

Name: _____ Date: _____ Period: _____

KEY

Honors Biology: Phylogeny (15.14-15.19) Guided Reading
How are organisms classified?

1. On your own...Read Sections 15.14-15.19

2. Define the following terms:

- Phylogeny: **the evolutionary history of an organism or species**
- Convergent evolution: **adaptive change which results in analogous structures and similarities in organisms**
- Analogy (analogous structures): **similarity due to convergence, not descent from common ancestor**
- Binomial nomenclature: **system of naming that uses genus and species to name each organism**
- Domains: **most general taxonomic category**
- Systematics: **science of classifying organisms and determining evolutionary history**
- Phylogenetic trees: **a branching diagram representing hypotheses about evolutionary relationships**
- Taxon: **a named taxonomic unit at any level of classification**
- Cladistics: **an approach to systematics which uses common descent as primary classification tool**
- Parsimony: **search for least complex explanation**
- Molecular systematics: **use of nucleic acids to establish relationships**
- Molecular clock: **method of using constant rates of change in parts of a genome to time the rate of evolution**

3. How are phylogenies constructed?

combines evidence from fossil record, structural and molecular homologies to predict evolutionary relationships

4. Contrast analogous structures with homologous structures:

↓
**same function
diff structure
(insect vs. bird wings)**

↘
**same structure
diff function
(whale flipper vs. arm)**

5. How would human beings be classified in the current hierarchy of biological classification? What features emerge at each level? (you may want the internet for this one!)

Eukarya - Animalia - chordata - mammalia - primate -
 ↓
 hominid - homo - sapiens
 ↓
 eukaryotic cell structure
 ↓
 central nerve chord
 ↓
 hair nursing of young
 ↓
 upright bipedal

6. Describe how the process of cladistics is used to classify organisms:

As new heritable traits develop they become a branching pt. in phylogenic tree

branch pt < either in vs. outgroup
 or (has) (doesn't have)

7. Explain how molecular systematic has enhanced our ability to classify the evolutionary relationships between organisms:

by using molecular comparisons...
 evolutionary relationship can be determined more precisely

8. How do molecular clocks work?

Some regions of genome accumulate change at a constant rate ... can be used to compare rate of change in other areas

9. Describe the three domains of life and the characteristics of each (section 1.5):

~~multicellular~~

Eukarya

- complex cell structure
- uni- and multi-cellular

Bacteria

- prokaryotes
- phospholipid membrane
- most diverse prokaryotes

~~unicellular~~

Archaea

- "extreme"ophiles
- unique cell membrane
- prokaryotes