16. History of invertebrate diversity and phylogenetic review

"Time is nature's way of keeping everything from happening all at once" --Woody Allen

MAJOR THEMES

- Characters used in cladistic analysis
- Controversy in phylogenetic relationships
- Likelihood of fossilization
- The "Cambrian Explosion"
- "Problematic" taxa and the Burgess Shale
- Historical patterns of diversity
- Decimation and radiation
- Mass extinction

Recap: >20 phyla in 10 weeks: diverse evolutionary solutions to common functional problems

OUTLINE

History of diversity: patterns and processes in the evolution and extinction of taxa

- What are the major types of evidence for phylogenetic relationships?
- When did major body plans (phyla) arise?
- What are patterns of change at lower taxonomic levels?

GOALS

After studying from lecture notes and the associated reading, you should be able to:

- Explain why fossil evidence of evolutionary relationships is useful for relatively few taxa
- Explain how morphological characters of living animals can be used to reconstruct phylogenetic relationships
- List some larval and adult traits that have been used to discern evolutionary relationships, and describe a case where larval and adult traits conflict
- Describe one benefit and one possible pitfall of the use of molecular characters
- Describe some examples where recent molecular phylogenetic reconstructions conflict with conventional wisdom about phylogenetic relationships
- Describe when various phyla first appeared in the fossil record, and explain why such a pattern would hinder our ability to resolve evolutionary relationships
- List some major dates in the evolutionary history of animal phyla
- Describe a hypothesis for how animal phyla may have been present well before they appeared in the "Cambrian explosion"
- Describe some animals of the Burgess Shale and their implications for the history of diversity
- Describe patterns of change in particular phyla, and the role of extinction in these changes

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