

# Exam 1, BIOL467, Spring 2021

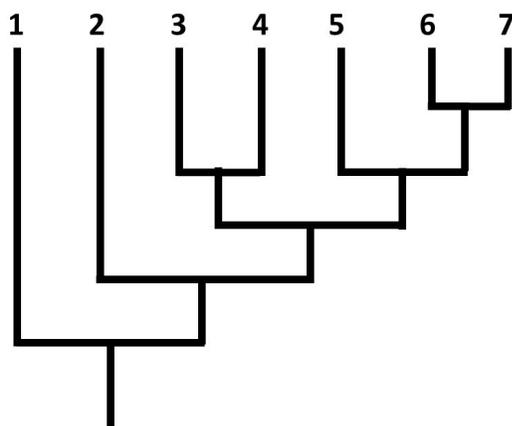
Started: Mar 4 at 9:21am

## Quiz Instructions

### Question 1

2.5 pts

The numbers on the phylogenetic tree below represent species. Which species pair is more closely related?



3 and 2

3 and 7

### Question 2

2.5 pts

*Wolbachia* is a maternally inherited microorganism that is found in the cells of a number of invertebrate species. We discussed *Wolbachia* in the context that it:

influences the DNA sequence variation in the mitochondrial genome but not the nuclear genome.

- it forces the phylogeny of the nuclear and mitochondrial genomes to match.
- has been demonstrated to have clinal variation in many species that harbor it.
- influences the DNA sequence variation in the nuclear genome but not the mitochondrial genome.

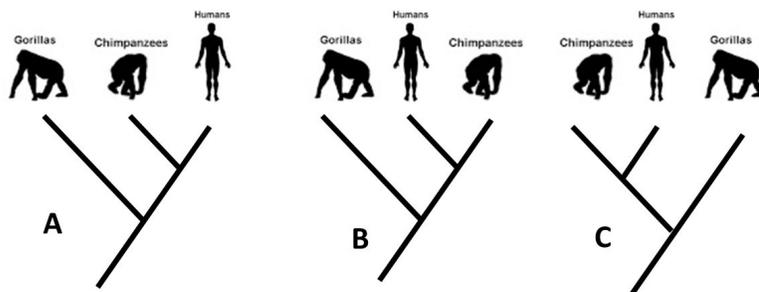
**Question 3****2.5 pts**

Which is an example of a vestigial trait:

- eye placement in alligators and hippos.
- goose bumps in humans.
- mammalian forearms of gophers.
- the redundancy of the amino acid code.

**Question 4****2.5 pts**

Which phylogeny of the relationship of gorillas, humans and chimpanzees is considered correct?



- B
- C
- A
- They are all the same.
- A and B are correct.

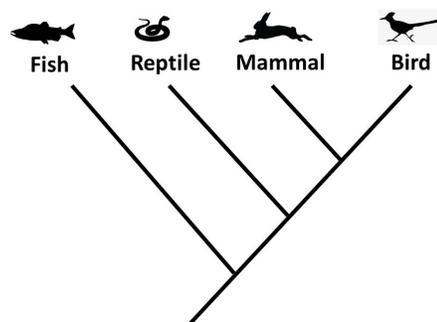
**Question 5****2.5 pts**

In the middle of the 20<sup>th</sup> century, this scientist championed the idea chance processes may be important to evolution, particularly on the molecular level.

- John Haldane
- Francis Galton
- Masatoshi Nei
- Th. Dobzhansky

**Question 6****2.5 pts**

Which statement is correct?



- The reptile is more closely related to the bird than the fish.
- The fish and the bird are not related.
- The reptile is equally related to the bird and the fish.
- The reptile is more closely related to the fish than the bird.

**Question 7****2.5 pts**

What is industrial melanism?

- change in the frequency of moths color morphology in response to pollution
- change in color of tree bark when covered in soot
- the root of ideas that made Darwin conceive of the theory of natural selection

**Question 8****2.5 pts**

The CCR5- $\Delta$ 32 genotype is:

- a less transmissible strain of HIV
- a gene that is functional in HIV but not HIV, so a good target for medication
- a deletion on the gene in humans that encodes for the recognition site of HIV
- a deletion in the HIV gene for virulence

**Question 9****2.5 pts**

This population geneticist thought about how variation is maintained in populations. For example, if individuals that are heterozygous have more offspring than either of the homozygotes then both alleles would persist in the population.

- Ronald A. Fisher
- John Haldane
- Masatoshi Nei
- Thomas Hunt Morgan

**Question 10****2.5 pts**

Who had similar ideas to Darwin's "Natural Selection" - and stimulated Darwin to publish.

- Masatoshi Nei
- Alfred Russel Wallace
- John Haldane
- Francis Galton

**Question 11****2.5 pts**

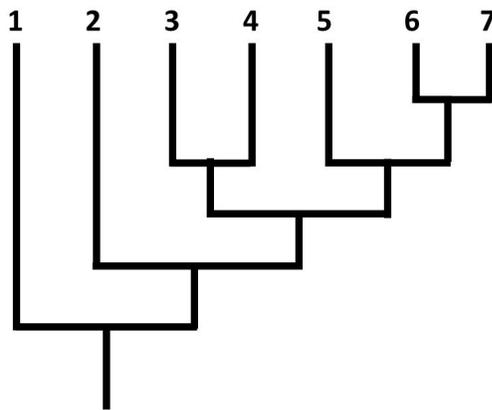
Beak length in the Soapberry Bug:

- is smaller in Central Florida, a response to introduction of an ornamental host that has flattened pods compared to the native host.

- has gotten larger in historic time (measured from museum specimens).
- is a trait that shows a normal distribution when the populations in Florida are combined.

**Question 12****2.5 pts**

The numbers on the phylogenetic tree below represent species. If a trait were shared by taxa 3 and 4 but not 2 and 5, would this trait be considered homologous or analogous?



- analogous
- homologous

**Question 13****2.5 pts**

In America, HIV was originally identified in populations of gay men. What other ways in which HIV is currently known to be transmitted?

- needle sharing
- blood transfusions
- all of these
- heterosexual sex

**Question 14****2.5 pts**

HIV-1 is believed to have been transmitted to humans from which of the following organisms?

- sooty mangabeys
- chimpanzees
- African green monkeys
- gorillas
- baboons

**Question 15****2.5 pts**

After a few months of stand-alone therapy of AZT to HIV patients, viruses showed resistance to AZT. This therapy was dropped in the 1980. Now we can find HIV strains that are susceptible to AZT can be found. What is the most likely explanation?

- There is no more AZT selective pressure applied to the viral population, the viral particles that are most effective in this environment are ones that only recognize the –OH binding site on nucleotides.

- Without AZT, the selection changes to benefit particles that accept both the –OH and the –N3 binding sites.
- The absence of AZT induces mutation to the susceptible condition.
- CCR5 receptors respond to the environment and no longer accept HIV in cells.

**Question 16****2.5 pts**

What is the biological definition of Evolution?

- Natural selection.
- Metamorphoses (change in body form over one's lifetime).
- Change in allele or genotype frequency.
- Differential reproduction.

**Question 17****2.5 pts**

Which is *not* essential for evolution to happen?

- Inherited variation.
- Natural selection.
- Differential reproduction.
- A population.

**Question 18****2.5 pts**

In which of the following regions is HIV infections at the highest frequency?

- China
- India
- United States
- United Kingdom
- Sub-Saharan Africa

**Question 19****2.5 pts**

The classic experiments of Luria and Delbruck on replicate plating of bacteria were designed to support:

- Mutations happen faster if selection pressure is applied.
- Mutations happen randomly in populations.
- Mutations were induced by the application of bacteriophages.
- Mutations happen in response to selection.

**Question 20****2.5 pts**

The redundancy of the amino acid code throughout most life indicates \_\_\_\_\_.

- secondary evolution

- analogy
- homology
- convergence

**Question 21****2.5 pts**

In the Ivory Coast, the frequency of military personnel with HIV infections went down in the 1990s. This was coincident with:

- screening blood bank to eliminate sources with HIV.
- educating safe sex practices in homosexual male populations.
- the health ministry handing out needles to drug users.
- encouraging condom use in sex workers.

**Question 22****2.5 pts**

The genetic code, which specifies the three-letter codons that specify particular amino acids, is said to be redundant because \_\_\_\_\_.

- non-synonymous substitutions are non-existent
- phenotypic variation is observed depending on the codon usage
- some amino acids are coded for by more than one codon cause synonymous substitutions
- it is observed in virtually all know organisms

**Question 23****2.5 pts**

He developed an early theory of evolution, and believed that there was constant spontaneous generation of organisms, and that each life form was on a route of greater complexity.

- Alfred Russel Wallace
- John Haldane
- Charles Darwin
- Jean Baptiste Lamarck

**Question 24****2.5 pts**

Which of the following statements best describes the rationale for applying the principle of parsimony in constructing phylogenetic trees?

- Parsimony tells you how long to draw the branches on the tree.
- Parsimony allows the researcher to "root" the tree.
- Parsimony assumes that similarity due to common ancestry should be more common than similarity due to analogy.
- Parsimony prioritizes analogous traits.

**Question 25****2.5 pts**

Humans have used the principles of evolution to produce many breeds of dogs. This is called:

- Artificial Selection
- Homologous characters
- Natural Selection
- Breeding Selection

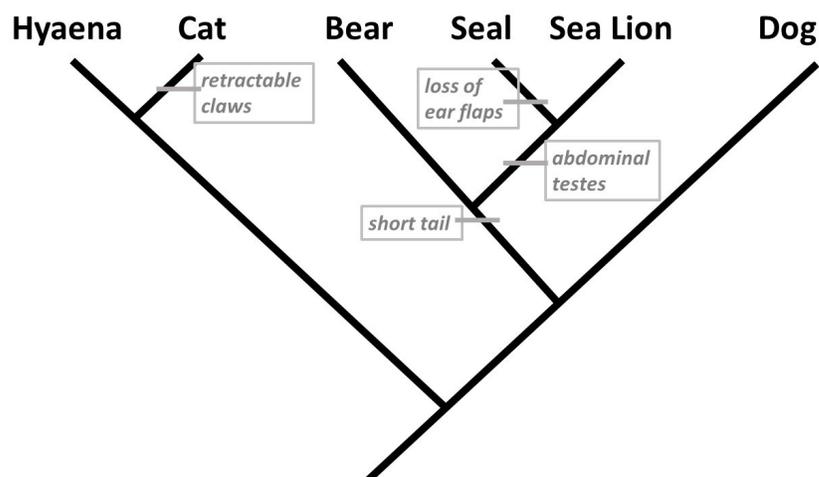
**Question 26****2.5 pts**

Charles Darwin's major contribution was:

- popularizing the idea of natural selection
- developing the idea of acquired traits
- the first formal theory of evolution
- pioneering artificial selection in dogs

**Question 27****2.5 pts**

Consider the phylogeny. What trait does the dog have?



- abdominal testes
- fixed claws
- short tail

**Question 28****2.5 pts**

What scientific evidence supports the idea that HIV first infected humans around 1930?

- A man in the Congo died of AIDS like symptoms in 1930.
- The first case in the United States was in 1959, the first HIV must have been before then.
- A regression of "time a HIV sample was collected" and "divergence from a common ancestor from HIV1 sequence" data identify the date near 1930 on the x-axis.
- The estimated time it would take for HIV to become resistant to AZT is about 85 years.

**Question 29****2.5 pts**

With regards to fitness of the organism that carries the mutation, most mutations are:

- lethal
- advantageous
- nearly neutral

**Question 30****2.5 pts**

In determining the evolutionary relationships of current species, one needs to \_\_\_\_\_.

- read along the tree tips: Species closer to each other are always more closely related.
- trace the branches and find the node that connects species to determine common ancestry.
- find the taxa that have the least number of branches between them.
- count the number of nodes between taxa in the tree- those with fewer nodes are closer related.

**Question 31****2.5 pts**

Which type of mutation is most likely to persist in a population?

- a frame shift (indel) mutation.
- a synonymous point mutation.
- a nonsense (stop codon) mutation.
- a replacement point mutation.

**Question 32****2.5 pts**

The AIDS phase of an HIV infection starts:

- during a long period where an infected person feels relative well
- when the infected person's immune system collapses
- when a person is first infected with the HIV retro-virus

**Question 33****2.5 pts**

Which of the following represents a pair of analogous structures?

- the wing of a dove and the wing of an ostrich.
- the forearm of a human and the forearm of a gopher.
- the streamline body of a shark and of a penguin.
- the amino acid code of a human and the amino acid code of a fly.

**Question 34****2.5 pts**

The patterns of phenotypes an individual may develop upon exposure to different environments is called its \_\_\_\_\_.

- predictability norm
- response norm
- reaction norm
- expression norm

**Question 35****2.5 pts**

Identify the 20<sup>th</sup> century English biologist and cousin of Charles Darwin, studied innate differences between individuals in a population.

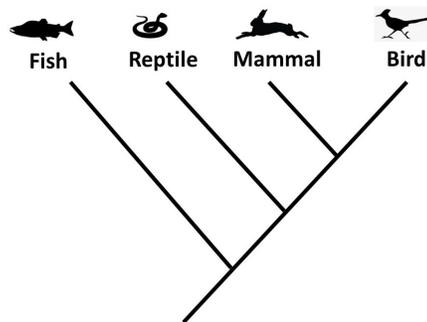
- Alfred Russel Wallace
- Francis Galton
- Ronald Fisher
- Thomas Hunt Morgan

**Question 36****2.5 pts**

The human ear is a curious thing. We have a lot of muscles attached to our ears, but only some of us can actually wiggle them. However, many great apes and monkeys move their ears to pick up sounds in different directions. This means that ears in humans are:

- terminated
- redundant
- vestigial
- homologous

**Question 37****2.5 pts**



Which statement is correct?

- The reptile is more closely related to the mammal than the bird.
- The reptile is more closely related to the bird than the mammal.
- The reptile is equally related to the bird and the mammal.

### Question 38

2.5 pts

It has been noted that HIV infection frequencies are lower in western Africa (say, Ghana and Togo) than southern Africa (say, Botswana). What observation might lead to these lower infection frequencies?

- There is a high frequency of humans with the  $\Delta 32$ -CCR5 genotype in humans which give those people some resistance to HIV infection.
- Education programs about safe sex targeting gay males have lowered the incidence of HIV infections in western Africa.
- The major transmission mode in western Africa is needle sharing, and extensive clean needle campaigns have successfully lower incidence of the disease.
- The major infection of HIV in western Africa is HIV2, which has a lower transmission frequency than the world-wide epidemic.

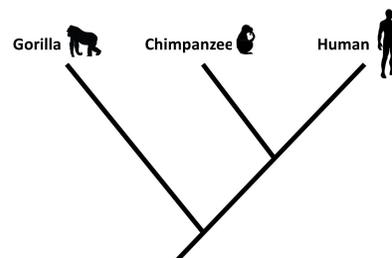
**Question 39****2.5 pts**

Which is true about different strains of HIV?

- HIV is an infection that is in higher frequency in gay men than any other subset of humans throughout the world.
- HIV-2 probably was transmitted to humans from Chimpanzees
- Strains of HIV-1 efficiently transmit from host to host but are not as lethal as ones strains of HIV-2.
- HIV-1 is more efficient at transmitting between cells and are more lethal than HIV-2, meaning there is a positive correlation between transmission and lethality.

**Question 40****2.5 pts**

Did humans evolve from chimpanzees?



- no
- yes

Saving...

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