

25/26 The History of Life on Earth and the Tree of Life

ESSENTIAL QUESTION: *How did we come to look like this and are you related to me?*

Vocabulary:

protobionts
ribozymes
Stromatolites
endosymbiosis
adaptive radiations
heterochrony /paedomorphosis/homeotic genes
phylogeny/binomial nomenclature/taxon
phylogenetic tree/cladistics
shared ancestral character/shared derived character
outgroup/ingroup
principle of MAXIMUM LIKELIHOOD
orthologous genes/paralogous genes
neutral Theory

Book Diagrams and Charts:

- *Figure 25-3 protobionts*
- *Figure 25.4 Documenting the history of life*
- *Figure 25.7 clock analogy*
- *Figure 25.9 endosymbiosis*
- *Figure 25.14 mass extinction*
- *Figure 25.17 adaptive radiation of mammals*
- *Figure 25.19 Relative growth rates of body parts*
- *Figure 25.25 branched evolution of horses*
- *Figure 26.3 Hierarchical classification*
- *Figure 26.4 Connection between classification and phylogeny*
- *Figure 26.5 How to read a phylogenetic Tree*
- *Figure 26.7 Convergent evolution*
- *Figure 26.8 Aligning segments of DNA*
- *Figure 26.10 Mono,para,poly groups*
- *Figure 26.11 constructing a phylogenetic Tree*
- *Figure 26.12,13 Branch Lengths*
- *Figure 26.18 How two types homologous genes originate*
- *Figure 26.11 The three domains of life*

Questions

1. How do we define life?
2. Miller and Urey experiment showed?
3. Why is RNA considered to be the first genetic material likely?
4. What is the advantage of internal membranes?

5. What two organelles are considered the products of endosymbiosis? What is the evidence supporting this theory?

6. In this hypothetical tree which number represents the common ancestor of all the taxa? Which branch is a polytomy? Which taxa are sister taxa?

7. Draw a phylogenetic tree that best represents the relationship among the taxa A-E described below. Taxa A was the first to to diverge from the other evolutionary lines- iot shares its last common ancestor with B,C,D and E . B and C are sister taxa. They share a more recent common ancestor with D than with E

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Characters	Out group	Taxa			
	O	A	B	C	D
4	0	1	1	1	1
3	0	0	1	0	1
2	0	1	1	0	1
1	0	0	1	0	0