**Human lineage**

<table>
<thead>
<tr>
<th>MYR</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Ancestral bipeds ?</td>
</tr>
<tr>
<td>6</td>
<td>Early Australopithecines</td>
</tr>
<tr>
<td>5</td>
<td>Homo erectus</td>
</tr>
<tr>
<td>4</td>
<td>Early Homo</td>
</tr>
<tr>
<td>3</td>
<td>Archaic Homo</td>
</tr>
<tr>
<td>2</td>
<td>Later Australopithecines</td>
</tr>
<tr>
<td>1</td>
<td>Modern humans</td>
</tr>
</tbody>
</table>

**New kids on the block**

*Homo erectus*

**Tools appear before Homo**

<table>
<thead>
<tr>
<th>MYR</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Homo habilis</td>
</tr>
<tr>
<td>6</td>
<td>2.3 - 1.5 mya</td>
</tr>
<tr>
<td>5</td>
<td>1.9 - 1.0 mya</td>
</tr>
<tr>
<td>4</td>
<td>Early Homo erectus</td>
</tr>
<tr>
<td>3</td>
<td>2.6 my</td>
</tr>
<tr>
<td>2</td>
<td>0.7 my</td>
</tr>
<tr>
<td>1</td>
<td>Homo habilis</td>
</tr>
</tbody>
</table>

**Out of Africa**

**Ecological Entrepreneurs**

- New bodies
- New tools
- New lands
- New social adaptations?
### Hominid Brain size

<table>
<thead>
<tr>
<th>Brain size</th>
<th>500 cc</th>
<th>1000 cc</th>
<th>1500 cc</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Homo habilis</strong></td>
<td>510-770 cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Homo erectus</strong></td>
<td>850-1000 cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Australopithecines</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Body size</th>
<th>50 lbs</th>
<th>100 lbs</th>
<th>150 lbs</th>
<th>200 lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cool Body!

- Built for trekking
  - Long legs
  - Rugged joints
- Adapted to hot, dry
  - Tall, thin
- "Naked sweaty ape"?
  - Skin?

### Skin of Homo erectus?

- Less hairy
- Exposed sweat glands
- Color adapted to latitude (UV vs Vit D)

*Scientific American* pp 72-77

### UV radiation

- **Too much:**
  - Skin cancer
- **Too little:**
  - Vit D Deficiency
  - Calcium in bones
  - Rickets

### What about Turkana Girl?

- Much less sexual dimorphism than Australopithecines
- Big brain & narrow birth canal
  - Prolonged dependence of babies
Infant development

Brain size

conception birth maturity

Infant development

Brain size

birth maturity

Big brain

Costs
- Infant dependency
- Expensive tissue
  - Calories
  - Protein

Benefits
- Flexibility
- Planning & memory
- Communication & cooperation?
- Problem-solving (e.g. tools)

Mega-Lucy

Feeding an expensive brain
With higher quality foods
“Who Dunnit?”
Archaeological detective work

Early tool sites
Rift Valley

Archaeological sites

bones

?
stones

Archaeological sites

Camps? Sharing?

Social Organization?

Dependent offspring
Less sexual dimorphism
Tool using
Meat eating
Carrying
Food sharing?
Cooperation?

Hunting??
Food Sharing?

Georgia
1.6 mya

E. Africa
1.9 mya

1.9 mya

1.8 mya

1.9 mya