Human Evolution

Primate Patterns
A. Order - Primates
   1. Humans, monkeys, apes, lemurs, tarsiers
B. Structural Similarities
   1. Shoulder region is similar
   2. Leg and foot designed to bear weight
   3. Fingers are well developed
      a. Most have an opposable thumb
      b. Nails rather than claws
   4. Binocular vision
      a. eyes directed forward
      b. improved three dimensional perception
      c. Improved depth perception
   5. Brains are proportionally very large
   6. Sense of color
C. Behavioral similarities
   1. Most are arboreal - live in trees
   2. Tend to be omnivorous
   3. Well established communication
   4. Extended care and nurturing of offspring
D. Differences Between Primates and Humans
   1. Larger, more complex brain
   2. Skeleton designed for bipedal, upright existence
   3. Highly developed speech

Biochemical Comparisons
A. Determination of Characteristics
   1. 100,000 genes is current estimate (book says 40,000)
   2. Most traits are multifactorial
      a. Controlled by several genes plus the environment
B. Comparison with Chimpanzees
   1. DNA of Man and Chimp is 98.4% the same

**Chimpanzee and Human Protein Similarities**

<table>
<thead>
<tr>
<th>Protein</th>
<th># of amino acids</th>
<th>amino acid differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>579</td>
<td>1</td>
</tr>
<tr>
<td>Myoglobin</td>
<td>153</td>
<td>1</td>
</tr>
<tr>
<td>Cytochrome</td>
<td>104</td>
<td>0</td>
</tr>
<tr>
<td>Serum albumin</td>
<td>580</td>
<td>6 (?)</td>
</tr>
<tr>
<td>Carbonic Anhydrase</td>
<td>264</td>
<td>3 (?)</td>
</tr>
<tr>
<td>Transferrin</td>
<td>647</td>
<td>8 (?)</td>
</tr>
</tbody>
</table>
Skeletal Comparisons

A. Morphology vs. Biochemistry
   1. Structural evidence from the fossil record
      a. Comparisons yields similar “evolutionary trees”
   2. Fossil evidence
      a. Few complete skeletons have been found
      b. Inferences made from small pieces

B. Hominids
   1. Bipedal human-like animals
      a. Belong to same family as humans

C. Pongids
   1. Large, nonhuman, primates

D. Important Points of Comparison
   1. Jaw and teeth
      a. Clues as to diet from shape of teeth and wear pattern
   2. Backbone (spine)
      a. May indicate the way in which the individual moved
   3. Pelvis and femur
      a. Bipedal vs. quadrapedal
   4. Cranium
      a. Brain size is no longer considered a major point of comparison

Dating Remains

A. Stratigraphy
   1. Assign age to fossils based on the rock layer in which they are found

B. Biostratigraphy
   1. Assumption that fossils found in the same layer are about the same age

C. Radioisotope Dating
   1. Carbon-14
      a. Decays at a steady rate to form Nitrogen-14
   2. Potassium-40
      a. Decays to form argon gas at a steady rate
The First Humans

A. Homo erectus
   1. Replaced Homo habilis 1.6 million years ago
      a. Larger brain
   2. Spread to Asia by 1 million years ago
   3. Disappeared 300,000 years ago
      a. Physically unchanged over 1.3 million years
   4. Maker of stone tools

B. Neanderthals (Homo sapiens neanderthalensis)
   1. Subspecies of Homo sapiens
   2. Replaced Homo erectus
   3. Stronger than modern man
   4. Buried their dead
      a. Sometimes with flowers
   5. Wore jewelry
   6. Disappeared 30,000 years ago
      a. Why?
      b. Is this Man’s ancestor?

C. Cro Magnon People (Homo sapiens sapiens)
   1. Lived at same time as Neanderthals
   2. Unusual blend of physical traits
      a. Interbred with Neanderthals?
      b. Separate origin?
   3. Behavioral differences
      a. Superior bone and stone tools
      b. Use and control of fire
      c. clothing
      d. art
      e. rituals

Gene Pools

A. Blood Types
   1. Absence of B allele
      a. American Indians
      b. Basques
      c. Australian aborigines

B. Allele Frequency
   1. Used to determine relationships between populations
      a. Eye, hair and skin color
      b. Genetic diseases

C. Races
   1. Term “race” doesn’t apply in the field of genetics
   2. Different identifiable gene pools far outnumber races