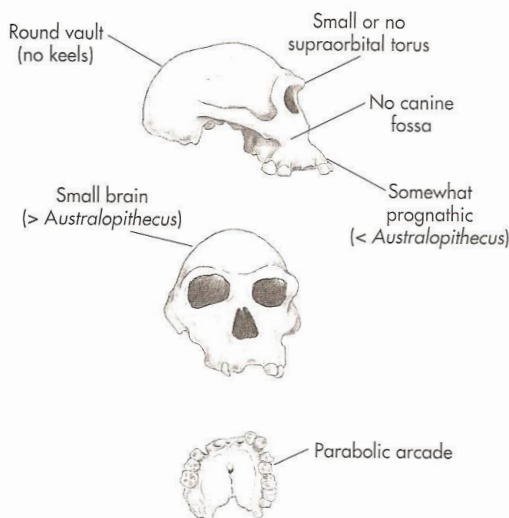


Evolution of the Genus *Homo*

PART ONE - Early *Homo*

Around 2 mya, the lineage leading to *Homo* evolved in Africa, most likely from a gracile australopithecine ancestor. This lineage demonstrates a broader environmental adaptation with increased dietary flexibility, in other words, a change in *adaptive strategy* (Hens 2008:194). Early members of the genus *Homo* have been found in both East Africa and South Africa. They range in time from 2.4 to 1.4 million years ago. The earliest known member of our genus was discovered by Louis and Mary Leakey in Olduvai Gorge, Tanzania in East Africa. Named *Homo habilis*, or “**Handy man**,” the Leakeys firmly believed that this hominid was the maker of the stone tools they had found along with it. Although *H. habilis* was similar to *Australopithecus africanus* in many ways (especially in terms of limb proportions; i.e., relatively longer arms than legs and small stature), its brain was significantly larger (cranial capacity ranges from 650 – 775 cc; this is 25% to 40% larger than any australopith) and its face and dentition smaller (see illustration below).

Anatomical Features of *Homo habilis*



The tools fashioned by *H. habilis* were called **Oldowan** style tools and consisted of a multi-purpose “smasher-basher” core tool, and a razor sharp flake tool used to slice & scrape meat from bones. These tools were produced by striking a hammerstone rock against a large cobblestone, which would chip off a flake and produce a jagged edged core---two tools from one action. The introduction of stone tools was revolutionary for it allowed hominids to exploit a new food resource more safely, efficiently, and with more regularity: meat and bone marrow. These high-energy, calorie packed foods are just what is needed for a growing brain and a more active lifestyle. This also led to changes in dentition, as now hominids can rely on tools they manufacture rather than their teeth for food processing.

Homo habilis, with its small size, still faced formidable challenges from big predators. It is therefore unlikely that *habilis* was hunting prey any bigger than itself. Rather, the archaeological record overwhelmingly supports a **scavenging** way of life, which demands a keen sense of animal activity patterns and the environment. Leg bones, usually the leftovers from a leopard’s or a lion’s meal since they contain the least amount of meat, have been found with cut marks made by stone tools in association with *H. habilis* remains. The bones have been smashed open, and the marrow extracted---something no carnivore could accomplish with teeth alone.

At the table for comparison are the skulls of *Homo habilis*, *Homo sapiens* and *Aus. africanus*. Describe the condition of *Homo habilis*, using *H. erectus* and *Aus. africanus* as a basis of comparison.

TRAIT	Homo habilis
Size of braincase in relation to overall size of skull	
Forehead shape	
Sagittal crest?	
Occipital shape	
Shape of base of skull	
Browridge size/shape	
Facial prognathism	
Shape of mouth (broad? Narrow?)	
Appearance of canines	
Size of molars in relation to other teeth	

➤ Based on your observations of the skulls at the lab table, does *Homo habilis* appear:

- 1) More ape-like or more human like?
- 2) List the specific features contributed to your conclusion?

➤ Consider *Homo habilis* in relation to the australopithecines you examined in this lab & the Early Ancestors lab. List THREE key differences in cranial anatomy that distinguish between the two genera (*Homo* vs. *Australopithecus*)?

- 1)
- 2)
- 3)

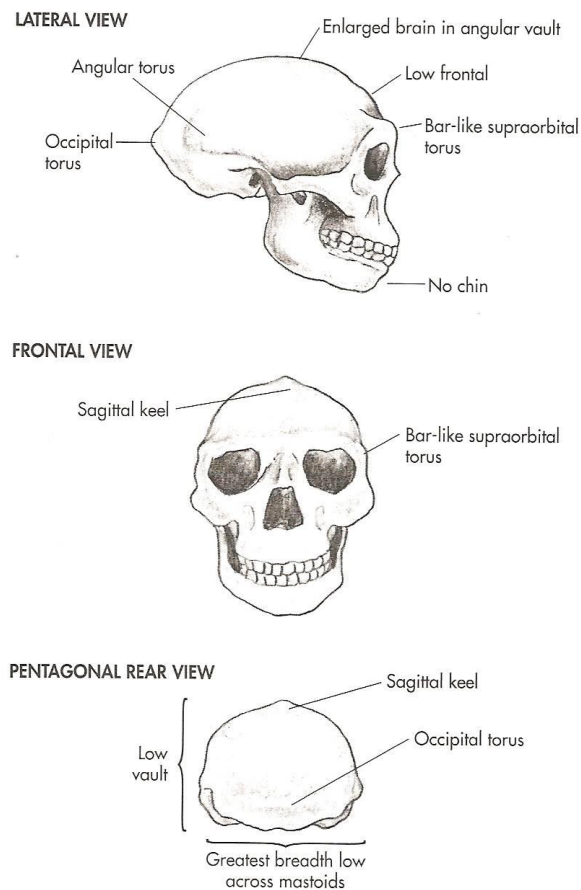
PART TWO: Later *Homo* Hominids

*Adapted from *Exploring Physical Anthropology: A Lab Manual & Workbook* (Walker 2007) and *Method & Practice in Biological Anthropology: A Workbook & Laboratory Manual for Introductory Courses* (Hens 2008)

INTRODUCTION: *Homo erectus* and descendants

Around 2 mya, the hominids underwent a major adaptive shift in body size and in cultural innovations. Closely following early populations of *Homo habilis*, a new type of hominid appears. This species is known as ***Homo erectus***, or “Upright walking man.” The age range for *Homo erectus* is **2 my to as recent as 250,000 years ago**. Unlike the short, australopithecine sized *habilis*, *Homo erectus* was very tall and much more muscled and robust than modern humans. Brain size again increased dramatically with a cranial capacity of 850-1100 cc. The crania belonging to this species of *Homo* have some very distinct features which are reviewed below in the illustration.

Anatomical features of *Homo erectus*



Behaviorally, *Homo erectus* is also distinct from other hominids. For one, some members of this group were presumably the first to leave the African continent. *Homo erectus* sites/remains have been uncovered in Asia, Southeast Asia, North, East and South Africa, and in some parts of Europe, making it the widest ranging hominid besides modern humans. Changing climates, growing populations, and pressure on resources probably led some segments of erectus populations to search for food, shelter and water in other places. It has also been suggested that *Homo erectus* may have been following the movements of migratory animals, which archaeological evidence shows they were now **hunting** with some regularity. In addition, they were the first hominid known to control (not make) fire; again, suggesting increased intelligence and a keen sense of the environment. Cooking food, especially meat, makes it easier to chew and digest. Less and less pressure for the teeth to be used as food processing tools is reflected in the very modern human-like appearance of *H. erectus* dentition.

Finally, the stone tools made by *Homo erectus* were more developed than the *Oldowan* style tools made by *Homo habilis* and represented more manipulation and control over the size and shape of the tools. The tool tradition or style associated with *H. erectus* is known as the **Achuelean**. A typical Achuelean tool is a large, bifaced, often tear-drop shaped tool called the **hand axe**. Hand axes are found in Africa and Europe but NOT in eastern Asia. Experiments show that this tool was probably used on meat, bone, wood, and hides and have been referred to as the “Swiss Army knife of the Lower Paleolithic.”

Cranial-dental comparisons of Later Hominids

Instructions: Go to the table where the skulls of *Homo erectus* (1.7 mya – 350,000 ya), and *Homo ergaster* (1.8 mya – 350,000 ya) have been placed. *Homo ergaster* comes from Africa and is considered a separate, but related species to *Homo erectus*. The distinction between these two species of Pleistocene hominids is based on cultural (differences in stone tool technology) and geographical differences. (NOTE: There is still debate over whether *Homo erectus* & *Homo ergaster* represent different species, or are simply indicative of a range of variation due to different selective pressures operating on the geographically distinct populations.)

For each of the traits listed below, describe the condition for *Homo erectus* and *Homo ergaster*.

	<i>Homo erectus</i>	<i>Homo ergaster</i>
Age Range of species	1.7 my – 350,000 years	1.8 my – 350,000 years
Cranium size: (in relation to overall skull)		
Forehead shape: (sloped or rounded)		
Browridges		
Sagittal keel (ridge) present?		
Degree of facial prognathism		
Occipital contour: (rounded/compressed)		
Viewed from the back, is cranial vault high or broad & wide?		
Appearance of zygomatic arches (robust? narrow? flaring?)		
Shape of dental arcade (mouth)		
Anterior tooth size (including appearance of canines)		
Size of molars (relative to front teeth)		

PART THREE: SPECIES COMPARISONS

Compare the cranio-dental morphology of *Homo erectus* to *Homo ergaster*. Describe the similarities and differences you observe between the two below.

Cranio-dental Similarities -

Cranio-dental Differences -

PART FOUR: ANALYSIS & REVIEW

1. From the lab worksheet, you learned that two major developments occurred with *Homo habilis* that set the stage for further *bio-cultural* developments in our genus. Name the two developments and relate them to the changes in cranial anatomy you observed.
2. Based on your reading of the cover sheet and the info from the video (In Search of Human Origins, Episode 2), what new behaviors (i.e. cultural innovations) appeared with *Homo erectus*?
3. Identify TWO cranio-dental features that reflect the changes you described above.