SOME MAJOR RECENT DEVELOPMENTS IN HOMINID PALEONTOLOGY

Article Summary for ENSI by Craig E. Nelson
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In the last two years, **several new discoveries** have been announced, and some described, that **radically increase the Hominid materials available from Africa from 3.3 to 6 million years ago**. These were summarized, with comments by many of the key workers, by Ann Gibbons [Becoming Human: In Search of the First Hominids***. Science***. 15 Feb. 2002. = vol 295, p. 1214-1219.] Gibbons' article includes a nice time-line, a map of the localities and figures of some of the key fossils. The following material is summarized, paraphrased and quoted from Gibbon's article.

Six points deserve special emphasis:

>> **Habitat & Bipedal Posture:** It has commonly been thought that bipedal posture may have evolved as a response to more open habitats produced by climatic drying. However, ***thus far all of the distinctly older hominids (below) are from forested environments***. Indeed, "...one reason it took so long to find fossils older than 4 million years is probably because fossil hunters were scouring the wrong places .... the open shorelines of ancient lakes and open grasslands --where later hominids are found--contain few traces of our earliest ancestors."

>> **Diet and Dentition & Bipedal Posture**: ***Bipedal posture seems to have arisen before the main switch in diet, too.*** Molar size is small relative to body size in Chimps, ***Ardipithecus*** and ***Orrorin*** (suggesting a diet of fruit and leaves) and again in ***H. erectus*** and ***H. sapiens.*** Tooth enamel is thin in Chimps; intermediate in ***Ardipithecus;*** thick in ***Orrorin***, ***Australopithecus*** and ***Homo*** (and in Orangutans and some earlier fossil apes). Canines in chimps and ***Orrorin*** are large, sharpened,and V shaped but smaller and diamond shaped in ***Ardipithecus*** and more advanced forms (smallest in ***Homo)***. By Lucy we have combined: thick tooth enamel, large molars, and smaller diamond shaped canines. This combination is thought to reflect a transition in diet from mainly fruits and leaves to more roots, tubers, insects and other small animals.

>> **Diverse Bipedalisms**. Although "Little Foot" apparently was bipedal its gait may have differed from Lucy's and its slightly divergent big toe certainly differed from Lucy's. This and the emerging even older material has led to suggestions that the skeletal signatures of bipedialism may differ among species and even that bipedial posture might have evolved more than once in this array of forms.

>> **Dating:** The more widely accepted dates from molecular clocks for the human-chimp slplit have been about 6 million years ago. The recently announced fossils from 6 million years may be so advanced in some features as to give more credence to the alternative calibrations of the relevant molecular clocks that place the split at 10-11 million.

>> **Overall Interpretations.** There is a deep division here. Some workers (Tim White and Alan Walker) interpret the material for the entire period from 6 to2.5 million years ago as all falling within a single lineage. Others (Leakey, Wood, Tattersall, Pickford and Senut) see a multiple-branched, bushy tree on which exact lines of descent are harder to discern.

>> **Modern Humans:** Gibbons' article is followed by ***"What Made Humans Modern,"*** pp. 1219-1225 discussing new etched ochre "art" from 77,000 years ago (good photo) and a bone tool cache from 70,000 years ago, both from the Blombos Cave of South Africa. These are substantially older than most comparable artifacts from elsewhere.

A. LUCY: THE BASE FOR COMPARISONS

3--3.6 million years. "Lucy" & family. *Australopithecus afarensis.* Discovered 1973. Hadar, Ethiopia. Now includes 360 fossils from over 100 individuals. The size of a female chimpanzee with long arms, a small brain, and a strikingly apelike jaw. More derived, human-like traits: bipedal, thick tooth enamel, large molars, and smaller canines shaped like later australopithecines.

B. EARLY PRE-LUCY AND LUCY-CONTEMPORARIES.

"Stunning new fossils of hominids that lived 3 million to 4 million years ago..." "During this time, we're dealing with a wetter, warmer Africa that it seems was spawning hominids from the shores of Lake Chad to the caves of Sterkfontein ..." (P. Tobias).

3.3 million. Little Foot. Not described yet. Sterkfontein Caves of S. Africa. Ron Clarke. Announced: ***Science***, 5/5/2000, p. 798. Nearly complete skeleton, still partly in rock, similar to ***A. afarensis*** but: a slightly divergent big toe that could have grasped branches.

3.3--3.5 million. New. Not described yet. Sterkfontein Caves of S. Africa. Ron Clarke. Announced 2001. Six fossils. Older than Little Foot and "more apelike."

3.5 million. *Australopithecus bahrelghazali*. Djourab Desert of Northern Chad. Michel Brunet et al. Lower jaw. Some think = ***A. afarensis.***

3.5 million. Flat-Faced Man. *Kenyanthropus platyops* . Western side of Lake Turkana, Kenya. Discovered 1999. Meave Leakey. Skull and jaw fragment. Flattened face resembles ***H. rudolfensis.*** Leakey suggests both may fit into a new genus, ***Kenyanthropus***. However, the ***K. platyops*** skull is so fragmentary that some question its reconstruction and, thus, its classification.

3.9--4.2 million. *Australopithecus anamensis* . Lake Turkana, Kenya. Meave Leakey and Alan Walker. 88 fossils (many fragmented teeth, several jaws, part of a humerus...). Bipedal with a narrow, apelike lower jaw. Habitat was tree-lined river banks.

3--4 million. *Praeanthropus*. "Senut and Pickford argue that ***Orrorin tugenensis*** is ancestral to ***Homo*** by way of a proposed genus called ***Praeanthropus***, which includes certain fossils now assigned to ***A[ustralopithecus] afarensis*** and ***A. anamensis***. They also suggest that ***Ardipithecus*** gave rise to chimpanzees." White and others disagree.

C. DISTINCTLY OLDER FORMS.

4.4 million. ***Ardipithecus ramidus ramidus.*** Aramis in the Afar depression of Ethiopia (75 km S of Hadar). Discovered 1992, by Tim White's group. Chimp-sized. Mosaic of chimp-like (shape of its baby molars), and human-like (diamond-shaped canine rather than the honed V shape of chimps). Includes 100 fragments that make up about half of a single skeleton, including pelvic, leg, ankle, foot, wrist and hand bones, a lower jaw with teeth--and a skull. No details published yet--"bones are so soft and crushed that preparing them requires a Herculean effort, says White." Skeptics argue published features are so chimp-like that could be ancestral to chimps, not humans.

5.2-5.8 million ***A. ramidus kadabba.*** Middle Awash. Published 2001. Yohannes Haile-Selassie et al. Includes a foot bone "that the team thinks was used to "toe off" in a manner seen only in upright walkers." Otherwise not clear that this genus was bipedal.

5.7-6.1 million. "Millennium Man" ***Orrorin tugenensis.*** Kenya's Tugen Hills. Discovered 2000 by Brigitte Senut and Martin Pickford. Now 22 fossils from 6 or more individuals from 4 sites. Includes 3 femurs, a thumb bone and most of the adult dentition. Senut and Pickford propose that "***O. tugenensis*** walked more like humans than Lucy did, based on six features, including the size and shape of the head and neck of ***...*** femur." ***O. tugenensis*** [like ***Australopithecus & Homo***] has thicker tooth enamel than ***Ardipithecus ramidus***. ***Orrorin*** and ***Homo*** both have small molars relative to their bigger bodies, unlike ***Australopithecus.*** But ***A. ramidus*** has homo-like canines, while ***O. tugenensis*** has small V-shaped canines like a female chimp's. These mosaics of features leave it unclear which genus is closer to ***Australopithecus.*** [Much known material is still to be described.]

6+ million Chad skull. Not named or described. Discovered 2001. Djourab Desert of Northern Chad by Michel Brunet et al. The team "won't discuss details until they publish, but those who have seen the skull are intrigued by its mix of old and new traits."