

Name Bowers Date _____ Period _____

Mechanisms of Evolution Notes Organizer

1.) Define **species**. organisms capable of reproducing to make fertile offspring in their natural habitat

a. Are horses and donkeys members of the same species? Why or why not? No, because their offspring are not fertile

b. Are lions and tigers members of the same species? Why or why not? No, they would never breed in their natural habitat

2.) Who was Charles Darwin? A British Naturalist (researcher)

a. Darwin made his most significant observations when he traveled to the Galapagos Islands on the HMS Beagle.

b. Summarize Darwin's observations of the island finches.
Finches with different beaks / Iguanas (claws) from one island to the next

c. Summarize Darwin's conclusions based on his observations.
The shape of the finches' beaks were the result of adaptations so that finches could better survive.

d. Define **adaptation**. traits that affect an organism's survival from generation to generation

e. Define **evolution**. a gradual change in a species over time

3.) What is a scientific theory? a well tested concept that explains a set of observations

4.) Summarize the **theory of evolution**. a scientific explanation about how species change over time

5.) Evolution occurs through the process of natural selection.

a. What is another name for natural selection?

"Survival of the fittest"

b. Explain the concept of natural selection.

process by which the environment affects the survival of an organism

c. What is meant by the "fitness" of an organism?

↳ how well adapted an organism is to its environments

6.) List the three major factors which affect the process of natural selection.

- Overproduction - production of far more organisms than can survive
- Competition -
- genetic variation

7.) Complete the following chart.

	Overproduction	Competition	Genetic Variation
Definition	production of far more organisms than can survive	organisms have to share resources	difference between any organism in a species
Examples	sea turtles, frog eggs	Competition for space, food...etc	some turtles fast, some slow, some darker color, some lighter
Impact on Natural Selection	introduces competition which insures that the best survives	insures that the best survives	insures that some are better able to survive than others

8.) What are two examples of evolution in action?

- Irish potato famine
- antibiotic resistance

9.) Describe the process through which bacteria evolve to become resistant to certain antibiotics.

If not all bacteria are killed, then the strongest ones survive and make a new, stronger form of the bacteria.

10.) Describe the process through which insects evolve to become resistant to pesticides ← chemicals that kill pests

same answer

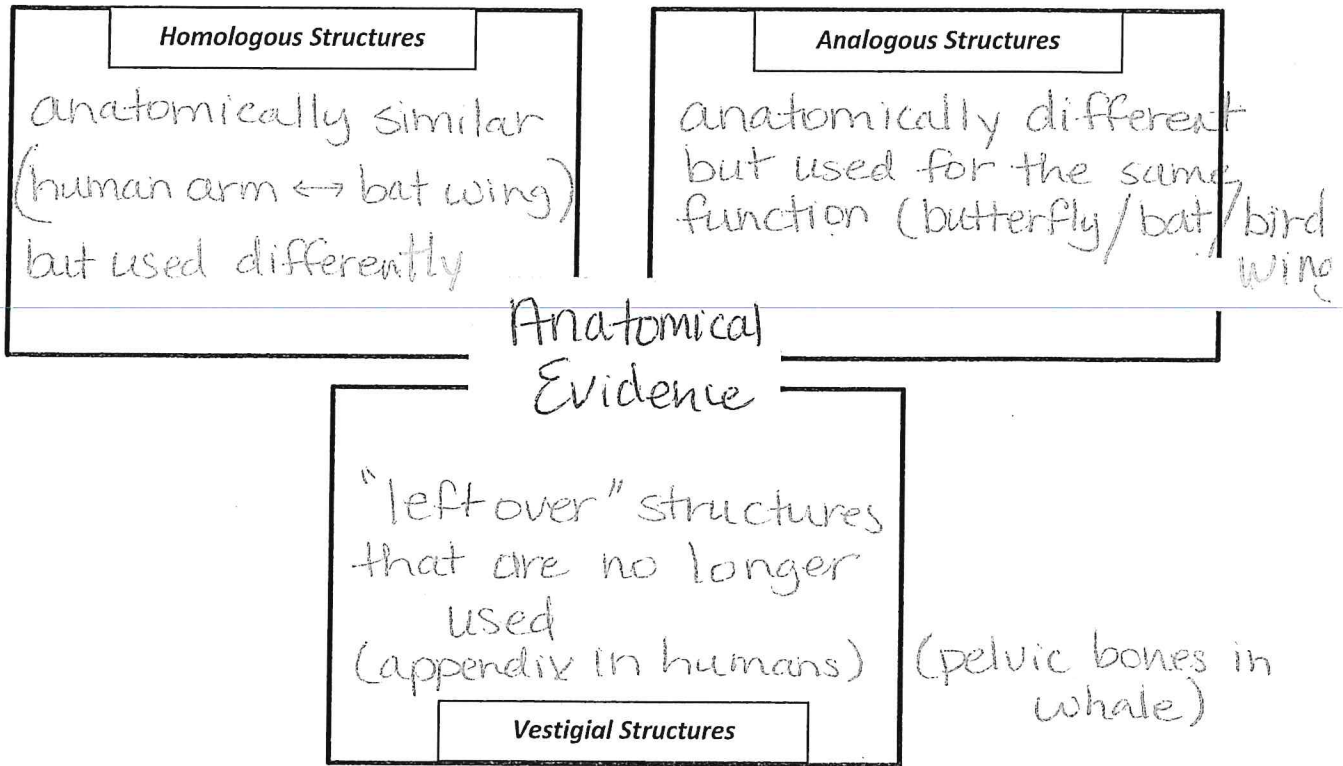
11.) List four major sources of evidence for evolution.

- fossil record - a record of extinct organisms
- anatomical evidence
- molecular evidence
- embryonic evidence

12.) Use the t-chart to describe the two ways in which we can determine the age of a fossil.

Relative Dating	Absolute (Radiometric) Dating
- using the location of a fossil to know that one fossil is older than the other	*example: carbon-dating using the decay of radioactive isotopes to determine the age of a fossil

13.) Fill in the following organizer regarding the three types of anatomical evidence which provide us with information regarding evolutionary relationships.



14.) Describe the evolutionary evidence provided to us through biochemical molecules such as DNA and protein.

All cells use DNA to make protein (which are made out of sequences) of amino acids. Scientists have found that the more closely related two species are, the more similar their amino acid sequence (proteins).

15.) Describe the evolutionary evidence provided to us through embryological development.

Scientists also compare the embryological development of organisms. Similarities in development are used to infer evolutionary relationships in organisms.

What is speciation?

CLASSIFICATION NOTES ORGANIZER

1. Classification

- a. Define **Taxonomy**: Branch of Biology that names and organizes organisms according to their characteristics.
- b. Why do scientists classify organisms? To answer questions:
 • What are the characteristics of the species? How many species are there? What are the relationships between species?
- c. A Greek philosopher named Aristotle is considered the first person to attempt a classification system for all living things.

2. Limitations of Early Classification

- a. What were some of the limitations to the earliest classification systems, such as Aristotle's? There were only two major classifications: plants & animals. Not all organisms fit in one of those categories (like fungi, protists). Also, did not take into consideration evolutionary relationships.

3. Carolus Linnaeus

- a. Nicknamed the "Father of Taxonomy"
- b. Describe the classification system developed by Carolus Linnaeus. Organisms were grouped in hierarchies. Based on morphology (form & structure). Created a naming system called binomial nomenclature.

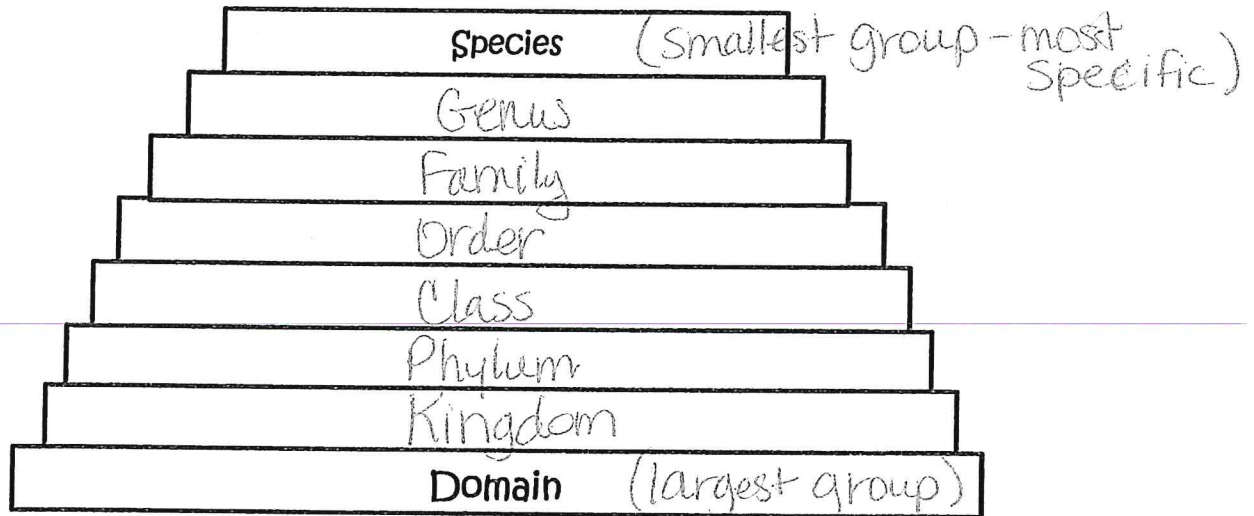
4. Binomial Nomenclature – "Two Name" Scientific Naming System

- a. What is the purpose of giving organisms a scientific name, instead of simply using common names?
 Common names can be misleading and vary by location, language.
- b. Identify the rules of **binomial nomenclature**.
 • First name = genus, second name = species
 • must be italicized or underlined
 • Capitalize the genus, everything else lowercase.
- c. Give two examples of common names and their scientific names (written correctly).

COMMON NAME	SCIENTIFIC NAME
Vampire Bat	<i>Desmodus rotundus</i>
Eastern Chipmunk	<i>Tamias striatus</i>

5. Taxonomic Hierarchy

- a. Complete the levels of *taxonomic hierarchy*.



- b. Why is domain the largest box and species the smallest?

Domain includes several kingdoms, which contains several phylums... etc.
Species is the most specific group of organisms

6. Domains

- a. Identify the three domains and the *organisms* you will find in each.

Bacteria
Archaea
Eukarya

7. Kingdoms

- a. Identify the six kingdoms accepted by today's scientists and the major characteristics of each.

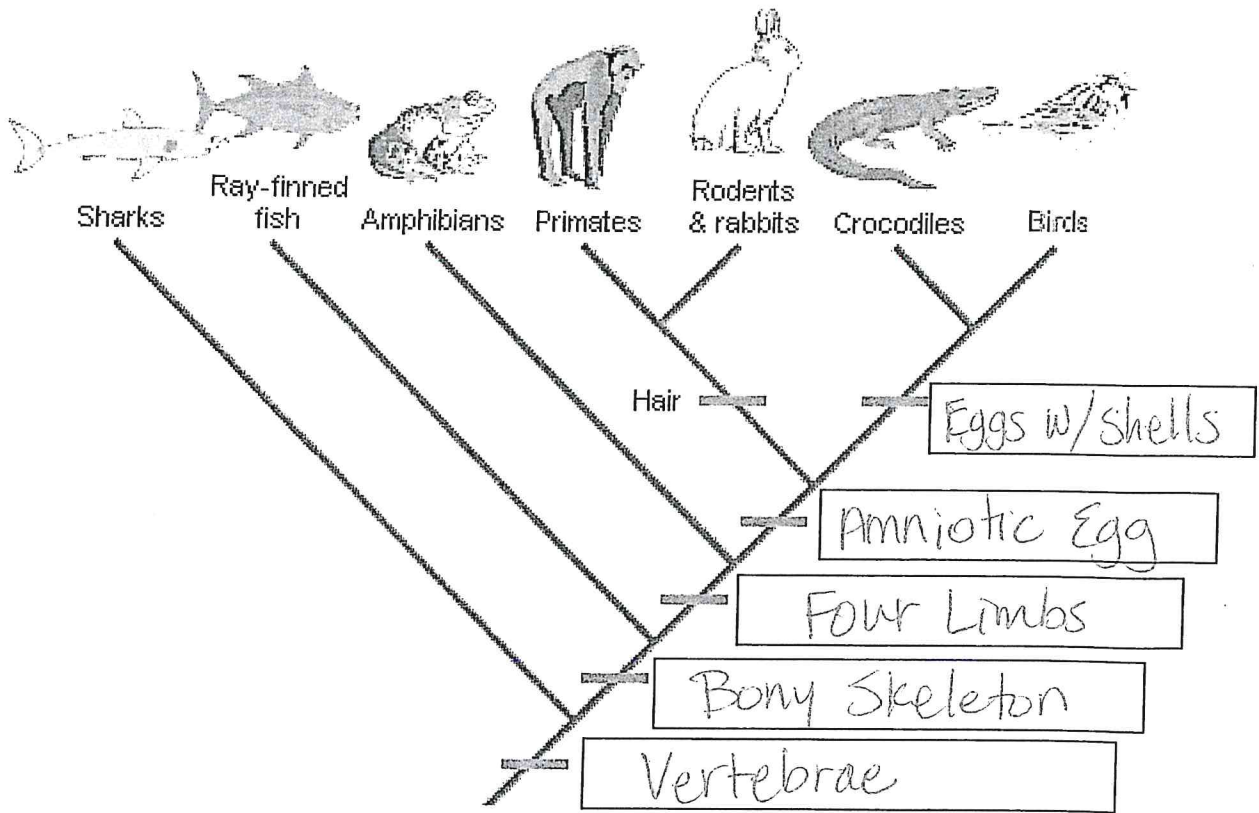
KINGDOM NAME	Archaeobacteria	Eubacteria	protista	fungi	plants (plantae)	animals (animalia)
ORGANISMS AND CHARACTERISTICS	unicellular prokaryotes live in extreme environments	unicellular prokaryotes require oxygen	eukaryotes	eukaryotes heterotrophic most are multicellular cell wall made of chitin	eukaryotes autotrophs cell wall made of cellulose	eukaryotes multicellular heterotrophs all can move at some point no cell walls

8. Modern Taxonomy

- a. Classifies organisms in the context of evolution.
- b. Briefly describe the four major sources of information used by scientists to classify organisms.
- Morphology - form & structure - inherited features like bone structure
 - Biological Macromolecules - comparing DNA sequences, proteins - the more similar they are, the more closely related they are
 - Fossil Record - remains of organisms show the change over time.

9. Cladistics

- a. Define *cladistics*: Shows evolutionary relationships based on "shared derived characteristics"
- b. What tool illustrates cladistic (evolutionary) relationships? Cladogram
- c. Complete the cladogram by filling in the derived characteristics.

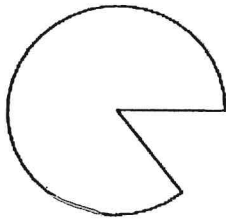


- d. What kind of information does *this particular cladogram* tell you?

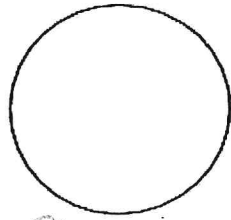
10. Dichotomous Keys

- a. What does *dichotomous* mean? Divided into 2 parts
- b. Describe the purpose of a dichotomous key. allows user to determine the identity of an organism based on its characteristics
- c. What are the rules in making a dichotomous key? • use constant characteristics • use measurements • make the choice positive • start both choices with the same word • finish the dichotomous key with the same word

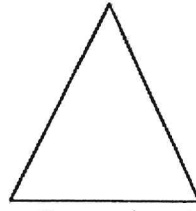
d. Create a dichotomous key for the shapes below.



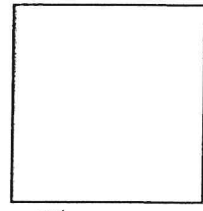
Shapus
pacmanus



Shapus
roundus



Shapus
trianglus



Shapus
squarus

① a. has ^{some} rounded edges
Go to 2

b. has only straight edges
Go to 3

② a. has some straight edges
Shapus pacmanus

b. has only rounded edges
Shapus roundus

③ a. has only 3 sides
Shapus trianglus

b. has 4 sides
Shapus squarus