TOUMAI, DMANISI AND THE HOBBIT:
FOSSILS RECENTLY FOUND IN AFRICA, EUROPE AND
ASIA ARE CHANGING OUR IDEAS OF HUMAN ORIGINS

Toumai
Sahelanthropus tchadensis
Chad in Central Africa
PART A
Slides 2-16

Dmanisi
Homo erectus
Republic of Georgia
PART B
Slides 17-35
March 31, 2005

Hobbit
Homo floresiensis
Indonesia
PART C
Slides 36-56

July 11, 2002

Toumai
Sahelanthropus tchadensis
7-million year old hominid discovered by Ahounta Djimdounalbaye in 2001 in Chad, in the southern Sahara desert.

"It's a lot of emotion to have in my hand the beginning of the human lineage. I have been looking for this for so long." Michel Brunet of the University of Poitiers, France.
The search for the earliest hominid fossil evidence has been concentrated in the Rift Valley of East Africa. This discovery of six hominid specimens in Chad is 2,500 km from the East African Rift Valley. The fossils include a nearly complete cranium and parts of the lower jaws. No bones below the skull were discovered.

Map of the Chad basin. The red dot shows the location of the Toumai fossil discovery. The crossed line represents the Chad border.
Finding hominids in the Sahara was a bit of a long shot.

All six known specimens of *S. tchadensis* come from a single location. The rich animal life in the area includes fish, crocodiles and amphibious mammals, primates, rodents, elephants, horses and cattle-like mammals. The presence of these animals suggests an age of between 6 and 7 million years. The evidence also suggests that *S. tchadensis* lived close to a lake, but not far from a sandy desert.

The age of the Toumai fossils was determined by the known age of other animals that lived in the area at the same time.

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Why is Toumai Important?
At between 6 and 7 million years old, the skull is the earliest known record of the human family. Toumai comes from a crucial yet little-known interval when the human lineage was becoming distinct from that of chimpanzees.

The distance from the Rift Valley, and the great age of the fossils, suggest that the earliest hominids were more widely distributed than has been thought, and that the divergence between the human and chimpanzee lineages was earlier than indicated by most molecular studies.
The dental arch is U-shaped with cheek teeth smaller than Australopithecine ones. The dental enamel is thicker than Chimpanzee but thinner than Australopithecine.

What features of the Toumai skull suggest it is more like an ape? More like a human?

THERE IS MIX OF ANATOMY

The small brain is comparable to that of a chimpanzee.

The heavy brow ridge suggests an ape.

The flat face and small canines suggest a hominid.
The known fossil record of hominids, including *S. tchadensis*, also showing ourselves and the chimpanzee.

Much remains to be learned about the identity of Toumai and where it belongs on the family tree.

**Is Toumai a hominid or an ape?**

**Is Toumai the last common ancestor of humans and apes?**

Michel Brunet of the Univ. of Poitiers in France thinks Toumai is a hominid and is “a likely ancestor of all later hominids”.

Chris Stringer of the Natural History Museum in London said “This creature could be our missing ancestor, it could be on the human line of evolution. But I don’t think we can really say yet that it’s a human relative…”

Micheal Wolpoff of the Univ. of Michigan concluded Toumai is an ape because the position of the foramen magnum suggests it did not walk on two legs but was a quadruped like apes.

Whatever Toumai is, scientists agree that it is a find of major significance.

“Toumai” is arguably the most important fossil discovery in living memory…”

Dr. Henry Gee, Paleontology Editor, *Nature*

It may be impossible to know how Toumai is related to us until other fossils can be found in the same time period.
Credits and References – Part A - Toumai
Rasch, John, "Controversy over Famed Skull: Ape or Human?", National Geographic News, October 9, 2002.
Stone, Richard, “Survivor”, Discover. March 2003 and on line at Tools
http://www.discover.com/issue/mar-03/features/featsurvivor/

Dmanisi

This is the face that's changing a thousand minds. It could be the face of the first human to leave Africa. And it's not what anyone expected.

March 31, 2005
Between 1999 and 2002 four 1.8 million-year-old skulls were found in the village of Dmanisi in the Republic of Georgia.

The excavation site is on a wooded plateau where two rivers meet.
Excavations at Dmanisi were led by David Lordkipanidze (in blue vest) of the Georgian Site Museum. Fossils were dated at 1.8 million years old by magnetic analysis of sediments and by the known age of animal fossils found with the hominid fossils.

The team found fossils of as many as six individual hominids as well as saber-toothed cats, giraffes, wolves, and deer. New material is being found faster than it can be analyzed.

The fossil bone fragment (probably a deer) at the top of this photo was found near the stone tool shown below the bone. Cut marks on some bones indicate that Dmanisi used stone tools to butcher animals.

Over 800 stone artifacts have been recovered.

Primitive stone tools used by Dmanisi are like those used by African Homo erectus.

Dmanisi individuals show much variation but probably belong to the same species.
What are Dmanisi’s unique characteristics?

- Small cranium
- Thin brow ridge
- Large canines

Bones from at least two of the four skeletons found at Dmanisi. Altogether, 50 bones have been found. Thick leg bones suggest a robust adult who hiked nearby hills and the leg bones indicate that one individual stood four feet seven inches tall.

The scene of a fresh kill could have become chaotic as both human and animal carnivores competed for food. Dmanisi was probably more a scavenger than a hunter. They had primitive stone tools which they probably used to chase away predators from carcasses.
How does Dmanisi compare with *H. Erectus* and *H. habilis*?

<table>
<thead>
<tr>
<th></th>
<th><em>H. habilis</em></th>
<th><em>H. erectus</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain size</td>
<td>About 650 cc</td>
<td>About 900 cc</td>
</tr>
<tr>
<td>Height</td>
<td>4.5 ft.</td>
<td>6 ft.</td>
</tr>
</tbody>
</table>

The raw Dmanisi skull has a brain size of 770 cc in one specimen. *H. erectus* is shown in yellow.

How should Dmanisi be classified?
As *H. habilis*, *H. erectus*, or something else.

Dmanisi may have evolved from *Homo habilis* and wandered out of Africa completing the transition to *Homo erectus*.

Dmanisi is provisionally classified as *Homo erectus* but some scientists think it should be *Homo habilis*. At least one scientist proposed naming it *Homo georgicus*.

The search continues for more parts of the skeleton which may tell us more.
How did Dmanisi get to Georgia?

Arrows indicate possible migration routes of early humans.

This toothless Dmanisi poses an interesting question. How did he survive without chewing?

Maybe he found soft foods, or perhaps another Dmanisi helped him – which, if true, would be the first sign of human caring.

Alternate Family Trees for Dmanisi

Note: Dmanisi is provisionally classified as Homo erectus.
No hominids so ancient have been found outside of Africa. Dmanisi challenges the notion that hominids had to have large brains and sophisticated tools in order to leave Africa.

The volume and quality of the fossils being found at Dmanisi will likely yield significant information in our quest to understand hominid evolution.

**Why the Dmanisi Discovery Is Important**

The volume and quality of the fossils being found at Dmanisi will likely yield significant information in our quest to understand hominid evolution.

**Credits and References – PART B: Dmanisi**


Dmanisi, web site, http://www.dmanisi.org.ge/


**The “Hobbit” - Homo floresiensis**

The “Hobbit” - Homo floresiensis

**PART C**
A spectacular find in Indonesia reveals that a strikingly different hominid shared the earth with our kind as recently as 13,000 years ago. *Homo floresiensis* hunts the pigmy Stegodon and giant rat.

The remains of giant rats and Komodo dragons, and the presence of complex stone tools suggest that *H. floresiensis* hunted these animals.

The Hobbit’s 13,000 year age was determined by radio carbon dating of charcoal found next to the skeleton, together with luminescence dating of surrounding sediments exposed to the sun.

*H. floresiensis* was discovered in 2003 on the island of Flores in Indonesia.
Liang Bua
Site of limestone cave on Flores where *H. floresiensis* was found.

*H. floresiensis* excavation site in Liang Bua limestone cave.

Archaeologists Wahyu Saptomo and Mike Morwood examine stone artifacts.
Australian palaeoanthropologist Peter Brown photographs *H. floresiensis*.

Thomas Sutikna of the Indonesia Centre for Archaeology holds skull of *H. Floreisinsis*.

The most complete *H. floresiensis*, LB1, consists of an almost complete skull and a partial skeleton consisting of leg bones and parts of the pelvis, hands and feet.

The remains were not yet fossilized – “they were as soft as wet blotting paper” according to archaeologist Mike Morwood.

LB1 stood 1-meter or roughly half that of a modern human adult. Judging from the wide pelvis, LB1 was an adult female whose arms hung almost to the knees. Her delicate hand and wrist bones imply she did little climbing.

With a tiny brain and bones built for upright walking, *H. floresiensis* is built like Africa’s Australopithecus - like the famous Lucy who lived 3 million years earlier.
How does *H. floresiensis* brain size and height of compare with other hominids?

The grapefruit-sized brain of *H. Floresiensis* was 380 cubic centimeters or about size of a chimpanzee’s and one-third the size of a modern human’s.

Anatomical studies of the creature’s brain case show that it was neither a pigmy nor an individual with a malformed skull and brain.

The 380 cc brain is as small as that of any hominid ever discovered.

Human pigmies have brains almost as large as those of normal-sized humans.
How does *H. floresiensis* compare with *H. sapiens* and *H. erectus*?

**Hint:** Compare their foreheads, brow ridges, chins, and facial protrusions.

What question do these tools raise about the relation between brain size and intelligence?

ADVANCED IMPLEMENTS appear to have been the handiwork of *H. floresiensis*. Earlier hominids with brains similar in size to that of *H. floresiensis* made only simple flake tools at most. But in the same stratigraphic levels as the hominid remains at Liang Bua, researchers found a suite of sophisticated artifacts—including awls, blades and points—exhibiting a level of complexity previously thought to be the sole purview of *H. sapiens*.

What does this timeline suggest about the importance of *H. floresiensis* in our understanding of human evolution?
How did *H. floresiensis* evolve to have such a small size?

Dwarfs and giants tend to evolve on islands.

Dwarfs and giants tend to evolve on islands, with animals larger than rabbits shrinking and animals smaller than rabbits growing. The shifts appear to be adaptive responses to the limited food supplies available in such environments. Stegodon, an extinct proboscidian, colonized Flores several times, dwindling from elephant to water buffalo proportions. Some rats, in contrast, became rabbit-sized over time. *H. floresiensis* appears to have followed the island rule as well. It is thought to be a dwarfed descendant of *H. erectus*, which itself was nearly the size of a modern human.
Some Interesting Questions

Could the Hobbit and Dmanisi, two species separated by 1.8 million years and 6,000 miles, be distant cousins?

How did the Hobbits get to Flores? Were they good mariners capable of building rafts and planning voyages?

Modern humans colonized Australia from mainland Asia about 50,000 years ago. Did they and the Hobbits ever meet? Could some Hobbits still live in remote pockets of Southeast Asia’s dense rain forest?

(FORKLORE OF FLORES ISLANDERS INCLUDES STORIES OF EBU GOOG, HALF-SIZE, HARY PEOPLE WITH FLAT FOREHEADS.)

What could be learned if mtDNA could be extracted from the skeleton? (THIS IS POSSIBLE BUT SEEMS UNLIKELY BECAUSE DNA DEGRADES RAPIDLY IN WARM TROPICAL ENVIRONMENTS.)

Credits and References – Part C - Hobbit

Dalton, Rex, “Critics Silenced By Scans of Hobbit Skull”, news@nature.com, 3 March 2005.


