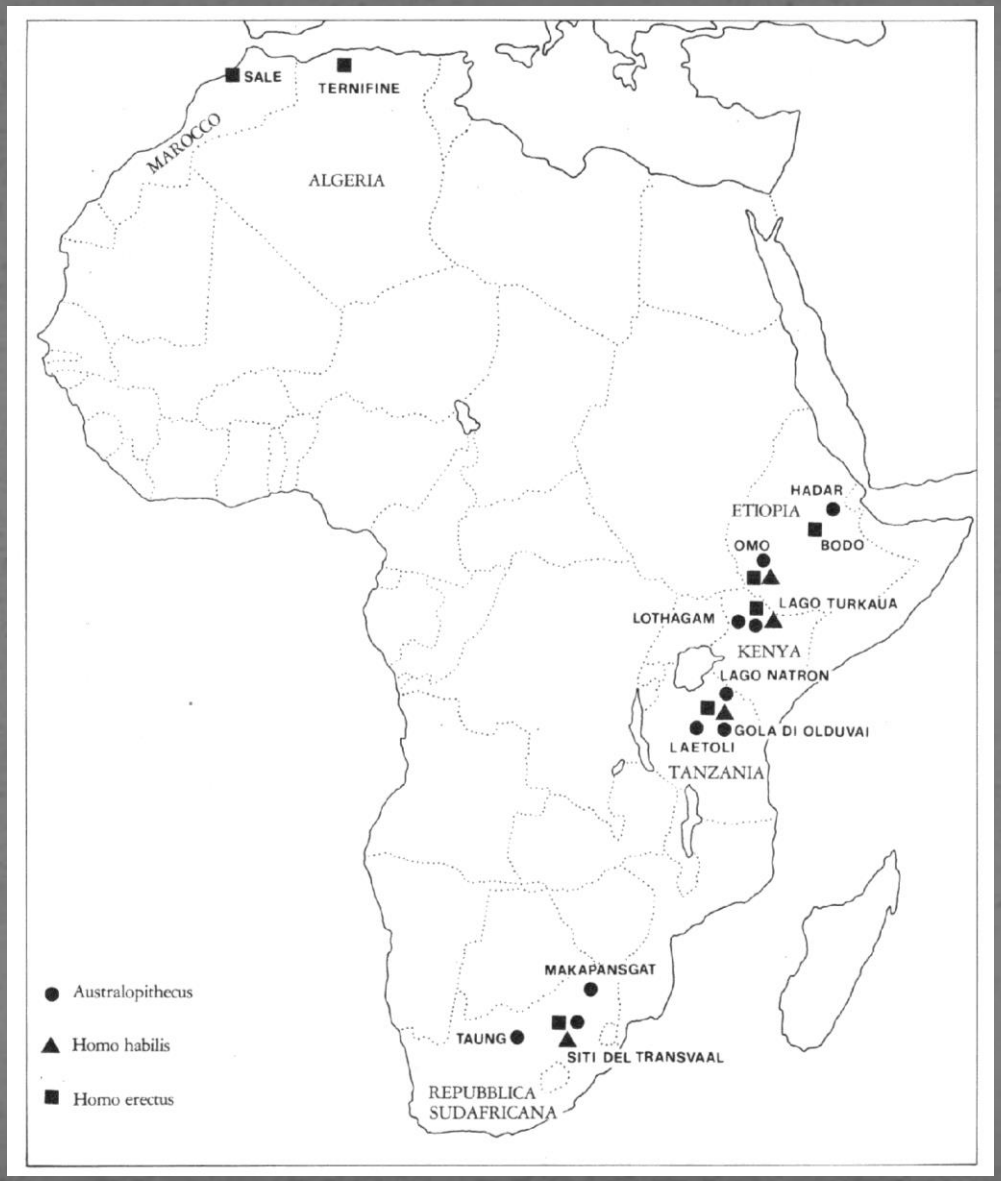
Università degli Studi di Ferrara

Marco Peresani

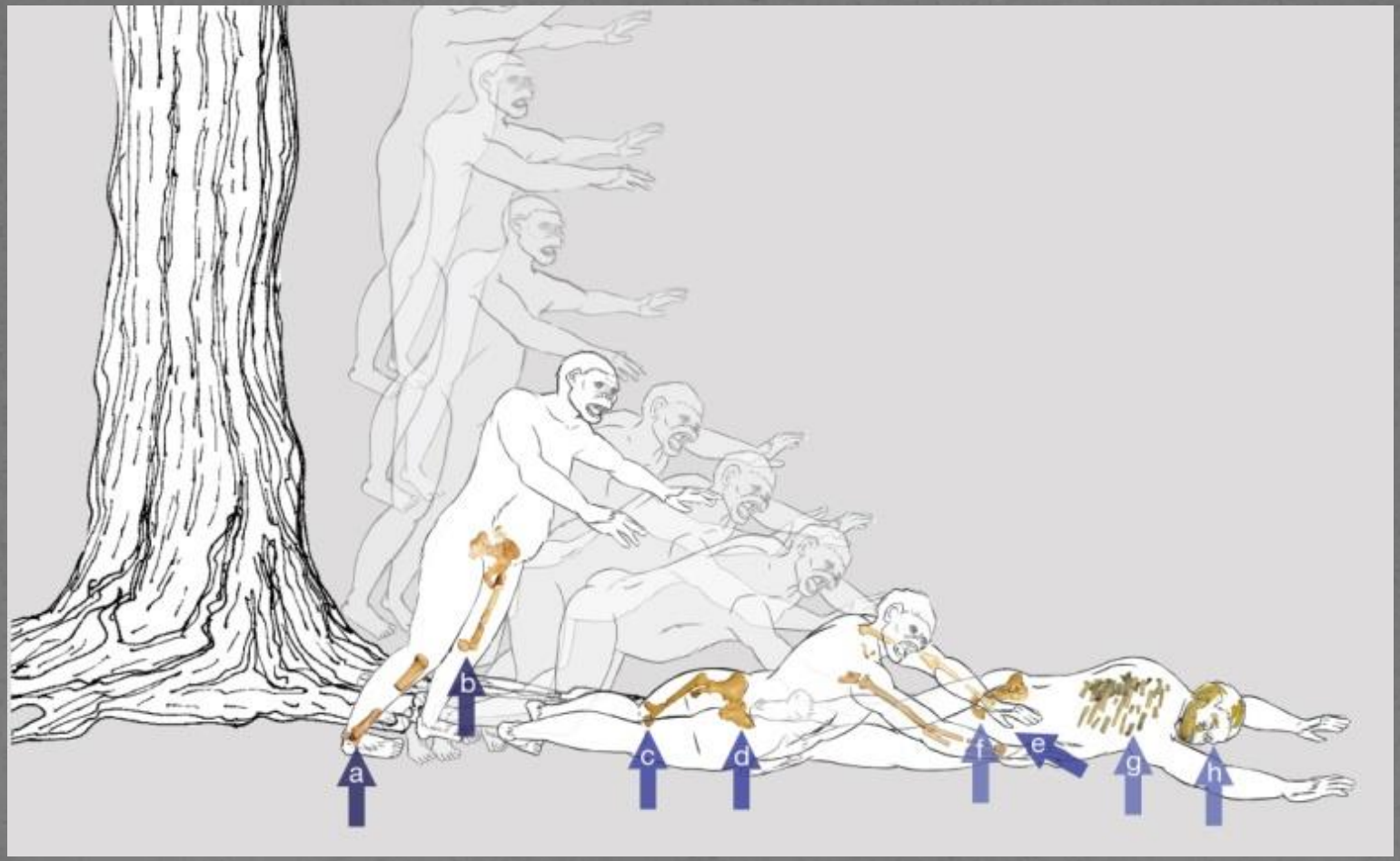
Cronologie e culture del Paleolitico
lezione 2 – The Oldowan

Università di Ferrara
Dipartimento di Studi Umanistici
Sezione di Scienze Preistoriche e Antropologiche

Most relevant palaeoanthropological sites in Africa



Reconstruction of Lucy's vertical deceleration event



J Kappelman *et al. Nature* 1–5 (2016) doi:10.1038/nature19332

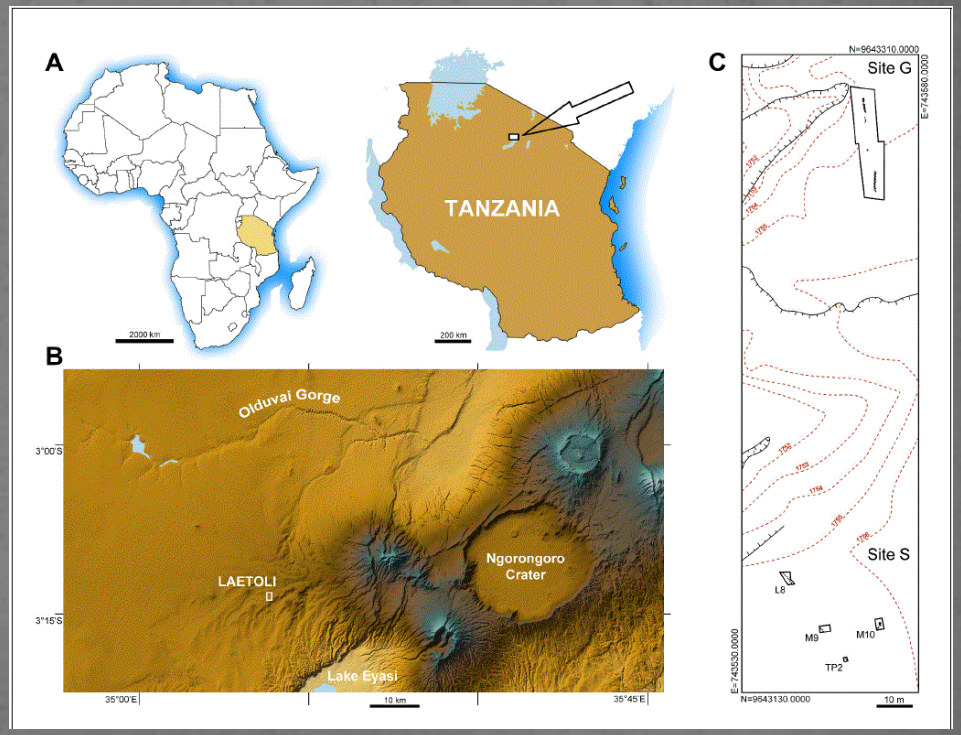
nature

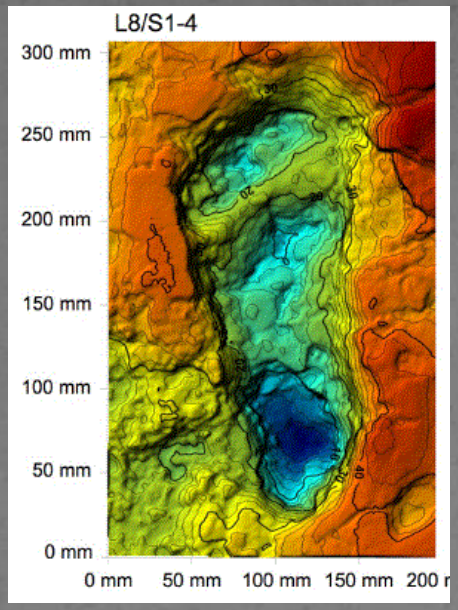
eLIFE elifesciences.org

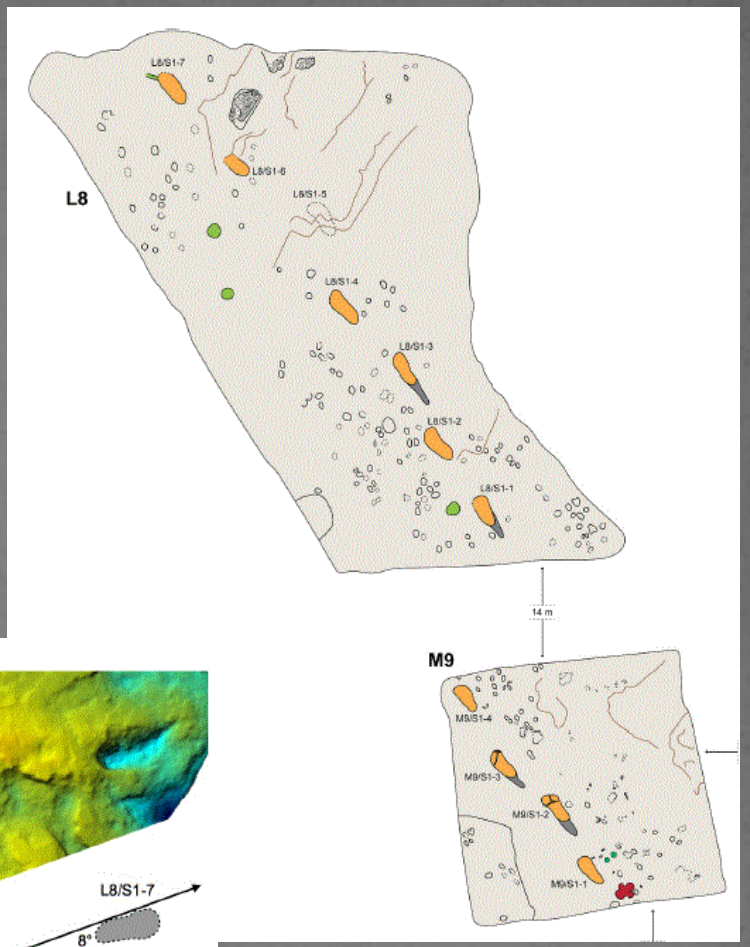
RESEARCH ARTICLE

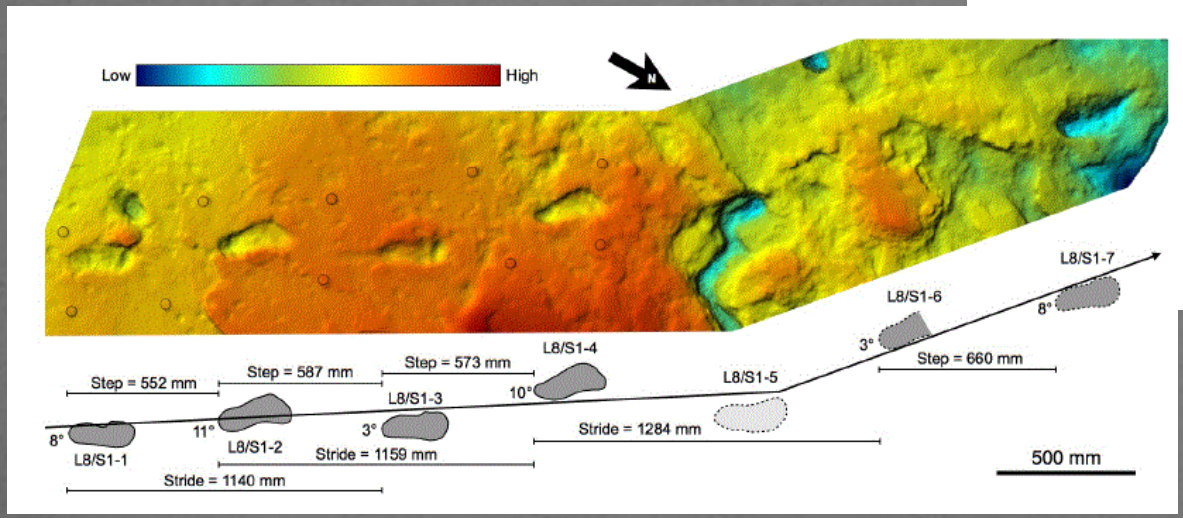
New footprints from Laetoli (Tanzania) provide evidence for marked body size variation in early hominins

Fidelis T Masao[1], Elgidius B Ichumbaki[1], Marco Cherin[2,3]*, Angelo Barili[4], Giovanni Boschian[5], Dawid A Iurino[3,6], Sofia Menconero[7], Jacopo Moggi-Cecchi[8], Giorgio Manzi[9]

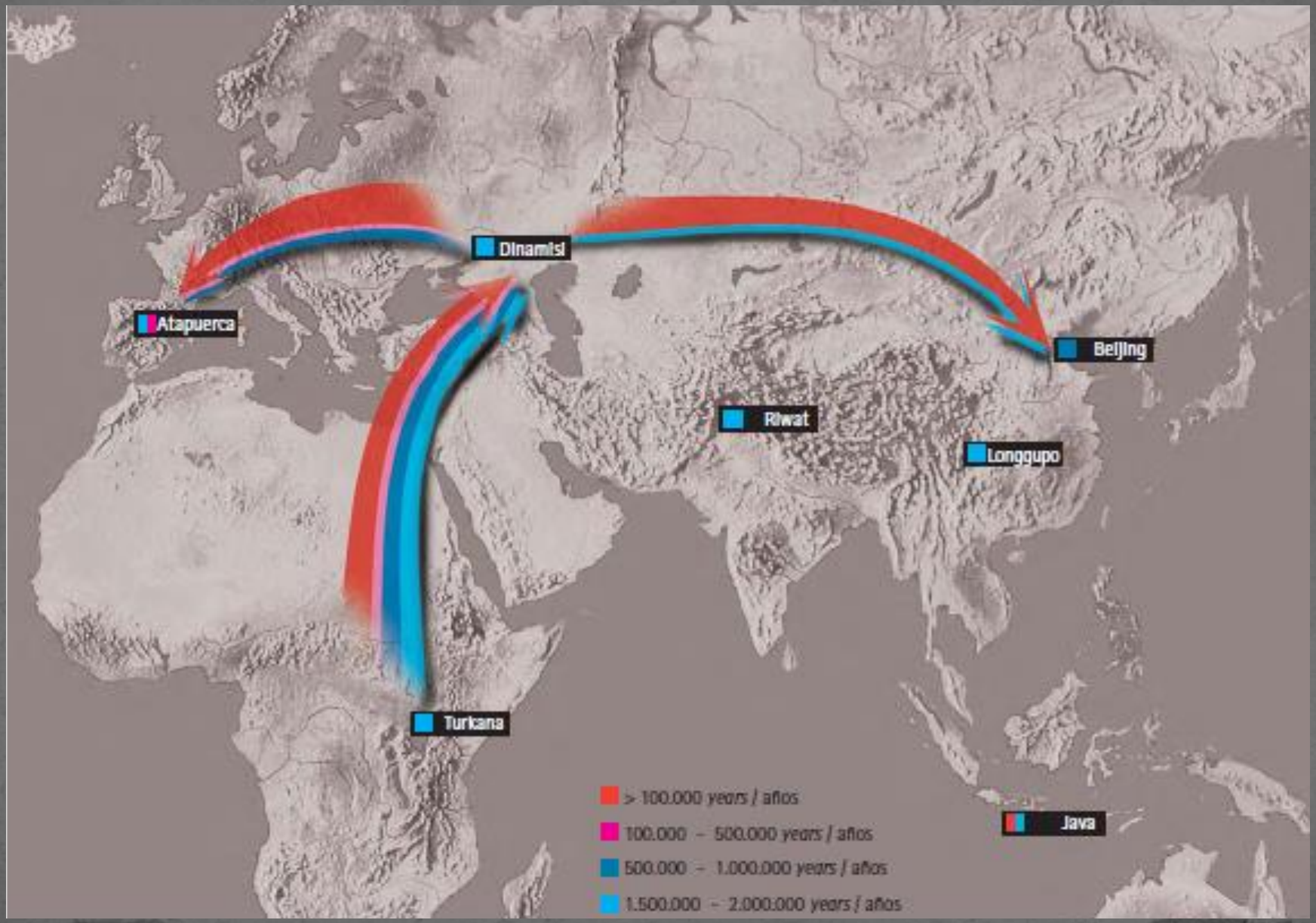



L8/S1-4
300 mm
250 mm
200 mm
150 mm
100 mm
50 mm
0 mm
0 mm
50 mm
100 mm
150 mm
200 m


L8
L8/S1-7
L8/S1-6
L8/S1-5
L8/S1-4
L8/S1-3
L8/S1-2
L8/S1-1
14 m
M9
M9/S1-4
M9/S1-3
M9/S1-2
M9/S1-1


Low
High
N
L8/S1-7
L8/S1-6
L8/S1-5
L8/S1-4
L8/S1-3
L8/S1-2
L8/S1-1
8°
11°
3°
10°
3°
8°
Step = 552 mm
Step = 587 mm
Step = 573 mm
Step = 660 mm
Stride = 1140 mm
Stride = 1159 mm
Stride = 1284 mm
500 mm

Dispersal routes out of Africa



NATURE vs CULTURE

Reconstructing a puzzle
Hominins **were able to survive,**
to adapt and to occupy new territories

Progressive "emancipation" from the natural constraints of nature
Capacity to create culture

Tempos, modes, and phases

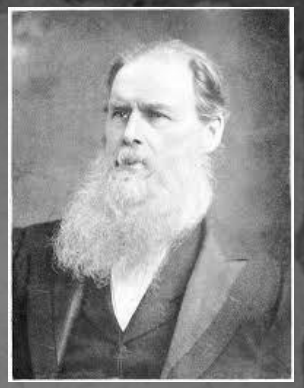
WHO?

By Gallotti, 2017

CULTURA

- Capacità di realizzare un rapporto cosciente con l'ambiente, di controllarlo e organizzarlo, inventando nuove risposte a stimoli esterni;
- Fabbricazione sistematica di manufatti via via più perfezionati secondo un progetto che comprende una serie di operazioni gestuali e rivela capacità innovative;
- Possibilità di scelta tra alternative diverse, anche nelle medesime circostanze, e quindi l'autodeterminazione o libertà;
- Comunicazione simbolica, realizzata attraverso il linguaggio e altri mezzi, come le rappresentazioni artistiche;
- Accumulazione e trasmissione di comportamenti per via non genetica, né esclusivamente parentale;
- Tendenza alla vita e organizzazione sociale di crescente complessità;
- Legami familiari forti e relativamente duraturi nel rapporto genitori-figli;
- Capacità di trascendere l'aspetto puramente biologico attraverso atti e concezioni che assumono rilevanza sul piano artistico, giuridico, etico e religioso.

Edward Burnett Tylor



Il concetto di cultura

«La cultura […] intesa nel suo ampio senso etnografico, è quell'insieme complesso che include la conoscenza, le credenze, l'arte, la morale, il diritto, il costume e qualsiasi altra capacità e abitudine acquisita dall'uomo come membro di una società» (Tylor, *Primitive Culture*, 1871)

La cultura è ovunque
La cultura è un insieme complesso
La cultura è acquisita
La cultura è un fatto sociale, non meramente individuale

Mains steps in cultural evolution

Pebble industries (Europe)

(Mode 1)

ACHEULEAN (Africa) (Mode 2)

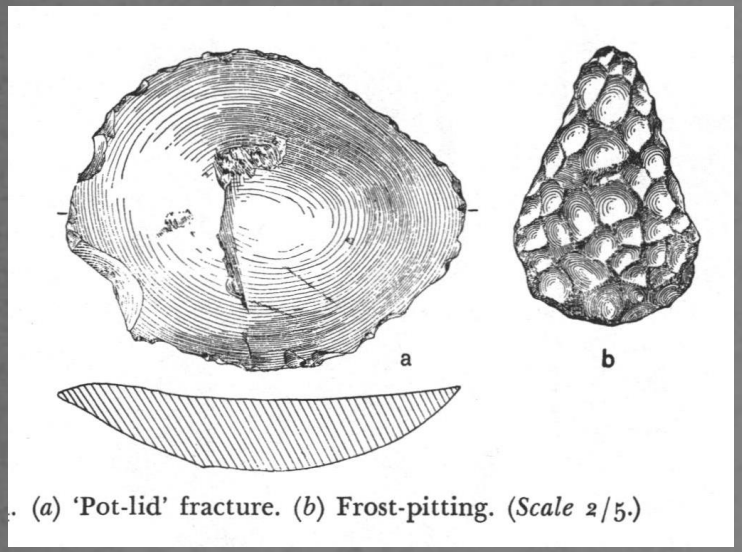
Pebble industries (Africa)

(Mode 1)

Biface

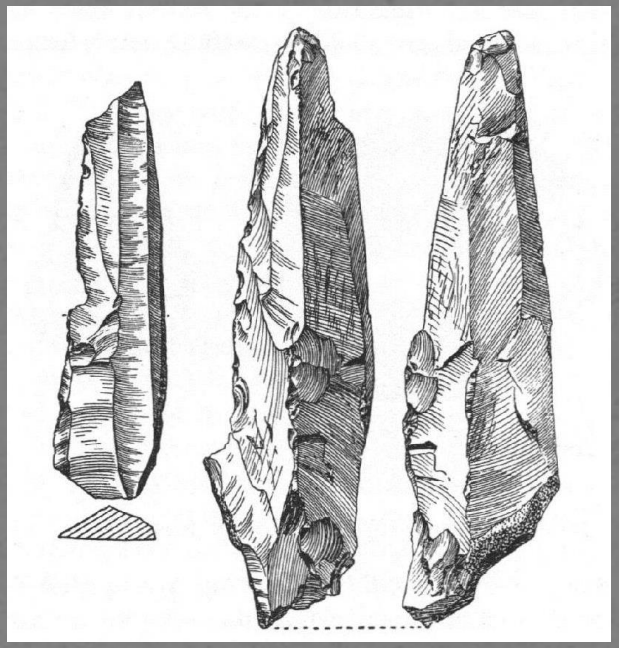
Chopper

Pseudo-artifacts



(*a*) 'Pot-lid' fracture. (*b*) Frost-pitting. (*Scale* 2/5.)

Flake and biface originated from frost-shattering



Blades originated from natural fissuration

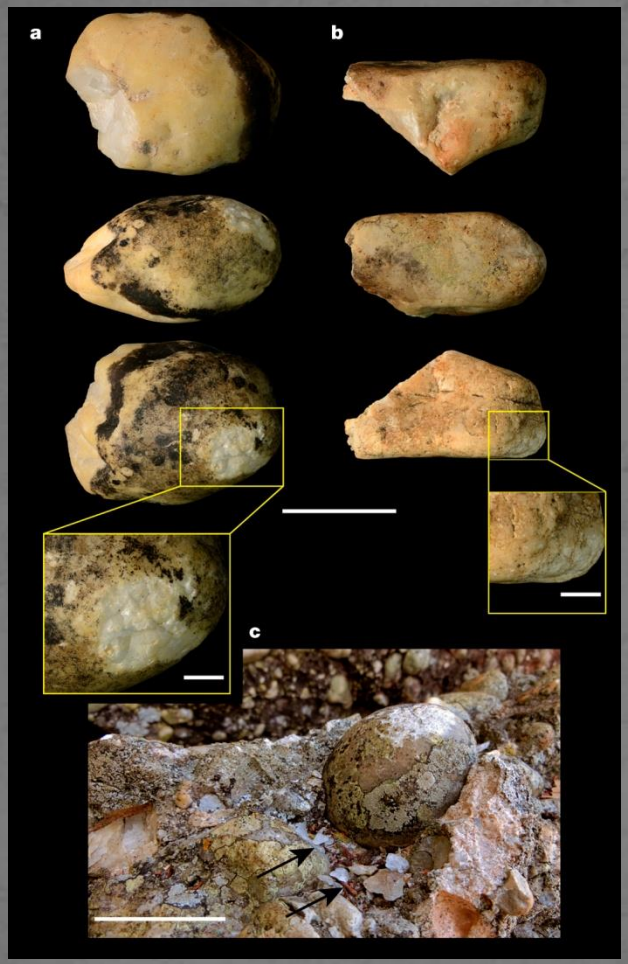
Animals using tools

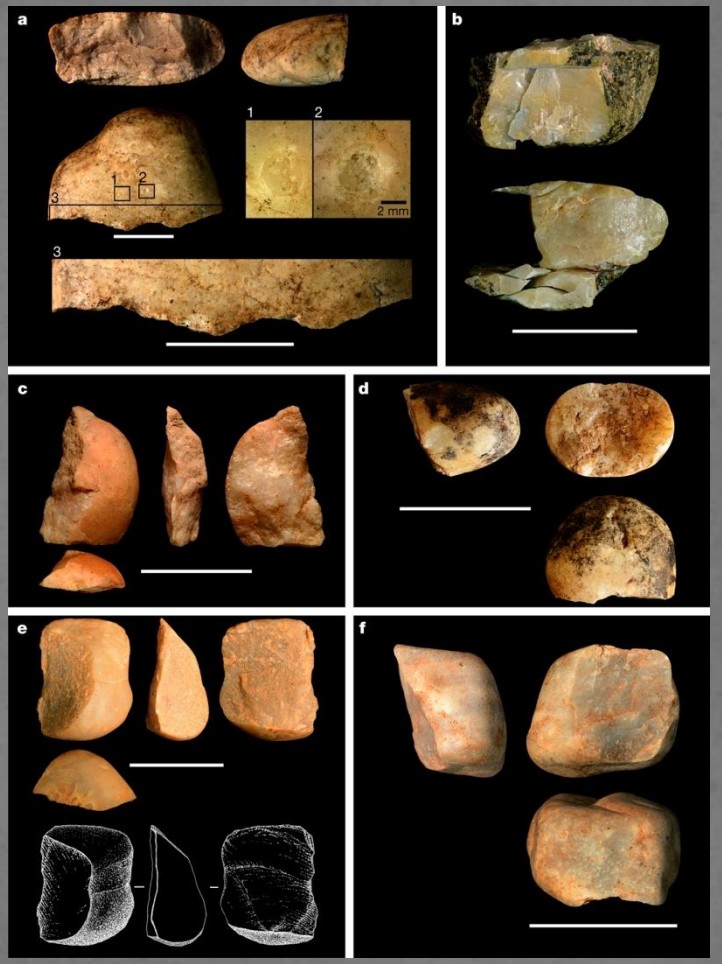
Wild bearded capuchin percussion, Serra da Capivara National Park, Brazil

T Proffitt *et al. Nature* 1–4 (2016) doi:10.1038/nature20112

nature

Examples of passive hammers and flaked stones from capuchin percussion

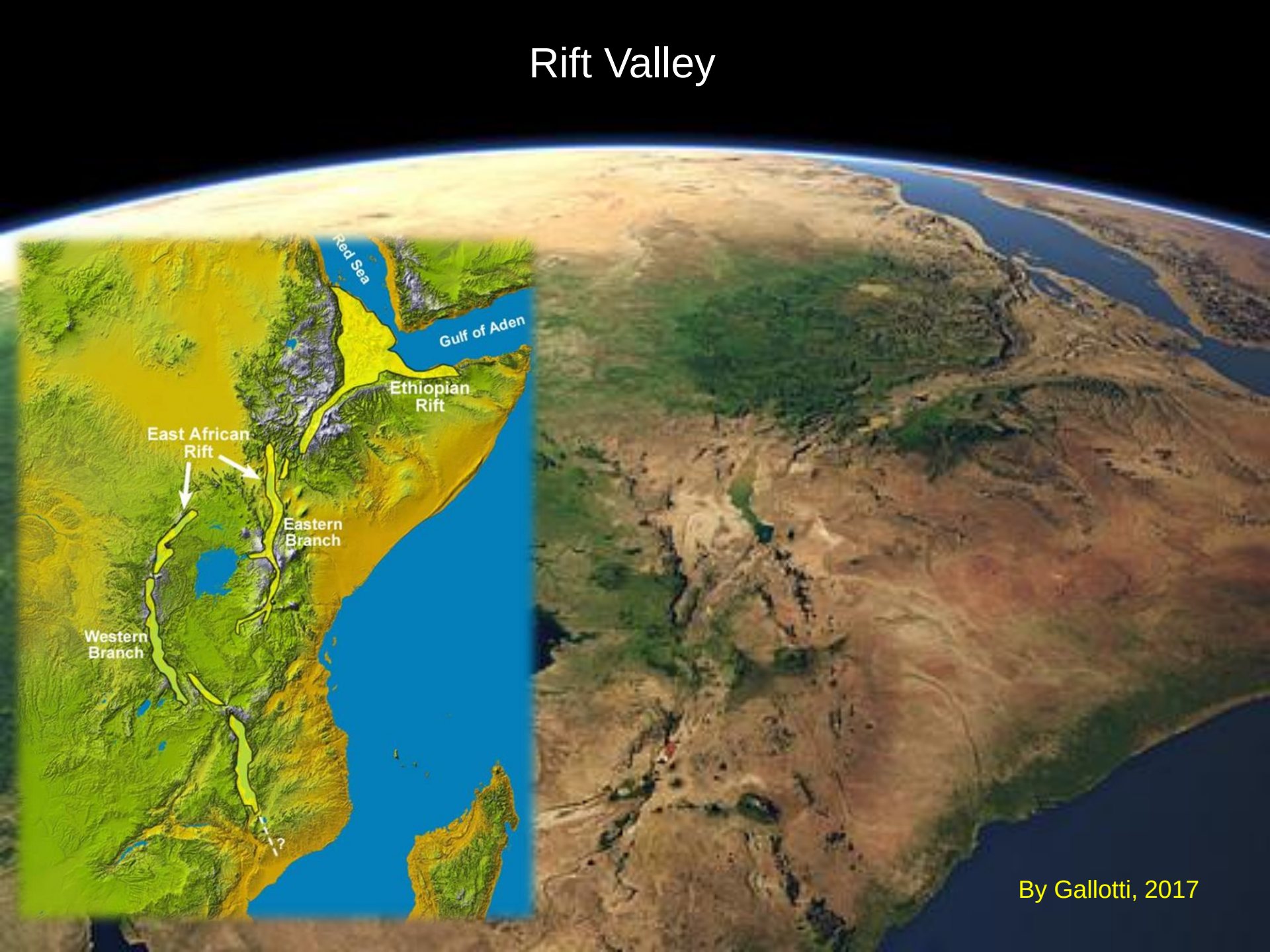




T Proffitt *et al. Nature* 1–4 (2016) doi:10.1038/nature20112

nature

Rift Valley



By Gallotti, 2017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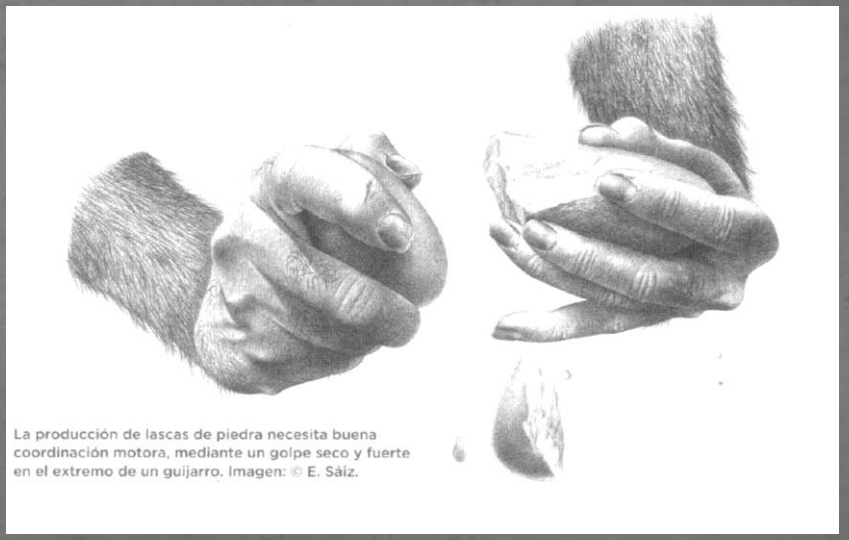
Choppers and chopping tools: tools or cores for flakes?



La producción de lascas de piedra necesita buena coordinación motora, mediante un golpe seco y fuerte en el extremo de un guijarro. Imagen: © E. Sáiz.

Who did what

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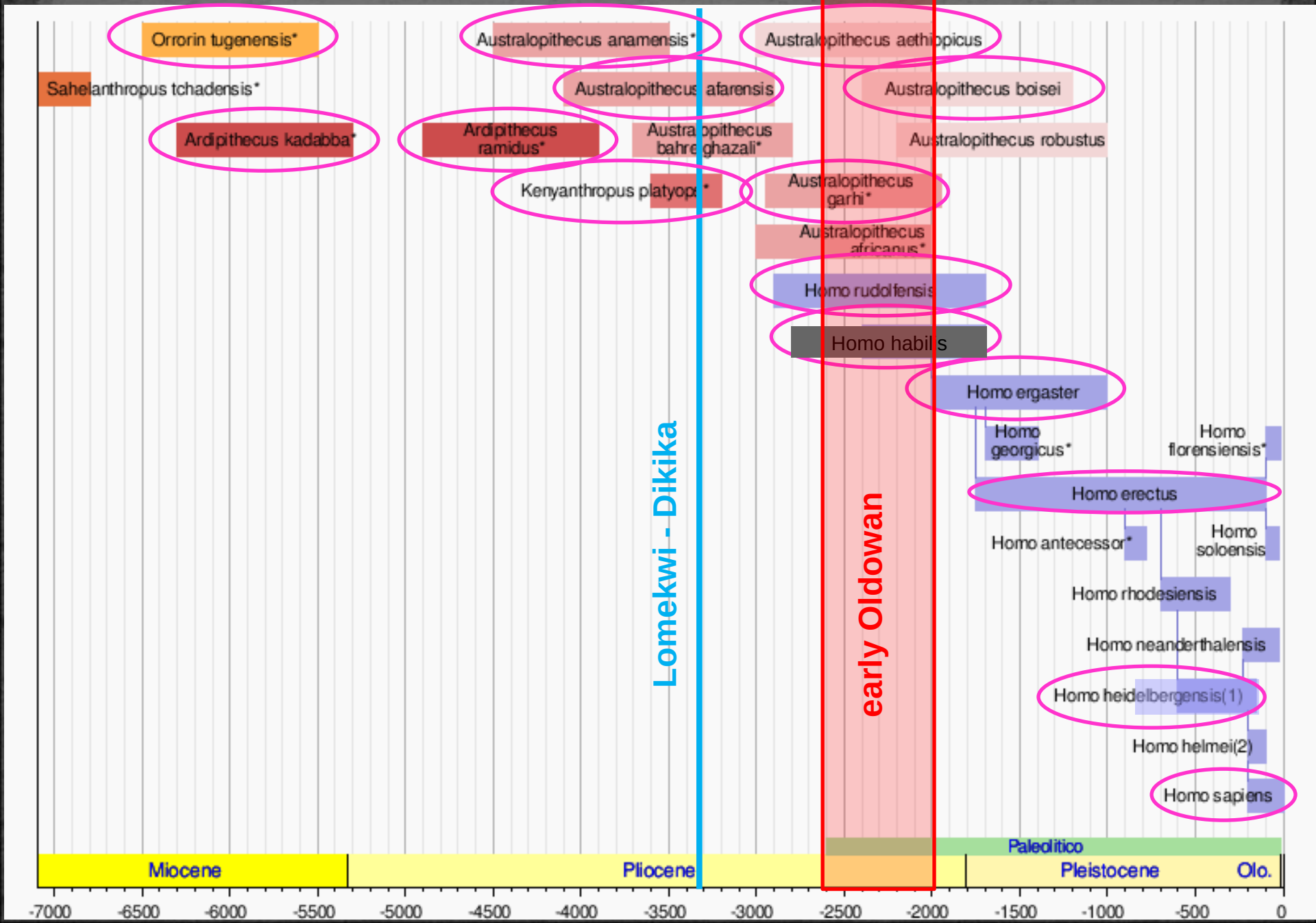
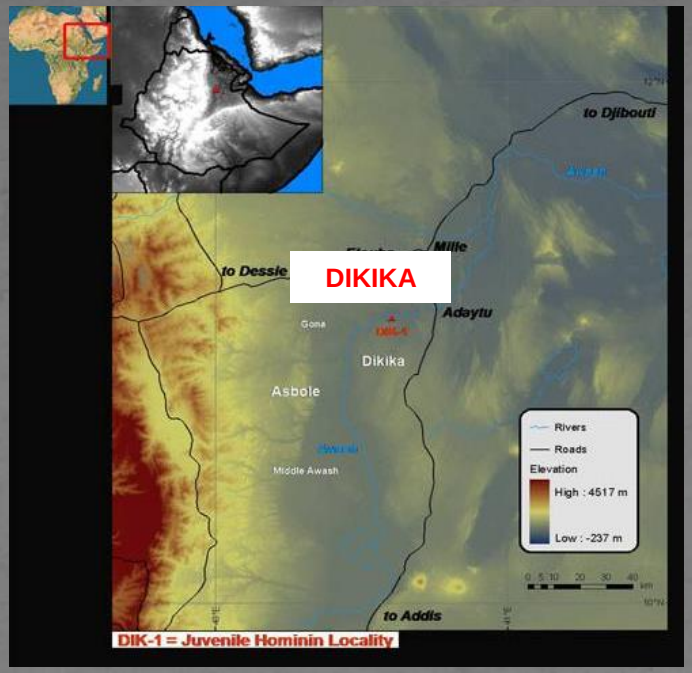


Did Australopithecus afarensis make the first cut-mark?

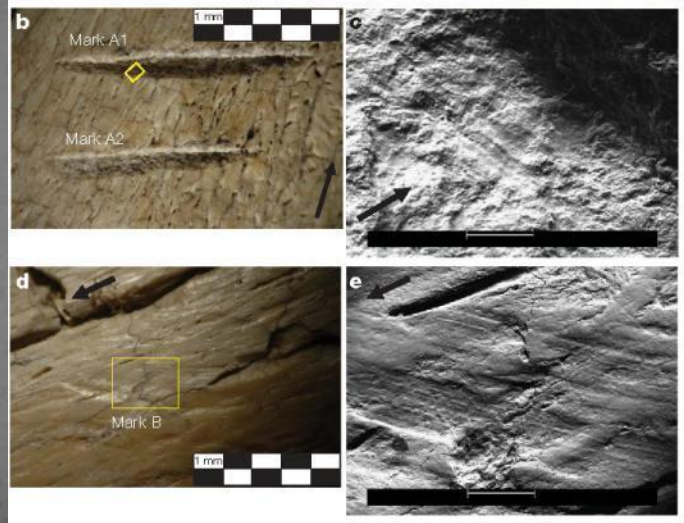
DIKIKA

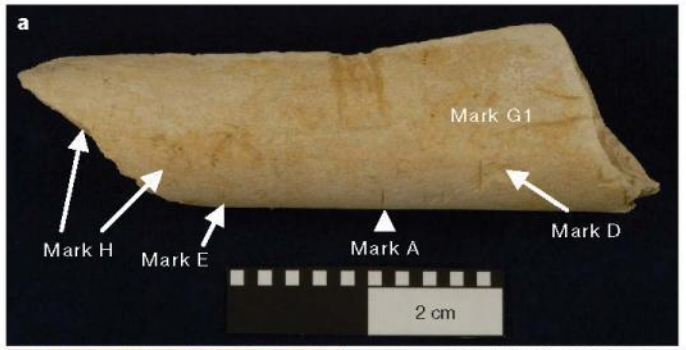


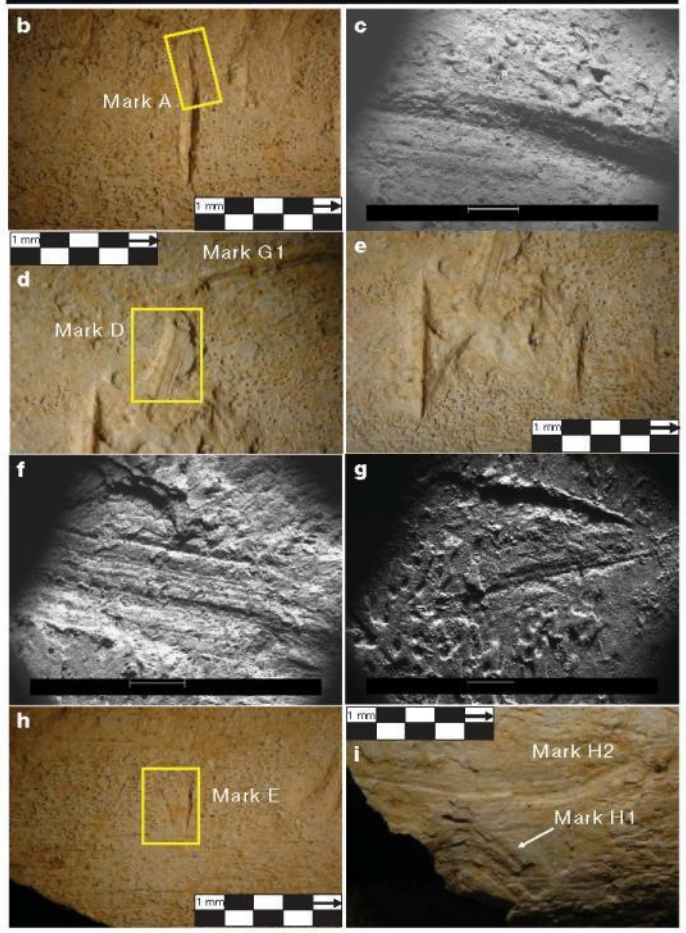
Australopithecus afarensis

Dikika (DIK-55): bones with cut-marks and percussion cones

Mc-Pherron et al. 2010; Braun 2010







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Summary

The first stone tools used by **early hominins** (and most probably by their primate and australopithecine counterparts as well) were presumably natural pebbles/cobbles and perhaps even naturally sharp edged rocks that were collected and later discarded.

Some three million years ago in Africa, a set of novel behavioral and technological capabilities emerged, coupled with biological, cognitive, and possibly cultural adaptations that together enabled our earliest ancestors to select rock types with specific morphological and physical features for the production of tools suitable for their daily needs.

They were able to split or chip pebbles or chunks of rocks with a stone hammer to produce sharp cutting flakes and sharp-edged pebbles/cobbles as desired working tools.

Tool-making capabilities became regularized in the Oldowan as early as 2.6 Ma in Africa through the understanding and controlling of the conchoidal fracture mechanisms. However, known examples from Lomekwi in Ethiopia place even prior to this date, while many of the oldest (Ledi-Geraru) and other Oldowan localities from the following one million years were discovered in the Rift Valley of Eastern Africa, in South Africa, in Northern Africa, and most likely outside of Africa as well.

Oldowan stone tool assemblages are composed of:

- Hammerstones: pieces of stone that were battered against other rocks from which flakes were struck

- Manuports: unmodified blocks of rock that were brought to the site by hominins

- Core forms: pebbles and angular rock fragments from which flakes were removed:
cores = source for flake detachment
core tools = flakes removed to produce useful edges of a desired shape

- Flakes (retouched or not)

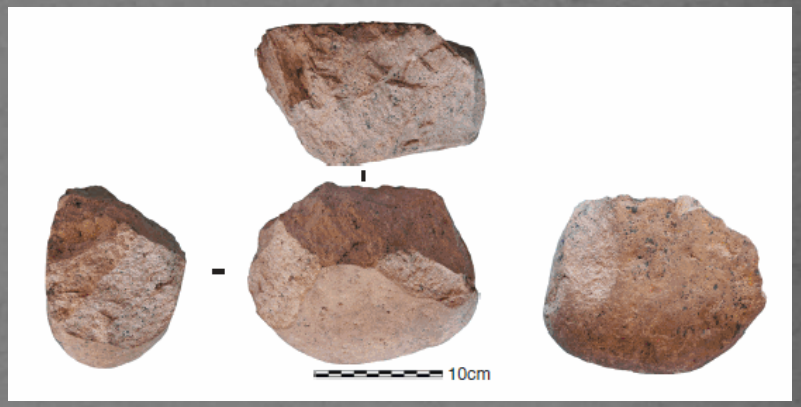
Before the Oldowan – The origin of lithic technology

Lomekwi 3, West Turkana, 3.3 Ma

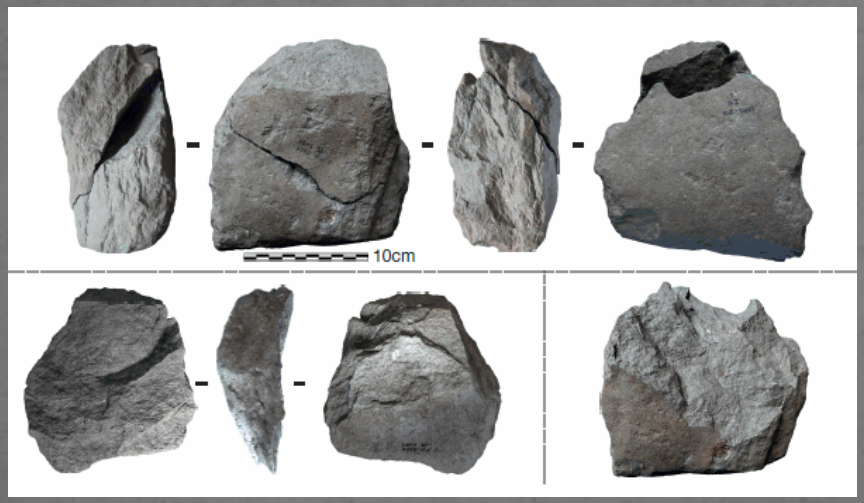
By Gallotti, 2017

3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya

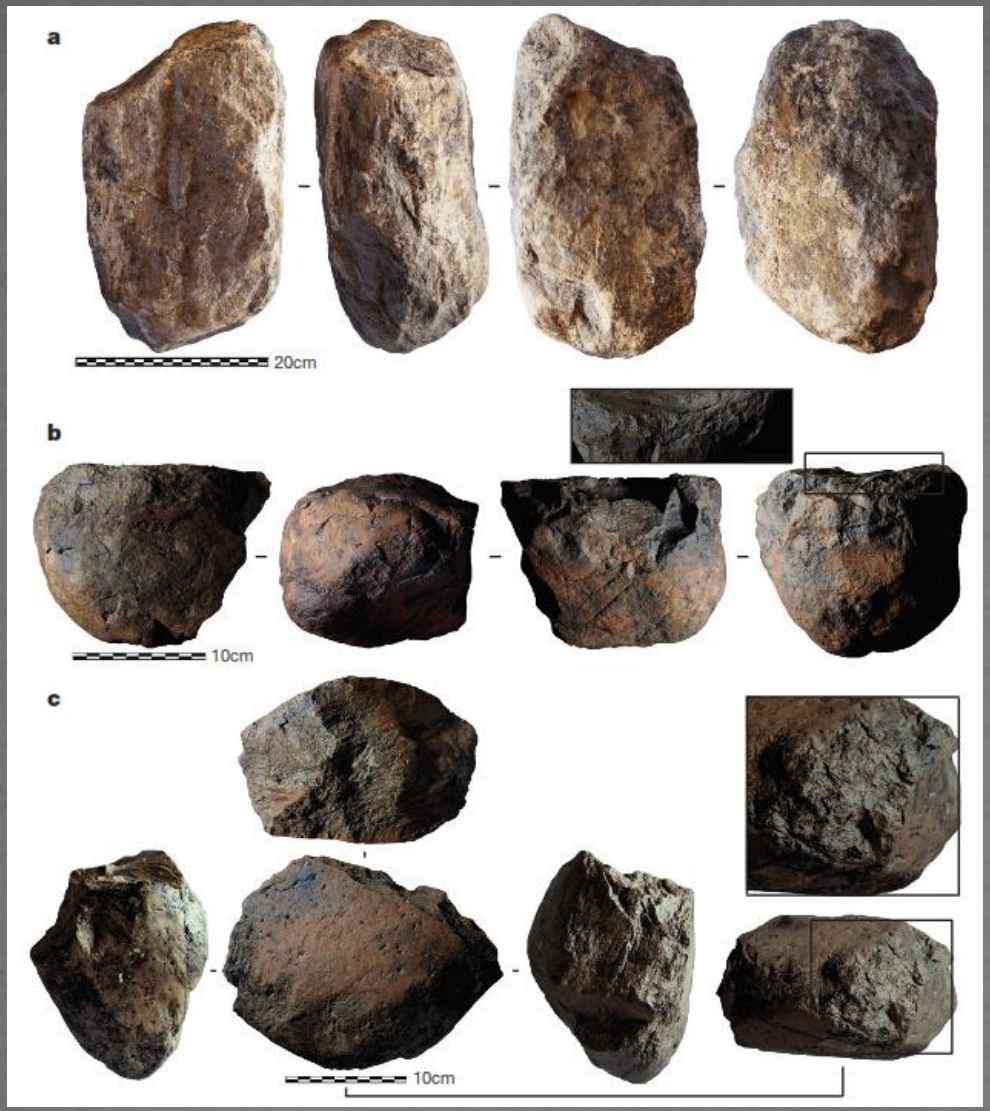
Sonia Harmand[1,2,3], Jason E. Lewis[1,3,4], Craig S. Feibel[3,4,5], Christopher J. Lepre[3,5,6], Sandrine Prat[3,7], Arnaud Lenoble[3,8], Xavier Boës[3,7], Rhonda L. Quinn[3,5,9], Michel Brenet[8,10], Adrian Arroyo[2], Nicholas Taylor[2,3], Sophie Clément[3,11], Guillaume Daver[12], Jean-Philip Brugal[3,13], Louise Leakey[1], Richard A. Mortlock[5], James D. Wright[5], Sammy Lokorodi[3], Christopher Kirwa[3,14], Dennis V. Kent[5,6] & Hélène Roche[2,3]



Unifacial core (3.45 kg), bipolar technique.



In situ core (1.85 kg) and refitting surface flake. Unifacial core, passive hammer and bipolar technique. Both the core and the flake display a series of dispersed percussion marks on cortex showing that percussive activities occurred before the removal of the flake, potentially indicating the block was used for different purposes.

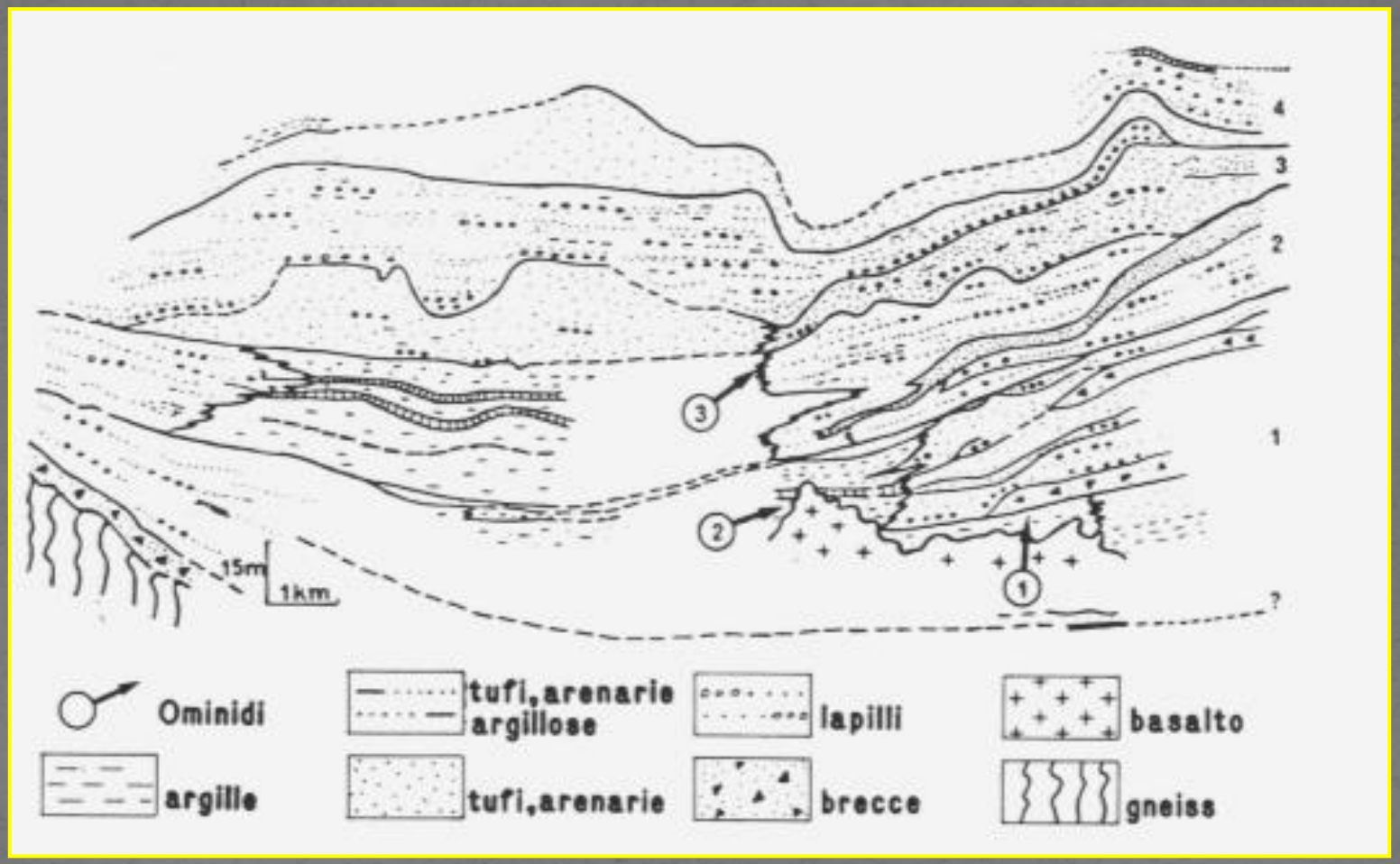


Lomekwi, West Turkana, 3.3 Ma – Percussion tools

By Gallotti, 2017

OLDUVAI GORGE

Stratigraphy at Olduvai



An Overview of the Oldowan Lithic Assemblages

The Oldowan is a simple technical complex
when compared to Acheulean industries.

A complex characterized by
tools on cobble, flakes and few tools on flake.

Time span: two views

2.6-1.5: a long period of technological stasis

or

2.6-2.3 (2.0) Pre-Oldowan **2.3 (2.0)-1.5 Oldowan**

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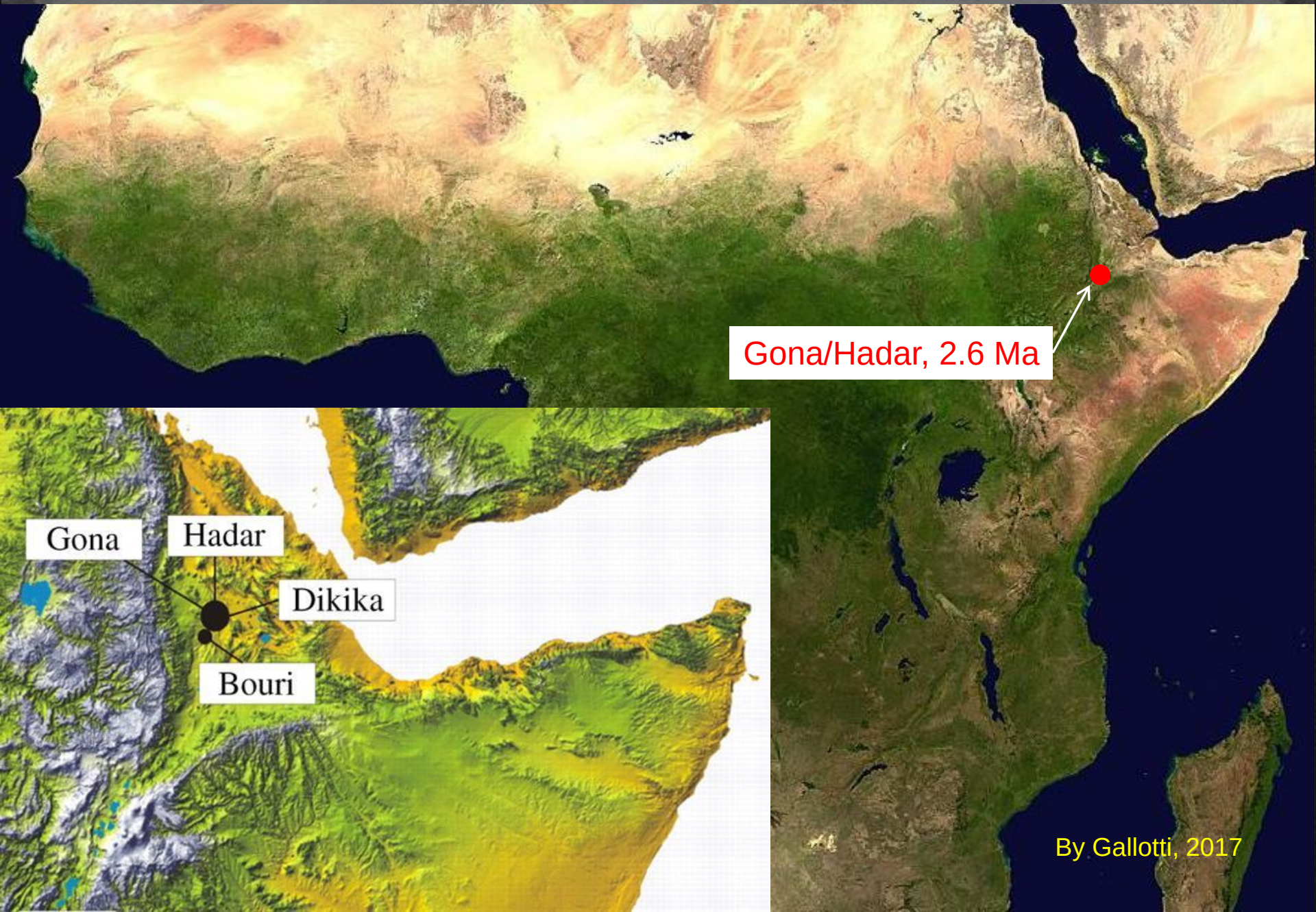
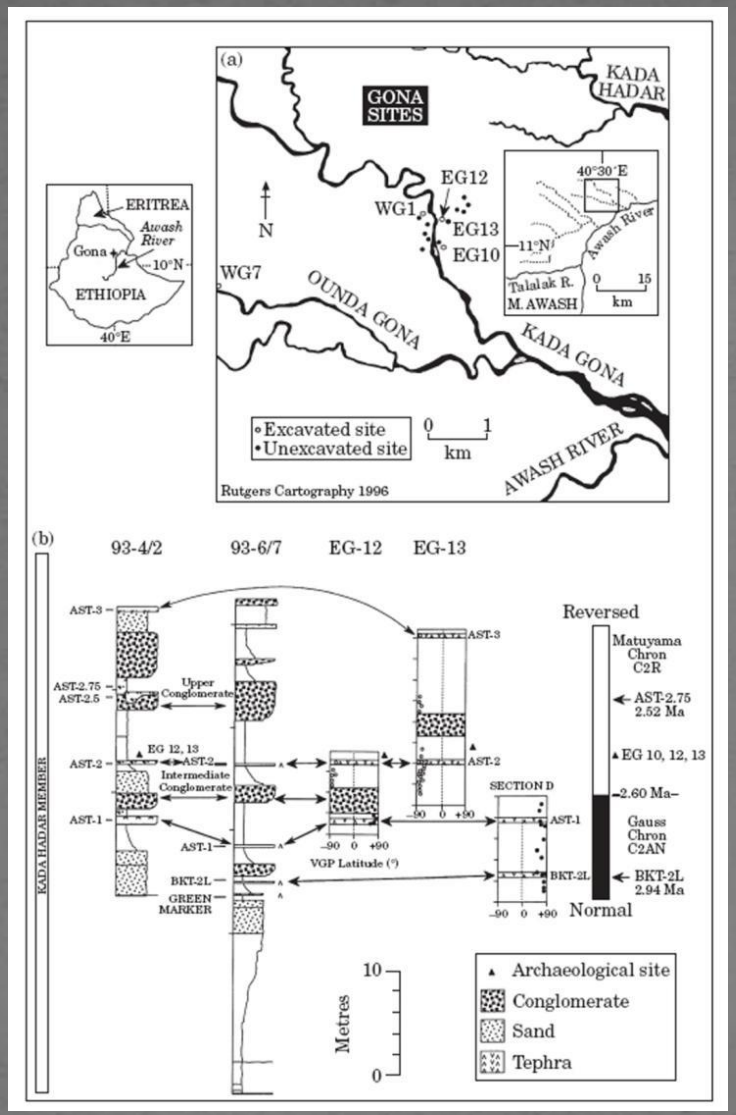
AFAR REGION



GONA – early Oldowan (2.6 Ma)



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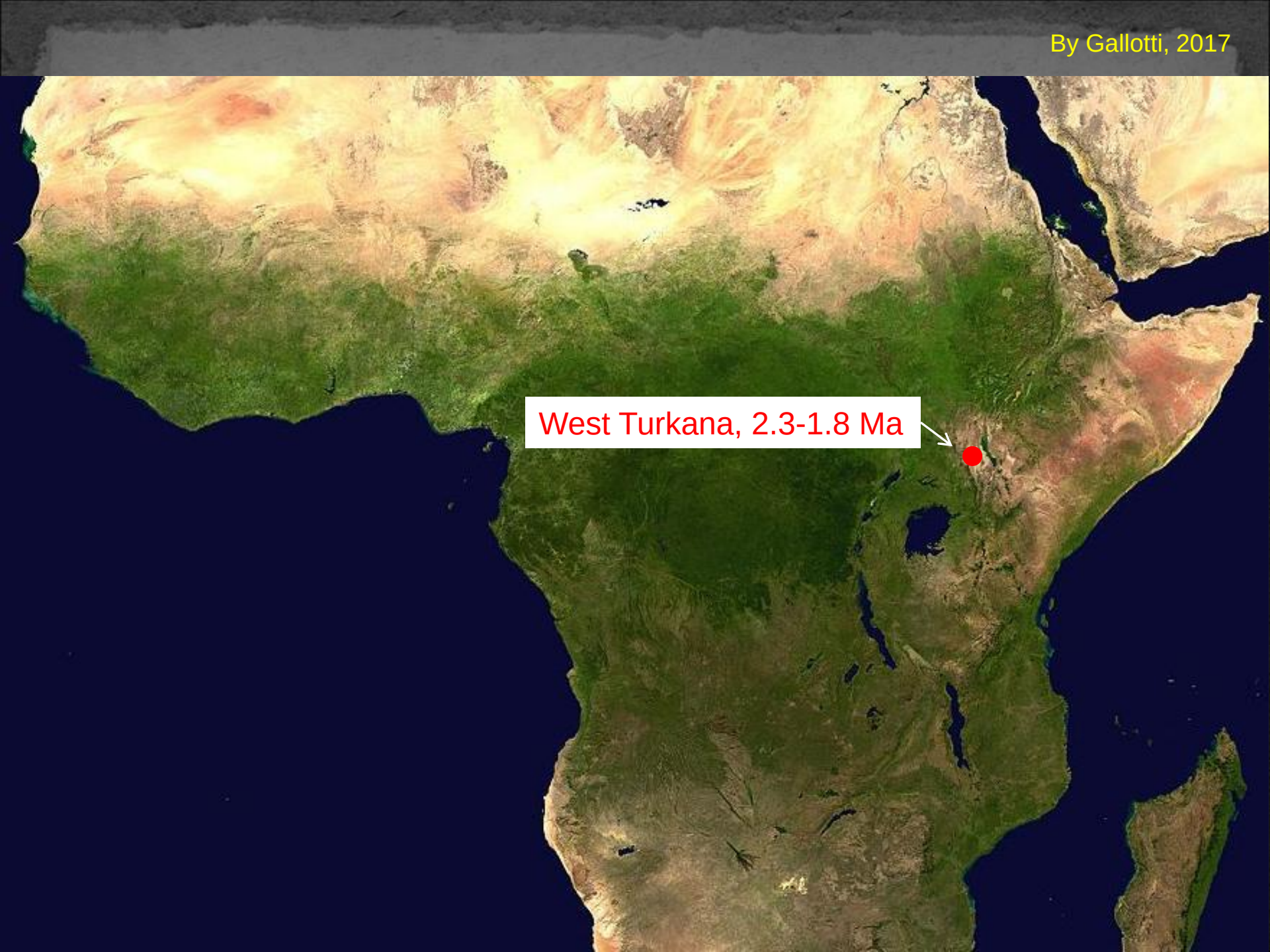
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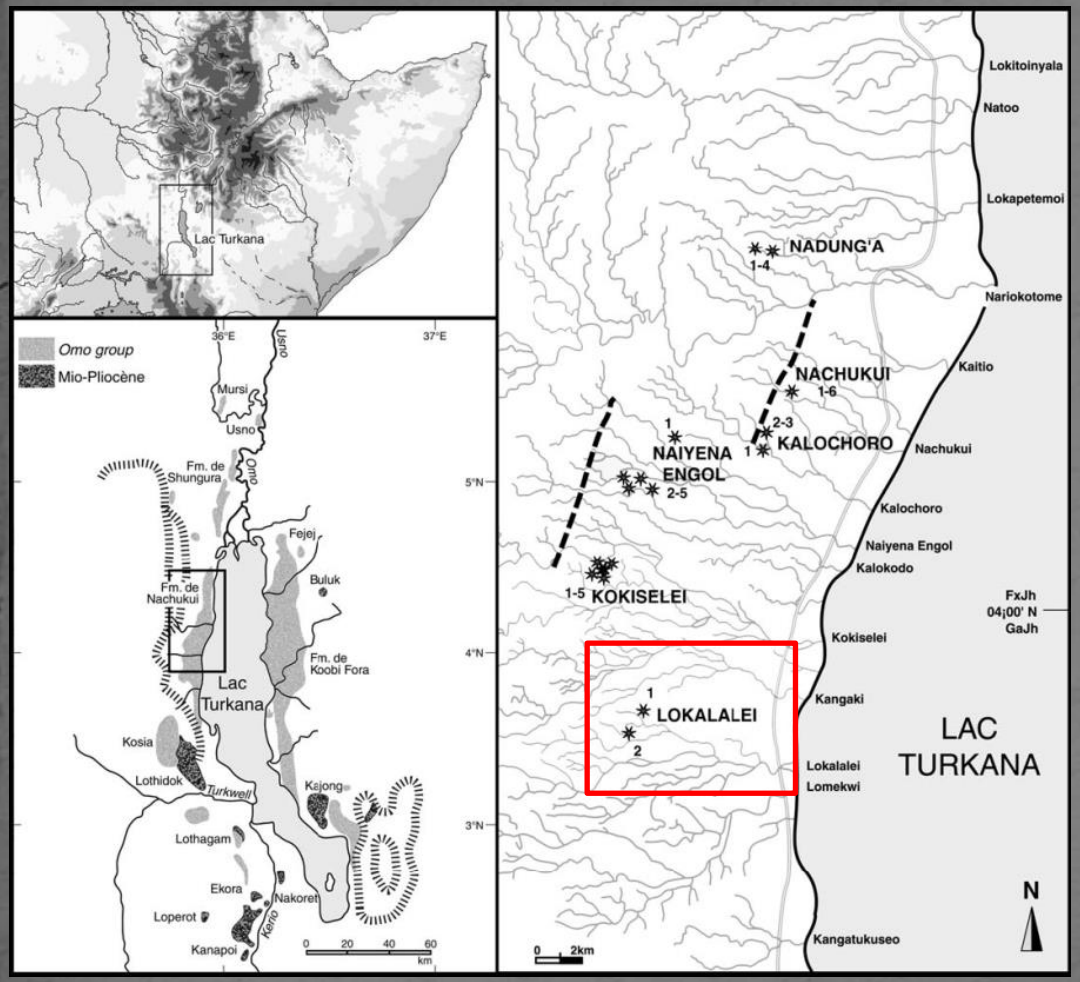
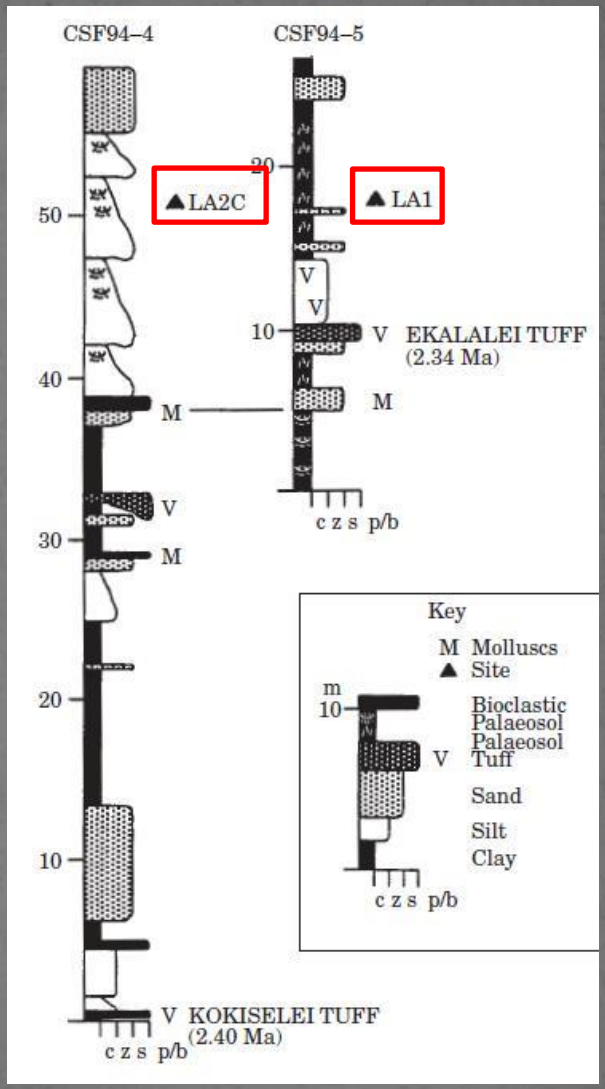
West Turkana, 2.3-1.8 Ma

WEST TURKANA – early Oldowan (2.3 Ma)





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Who did what

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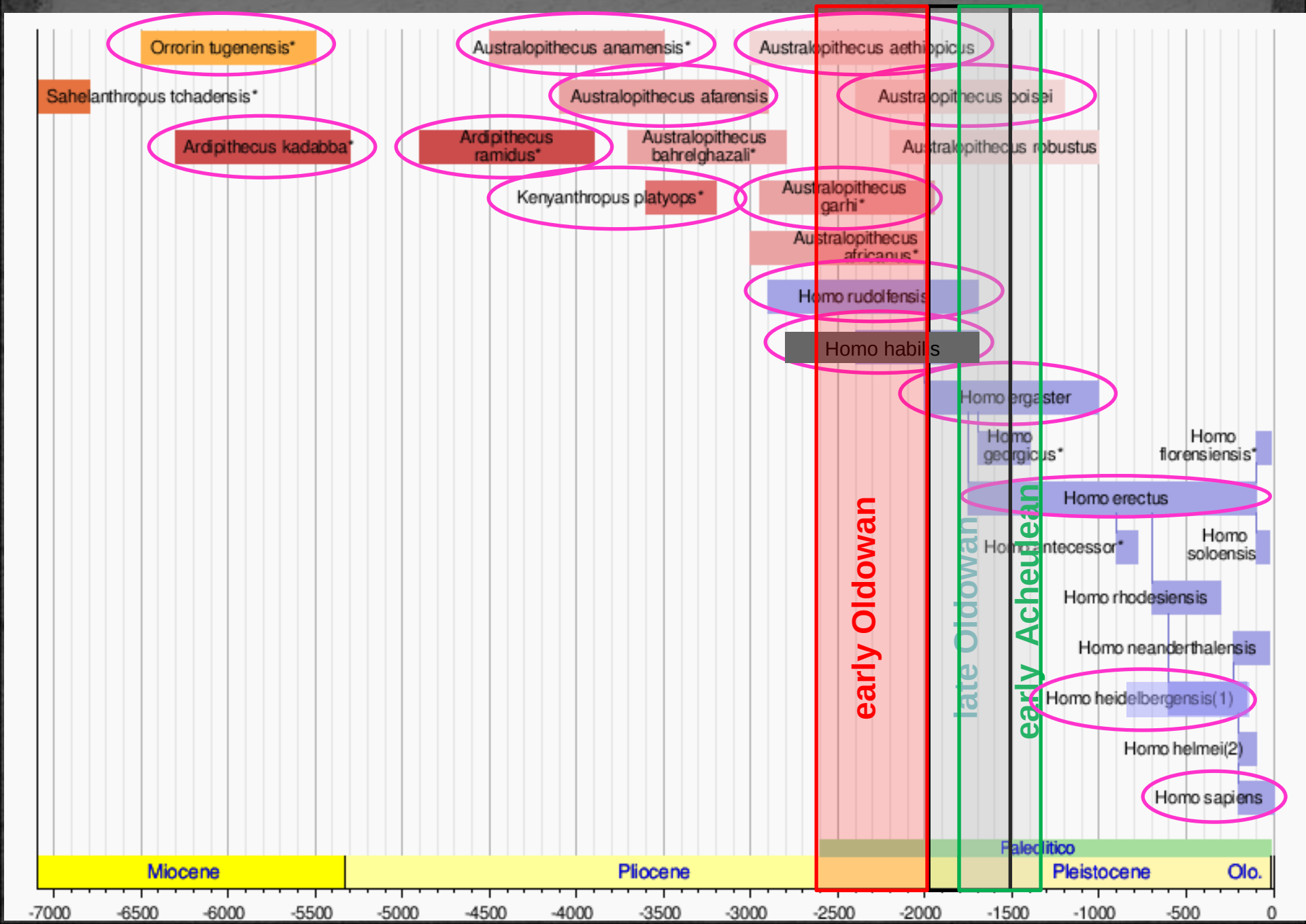


The makers of the Oldowan

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

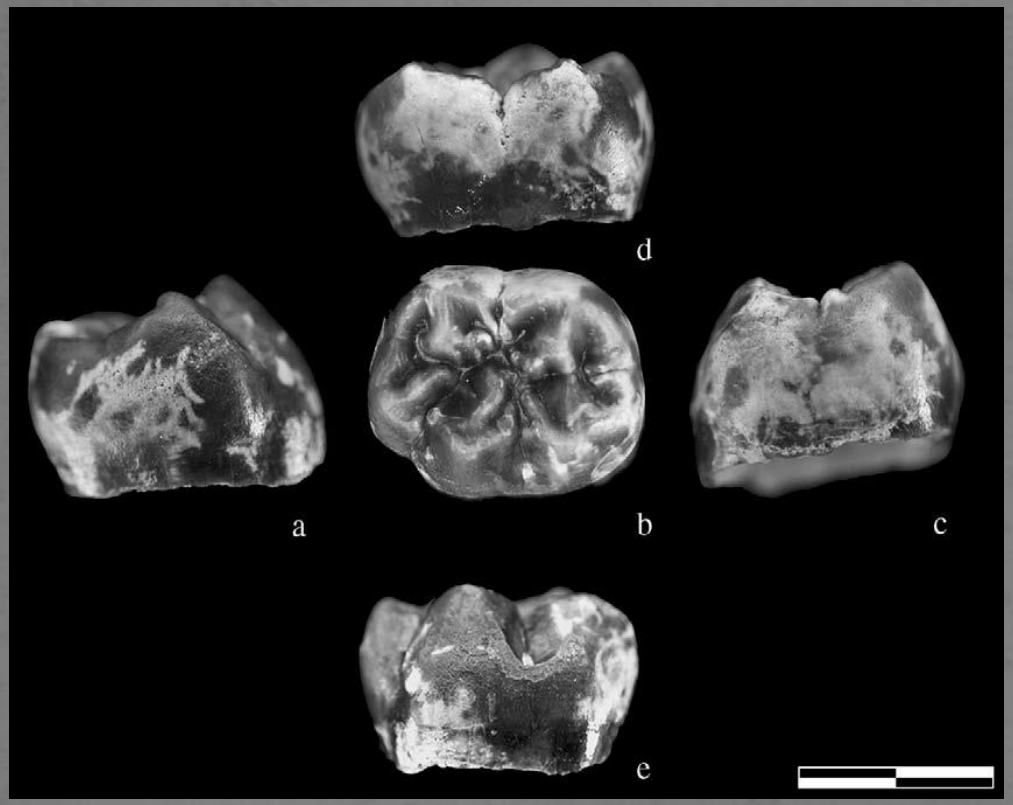
Brian Villmoare,[1,4,6]* William H. Kimbel,[2]* Chalachew Seyoum,[2,7] Christopher J. Campisano,[2] Erin DiMaggio,[3] John Rowan,[2] David R. Braun,[4] J. Ramon Arrowsmith,[5] Kaye E. Reed[2]

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).

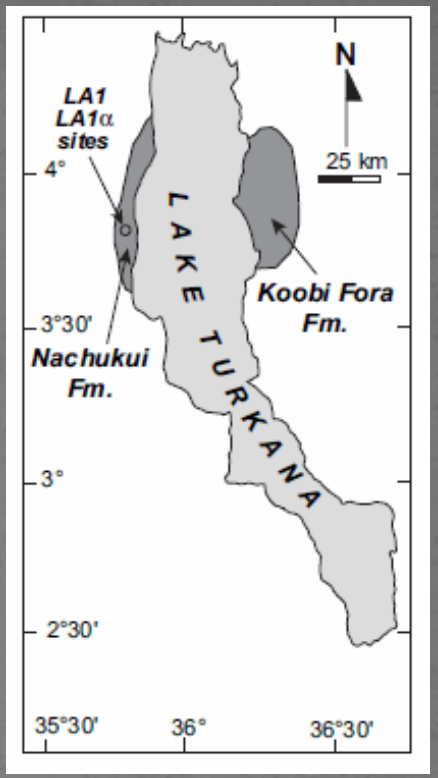
The discovery of a partial hominin mandible with teeth from the Ledi-Geraru research area, Afar Regional State, Ethiopia, establishes the presence of Homo at 2.80-2.75 Ma. This specimen combines primitive traits seen in early Australopithecus with derived morphology observed in later Homo, confirming that dentognathic departures from the australopith pattern occurred early in the Homo lineage.

First occurrence of early *Homo* in the Nachukui Formation (West Turkana, Kenya) at 2.3-2.4 Myr

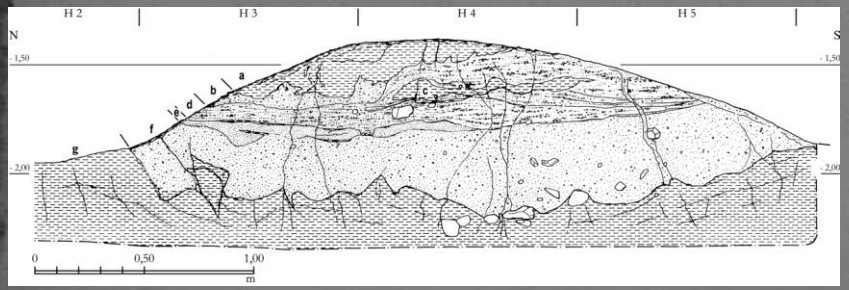
Sandrine Prat [a,*], Jean-Philip Brugal [b], Jean-Jacques Tiercelin [c], Jean-Alix Barrat [c], Marcel Bohn [c], Anne Delagnes [d], Sonia Harmand [e], Kamoya Kimeu [f], Mzalendo Kibunjia [f], Pierre-Jean Texier [g], Hélène Roche [e]

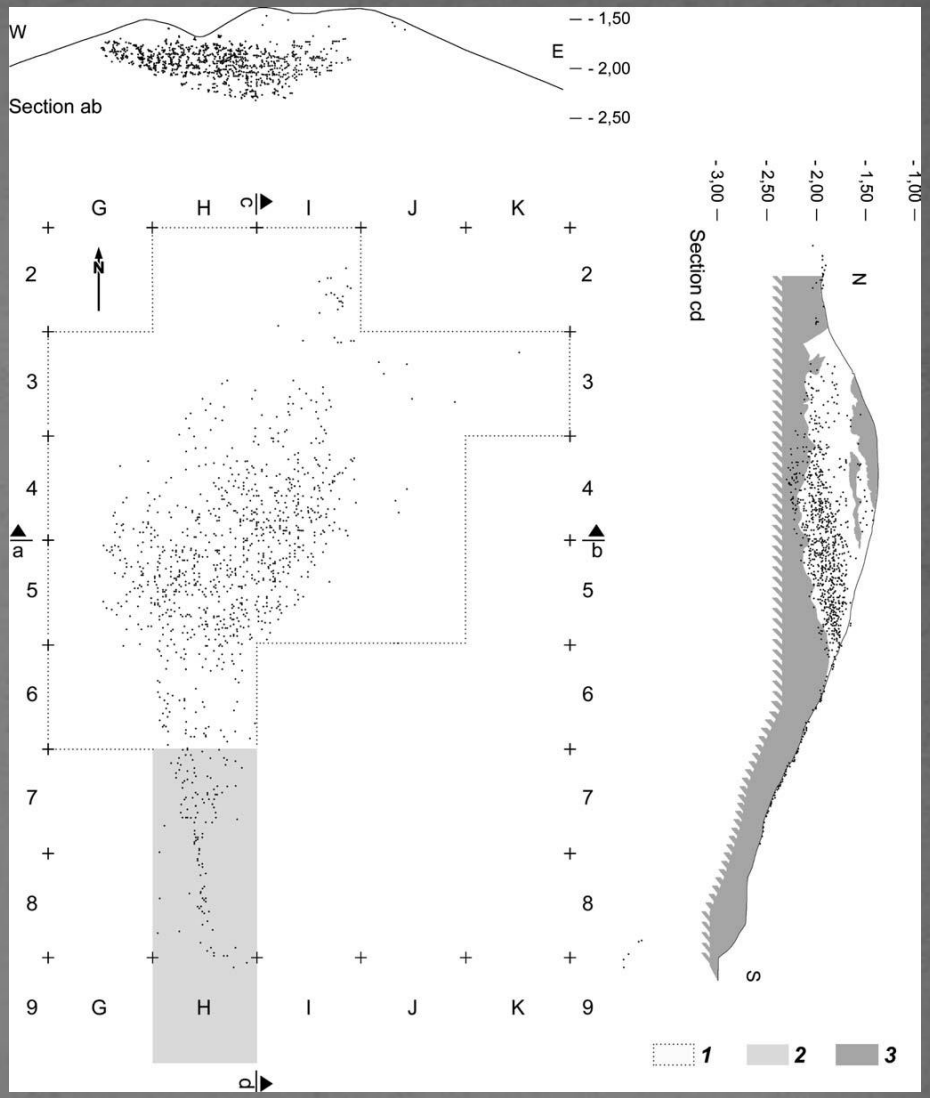


KNM-WT 42718, (a) distal, (b) occlusal, (c) mesial, (d) lingual, (e) buccal views. Scale bar is 1 cm.



Lokalalei 2C, 2,3Ma





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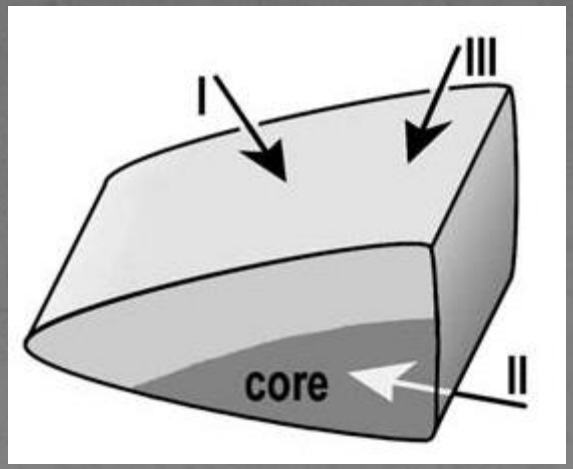
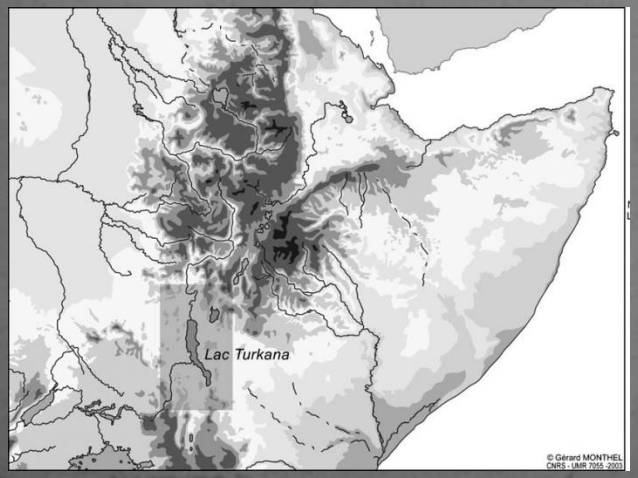
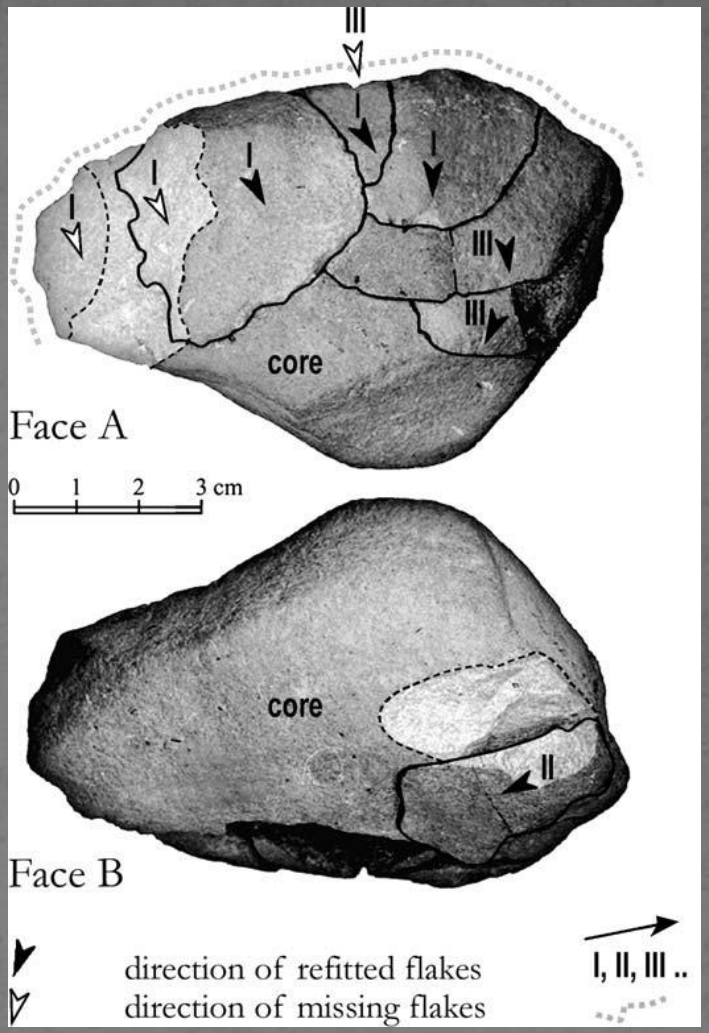
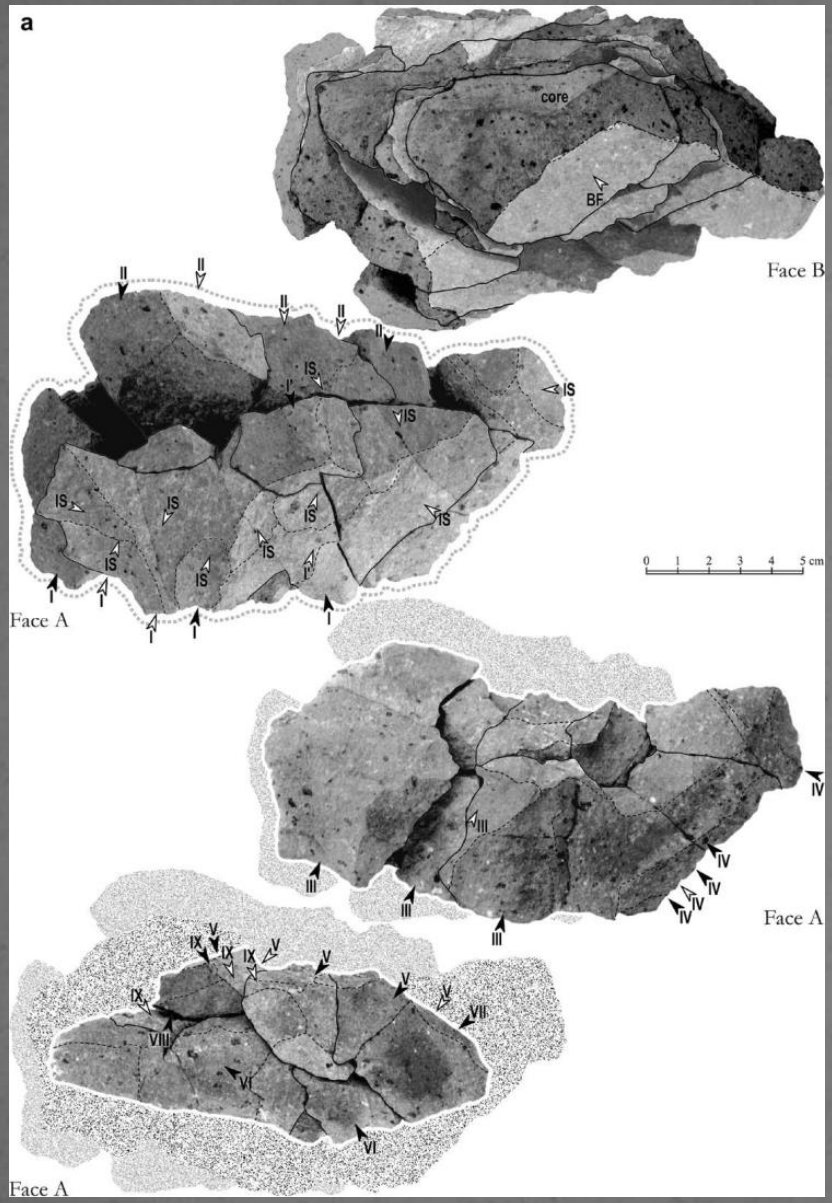


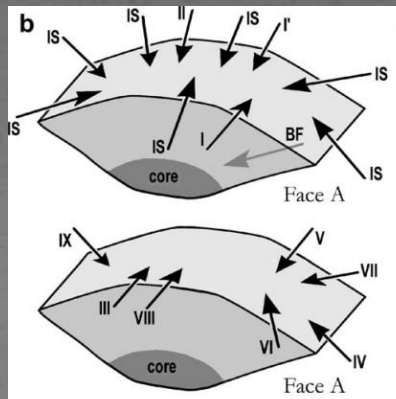
Late Pliocene hominid knapping skills: The case of Lokalalei 2C, West Turkana, Kenya

Anne Delagnes[a,*], Hélène Roche[b]





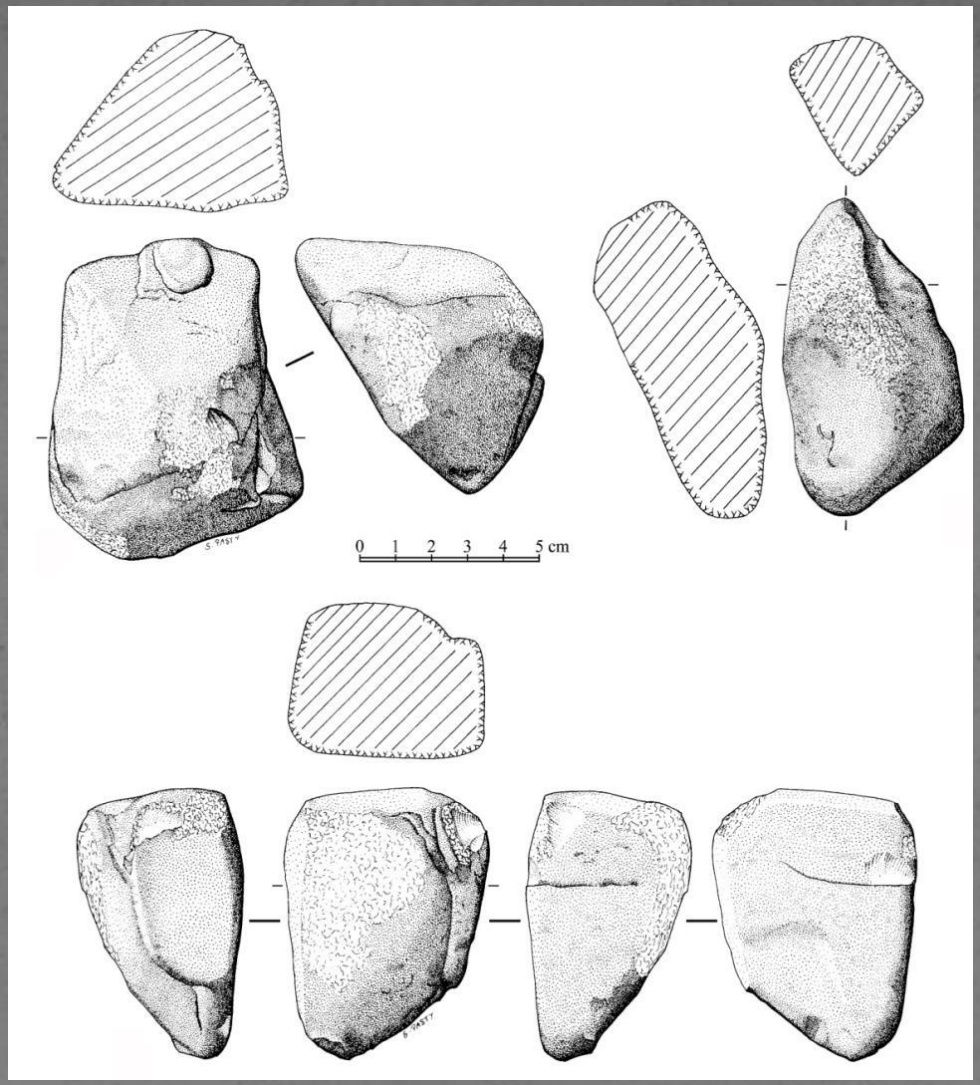




Series	Refitted pieces	(fragments)	Missing pieces	Total of refitted and missing pieces
BF	0	(0)	1	1
IS	0	(0)	≥9	≥9
I	3	(8)	2	5
I'	2	(3)	6	8
II	3	(4)	2	5
III	3	(5)	1	4
IV	4	(7)	1	5
V	3	(4)	2	5
VI	2	(3)	0	2
VII	1	(1)	0	1
VIII	1	(1)	0	1
IX	1	(1)	3	4
core	1	(1)	0	1
TOTAL	**24**	(38)	**≥27**	**≥51**

direction of refitted flakes
direction of missing flakes
direction of successive series of removals

I, II, III .. successive series of removals
extension of suitable natural striking platforms
IS initial series
BF block fragmentation

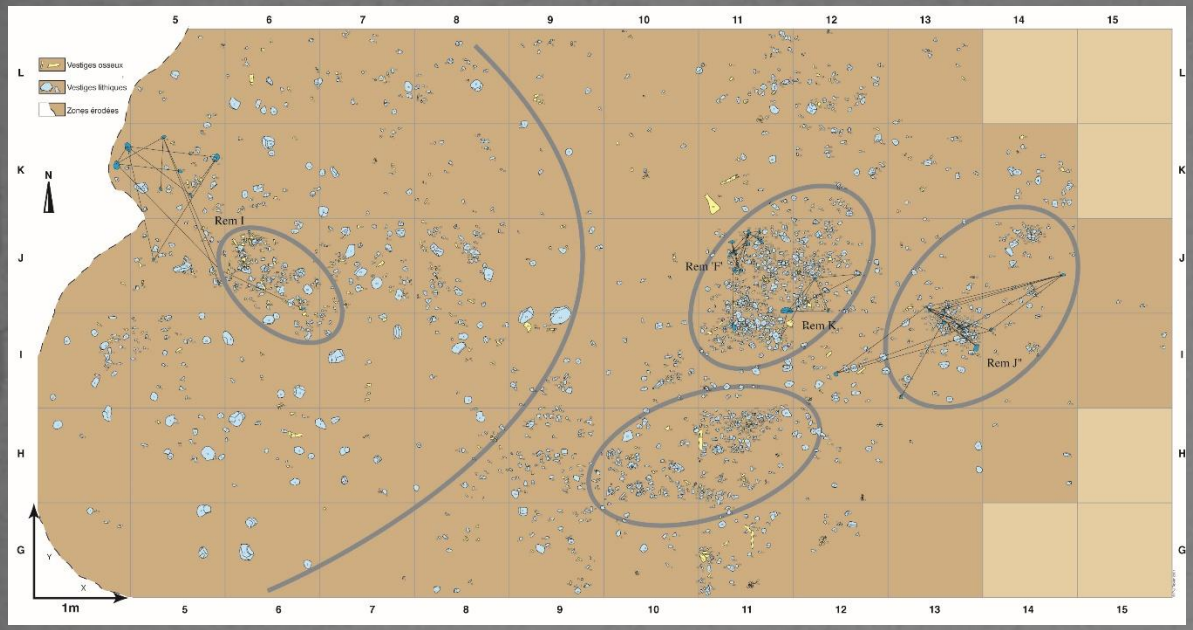


Hammerstones

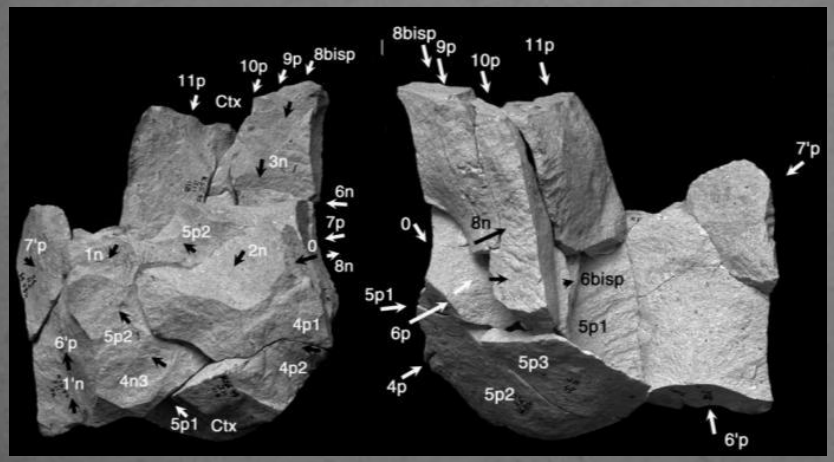
By Gallotti, 2017

WEST TURKANA – late Oldowan (1.8 Ma)

Kokisei 5



Lithic categories (n=1765)	N°
Unworked cobble	112
Worked cobble	25
Hammerstone	8
Core	39
Flakes & fl. fragment	1562
Tool-core	18



By Gallotti, 2017

WEST TURKANA – late Oldowan (1.8 Ma)

Lava large cobbles available in paleo-channels at a maximum distance of 50 m from the site

No selection of a specific block shape

Direct percussion, hard-stone hammer

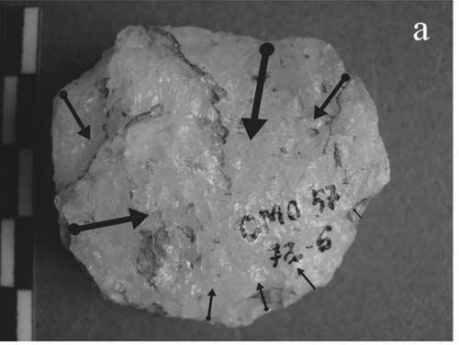
Continuous rectification and mantainance of the striking platform

Production of flakes in any direction: management of a three-dimensional space

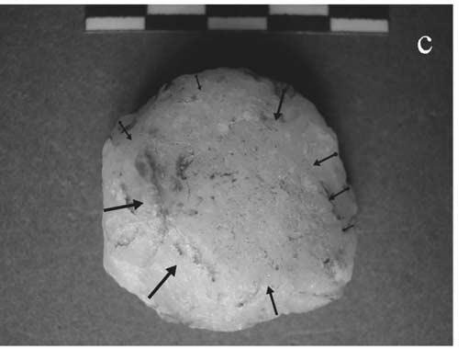
By Gallotti, 2017

OMO GROUP

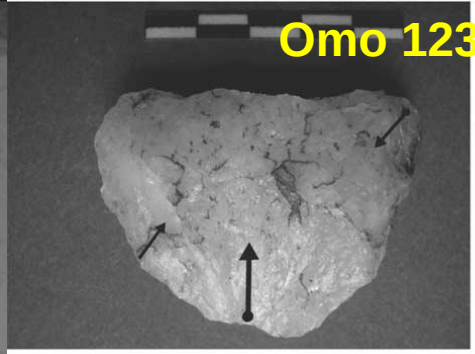
By Gallotti, 2017

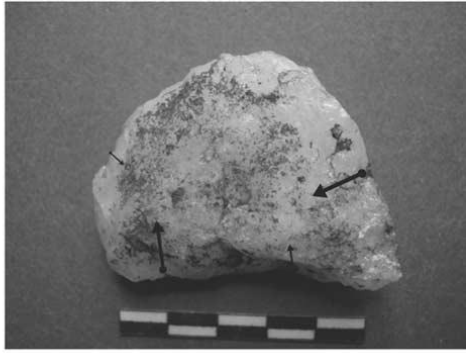

a
OMO 57
72-6

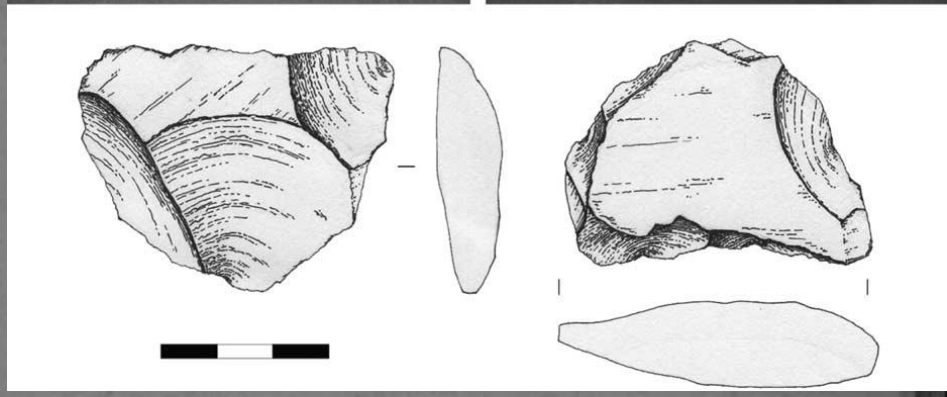

Omo 57
b

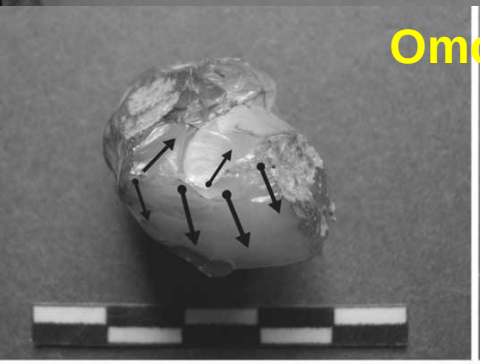

c


d
OMO 57
72-6


Omo 123



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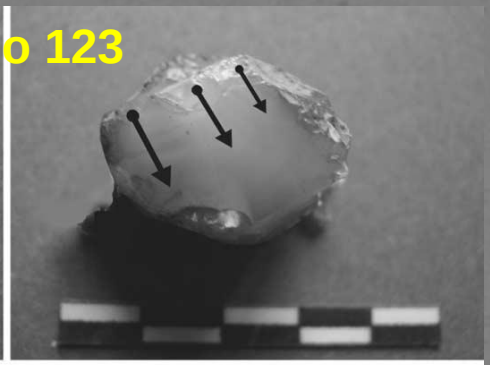
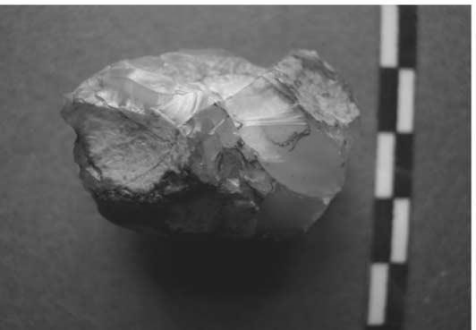
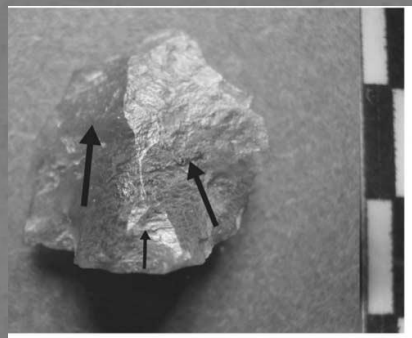
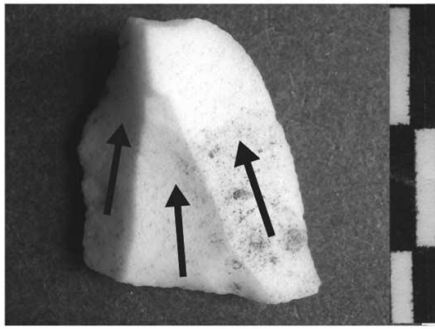
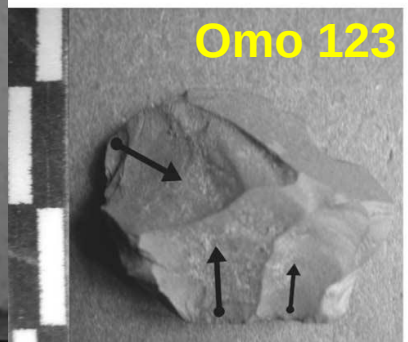






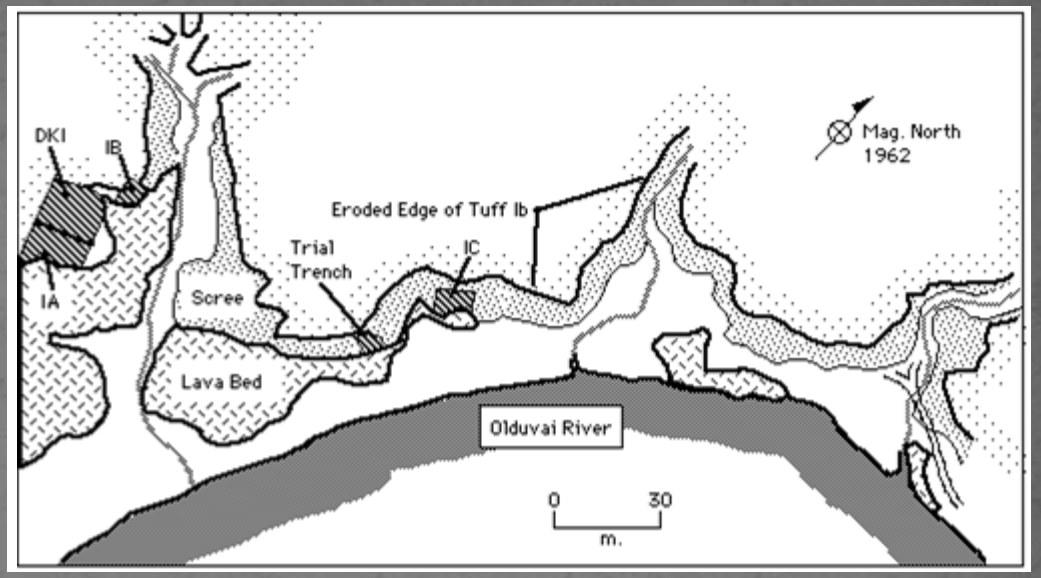


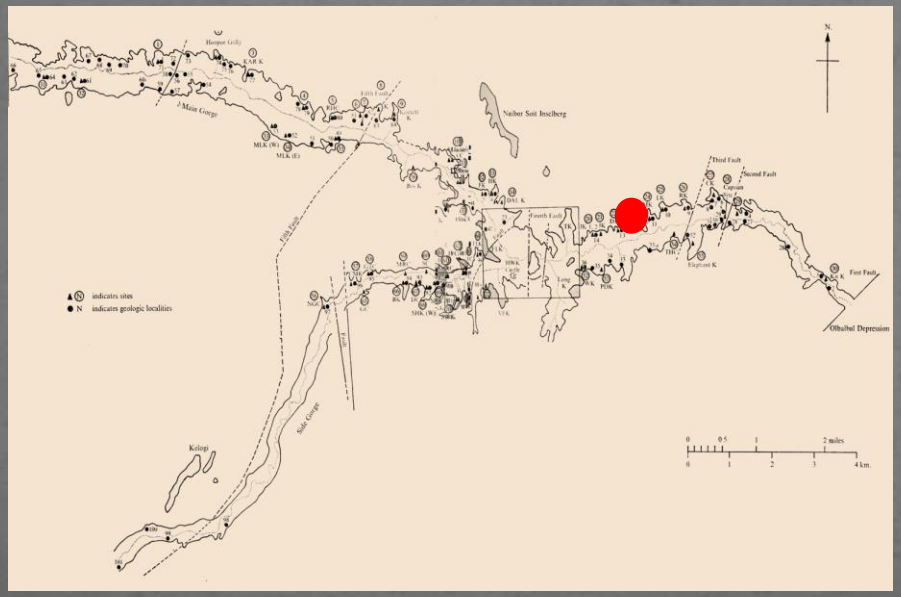

Omo 123


By Gallotti, 2017

Olduvai Gorge

OLDUVAI – BED I- DK





By Gallotti, 2017

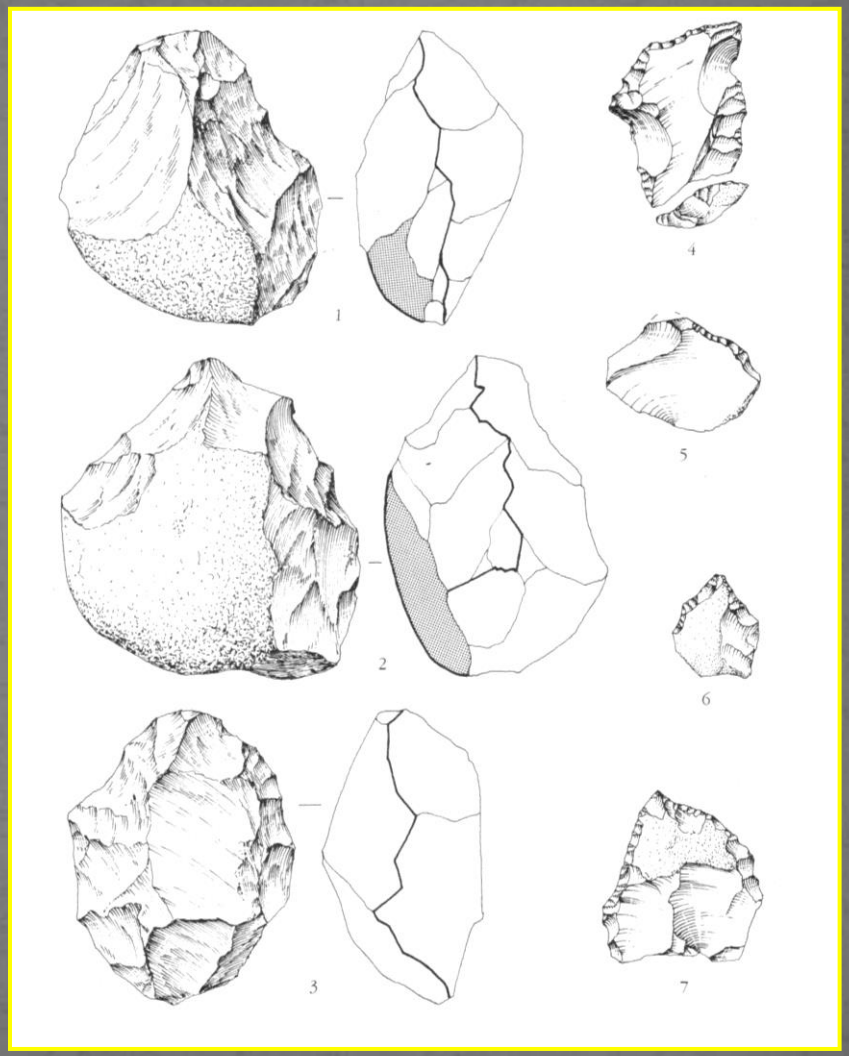
Olduvai – late Oldowan (1.9-1.8 Ma)

Raw materials of local origin
Medium-sized cobbles and tabular blocks

Direct hand-held percussion / **bipolar** percussion

Intra-site **variability** of the flaking methods

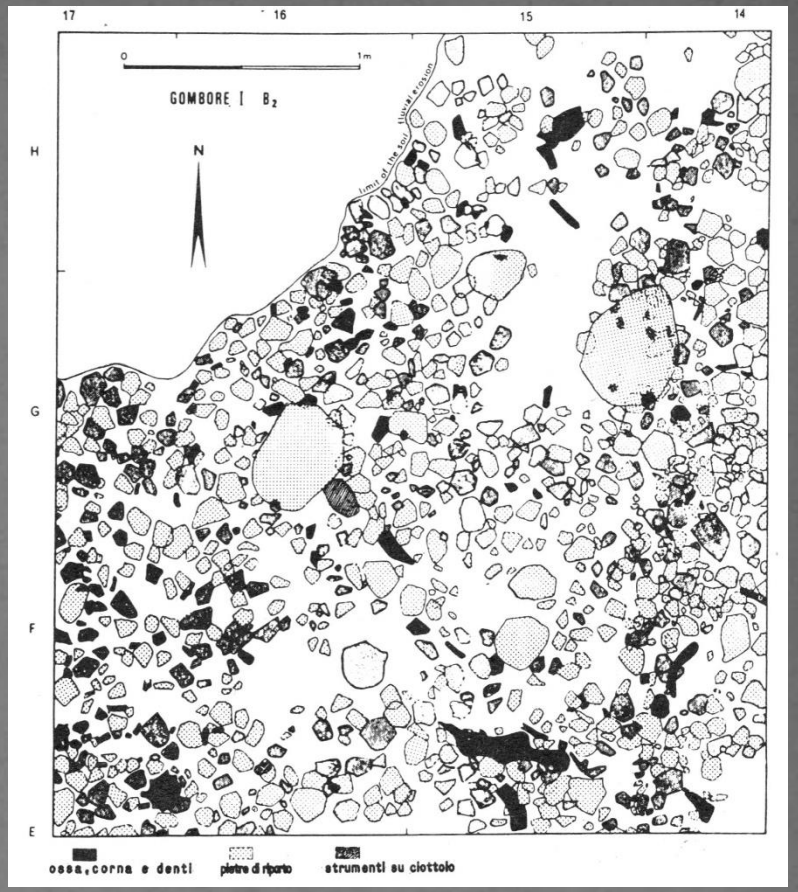
Very few **retouched flakes** – only edge modification



By Gallotti, 2017

Spatial distribution of bones, stones and artifacts at Olduvai and Gomborè IB

Olduvai, sito DK



Gomborè IB

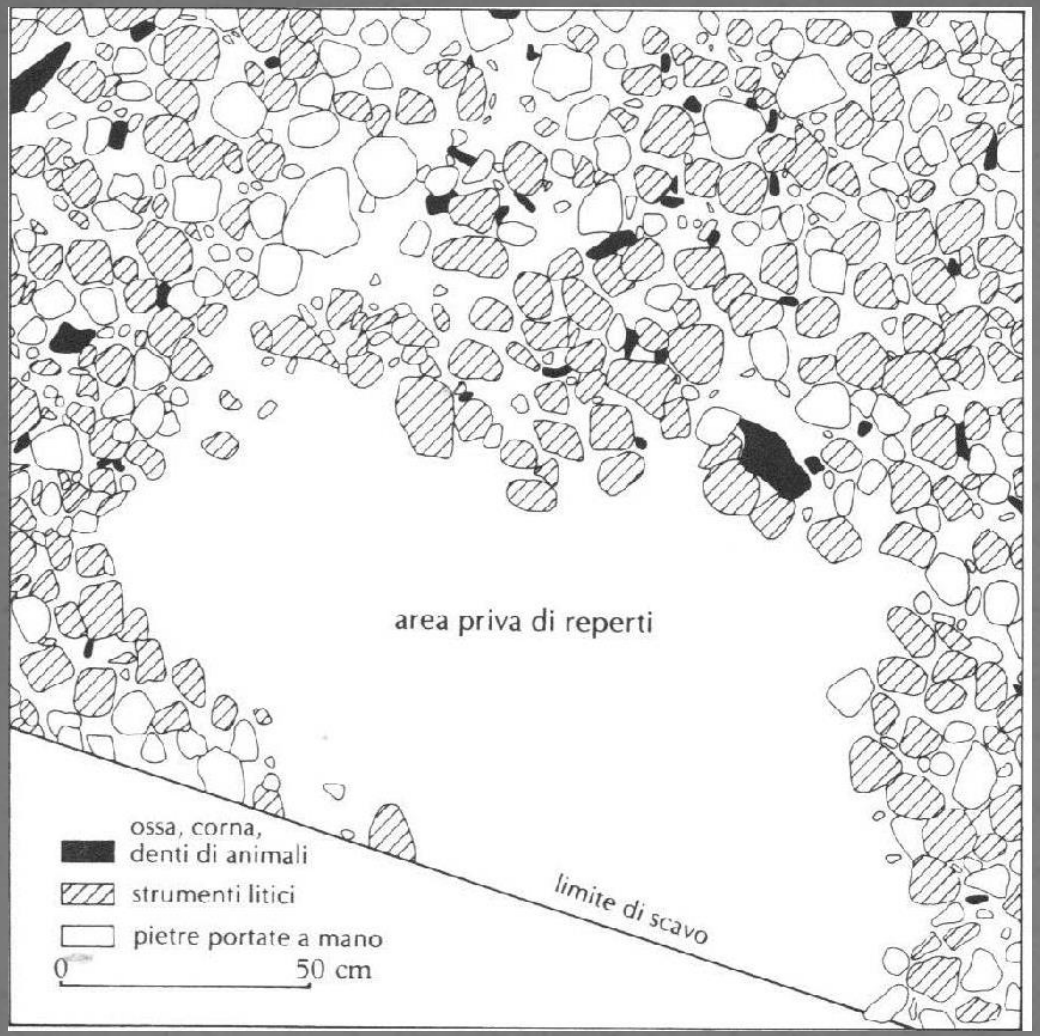
Melka Kunture

By Gallotti, 2017

Bones and artifacts at Melka Kunturè

1Ma

BAMBINI IN ACQUA UN MILIONE DI ANNI FA: SCOPERTE IMPRONTE FOSSILI UMANE IN UN FIUME PREISTORICO A MELKA KUNTURE



Spatial distribution of bones, stones and artifacts at Melka Kunturè

FLK22 from Olduvai

Homo habilis

http://www.olduvaiproject.org/flk-zinj-and-the-zinjanthropus/

Which interaction between humans and carnivores?

- Skeletal part profile debate

Do exist diagnostic patterns for discriminating the modality of accumulation of bones by man from carnivores?

(Binford 1981, O'Connell 1990, 1991, 1992)

- Tooth marks, percussion marks, butchery marks: frequency, localization and association
- Difficulties in marking out the beginning: contrasting evidence

The case of FLK22 (1.90-1.75 Ma) from Olduvai – (Dominguez-Rodrigo 2002)

FLK22 from Olduvai – Zinjanthropus site

Mary and Louis Leakey discovered *Zinjanthropus boisei* (Zinj) at this site known as FLK in 1959, then the oldest significantly intact hominid fossil from Olduvai Gorge.

From the 1960-61 excavation of the Level 22, i.e. the FLK-Zinj layer, Leakey reported approximately 2500 Oldowan stone artifacts and 3500 fossil bone specimens, including remains of *Homo habilis* and *Zinjanthropus* (later renamed *Paranthropus boisei*).

The site is recognized as one of the prime examples of a localized, dense concentration of Oldowan tools and fossilized bones. The significance of the site for understanding the origins of sophisticated hominin behavior, such as foraging strategies, is documented by abundant butchered bones and evidence of repeated transport of portions of at least 48 large mammal carcasses (mostly Bovidae) to this location on the paleolandscape.

The meat-eating behavior of Plio-Pleistocene hominids, responsible for the bone accumulations at the earliest archaeological sites, is still a hotly-debated issue in paleoanthropology.

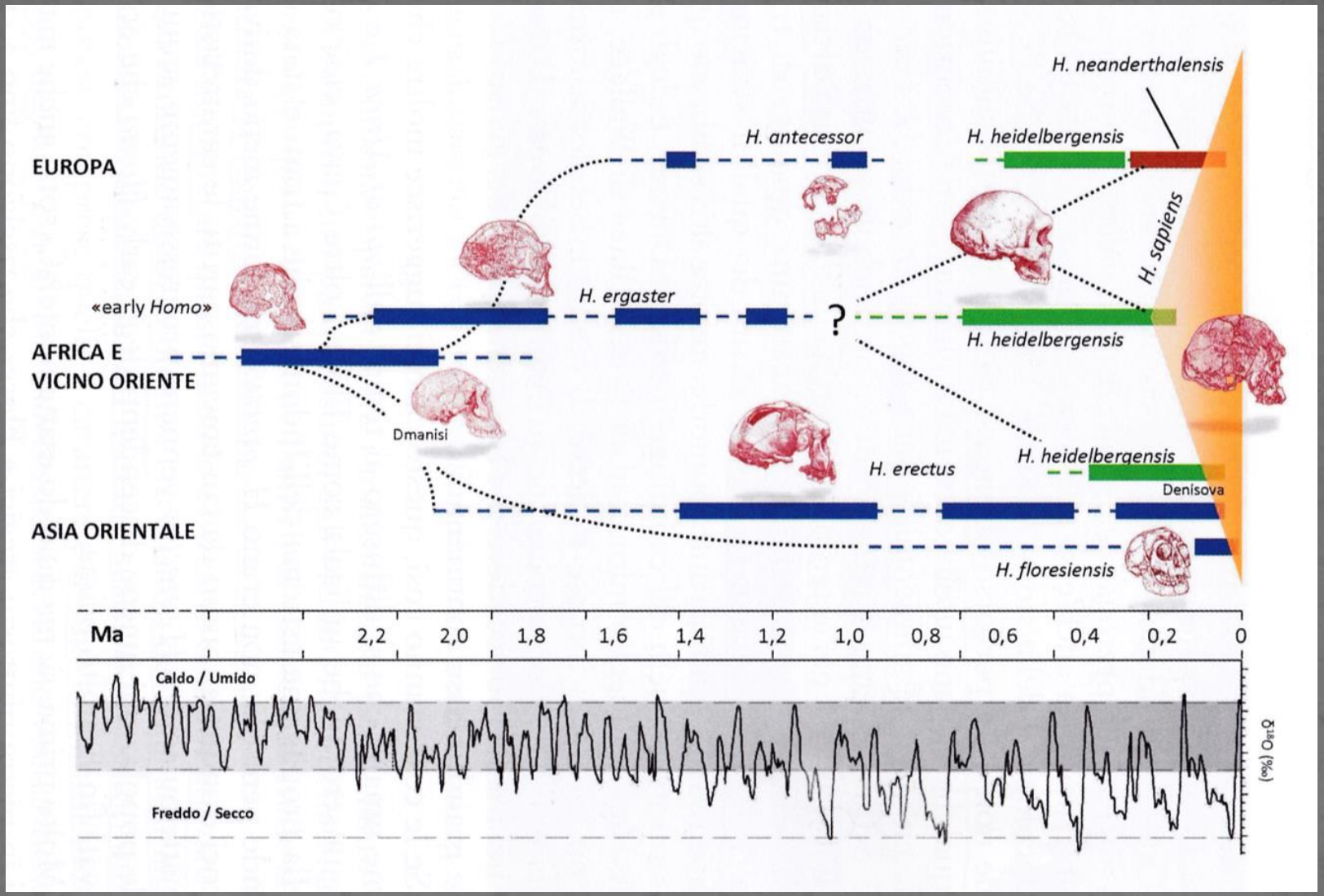
The presence of cut marks on fossil archeofauna is a potential source of information that has not been consistently used as evidence of carcass consumption by hominids. Some authors interpret cut marks as the result of hominids manipulating meat-bearing bones, while others argue that they can also be the result of hominids extracting marginal scraps of carcass flesh that have survived carnivores' initial consumption.

In FLK "Zinj" site, according to experiments and data drawn, it has been suggested that hominids processed meat-bearing bones (on which flesh was abundant) rather than defleshed carcasses from felid kills.

Dominguez-Rodrigo 2002

http://www.ncbi.nlm.nih.gov/pubmed/9467775

Human evolution and climate change



By Manzi, 2014