

Taxonomy and Cladistics Review

1. The scientific discipline concerned with naming organisms is called:

- A) **taxonomy**
- B) cladistics
- C) binomial nomenclature
- D) systematics.

2. When using binominal nomenclature (scientific name) of an animal, you use which of the following taxonomic levels?

- A) Species genus
- B) **Genus species**
- C) Family genus
- D) Family species

3. Which of these illustrates the correct representation of the binomial scientific name for the African lion?

- A) Panthera leo
- B) panther leo
- C) Panthera leo
- D) Panthera Leo
- E) **Panthera leo**

4. A phylogenetic tree that is "rooted" is one

- A) that extends back to the origin of life on Earth
- B) **at whose base is located the common ancestor of all taxa depicted on that tree**
- C) that illustrates the rampant gene swapping that occurred early in life's history.
- D) that indicates our uncertainty about the evolutionary relationships of the taxa depicted on the tree

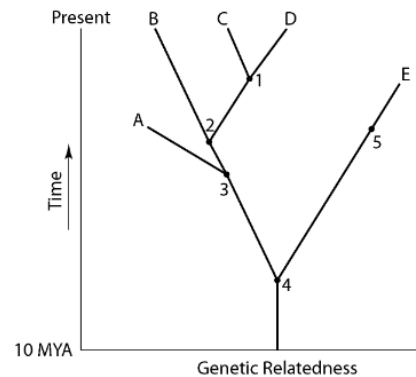
5. The correct sequence, from the most to the least comprehensive, of the taxonomic levels listed here is:

- A) family, phylum, class, kingdom, order, species, and genus.
- B) **kingdom, phylum, class, order, family, genus, and species.**
- C) kingdom, phylum, order, class, family, genus, and species.
- D) phylum, kingdom, order, class, species, family, and genus.

6. The common housefly belongs to all of the following taxa. Assuming you had access to textbooks or other scientific literature, knowing which of the following should provide you with the most specific information about the common housefly?

- A) Order Diptera
- B) Family Muscidae
- C) **Genus Musca**
- D) Class Hexapoda
- E) Phylum Arthropoda

Use the diagram for questions 7, 8, and 9.



7. A common ancestor for both species C and E could be at position number

- A) 1
- B) 2
- C) 3
- D) **4**

8. The two extant (Still living) species that are most closely related to each other are

- A) A and B
- B) B and C
- C) **C and D**
- D) D and E
- E) E and A

9. Which species are extinct?

- A) **A and E**
- B) A and B
- C) C and D
- D) D and E
- E) cannot be determined from the information provided

10. The best classification system is that which most closely

- A) unites organisms that possess similar morphologies.
- B) Conforms to traditional, Linnaean taxonomic practices.
- C) reflects evolutionary history.**
- D) corroborates the classification scheme in use at the time of Charles Darwin.
- E) reflects the basic separation of prokaryotes from eukaryotes.

Species	Percentage Similarity
Chimpanzee	99.7
Baboon	97.2
Rabbit	93.7
Rhesus Monkey	96.9
Orangutan	98.6

11. What conclusions can be drawn from the data shown:

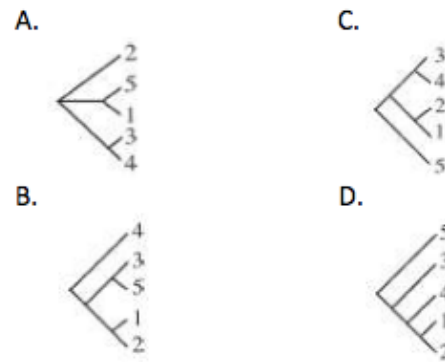
- A) Humans and other primate evolved from rabbits within the past 10 million years.
- B) All of the genes of other organisms are similar to human genes.
- C) Among the species listed, humans shared a common ancestor most recently with chimpanzees.**
- D) Humans evolved from chimpanzees somewhere in Africa within the last 6 million years.

12. Five new species of bacteria were discovered in Antarctic ice core samples. The nucleotide (base) sequences of rRNA subunits were determined for the new species. The table below shows the number of nucleotide differences between the species.

NUCLEOTIDE DIFFERENCES

Species	1	2	3	4	5
1	–	3	19	18	27
2		–	19	18	26
3			–	1	27
4				–	27
5					–

Which phylogenetic tree best represents the data? C



13. A cladogram or phylogenetic tree is...

- A) A branching tree diagram that shows evolutionary relationships**
- B) A field of science involved in the classification and organization of life
- C) The study of evolutionary relationships of organisms
- D) A type of rock

14. What are the 4 kingdoms of Eukarya?

- A) Protista, fungi, plantae, animalia**
- B) Monera, fungi, plantae, animalia
- C) Plantae, animalia, archaea, virus
- D) Plantae, animalia, archae, fungi

15. A major distinction between the kingdoms involves:

- A) Molecular makeup of the cell wall**
- B) Nutrition of the members
- C) Size and complexity of each member
- D) Molecular makeup of the genetic material

Evolution Review

1. Which of the following pairs are the best examples of homologous structures?

- A) bat wing and human hand
- B) owl wing and hornet wing
- C) porcupine quill and cactus spine
- D) bat forelimb and bird wing
- E) Australian mole and North American mole

2. Some molecular data place the giant panda in the bear family (Ursidae) but place the lesser panda in the raccoon family (Procyonidae). Consequently, the morphological similarities of these two species are probably due to

- A) inheritance of acquired characteristics.
- B) sexual selection.
- C) inheritance of shared derived characters.
- D) possession of analogous structures.
- E) possession of shared primitive characters.

3. The common ancestors of birds and mammals were very early (stem) reptiles, which almost certainly possessed 3-chambered hearts (2atria, 1ventricle). Birds and mammals, however, are alike in having 4-chambered hearts (2atria, 2ventricles). The 4-chambered hearts of birds and mammals are best described as

- A) analogous structures
- B) vestigial
- C) developed independently from a 3 chambered ancestor
- D) shared derived characteristic

4. In a comparison of birds with mammals, having four appendages is:

- A) a shared ancestral character.
- B) a shared derived character.
- C) a character useful for distinguishing birds from mammals.
- D) an example of analogy rather than homology.
- E) a character useful for sorting bird species.

5. Which statement best represents the meaning of the term *evolution*:

A) Changes in species toward greater complexity over time

B) Changes in gene frequencies in a population over time

C) The strongest individuals survive and produce the most offspring

D) Changes in an individual over time in response to natural selection

6. Over the past several decades, natural selection has caused populations of *Staphylococcus aureus* (an infectious wound bacterium) to evolve resistance to most antibiotics. If antibiotic use were stopped, what would you predict would happen to these *S. aureus* populations?

A) They will go extinct without the antibiotic.

B) The frequency of resistant forms will increase in these populations.

C) The populations will begin colonizing new environments.

D) The frequency of nonresistant forms will increase in these populations.

7. Which of these does NOT describe one way in which the fossil record is biased?

A) Certain habitats are more likely to produce fossils than others

B) Soft-bodied organisms are more likely to be preserved

C) Recent fossils are more likely to be found than older ones

D) Organisms that lived above ground are more likely to be found than underground

E) Abundant species are more likely to appear in the fossil record than rare species

8. Starting from a single wild canine species, humans have developed hundreds of breeds of domestic dogs. Which of the following statements is supported by this observation?

A) Natural selection had not occurred very frequently in the wild dog populations.

B) There was enough heritable variation in the wild canine species to create a variety of features.

C) Heritable variation is low; otherwise there would be more wild dog species.

D) Most of the variation in domestic dog species is a result of variation in nutrition and training.

9. For a given population that contains genetic variation and is under the influence of natural selection, what is the correct sequence of the following events?

1. Well-adapted individuals leave more offspring
2. A change occurs in the environment.
3. Genetic frequencies within the population change
4. Poorly adapted individuals do not survive

- a. 2 -> 4 -> 1 -> 3
b. 2 -> 4 -> 3 -> 1
c. 4 -> 1 -> 2 -> 3
d. 4 -> 2 -> 3 -> 1

10. The Grant's studies of Darwin's finches (video from class) provided evidence that beak size:

A) adjusted within a given year depending on nutrition status

B) differences were the result of inherited changes in response to environmental selective pressures

C) were completely random and no pattern was determined

D) made no difference as to the food being eaten

11. Which is not an example of macroevolution:

A) a population of lizards who, over many generations, are selected to have smaller tails in response to predation

B) polar bears and grizzly bears having a common ancestor in a habitat that occasionally overlaps

C) a group of finches that are geographically isolated and can no longer reproduce with the original population

12. Natural selection changes allele frequencies because some _____ survive and reproduce better than others.

A) alleles

B) loci

C) species

D) individuals

Written:

1. What is the difference between homologous traits and analogous traits and use the following structures as examples: a bird's wing, a dog's leg, and a fly's wing.
2. "Speciation occurs when enough change occurs that a population separated from the original population can no longer reproduce with the original population when brought back into contact with each other." What is considered enough for speciation to occur?
3. Describe how DNA is related to evolution. What happens to the **allelic frequency** (% of a certain version of gene) when a directional selective pressure is added to a population.

Cell Biology Review

1. Which of these describe the process of mitosis?

- A)Two haploid daughter cells are produced
- B)Four diploid daughter cells are produced
- C)**Two diploid daughter cells are produced**
- D)Four haploid daughter cells are produced

2. Which of the following is absent from prokaryotic cells?

- A) Plasmids
- B) Cell Wall
- C) **Rough ER**
- D) Ribosomes

3. Which of the following cell structures does not have an envelope?

- A) **lysosome**
- B) nucleus
- C) mitochondrion
- D) chloroplast

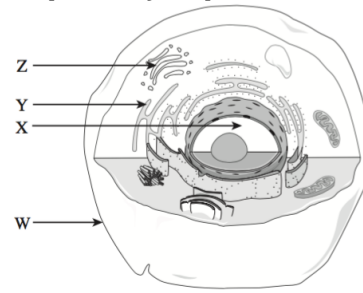
4. What are centrioles involved in?

- A) lysosome formation
- B) intracellular digestion
- C) ribosome formation
- D) **cell division**

5. Which one of the following is responsible for the storage of proteins (enzymes) used in the destruction of damaged organelles?

- A Golgi apparatus
- B cytoskeleton
- C smooth ER
- D **Lysosome**

Use this picture for questions 6 and 7



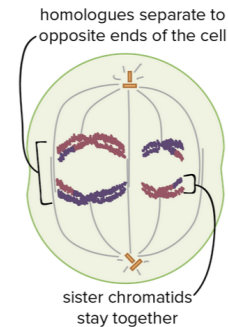
6. Which organelle contains the necessary information to produce enzymes?

- A) Z
- B) Y
- C) **X**
- D) W

7. The cell above is a...

- A) Prokaryotic cell due to membrane bound organelles
- B) Eukaryotic due to the presence of circular DNA
- C) Prokaryotic cell due to the presence of ribosomes
- D) **Eukaryotic due to the presence of a nucleus**

Use this diagram for questions 8 and 9

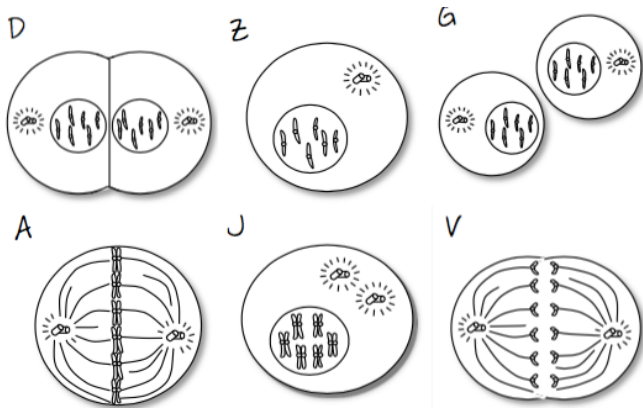


8. The picture above shows a stage in either mitosis or meiosis. Where could this type of cell division take place in humans?

- A) In the bone marrow to produce white blood cells
- B) Within the stomach
- C) In a developing embryo
- D) **Within the gonads (testies or ovaries)**

9. The stage above is...

- A) Metaphase (Mitosis)
- B) **Metaphase I (Meiosis)**
- C) Metaphase II (Meiosis)
- D) Prophase (Mitosis)



10. Put the cell cycle diagrams in order:

- A) Z, J, A, V, D, G
- B) J, Z, A, V, D, G
- C) G, D, Z, J, A, V
- D) D, G, Z, A, J, V

11. How is energy used in cellular processes stored in the body?

- A) As ATP
- B) In chemical bonds in glucose
- C) As heat energy
- D) In kinetic energy due to cell movement

12. Which statement about unicellular organisms is true?

- A) unicellular organisms can only survive in warm, dry environments
- B) unicellular organisms carry out many of the same functions as multicellular organisms
- C) unicellular organisms are most often larger than the tip of a pen
- D) unicellular organisms have the same basic structure

13. If cells in the process of dividing are subjected to colchicine, a drug that interferes with the functioning of the spindle apparatus, at which stage will mitosis be arrested?

- A) anaphase
- B) prophase
- C) telophase
- D) metaphase – Can't enter anaphase if

spindle apparatus does not work

14. The formation of a cell plate is beginning across the middle of a cell and nuclei are re-forming at opposite ends of the cell. What kind of cell is this?

- A) an animal cell in metaphase
- B) an animal cell in telophase
- C) an animal cell undergoing cytokinesis
- D) a plant cell in metaphase

E) a plant cell undergoing cytokinesis

Written:

1. When working out for an extended period of time, our muscles "burn." This is caused by a build up in lactic acid. Why does this only happen during times of intense exercise? What is the process that is occurring?
2. Comparing Meiosis I to Mitosis. Why are these differences necessary? Is this an evolutionary benefit? Explain.
3. Outline the four stages of cellular respiration. Could any of these stages occur without oxygen? Explain.

Microbiology Review

1. Which of the following cells lack membrane bound organelles?

- i. Ebola virus
- ii. A human stomach cell
- iii. Fungi ectodermal cells
- iv. A paramecium – (Protist)
- v. Staphylococcus bacteria

- A) I, III, V
- B) I, IV, V
- C) I, V**
- D) IV, V
- E) III, IV, V

2. The difference between archaeobacteria and eubacteria is...

- A) Archae has peptidoglycan in their cell walls, Eubacteria does not
- B) Eubacteria has peptidoglycan in their cell walls, Archae does not**
- C) Both archae and eubacteria have peptidoglycan in their cell walls
- D) Neither archae and eubacteria have peptidoglycan in their cell walls

3. Who accidentally identified the antimicrobial action of penicillin?

- A) Robert Koch
- B) Richard Petri
- C) Alexander Fleming**
- D) Louis Pasteur

4. Which group of microorganisms is thought to be the oldest living organism?

- A) eukaryotes
- B) heterotrophic prokaryotes
- C) Archaea**
- D) viruses
- E.) autotrophic prokaryotes

5. Many plant viruses cannot infect animal hosts because:

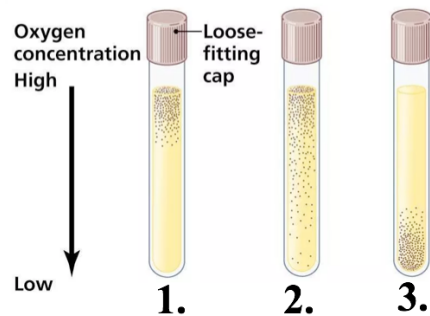
- A) They have a high host specificity**
- B) They lack the correct genetic material
- C) They cannot survive the human immune system
- D) They are made of different biomolecules

6. Viruses are on the “edge” of living and non-living because...

- A) They do not ingest nutrients or produce waste
- B) They evolve, but only in a host when a host is replicating their DNA
- C) They do not grow, but are assembled
- D) All of the above**

7. Antigens are described as...

- A) Y-Shaped proteins produced by lymphocytes in an immune response
- B) Y-Shaped proteins produced by macrophages in an immune response
- C) Cell markers that are involved in the stimulator of an immune response**
- D) Cell markers only found on pathogens



8. Which test tube indicates an obligate aerobe?

- A. 1**
- B. 2
- C. 3
- D. 1 and 2
- E. 2 and 3

9. Which test tube could indicate the type of bacteria we used in our streaking lab?

- A. 1
- B. 2
- C. 3
- D. 1 and 2**
- E. 2 and 3

10. Integration of viral 'DNA' into cell 'DNA' results in a structure named as:

- A) Viral genome
- B) Prophage**
- C) Virion
- D) Prion
- E) Bacteriophage

11. This integration of viral DNA into host

DNA is part of the...

- A) Lytic cycle
- B) Lysergenic cycle
- C) Lysogenic cycle**
- D) Lygenic cycle

12. Which best describes a vaccine?

- A) Virus antibodies that stimulate an adaptative immune response
- B) A weakened or inactivated virus that stimulates an adaptive immune response**
- C) An infusion of memory cells created due to safe exposure of a virus
- D) A dead virus that stimulates an innate immune response

13. The “secondary” line of defense includes:

- A) Inflammation, macrophages, fast speed**
- B) Infammation, lymphocytes, fast speed
- C) Fever, macrophages, slow speed
- D) Fever, lymphocytes, slow speed

Written:

1. Describe how **antibiotic resistance** develops and becomes an adaptation in a population. Relate this to the process of natural selection and other evolutionary concepts.
2. What is the difference between **lysogenic** and the **lytic cycle**? Do these differences relate to the symptoms/illnesses they can cause in humans?
3. Walk through the process of an immune response after exposure to a disease causing pathogen.
4. Why could it be considered irresponsible or unethical to **opt out** of getting vaccinations? (*Note: this does not include legitimate exemptions*)