<table>
<thead>
<tr>
<th>LIFE GROUPS</th>
<th>ESTIMATED SPECIES</th>
<th>NUMBER OF ESTIMATED SPECIES</th>
<th>ADJUSTED</th>
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<td>Viruses</td>
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<tr>
<td>Prokaryotes</td>
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Dromeosaur

T. rex (Sue)
• Synapomorphy: A shared derived characteristic
• Homoplasy: A character that evolves more than once on a tree

Endosymbiosis hypothesis for the origin of organelles

• Organelles originated in symbiotic union of ancestral prokaryotes

Evidence

• Mitochondria and chloroplasts are superficially like bacteria
• Circular DNA molecules with no associated histones (similar to those of bacteria)
• Chloroplasts and mitochondria both have their own replication machinery, which more closely resembles that of prokaryotes
• first aa of transcripts is fMet (not Met as in eukaryotes; the amino group of the Met tRNA is modified by the addition of a formyl group)
• antibiotics, such as streptomycin, block protein synthesis in mitochondria, just as they do in bacteria
• inhibitors of protein synthesis in eukaryotes (e.g., diphtheria toxin) don’t block synthesis in mitochondria
• rifampicin, which inhibits RNA polymerase in bacteria also inhibits RNA polymerase in mitochondria (does not affect eukaryotic nucleus)
Genetic Tree

Language Tree

Cognates

<table>
<thead>
<tr>
<th>Language</th>
<th>Word</th>
<th>German</th>
<th>French</th>
<th>Latin</th>
<th>Greek</th>
<th>Sanskrit</th>
<th>Persian</th>
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</thead>
<tbody>
<tr>
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<td>ist</td>
<td>est</td>
<td>est</td>
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<td>asti</td>
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</tr>
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</table>

Fit language tree to gene tree