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Orrorin tugenensis

Name: *Orrorin tugenensis* (means "original man" in local dialect)

Nickname: "Millennium Man" because it was discovered last year

Location of fossils:

1. The first specimen was excavated from the deep ravines of Kapsomin, about 20 miles from Lake Baringo, about 260 miles north west of capital Nairobi, on the western escarpment of the Great Eastern Rift Valley.
2. The latest fossils were found in the village of Rondinin in the Tugen Hills, around 235 km northeast of the capital, Nairobi.
3. During follow-up surveys and surface screening, other hominid fossils were found at Kapsomin, Kapcheberek, and Aragai.

Age: Approximated at 6 million years old from the geological strata that the specimens were found in.

Fossil Features:

1. Bones of 5 different individuals found, representing both male and female; 13 bones total.
2. Pieces of jaw with teeth, isolated upper and lower teeth, arm bones (left humerus), leg bones (left femur), and a finger bone.
3. Bone lengths indicate it was about the size of a modern chimpanzee.
4. A thick right humerus bone from the upper arm and finger bones suggest it had moderate tree-climbing skills, but probably not enough to "hang" from tree branches or swing limb to limb.
5. Large left femoral head indicate it was bipedal. [The femoral head is smaller than modern humans, but larger than Lucy's (*Australopithecus afarensis*).]
6. Groove on femur where muscles and ligaments needed for walking might attach further suggest bipedalism.
7. Canines are reduced compared to other apes, but larger than modern humans.
8. Incisors are broad and robust.
9. Molars are thickly enameled, small, and squared.
10. Diet of hard-skinned fruits, vegetables, with occasional meat.

Location Map



Catalogue of Fossils Found



Large femur head evidence of bipedalism



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The question of human origins has plagued humankind since the beginnings of human speculation. A controversial new fossil find may soon shed new light on our earliest ancestor. Bridgett Senut and Martin Pickford report in the 28 February issue of the *Comptes Rendus* of their discovery in Kenya of 6-million-year-old fossils that they believe are the bones of the earliest human ancestor ever discovered. They have classified their specimen - nicknamed "Millennium Man" because it was discovered last year - as a new species, *Orrorin tugenensis*, which means "original man" in the local dialect. Senut and Pickford believe that their specimen is the real ancestor to *Homo*, relegating the australopithecines to a side-branch of the evolutionary tree.

The researchers have found a total of 13 bones - representing five different individuals, both male and female. Although the fossils themselves have not been dated, they were found in a layer of rock that has been conclusively dated at approximately 6 million years. This extreme age makes *Orrorin* the oldest known hominid, older than *Australopithecus ramidus*, dated at 4.4 million years, which is currently believed to be the ancestor of all later australopithecines and *Homo*. It also places *Orrorin* right around the time of the split between the ape and hominid lineages.

Relative bone lengths indicate that *Orrorin* was the size of a modern chimpanzee, and teeth structure indicate it had a diet of hard-skinned fruits, vegetables, and occasional meat. The researchers report that the leg bones "had been chewed, indicating that the individuals to which they belonged probably fell prey to a large carnivore." Pickford said, "It looks like he was killed and eaten by some sort of carnivore, probably a cat. It was probably dragged up a tree to the cat's usual eating place and then bits fell into the water below."

Several features of the *Orrorin* skeleton make it an extremely interesting specimen. Structural features of the leg bones strongly suggest that *Orrorin* was a biped, a defining characteristic of hominids. A well-preserved left femur contains a large head that would have served to distribute the weight during bipedal walking. The femoral head, while smaller in absolute size than modern humans, is larger than Lucy's. (However, other specimens of *Australopithecus afarensis* show femoral heads that are larger than *Orrorin*'s.) Furthermore, grooves on the femur for muscle and ligament attachment further suggest that *Orrorin* was bipedal. The discovery of a thick right humerus bone and several finger bones suggest *Orrorin* had moderate tree-climbing ability, though probably not enough to "hang" from tree branches or swing limb to limb.

It is *Orrorin*'s teeth, however, which make the specimen especially interesting and are at the source of much of the controversy. The canines, though larger than modern humans, are reduced compared to other apes. Canine reduction is a general trend in hominid evolution. Its incisors are broad and robust, and its molars are thickly enameled, small, and squared. Of the four living African ape species, only humans have thick enameled molars. (The other three species - gorillas, chimpanzees, and bonobos - have thin enamel.) Most australopithecines also have thickly enameled molars, though they are much larger. The next oldest hominid, *Australopithecus ramidus*, the other contender for human ancestor, has unhumanlike thin enamel (*Science*, 23 February).

Not everyone is convinced by the dental evidence, however. Some researchers argue that many of the early *Homo* species had large molars, so the *Orrorin* small molars do not automatically make it a better candidate for human ancestry. Others argue that enamel thickness varies considerably from one species to the next, which makes its value

in measuring evolutionary relationships questionable. The debate appears to be undecided, and more fossil discoveries and analysis will be needed to resolve this issue.

The great age of the specimen, which appears to be unquestioned, as well as its unique combination of features, warrants the creation of a new genus and species name. At this early stage in the research, it is impossible to deduce the precise evolutionary relationships between *Orrorin* and the australopithecine stock. Further analysis of the *Orrorin* fossil remains will no doubt shed new light on the mystery of human origins - and without a doubt will create new and as yet unpredicted questions.

Press release quotes

1. "Not only is this find older than any else previously known, it is also in a more advanced stage of evolution," paleontologist Martin Pickford told a news conference.
2. "It is at least 6 million years old, which means it is older than the (previously oldest) remains found at Aramis in Ethiopia, which were 4.5 million years old."
3. Although no dating has been done on the remains just unearthed, strata from where the fossils were recovered have been previously proven twice by independent teams - from Britain and the U.S. - to show an age of 6 million years.
4. "Preliminary studies of the arm and finger bones reveal that the Kapsomin hominid was an agile climber in the trees, whereas its leg bones indicate that when it was on the ground it walked on two legs," the KPE said in a statement.
5. An almost perfectly fossilized left femur shows the much older Millennium Man already had strong back legs which enabled it to walk upright - giving it hominid characteristics which relate it directly to man.
6. A thick right humerus bone from the upper arm suggests it also had tree-climbing skills, but probably not enough to "hang" from tree branches or swing limb to limb.

7. The length of the bones show the creature was about the size of a modern chimpanzee, according to Brigitte Senut, a team member from the Museum of Natural History in Paris.
8. But it is the teeth and jaw structure which most clearly link Millennium Man to the modern human.
9. "The teeth indicate that the species probably subsisted on hard-skinned fruits among the other foods ... The canines are reduced when compared with those of apes, but are larger than those of modern humans," it added.
10. It has small canines and full molars - similar dentition to modern man and suggesting a diet of mainly fruit and vegetables with occasional opportunistic meat-eating.
11. The canines are smaller compared with those of apes, but are larger than those of modern humans.
12. The teeth indicate that the species probably subsisted on hard skinned fruits among other foods, the incisors being broad and robust, while the cheek teeth have thick enamel.
13. "Thickened enamel in the molars...is something we don't see in the chimpanzee and the gorilla," said Robert Kruszynski of the Natural History Museum in London.
14. The three femur bones in the collection have been chewed, indicating that the individuals to which they belonged probably fell prey to a large carnivore.
15. The KPE statement noted that the leg bones "had been chewed, indicating that the individuals to which they belonged probably fell prey to a large carnivore". Pickford said: "It looks like he was killed and eaten by some sort of carnivore, probably a cat. It was probably dragged up a tree to the cat's usual eating place and then bits fell into the water below."
16. Orrorin should be the early human ancestor, and australopithecines are a side-branch.
17. Orrorin around the time of the split between ape and human.

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