Announcements

• Lab for next week will be on web today- print it and bring it to lab
• Bring your textbook to lab
• First Quiz on Monday at beginning of class

Last lecture

• Hierarchical classification and terms
• Major lineages of life
• 5 kingdoms, 3 domains
• Phylogenetic classification
• Kinds of characters

Homology

• Homology- similarity in characteristics resulting from descent from a common ancestor (shared ancestry).
• Derived homology-
  – two groups share a derived character state because they inherited it from their most recent common ancestor.
  – Example- salamanders and horses have legs (not fins)
Analogy

- Analogy - similarity in character state resulting from convergent evolution
- Derived character state evolved more than once

Groupings based on characters

- Monophyletic
  - Grouping based on shared derived homologies among taxa
  - If two taxa share the derived homology, so did their common ancestor
- Polyphyletic
  - Groups based on shared analogies
  - Using analogies to form groups and classify organisms does not retrace phylogeny.

Phylogenetic classification

- Monophyletic groups formed by identifying shared derived homologies
- The classification should reflect the evolutionary history (phylogeny) of the group
Remarks about phylogenetic trees

- Existing species shown at top
- Branching pattern reflects the history of evolutionary diversification within the group.
- We must use existing taxa to develop a phylogenetic tree

Steps in phylogenetic classification I

- Choose species in ‘ingroup’ and ‘outgroup’
  - The ingroup consists of species you want to classify
  - The outgroup consists of a close relative to the ingroup
- Collect information about characters in all taxa
  - Characters should show ancestral state in outgroup.
  - Ingroup species may show derived or ancestral state

Steps in phylogenetic classification II

- Use derived homologies to define monophyletic groups
- Draw tree to represent ‘nested’ monophyletic groups
- When characters disagree,
  - Study characters and eliminate those that seem to arise through convergent evolution
  - Construct multiple trees that fit the data and determine which one is the ‘simplest,’ which requires the fewest evolutionary steps- parsimony principle
Autapomorphy – a derived character found in only one group (not shared).

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<tr>
<td>taxon D</td>
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Monophyletic groups:
BD
AC
ABCD