- biology v. behavior
- earliest arch sites
  - 2.6-1.8 mya
  - Gona; W. Turkana; Koobi Fora; Olduval Gorge
- site types
  - stone technology only
  - stone & bones
  - animal bones only
- early interpretations
  - home-base hypothesis

• stone technology
  - unmodified: raw material
  - modified: hammer; core; flake; tool
  - stone transport

• animal bones
  - cut, percussion & tooth marks

• carnivore competition
• scavenging v. hunting
• is it culture?

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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…
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early Homo
2.5-1.6 mya

“robust” australopithecines
2.5-1.1 mya

OH5
Olduvali
1.8 mya

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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”
Geographic and Temporal Coincidence
multiple hominid species & arch sites

Oldowan Chopper 1.8 mya

Early Stone Technology

Who is responsible for earliest sites?

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

• Oldowan Industry 2.6-1.6 mya
  – name from Olduvai Gorge but now found throughout East Africa
  – earliest sites
    • Gona, Ethiopia 2.6-2.5 mya
    • Lokalalei, Kenya 2.34 mya
    • Shungura Fm Member F, Ethiopia, 2.34 mya
  – abundant sites
    • Olduvai Gorge and Koobi Fora 2.0-1.6 mya
big-brained humans are not the only tool users!!

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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

assumed all of the social and cultural features of modern hunter-gatherers too…
Site Types

1. stones only
2. bones WITH cut marks
3. stones and bones WITH cut marks

Complex mix of agents responsible for formation of early archaeological sites

elements of stone technology

- Raw Material = unused but transported stone
- only some stone types can be used for making flaked stone tools...

• stone raw materials
  - brittle
    • fractures easily
    • fracture follows a single crack that propagates under applied force
  - homogeneous
    • material is composed of a uniform mix of constituents (e.g., crystal sizes)
  - isotropic
    • material is structurally similar in all directions

• 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 modified by removing many smaller flakes

North American Clovis Points ca. 11 ka

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
• stone transport…

Olduvai Gorge 2.0 – 1.6 mya
Stone Transport Patterns
transported 10-15 km
very different from chimps!

• what about the bones?
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 (*Megantereon, Smilodon, Homotherium*), leopard

Hominids as Prey!

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carnivore succession at a carcass...
saturated ecological system?
or room for hominids?
• how did hominids compete?
  – Hunting (first access ➔ search strategies)
  – Active Scavenging (mid ➔ group intimidation)
  – Passive Scavenging (last access ➔ search strategies)

• Is it culture? Is learned behavior advantageous in the organization of...
  – 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