AP Biology Name _____
Ch 22 Descent with Modification

**22.1** Darwin was influenced by the work of others during his time.

Catastrophism -

Uniformitarianism –

New thinking at the time was that the Earth was _____ of years old, not thousands.

**Lamarkian Evolution**
Darwin was not the first to suggest that life evolved as environments change. Jean-Baptiste de Lemarck had two principles to his hypothesis and there was an innate drive or "need" to become more comples.
Summarize his idea of USE AND DISUSE.

Summarize the INHERITANCE OF AQUIRED CHARACERISTICS

Although his theory lacks support in modern science, we give Lamarck a bushel-full of credit for attempting to explain evolutionary change in a time when even the idea of change in the natural world seemed preposterous

● (Page 459) Darwin's thinking was also influenced by Thomas Malthus, who wrote in an essay concerning human populations that overpopulation contributed to much of human suffering. Malthus noted that overpopulation was typical of all species - of the many eggs laid or young produced, few survived long enough to reproduce. The rest were _____, _____, _____, or _____.

**22.2 Descent with Modification (**Condensed historical perspective, but **not critical info**)

Darwin was 22 years old when he sailed away from England in the HMS Beagle in December, 1831. While the ship's crew was surveying the South American coastline, Darwin spent his time on land collecting plant and animal specimens. He noted that the characteristics of the specimens he collected were distinctly South American and very different from the characteristics of European specimens. Even the fossils he collected in South America were both different from modern organisms but still distinctly South American.

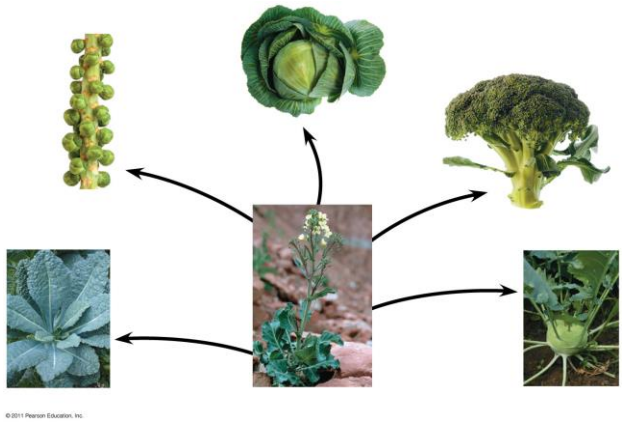
Young Charles also spent time on and collected specimens from the Galapagos Islands off the western coast of South America. He recognized (after his return from his voyage) that these specimens were found nowhere else on Earth, but they did resemble species on the mainland 600 miles to the east.

While sailing the coast of South America, Charles read Charles Lyell's book, Principles of Geology, which departed from the traditional view that the earth was several thousand years old. Lyell held the view that Earth was very old and constantly changing. So Darwin began to speculate that life on our planet must be very old and changing as well.

Charles Darwin returned to England in 1836 after spending 5 years collecting specimens, taking notes, reading, and arguing his observations and preliminary conclusions with Captain Fitzroy. It was in England that he poured over his notes and his specimens, which included plants and finches. Between 1836 and 1844, he developed his theory, now known as the Theory

of _____ _____ which attempted to explain how organism species changed over time. By 1844 he had finally written a long essay on the origin of species and natural selection, but he hesitated to publish because he was acutely aware of the uproar it would cause. He instructed his wife (Mrs. Darwin) to publish his paper after his death. A young naturalist, Alfred Wallace, mailed a manuscript to Darwin for review that came to the same conclusion as Darwin's work. Darwin felt _____ and _____. Both Darwin's and Wallace's papers were presented to the British scientific community in 1858. Darwin receives the lion's share of the credit for the development of the Theory of Natural Selection because of his extensive and insightful research and because his notes confirmed that he had begun to develop the theory 14 years earlier than Wallace. To this day, Alfred Wallace remains unbitter, happy just to bask in the slight glow at the edge of the spotlight that shines so brightly on the biological giant of giants, Charles Darwin ("Chuck" or "Chuckles" to his friends.)

● _____: inherited characteristics that enhance survival and reproduction in specific environments.
● The breeding of domesticated plants and animals is known as _____ selection.
    ● _____ (who) selects the most “fit” for breeding.
● The most striking difference among the 14 species of finches which occupy the Galapagos Islands is found in the structures of their _____.
● Darwin's phrase for evolution, _____ with _____, captured the idea that an ancestral species could diversity into many descendent species by the accumulation of different _____ to various environments.
● How often did Darwin use the word “evolution” in his book? _____



DO THIS!
Using both a written description and a simple drawing, show what the terms "common ancestry" and "divergence" mean in the context of evolutionary biology.

**NATURAL SELECTION** (KEY CONCEPT) contains several main ideas. All of these lead to the accumulation of favorable traits in a population over generations Explain the following:

1) Variation

2) Excess Individuals

3) Competition

4) Adaptive advantage

RECAP

1) Survival of the _____
2) Over time, natural selection can increase the match between an organism and its _____.
3) IF the environment changes, then natural selection MAY result in the accumulation of adaptations to the new environment, sometimes giving rise to a new _____.

● Do individuals evolve? _____ A _____ evolves over time.
● Natural selection can _____ or _____only those heritable traits within the variation of the population.
● If a population is composed of only clones, will they be able to evolve? _____ Why?

As the environmental factors change, so the do the favorableness of _____.

**22.3 Scientific Evidence Supporting Evolution**

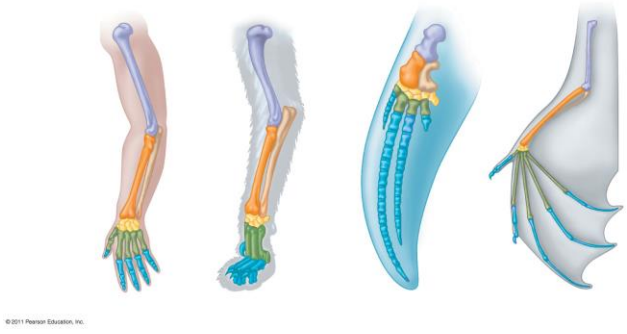
**DIRECT OBSERVATIONS**

1) Have soapberry bugs changed with the introduction of new plant species? Explain

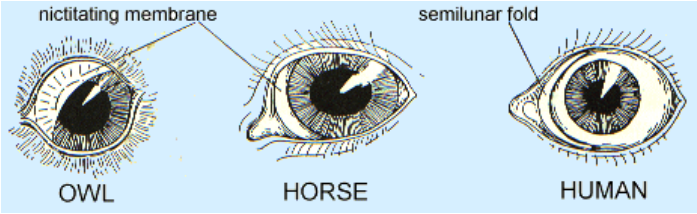
2) Explain why we are getting new strains of antibiotic resistant bacteria.

**HOMOLOGY**

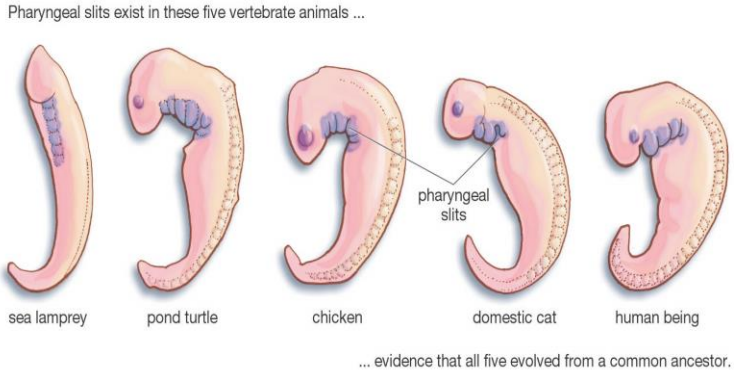
● _____ structures have similar underlying _____ but may vary in their _____. Their structural similarity is due to inheritance from a c_____ a_____.



● V_____ structures are remnants of features that served a function in the organism's ancestors. Why do vestigial structures persist? Why don't they disappear due to selection?

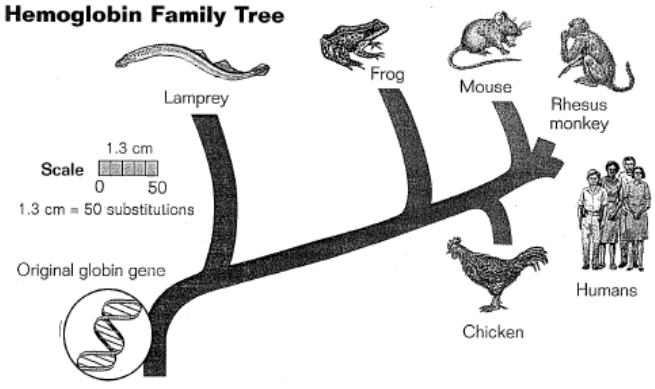



● Embryology shows anatomical homologies not visible in _____. Pharyngeal pouches become _____ in fish and parts of the _____ and _____ in mammals.




● Molecular homologies are seen in the molecule __ __ __ and also in the translation produced molecule p_____. The molecular version of a vestigial structure is a p_____,

| Species | Amino Acid Differences Compared with human hemoglobin |
|---|---|
| **Gorilla** | 1 |
| **Rhesus monkey** | 8 |
| **Mouse** | 27 |
| **Chicken** | 45 |
| **Frog** | 67 |
| **Lamprey** | 125 |

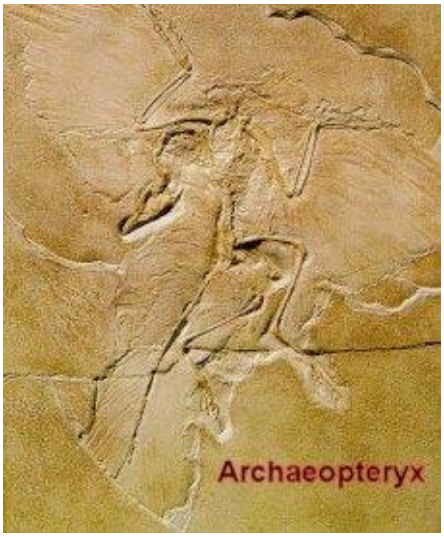


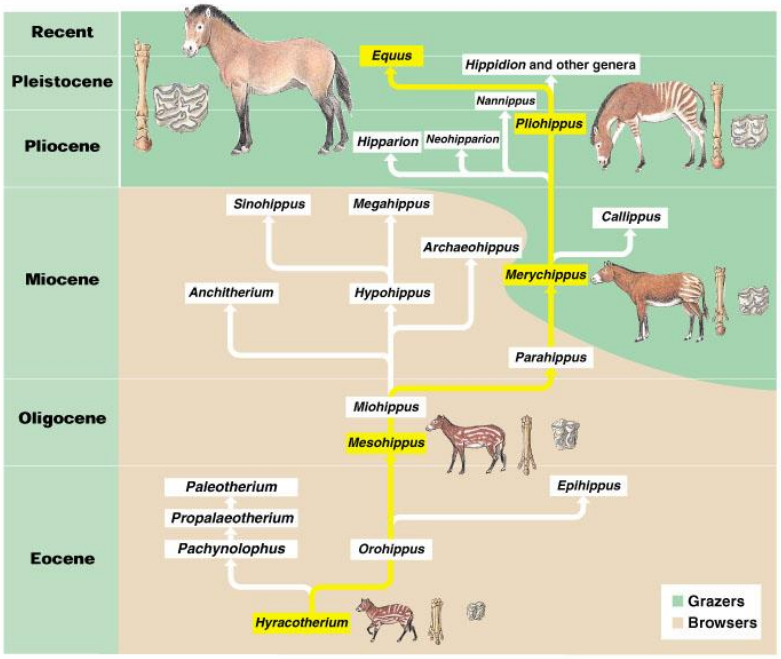
**FOSSIL RECORD**
The fossil record show that many species in the past have become e_____.

It can also show a progression of changes over time.

Transitional fossils have a mixture of features from two different groups.

Therapsids are fossils with some mammalian traits and some reptilian traits.




Archaeopteryx is a bird-like reptile with more reptile features than bird.

**BIOGEOGRAPHY** – The geographic distribution of species.
Two islands on opposite sides of the planet have similar environments. Which scenario is most likely? Explain

1) They are populated by closely related species

2) They are populated by species similar to the closest mainland.

MISC: How do the terms convergent evolution and analogous features relate to each other?