Homo habilis
Smithsonian Museum of Natural History
http://humanorigins.si.edu/evidence/human-fossils/species/homo-habilis
**Homo habilis**

**Nickname:** Handy Man

**Where Lived:** Eastern and Southern Africa

**When Lived:** 2.4 million to 1.4 million years ago

This species, one of the earliest members of the genus *Homo*, has a slightly larger braincase and smaller face and teeth than in *Australopithecus* or older hominin species. But it still retains some ape-like features, including long arms and a moderately-prognathic face.

Its name, which means ‘handy man’, was given in 1964 because this species was thought to represent the first maker of stone tools. Currently, the oldest stone tools are dated slightly older than the oldest evidence of the genus *Homo*.

**Year of Discovery:** 1960

**History of Discovery:**

A team led by scientists Louis and Mary Leakey uncovered the fossilized remains of a unique early human between 1960 and 1963 at Olduvai Gorge in Tanzania. The type specimen, OH 7, was found by Jonathan Leakey, so was nicknamed "Jonny's child". Because this early human had a combination of features different from those seen in *Australopithecus*, Louis Leakey, South African scientist Philip Tobias, and British scientist John Napier declared these fossils a new species, and called them *Homo habilis* (meaning 'handy man'), because they suspected that it was this slightly larger-brained early human that made the thousands of stone tools also found at Olduvai Gorge.
**Height:** average 3 ft 4 in - 4 ft 5 in (100 - 135 cm)

**Weight:** average 70 lbs (32 kg)

We don’t know everything about our early ancestors—but we keep learning more! Paleoanthropologists are constantly in the field, excavating new areas, using groundbreaking technology, and continually filling in some of the gaps about our understanding of human evolution.

Below are some of the still unanswered questions about *Homo habilis* that may be answered with future discoveries:

1. **Was** *H. habilis* on the evolutionary lineage that evolved into later species of *Homo* and even perhaps our species, *Homo sapiens*?
2. **Are** *H. habilis* and *Homo rudolfensis* indeed different species, or are they part of a single, variable species? Or was one the ancestor of the other?
3. **If** *H. habilis* is not the ancestor of *Homo erectus*, how does it fit into our evolutionary tree?
4. *H. habilis* is one of the earliest members of the genus *Homo*. Was there a relationship between the origin of this genus and climate change – either with an increased period of climatic fluctuations, or major episodes of global cooling and drying leading to the spread of C4 grasslands?

**First paper:**


**Other recommended readings:**


**How They Survived:**

Early Homo had smaller teeth than Australopithecus, but their tooth enamel was still thick and their jaws were still strong, indicating their teeth were still adapted chewing some hard foods (possibly only seasonally when their preferred foods became less available). Dental microwear studies suggest that the diet of *H. habilis* was flexible and versatile and that they were capable of eating a broad range of foods, including some tougher foods like leaves, woody plants, and some animal tissues, but that they did not routinely consume or specialize in eating hard foods like brittle nuts or seeds, dried meat, or very hard tubers.

Another line of evidence for the diet of *H. habilis* comes from some of the earliest cut- and percussion-marked bones, found back to 2.6 million years ago. Scientists usually associate these traces of butchery of large animals, direct evidence of meat and marrow eating, with the earliest appearance of the genus *Homo*, including *H. habilis*.
Many scientists think early Homo, including *H. habilis*, made and used the first stone tools found in the archaeological record—these also date back to about 2.6 million years ago; however, this hypothesis is difficult to test because several other species of early human lived at the same time, and in the same geographic area, as where traces of the earliest tool use have been found.

**Evolutionary Tree Information:**

This species, along with *H. rudolfensis*, is one of the earliest members of the genus *Homo*. Many scientists think it is an ancestor of later species of *Homo*, possibly on our own branch of the family tree. Naming this species required a redefining of the genus *Homo* (e.g., reducing the lower limit of brain size), sparking an enormous debate about the validity of this species.

While scientists used to think that *H. habilis* was the ancestor of *Homo erectus*, recent discoveries in 2000 of a relatively late 1.44 million-year-old *Homo habilis* (KNM-ER 42703) and a relatively early 1.55 million-year-old *H. erectus* (KNM-ER 42700) from the same area of northern Kenya (Ileret, Lake Turkana) challenged the conventional view that these species evolved one after the other. Instead, this evidence - along with other fossils - demonstrate that they co-existed in Eastern Africa for almost half a million years.

**Best known Homo habilis**

KNM-ER 1813 This fossil is one of the most complete skulls of this species, best known from the Turkana Basin (Kenya) and Olduvai Gorge (Tanzania) in East Africa. It has a cranial capacity of only 510 cubic centimeters, well below the 600 cubic centimeter cutoff that had been in place since the creation of the *Homo habilis* species name. It is also not much larger than the average.
for Australopithecus. Still, KNM-ER 1813 is similar to many of the accepted *Homo habilis* specimens from Olduvai Gorge, like **OH 24**. The similarities include overall size, smaller orbits, and sub-nasal prognathism (projection of the face below the nose). It is somewhat skewed on its left side, a result of the pressures the skull experienced during the fossilization process.

KNM ER 1813 was found a year after **KNM-ER 1470** and led to the a debate over the exact nature of *Homo*. The discovery of KNM-ER 1470 solidified *Homo habilis* as a species, but the large cranium and big teeth of KNM-ER 1470 contrasted with the find of KNM-ER 1813. KNM-ER 1813 was an individual from the same time period in the same region, but with a small brain and diminutive teeth and face. The difference in size was not a result of KNM-ER 1813 being immature at the time of death; the third molars were fully erupted and showed evidence of wear, so she was probably a female who was fully mature at the time of her death.

**OH 24** is the oldest fossil skull found at Olduvai Gorge; besides **OH 5**, it is the most complete.

The cranium was found crushed flat (hence the nickname) and cemented together with a coating of limestone. Little value was placed on the find originally, but after much effort by scientist Ron Clarke, the skull was reconstructed. Despite this effort, there still is a good deal of distortion from the fossilization process. The slightly small cranial capacity (just under 600 cubic centimeters) is attributed to this distortion. The face of the individual is prognathic (projects forward under the nose: see the third photograph down), as in other *H. habilis* individuals, but not quite to the extent of the earlier *Australopithecus* species. This specimen manifests the larger brain size and the reduction of facial size typical of the evolution of early *Homo*.

The individual's third molars had erupted, so we know that Twiggy was an adult at death. Yet the molars show no sign of wear (the points on the crowns of her teeth are still sharp, and show little sign of abrasion by rough food matter), indicating that that this individual probably died soon after their eruption.
Homo habilis
Australian Museum

https://australianmuseum.net.au/homo-habilis
The earliest of our ancestors to show a significant increase in brain size and also the first to be found associated with stone tools.

*Homo habilis* skull front view
Photographer: Carl Bento © Australian Museum

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These characteristics resulted in this species’ placement into the human genus, Homo. However, this classification is now being debated because new fossil discoveries show this species shares some important physical similarities with members of the *Australopithecus* genus.

**Background to discovery**

**Age**

This species lived between about 2.3 and 1.5 million years ago.
What the name means

*Homo*, is a Latin word meaning ‘human’ or ‘man’. This is the same genus or group name as the one given to modern humans and is used to show the close relationship between this species and our own.

The word *habilis* is based on a Latin word meaning ‘handy’ or ‘skilful’. This species known as ‘handy man’ because stone tools were found near its fossil remains and it is assumed this species had developed the ability to modify stone into tools.

Important fossil discoveries

The discovery of *Homo habilis* began in 1959 when two teeth were unearthed at Olduvai Gorge in Tanzania by a team led by Louis and Mary Leakey. Parts of a boy’s skeleton were located at the site the next year and additional fossils from other individuals continued to be found.

Their brain size, features of their hands and feet, and evidence that they may have used stone tools all suggested that a new type of human ancestor had been found. They were officially announced as new species in 1964 but their placement into the human genus *Homo* was controversial. Additional fossils, including the discovery of a partial skeleton in 1986, have revealed that this species was more ape-like than previously believed.

Important specimens

- **OH 62** - a 1.8-million-year-old partial skeleton discovered in 1986 by Tim White in Olduvai Gorge, Tanzania. These remains are thought to be those of a female because of the short stature. This partial skeleton was discovered as 302 fragments of fossilised tooth and bone. It was an important discovery because it enabled this species’ arm, leg and body proportions to be determined. These proportions revealed that this *Homo habilis* was more ape-like than previously believed. Like apes, this individual had relatively long arms and short legs.
• KNM-ER 1813 – a 1.9-million-year-old skull discovered in 1973 by Kamoya Kimeu in Koobi Fora, East Turkana, Kenya. This adult skull has a brain size of only 510 cubic centimetres, which is only just above the average for species placed in the Australopithecus genus.

• ‘Twiggy’ OH 24 – a 1.8-million-year-old skull discovered in 1968 by Peter Nzube in Olduvai Gorge, Tanzania. When found, this skull had been badly crushed and was reconstructed from hundreds of fragments. It also shows some distortion of the bones that occurred before fossilisation was complete.

• ‘Cindy’ OH 13 – a 1.7-million-year-old lower jaw discovered in Olduvai Gorge, Tanzania. This jaw was found with other pieces of the skull and a lower arm bone.

• ‘Jonny’s Child’ OH 7 – a 1.8-million-year-old partial skeleton discovered in 1960 by Jonathan Leakey in Olduvai Gorge, Tanzania. This partial skeleton belongs to a boy and was selected as the ‘type specimen’ or official representative of this species.

• OH 35 – lower leg bones discovered in 1960 in Olduvai Gorge, Tanzania. These leg bones and the OH 8 foot bones may have come from the same individual.

• OH 8 – 1.8-million-year-old foot bones discovered in 1960 in Olduvai Gorge, Tanzania. This partial left foot lacks its heel and toe bones but the foot’s arch and general shape are similar to our own and provide evidence that this species’ walking gait was identical to that of a modern human.

• AL 666-1 – a lower jaw Homo sp. (species unknown) discovered in 1994 in Hadar, Ethiopia. This jaw has the distinctive dental arch of humans. It has therefore been classified in the genus Homo, but its actual species designation is uncertain – it may be Homo habilis or it may even be a totally new species of early human. At 2.3 million years in age it is the oldest known Homo found directly associated with stone tools.

• KNM-ER 42703 – a right upper jaw bone dated to about 1.44 million years old, discovered in Ileret Kenya in 2000. It is the youngest fossil of Homo habilis yet found.

Distribution

Fossils of this species have been found in the countries of Kenya and Tanzania in Africa, in particular at Lake Turkana, Olduvai Gorge and Koobi Fora.
Relationships with other species

This species was initially considered to be a direct ancestor of modern humans but fossil discoveries in the mid-1980s showed that *Homo habilis* had rather ape-like limb proportions. This evidence led to a reassessment of *Homo habilis* and its relationship to modern humans. Many scientists no-longer regard this species as one of our direct ancestors and instead have moved it onto a side branch of our family tree.

The debate about *Homo habilis* continues following the discovery of some skulls at Dmanisi in the Republic of Georgia. Two of the skulls are very similar to *Homo ergaster* but one appears to have features intermediate between *Homo habilis* and *Homo ergaster* and may represent a link between these two species. If so, *Homo habilis* may be a direct ancestor of modern humans or that they both evolved from a yet-undiscovered species. *Homo habilis* arose at a time when there is a relative gap in the fossil record (between 2 and 3 million years ago). This makes it difficult to determine where it came from or how it is related to the earlier australopithecines. More fossil evidence is needed to resolve this issue.

Other names

*Homo habilis* has been a controversial species ever since the name was first announced. The fossils originally named *Homo habilis* have now been split into two groups. One group retains the name *Homo habilis* although some scientists prefer the name *Australopithecus habilis* because these individuals have physical similarities with the australopithecines.

The other group consists of fossils with larger brains and larger teeth, including the skull KNM-ER 1470 and jaw KNM-ER 1802. These individuals are now placed in a different species but there is debate as to whether these fossils should be named *Homo rudolfensis, Australopithecus rudolfensis* or *Kenyanthropus rudolfensis.*
The *Homo habilis* and *Homo rudolfensis* debate

Scientists often disagree about naming fossil specimens. Scientific names may be changed following new discoveries, different interpretations or new lines of investigation. *Homo habilis* is a well-known but poorly defined species and scientific opinions about the attributed specimens vary widely. Two specimens at the centre of the debate are KNM-ER 1470 and KNM-ER 1813.

**KNM-ER 1470 (discovered 1972)**

- about 1.7 million years old
- large brain, about 750-800ml
- teeth not preserved; roots and sockets suggest they were large, as in *Australopithecus*, with larger molars than other *Homo habilis* specimens
- square upper jaw
- slightly developed brow ridge
- face large and flat and longer than KNM-ER 1813

**KNM-ER 1813 (discovered 1973)**

- about 1.7 million years old
- small brain, about 500ml
- small upper jaw with human-like teeth
- rounded upper jaw
- strongly developed brow ridge
- face small and not very flat
The differences between KNM-ER 1470 and KNM-ER 1813 can be interpreted in various ways.

- Different Sexes - other things being equal, large bodied individuals have a bigger head and brain than small individuals. KNM-ER 1813 may be a female and KNM-ER 1470 may be a male of *Homo habilis*. However, they do not differ from each other in the sort of ways that males and females of modern apes (including humans) differ from one another.
- Different Species - scientists claim that 1813 and 1470 represent two species, or even two genera. Suggestions include *Australopithecus africanus, Homo habilis* and *Homo rudolfensis*. The discovery of a skull of *Kenyanthropus platyops* in 1999, and its similarity to KNM-ER 1470, has led some to consider reclassifying KNM-ER 1470 into the *Kenyanthropus* genus.

**Key physical features**

*Homo habilis* had a larger brain than earlier human ancestors and this is reflected in significant changes to the shape of the skull. However, many other features including limb proportions are similar to those of the earlier australopithecine ancestors.

**Body size and shape**

Body proportions were similar to those of australopithecines with females growing to about 110 centimetres and males to about 130 centimetres in height.

**Brain**

Brain averaged 610 cubic centimetres in size, representing 1.7 per cent of their body weight. This was a significant increase compared to australopithecine brains.
Skull

- brain case had become fuller and more rounded due to expansion of the brain
- beginnings of a slight forehead were appearing
- face had a small, arched brow ridge and was smaller and shorter than those of earlier ancestors
- hole for the spinal cord was located in the centre of the skull base, showing that this species walked on two legs
- facial projection was reduced compared with earlier species

Jaws and teeth

- jaw was smaller than those found in the earlier australopithecines
- teeth were arranged in a more rounded arc like those of modern humans
- teeth had become smaller and more human-like, although the incisors were still relatively large

Limbs

- features of the leg and foot bones indicate that this species walked on two legs.
- legs were relatively short, providing this species with arm and leg proportions that were relatively ape-like and similar to those of the australopithecines.
- finger bones are slightly curved and intermediate in shape between the curved finger bones of quadrupedal apes and the straight finger bones of modern humans
- finger bone proportions suggest the human-like ability to form a precision grip

Lifestyle

How they lived

*Homo habilis* may have been the first of our ancestors to make stone tools. This represented a significant change in mental capabilities and a shift toward new survival strategies.
The first crude stone tools consisting of simple choppers, core tools and scrapers were made as early as 2.6 million years ago and are classified as Mode 1 technology. It is uncertain who the makers of these earliest stone tools were. The tool makers may have been early populations of *Homo habilis* or they may have been made by another species. One such candidate is represented by the fossil AL 666-1, which has been provisionally named *Homo sp.* (meaning a human whose species is currently unknown).

Mode 1 technology includes core tools, choppers and smaller flakes used as scrapers. They are often called Oldowan stone tools as the first discoveries of these tools occurred at Oldoway (now Olduvai) Gorge, Tanzania in east Africa. These tools were a simple progression from the use of sticks and natural, unmodified stones that our earliest ancestors probably used. The chopping or cutting edges on Oldowan tools were created by using one stone (the hammerstone) to strike another (the core) in order to remove one or more rock fragments (flakes).

**Environment and diet**

*Homo habilis* lived in a predominantly grassland environment. The climate was becoming cooler and drier and this may have been the impetus for new feeding strategies that included scavenging and tool use. Chemical analysis suggests that this species was mainly vegetarian but did include some meat in their diet.

Fran Dorey, Exhibition Project Coordinator
Last Updated: 30 October 2015
Homo habilis

*Homo habilis*, which dates to between 2.1 and 1.5 million years ago (mya) is named for the Latin term (’habilis’) meaning “handy, skillful, able” and is one of the earliest species in the genus Homo. Fossils of *H. habilis* have been found in Tanzania, Ethiopia, Kenya, and South Africa and represent cranial (from the skull), dental (teeth), and postcranial (from the skeleton below the skull) remains. While this species is distinct from the australopiths in many aspects of its cranial morphology (size and shape), it also exhibits many primitive traits (shared with its ancestor, in this case species in the genus *Australopithecus*), especially in its postcranial skeleton, which suggest it was more similar to its australopith ancestors than was originally thought.

Compared to australopiths, *H. habilis* has a relatively and absolutely bigger brain (average cranial capacity [a measure of the volume of the braincase, used to estimate brain volume] is around 680 cubic centimeters), a more vertical forehead, and weaker brow ridges (the enlarged bony area over the eye sockets). Additionally, the face and jaws of *H. habilis* are smaller and less projecting than those of the australopiths and the cheek teeth (the teeth behind the canine; molars and premolars) are narrower mesiodistally (front-to-back).

Postcranial remains of *H. habilis* indicate a mosaic of primitive and derived traits (traits different from those in the ancestral species, in this case different from the australopiths and more similar to later species in the genus Homo). For example, *H. habilis* was undoubtedly bipedal, with an adducted big toe (the big toe is in line with the other toes, not splayed out to the side, as in living apes) and well-defined arches in the foot (structures in the foot formed by bone and strengthened by tendons and ligaments that allow the foot to support the weight of the body and act as shock-absorbers during bipedal walking) like humans. However, while *H. habilis* shows definite signs of bipedalism, it also shared features with great apes, such as a marked tubercule (enlargement of bone at a site of muscle attachment) for a leg muscle useful for climbing. While only a few postcranial remains associated with
H. habilis permit reconstructions of the proportions of the limbs, the fossils that have been found suggest that the legs are elongated relative to australopiths, but have retained long forearms. The H. habilis hand is a mosaic of ape- and human-like features. The phalanges (finger bones) resemble those of living apes insofar as they are robust (thick) and curved, but have broad tips (similar to humans) and attach to the palms in a way similar to humans. Additionally, some bones of the wrist and attachment sites for flexor tendons (tendons that pull the palm of the hand closer to the forearm) are more ape-like and have been suggested to be useful while climbing.

Because of the range of variation present in early Homo fossils, there has been controversy over whether H. habilis should be considered one highly variable, sexually dimorphic (exhibiting large size differences between the sexes) species, or whether some specimens originally grouped with H. habilis should be separated into a different species, Homo rudolfensis (see essay on H. rudolfensis for more detailed information on this controversy). However, critical examination of the fossil anatomy of these specimens reveals that the patterns of variation expected in a sexually dimorphic species are not present among H. habilis and H. rudolfensis fossils. Furthermore, dental analysis suggests that each species had very different ecological niches. At present, it is generally accepted that H. habilis and H. rudolfensis represent separate species.

The first H. habilis fossils were found in Olduvai Gorge in the same stratigraphic layer as early types of stone tools called Oldowan tools. These tools are very simple, and comprise a core, the scarred center of rock that results from the detachment of one or more flakes (the portion of rock removed from original source material by percussion or pressure) from a lump of source material. These cores, while simple, had sharp, cutting edges, and could be used for many purposes. Although H. habilis fossils are found near stone tools, they are not the only hominins to be linked to tool manufacture. For example, Paranthropus boisei fossils have also been found near stone tools, making definitive determination of which species was a tool-maker impossible. (There were several different species, Australopithecus, Paranthropus and Homo, extant between 2.5 and 2.0 mya, as can be seen on the Timeline graphic.) Because H. habilis has a larger brain and smaller teeth than other australopiths (including P. boisei), many scientists consider them to be the earliest tool-makers.
However, this assertion may need to be re-evaluated in light of more recent finds of a species of australopith, Australopithecus garhi, with a smaller brain and larger teeth than *H. habilis*, and that is associated with stone tools (see essay on A. garhi for more information).

Speculations as to whether *Australopithecus* or *Homo* was the first user of stone tools may have been made moot by the discovery in 2009 of markings on animal bones which could have been made only by stone being used to deflesh the bones. The bones bearing stone cut marks were found at Dikika, Ethiopia and dated to 3.4 ma, a time at which the only hominin then extant was *Australopithecus afarensis*.

About 2.5 mya, Africa underwent a climatic change that resulted in the changing of hominin habitats from more closed and wet to more open and arid, which lead to changes in available food resources and may have signaled the origins of the genera *Homo* and Paranthropus. By approximately 2 mya, however, the climate was returning to slightly more warm and humid conditions. Environmental reconstructions of *H. habilis* sites suggest that these hominins lived in a woodland habitat with access to lakes and/or streams.

*H. habilis* is one of the oldest species in the genus *Homo*. Nevertheless, evidence suggests that in some ways, it was quite similar to species in the genus *Australopithecus*, especially in aspects of the postcranial skeleton and the small size of its brain. Taking into account body size and shape, locomotion, the masticatory system, and brain size, some scientists suggest that *H. habilis* had an adaptive strategy more similar to australopiths than to modern humans and should be placed within the genus *Australopithecus*. Whether or not this is a valid suggestion depends upon how a genus is defined. Scientists disagree as to whether phylogeny (evolutionary relationships) should be given priority over adaptive strategies when defining a genus, or vice versa, a distinction that is not easy to make, especially when dealing with fossil specimens. Currently, *H. habilis* is placed within the genus *Homo* because it shares derived traits with other members of the genus to the exclusion of the australopiths.
Assigning *H. habilis* to either the genus *Homo* or *Australopithecus* has implications for the way we interpret the fossil record. If *H. habilis* belongs in the genus Homo, this suggests that the beginning of our evolutionary line encompassed a very broad range of morphological and adaptive variation. The variation present at the beginning of our clade (a group consisting of an ancestor and all of its descendents) suggests that human evolutionary history is more complicated than has traditionally been assumed.
Homo rudolfensis
Smithsonian Museum of Natural History

http://humanorigins.si.edu/evidence/human-fossils/species/homo-rudolfensis
**Homo rudolfensis**

**Where Lived:** Eastern Africa (northern Kenya, possibly northern Tanzania and Malawi)

**When Lived:** About 1.9 million to 1.8 million years ago

There is only one really good fossil of this *Homo rudolfensis*: KNM-ER 1470, from Koobi Fora in the Lake Turkana basin, Kenya. It has one really critical feature: a braincase size of 775 cubic centimeters, which is considerably above the upper end of *H. habilis* braincase size. At least one other braincase from the same region also shows such a large cranial capacity.

Originally considered to be *H. habilis*, the ways in which *H. rudolfensis* differs is in its larger braincase, longer face, and larger molar and premolar teeth. Due to the last two features, though, some scientists still wonder whether this species might better be considered an *Australopithecus*, although one with a large brain!

**Year of Discovery:** 1986

**History of Discovery:**

Russian scientist V.P. Alexeev named the species in 1986 after Richard Leakey’s team uncovered *Homo rudolfensis* fossils near the shores of Lake Rudolf (now known as Lake
Turkana) in 1972. Alexeev originally named the species *Pithecanthropus rudolfensis*, but the genus name *Pithecanthropus* was later replaced by *Homo*.

We don’t know everything about our early ancestors—but we keep learning more! Paleoanthropologists are constantly in the field, excavating new areas, using groundbreaking technology, and continually filling in some of the gaps about our understanding of human evolution.

Below are some of the still unanswered questions about *H. rudolfensis* that may be answered with future discoveries:

1. Was *Homo rudolfensis* on the evolutionary lineage that evolved into later species of *Homo* and even perhaps our species, *Homo sapiens*?
2. Are *Homo rudolfensis* and *Homo habilis* indeed different species, or are they part of a single, variable species? Or was one the ancestor of the other?
3. Are *Homo rudolfensis* fossils more like australopithecines than other *Homo* fossils, as some scientists have suggested?
4. How big was *Homo rudolfensis*? Was this species sexually dimorphic?

First Paper:


Other recommended reading:


How They Survived:

*Homo rudolfensis* had large and wider molars compared to *Homo habilis*. While their teeth were only slightly smaller than those seen in robust australopithecines, *H*
Homo rudolfensis didn’t have the heavily-built jaw and strong jaw muscle attachments seen in robust early humans. These anatomical differences likely indicate different diets between *H. rudolfensis* and earlier australopith species capable of more powerful chewing.

Like other early *Homo* species, *Homo rudolfensis* may have used stone tools process their food. However, because more than one species of early human lived at the time tool manufacture and use originated, it’s hard for scientists to be certain which species is responsible for the making and using the first stone tools. There are currently no stone tools found in the same layers as the *H. rudolfensis* fossils, but there are stone tools existing in the same time period that *H. rudolfensis* lived.

**Evolutionary Tree Information:**

KNM-ER 1470, the type specimen for *Homo rudolfensis* was originally thought to belong to *Homo habilis*, along with KNM-ER 1813. While both skulls are about 1.9 million years old, KNM-ER 1470 had a large face and brain size around 700 cc, while KNM-ER 1813 had a smaller face and brain around 500 cc. The explanation was that KNM-ER 1470 was a male, and the smaller KNM-ER 1813 was a female in a strongly sexually dimorphic species; however, the anatomy of the two skulls differ considerably.

KNM-1470’s tooth roots and sockets imply the individual’s teeth were large with broad molars, while KNM-1813 had a small upper jaw with smaller, more modern-like teeth. KNM-1470 had a square upper jaw, while KNM-1813’s was rounded. KNM-1470’s browridge was slight, while KNM-1813’s was strongly developed and pronounced. These anatomical differences between KMN-ER 1470 and KNM-ER 1813 have caused many scientists question whether the two individuals were just different sexes of the same species. However, the hypothesis that two species of
Homo lived at the same time went against the traditional view that humans evolved one after another in a single lineage.

Today, most scientists recognize four species that lived in the Turkana Basin, northern Kenya, sometime between 2.0 and 1.5 million years ago: *Homo rudolfensis*, *Homo habilis*, *Homo erectus*, and *Paranthropus boisei*. 
Homo rudolfensis
Australian Museum
https://australianmuseum.net.au/homo-rudolfensis
This early human lived about 2 million years ago, but its place on our family tree is debated.

**Background of discovery**

**Age**

2.4 to 1.8 million years

**Important fossil discoveries**

The key specimen of this species is skull KNM-ER 1470. When it was discovered by Richard Leakey’s team in 1972, it was not attributed to a species, only a member of the genus *Homo*. In 1986, a Russian anthropologist gave the skull the species name *Pithecanthropus rudolfensis*. The genus name of *Pithecanthropus* was later dropped and replaced with *Homo*.

Other cranial remains attributed to this species include the KNM-ER 1802, 1590, 1801 and 3732. Possible limb remains may include KNM-ER 1472 and 1481, but these were not found with skulls so attribution is questionable.
What the name means

*Homo* is a Latin word meaning ‘human’ or ‘man’. It is the same genus or group name as the one given to modern humans, which indicates the close relationship between this species and our own. The species name *rudolfensis* comes from the location where the type specimen KNM-ER 1470 was found – Lake Turkana, East Rudolph, Kenya.

Distribution

Fossil have been found in Urhara, Malawi, and Lake Turkana in Kenya.

Relationships with other species

The scientific name *Homo rudolfensis* was originally proposed for the specimen skull KNM-ER 1470, discovered in 1972. It was once thought by many to be a member of the species *Homo habilis* but the differences compared to other *Homo habilis* skulls were considered too great.

As in the case of *H. habilis*, there is large amount of controversy about the classification of *H. rudolfensis*. Debate continues as to whether these fossils should be named *Homo rudolfensis*, *Kenyanthropus rudolfensis* or *Australopithecus rudolfensis*, or returned to *Homo habilis*.

Analysis shows this species shows more affinities to australopithecines than to *Homo*. So it is not certain if *H.rudolfensis* was ancestral to the later species in *Homo*, or if *H.habilis* was, or if some undiscovered species was.

In 2007, a team led by Timothy Bromage, an anthropologist at New York University, reconstructed the skull of KNM-ER 1470. The new construction had a more ape-like projecting jaw and a smaller brain size. They claim this new reconstruction makes it more like other *Homo habilis* specimens.
The *Homo habilis* and *Homo rudolfensis* debate

Scientists often disagree about naming fossil specimens. Scientific names may be changed following new discoveries, different interpretations or new lines of investigation. *Homo habilis* is a well-known but poorly defined species and scientific opinions about the attributed specimens vary widely. Two specimens at the centre of the debate are KNM-ER 1470 and KNM-ER 1813.

**KNM-ER 1470 (discovered 1972)**

- about 1.7 million years old
- large brain, about 750-800ml
- teeth not preserved; roots and sockets suggest they were large, as in *Australopithecus*, with larger molars than other *Homo habilis* specimens
- square upper jaw
- slightly developed brow ridge
- face large and flat and longer than KNM-ER 1813 (although this is now questioned)

**KNM-ER 1813 (discovered 1973)**

- about 1.7 million years old
- small brain, about 500ml
- small upper jaw with human-like teeth
- rounded upper jaw
- strongly developed brow ridge
- face small and not very flat
The differences between KNM-ER 1470 and KNM-ER 1813 can be interpreted in various ways.

- They are different sexes: other things being equal, large bodied individuals have a bigger head and brain than small individuals. KNM-ER 1813 may be a female and KNM-ER 1470 may be a male of *Homo habilis*. However, they do not differ from each other in the sort of ways that males and females of modern apes (including humans) differ from one another.
- They are different species: many scientists claim that 1813 and 1470 represent two species, or even two genera. Suggestions include *Australopithecus africanus*, *Homo habilis* and *Homo rudolfensis*. The discovery of a skull of *Kenyanthropus platyops* in 1999, and its similarity to KNM-ER 1470, has led some to consider reclassifying KNM-ER 1470 into the *Kenyanthropus* genus.

**Key physical features**

**Brain**

average size of about 750cc (larger than *Homo habilis* specimens)

**Body size and shape**

general lack of postcranial remains makes size assessment difficult. The larger teeth and skulls compared to *Homo habilis* suggest it may be larger than this species.

**Jaws and teeth**

- large molars and broader lower molars than *Homo habilis*
- complex crowns and roots

**Skull**

- relatively flat and long face (although more recent reconstructions debate this and suggest the face was more protruding))
• small brow ridge
• lack of crests and heavy muscle markings that are found in australopithecine skulls

Limbs

• limb proportions unknown because of lack of skeletal material
• assumed to be bipedal but without the ability to move in a fully human locomotion

Lifestyle

Environment and diet

The area was predominantly a grassland environment. The climate was becoming cooler and drier at this time.

Limited studies have been done on the diet of this species, but the tooth shape and comparisons to other species suggests plant material and probably meat were eaten.

Culture

Although no associated archaeological evidence was found with any Homo rudolfensis remains, they were living at a time when it is known that human ancestors were making tools.

The first crude stone tools consisting of simple choppers, core tools and scrapers were made as early as 2.6 million years ago and are classified as Mode 1 technology or Oldowan. It is uncertain who the makers of these earliest stone tools were. The tool makers may have been early populations of Homo habilis or they may have been made by another species. One such candidate is represented by the fossil AL 666-1, which has been provisionally named Homo sp. (meaning a human whose species is currently unknown).

Fran Dorey, Exhibition Project Coordinator
Last Updated: 3 December 2009
Homo rudolfensis
Becoming Human
http://www.becominghuman.org/node/homo-rudolfensis-essay

What About ... Human Evolution?
Carl Kerby
The earliest fossils from the genus *Homo* are found in eastern, southeastern, and southern Africa. Three species comprise early *Homo*: *Homo rudolfensis* (2.5-1.8 million years ago [mya]), *H. habilis* (2.1-1.5 mya, with which *H. rudolfensis* shares many similarities) and *H. erectus* (1.8-0.9 mya). The earliest known species of early *Homo*, *H. rudolfensis* fossils are found in Kenya, Ethiopia and northern Malawi. The subject taxon displays an intriguing mix of primitive (traits that are shared with an ancestor) and derived traits (traits different from those found in the ancestral species) that make taxonomic and phylogenetic interpretations difficult and controversial.

*H. rudolfensis* is named for the fossil KNM-ER 1470, found on the east side of Lake Rudolf (now Lake Turkana) in Kenya. KNM-ER 1470 most clearly exemplifies *H. rudolfensis*, and is characterized by a large cranial capacity (around 750 cc), large cheek teeth and a long face that is broad across the orbits (eye sockets) and flattened below the nose. Brain endocasts (a cast made of the mold formed by the impression the brain makes on the inside of the brain case, providing a replica of the exterior surface of the brain) indicate that Broca’s area, an area of the brain associated with speech, is more clearly developed in *H. rudolfensis* than in australopiths. However, it must be noted that possessing the neurological architecture (i.e., structures within the brain) for speech does not mean that *H. rudolfensis* used spoken language. In addition to a large brain, *H. rudolfensis* has very large (i.e., megadont) premolar and molar teeth (i.e., cheek teeth) similar to australopiths, which has led some researchers to question its inclusion in the genus *Homo*. 
There is controversy over which fossils should be attributed to *H. rudolfensis* versus *H. habilis*. There are approximately 200 skeletal fragments that comprise 40 individuals from both species, each with a distinctive mosaic of primitive and derived traits. A minority of researchers feel that the differences between *H. rudolfensis* and *H. habilis* are due to differences in size between the sexes of a single species (this is called sexual dimorphism), and thus group all of the fossils together. However, many of the morphological patterns in *H. rudolfensis* are either opposite of what would be expected for the male of a single sexually dimorphic species or are lacking entirely. Furthermore, while there are postcranial (the skeleton minus the skull) remains for *H. habilis* (see essay on *H. habilis* for details on anatomy), there are no postcranial remains associated with known *H. rudolfensis* crania, so we do not have estimates of body size or proportions for this species.

Further evidence for the distinctiveness of *H. rudolfensis* and *H. habilis* comes from dental wear analysis (study of how a tooth is worn down over time), which shows that *H. rudolfensis* molars were larger and worn horizontally, in contrast to *H. habilis* whose molars were smaller and show more occlusal relief (complex, less flat topography of the teeth). This fact indicates that *H. habilis* and *H. rudolfensis* had significantly different dietary strategies. *H. rudolfensis*, like *Paranthropus*, was probably mainly herbivorous and able to cope with tough fruits and plants. *H. habilis*, by contrast, has dental anatomy that suggests a certain amount of omnivory (consumption of vegetal foods and meat). Over time it has become clear that a differentiation between *H. habilis* and *H. rudolfensis* is warranted, as the physical variation between the two is too extensive to be contained within one species.
Interpreting the evolutionary history of early *Homo* depends upon which traits are emphasized. While *H. habilis* shows a reduction in tooth size combined with a more australopith-like post cranium, *H. rudolfensis* has a much larger face and teeth (similar to robust australopiths) combined with a larger brain. If brain expansion is emphasized, then *H. rudolfensis* would be considered the most likely ancestor to later *Homo*. However, if a reduction in the face and teeth is emphasized, then *H. habilis* is the most likely ancestral form. The problem is identifying which traits are homoplasies; that is, identifying which traits are similar due to shared ancestry (homology) versus those that are similar due to exploitation of a similar environment, but not to shared ancestry (homoplasy). For example, if *H. habilis* is accepted as our direct ancestor, then the large brains of *H. rudolfensis* and *H. erectus* would have developed independently. Conversely, if *H. rudolfensis* is considered ancestral, then its large, broad face and Paranthropus-like teeth would be considered homoplasies.

About 2.5 mya, Africa underwent climate change, resulting in the changing of hominin habitats from more closed and wet to more open and arid, which led to an increase in the prevalence of tougher foods, such as roots and tubers. It is around this time that the robust australopiths (*Paranthropus*) and early *Homo* appear on the landscape. This is also about the time that the first stone choppers (a stone, often roughly spherical, from which several large flakes have been broken to produce a sharp edge or point) are found in Ethiopia and Tanzania. There is no definitive evidence that links either *Paranthropus* or early *Homo* to the manufacture of stone tools. However, many scientists support a link between stone tools and early *Homo* rather than *Paranthropus* due to the relatively larger brain of the former. *H. rudolfensis* had a relatively large brain combined with very large teeth, making it uniquely suited to handle these new climactic challenges.
Homo heidelbergensis
Smithsonian Museum of Natural History
http://humanorigins.si.edu/evidence/human-fossils/species/homo-heidelbergensis
*Homo heidelbergensis*

**Where Lived:** Europe; possibly Asia (China); Africa (eastern and southern)

**When Lived:** About 700,000 to 200,000 years ago

This early human species had a very large browridge, and a larger braincase and flatter face than older early human species. It was the first early human species to live in colder climates; their short, wide bodies were likely an adaptation to conserving heat. It lived at the time of the oldest definite control of fire and use of wooden spears, and it was the first early human species to routinely hunt large animals. This early human also broke new ground; it was the first species to build shelters, creating simple dwellings out of wood and rock.

**Year of Discovery:** 1908

**History of Discovery:**
In 1908 near Heidelberg, Germany, a workman found the type specimen of *H. heidelbergensis* in the Rösch sandpit just north of the village of Mauer. This mandible was nearly complete except for the missing premolars and first two left molars; it is heavily built and lacks a chin. German scientist Otto Schoentensack was the first to describe the specimen and proposed the species name *Homo heidelbergensis*.

Before the naming of this species, scientists referred to early human fossils showing traits similar to both *Homo erectus* and modern humans as ‘archaic’ *Homo sapiens*.

**Height:** Males: average 5 ft 9 in (175 cm); Females: average 5 ft 2 in (157 cm)
**Weight:** Males: average 136 lbs (62 kg); Females: average 112 lbs (51 kg)

We don’t know everything about early humans—but we keep learning more! Paleoanthropologists are constantly in the field, excavating new areas with groundbreaking technology, and continually filling in some of the gaps about our understanding of human evolution.

Below are some of the still unanswered questions about *Homo heidelbergensis* that may be answered with future discoveries:

1. Did this early human species indeed range in time from 1.3 million to 200,000 years ago, and in geography from Africa to Europe to Asia? Or are there more than one species represented among the fossils that some scientists call *H. heidelbergensis* (including *H. antecessor*, *H. cepranensis*, and *H. rhodesiensis*)?
2. Many scientists think this species was ancestral to our own, but which species was the ancestor of *H. heidelbergensis*?
3. Did *H. heidelbergensis* have any cultural or behavioral adaptations that facilitated it living in colder climates?
4. Did regional groups or populations of *H. heidelbergensis* exhibit any unique behaviors or anatomical adaptations?

**First paper:**


**Other recommended readings:**


**How They Survived:**
There is evidence that *H. heidelbergensis* was capable of controlling fire by building hearths, or early fireplaces, by 790,000 years ago in the form of fire-altered tools and burnt wood at the site of Gesher Benot Ya-aqov in Israel. Social groups probably often gathered around their hearths sharing food, stay warm, and ward off predators.

*H. heidelbergensis* probably took advantage of natural shelters but this species was also the first to build simple shelters. Evidence for this comes from the site of *Terra Amata, France*.

*H. heidelbergensis* was also the first hunter of large game animals; remains of animals such as wild deer, horses, elephants, hippos, and rhinos with butchery marks on their bones have been found together at sites with *H. heidelbergensis* fossils. Evidence for this also comes from 400,000 year old wooden spears found at the site of Schöningen, Germany, which were found together with stone tools and the remains of more than 10 butchered horses.

One site in Atapuerca, northern Spain, dating to about 400,000 years ago, shows evidence of what may be human ritual. Scientists have found bones of roughly 30 *H. heidelbergensis* individuals deliberately thrown inside a pit. The pit has been named Sima de los Huesos (‘Pit of Bones’). Alongside the skeletal remains, scientists uncovered a single well-made symmetrical handaxe —illustrating the tool-making ability of *H. heidelbergensis*. 
Evolutionary Tree Information:
This species may reach back to 1.3 million years ago, and include early humans from Spain (‘Homo antecessor’ fossils and archeological evidence from 800,000 to 1.3 million years old), England (archeological remains back to about 1 million years old), and Italy (from the site of Ceprano, possibly as old as 1 million years).

Comparison of Neanderthal and modern human DNA suggests that the two lineages diverged from a common ancestor, most likely Homo heidelbergensis, sometime between 350,000 and 400,000 years ago – with the European branch leading to H. neanderthalensis and the African branch (sometimes called Homo rhodesiensis) to H. sapiens.
These humans evolved in Africa but by 500,000 years ago some populations were in Europe.

‘Kabwe’ or ‘Broken Hill 1’ *Homo heidelbergensis* skull
Photographer: Stuart Humphreys © Australian Museum

They were tall with strongly built bodies and their faces were relatively flat but they still did not have the pointed chins typical of modern humans. They lived and worked in co-operative groups, hunted large animals and made a variety of tools including stone hand axes and wooden spears set with stone spearheads.

**Background of discovery**

**Age**

This species lived between 300,000 and 600,000 years ago. The African fossils tend to be older than those from Europe. Fossils from Gran Dolina in Spain date to 800,000 years old, and may be *Homo heidelbergensis* or a different species, *Homo antecessor*. 
Important fossil discoveries

In 1907, an ancient human jaw was discovered in a quarry at Mauer, a village near Heidelberg, Germany. The jaw had small, human-like teeth but was unlike modern human jaws in being extremely large and heavy boned. The unique features of this Mauer 1 jaw led to it being named a new species the following year. However, the species *Homo heidelbergensis* has only become more accepted since the end of the 20th century with the discovery of additional fossils that had features intermediate between those of earlier and later human species.

Important specimens:

- **Boxgrove 1** – a tibia (shinbone) discovered in 1993 in Boxgrove, West Sussex, England. This shinbone has been gnawed at each end by an ancient carnivore but the remaining bone shows its owner was more strongly built than modern humans. The large ridges which run down the back of the bone (shown here) are places where muscles attach to the bone and indicate that this individual had very large and powerful leg muscles.

- **‘Kabwe’ or ‘Broken Hill 1’** – skull discovered in 1921 in Kabwe (formerly Broken Hill), Zambia. This skull was the first fossil of a human ancestor to be discovered in Africa. It combines primitive features such as a wide face, thick arching brow ridges and a sloping forehead with a large brain capacity of 1280 cubic centimetres. The date of this specimen is uncertain but it may be 300,000 years old. This individual had significant tooth decay and a number of associated abscesses had decayed the upper jaw bone. Significant dental decay such as this was unusual in our ancestors prior to the development of agriculture approximately 10,000 years ago when more sugars and starchy foods were included in the diet.

- **Saldanha** – a skullcap discovered in 1953 in Elandsfontein, South Africa. This skullcap closely resembles the Broken Hill 1 skull in having large brow ridges, a broad, sloping forehead and a rear skull wall that is vertical rather than rounded or sloping.
• Arago 21 and Arago – skull and lower jaw discovered in Arago Caves, Tautavel, France. Excavations since 1964 have revealed a number of human fossils at Arago including this skull and jaw from different individuals. Thousands of stone tools and the bones of many types of animals have also been uncovered at this site. The Arago 21 skull is relatively complete but it was distorted either before or during fossilisation. Its features are typical of this species but its size and robust facial features suggest that it is the skull of a young male. It has been dated as being between 250,000 and 400,000 years old.

• Mauer 1 – a lower jaw discovered in 1907 in Mauer, near Heidelberg, Germany. This jaw is the ‘type specimen’ or official representative of this species. It was discovered by workers at a gravel quarry which had previously yielded many fossils of extinct mammals. Lying at a depth of about 24 metres, its age is estimated to be between 400,000 and 600,000 years old.

• The remains of at least 6 individuals found at the site of Gran Dolina, Atapuerca, in Spain. They lived about 800,000 to 1 million years ago in Europe and are the oldest human remains found in that continent. Although many experts consider these remains to be part of an early and variable Homo heidelbergensis population, the discoverers believe the fossils are different enough to be given a new species name Homo antecessor.

What the name means

_Homo heidelbergensis_ means ‘Heidelberg Man’. _Homo_, is the Latin word for ‘human’ or ‘man’ and _heidelbergensis_ is the latinised word for ‘Heidelberg’, the city in Germany where the first _Homo heidelbergensis_ fossil was discovered in 1907.

Distribution

Fossils of this species have been found scattered across Africa and Europe. A fossilised skullcap discovered in northern India’s Narmada Valley may also be _Homo heidelbergensis_ and if so, currently represents the easternmost occurrence of this species. Important sites include Lake Turkana, Bodo, Nduutu, Kabwe, Elandsfontein, Petralona, Mauer, Steinheim, Arago, Boxgrove, Swanscombe and Narmada.
Relationships with other species

Most fossils now known as *Homo heidelbergensis* were previously known as either *Homo erectus*, *Homo neanderthalensis* or ‘archaic’ *Homo sapiens*. With the discovery of many more fossils over the last few decades, many researchers now accept *Homo heidelbergensis* as a separate species, although the designation of some fossils is still debated since they possess features that are transitional between earlier and later species.

*Homo heidelbergensis* began to develop regional differences that eventually gave rise to two species of humans. European populations of *Homo heidelbergensis* evolved into *Homo neanderthalensis* (the Neanderthals) while a separate population of *Homo heidelbergensis* in Africa evolved into our own species, *Homo sapiens*.

Some European fossils have features that indicate they were intermediate between earlier *Homo heidelbergensis* and the later Neanderthal people. Their classification is therefore debated – are they *Homo heidelbergensis* or are they early *Homo neanderthalensis*?

Examples of debated classification: *Homo heidelbergensis* or early *Homo neanderthalensis*?

- Steinheim – skull discovered in 1933 in Steinheim, Germany. The face of the Steinheim skull is shaped like those of other *Homo heidelbergensis* individuals although it is less robust and may belong to an adult female. The cranium, however, is Neanderthal-like as it is very rounded at the rear and has a slight depression in the occipital bone at the back of the skull.
- Swanscombe – cranium discovered in 1935, 1936 and 1955 (in three separate pieces) in Swanscombe, England. The face of the cranium has not been found but the back of the cranium resembles the Steinheim skull.

More recently, fossils remain found at Gran Dolina in Spain have cast doubt on this interpretation. Although many experts consider these remains to be part of an early and variable *Homo heidelbergensis* population, the discoverers believe the fossils are different enough to be given a new species name *Homo antecessor*. They also claim they are the last common ancestor of Neanderthals and *Homo sapiens*. This scenario sees European *Homo heidelbergensis* moved to a side branch from modern humans as they are the
descendants of *Homo antecessor* and the ancestor of Neanderthals. African *Homo heidelbergensis* would require a name change.

**Key physical features**

*Homo heidelbergensis* fossils tend to have features that are intermediate between those of *Homo ergaster* and either *Homo neanderthalensis* or *Homo sapiens*.

**Body size and shape**

- fossil evidence regarding body size and shape is currently limited but leg bones indicate they were tall, reaching about 180 centimetres in height and had relatively long legs like their earlier ancestor, *Homo ergaster*.
- the shinbone’s thickness and bony ridges indicate that these people were strongly built.

**Brain**

- brain was large, averaging approximately 1250 cubic centimetres in size, representing 1.9% of their body weight
- frontal and parietal lobes of the brain were enlarged and may indicate an increase in brain complexity

**Skull**

- small post-orbital constriction behind the eye sockets.
- a moderate, double arched brow ridge and a short, sloping forehead lay above the eyes. The brow ridge was more arched than that of the earlier species, *Homo ergaster*. The sloping forehead resembled those found in earlier species rather than the vertical foreheads of modern humans.
- nasal opening was relatively wide
Jaws and teeth

- jaws were shorter than those of earlier species resulting in a face with only a slight projection
- some members of this species possessed a gap, called the retromolar space, behind the third molars (or wisdom teeth) at the back of the jaw. Others had only a tiny gap or no gap.
- lower jaw was strongly built for the attachment of strong chewing muscles
- as with earlier species, the lower jaw did not have a protruding, pointed chin
- teeth were arranged in the jaw so that they formed a parabolic shape (curved at the front then splayed out toward the back)
- teeth were smaller than those of earlier species but were larger than those of modern humans

Limbs

- lower legs were relatively long. Limb proportions such as these represent an adaptation to tropical conditions as they provide a larger skin surface to help cool the body. These limb proportions are similar to those found later in *Homo sapiens* and contrast with the short lower legs that developed in the Neanderthals.
- leg bones tended to be thick and strongly built.

Lifestyle

Culture

*Homo heidelbergensis* people spread out of Africa and had established populations in Europe and possibly also in southern Asia by about 500,000 years ago. By about 300,000 years ago, regional differences began to develop as they adapted to their new environments.
The tools made by *Homo heidelbergensis* were mostly used for hunting and butchery. Most of their tools were of the type previously used by *Homo ergaster*. These were large stone tools with flakes removed from two sides to produce the bifacial stone hand axes, cleavers and carvers classified as Mode 2 technology. Some later populations are known to have also made tools from deer antler, bone and wood. These materials were modified into scrapers, hammers and sophisticated wooden throwing spears.

Fire was used, although further evidence is needed to establish whether this was a controlled use of fire.

Animal hide clothing may have been worn, especially by populations living in the cooler European areas. However, direct evidence of clothing is difficult to obtain since it is non-durable and tends to quickly perish. No direct evidence of clothing currently exists.

**Environment and diet**

Between 600,000 and 200,000 years ago, the climates of Africa and Europe experienced a series of warm and cool phases and the move from Africa to Europe subjected these people to generally colder climates. About 300,000 years ago, a severe cold, dry period began and the Sahara became a barrier to movement between Africa and Eurasia, although movement may have been possible between Europe and northern Asia. At this time, populations in Africa and in Europe were isolated from one another and regional differences began to appear.

*Homo heidelbergensis* hunted large animals for food although the hides may also have been useful, especially in colder areas. The fossilised bones of these animals have shown that large animals including rhinos, hippopotamus, bears, horses and deer were targeted. These animals were skilfully hunted then butchered in an orderly fashion that suggests that these people were working in co-operative groups.

**Fran Dorey**, Exhibition Project Coordinator
Last Updated: 25 September 2015
Homo antecessor
Australian Museum
https://australianmuseum.net.au/homo-antecessor

What About ... Human Evolution?
This species name is highly debated with many considering the remains to be *Homo heidelbergensis*. Whatever species they come from, these fossils are the oldest *Homo* found in Europe.

**Background to discovery**

**Age**

This species lived about 800,000 to 1.2 million years ago in Europe.

**Important fossil discoveries**

These are the oldest human remains found in Europe.

Remains of over 80 fossils representing at least 6 individuals and including skeletal and cranial remains were found at Gran Dolina in Atapuerca, Spain, between 1994-1996. These remains date to at least 780,000 years old. Due to the unique combination of features, the discovers believed that they had found a new species. The name *Homo antecessor* was announced in 1997 by JL Arsuaga.

In 2007-2008 researchers working at Sima del Elefante, also in Atapuerca, recovered remains dating to about 1.2 million years ago. The human fossils included an isolated molar and a jaw bone with some front teeth (ATE9-1). The molar was described as belonging to an individual aged between 20 and 25 years and being ‘well worn’. Other remains included stone flakes and butchered animal bones.

The type specimen for this species is ATD 6-69 (Hominid 3). It is the cranium of a 10-year old juvenile found at Gran Dolina. Some experts claim that having a juvenile as a type specimen is a problem as some of the features may simply be juvenile traits that are lost in the adults of the species. However, a comparison to juveniles of other species shows these traits to be unique to these remains.
What the name means

The genus name *Homo* is the Latin word for ‘human’ whereas the species name *antecessor* is a Latin word meaning ‘explorer’, ‘pioneer’ or ‘early settler’. This name was assigned due to the belief that these people belonged to the first human population as yet known from the European continent.

Distribution

Remains have been found at two sites in Atapuerca, Spain - Gran Dolina (Level TD-6) and Sima del Elefante.

Position on the human family tree

This is a controversial species designation. Most researchers consider these to be part of an early and variable *Homo heidelbergensis* population. However, its discoverers suggest that it shares more traits with modern humans than European *H. heidelbergensis* so consider *H.antecessor* to be the last common ancestor of Neanderthals and *Homo sapiens*. Some dental and cranial features suggest *H. antecessor* is descended from *Homo ergaster*.

The discovers offer this scenario for the evolutionary and temporal relationships of *H. antecessor* to other species. *H. ergaster* gave rise to *H. antecessor* in Africa. About one million years ago, *H. antecessor* spread via the Middle East to Europe, including Gran Dolina. In Europe, *H. antecessor* evolved into *H. heidelbergensis*, who were the ancestors of the Neandertals. In Africa, *H. antecessor* evolved into *Homo sapiens* via an unknown species, although possibly represented by such fossils as the Bodo and Kabwe skulls. In this scenario *H. heidelbergensis* is off the line leading to modern humans as it is the descendant of *H.antecessor* in Europe. African *H. heidelbergensis* would require a name change, probably to *Homo rhodesiensis*, the name originally given to the Kabwe skull.

Key physical features

This species has a unique combination of features in the cranium, teeth and lower jaw that are collectively different from other *Homo* fossils, rather than any particular feature that distinguish it from others. Features show a mix of modern and archaic traits.
Brain size

approximately 1000 cc (compared to 1350cc for humans today)

Body size and shape

- similar to modern humans, but more robust
- males averaged about 1.6-1.8 metres tall

Skull:

- modern traits include a modern looking mid-face, canine fossa with ‘hollowed’ cheekbone and projecting nose
- archaic traits include a low forehead and marked double brow ridge, similar to Chinese Homo erectus and Neanderthals
- protruding occipital bun at the rear of the skull

Teeth and jaws

- primitive aspects of dentistry include robust teeth, premolars with multiple roots and shovel-shaped incisors in the upper jaw
- derived features include canines and some of the anterior teeth that are reduced in size
- tooth eruption patterns appear to be similar to modern humans, suggesting the same developmental rates
- receding chin
- mandible (lower jaw) is thinner than that of H. ergaster and H. habilis
- postcanine teeth are smaller than in H. habilis, within the range of H. ergaster, H. erectus and H. heidelbergensis
Excavations at Gran Dolina also uncovered roughly 200 stone tools and about 300 animal bones from the same levels as the human remains, dated to at least 780,000 years old. Similar finds were made at Sima del Elefante, with about 32 stone tool pieces and a variety of mixed animal remains recovered, all dating to about 1.1-1.2 million years old.

Stone tools at both sites were simple Mode 1 technology or Oldowan-style and made from local raw materials. Tools included simple cutting flakes, lacking the more sophisticated tools found elsewhere at this time. At Sima del Elefante the cave seemed to be a tool knapping site, with flakes showing clear evidence of manufacturing techniques - artefacts were detached by direct hammer percussion on hand-held medium-sized cores. The absence of retouched tools at this site, along with the nature of the tool kit, suggests that the tools were created mainly for processing and eating meat and marrow.

Cut marks are present on the animal remains at both sites. The marks are consistent with processing by humans for the purpose of obtaining meat and marrow. Interestingly, at Gran Dolina most of the human material also display the same types of cut marks, indicating dismemberment was probably the goal. The lack of carnivore tooth marks supports the suggestion that it was humans that made the incisions or marks. Whether this was due to cannibalism is debatable as there are cases of defleshing bones that do not involve eating the flesh. However, these cases are usually relate to funerary rites of which there is no evidence for in this species (or any Homo species for at least another 700,000 years).

It does not appear that these people lived permanently in either of the caves. Rather, they visited them for certain activities or at certain times of the year. They were probably nomadic and followed food sources.
Environment and diet

Small animal remains at the Sima del Elefante site suggest the climate at the time was generally warm and humid with warmer-cooler shifts. This correlates with the Waalian, a warm stage also with warmer-cooler shifts that is dated to 1.5 to 1.3 million years ago.

This conditions are similar to those suggested for the region about 800,000 years ago. At this time, the climate was warm, wet and relatively stable. This all changes about 600,000 to 500,000 years ago, when conditions became relatively harsh and cold. It is not long after this that humans living in Europe start to develop Neanderthal-like features, many of which appear to be adaptations to very cold environments.

The diet appears to have included large amounts of meat. Many of the remains at both sites are of large mammals that have been butchered and some of the larger bones have been broken to obtain the marrow. At Gran Dolina, young horse and deer are particularly common. The remains do not indicate whether the animals were hunted or scavenged, but both methods of procuring food were probably used. It is also likely that they supplemented their diet with plants.

Fran Dorey, Exhibition Project Coordinator
Last Updated: 2 November 2009
(04) Johnny's Child - OH 7

“24 bones and 14 teeth: nearly complete left parietal, fragmented right parietal, most of the mandibular body, lower teeth from incisors back; 21 finger, hand and wrist bones:”

**OH 7 – Jonny’s child**

*Age:* 1.75 myr

*Species:* *Homo habilis*, holotype

*Features*
- 24 bones and 14 teeth: nearly complete left parietal, fragmented right parietal, most of the mandibular body, lower teeth from incisors back; 21 finger, hand and wrist bones;
- male juvenile, 10-12 yrs
- evidence of significant carnivore damage: distal ends of foot bones & mandible gnawed, parietals show broad furrows, likely from canines or carnassials; similar to damage inflicted by hyenas
- premolars & molars narrower than *Aust*
- hand & foot bones similar to *Homo*

*Site:* Olduvai Gorge, Tz

*Found:* J. Leakey in 1960

*Bibliography*
Homoplasy and early Homo: an analysis of the evolutionary relationships of H. habilis sensu stricto and H. rudolfensis

Dividing the fossils usually assigned to the taxon H. habilis sensu lato into two species (as most researchers now accept) necessitates a re-examination of their evolutionary relationships. A cladistic analysis of 48 of the most commonly-used cranial characters from recent studies of Pliocene hominid phylogeny and which distinguish two taxa within H. habilis sensu lato suggests that these fossils have different evolutionary affinities. One taxon, H. habilis sensu stricto, is represented by KNM-ER 1813 and the fossils from Olduvai Gorge, and is most likely a sister group of H. erectus. The other taxon, H. rudolfensis, is represented by KNM-ER 1476, and shares many derived characters with the australopiths. A close analysis of the developmental basis of these characters suggests that many of the australopitheal similarities of H. rudolfensis are likely to be homologies rather than homoplasies.

Introduction

Homo habilis (Leakey et al., 1964) is critical in scenarios of hominin evolution. Since its initial description it has apparently provided the earliest evidence for a significant increase in encephalisation relative to the australopiths (Tobias, 1971), for a Homo-like pattern of craniofacial development (Bromage, 1989) and gnathic reduction (Vanderwoude, 1969), and has been persistently associated with the oldest archaeological evidence for tool-making and meat-eating (Isaac, 1984; Hill et al., 1992; Schrenk et al., 1993).

Diverse opinions about the taxonomy and evolutionary relationships of H. habilis sensu lato with other hominids have been offered since the taxon was first proposed (e.g. Robinson, 1965; Brack et al., 1972; Pilbeam, 1972; Walker & Leakey, 1978; Walker, 1981; Groves, 1989; Tobias, 1991). Recent discussions have focused on how many species are represented by the fossil material commonly assigned to the taxon. Some palaeoanthropologists (e.g. Howell, 1978; Johanson et al., 1987; Miller, 1991; Tobias, 1991) believe that the accumulated hypodigm represents a single species, albeit one that is highly variable and polymorphic. Others, including ourselves, have argued that the cranial, dental and mandibular material usually assigned to H. habilis sensu lato probably comprises more than one species (Groves & Mazak, 1975; Wood, 1985, 1991, 1992; Stringer, 1986; Chamberlain & Wood, 1987; Lieberman et al., 1988; Chamberlain, 1989; Groves, 1989; Rightmire, 1993). If it were one species, H. habilis would demonstrate a greater degree of sexual size dimorphism for most cranial traits than any reasonable analogues, and more significantly would have exhibited a pattern of sexual dimorphism that is markedly different than that observed in closely related taxa (e.g. females having larger browridges than males) (Lieberman et al., 1988; Wood, 1991).

Despite increasing consensus that more than one species of early Homo (in addition to H. ergaster, or early African H. erectus) co-existed in the Pliocene, there is no unanimity on how
Habilis has always been controversial in anthropology. It was for my father. It was for me. And, from a glance at the OH 62 paper he sent me, I knew it was going to be so for Don.

"You know, they call this a partial skeleton, but it’s really scrappy, I mean really scrappy," said Alan as we installed ourselves at a little Italian restaurant five minutes from the museum.

The list of fossil fragments was long, a total of 302 pieces in all, parts of the skull, right arm bone, and both legs, but frustratingly incomplete and badly eroded. The creature was described as being extremely small, about three feet in height, with long arms and relatively short legs. "When you look at this, and think about some of the things we’ve got — like 1500, 3735 — you wonder what all this fuss is about," I said, my competitive instincts rising. (Numbers like 1500 and 3735 are museum accession codes for the fossil specimens we have found, and conversations among anthropologists can seem somewhat arcane to outsiders, because they are often replete with such numbers and devoid of names.) "When we get back to the museum, we'll dig out some of our partial skeletons," I said. "I think we can have some fun."

We planned to make comparisons among some fossil specimens, and we expected to see something interesting.

We also knew that the episode unfolding before us was certain to revive an old problem of Homo habilis, one that has dogged anthropologists since the species was discovered and has impeded attempts to reveal the nature of the evolutionary pattern we were seeking. When, in April 1964, my father, in company with Phillip Tobias and John Napier, announced in the pages of Nature the discovery of Homo habilis, a new species of hominid they described as the maker of stone tools and the ultimate ancestor of modern humans, the response was immediate, loud, and highly critical. The critics, incidentally, were led by none other than Le Gros Clark, thus fulfilling his "Bones of Contention" statement of six years earlier.

One reason Louis and his two colleagues had opprobrium heaped on their heads so liberally was that, in making their new fossil a member of the genus Homo, they were forced to modify the definition of Homo. A second was that the collection of fossils brought together under the name Homo habilis was highly variable anatomically, too variable to represent just one species, according to many anthropologists.

Eventually the decibels of the debate died down, and Homo habilis became accepted as a valid species, the immediate precursor to Homo erectus. However, the issue of extreme anatomical variability in the species sample persisted, and debate on this remains as vigorous as ever, leading one prominent anthropologist recently to publish a paper with the title "The Credibility of Homo habilis." This gives a sense of the uncertainty anthropologists feel when they speak about the issue.

"Well, it depends on which specimens you feel you'd like to include" is the typical response when someone is asked for an opinion on Homo habilis. Of the several dozen specimens that have been said at one time or another to belong in this species, at least half probably don't. But there is no consensus as to which 50 percent should be excluded. No one anthropologist's 50 percent is quite the same as another's. It was into this paleontological mire — what qualifies as Homo habilis and what does not — that Don and his colleagues inserted themselves with their conclusions about their diminutive new Olduvai fossil, OH 62.
“Unfortunately, the Olduvai remains are very fragmentary. OH 7 (the type) consists of a broken mandible with teeth, parts of two parietals, and hand bones. Other individuals described in the 1964 report are just as incomplete, and several have been removed from the hypodigm at least temporarily, as noted before. The cranium of OH 24, which was badly crushed when found, is still distorted. The affinities of this hominid also have been questioned. Given this state of the material and continuing uncertainty over which of the specimens are Homo habilis, the Olduvai assemblage cannot readily serve as a basis for identifying fossils from other localities.”
“Primitive Homo”- or “Advanced Australopithecus?”

Cartmill Matt, Smith Fred H., The Human Lineage, Chapter 4., Wiley-Blackwell

“Researchers have been debating the reality of this species ever since it was first described in 1964.”

PRIMITIVE HOMO—OR “ADVANCED” AUSTRALOPITHECUS?

The first fossils that everyone accepts as Homo show up in the African fossil record around 1.8 Mya. The genus appears soon afterward in other low-latitude areas of the Old World. These wide-ranging early humans are usually grouped into the species Homo erectus. Many scholars prefer to consign the oldest fossil Homo from Africa and western Asia to a separate species, Homo ergaster. We will deal with these fossils in the next chapter under the taxonomically noncommital headings of “Erectines” and “Ergasters.”

But as the theory of evolution might lead us to expect, there are older African fossil hominins that seem to be intermediate between Australopithecus and Homo in their morphology. Many of these fossils have been referred to a third species of Homo: H. habilis. Researchers have been debating the reality of this species ever since it was first described in 1964. Some experts think that the “H. habilis” fossils represent primitive forms of Homo. Others regard them as “advanced,” humanlike versions of Australopithecus. For the time being, we will evade this taxonomic issue as well, by referring to them all as “Habilines.”

The first fossils to be identified as intermediate forms connecting Australopithecus and Homo came from the Transvaal caves. In 1949, R. Broom and J. Robinson reported the discovery of a gracile mandible from Swart-kraal, SK 15, that looked more human to them than anything previously found at the Transvaal cave sites. Pointing to the small molars and slender mandibular body of SK 15 as key differences from any known Australopithecus, Broom and Robinson assigned it to a new genus and species, Telanthropus capensis. Robinson (1953b, 1954a) hailed “Telanthropus” as an ancestor of the genus Homo, and eventually sank it into H. erectus.

The “Telanthropus” specimens were fragmentary and unconvincing. In 1960, theories about Plioene Homo in Africa took on more substance with the discovery of OH 7 in Bed 1 at Olduvai Gorge (Leakey 1961). OH 7, comprising a mandible, some hand bones, and parts of both partials, was almost as fragmentary. It was also immature, roughly equivalent in dental development to a 12- to 13-year-old child. Nevertheless, it seemed clear that this gracile skeleton was not the same sort of creature as the other Bed I hominins, the hyper-robust A. boisei. Louis Leakey and his co-workers (Leakey et al. 1964) assigned the “pre-Zinj child” and a partial foot skeleton (OH 8) found nearby to a new species, Homo habilis.

The definition of this new species, and its assignment to the genus Homo, revolved around three supposed differences between OH 7 and known species of Australopithecus. The first was a bigger brain. Cranial capacity estimates for OH 7 ranged between 642 and 723 cc, with a central tendency of 681 cc (Tobias 1964)—significantly greater than any estimates for Australopithecus. Second, the OH 7 mandible (Fig. 4.41) was described as having smaller cheek teeth and less molarized P3’s than even the most gracile Australopithecus. Finally, the OH 7 hand bones were interpreted as having features associated with a so-called “precision grip,” in which the thumb tip is fully opposed to the tip of the index finger (Napier 1961, 1962). The toolmaking skill supposedly reflected in the enlarged brain and nimble hand of OH 7—and in the stone tools found throughout the Olduvai deposits—was touted as a key part of the taxonomic and adaptive distinctiveness of the new species.

During the next 10 years, more fossil hominins that were clearly not A. boisei emerged from the lower levels of Olduvai Gorge. All were assigned to H. habilis by Leakey and his coworkers. The most important of these new H. habilis finds were the OH 24 partial cranium from Bed I (Fig. 4.77; Leakey et al. 1971); the OH 13 fragmentary cranial vault with an associated maxilla and mandible from lower Bed II (Fig. 4.78; Leakey et al. 1964); and the OH 16 fragmentary cranial vault and associated dentition, also from lower Bed II (Fig. 4.79; Leakey et al. 1964 Tobias 1981).

There was general agreement that the gracile hominins from Olduvai represented a different species from A. boisei. But not everyone agreed that it was a new species. Many thought that the new material could
Many of my colleagues have expressed concern that the work isn’t perfect, even after all these years of preparation and study. Three common complaints are that the comparison to Lake Turkana (east, west, and Omo) Homo habilis aren’t complete enough, the details and metrics of OH 24 are given more weight than the miserable condition of the specimen permits, and there are no systematic comparisons with Australopithecus afarensis (on this point, he is probably avoiding shooting himself in the knee, as a description of his 500 or so new Sterkfontein specimens is going to make the validity of the taxon very problematic—an argument he made to begin with)."

"Ironically, after all the years of unresolved phenetic debate about the validity of Homo habilis, the phylogenetic outlook suggests that if these weren’t a Homo habilis we would have to invent one."

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“Homo habilis” has received a good deal of publicity since his sudden appearance was announced, and it is particularly unfortunate that he should have been announced long before a full and detailed study of all the relevant fossils can be completed . . . . From the brief accounts that have been published, one is led to hope that he will disappear as rapidly as he came.” Wilfrid Le Gros Clark

“Homo habilis is an empty taxon inadequately proposed and should be formally sunk.” C. Loring Brace

4.

EAST AFRICA:

HOMO HABILIS—

THE EARLIEST MAN?

“The Zinj find of 1959 not only made Louis Leakey famous; it also made paleoanthropology fashionable. Not since the 1920s and 1930s, with the discoveries of the Taung Baby and Peking Man, had there been any new hominid fossils of their caliber to engage the public mind. Geology and paleontology were rated dull subjects in universities. Foundations turned their backs on requests for money to be spent digging for bones in obscure places. Newspapers ignored the subject.

But when Zinj fell into Leakey’s hands, it was like a legacy from a forgotten uncle. Now he had a hominid, and that made all the differ-
"From there on, however, habilis had heavy going. A principal reason was the scrappy condition of the evidence, for the four specimens found were badly preserved."

"The first one found, a mandible with two cranial fragments, was named Johnny's Child after its finder, Leakey's son Jonathan. Cindy, the second one found, had a lower jaw and teeth, some bits of an upper jaw and a patch of skull. The third, George, had only his teeth and some very small skull fragments. The fourth, Twiggy, was represented by a crushed cranium and seven teeth. George's story was a frustrating one. He was found so late in the afternoon that the delicate joby of removing him from the rock matrix was put off to the next day. During the night a herd of Masai cattle wandered up the Gorge and trampled on George, squashing him flat and grinding him into fragments, many of which were never recovered. Twiggy, who also was flattened—not by cattle but by the remorseless pressure of rock—got her name from a notably flat-chested English fashion model of the day."

EAST AFRICA: HOMO HABILIS—THE EARLIEST MAN?

with huge unmanlike molars, a small brain and a bony crest along the top of its skull should have been the tool maker—and thus, by inference, the ancestor of man—had been hard to digest. It was a relief to shove Zinj aside and accept this new larger-brained type as a more appropriate human ancestor.

From there on, however, habilis had heavy going. A principal reason was the scrappy condition of the evidence, for the four specimens found were badly preserved. As fossils so often are, they were given names. The first one found, a mandible with two cranial fragments, was named Johnny's Child after its finder, Leakey's son Jonathan. Cindy, the second one found, had a lower jaw and teeth, some bits of an upper jaw and a patch of skull. The third, George, had only his teeth and some very small skull fragments. The fourth, Twiggy, was represented by a crushed cranium and seven teeth. George's story was a frustrating one. He was found so late in the afternoon that the delicate joby of removing him from the rock matrix was put off to the next day. During the night a herd of Masai cattle wandered up the Gorge and trampled on George, squashing him flat and grinding him into fragments, many of which were never recovered. Twiggy, who also was flattened—not by cattle but by the remorseless pressure of rock—got her name from a notably flat-chested English fashion model of the day. Cindy is short for Cinderella. Nobody seems to know where George's name came from.

Despite the fragmentary condition of these skulls, a preliminary survey suggested that they probably were larger than the typical gracile skull from South Africa. That was enough for Leakey. Always obsessed with finding human fossils, he insisted that these belonged to the genus Homo and should be so named. As his colleagues became more familiar with the fossils and began finding other things about them that seemed to connote Homo, they reluctantly went along with him. Tobias set himself to reconstructing the skulls and deriving from them an idea of their brain capacity. This turned out to be an extremely difficult task, because the skull pieces were so small that it was not always possible to decide with certainty at what angle they should be inserted in the reconstruction. Raise the angle slightly, and the brain would get larger; lower it slightly, and it would get smaller. Despite this difficulty, Tobias managed, by making inferences back and forth between the three skulls, to calculate that their mean brain capacity was 642 cubic centimeters (about 41 cubic inches). For Leakey, 642 cc was plenty. It was 200 cc larger than
“It may seem ridiculous for science to have been talking about humans and prehumans and protohumans for more than a century without ever nailing down what a human was. Ridiculous or not, that was the situation. We do not have, even today, and agreed-on definition of humankind, a clear set of specifications that will enable any anthropologist in the world to say quickly and with confidence, “This one is a human; that one isn’t.”

BACKGROUND

the mean for the gracile australopithecines, and to him clearly placed the three Olduvai hominids in another, more advanced species.

But should that species be *Homo*? Why not another kind of *Australopithecus*? How small a brain could a hominid have and still qualify as human? In fact, how did one even define a human?

It may seem ridiculous for science to have been talking about humans and prehumans and protohumans for more than a century without ever nailing down what a human was. Ridiculous or not, that was the situation. We do not have, even today, an agreed-on definition of humankind, a clear set of specifications that will enable any anthropologist in the world to say quickly and with confidence, “This one is a human; that one isn’t.”

It is not accurate to say that there were no standards for assessing humanness. Back in the days when Keith and Woodward were measuring Piltdown Man’s skull capacity, a large brain was the *sine quanon*. The question was “How small a brain can we accept in a human?” The answer: “The smallest human brain that we have.” That amounts to circular reasoning, but lacking more and better fossils, it was the best that Keith and his contemporaries could do. His figure, then widely accepted, was 750 cc.

Le Gros Clark later shrank the human brain minimum to 700 cc. Again, this was an arbitrary figure: it measured the capacity of the smallest fossil human skull then in human possession. But Le Gros Clark, even as he set that new standard, realized that a newer find might force him to lower it again. He was also troubled by another problem that troubled many others. He knew that a species cannot be defined properly by one characteristic. There should be many, and that was what emerging *Homo* had always lacked. If there had been as much in the way of arm and leg and foot and pelvic bones as there was of skulls and teeth, it might have been possible to arrive at some useful benchmarks among those parts of the skeleton too. But postcranial remains were horribly scarce. Therefore, other characteristics of the skull—its shape as well as its size, the nature of the jaws and teeth—would have to be considered.

Australopithecines fell into a multimillion-year gap between true humans and late Miocene apes. And it was Le Gros Clark’s celebrated review of ape and human teeth that determined that australopithecines were not apes. But they were not humans either. Australopithecine teeth, in short, were their very own. So were their brains, which were in the 430–550-cc range—consistently larger than ape brains, notably smaller than *Homo erectus* brains. That in-be-
“Nearly half a century of accumulating evidence and discussion has left *Homo habilis* more open to question, more insecure than it ever was.”

“*Homo habilis* remains more of an evolutionary idea than an example of anatomical fact linking one species to another.”

Who indeed? Bernard Wood returned to the question in a paper on the history of the genus *Homo* published in 2000, and found it no easier to answer. *Homo habilis* was a ‘problem’ species, he wrote. The original fossils were believed to have represented an animal that was habitually upright and bipedal, and dextrous enough to make the Oldowan stone tools. However, functional studies of the relevant fossils made since those initial announcements had shown that they had most probably belonged to an animal that was not a committed biped, but one in which bipedalism was combined with the ability to climb. Likewise, there was nothing about the hand morphology of *Homo habilis* to distinguish it functionally from hand fossils attributed to *Australopithecus*. Thus there were no anatomical grounds for claiming that only *Homo habilis* could have made the Olduvai Bed I stone tools, and, in any case, stone tools had since been found in Ethiopia that were older than the fossil evidence of *Homo habilis*. All this meant that *Homo habilis* no longer matched the functional criteria that Leakey, Tobias, and Napier had set out. The species was insufficiently advanced in terms of its adaptations to justify inclusion in *Homo*, Wood concluded, and should either be transferred to *Australopithecus* or placed in a new genus.

Nearly half a century of accumulating evidence and discussion has left *Homo habilis* more open to question, more insecure than it ever was. While the species stood alone, a box of fossils separated from their putative ancestors and descendants by respectable distances in both time and morphology, its intermediate status seemed perfectly safe. Further evidence has filled the temporal gaps and intensified discussion of the species’ morphological characteristics, but has not supplied the foundation of unequivocal evidence on which a valid new species could stand, safe and unassailed. *Homo habilis* remains more of an evolutionary idea than an example of anatomical fact linking one species to another.