

Biology IV Final Study Guide

The Forces of Evolution

Be able to describe each of the following evolutionary processes and apply them to examples:

The principles of Perpetual Change, Common Descent, Multiplication of Species, and Gradualism

Homology and Analogy

Phylogeny (Mono-, Poly-)

Convergent and Divergent Evolution

Microevolution/Macroevolution

Gradualism versus Punctuated Equilibrium

Forces other than Natural Selection: Mass Extinction

Be able to explain the basic **framework** of Darwinian evolution. At what level of organization does evolution happen? How does speciation occur? Give examples of macro and micro evolutionary events.

Describe the evidence we have for the theory of evolution.

Know the basic body plans/distinctions of these phyla/classes:

Phylum Porifera

Phylum Cnidaria

Class Hydrozoa

Class Scyphozoa

Class Anthozoa

Phylum Platyhelminthes

Class Turbellaria

Class Trematoda

Class Cestoda

Phylum Nematoda

Phylum Tardigrada

Phylum Annelida

Class Polychaeta

Class Oligochaeta

Class Hirudinea

Phylum Mollusca

Class Cephalopoda

Class Gastropoda

Phylum Arthropoda

Phylum Echinodermata

Phylum Chordata

Class Urochordata

Class Cephalochordata

Class Myxini

Class Cephalaspidomorpha

Class Chondrichthyes

Class Osteichthyes

Class Amphibia

Class Reptilia

Class Aves

Class Mammalia

What are the differences between protostomes and deuterostomes?

Describe the different types of cleavage patterns: radial, spiral, determinate, indeterminate

Describe the body plan of the first Chordate.

What were the first animals to invade land? What adaptations enabled them to complete this feat?

What were the first chordates that invaded land? How did they accomplish this? What evidence do we have?

What are the advantages of having a coelom?

Explain the evolutionary significance of the Annelids. What new niche did they take up? How does their body plan build on the successes of previous phyla?

Describe the major differences between the Gastropoda and Cephalopoda classes. What “sacrifices” led to the greater innovations and complexity seen in the Cephalopod class?

What were the first animals to invade land? What adaptations enabled them to complete this feat?

What feature(s) have enabled the arthropods to become the most species diverse of all the animal phyla?

Describe the body plan of the first Chordate. How is it a blueprint for the rest of the Chordate Phylum?

What were the first chordates that invaded land? How did they accomplish this? What evidence do we have?

What evolutionary event allowed for the rapid radiation and diversification of mammals? Why?

Be able to apply the evolutionary concepts listed on the front to evolutionary trends within and between the different phyla (i.e. anemones to jellyfish, gastropods to cephalopods, pseudocoelomates to eucoelomates).

Be able to interpret the major relationships and distinctions depicted on the phylogenetic charts we studied in class (these are on the website in the file titled “Important and Awesome Phylogenetic/Cladogram Charts”).

Human Evolution

What are the distinguishing characteristics of each Hominid listed? Approx. what time period were they alive? How are new emergent properties/characteristics expressed with each new “species”?

Australopithecus Afarensis

Australopithecus Africanus

Homo Erectus

Homo Neanderthalensis

Homo Sapiens (Cro Magnon)

Synthesis Questions: Complexity and Simplicity

What is lost with increasing complexity? What is gained?

Why is there a movement toward greater complexity within animal species over time? Why do some animals revert back to a simpler, more primitive form? Where are there examples in nature where a species has taken a path toward simplification of their body plan? What circumstances/situations might produce either pathway?

How do the following differing characteristics correlate with an organism’s complexity? With its behavior and ability to interact with its environment? Why?

Symmetry

Coelom

Body Systems

Senses

Size

Regeneration

Reproduction

Where are there examples in nature where a species has taken a path toward simplification of their body plan? What circumstances/situations might produce this pathway?

How do the behaviors of Cooperation and Competition contribute to evolutionary development and increases/decreases in complexity? How these strategies have led to successful evolutionary forms and the development of new species. How have these strategies allowed for the survival of mass extinctions and led to the dominance of new phyla/classes?

How have mass extinctions – wide-scale catastrophic events – played a role in the increase in biodiversity over time? Examples?