- biology v. behavior
- animal bones
  - cut, percussion & tooth marks
- earliest arch sites
  - 2.6-1.8 mya
  - Gona; W. Turkana; Koobi Fora; Olduvai Gorge
- stone technology
  - unmodified: raw material
  - modified: hammer; core; flake; tool
- stone transport
- early interpretations
  - home-base hypothesis
- carnivore competition
- scavenging v. hunting
- is it culture?

Plio-Pleistocene Cast of Characters

- Extinct by 2.5-2.0 mya
  - *Sahelanthropus* sp.
  - *Orrorin* sp.
  - *Ardipithecus ramidus*
  - *Australopithecus anamensis*
  - *Kenyanthropus platyops*
  - *Australopithecus afarensis*
  - *A. africanus*
  - *A. aethiopicus*

- Surviving after 2.5 mya
  - *Australopithecus boisei*
    - eastern Africa only
  - *A. robustus*
    - southern Africa only
  - early *Homo*
    - one or more species
    - *Homo habilis*
    - *Homo rudolfensis*
    - *Homo ergaster (erectus)*
      - after 1.8 mya
      - come back next class…

early *Homo*
2.5-1.6 mya

“robust” australopithecines
2.5-1.1 mya

- KNM-ER 1813
  - Koobi Fora 1.9 mya
- "brain" "software"
- "brawn" "hardware"

Early Stone Technology

- Oldowan Chopper 1.8 mya
- OH5
  - Olduvai 1.8 mya
Oldowan Industry 2.6-1.6 mya
- name from Olduvai Gorge but broad now
- earliest sites
  - Gona, Ethiopia 2.6-2.5 mya
  - Omo (Shungura F), Ethiopia, 2.3-2.4 mya
  - Lokalalei, Kenya 2.34 mya
  - Fejej, Ethiopia 2.3 mya
  - Hadar, Ethiopia (AL-666), 2.3 mya
- abundant sites
  - Olduvai Gorge and Koobi Fora 2.0-1.6 mya
  - Southern Africa 1.8-1.5 mya

Who is responsible for earliest sites?

“brain” → tool maker?
“brawn” → not tool maker?

Geographic and Temporal Coincidence
multiple hominid species & arch sites

not so simple!

big-brained humans are not the only tool users!!
elements of stone technology

- Raw Material = unused but transported stone
- only some stone types can be used for making flaked stone tools…
  - brittle, homogeneous, isotropic
  - SiO$_2$ → obsidian (volcanic glass), chert, quartzite

- hammer = stones used for percussion
- core = stone used as a source of sharp flakes
- flake = sharp-edged pieces of stone detached from cores

- tool = flakes with edges shaped or modified by removing many smaller flakes

Oldowan Sites

- moderate amounts of unused raw materials (“manuports”)
- many cores with evidence of several (2-7) flake removals each
- many apparently unutilized flakes
- very small numbers of utilized flakes and modified tools

North American Clovis Points ca. 11 ka
- Oldowan core and “tool types”
- What is the cause for variability?
- Social learning OR something simpler?

Many early sites show associations between stones and bones

Assumption...
- Stone tools used in acquisition and extraction of animal resources

Interpretations of stone-bone associations
- Home Base Hypothesis
- Modern hunter-gatherer camps taken as basic model for formation of stone-bone associations

Transported 10-15 km very different from chimps!

Assumed all of the social and cultural features of modern hunter-gatherers too...
hominids with stone tools not the only possible bone accumulator!

- when archaeologists started looking turned out that many bones at presumed archaeological sites bore tooth marks!

only definitive proof of hominid involvement!

hammer stone percussion mark

stone tool cut mark
the competition!!!

- at least 10 large-bodied mammalian predators
  - open environments: lion, hunting hyena, spotted hyena, brown hyena, striped hyena, hunting dog
  - closed environments: saber-tooth cats (Megatherium, Smilodon, Homotherium), leopard

- how did hominids compete?
  - Hunting (first access → search strategies)
  - Active Scavenging (mid → group intimidation)
  - Passive Scavenging (last access → search strategies)

carnivore succession at a carcass...
saturated ecological system?
or room for hominids?
Is it culture? Is learned behavior advantageous for…

- stone technology?
  - YES: knowledge of where stone resources are located and how different types of stone may be used

- competition with large-bodied carnivores?
  - YES: how and what to do when animal resources are encountered in different environments

**Conclusion…**

- stone technology evolved in response to selective pressures favoring the acquisition and extraction of animal resources