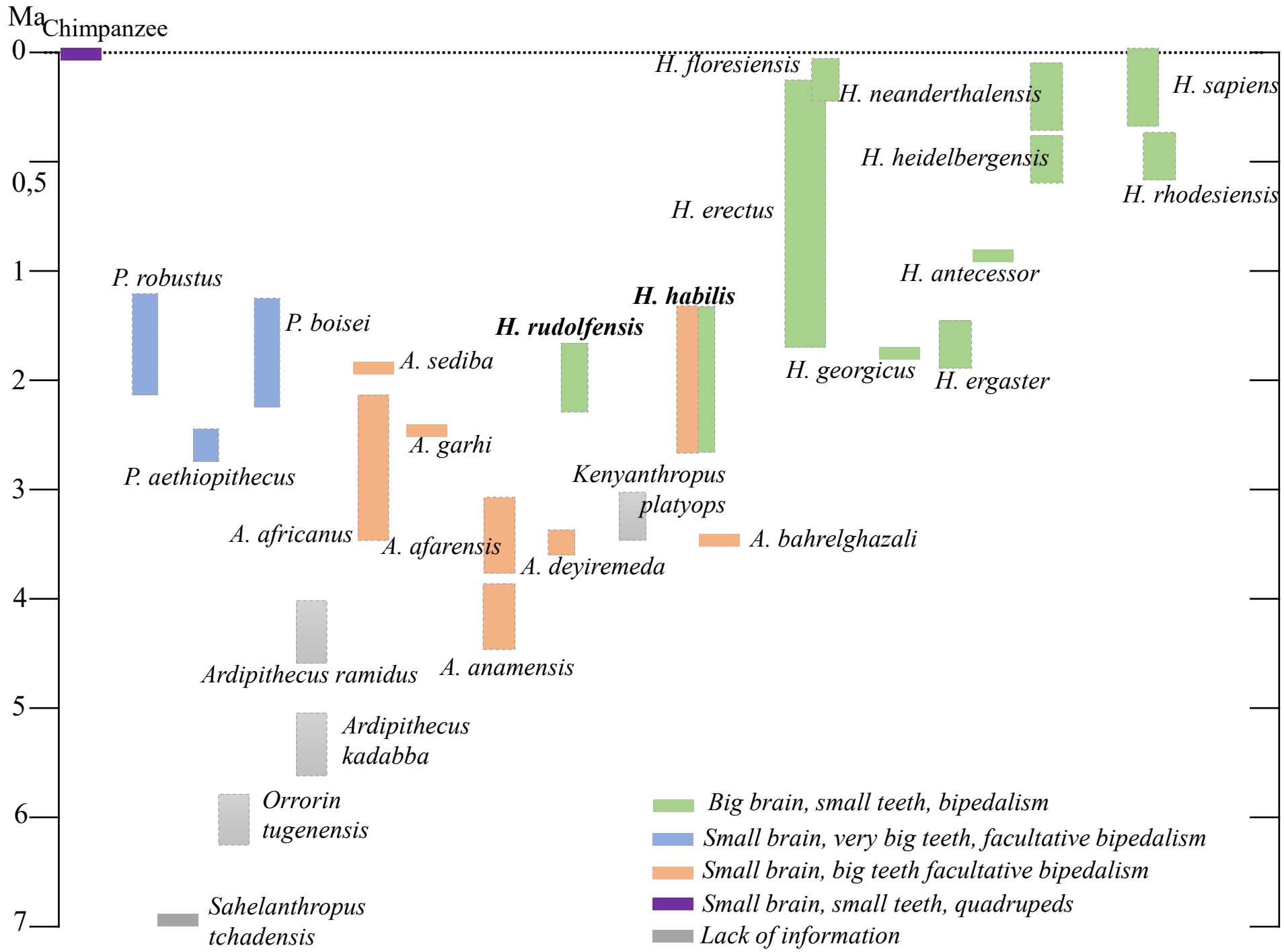
2 scenari where *A. sediba* is the ancestor of the genus *Homo*

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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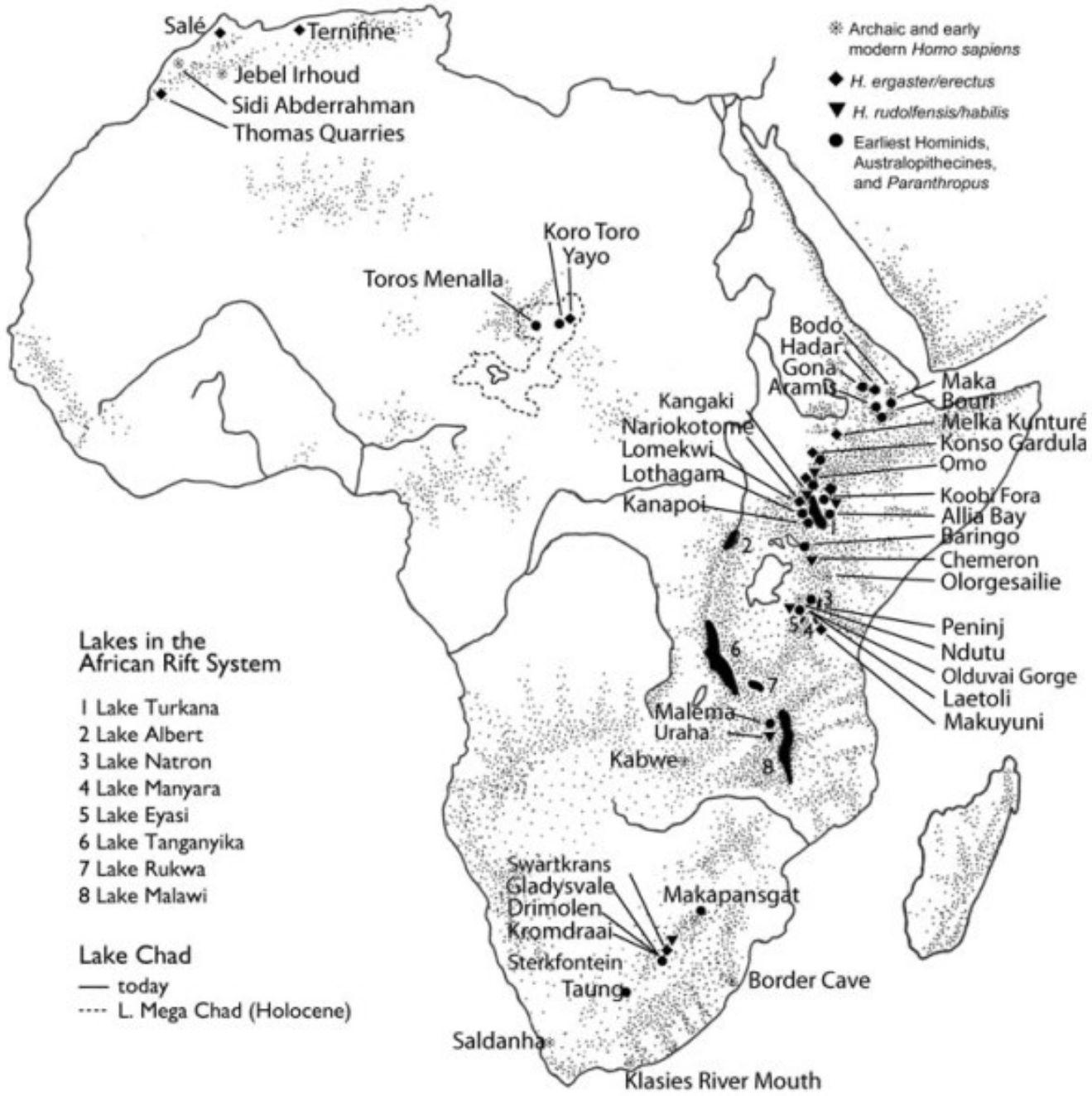
Lack of information

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



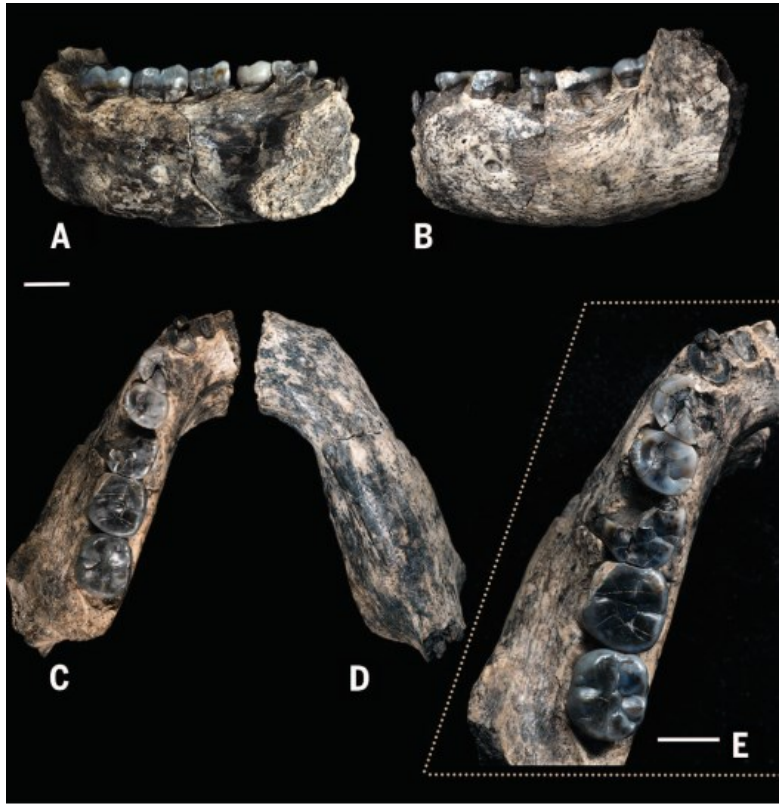
(Henke & Tattersall, 2007)

PALEOANTHROPOLOGY

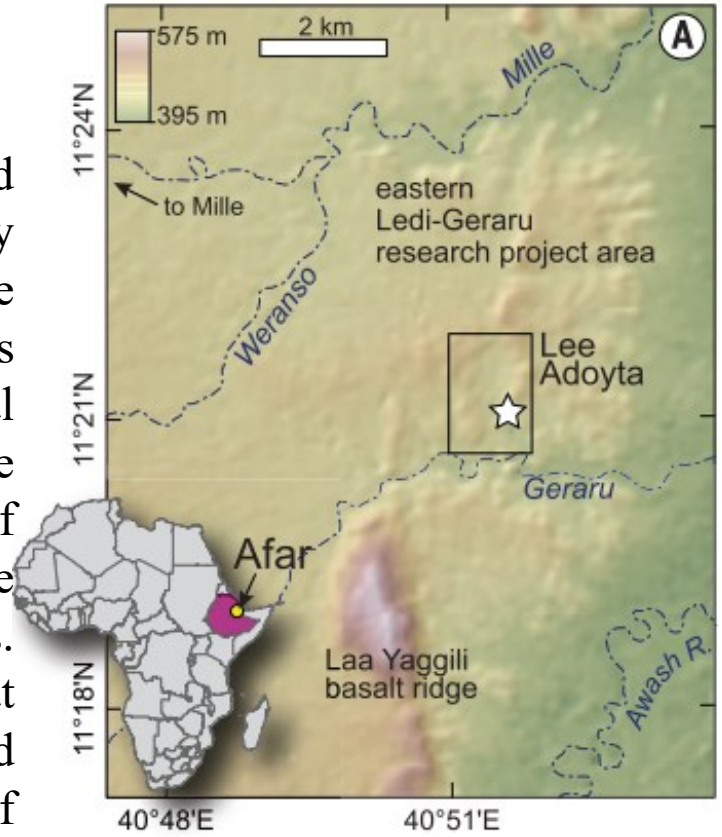
Early *Homo* at 2.8 Ma from Ledi-Geraru, Afar, Ethiopia

Brian Villmoare,[1,4,6*] William H. Kimbel,[2*] Chalachew Seyoum,[2,7] Christopher J. Campisano,[2] Erin N. DiMaggio,[3] John Rowan,[2] David R. Braun,[4] J Ramón Arrowsmith,[5] Kaye E. Reed[2]

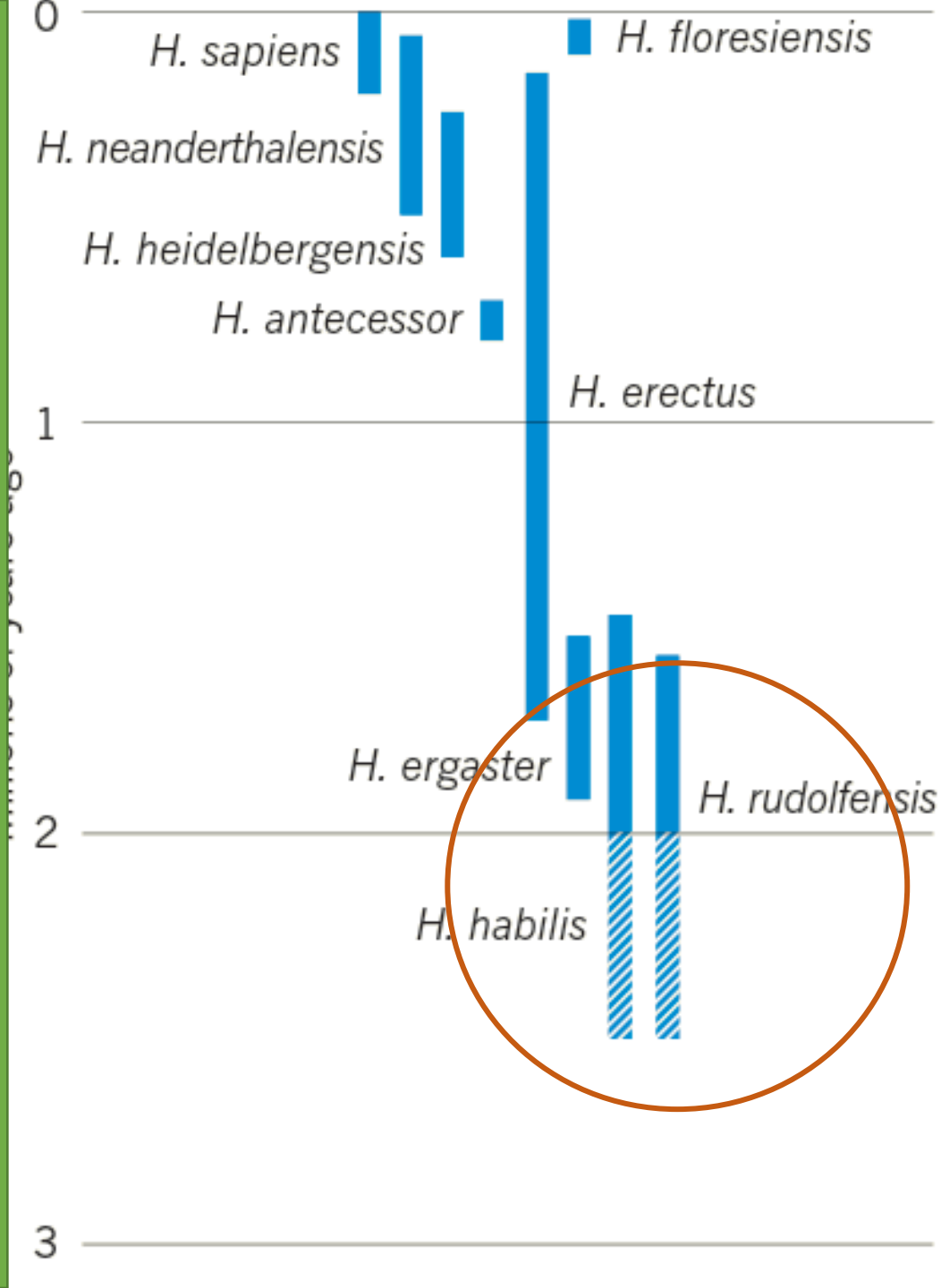
Our understanding of the origin of the genus *Homo* has been hampered by a limited fossil record in eastern Africa between 2.0 and 3.0 million years ago (Ma). Here we report the discovery of a partial hominin mandible with teeth from the Ledi-Geraru research area, Afar Regional State, Ethiopia, that establishes the presence of *Homo* at 2.80 to 2.75 Ma. This specimen combines primitive traits seen in early *Australopithecus* with derived morphology observed in later *Homo*, confirming that dentognathic departures from the australopith pattern occurred early in the *Homo* lineage. The Ledi-Geraru discovery has implications for hypotheses about the timing and place of origin of the genus *Homo*.



« The time period 2.8 to 2.5 Ma witnessed climatic shifts that are frequently hypothesized to have led to the origin of the *Homo* lineage. Although the open habitats reconstructed for the Lee Adoyta faunal assemblages provide a new window on these changes, too little is known of the pattern of hominin evolution during this period to forge causal links to specific evolutionary events. The Ledi-Geraru specimen confirms that divergence from austra- lopith dental and mandibular anatomy was an early hallmark of the Homo lineage. Additional discoveries are needed to determine whether or not these dentognathic changes were accompanied by neurocranial expansion, technological innovation, or shifts in other anatomical/behavioral systems that are familiar components of the *Homo* adaptive.”



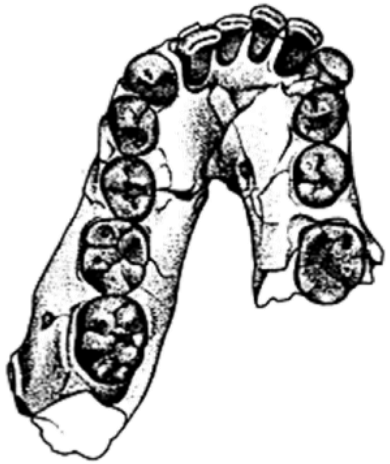
Homo habilis

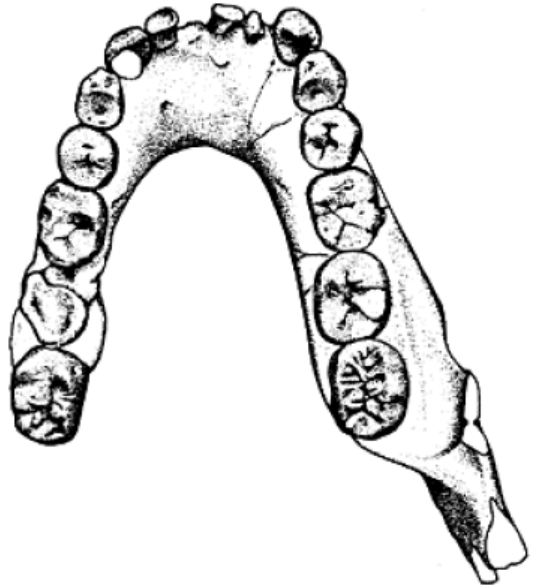


The genus *Homo*, to which modern humans (*Homo sapiens*) and several extinct species belong, most probably arose between **2 million and 3 million years ago**, but fossil evidence **before 2 million years** ago (hatched lines) is frustratingly **sparse**. New fossil discoveries from Leakey and colleagues 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

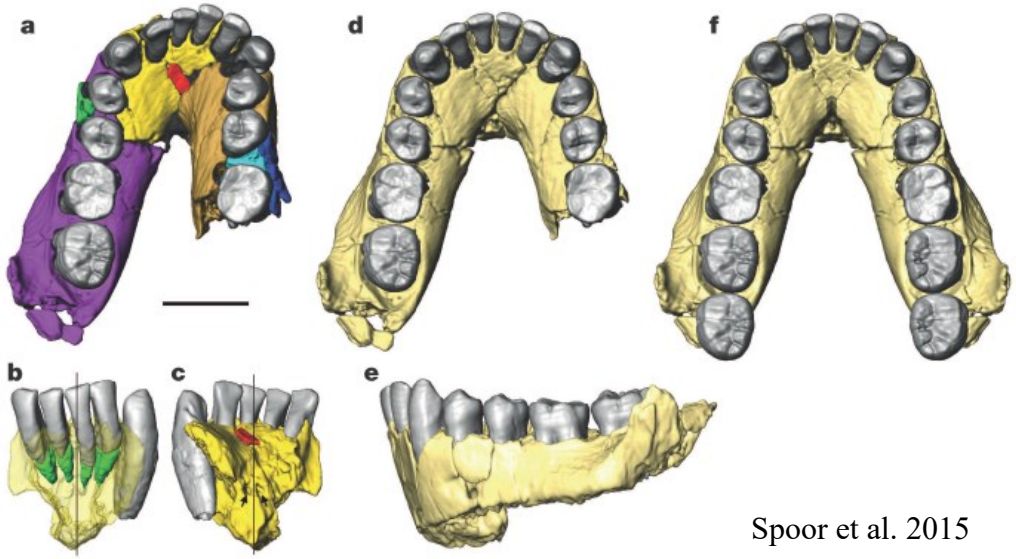




Homo habilis mandible OH 13 from Olduvai Gorge, Tanzania. Scale is 1cm.

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

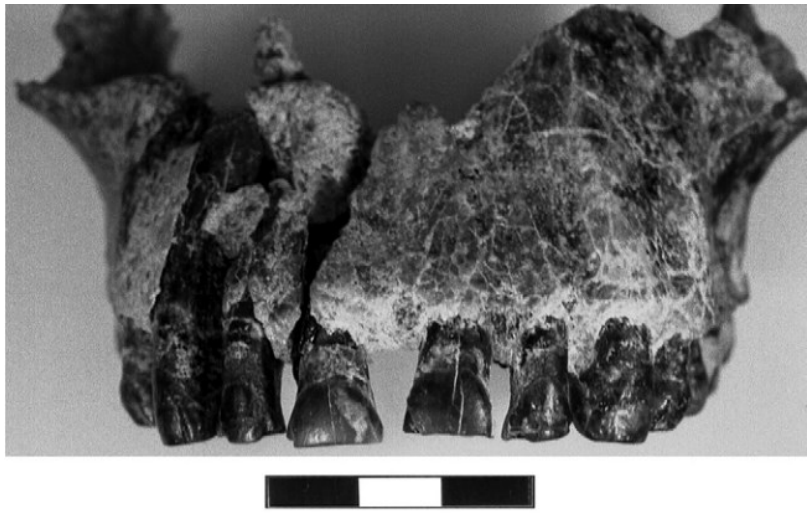
OH 7: Holotype of Homo habilis *from Olduvai Gorge (1964)*
- *Thick jaw*
- *PM and M* < Australopithecus
- *CC (calculated from two parietal bones) = 700 ml*



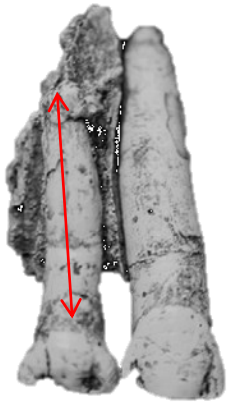
Spoor et al. 2015

Homo habilis

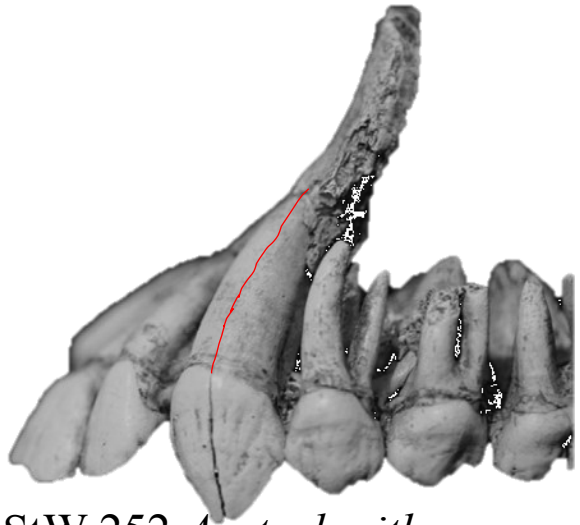
OH 65



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

Clarke, JHE 63 (2012)

LETTER

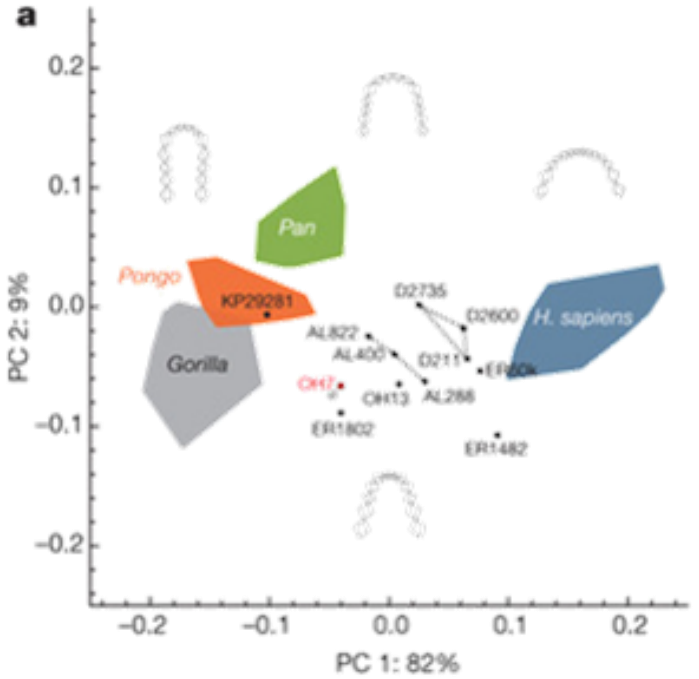
doi:10.1038/nature14224

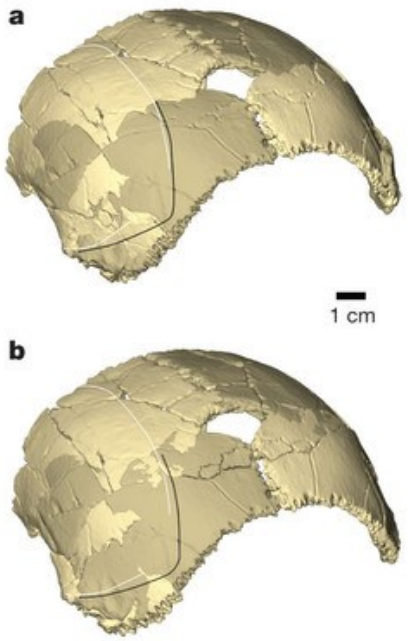
Reconstructed *Homo habilis* type OH 7 suggests deep-rooted species diversity in early *Homo*

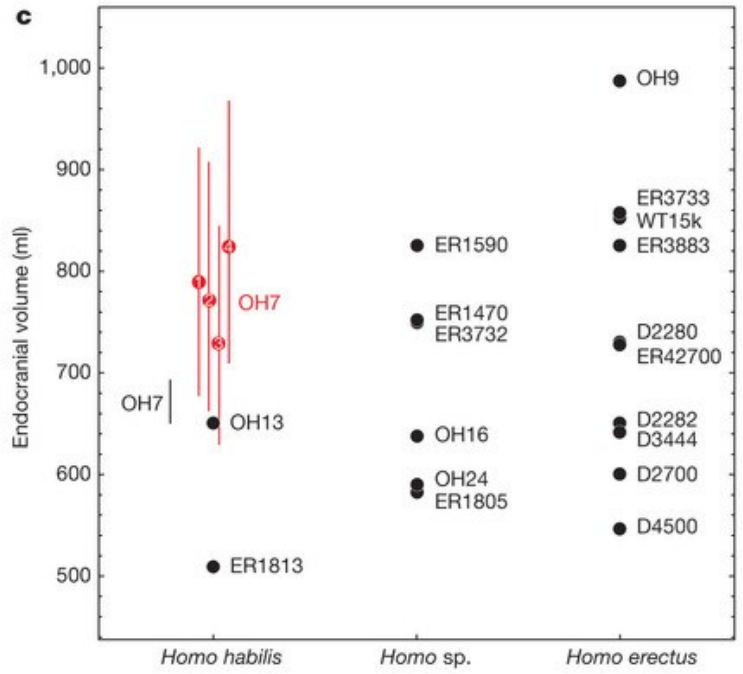
Fred Spoor[1,2]*, Philipp Gunz[1]*, Simon Neubauer[1], Stefanie Stelzer[1], Nadia Scott[1], Amandus Kwekason[3] & M. Christopher Dean[2]

OH7 = «remarkably primitive, with a long and narrow dental arcade more similar to *Australopithecus afarensis* than to the derived parabolic arcades of *Homo sapiens* or *H. erectus*. This shape variability is not consistent with a single species of early *Homo*

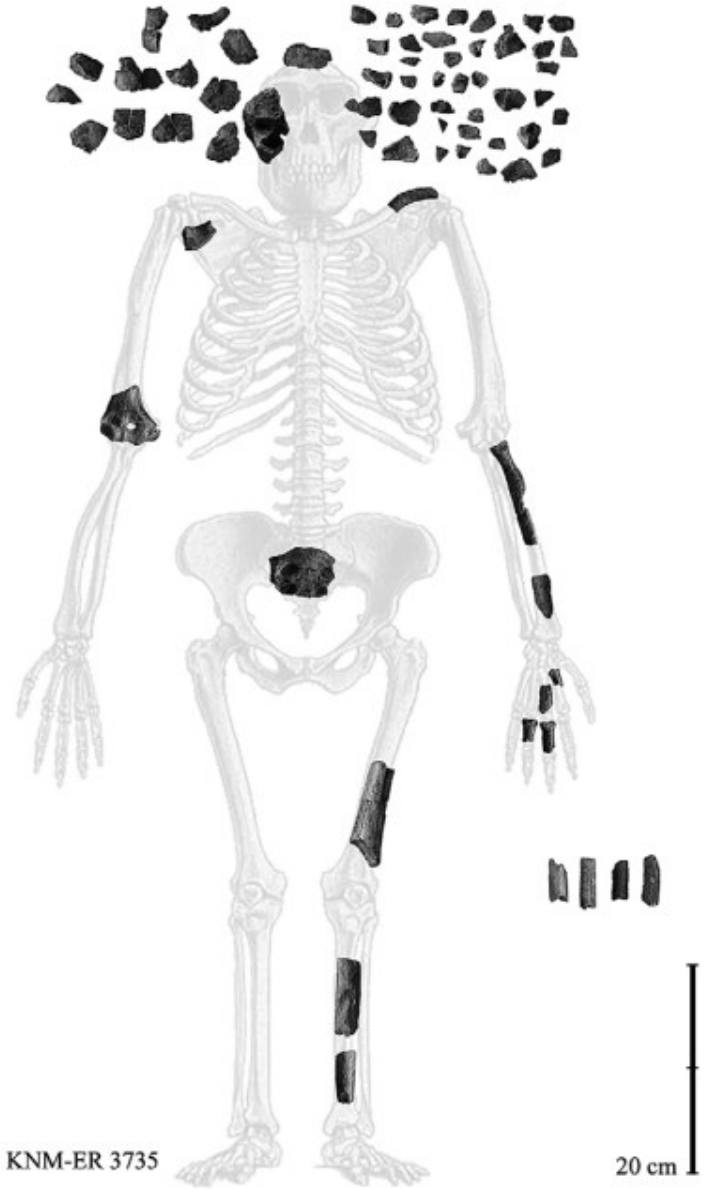
OH 7 is incompatible with fossils assigned to *Homo rudolfensis* and with the A.L. 666-1 *Homo* maxilla. The latter is morphologically more derived than OH 7 but 500,000 years older, suggesting that the *H. habilis* lineage originated before 2.3 million years ago.







Homo habilis



Haeusler, JHE 53(4), 2007

Mosaica di caratteri:

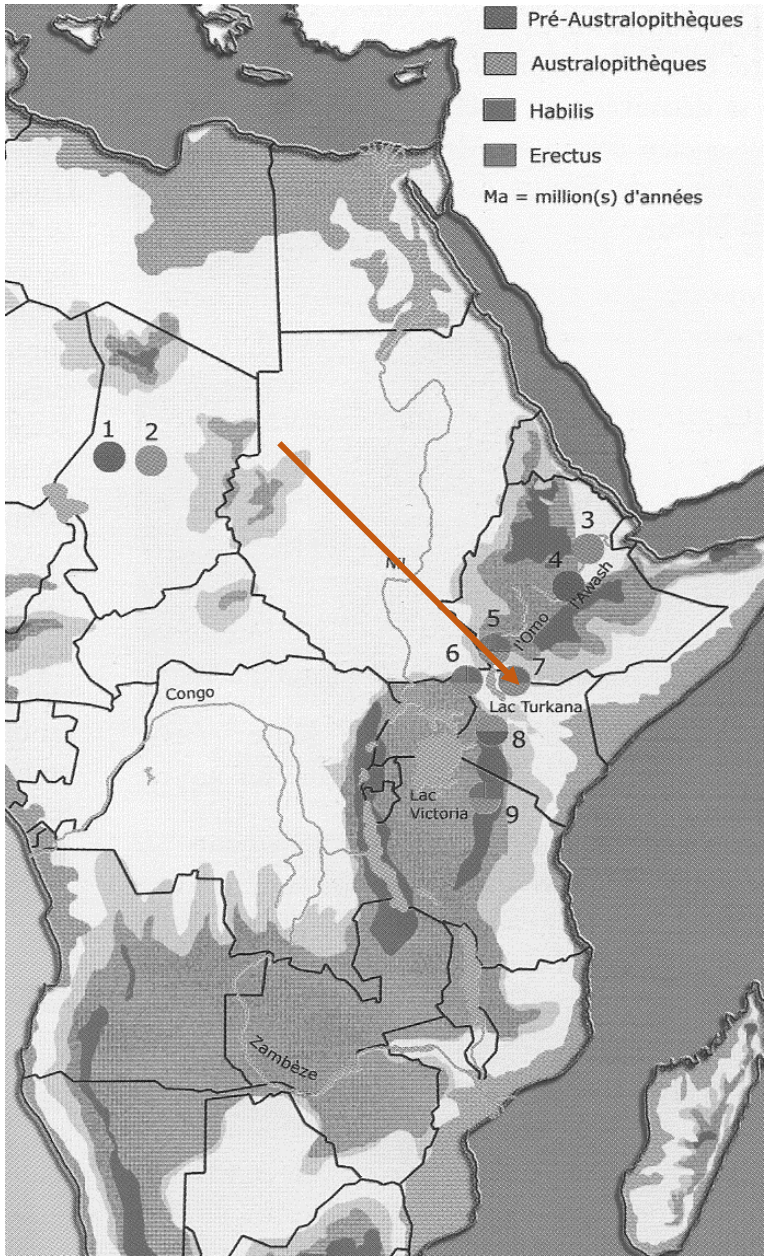
Moderni:
• Gracilità dell'omero e del radio
Gracile humerus and radius
• Epifisi prossimale delle falange piccole
Small base of the hand phalange
• Pilastro del femore ben svilupato
Well developed pilaster
• Geometria della sezione del femore
Cross sectional geometry of the femur

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

LETTER

doi:10.1038/nature11322

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

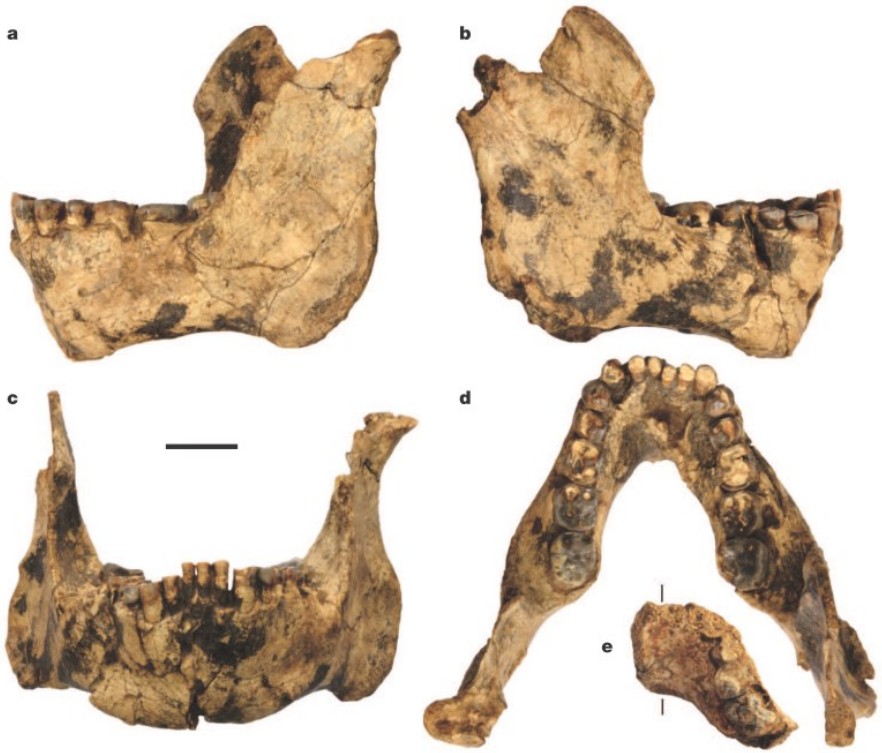
Meave G. Leakey[1,2], Fred Spoor[3,4], M. Christopher Dean[4], Craig S. Feibel[5], Susan C. Antón[6], Christopher Kiarie[1] & Louise N. Leakey[1,2]

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 bar, 3 cm.

KNM-ER 62000: 8 years (?)
Crown ~ early *Homo*
Palate shorter than Australopiths

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*

	Homo habilis sensu stricto	*Homo rudolfensis*
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 *Homo*-like
Femur	Australopithecine-like	Later *Homo*-like

After Wood (1992).

Homo rudolfensis
(2.5-1.6 M.a)

- Morfologia più robusta

Most robust mophology

- maggiore cc (750 cm3)

> CC

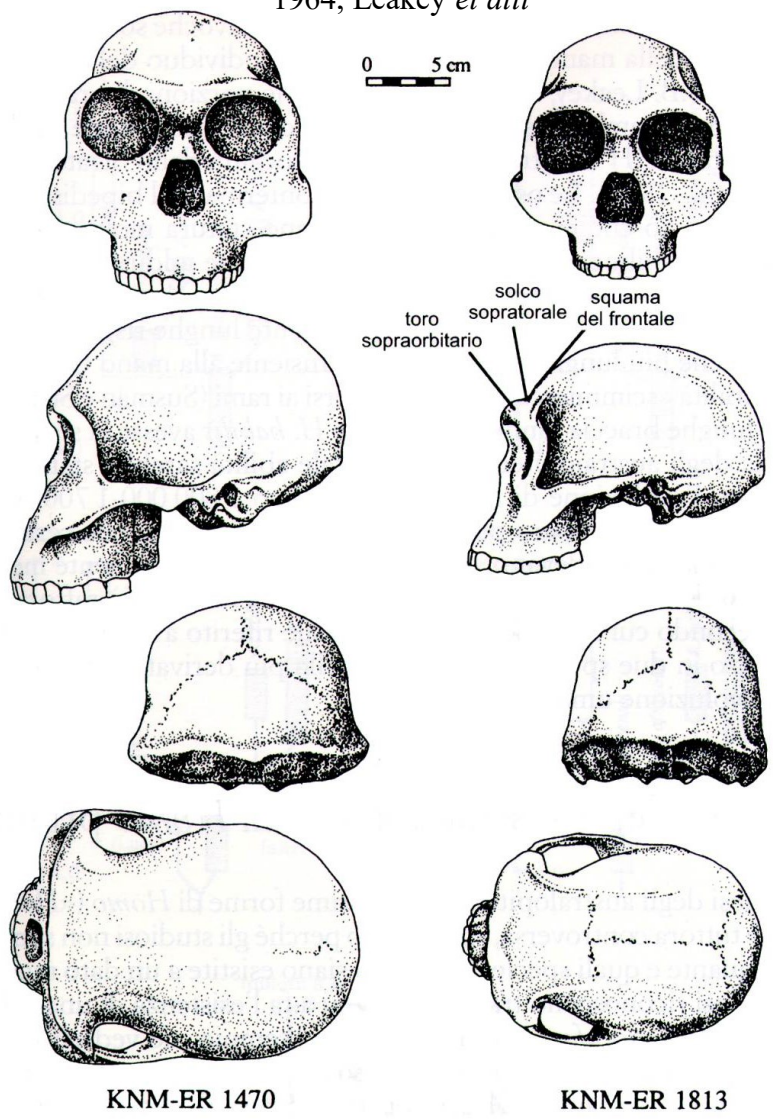
- faccia più robusta (larga a metà altezza e ortognata)

Most robust face

- Si trova a Koobi Fora, Chemeron e Uraha
- Denti megadonti e abrasione dei denti horizontale

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

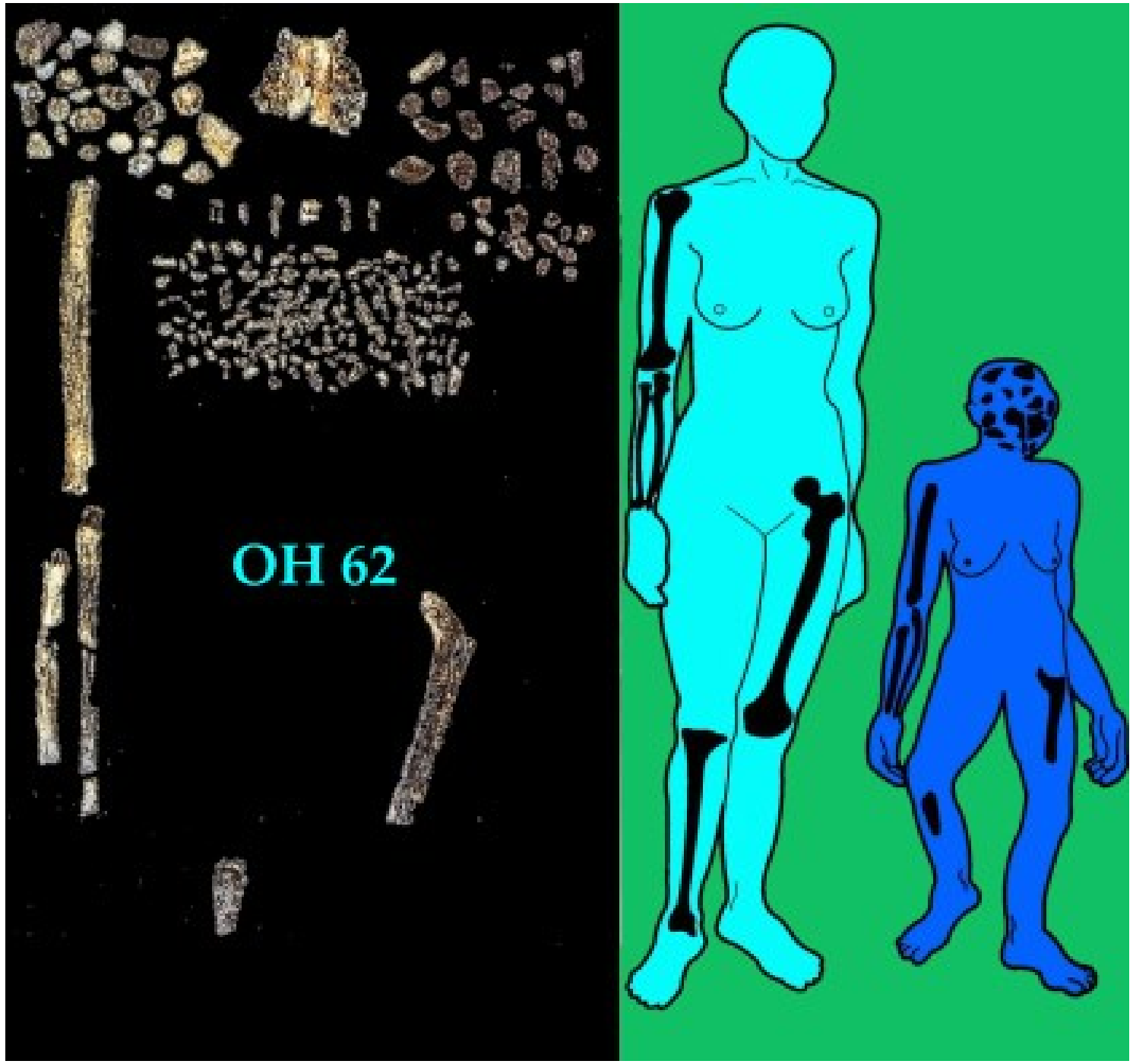
higher relief in worn teeth

Differenze dell'usura dentaria che indicano delle differenze notevole nella dieta e l'ecologia dei primi *Homo*

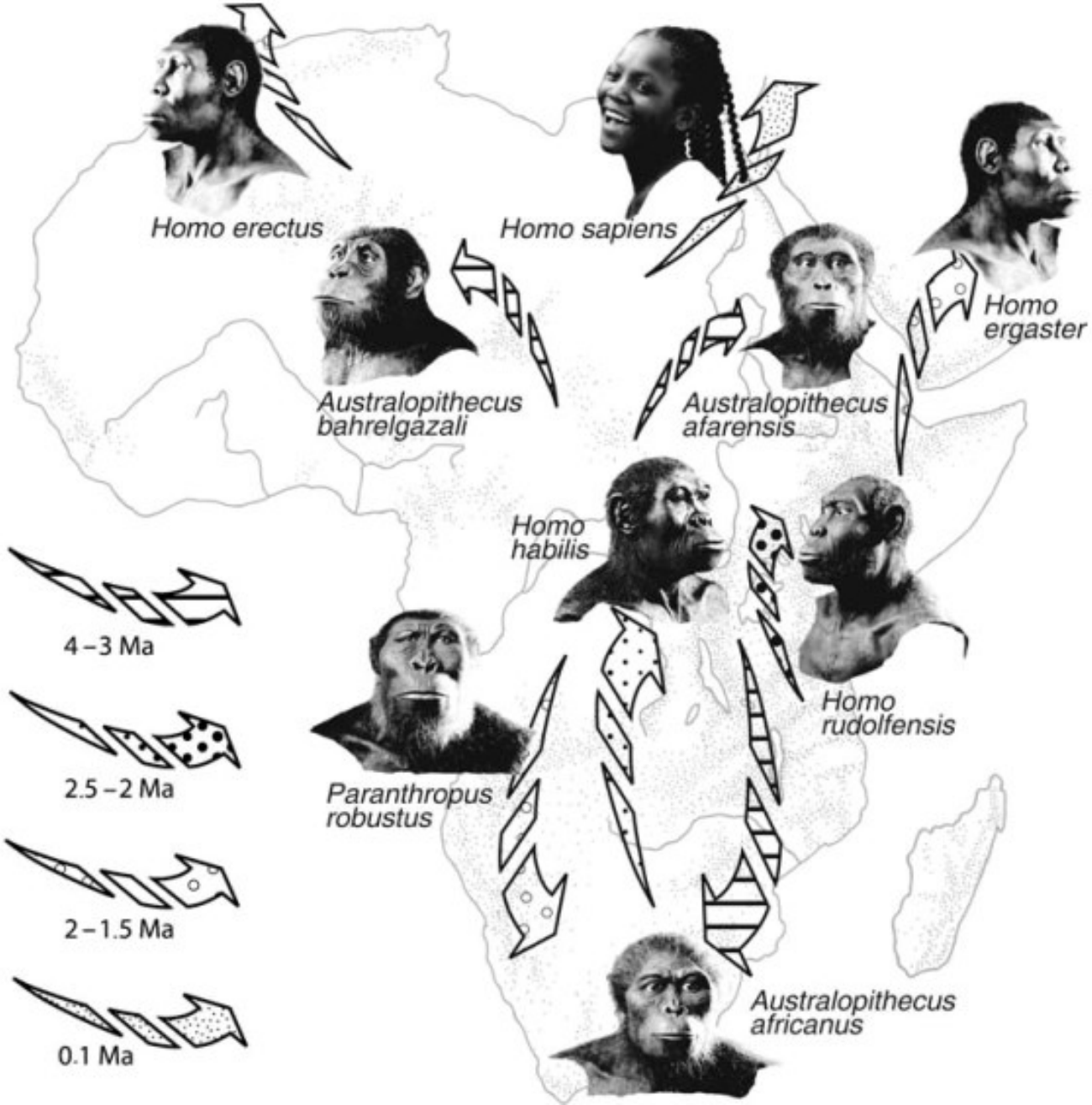
Differences in tooth wear indicating significant differences in diet and ecology of early Homo *species*

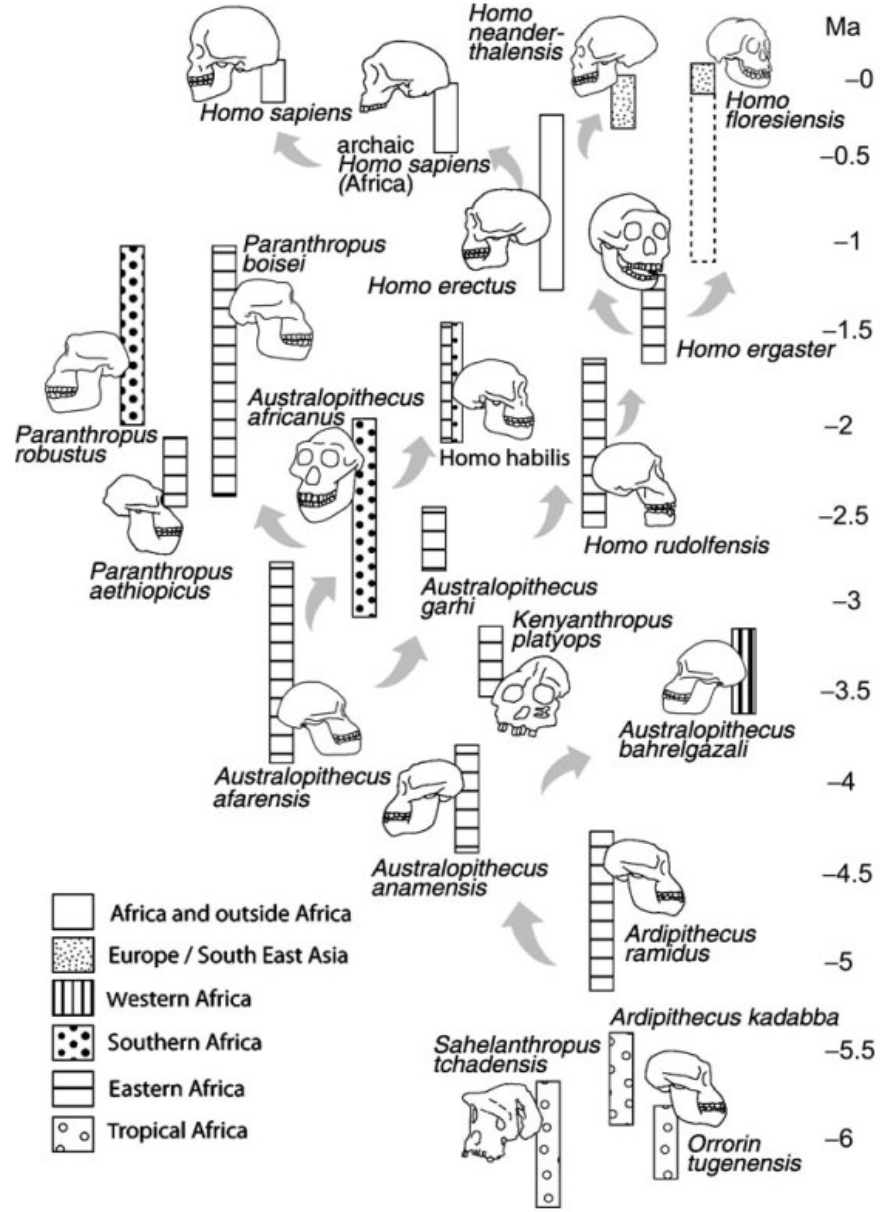
Le caratteristiche morfologiche dimostrano che i individui erano capace di avere una bipedia efficace. Pero il talus è meno umano che il resto del piede e ha una morfologia scimmiesca
La bipedia dell' *Homo habilis* può essere posizionata tra quella occasionale dei Australopitecine e quella obbligata dei *H. ergaster*.

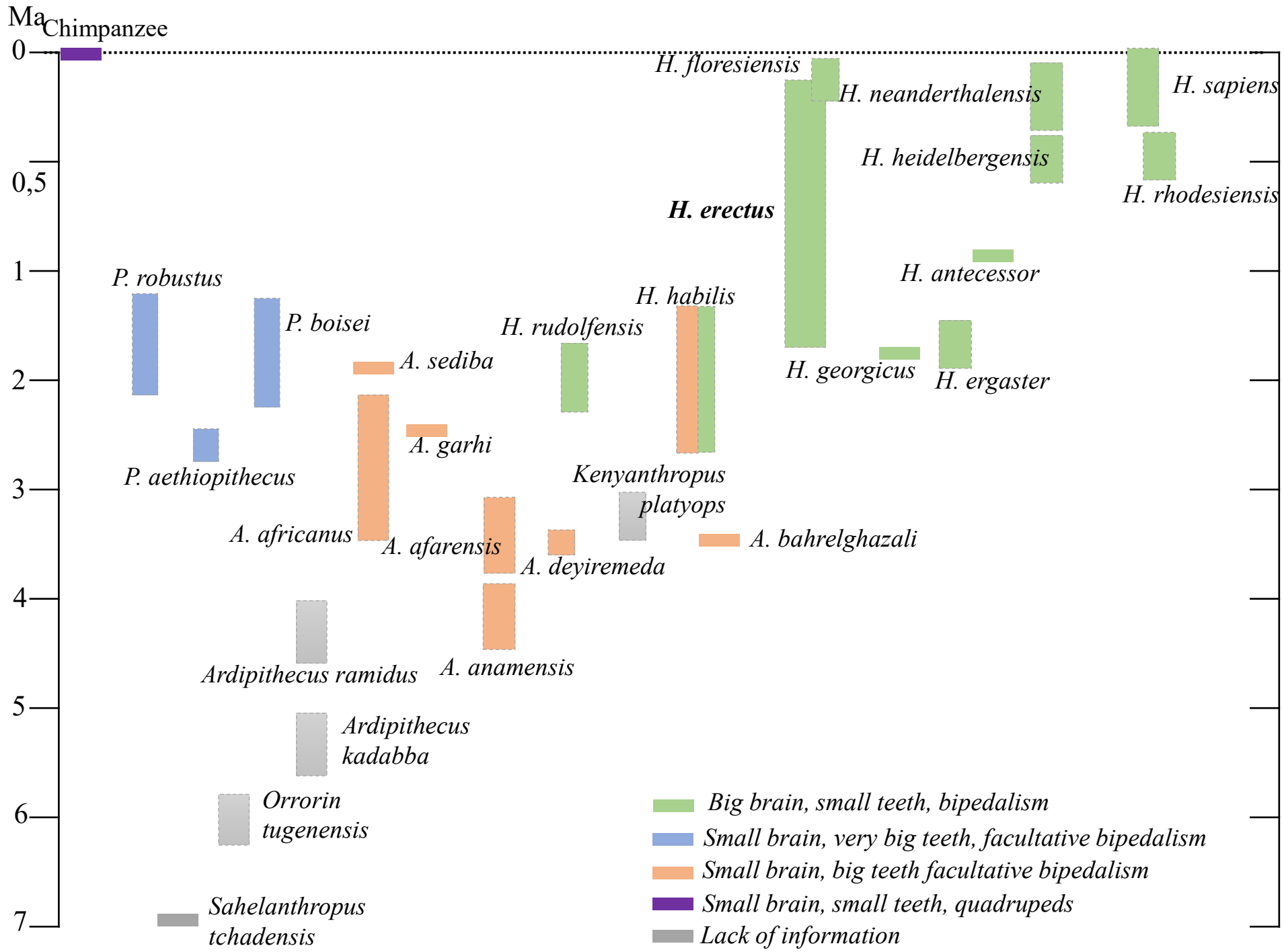
Efficient bipedism but the talus has ape-like morphology.
The Homo habilis *bipedism can be placed somewhere between the occasional one of the Australopiths and the obligatory one of* H. ergaster



Early hominid biogeography, dispersal and migration in Africa



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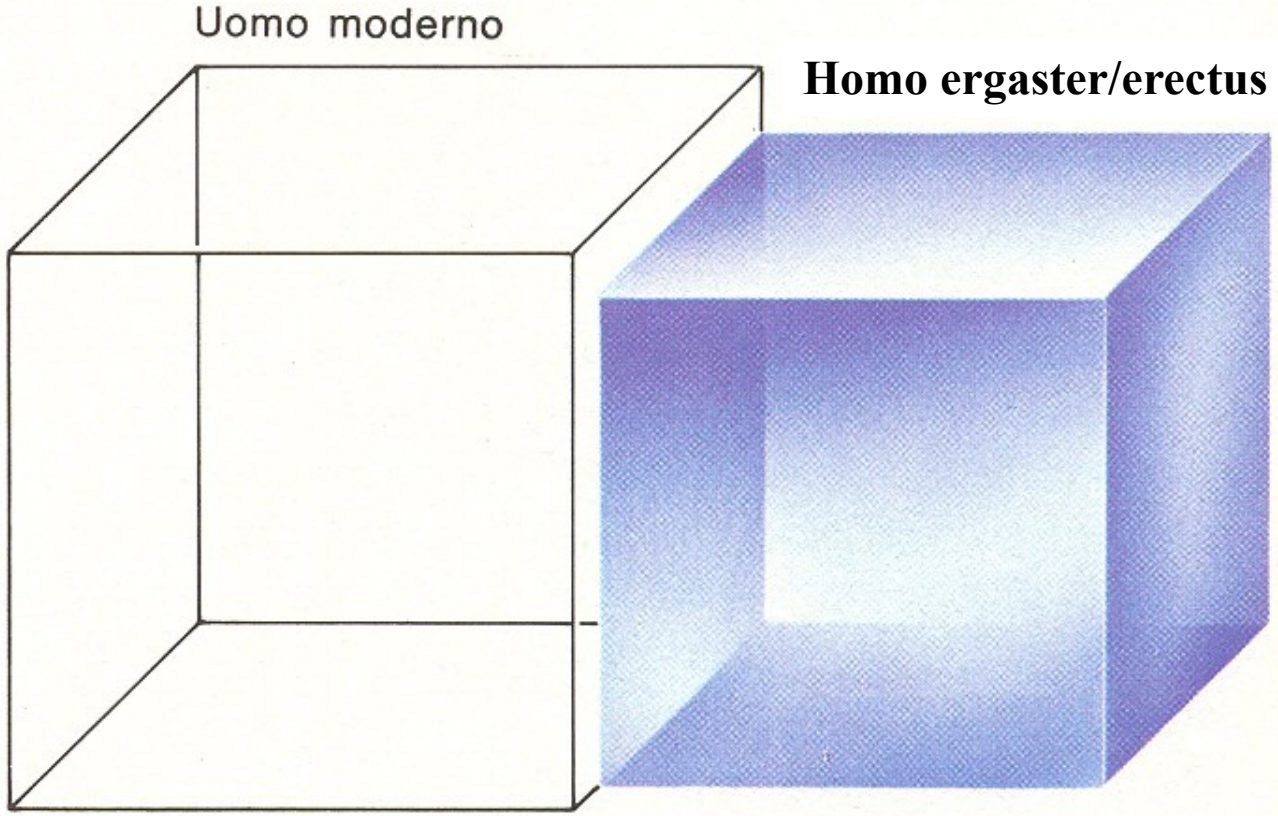
Small brain, small teeth, quadrupeds
Lack of information

Homo erectus/ergaster



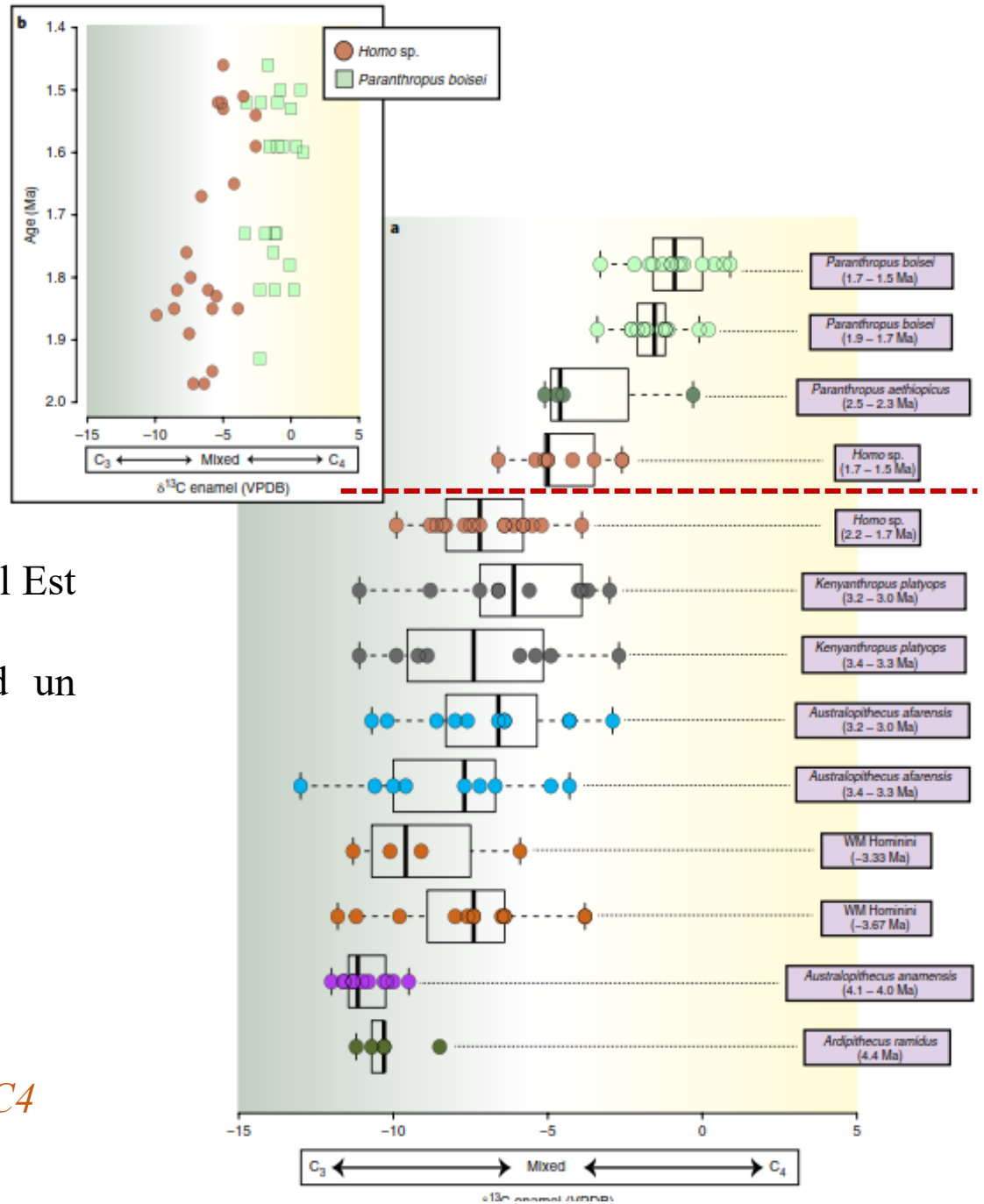
Il graduale aumento nella capacità cranica degli ominidi continuò nell'*Homo erectus*, la cui media era di 950 cm^3. Si verificarono anche importanti progressi sociali: la caccia fu organizzata, gli utensili divennero più vari, e nei climi più freddi venne usato il fuoco.

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

ARTICLES
https://doi.org/10.1038/s41559-019-0916-0
nature ecology & evolution

Comparative isotopic evidence from East Turkana supports a dietary shift within the genus *Homo*

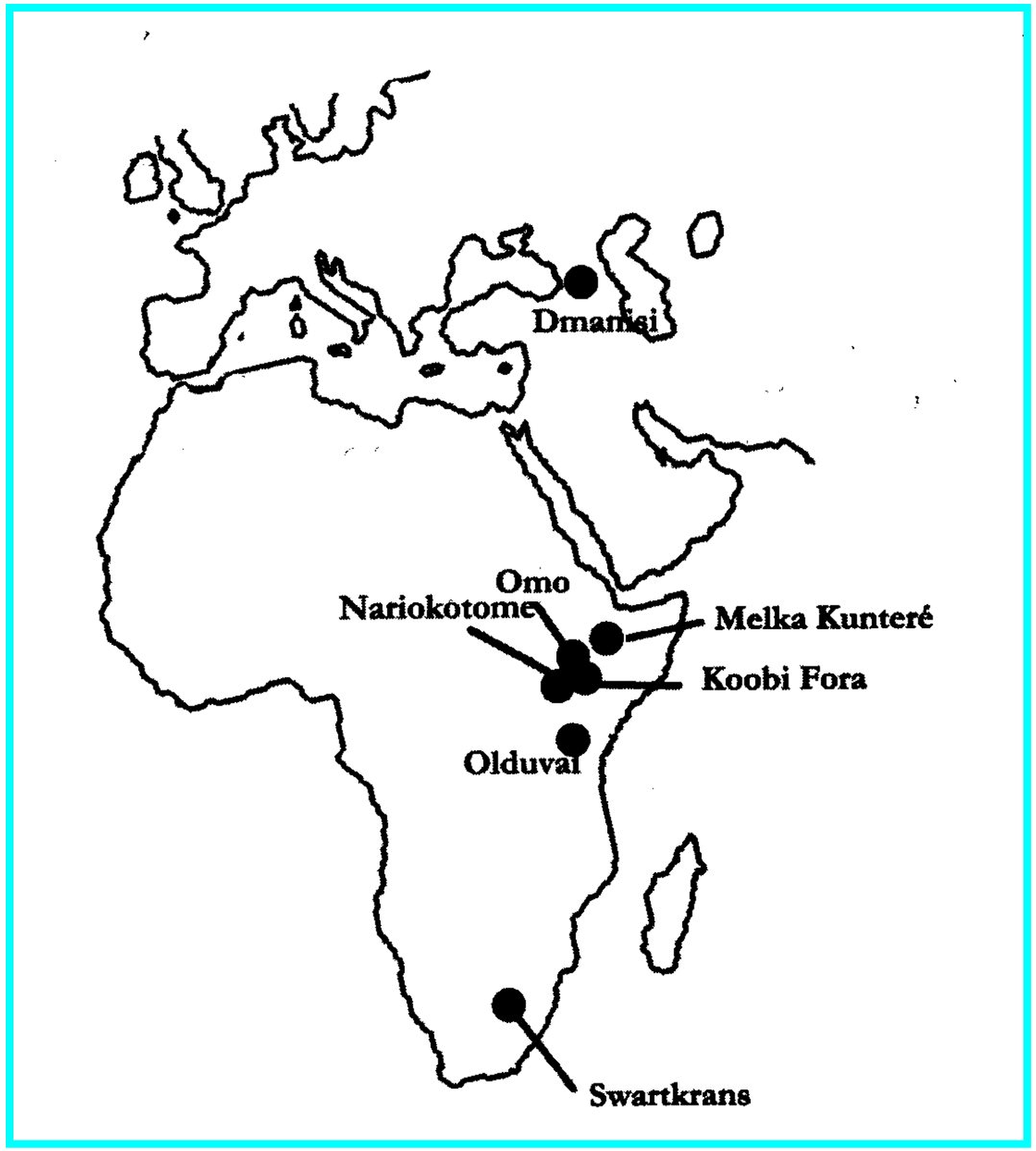
David B. Patterson[1,2*], David R. Braun[2], Kayla Allen[3], W. Andrew Barr[2], Anna K. Behrensmeyer[4], Maryse Biernat[5], Sophie B. Lehmann[6], Tom Maddox[7], Fredrick K. Manthi[8], Stephen R. Merritt[9], Sarah E. Morris[10], Kaedan O'Brien[11], Jonathan S. Reeves[12], Bernard A. Wood[2] and René Bobe[13,14]



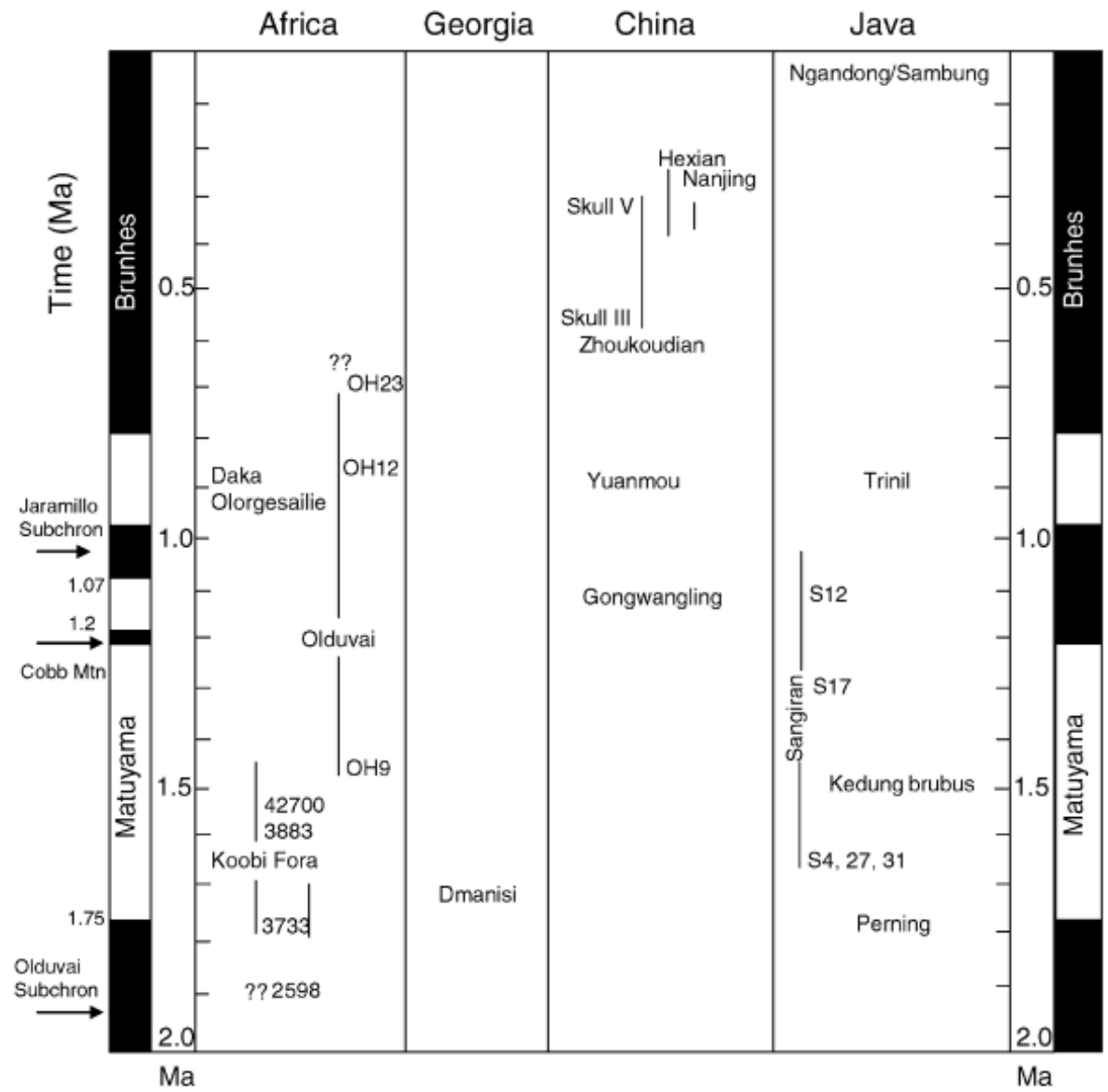
Cambio significativo della dieta a -1,65 Ma in *Homo* nella regione del Est Turkana che non è correlato ad cambiamenti ambientali.
Il pattern dei post-1,65 Ma *Homo* potrebbe essere correlato ad un aumento nel consumo di carne.

Dietary shift of the genus Homo (In East Turkana) around 1,65 Myrs ago which is not related to changes in this region vegetation and different from the pattens found in other East Turkana large mammals (including Paranthropus).
This shift occurred well after the first evidence of early Homo in the region and could be related to the ingestion of more animal tissues of C4 herbivores.

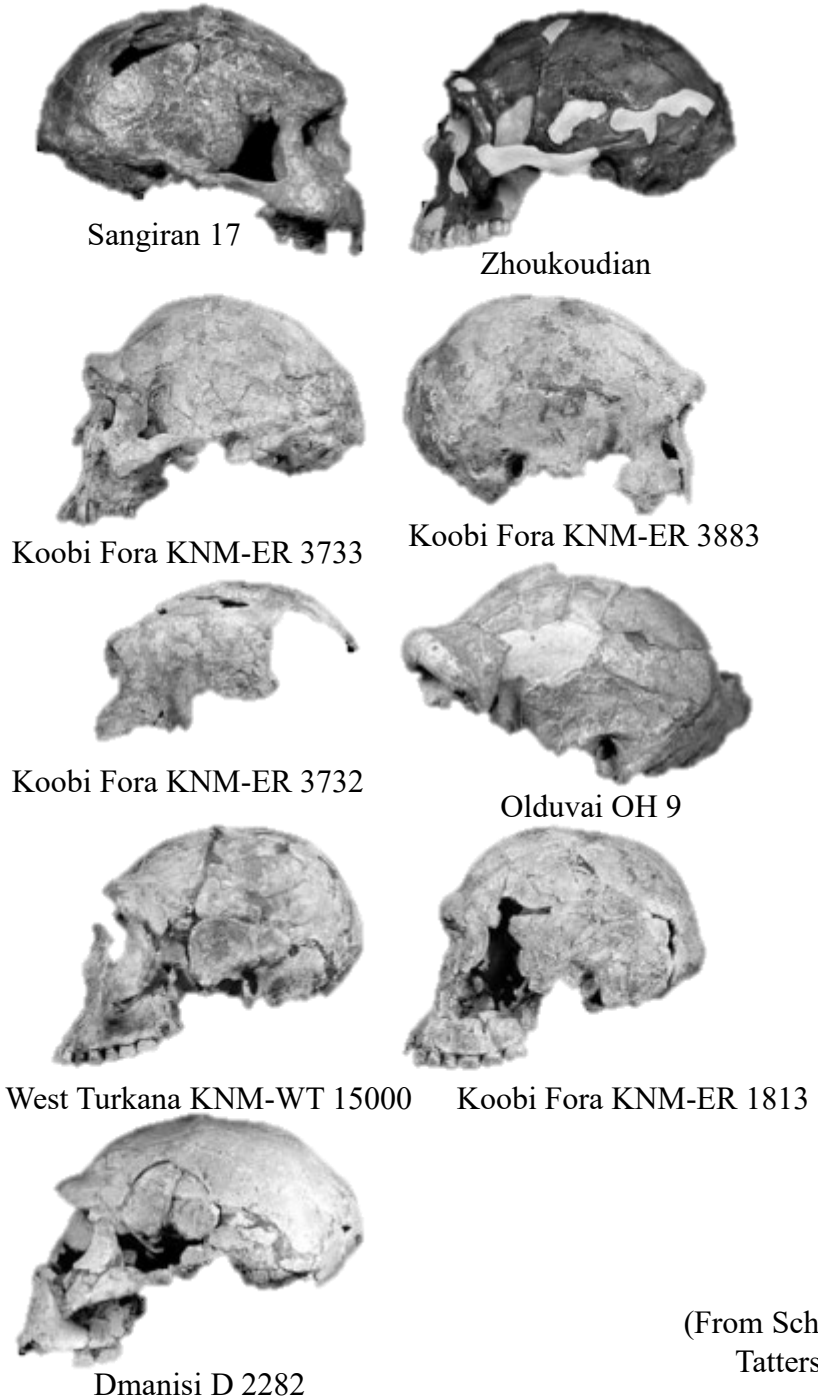
Homo ergaster



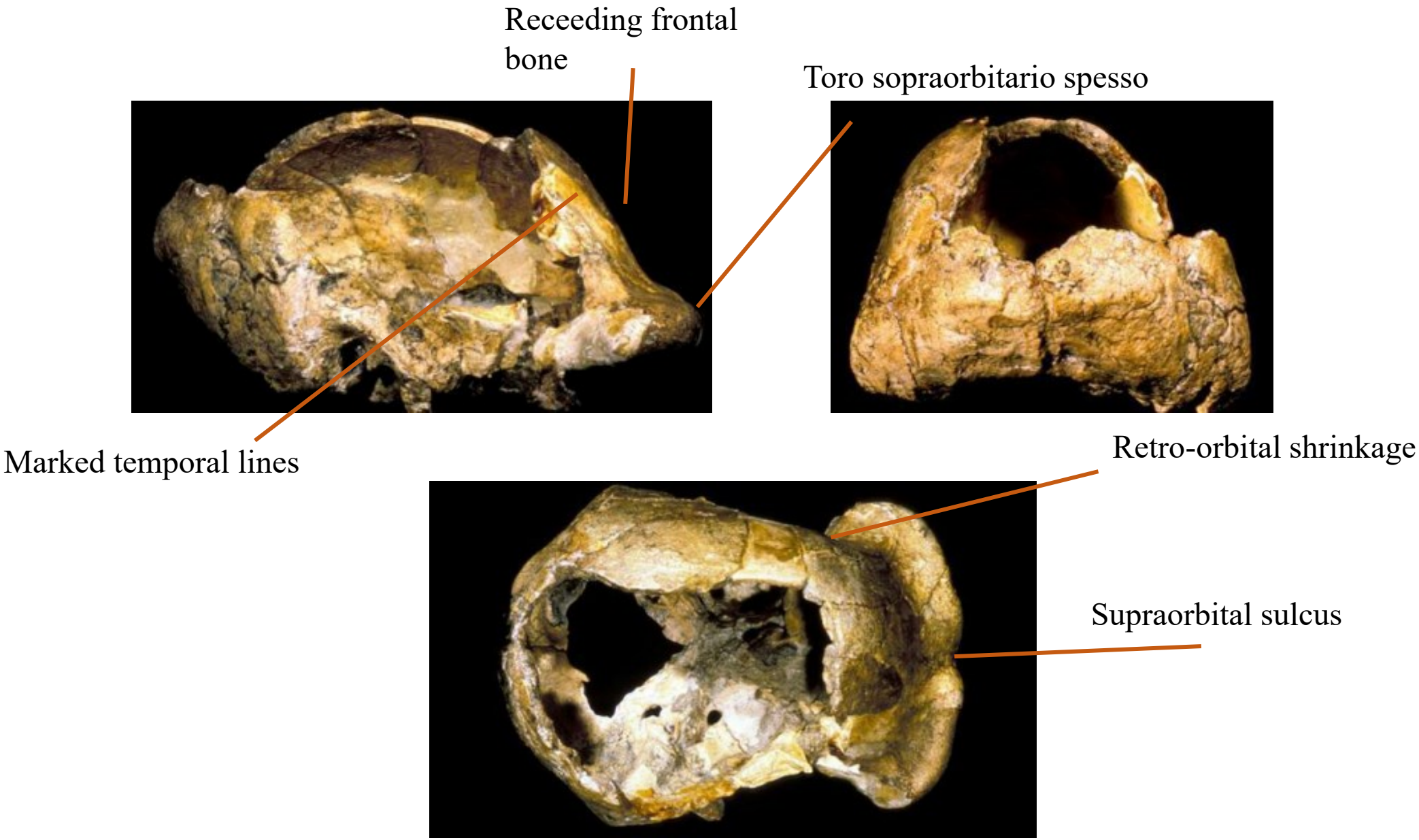
Main *Homo ergaster* sites location



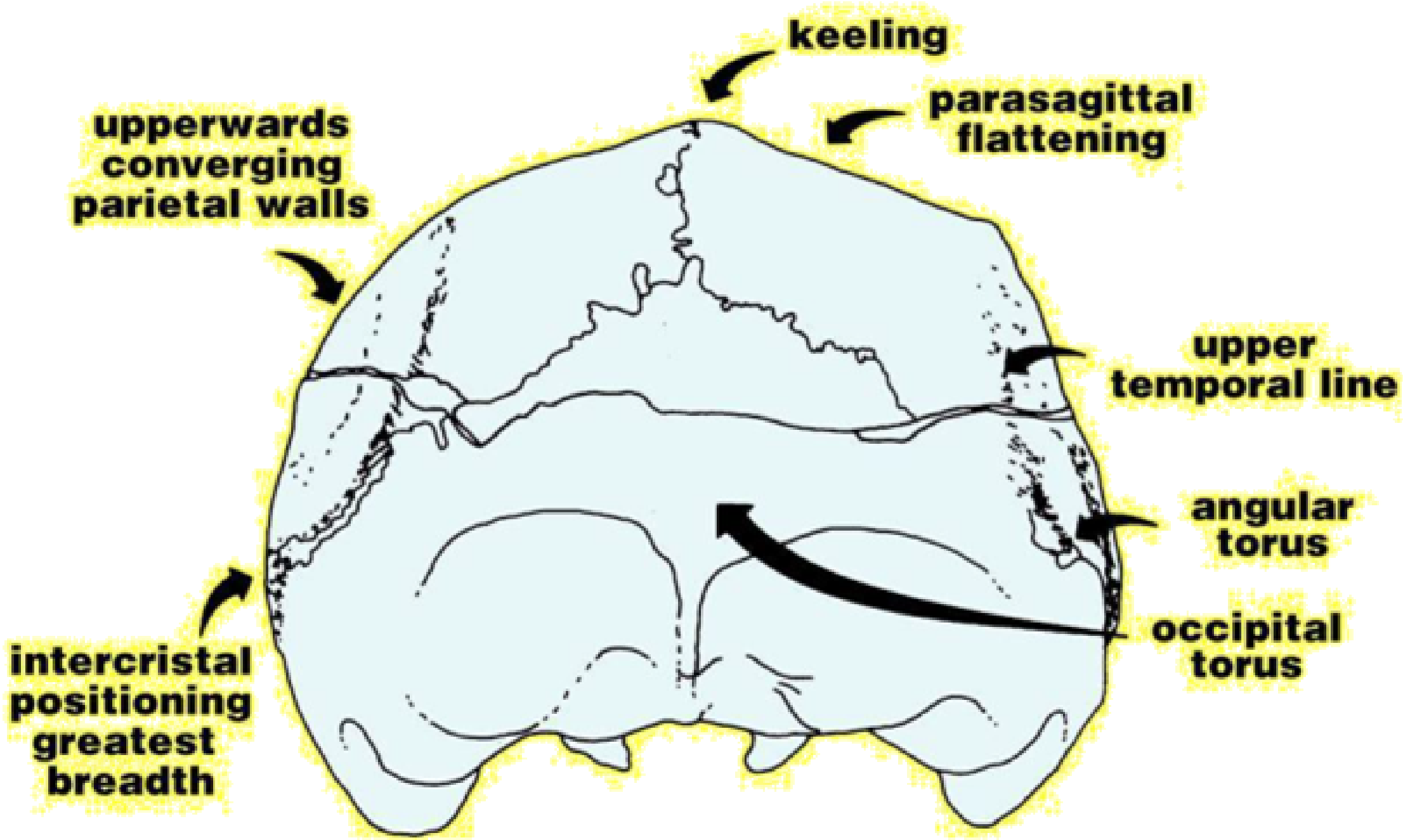
(Henke & Tattersall, 2007)

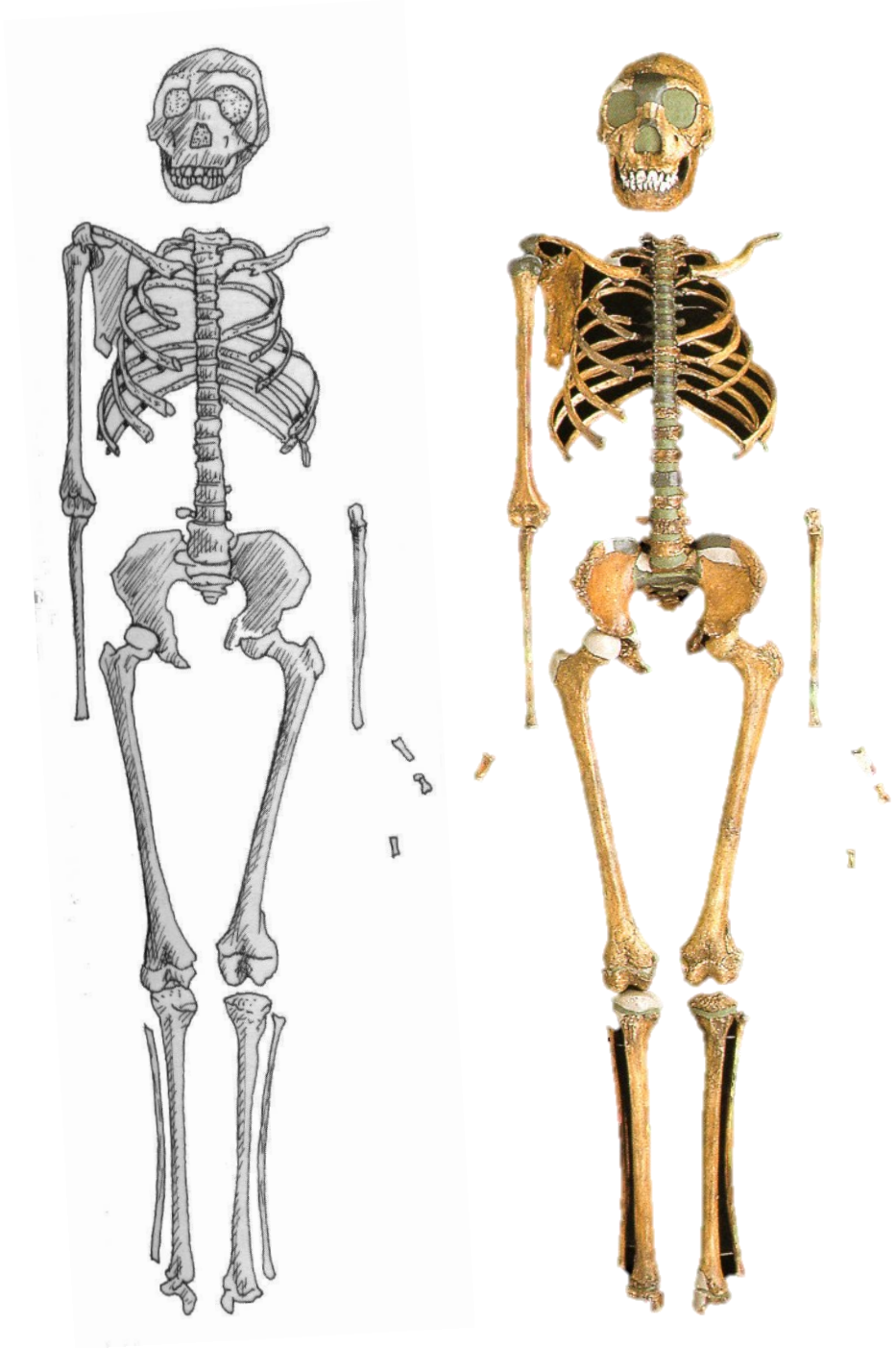


(From Schwartz and Tattersall, 2005)



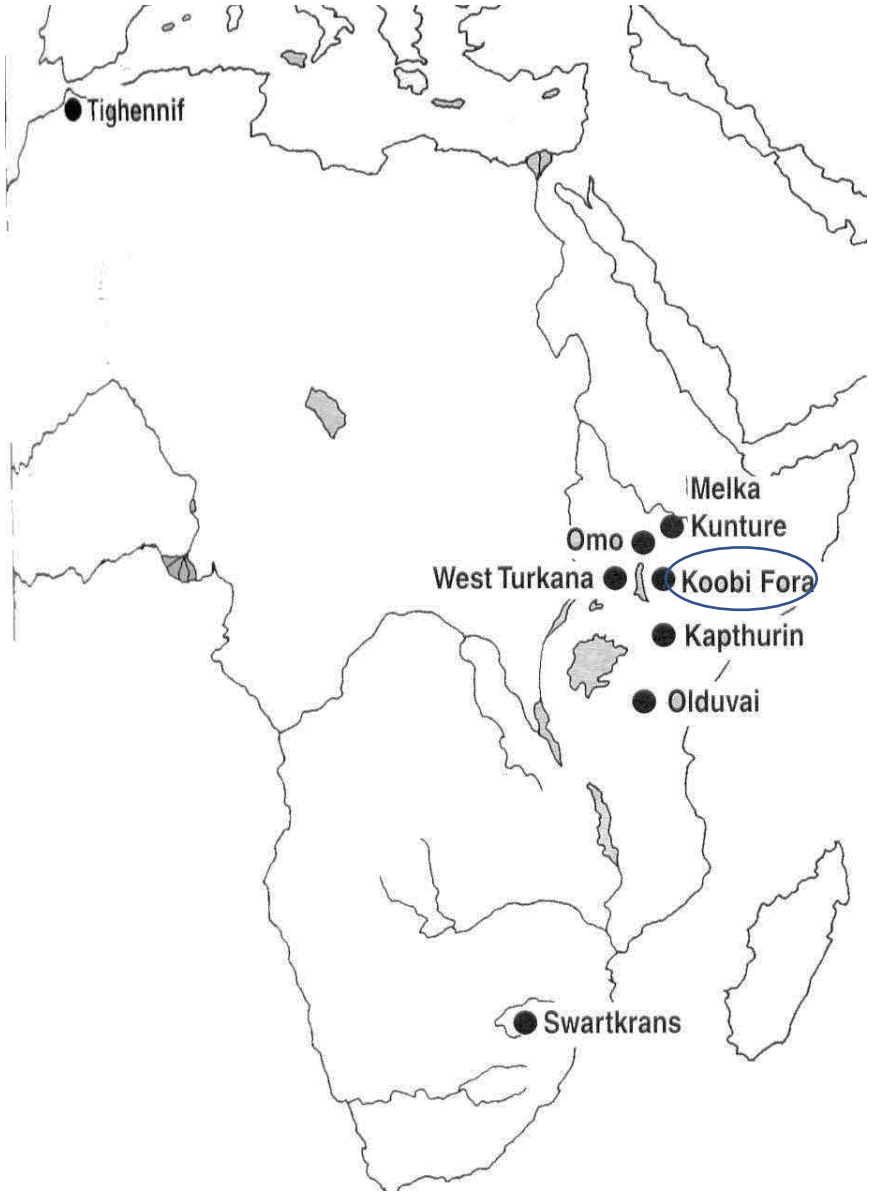
OH9, incomplete calvarium from Olduvai (shared features with Asiatic *Homo* erectus)


keeling
parasagittal flattening
upperwards converging parietal walls
upper temporal line
angular torus
occipital torus
intercristal positioning greatest breadth



Homo ergaster skeleton (KNM-WT 15000)discovered at Nariokotome (Kenya) and dated to ca. 1,6 Myrs

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



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

H. ergaster

KNM-ER 992
1.5 Myr
Koobi Fora
(Kenya)

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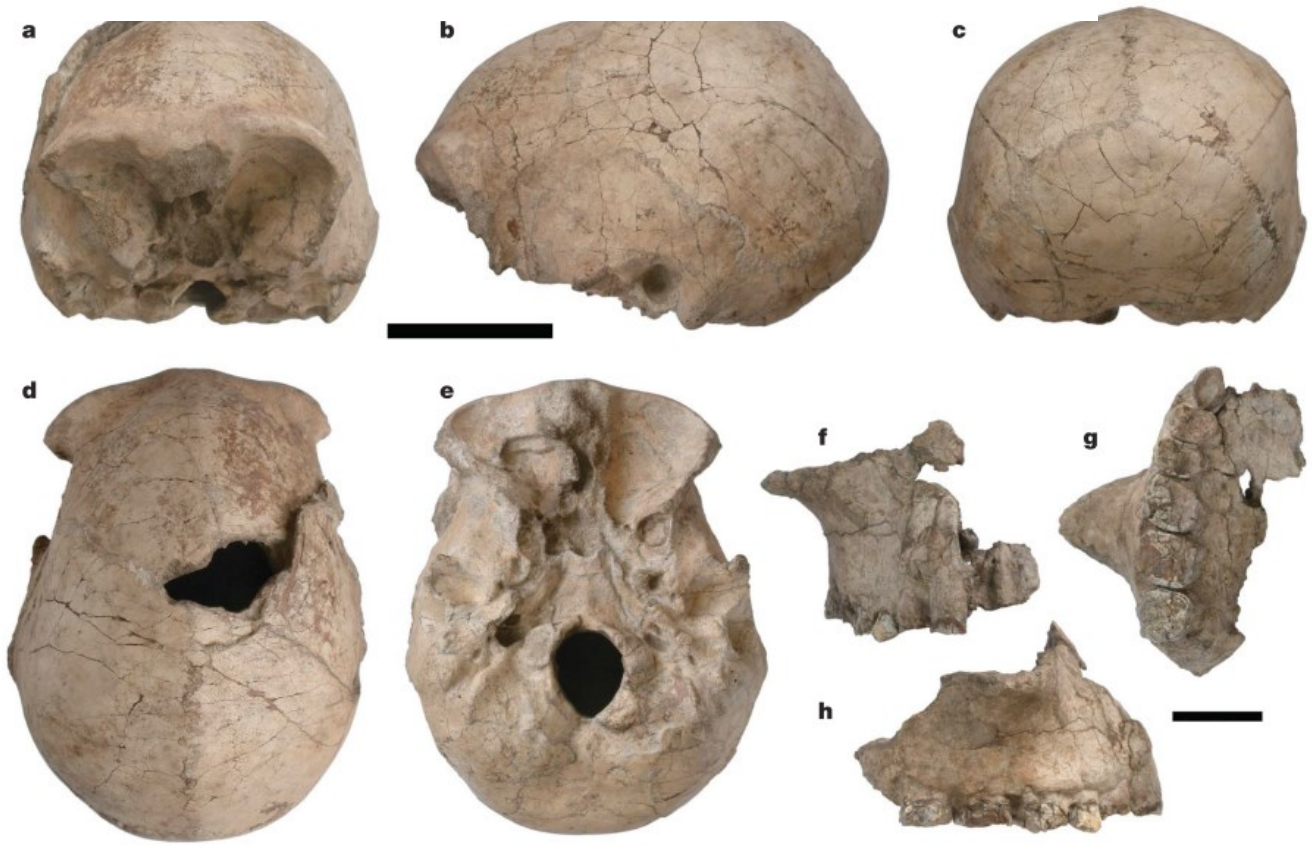
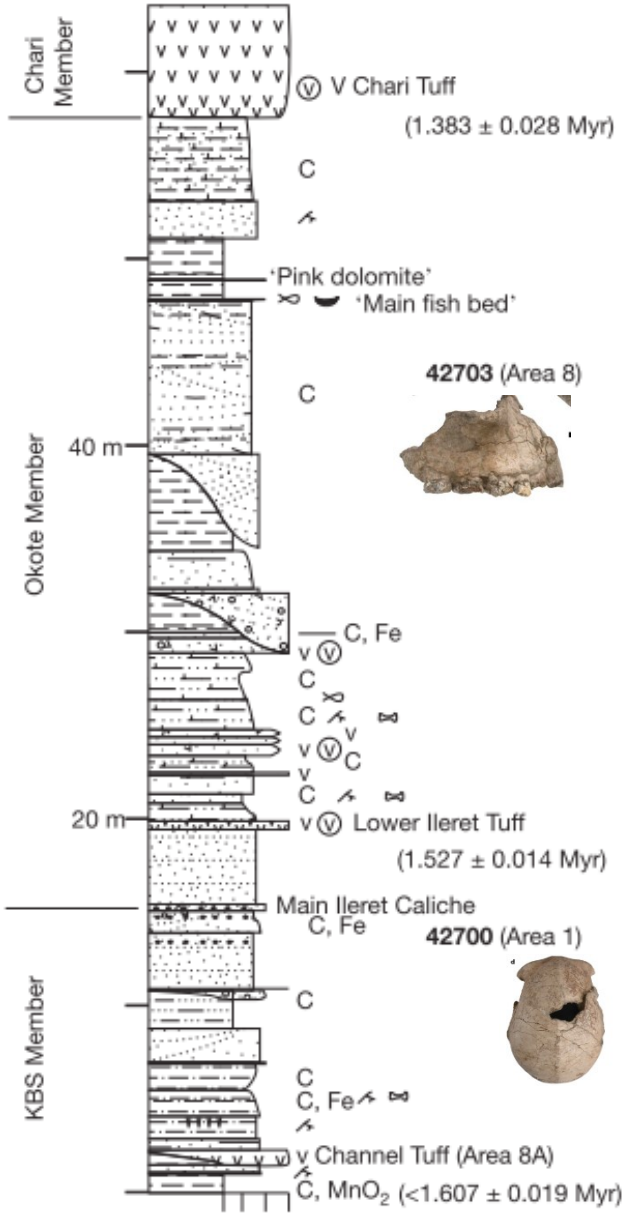
LETTERS

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

F. Spoor[1], M. G. Leakey[2,3], P. N. Gathogo[5], F. H. Brown[5], S. C. Antón[6], I. McDougall[7], C. Kiarie[8], F. K. Manthi[8] & L. N. Leakey[2,4]





The KNM-ER 42700 calvaria (*H. erectus*) and KNM-ER 42703 partial maxilla (

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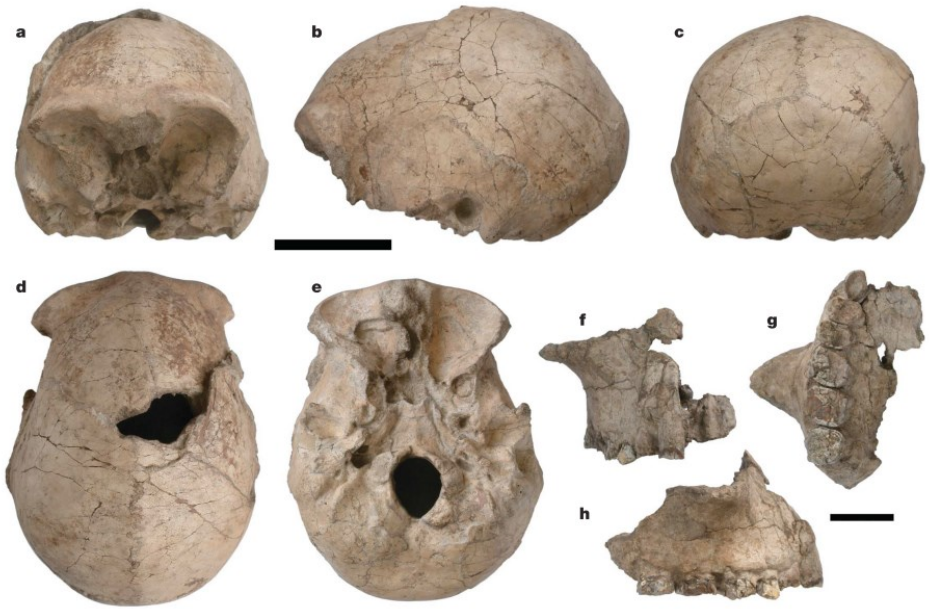
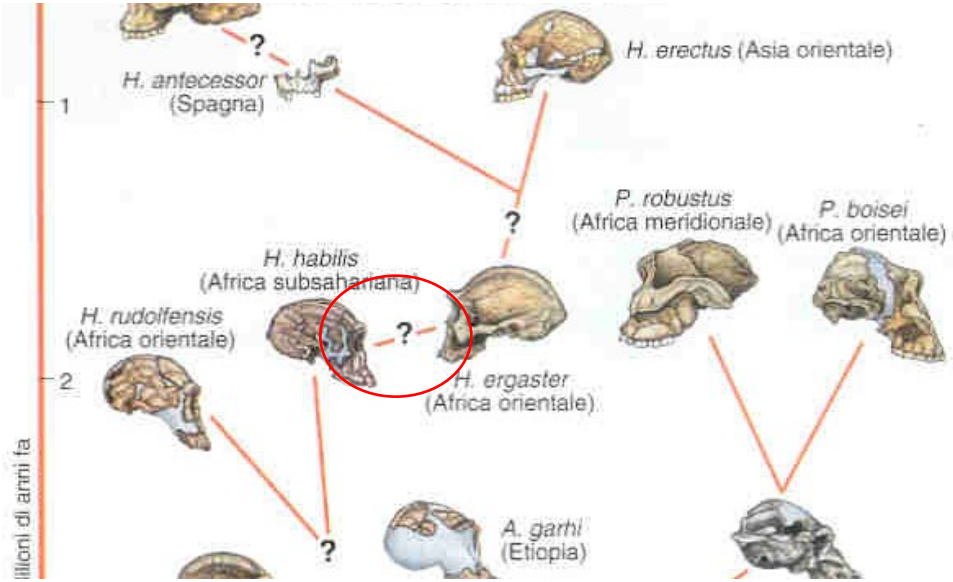
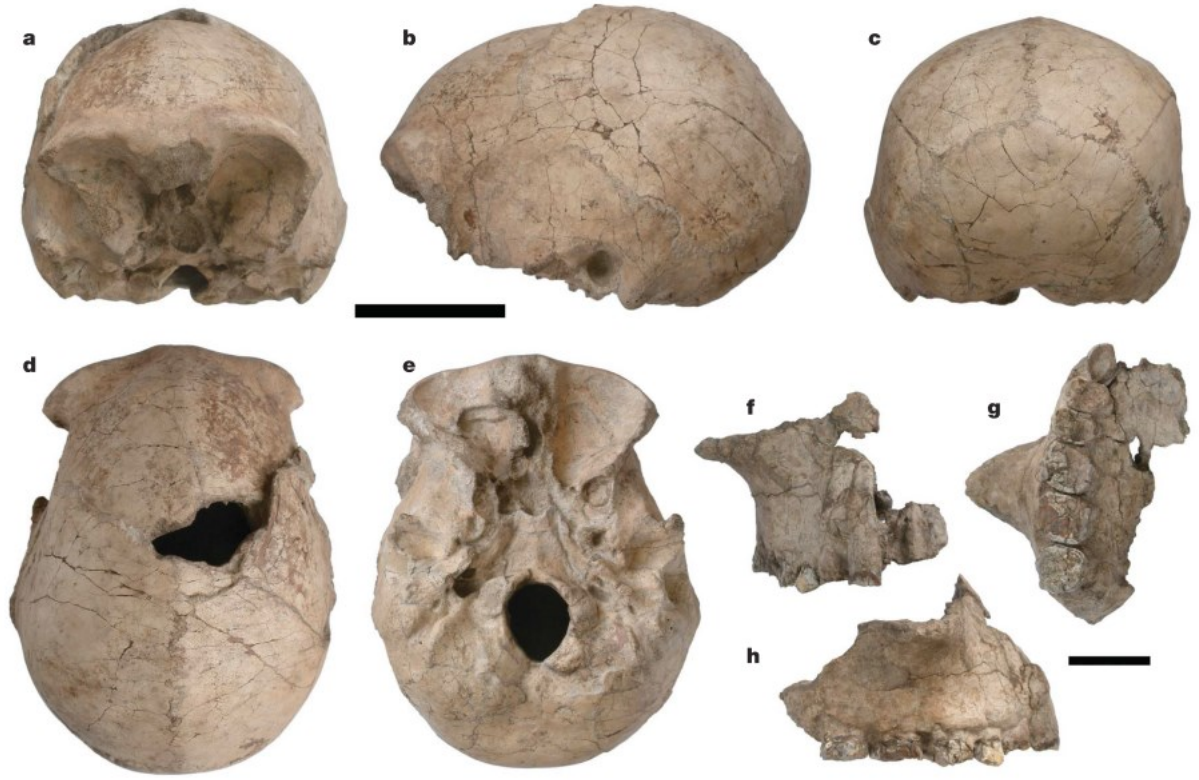




I siti in Africa orientale danno informazione sull'emergenza e l'evoluzione dei primi *Homo*.
Sites in eastern Africa have shed light on the emergence and early evolution of the genus Homo

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.

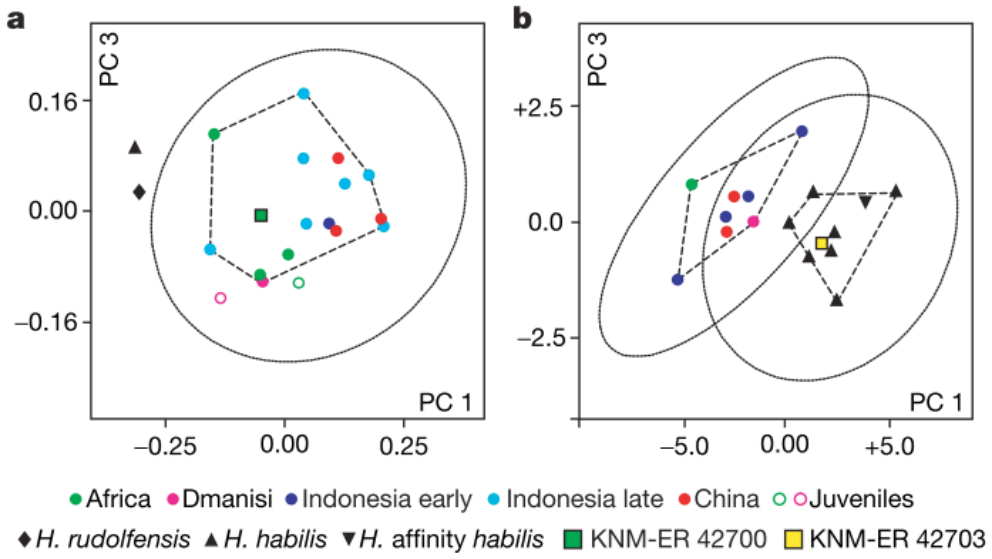
A partial maxilla assigned to H. habilis *reliably demonstrates that this species survived until later than previously recognized, making an anagenetic relationship with* H. erectus *unlikely.*

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. Behrensmeyer,[8] David Huddart,[9] Silvia Gonzalez[9]

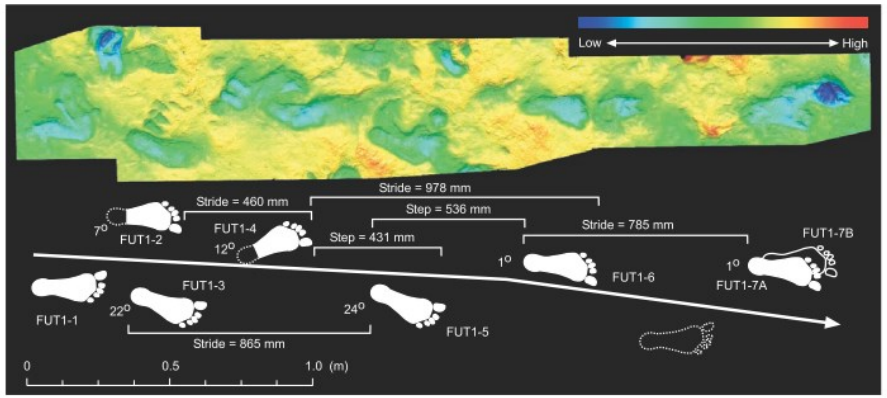
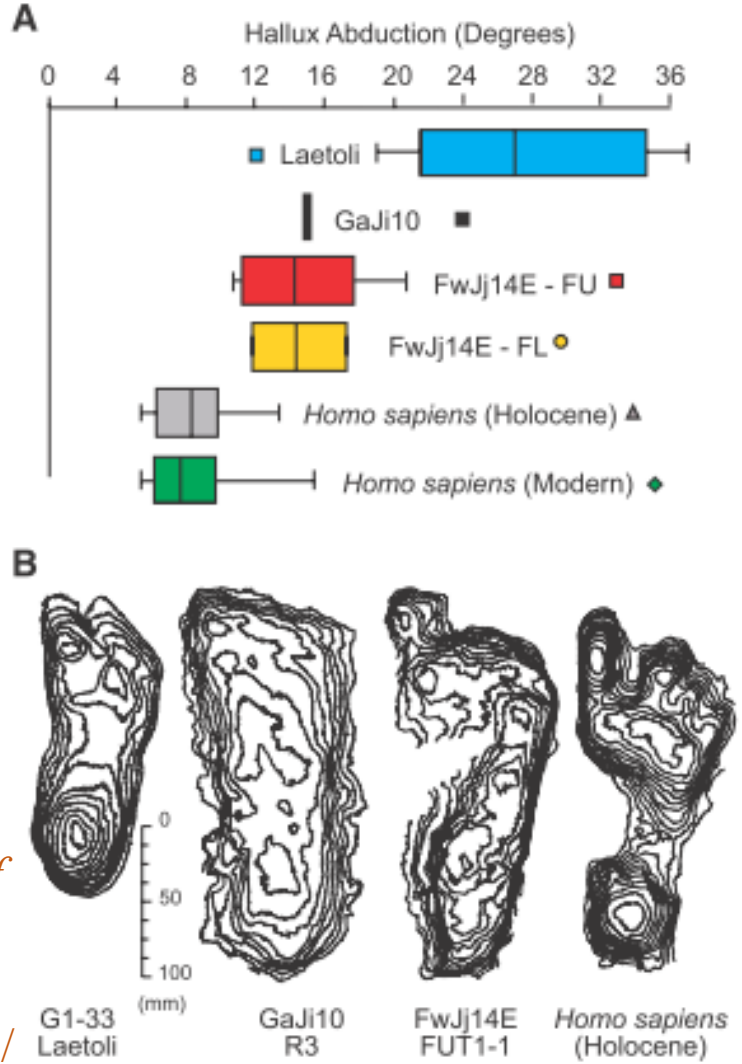


Fig. 2. Tessellated swath of optical laser scans of the main footprint trail on the upper footprint surface at FwJj14E. Color is rendered with 5-mm isopleths.



Footprints dated to 1.51-1.53 Ma

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

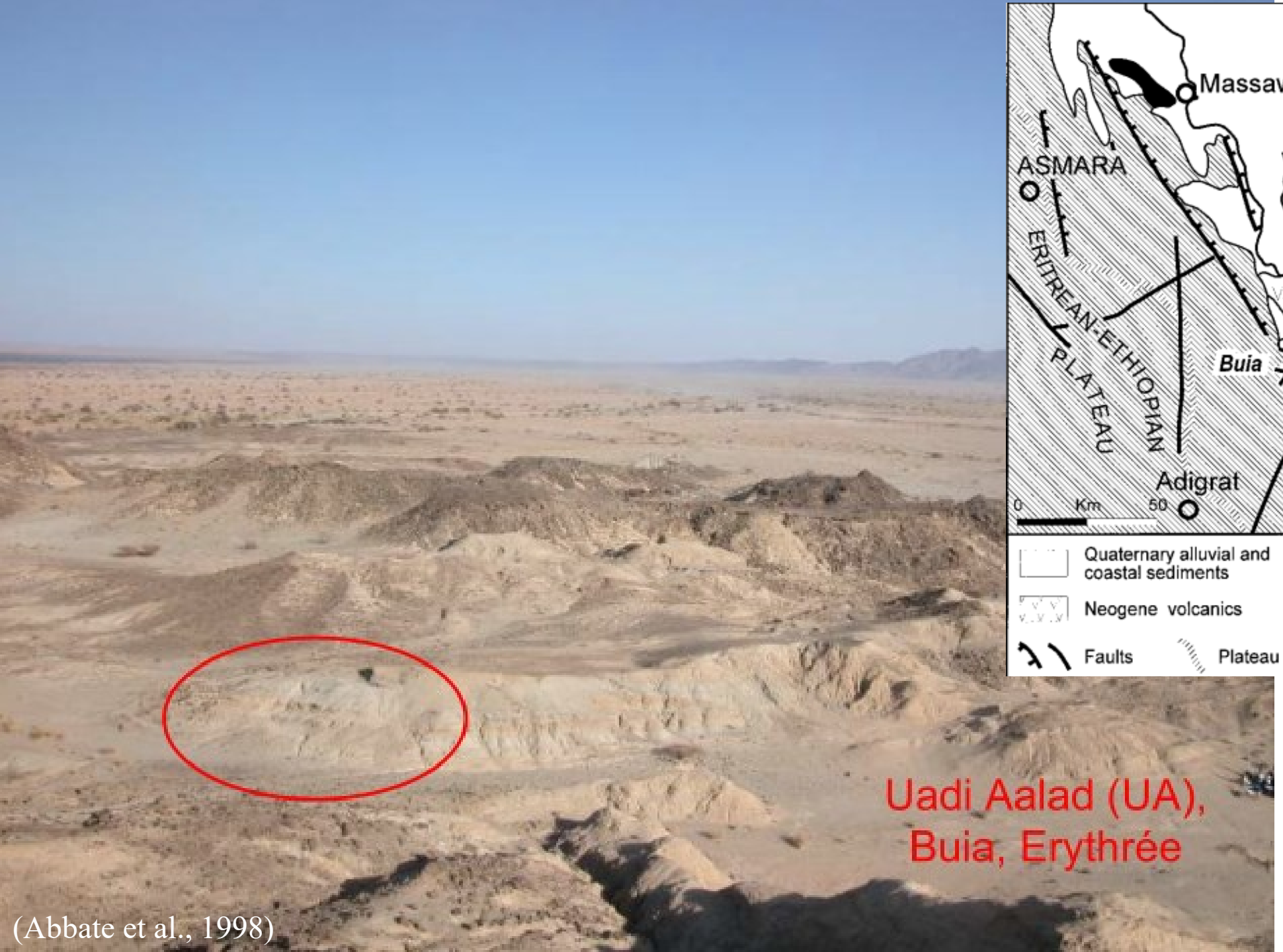
Trasferimento mediale del peso prima del push-off / *Medial weight transfer before push-off*

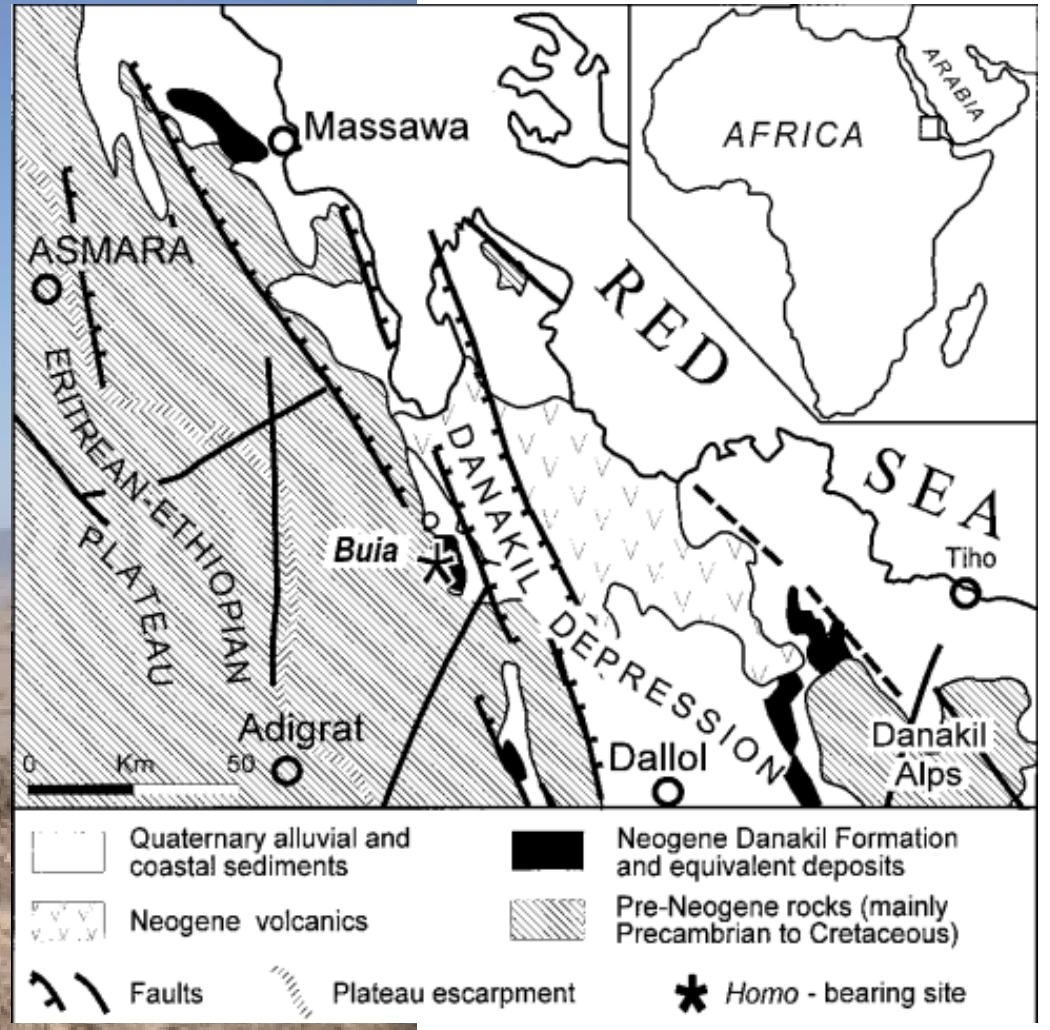
La taglia delle impronte è in accordo con la statura e la massa corporea stimata dei *ergaster/erectus*

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)*

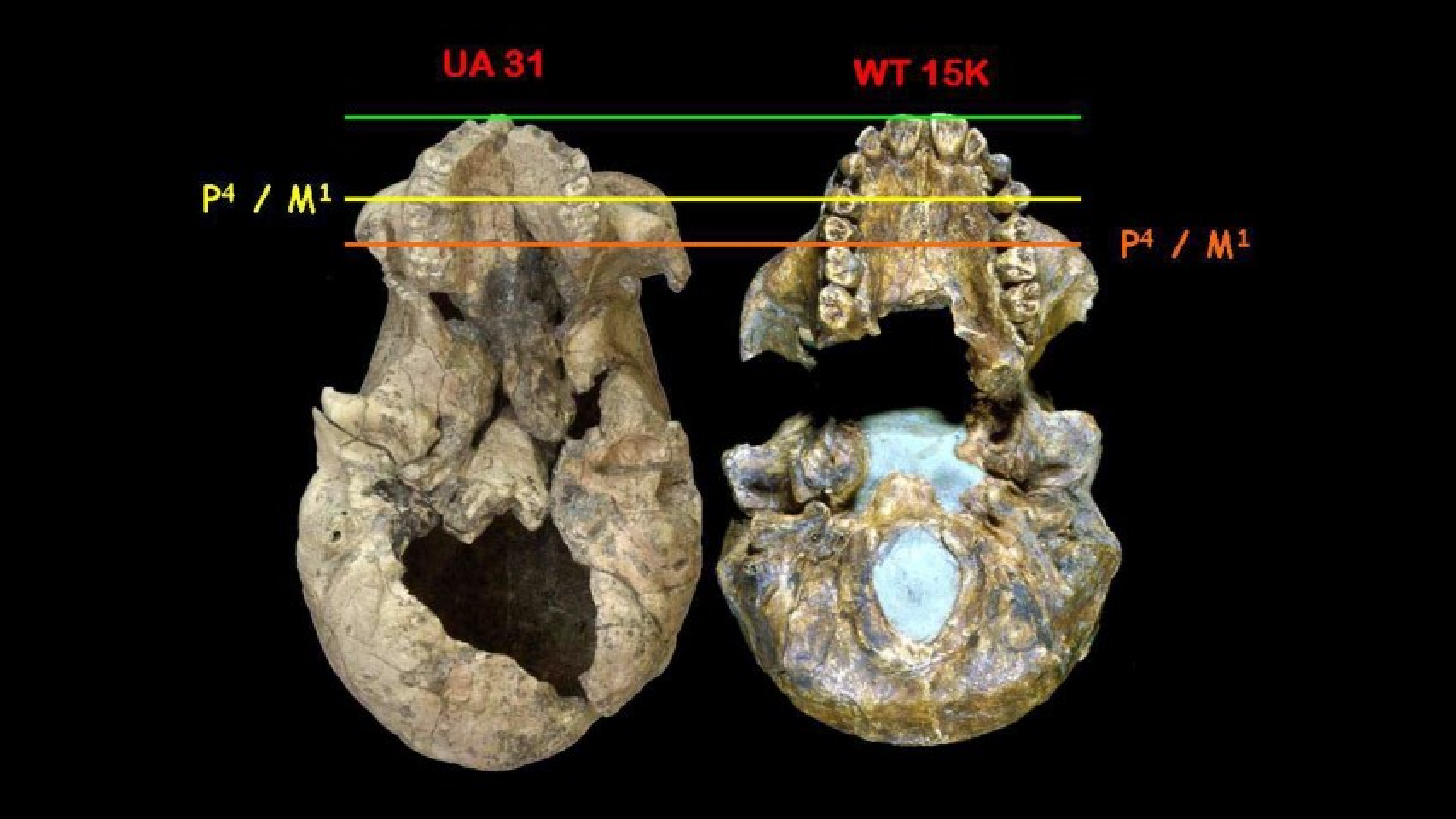
Dimostrano che i ominini hanno sviluppato un piede funzionalmente moderno e una locomozione bipeda / *Show that hominins had evolved an essentially modern human foot function and style of bipedal locomotion*

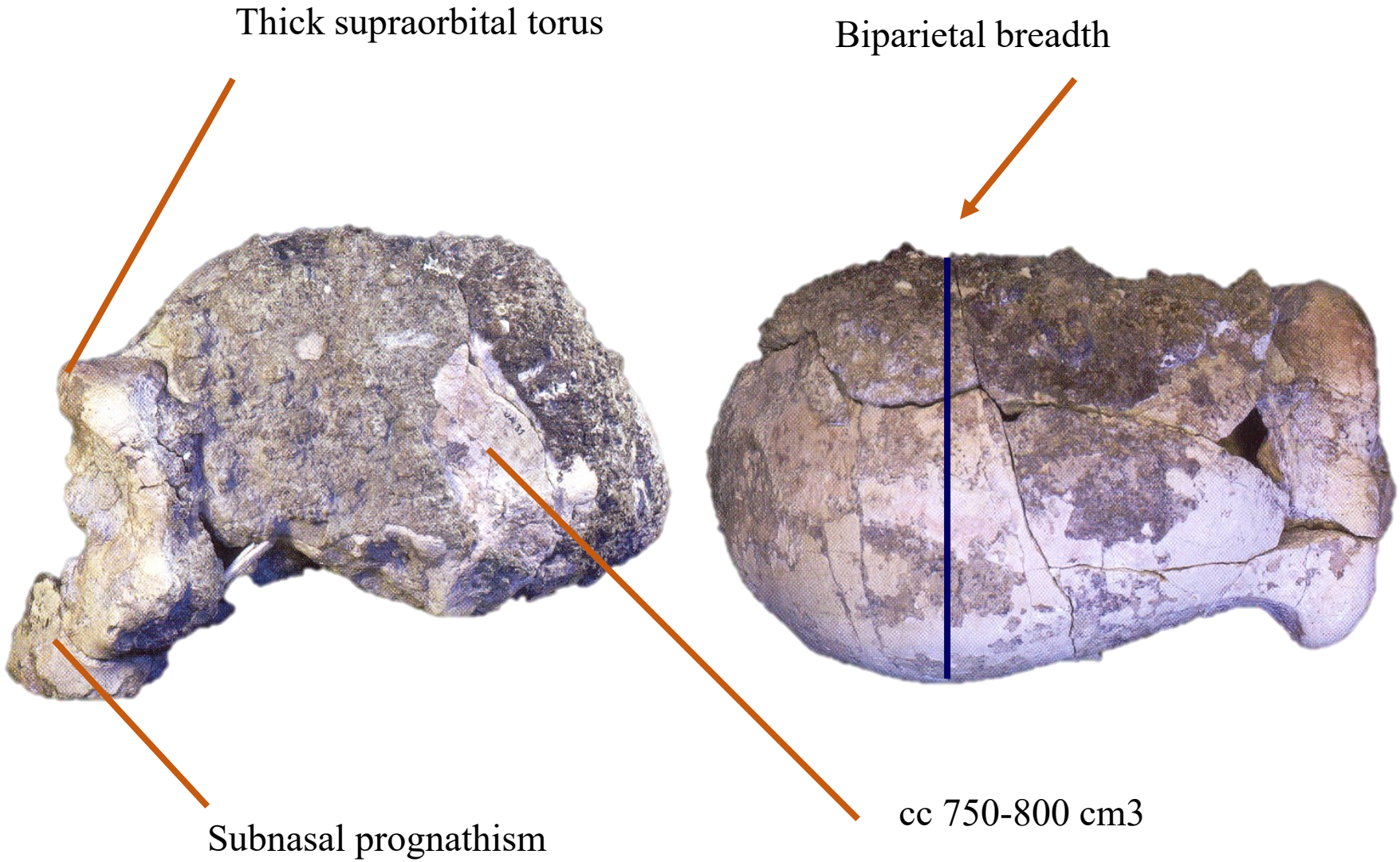




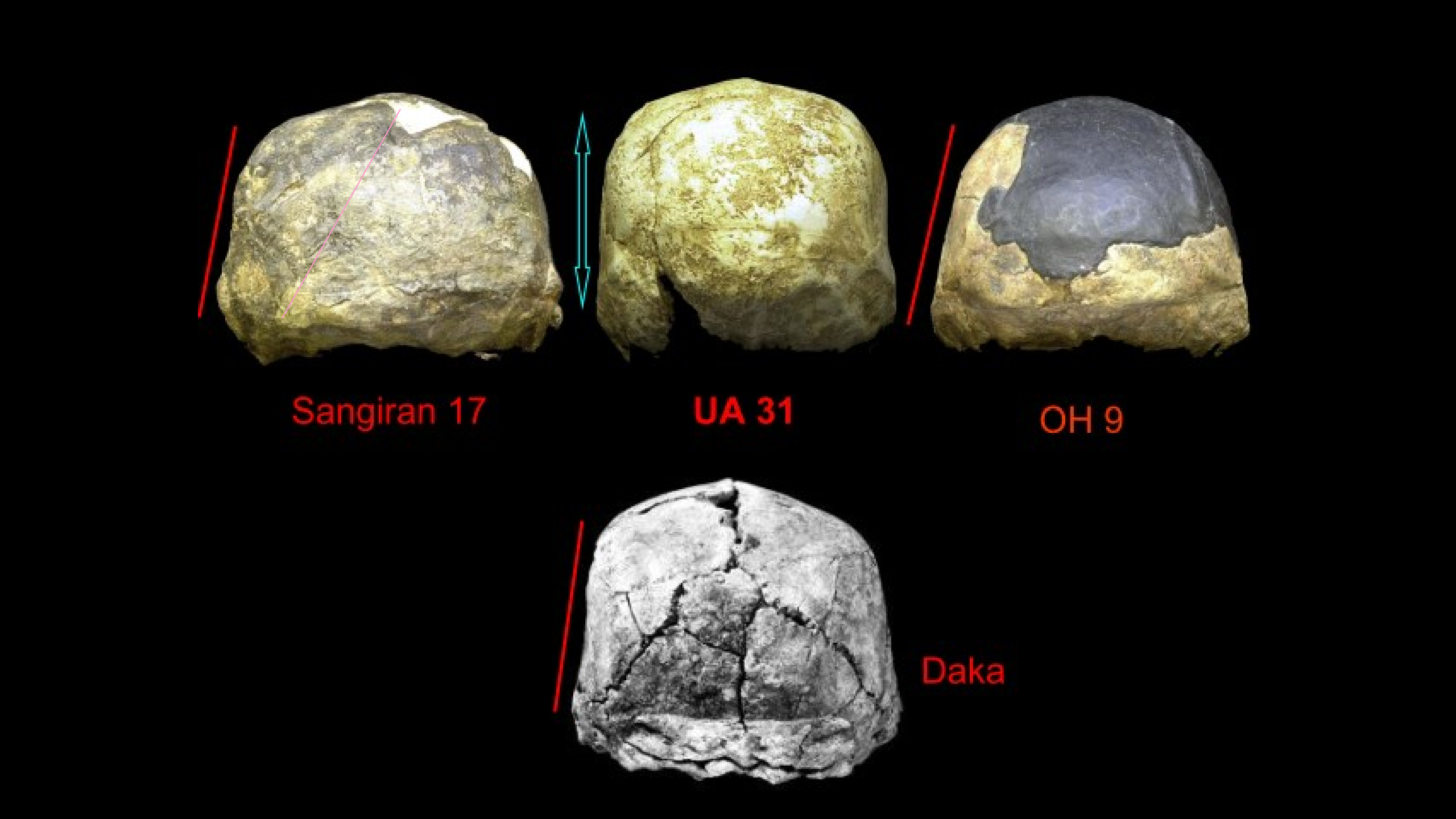
(Abbate et al., 1998)


UA 31
(Buia)


UA 31
WT 15K
P4 / M1
P4 / M1



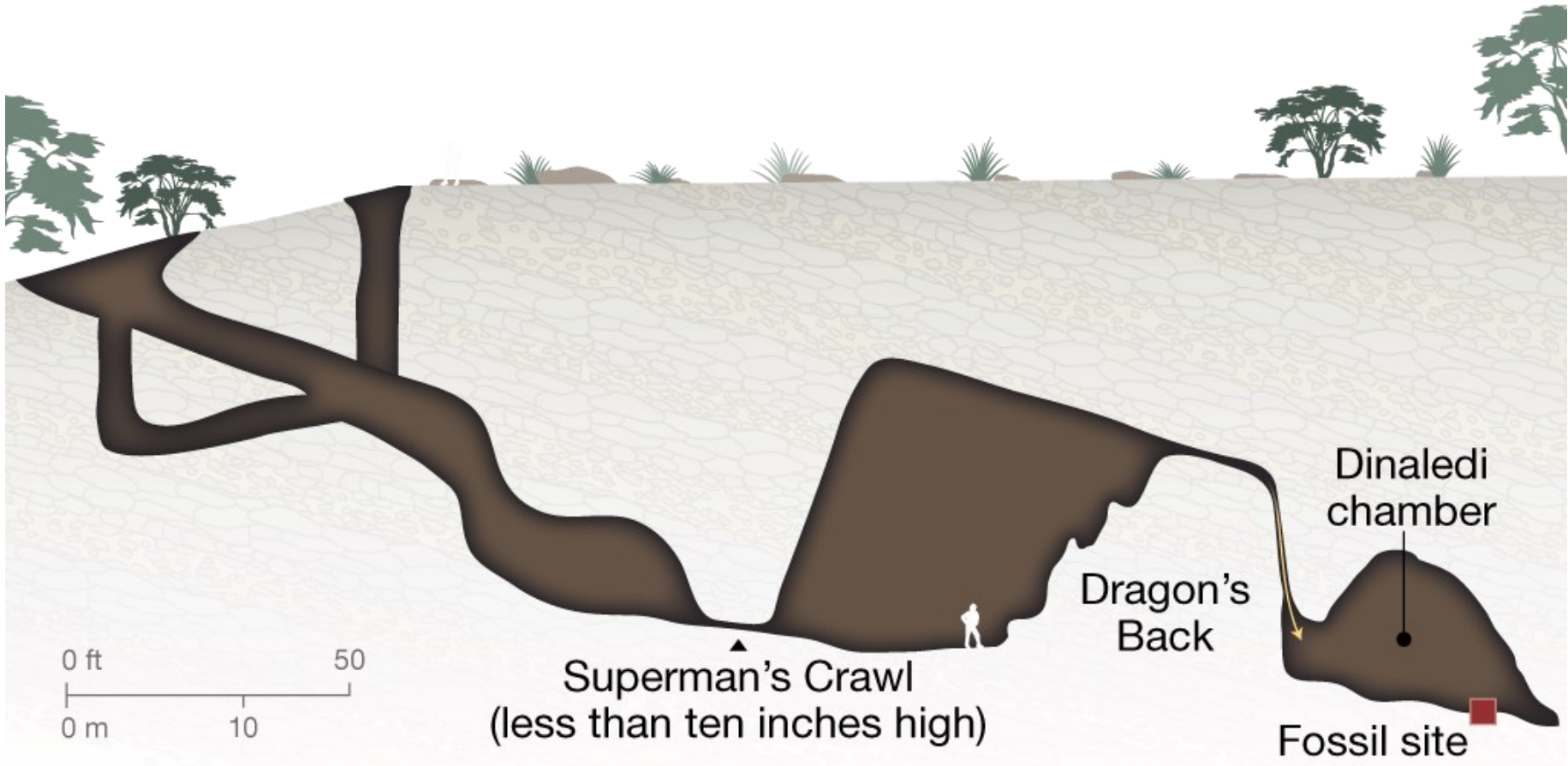
Buia, UA 31, (Eritrea, 1995-97)


Sangiran 17
UA 31
OH 9
Daka

JASON TREAT, NGM STAFF; NGM MAPS
SOURCE: LEE BERGER, WITS

Homo naledi

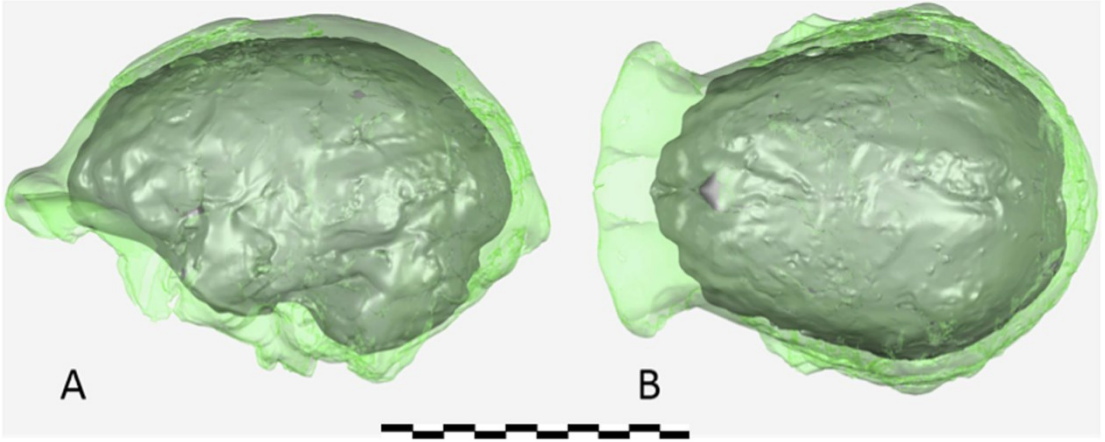
335 and 236 kya

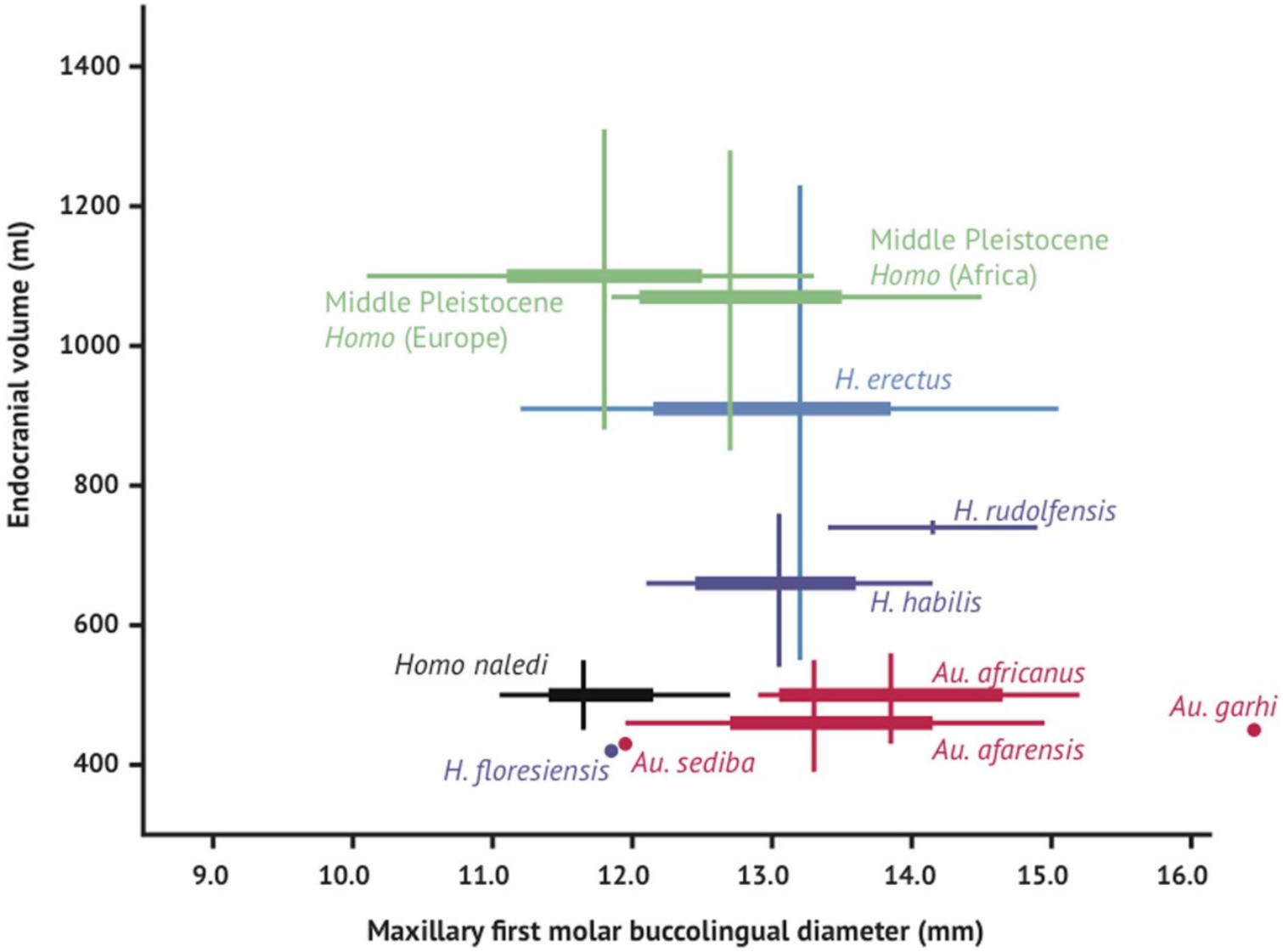


Holotype specimen of *Homo naledi*, Dinaledi Hominin 1 (DH1).

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

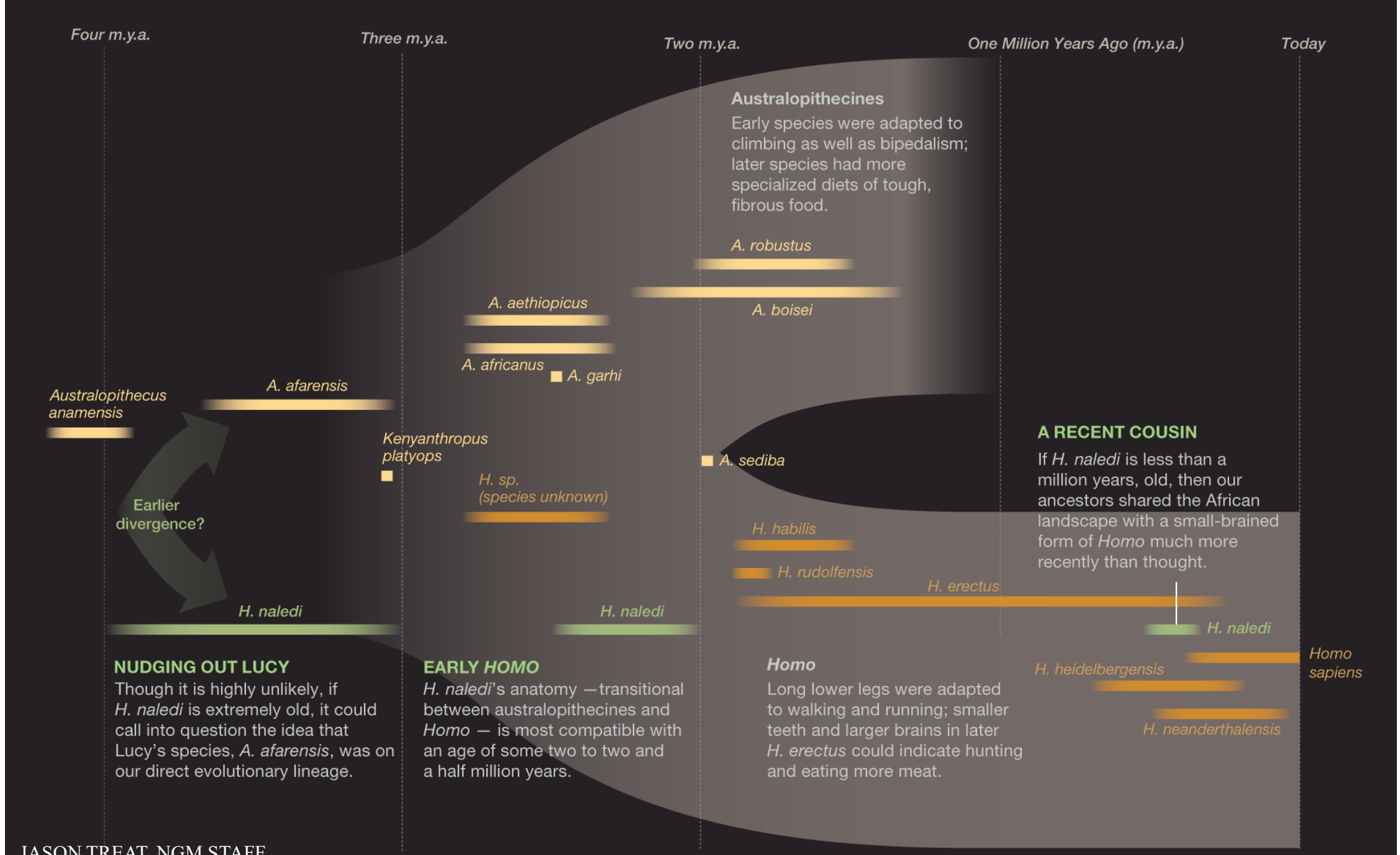
Virtual reconstruction of the endocranium of the larger composite cranium from DH1 and DH2 overlaid with the ectocranial surfaces.





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.



JASON TREAT, NGM STAFF
SOURCE: LEE BERGER, WITS; JOHN HAWKS, UNIVERSITY OF WISCONSIN-MADISON

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.

SKELETON: STEFAN FICHTEL
SOURCES: LEE BERGER AND PETER SCHMID, UNIVERSITY OF THE WITWATERSRAND (WITS), SOUTH AFRICA; JOHN HAWKS, UNIVERSITY OF WISCONSIN-MADISON

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RESEARCH ARTICLE

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-Wolf[1], Jan D Kramers[3], John Hawks[2,4], Anthony Dosseto[5], Mathieu Duval[6,7], Marina Elliott[2], Mary Evans[8], Rainer Grün[6,9], John Hellstrom[10], Andy IR Herries[11], Renaud Joannes-Boyau[12], Tebogo V Makhubela[3], Christa J Placzek[1], Jessie Robbins[1], Carl Spandler[1], Jelle Wiersma[1], Jon Woodhead[10], Lee R Berger[2]

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 ^{222}Rn 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* fossils than have previously been hypothesized based on their morphology.

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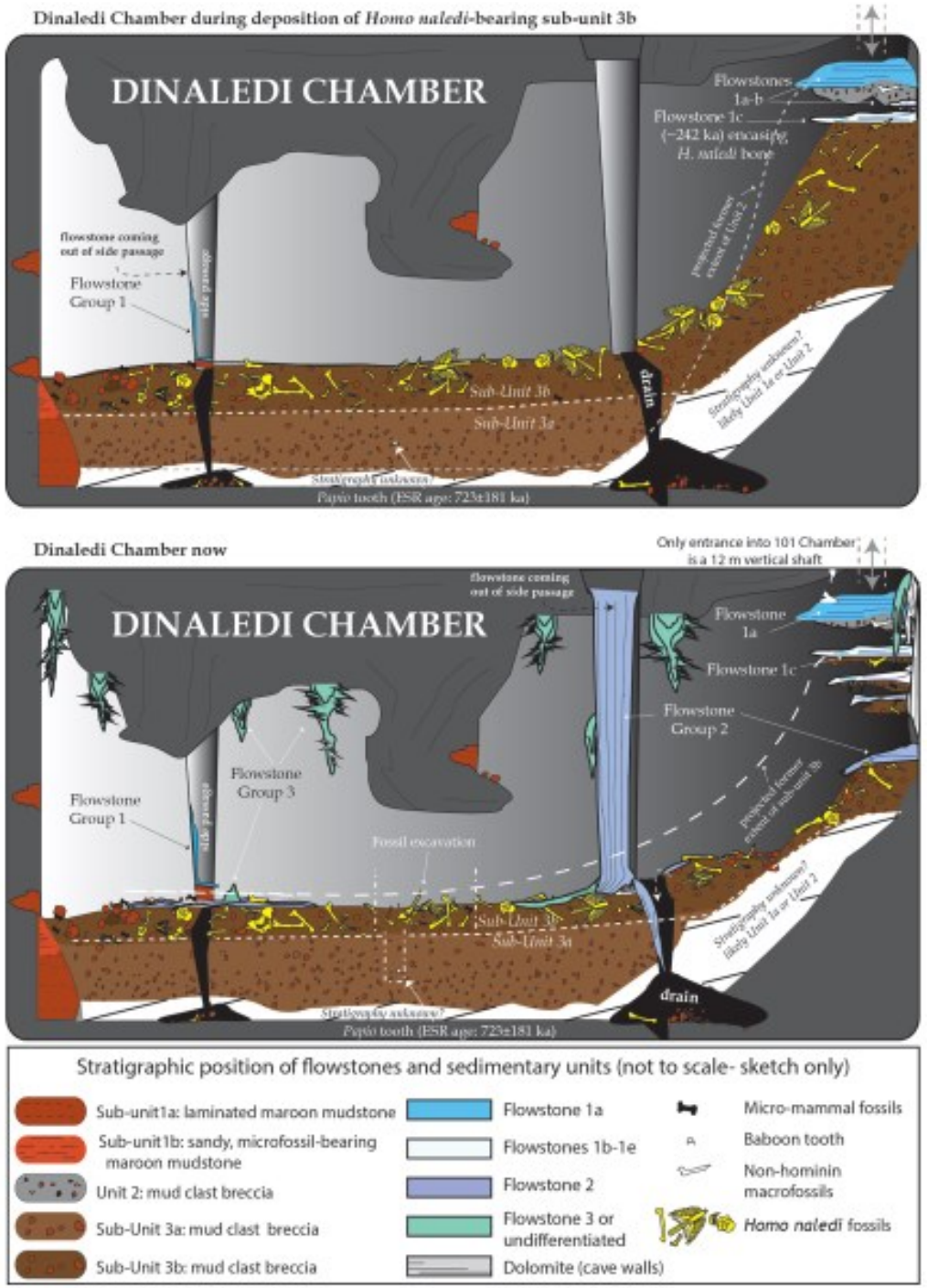

"Lucy"
Australopithecus afarensis
3.2 million years ago
Adult Female
3 ft 8 in
60-65 lbs

"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