Unit 2 Notes

_____ – change over time

- Modern organisms have _____ from ancient organisms.

_____– highly testable and observable explanation of a natural phenomenon

Lamarck – proposes ideas that were proven to be _____:

A. _____to Change

B. Use and _____– organisms could alter their shape by using their bodies in new and different ways. Ex. _____

C. Inheritance of acquired traits –   You pass on traits that you work for or get during your lifetime.
Ex. _____

Charles _____– Considered the father of Natural Selection

- Voyage on the "_____" as the ship's naturalist
- Traveled to the _____ _____
- Wrote *On the Origin of Species*
- Based his work on the following observations

  A. _____- combination of physical and behavioral traits that increase an organism's ability to survive and reproduce.

  B. _____- through long, slow change organisms have descended or come from common ancestors.

  C. Adaptation- _____ characteristic that enables organisms to be better suited to their environment. "More Fit" _____ chances of survival.

- Darwin's Case- Darwin had to back his book with the following ideas:

  A. _____ Selection- Nature provides the _____ & humans select those variation that they found useful. Ex. _____

  B. _____ Selection- "_____ of the Fittest"
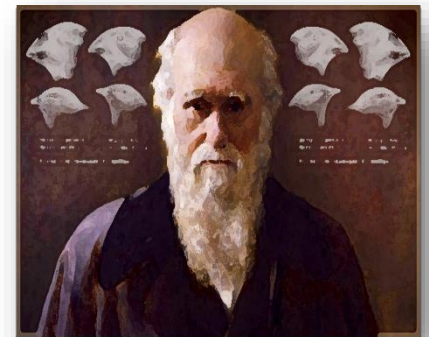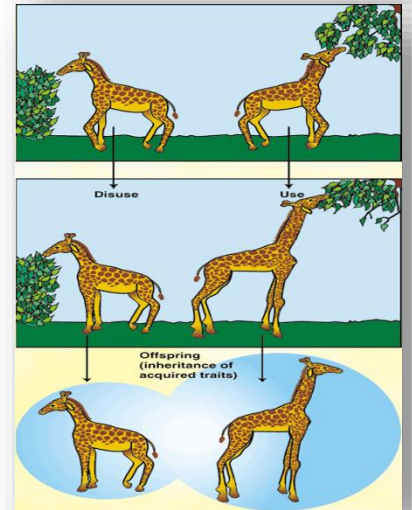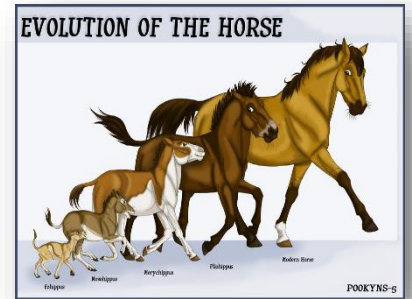
- _____that are best adapted to their environment survive based on _____and _____and pass their DNA on to their offspring.
- _____ with modification- Each living species has descended, with changes, from ancestral species over time

Evidence of Evolution

1. Fossil Record
   - Fossils- _____ remains of ancient organisms
   - Fossils show the _____ of life on earth and how different groups of organisms have changed over time
   - When comparing fossils found in rock layers, _____ fossils are older

2. Geographic Distribution
   - Similar animals in _____ may be the products of different lines of evolutionary development with no recent common ancestor?

3. Homologous Structures
   - Body parts that have the _____ basic structure (layout), but have _____ functions. Shows common descent/ancestry
     Ex. _____
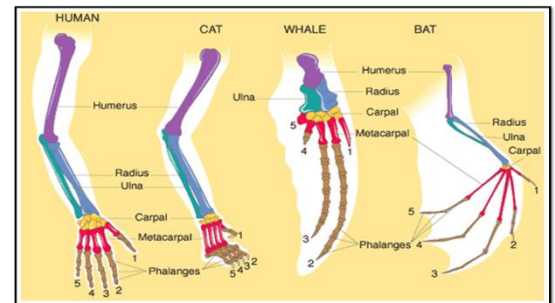
   Analogous Structures
   - Body parts that have similar functions but have different structures in _____.
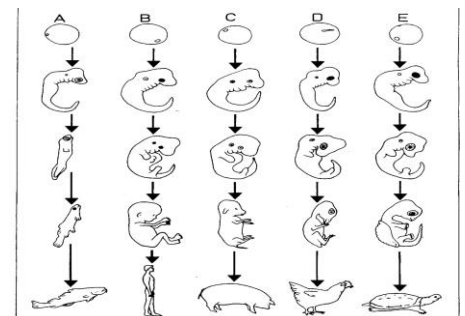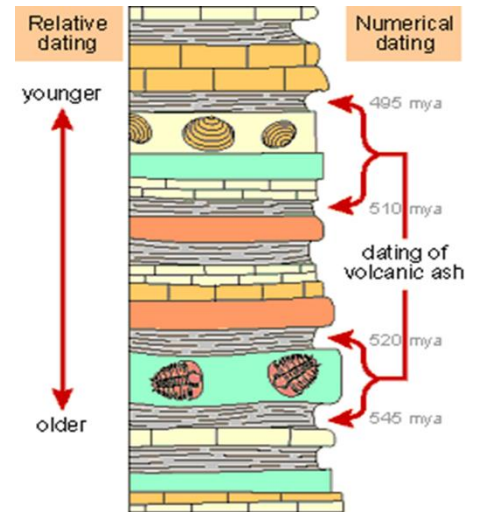   Ex. _____

4. Embryological Development
   - Evidence that uses the _____ pattern of organisms to support common ancestry between them.

5. _____ Organs
   - Organs that no longer serve a purpose but were believed to be important in the past.
   - Ex. _____

6. DNA Similarities

- The same ____ DNA bases are found in _____ living organisms.
- It has been shown that the more _____ related the species, the more_____ their DNA_____ are.
- Comparing _____ - The _____ _____ on stained chromosomes can be used to infer genetic similarity

Natural Selection – Individuals that are better suited to their environment can produce more offspring. --- "Survival of the Fittest"

I. **Evolution** – any change in the frequency of genes in a population.

    A. Gene Pool – combined _____ of all members in a population

    B. Genetic _____ - Variation in alleles (traits) of genes

    C. _____ – number (#) of times that a gene occurs in a gene pool

    D. Genetic Drift – _____ change in gene _____ – this usually occurs in small populations

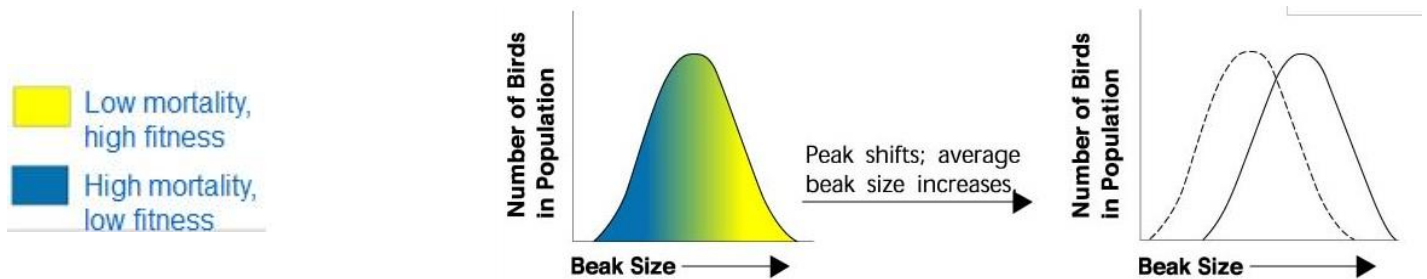   E. Genetic _____ – gene frequency remains the _____

II. **Sources of Genetic Variation**

    A. _____ – changes in a _____ of DNA.

    B. Gene shuffling – _____ during meiosis (sperm or egg production). Mostly results in_____ differences.

III. **Evolution as Genetic Change**

    A. Natural selection can lead to changes in _____ and thus to evolution.

    B. _____ selection can affect the _____ characteristics in any of three ways:

_____ _____ - When individuals at one end of the curve have a higher fitness than the others in the population.

Low mortality, high fitness

High mortality, low fitness

Number of Birds in Population

Beak Size

Peak shifts; average beak size increases

Number of Birds in Population

Beak Size

_____ _____ - When individuals near the center of the curve have a higher fitness than the others in the population.

Low mortality, high fitness

High mortality, low fitness

Selection against both extremes keep curve narrow and in same place.

Percentage of Population

Birth Weight
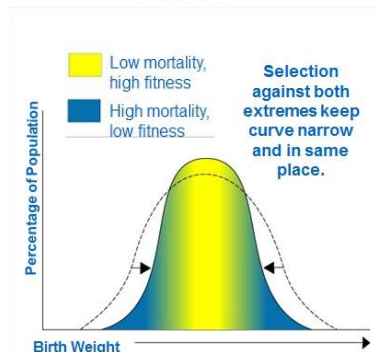
_____ _____ - When individuals at each end of the curve have higher fitness than individuals near the center.

Largest and smallest seeds become more common

Low mortality, high fitness

High mortality, low fitness

Number of Birds in Population

Beak Size

Population splits into two subgroups specializing in different seeds.

Number of Birds in Population

Beak Size
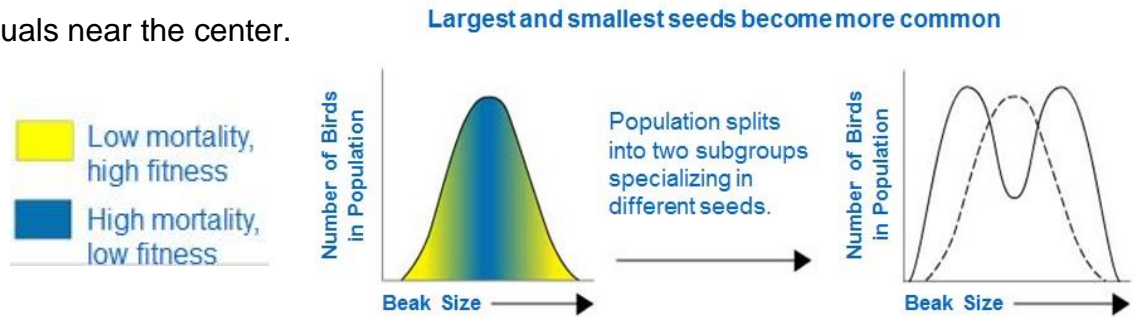
IV. **The Process of Speciation** – Formation of _____ _____.

Isolation Mechanisms

_____– when 2 populations cannot interbreed and reproduce

a. Behavioral Isolation – _____ ritual or songs change

b. Geographic Isolation – _____ by barriers, rivers, mountains

c. Temporal isolation – _____ of season

V. **Adaptation**- Physical or behavioral trait that help the individual survive and reproduce in their environment. *Makes them more "fit". Adaptations also include:

A. _____ - copying the appearance of another species or object

B. _____ - body covering or coloring that helps them blend into the environment

VI. **Darwin's Finches**

Based on the adaptations Charles Darwin observed in finches on the Galápagos, he wondered if species living on different islands had once been members of the same species.

- What adaptations did he observe?

Beaks came in all _____ based upon _____ & _____

- What conclusions did he draw from these observations?

All finches came from a _____!

VII. **How Natural Selection Works**: Antibiotic _____ = mutations occur and/or genes are transferred from one bacterium to another

VIII. **Viruses:**

Have	**Do NOT Have**
1.) Have genetic info (DNA/RNA)	1.) Do NOT have cells
2.) Have a capsid/protein coat	2.) Do NOT metabolize energy
3.) Have the ability to _____/change/respond	3.) Do NOT grow or replicate without a HOST

The History of Life

I.   The Fossil Record
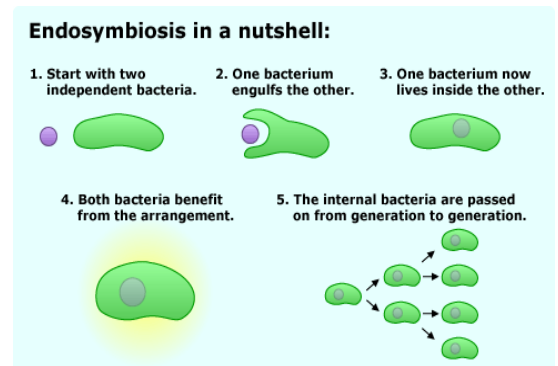
   A. _____ – Scientists who study fossils and arrange them from

      oldest to most recent.

   B. _____ – indicates that groups of organisms have changed

      over time.

   C. More than 99% of all species that have ever lived on Earth have become _____

      Examples of extinct species:_____&_____

   D. _____– Rock layers form in order of age, oldest on bottom.

   E. Index fossils – distinctive fossil used to _____ _____.

   F. _____ dating - Older fossils have less carbon-14. Half life of radioactivity.

II.   Evolution of Multicellular Life

   A. Precambrian time - mostly unicellular _____ organisms. First forms

      of life.

   B. When oxygen levels rose…

      1. Some life became _____

      2. Some survived in _____ _____

      3. Some evolved metabolic pathways that use _____

III.   Endosymbiotic Theory

A. Eukaryotes evolved from the _____ of
several cells
B. _____ and _____
may be descended from small
_____ and _____
prokaryotes
C. _____ began to live inside larger cells

Endosymbiosis in a nutshell:

1. Start with two independent bacteria.
2. One bacterium engulfs the other.
3. One bacterium now lives inside the other.
4. Both bacteria benefit from the arrangement.
5. The internal bacteria are passed on from generation to generation.

IV. Patterns of Evolution

   A. _____ (wipe out entire ecosystems) can occur for

      several reasons - meteorite impact?

      • Often leads to a burst of evolution for other species by making new

        habitats

      • How did life continue? A wide diversity of species existed before the
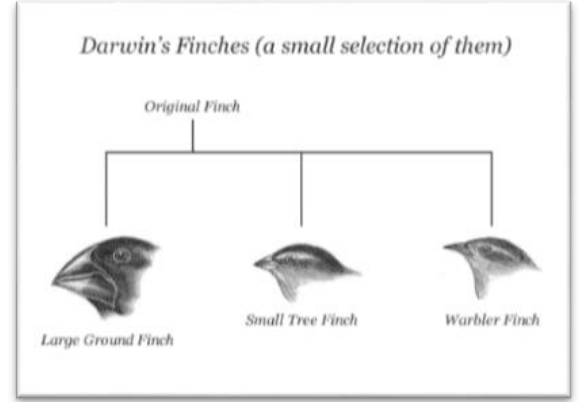
        event.

B. Extinction by _____ _____ – Can happen with only 1 food

source, live in rare habitats or reproduce slowly. Giant panda!

V. Types of Evolution

A. _____ _____ – a

single species or small group of species

evolves into several _____forms

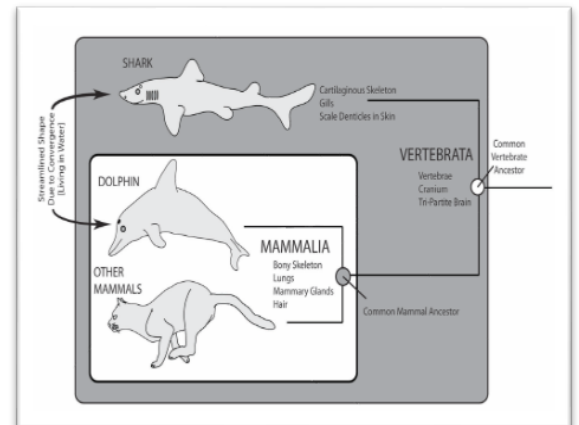that live in different ways.

Ex: Darwin's finches – a dozen species

evolved from a single species (_____

_____)

(Also called _____ Evolution)

B. <u>C</u>onvergent <u>E</u>volution – unrelated organisms

come to resemble one another due to a

(_____ environment).

Ex: Body shape of sharks, penguins, and dolphins

C. _____ – Two species

evolve in _____ to changes in

each other over time.

Ex: Orchid and Madagascar moth

Taxonomy Notes

I.   Classification of living things
      A. _____ - first to create a system of classification.
      B. "_____or _____"
      C. Carl _____ "Father of Modern _____"
      D. His classification system is based on _____
      E. Naming system is _____ _____ (Two names)

II.   Categories of modern taxonomy (or _____)
      A. Domains:
          i. _____ – Protists, Fungi, Plants & Animals (Have a Nucleus)
          ii. _____ – Eubacteria are unicellular & prokaryotic EX: Bacteria that make you sick, they also live in intestines & in food
          iii. _____ – Archaebacteria are unicellular & prokaryotic, live in extreme environments EX: hot springs, brine pools and mud
      B. Kingdoms – typically highest level and most general
          i. _____: True bacteria that live in common environments
          ii. _____: Oldest bacteria that live in extreme environments
          iii. _____: Protozoans, 'junk' kingdom
          iv. _____: Mushrooms, Mold, Mildew, Yeast
          v. _____: Trees, flowers... autotrophic organisms
          vi. _____: Insects, Mammals, Reptiles, Fish, Birds, Amphibians

III.   Taxon order
      A. Domain
      B. Kingdom
      C. Phylum
      D. Class
      E. Order
      F. Family
      G. Genus
      H. Species – Most _____, similar in appearance and structure, same _____, can mate and produce _____offspring
      I. Breeds or races
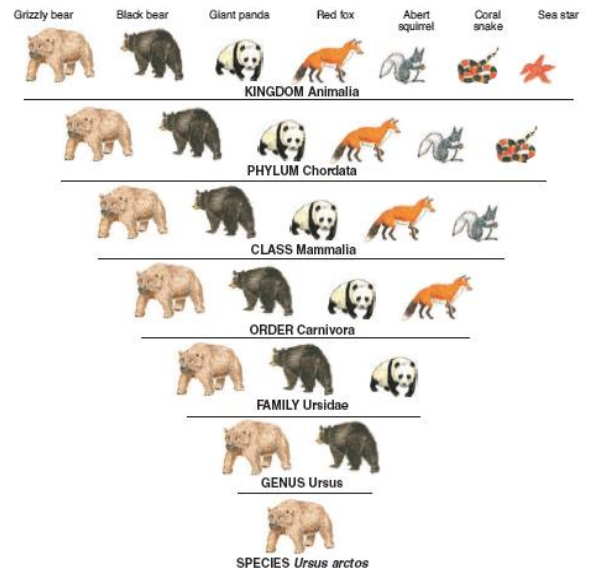
How I am going to remember this? _____

IV.   Binomial Nomenclature
      A. A _____part _____
      B. Scientific name
          i. Genus - _____part of name
             1. Always use a _____and _____
             2. Examples: Homo – human, Felis – cat, Canis – dogs, wolves, coyotes
          ii. Species - _____part of the name

1. Always with a lower case letter and _____
2. Examples: <u>sapien</u>-human; <u>domesticas</u> –cat; <u>tigris</u>- tiger
iii. Full binomial nomenclature : <u>Genus species</u>
    1. Human: _____
    2. Dog: _____
    3. Cat: _____

iv. Uses SAME language (Latin) for all scientific names because not everyone speaks the same language. Latin names are understood by all Taxonomists

V.   Guidelines for classification
    A. Fossils – Organisms that evolve from _____ _____
    B. Biochemistry – Sequence of _____ _____ in proteins
    C. _____- strongest evidence, DNA
    D. Structure of organism - _____, muscles, petals, _____
    E. _____- compare fetuses
VI. Cladogram
    Diagram that shows _____ _____ among organisms
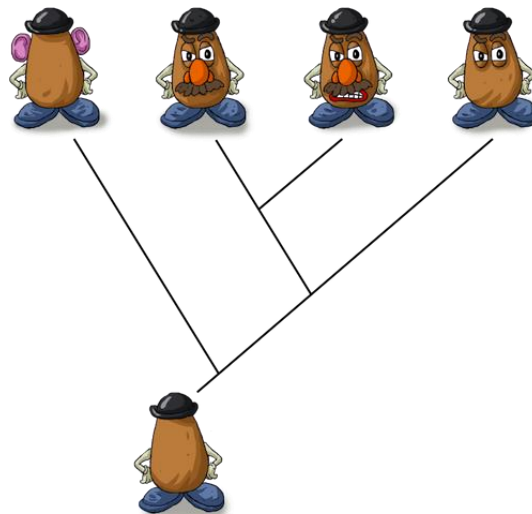
VII. What happens when a new organism is 'discovered'?
    -If it cannot be classified then continue to _____ observations and
    _____ to other known organisms.