Stone tools and foraging behavior

"Big one, Thag! . . . We caught biiiiiig one!"

1

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BRYN MAWR COLLEGE CLASS OF 1975

THE SKIN WE'RE IN:
THE EVOLUTION AND MEANINGS OF HUMAN SKIN

TUESDAY, OCTOBER 18, 2022
DALTON 300
4:15 P.M.

RECEPTION WILL FOLLOW ON WYNDHAM TERRACE

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Humans, the consummate tool-makers and users!

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Humans, the consummate tool-makers and users!

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Humans, the consummate tool-makers and users!

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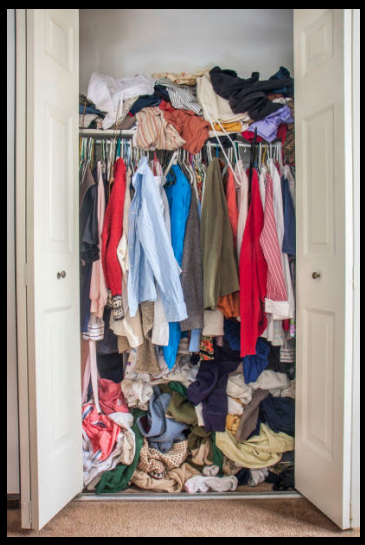
Humans, the consummate tool-makers and users!



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Earliest stone tools (as of now)

- 3.3 Ma, Lomekwi, W. Turkana, Kenya (2015)
- Purposefully modified
- *K. platyops*? *Au. afarensis*? Mystery hominin? (~1/2 million years before oldest known *Homo*)

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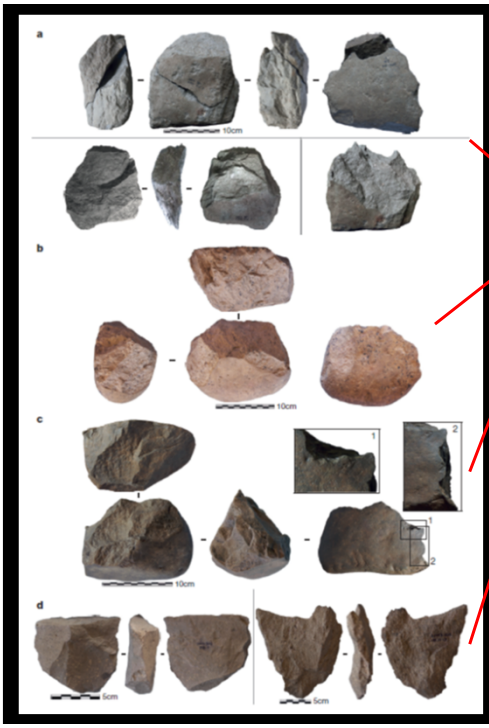

3.3 Ma, Lomekwian stone tools

core (with attached flake)

flakes

- manufactured by basic pounding onto an anvil or "bipolar" knapping on an anvil
- basic pounding known for some non-human primates

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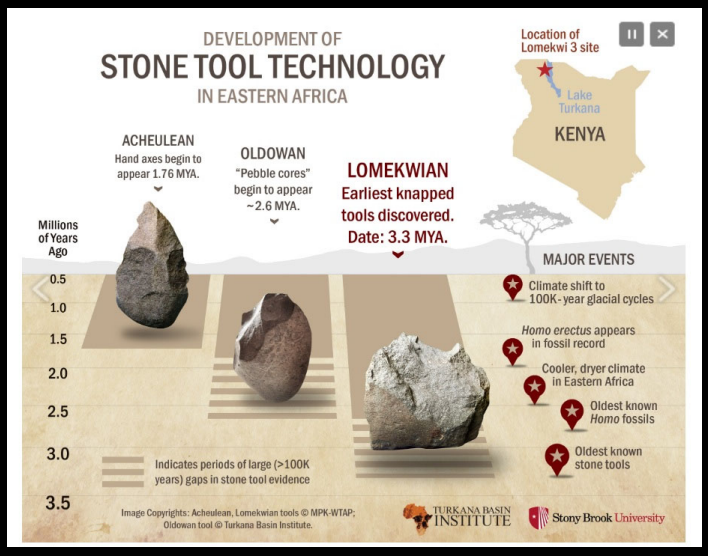
Lomekwian tools



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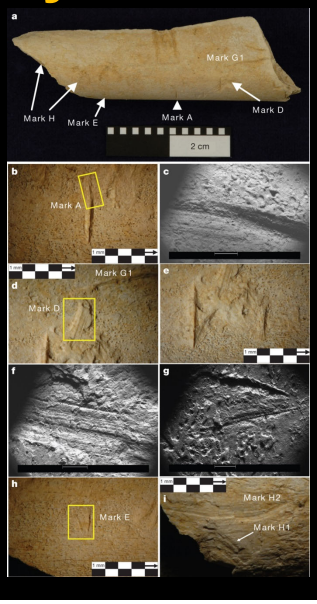
Earliest butchery?

- 3.4 Ma, Dikika, Ethiopia
- Controversial find…
- No stone tools found
- Tool marks? Trampling marks? Crocodile tooth marks?
- *Au. afarensis* known from the site



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Who was the first stone tool maker? What are we not seeing, potentially?

- Digging sticks - non-preserved wooden items may have been part of *Australopithecus* tool kit (??), as in other great apes
- Swartkrans – questionable evidence of bone tool use – digging or working hides (relatively not very efficient)
  - Early *Homo* or *Paranthropus*?

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Who was the first stone tool maker?

- *Au. garhi* - found NEAR stone tools and butchered animal bones (Bouri vs. Gona, Ethiopia, at ~2.6 Ma), but not associated
- *Homo habilis* ASSOCIATED with stone tools - thus, generally considered the first given available evidence

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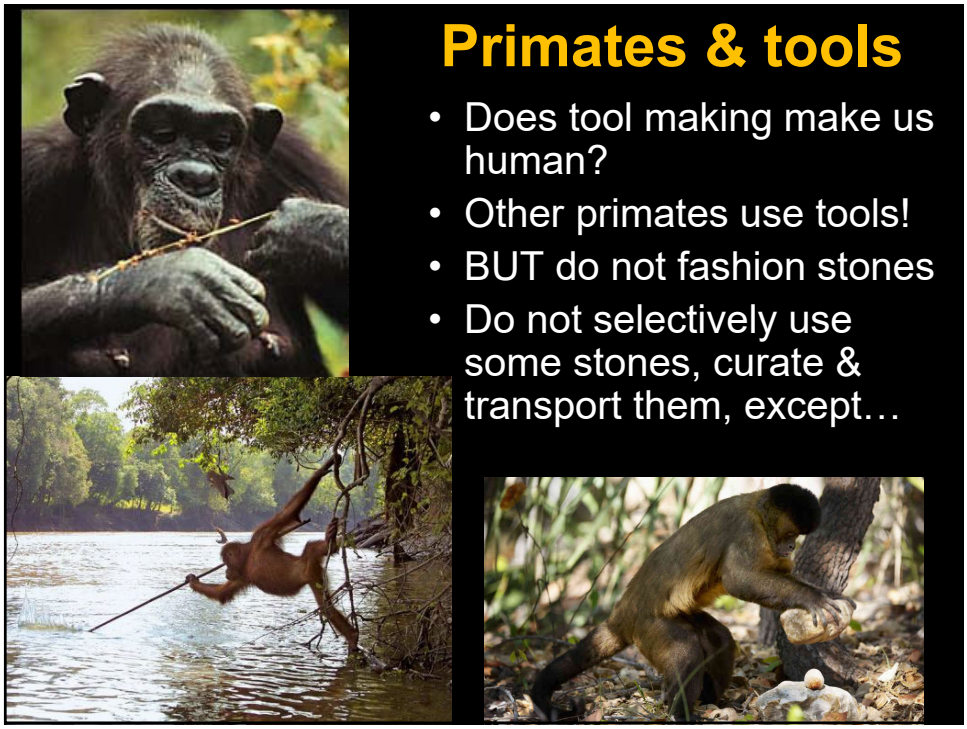
Primates & tools
• Does tool making make us human?
• Other primates use tools!
• BUT do not fashion stones
• Do not selectively use some stones, curate & transport them, except…

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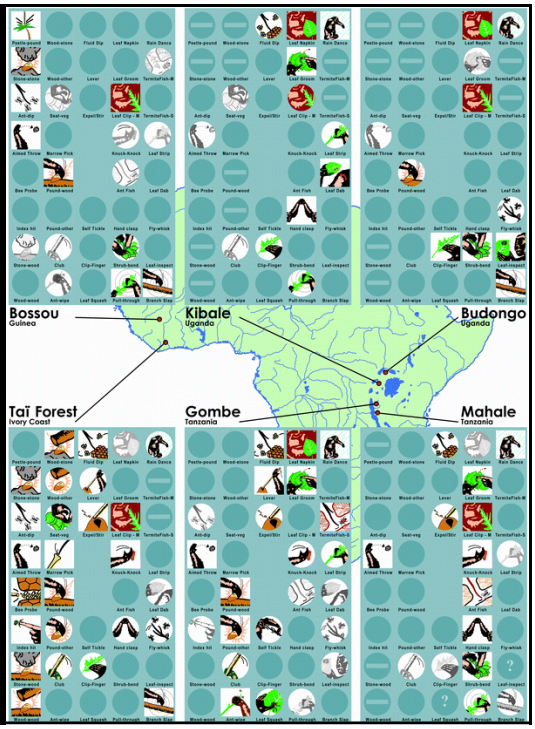
Regional cultural traditions in chimpanzees

- Primarily in the context of extractive foraging



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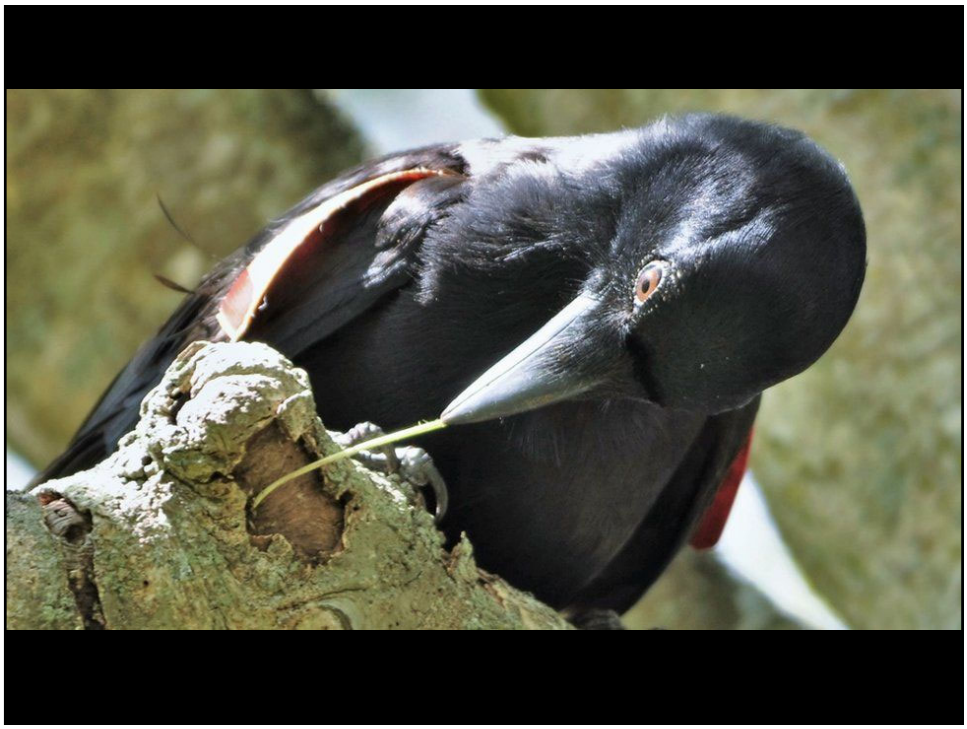

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Stone tools

- Can be made from virtually all rocks
- Best: hard, easily fractured, smooth & homogenous internal consistency (siliceous)
  - e.g. flint in Europe, chert in N. America, obsidian (aka volcanic glass)
- Africa: quartzites & igneous rocks common
  - more difficult to work

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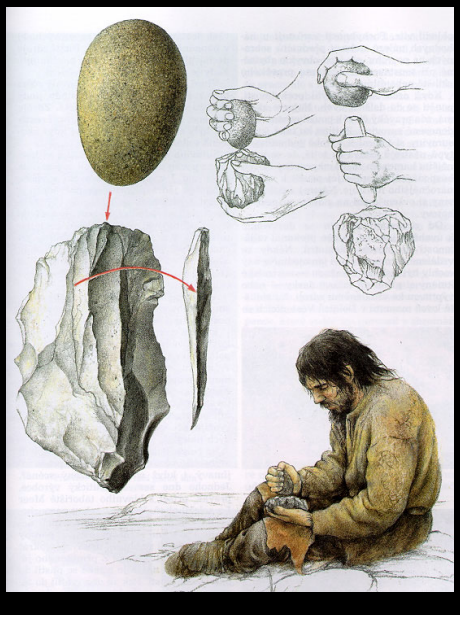
Stone knapping



- Striking flakes off central core
- Can be further retouched/resharpened
- A carefully prepared core controls shape & size of flakes

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Oldowan tool industry

- ~2.6 Ma,
- Gona, Ethiopia (early site)
- Found at every site early *Homo* is found
- Simple to make, using readily available raw material
- Microwear - majority of tools used for processing meat (cutting & skinning)

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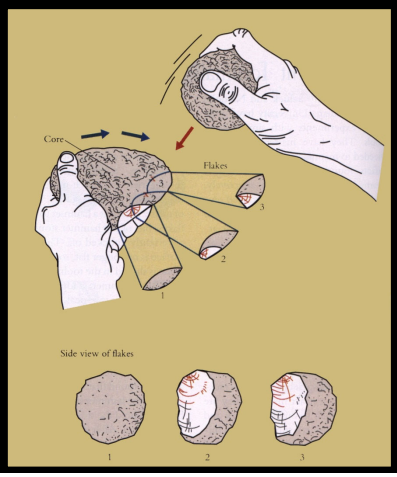
Oldowan tool industry

- Non-standardized (relative to what came later in time)
- BUT good material carried some distance



- Fashioned in one place, finished in another
- Foresight & knowledge of environment needed
- Planning not seen in non-human primates
- Choncoidal fracture patterns (understands stone fracture patterns)

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Choncoidal fracture

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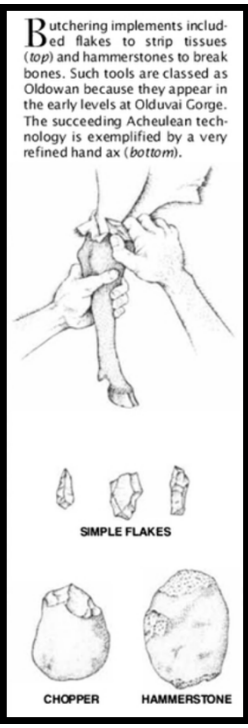

from Blumenschine & Cavallo (1992)

Experimental evidence

Butchering an elephant carcass using flakes (Nick Toth)

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PNAS

Earliest known Oldowan artifacts at >2.58 Ma from Ledi-Geraru, Ethiopia, highlight early technological diversity

published June 2019

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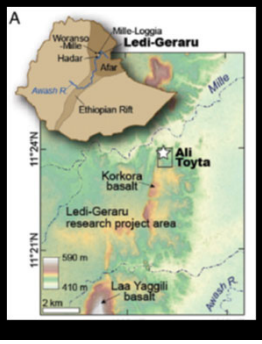
Bokol Dora 1 site (BD 1)
Ledi-Geraru, Ethiopia
2.61 Ma



Significance

Humans are distinguished from all other primates by their reliance on tool use. When this uniquely human feature began is debated. Evidence of tool use in human ancestors now extends almost 3.3 Ma and becomes prevalent only after 2.6 Ma with the Oldowan. Here, we report a new Oldowan locality (BD 1) that dates prior to 2.6 Ma. These earliest Oldowan tools are distinctive from the 3.3 Ma assemblage and from materials that modern nonhuman primates produce. So, although tool production and use represent a generalized trait of many primates, including human ancestors, the production of Oldowan stone artifacts appears to mark a systematic shift in tool manufacture that occurs at a time of major environmental changes.

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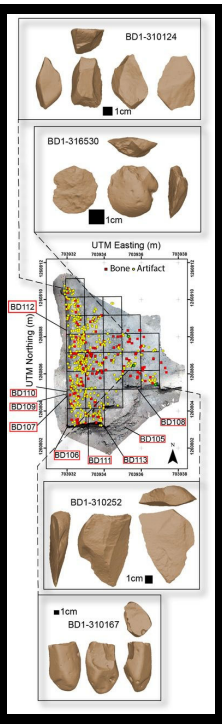

BD 1 site (Ethiopia) 2.61 Ma

- Another discovered early Oldowan industry assemblage
- Earliest evidence for onset of hominin knowledge of sequential flake removal & systematic flake production (common to all Oldowan)
- Earliest use of “free hand” knapping (common to all Oldowan)
- Technologically distinct from older Pliocene technologies (e.g., Lomekwi) and from tool use seen in non-human primates

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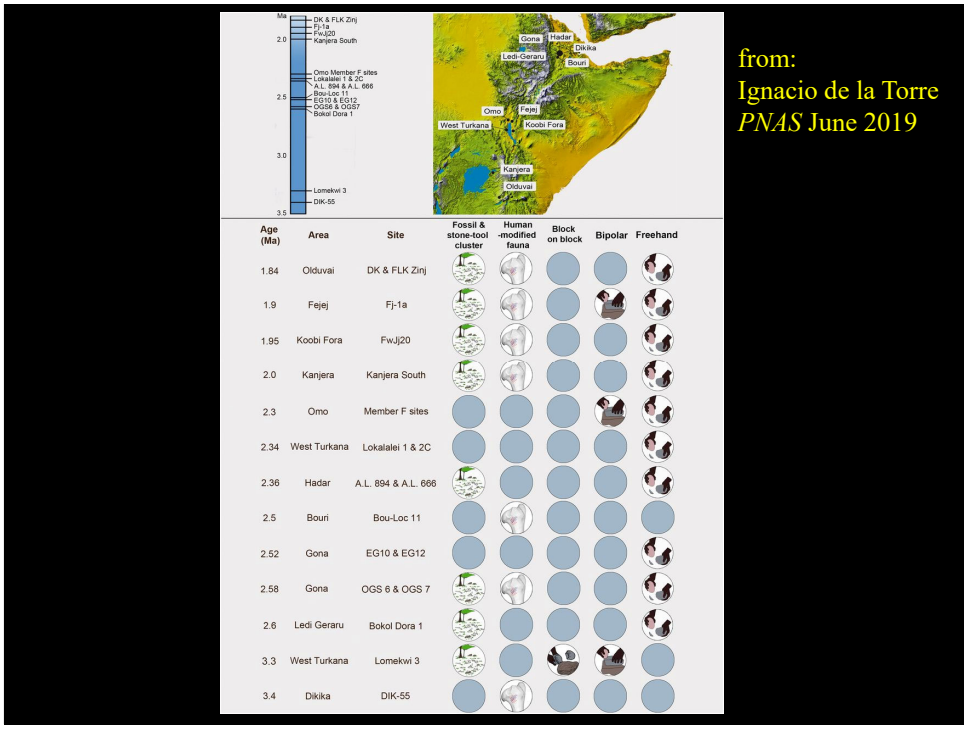

from:
Ignacio de la Torre
PNAS June 2019

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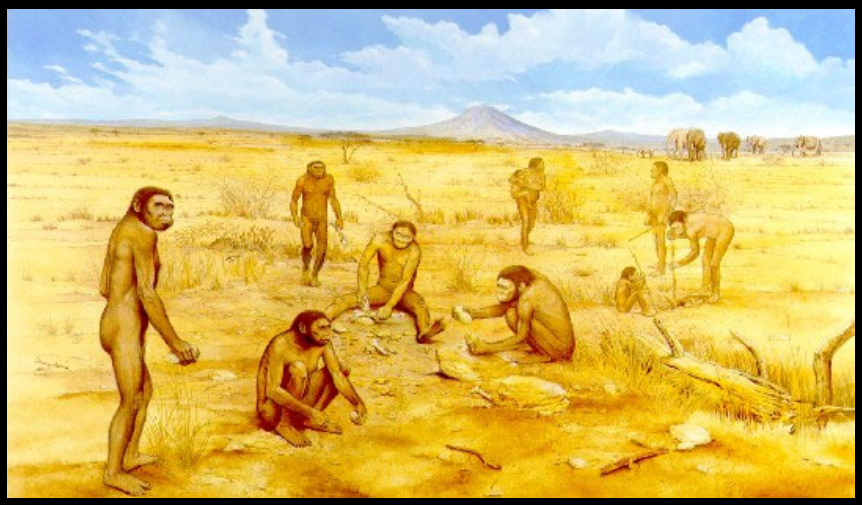
Homo habilis = handy man

Oldowan tool culture (Olduvai Gorge)



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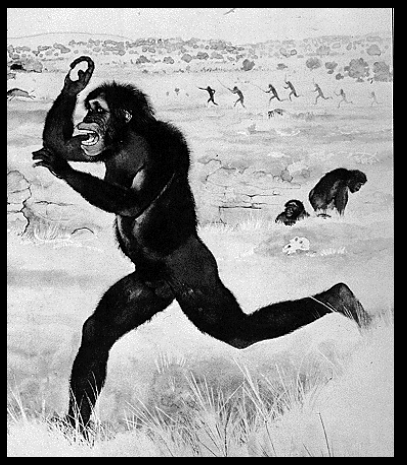
"Man the Hunter"?

- Idea dates back to Darwin's time
- Resurrected in mid 1960s - idea that hunting selects for intelligence
- Backlash in 1970s & 1980s – argued gathering more important
- Modern hunter-gatherers get 80+% of protein from gathered foods - nuts, tubers & small mammals



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Archeological evidence

- Olduvai Bed I (2-1.5 Ma): Association of stone tools & animal bones
- Hominins, or other depositional forces? (e.g., carnivores)
- Home base? Butchering site? Quarrying site?

Difficult to interpret!

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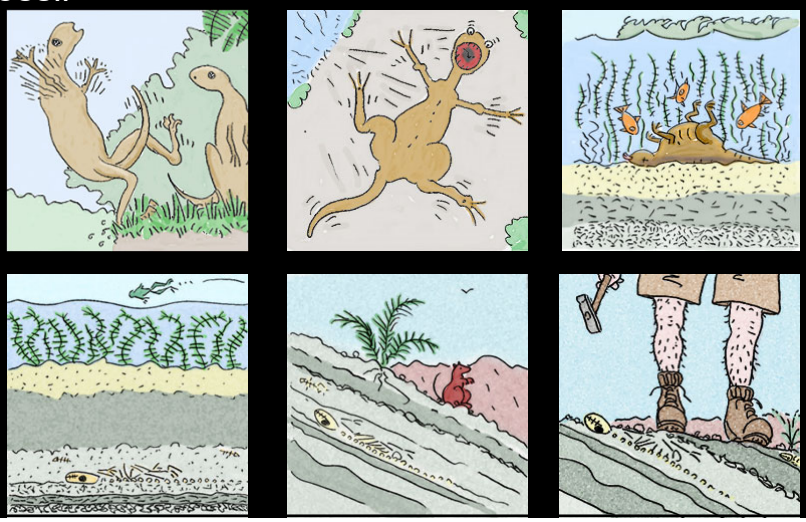
Taphonomy

Study of the processes that affect animal & plant remains from when it died to when it becomes a fossil



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Taphonomy of Olduvai bone assemblage

- Water did not deposit the bones in the beds (strata) at Olduvai - no sorting of bones by size (winnowing) as water does
- The deposition was not due to death of large number of animals at one site - there are many different taxa & these are jumbled together

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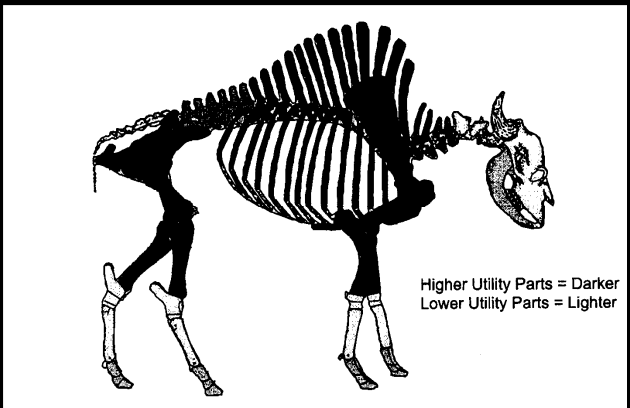
Representation of bones at Bed I



- Lots of large mammal bones - particularly from meat-rich areas of the skeleton
- Suggests site was used to process animal remains - deflesh, extract marrow etc.

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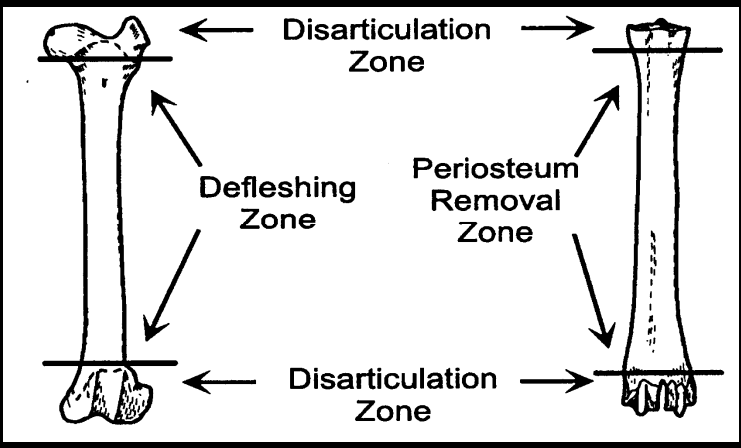
Hunting vs. scavenging



Hunting = most cut marks on bones with greatest utility

Scavenging = most cut marks on low utility body parts

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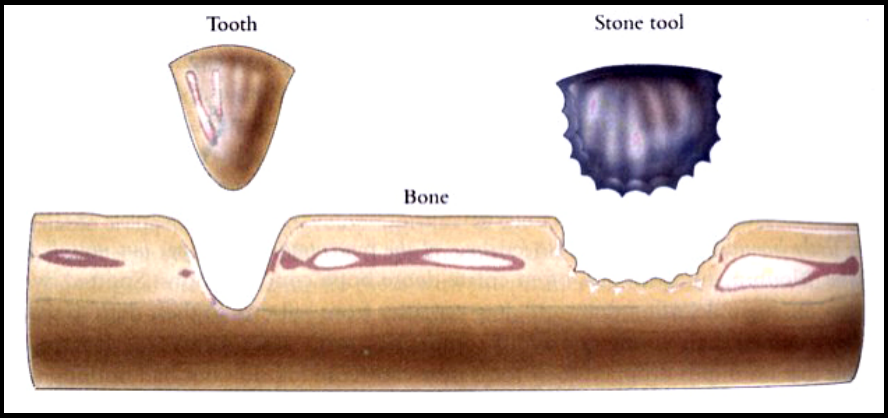
Cut marks on bones?



Carnivore teeth can leave similar marks

Cut marks appear on top of tooth marks - indicates scavenging

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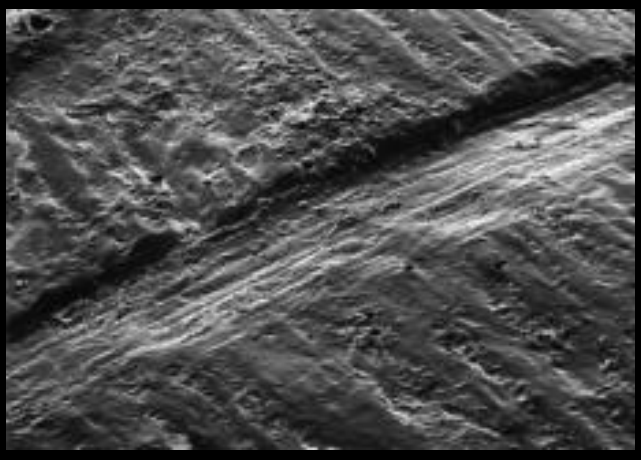
Scanning electron micrograph image of stone tool cut marks on fossil zebra bone



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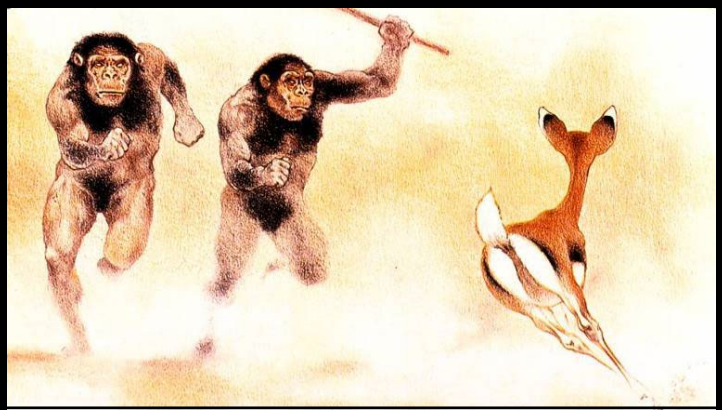
Kanjera hominins: Early access to small prey, late access to larger prey, low onsite competition, low damage frequencies. *Hunting of small prey, passive scavenging of large?*

FLK Zinj (Olduvai) hominins (~1.8 Ma): Higher frequencies of stone tool *and* carnivore damage, early access to large animals. *Aggressive scavenging from large felids, and before hyenas?*



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- Early *Homo* were opportunistic omnivores?
- Wide range of 'prey' species found
- Scavenging large animals while hunting small ones (+ gathering nuts, tubers etc.)

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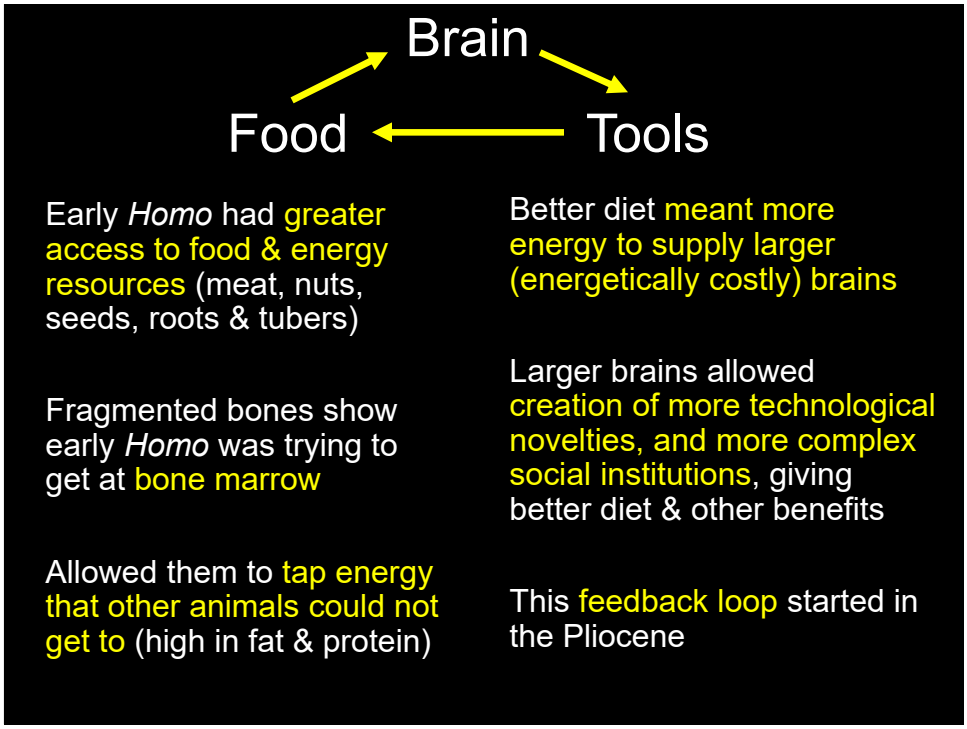
Brain
Food
Tools
Early *Homo* had greater access to food & energy resources (meat, nuts, seeds, roots & tubers)
Fragmented bones show early *Homo* was trying to get at bone marrow
Allowed them to tap energy that other animals could not get to (high in fat & protein)
Better diet meant more energy to supply larger (energetically costly) brains
Larger brains allowed creation of more technological novelties, and more complex social institutions, giving better diet & other benefits
This feedback loop started in the Pliocene

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