Anthropology Fossils and Skulls Display

This document is meant to be a guide for curious, to explain the significance of the items that we have on display. The three glass cases that contain the display currently reside in the library’s “Quiet Zone”, next to a window overlooking Gateway entrance. As stated, there are three display cases. Let’s call them from left to right (as you are facing them), cases A, B, and C. Each case has five shelves, and so we’ll refer to the shelves by number in descending order (that is, the top-most shelf in case is “shelf #1” and the bottom-most is “shelf #5”).

For most of the fossil replicas of human ancestors and extinct cousins that we have displayed, the date and place of discovery, the name of the discoverer and the age of the actual specimen in millions of years ago (Mya) or thousands of years ago (kya) will be given in brackets after the specimen name or designation.

Just as the chimpanzee in our little statue is sitting on a pile of resources and contemplating his evolutionary relationship to us, perhaps you too can use this document as your guide to contemplate your own place in the evolution of life.

Display Case A

On Shelf #1: Here you will find the skulls of our closest living primate cousins, the members of the genus Pan, the chimpanzee (Pan troglodytes) and the bonobo, which is sometimes and unfortunately called the “pygmy chimpanzee” (Pan paniscus). Both closely related species live in the rain forests of west central Africa – they are separated by about only a million years of evolutionary time and by the width of the great Congo River (chimpanzees live to the north of that river and bonobos to the south.)

• We have on display a male chimpanzee next to the skull of infant. If you compare these skulls you can see the development of the jaws in the adult. Compare that to the modern human skulls displayed on shelf #3 of display case #3. In humans. The development of the jaws is much less marked but the growth of the brain case from infancy to adulthood is highly developed.

• You can also compare these adult and infant chimpanzee skulls to the skulls of modern human adult and infant on display case #3, shelf #3. Note the relative size of the brain case to the size of the face in each species. Also note the increased amount of brain growth in humans as compared to chimps.

• In comparing the male chimpanzee skull and the female bonobo skull, you will see that some evidence that male apes tend to be more robustly built than females (note the size of the canine teeth in the male chimpanzee as well as in the male gorilla and male orangutan in the shelf below.)
On Shelf #2: Gorillas (Gorilla gorilla) are the largest of the great apes – a group that includes chimpanzees, bonobos, gorillas and orangutans. Except for the last, all live in forested parts of Africa and are closely related to humans. Where the African great apes are separated from us by about 6 to 7 million years, Orangutans are more distant cousins, separated from us by perhaps as much as 15 million years. Orangutans are the only great apes found naturally outside of Africa. They live on the Indonesian islands of Sumatra and Borneo – each island serving as the habitat of two distinct species (Pongo pygmaeus on Borneo and Pongo abelli on Sumatra.)

- Note the very large canine teeth of the gorilla and orangutan on display. Both are of male individuals. While these teeth can inflict severe damage if these individuals choose to bite, their main use is probably in threat displays against other males of their own species. Males of both species are substantially larger than the females and males compete fiercely for sexual access to and control of females.

- Also note the large bony ridge that runs front to back over the top of the skull. That bony structure called the sagittal crest serves as the anchor point for very large muscles that power the massive lower jaw. Compare the sagittal crest here to those on the skulls displayed on shelf #1 in display case #2.

On Shelf #3: On the left, you see the infamous Piltdown Man. Imagination and desire are powerful forces that shape human thinking. Driven by nationalist competition, English scientists, who wanted to be able to claim that the earliest humans had been found on their island rather than in the territories of the imperial competitors, in the first years of the 20th century were duped by the supposed discovery in 1912 in the south of England of the bones that were given the now defunct designation “Eoanthropus dawsonii” and that were said to be the remains of a possibly 50 million year old ancestor of humans. Fifty million years would put a comfortable distance between humans and apes, but the clincher was that these remains seemed to indicate that the human brain had achieved it large size eons ago. It was shown in the years right after the Second World War, that these bones are not fossils but were a combination of a modern human cranium and an orangutan’s jawbone. Who perpetrated the hoax and why it was done remain a mystery. Sharing space on this shelf are replicas of two authentic fossils, The Taung Child (Australopithecus africanus) and Toumai (Sahelanthropus tchadensis [found between 2001 and 2002, in the Djerab Desert region of Chad by teams led by Michel Brunet; ~7 Mya]).

- The Taung Child was found in 1924 by quarriers working near the town of Taung in South Africa and scientifically described by anthropologist Raymond Dart in 1925. Based on features of its face, skull and teeth, Dart asserted that it was an early human ancestor. The paleontological community of the time, however, refused to accept that assertion and based on its brain size (the endocast, that is the “fossilized” brain of the Taung Child is the smooth rock like object against which the remains of the skull are resting), dismissed the remains as those of an extinct ape. It was not until much later that it was generally accepted that the exaggerated brain size of our species was a more recent evolutionary development.
Toumai, which means “hope of life” in the Dazaga language of Chad, the country in north central Africa where these remains were found. Some feel that Toumai is an early member of the human family, some claim that this species may be the so-called “missing link”, that is the last common ancestor shared by humans on the one hand and bonobos and chimps on the other and still others assert that Toumai’s species may be an early ancestor of the gorilla. Discovered in 2001, the condition of the remains and the vagaries of reconstruction lead to varying interpretations. Note that scientists arguing for different and very often changing interpretations of fossils is not unusual and is indeed the expected process. Knowledge in science grows not through agreement and consensus but through disagreement and reasoned conflict.

On Shelf #4: Here we see three members of the group known to anthropologists as australopithecines. Specifically, you will see on the left a replica of the fossil skull known as STS 5 or Mrs. Ples (a nickname based on a now defunct genus name, “Plesioanthropus”, but now known as a member of the same species as the Taung Child. Mrs. Ples, who is actually probably a male, is an adult member of Australopithecus africanus [found in Sterkfontein, South Africa in 1947 by Charles Broom and John T. Robinson; ~2 Mya]. Taking up the center of the shelf are the skull, leg and hip bones of the individual known to science as AL-288-1 but known more widely as Lucy (Australopithecus afarensis [found in 1974 by Donald Johansen in the Afar region of Ethiopia; ~3.2 Mya]). To the right, we have displayed a skull of Kenyanthropus platyops [found by Justus Erus, a member of the team led by Maeve Leakey, in 1999; ~3.3 Mya]. Members of this group were all rather small, probably no more than 3 to 4 feet tall and all had small chimp-sized brains, and probably had diets similar to that present-day chimps, that is fruit, soft leaves, insects, eggs and small mammals when they could be caught.

Lucy’s leg bone is displayed in fragments but if you look shelf #4 in display case C, you will find Lucy’s femur reconstructed. Compare its shape to the femur of modern humans. How can you tell that it belonged to a bipedal creature that is one that walked upright on two legs?

Note that the jaws of these australopithecines were chimp-like in their prominence. The size of the jaws indicates the rough texture and consistency of their food.

Also note that the period in which these species lived was a time of great diversity in human evolution. For example, though there is some disagreement of doing so, the right most species has been placed in a separate genus to indicate that there are substantial and significant physical differences between it and other australopithecines. In this case, some say that the teeth of Kenyanthropus are smaller, and the bony structure of the face is flatter than those of species classified in the genus Australopithecus.

Rather than imagining that the evolution of humans followed a single line with one species arising in turn from another becoming extinct, it is best to think of human evolution as a process that yielded many variations that often co-existed on the same landscape. This leads, of course, to some healthy confusion…who was our ancestor? Was it Australopithecus afarensis? Kenyanthropus platyops? Or someone else as yet undiscovered? There are still mysteries to be solved.
On Shelf #5: On the bottom shelf of this display case, you will find some replicas of the kinds of tools that our ancestors were making. The set marked Oldowan, named after the Olduvai Gorge in Kenya, are associated with Homo habilis, Homo rudolfensis (see shelf #3 in the middle display case) and possibly some later australopithecines. The Acheulean tools, named so after the French town of Saint-Acheul where some of these tools were found in 1859, are associated with Homo erectus (see shelves 4 & 5 in the middle display case). The Mousterian tools, which are named after a site in southern France, a rockshelter known as Le Moustier in the Dordogne Valley, where such tools were first found, are associated with Neanderthals and other human species including early members of our own species.

Display Case B

On Shelf #1: Between 3 to 2 million years ago, perhaps in response to changing climate conditions, some australopithecine groups adapted to a new more arid, harsher environment by eating harder and tougher foods. As you can see in these skulls of species that some refer to as “robust australopithecines”, jaws and teeth as well as the bony structures of the face that supported the much larger chewing muscles needed for the new diet became larger. There are two specimens displayed here both discovered by teams led by the Leakey family of Kenya. On the left, the so-called “Black Skull” KNM-WT17000 (Paranthropus aethiopicus [found in 1985 by Alan Walker in the West Turkana region of Kenya; ~2.5 Mya]), which acquired its dark coloration from the high amount of manganese in the surrounding earth, and on the right, originally placed in the now-defunct genus “Zinjanthropus” by it’s discoverer and so nicknamed Zinj (Paranthropus boisei [found in 1959 by Louis and Mary Leakey in Kenya’s Olduvai Gorge; ~1.5-2 Mya]).

- The nickname “Zinj” is an Arabic word meaning “East Africa”, probably itself derived from “Zanzibar”, an island that is now a part of the country of Tanzania, and that was a central hub in the Indian Ocean trade network of Muslim traders for centuries.

- Note the sagittal crest, the ridge of bone that runs across the top of the head. This is where one set of chewing muscles from the lower jaw (the temporalis muscle) attached to the skull. Also note the exaggerated size of the cheekbones, there is another set of chewing muscles (the masseters) from the lower jaw that attach there.

- You can feel on yourself where those chewing muscles attach to the face and skull in modern humans. By comparison, our muscles are very small. The temporalis in modern humans attaches just above the ear. You can feel them working by placing your fingers just above your ears, while opening your mouth widely and then closing and clenching your jaws. You can feel our masseter by placing your fingers at your cheekbones and moving your jaws open and closed. (Why do you think the muscles of chewing in modern humans have become so small?)

On Shelf #2: The library staff and the anthropology faculty of the School of Arts & Sciences at Madison College together maintain a display of three cases of bone, fossil and artifact replicas which can be found in the college’s library on the third floor of the Truax Campus. You may direct any specific
questions that you might have about any of the items on display to anthropology faculty member, Luke Matthews whose e-mail address is: jmatthews@madisoncollege.edu.

On Shelf #3: On this shelf are displayed the skulls and a jaw of the earliest member of our own genus Homo. Where their contemporaries, the robust australopithecines, developed massive jaws, teeth and muscles for chewing, the members of the genus Homo, exhibit a reduced chewing apparatus but the beginnings of a brain expansion that would continue through time. The skull on the left, you will see KNM-ER 1813 (Homo habilis [found by Kamoya Kimeu in Koobi Fora, Kenya in 1973; ~1.9 Mya]), the OH7 jaw (also Homo habilis [nicknamed “Johnny’s Child”, this fossil jaw was in 1980 by Jonathan and Mary Leakey in Olduvai Gorge; ~1.75 Mya]) and KNM-ER1470 (Homo rudolfensis [found by Bernard Ngeneo in 1972 in Koobi Fora; ~1.9 Mya]).

• The brain size of these early members of Homo is rather modest, and they were made members of the genus because they were initially found with what have come to be called Oldowan tools. The species name “habilis” refers to their having been toolmakers. New discoveries have shown that species that were clearly in the australopithecine group were also using Oldowan-style tools, thus blurring the line between Homo and the australopithecines.

On Shelf #4: Colloquially known as either “The Nariokotome Boy” or “The Turkana Boy” since his remains were unearthed near the Nariokotome River which drains into Lake Turkana are the remains known to anthropology as KNM-WT 15000 (Homo ergaster, [found by Kamoya Kimeu in 1984 near Lake Turkana in Kenya; ~1.5 Mya]). On the shelf, you will see replicas of his skull and his pelvis. His pelvis shows that he walked on two feet much as we modern humans do. Studies show that he was somewhere between 8 and 12 at the time of his death.

• Note the lower forehead of the Turkana Boy as well as the more robust bony structure of the face, as compared to modern humans (see display case C). His species, as well as those on the shelf below and first two shelves in display case C, exhibit a supra-orbital ridge, or eyebrow ridge, that is mainly lacking in members of our species.

On Shelf #5: On this shelf we have the fossil known as Peking Man (Homo erectus [reconstructed from several fossil skulls and jaws found between 1923 and 1927, in Zhoukoudian or Chou K’ou-Tien near Beijing; ~750 kya]). Also displayed is another example of Homo erectus, Sangiran 17 [found in the site of Sangiran in Java, Indonesia; ~700 kya] and a replica of a specimen that some assign to a new species Homo georgicus and others more conservatively assign to Homo erectus D2700 [found in Dmanisi in the Republic of Georgia in the Caucasus; ~1.8 Mya].

These skulls are grouped together to draw attention to the fact that with the emergence of the genus Homo, members of the human family began to populate the world outside of Africa.
If you look at a map of the world today, you will see that Java is an island separated from the mainland of Asia. The world at the time of initial human movement out of Africa was a different place. The ancestors of Sangiran 17 would have been able to follow a coastal route and simply walk from Africa to Java. The islands of western Indonesia were linked to mainland Southeast Asia in a now drowned land mass known as Sunda.

Display Case C

On Shelf #1: The first three shelves of this display case are devoted to more recent members of the human family. On this shelf, you will find a specimen known as The Broken Hill Skull or Kabwe 1 [found by Arthur Smith Woodward in Kabwe, Zambia known in 1921 as Broken Hill, Northern Rhodesia; 125 – 300 kya] is a representative of a species that is classified as Homo heidelbergensis, descendants of populations of Homo ergaster that had moved away from their original habitat in East Africa. Next to Kabwe 1, you will find a replica of a set of bones unfortunately known as The Old Man of La Chapelle-aux-Saints (Homo neanderthalensis [found in 1908 in La Chapelle-aux-Saints, France; ~40 kya]). The “Old Man” was actually at the time of his death only 35 to 40 years old, but suffered from severe osteoarthritis, which left him stooped in his posture. Study of his remains in the early 20th century led many to imagine that the Neanderthals did not stand fully upright, had a shuffling gait and a bent-over posture. His osteoarthritis also affected his feet, which made it look as if his big toe projected to the side, which led some to believe that Neanderthals were more ape-like than human. More recent research based on individuals (such as La Ferrassie, see the shelf below, and others) has shown that Neanderthals were fully human in posture and gait.

The period between the movement of the first humans into the world outside of Africa, starting probably around 2 Mya until the time that modern humans (that is, members of our own species Homo sapiens) was very likely a time in which various groups were adapting to very different sorts of habitats leading to a wide variation in physical types. Though some anthropologists see species-level differences among human groups living in different parts of the world, others are more willing to entertain the idea that one species can exhibit a wide range of physical variation. The human groups of this period, from about 800 kya to the point in time when we became the only human species left on the planet, are often loosely collected under the label “archaic humans”.

The willingness with which people were willing to imagine that Neanderthals were ape-like brutes, like the hoax the Piltdown Man, once again shows how much the imagination and prejudice can get in the way of properly interpreting anthropological evidence. The “Old Man” reminds us to be vigilant in examining our biases as we look through these remains into the past.

On Shelf #2: For a few thousand years, we shared the planet with other human species. The last of the Neanderthals, here represented by La Ferrassie [found in La Ferrassie, France in 1909; ~50-70 kya] and The Teshik-Tash Child [found in Uzbekistan, representing the far eastern end of the area inhabited by Neanderthals], lived until about 26 thousand years ago. The small skull on the left side of the shelf is LB1 popularly known as “Flo” to her discoverer and more commonly to the rest of the world as “The Hobbit”
(Homo floresiensis [found on the Indonesian island of Flores in 2003 by archaeologist Michael Morwood; possibly as recent as 12 kya]).

- Neanderthals first emerge in the fossil record at about 250 kya, and were adapted to the cold of then glacial Europe. They were stockier and more robust than modern humans, who had evolved in the arid heat of Southeast Africa.

- The species Homo floresiensis seemed to have emerged through a common process by which animals living in relative isolation on islands undergo changes in their size. Members of this species were small, attaining a full adult size of just over 3 feet.

- Some anthropologists and folklorists who conduct research in Indonesia assert that the so-called Hobbit's species may be linked to folk memories, preserved in local tales of ebu gogo, that is of small people living in the forests of Flores, leading some to believe (wishful thinking?) that living populations of this species may yet be found.

On Shelf #3: What makes a human modern? All of the specimens on this shelf are those of our own species Homo sapiens. You will find Cro-Magnon [found at Les Eyzies, France in 1868; ~27 kya], a 10 thousand year old modern human skull found in Germany, a skull of a contemporary modern human adult from Asia, and the skull of a modern human infant. There are several physical features that make the modern human skull distinct from those of archaics such as Neanderthals. There are also behavioral characteristics that distinguish modern humans from other human species. We have place a copy of the so-called Venus of Willendorf here to represent those behaviors.

- If you compare the modern human skull to those of, say, the Neanderthals, you can see that the forehead is more prominent in our species than it is in theirs. This gives the impression when seen from the front that modern human brains were larger than those of Neanderthals, but that is an illusion. Neanderthals actually had, as an adaptation to the cold, slightly larger brains, but those brains sat behind the face rather than above the face as in our species. That placement probably acted to counter-weight the heavier face of Neanderthals.

- The modern human face and jaws have become more gracile. This has forced a supporting structure that is normally inside the jaw to move to the outside, thus forming the chin – only modern humans have a true chin.

- Further, as mentioned before modern humans have generally lost the eyebrow ridge that seemed to serve in other species to help buttress the facial bones from the constant shock of the chewing muscles doing their work.

- More than anatomy however, the main distinguishing characteristic of modern humans is the emergence of symbolic thinking as evidenced by the production of immediately non-pragmatic and more aesthetic and very probably meaningful objects such as the Venus figurine displayed or the cave wall art on the sign. (Though we do not and probably will not ever know what significance these things had to the people who produced them, we can safely assert that they must have had some meaning. Modern humans unlike their contemporaries of other human species were projecting meaningfulness onto the world.)
On Shelf #4: On this shelf and the one below are arranged for comparison the femurs of a range of primate species. On shelf #4 are the femurs of Australopithecus afarensis, of Homo erectus, of a Neanderthal, of a modern human and of an archaic child. You can note the similarities among these fully bipedal groups, but also see how, for example, the Neanderthal femur is thicker, more robust as a cold adaptation compared to the modern human and Homo erectus femur.

On Shelf #5: On shelf #5 are the femurs some non-human and therefore quadrapedal primate species. Arranged here are the femurs of gorilla, chimp, bonobo, orangutan, mandrill, and siamang (also known as a gibbon). You can compare the structure of the femurs on this shelf with those on the shelf above to see how the femurs changed to allow for bipedality.

• Look at the femoral neck, that is the upper end of the femur where it connects to the hip. See how much longer the neck becomes in bipedal creatures? Now look at the condyles of the femur that form the knee. Note the angle they form with the shaft of the femur. In apes and monkeys the femur hangs straight under the animal, but in bipedal animals like us, the femur hangs diagonally from the outside of the hip, so that our knees can meet under us.