Chapter 10 - Early Hominid Origins and Evolution:
The Roots of Humanity
1. What is a Hominid?
   a. Bipedal Locomotion: Getting Around on Two Feet
      i. Evolved before large brain size
      ii. Walking on two limbs (with associated skeletal changes)
   b. Nonhoning Chewing: No Slicing, Mainly Grinding
      i. Refers to the way the mouth processes food
      ii. Lack of projecting canine, diastema
      iii. More pressure on front portion of chewing muscles
2. Why Did Hominids Emerge? Three Hypotheses
   a. Charles Darwin's Hunting Hypothesis
      i. Bipedalism had freed the hands for carrying weapons.
      ii. Intelligence increased; size of canines diminished.
      iii. Tool production and use essential for development of human intelligence.
      iv. New evidence shows this not to be the case.
   b. Peter Rodman and Henry McHenry's Patchy Forest Hypothesis
      i. Human origins and bipedalism related to the greater efficiency in some habitats of moving on two limbs rather than four.
      ii. Bipedalism arose in areas where forests were fragmented and food resources also became scattered.
      iii. As forests fragmented, bipedalism freed the hands to pick up food allowing for both tree and ground food resources to be exploited.
2. Why Did Hominids Emerge? Three Hypotheses (cont’d)
c. Owen Lovejoy’s Provisioning Hypothesis
   i. Freeing the hands was important in allowing males to assist females more efficiently in procuring food; thus “provisioning” acted as a form of sexual competition among males for females.
   ii. Birth spacing would also be reduced, since females would have to move around less and would have access to greater food resources.
   iii. Lovejoy’s hypothesis makes the argument for monogamous fathers.

d. Sexual Dimorphism and Human Behavior
   i. Many primate species are highly sexually dimorphic, with males larger than females.
   ii. Some scientists see little sexual dimorphism in early hominids; therefore males would have been more cooperative and less competitive.

e. Bipedality Had Its Benefits and Costs: An Evolutionary Tradeoff
   i. Bipedalism was a clear advantage to early humans.
   ii. It allows for a better view of the horizon, but also exposes the individual to predators.
   iii. Walking along with lifting or carrying heavy loads can cause back injury.
   iv. The circulatory system also faces a greater burden.

--- East African Rift Zone ---
3. Who Were the First Hominids?
   a. The Pre-Australopithecines
      i. Sahelanthropus tchadensis
         1) Found by Michel Brunet in 2001
         2) Located in central Africa and dated to 7–6 mya
         3) Brain size (cranial capacity) of 350 cc
         4) Foramen magnum indicative of likely bipedality
         5) Nonhoning chewing complex
         6) Close to pongid/hominid divergence
3. Who Were the First Hominids? (cont'd)
   a. The Pre-Australopithecines
      i. Orrorin tugenensis
         1) Found by Brigitte Senet and Martin Pickford
         2) Located near Lake Turkana and dated to 6 mya
         3) Femurs indicative of bipedalism
         4) Curved hand phalanx, suggesting time spent in trees
         5) Nonhoning chewing complex
         6) Lived in a forest
3. Who Were the First Hominids? (cont’d)
   a. The Pre-Australopithecines
      i. *Ardipithecus kadabba* and *Ardipithecus ramidus*
         1) Found by Tim White and Yohannes Hahle-Selassie
         2) Located at Aramis and dated to 5.8–4.4 mya
         3) Partial skeleton, other bones, and teeth
         4) Variation in tooth wear; possessed thin enamel
         5) Lived in a forest
         6) Time spent on ground and in trees
3. Who Were the First Hominids? (cont’d)
   b. The Australopithecines (4–1 mya)
      i. Australopithecus anamensis (4 mya)
         1) Found by Maeve Leakey, Carol Ward, and Alan Walker; other remains studied by Tim White
         2) Located at Lake Turkana and Ethiopia and dated to 4 mya
         3) Physically somewhat similar to Ardipithecus
         4) Large canines, parallel tooth rows, different cusp pattern on lower first premolar

   b. The Australopithecines (4–1 mya)
      ii. Australopithecus afarensis (3.6–3.0 mya)
         1) Found by Donald Johanson, Maurice Taib, and Tim White
         2) Located in Laetoli and Hadar (found first in Hadar) and dated to 3.6–3.0 mya
         3) Lucy (type specimen) is very complete for the age, 40 percent of skeleton found
         4) Bipedal but with shorter legs, resulting in a slightly different stride
         5) Long arms, curved finger bones, suggesting tree use
         6) Cranial capacity of 430 cc
         7) At Laetoli, assemblages include hominids as well as footprints of three hominids
         8) Lived in varied habitats
3. Who Were the First Hominids? (cont’d)
   b. The Australopithecines (4–1 mya)
      iii. *Australopithecus (Kenyanthropus) platyops* (3.5 mya)
         1) Found by Maeve Leakey and colleagues
         2) Found at Lake Turkana and dated to 3.5 mya
         3) Woodland habitat
         4) Flat face with some primitive characteristics
3. Who Were the First Hominids? (cont’d)

c. Diversification of the Hominidae: Emergence of Two Evolutionary Lineages from One (3–1 mya)

   i. Australopithecus garhi (2.5 mya): First Maker and User of Tools

      1) Found by Berhane Asfaw and colleagues
      2) Located in Ethiopia and dated to 2.5 mya
      3) Bones, teeth, partial skeleton, and a skull
      4) Larger teeth than earlier australopithecines
      5) More humanlike humerus-to-femur ratio
      6) Cranial capacity of 450 cc
      7) Probable ancestor of Homo
      8) Associated mammal bones with cutmarks, leading to conclusion that A. garhi made Oldowan tools, the earliest stone tools.
      9) Stone tools long associated with meat consumption; some wear may indicate tools were also used for digging in ground.
3. Who Were the First Hominids? (cont’d)
   d. Evolution and Extinction of the Australopithecines
      i. Australopithecus aethiopicus and Australopithecus boisei
         1) Found in Lake Turkana (A. aethiopicus), Olduvai Gorge (A. boisei), and other locations in Africa
         2) A. aethiopicus dates to 2.5 mya and had a cranial capacity of 410 cc
         3) A. boisei dates to 2.3–1.2 mya and had a cranial capacity of 510 cc
         4) Smaller front teeth, larger back teeth
         5) Sagittal crest for attachment of chewing muscles
         6) Dietary focus on harder foods
3. Who Were the First Hominids? (cont’d)
   d. Evolution and Extinction of the Australopithecines
      ii. *Australopithecus africanus*
          – Found by Raymond Dart
          – Found at Taung, South Africa and other sites, dating to 3–2 mya
          – Larger teeth than *A. afarensis*
          – Brain size of 450 cc
3. Who Were the First Hominids? (cont’d)
   d. Evolution and Extinction of the Australopithecines
      iii. *Australopithecus robustus*
         1) Found in South Africa and dated to 2 mya
         2) Large premolars and molars, with a large face and sagittal crest
         3) Similar to East African forms
         4) Brain size of 530 cc
      iv. Evolution of earliest hominids resulted in a diverse group of species.
      v. Change in facial structure reflected dietary specialization.
      vi. No large change found in brain size.
      vii. *A. garhi* may have been ancestor of *H. habilis.*